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PD-ABA-787

AGENCY FOR INTERNATIONAL DEVELOPMENT PROJECT DATA SHEET		1. TRANSACTION CODE <input checked="" type="checkbox"/> C A = Add C = Change D = Delete	Amendment Number 1	DOCUMENT CODE 3
2. COUNTRY/ENTITY Indonesia		3. PROJECT NUMBER 497-0347		
4. BUREAU/OFFICE Asia		5. PROJECT TITLE (maximum 60 characters) Small Scale Irrigation Management		
6. PROJECT ASSISTANCE COMPLETION DATE (PACD) MM DD YY 03 31 95		7. ESTIMATED DATE OF OBLIGATION (Under "B" below, enter 1, 2, 3, or 4) A. Initial FY 85 B. Quarter 4 C. Final FY 93		

8. COSTS (\$000 OR EQUIVALENT \$1 =)						
A. FUNDING SOURCE	FIRST FY			LIFE OF PROJECT		
	B. FX	C. L/C	D. Total	E. FX	F. L/C	G. Total
AID Appropriated Total	5,565	13,050	18,615	18,455	12,794	31,249
(Grant)	(2,450)	(1,050)	(3,500)	(17,684)	(3,527)	(21,211)
(Loan)	(3,115)	(12,000)	(15,115)	(771)	(9,267)	(10,038)
Other U.S.						
1						
2						
Host Country		2,000	2,000		13,500	13,500
Other Donor(s)				2,660	10,237	12,897
TOTALS	5,565	15,050	20,615	21,246	36,400	57,646

9. SCHEDULE OF AID FUNDING (\$000)									
A. APPROPRIATION	B. PRIMARY PURPOSE CODE	C. PRIMARY TECH. CODE		D. OBLIGATIONS TO DATE / LOP TO DATE		E. AMOUNT APPROVED THIS ACTION		F. LIFE OF PROJECT	
		1. Grant	2. Loan	1. Grant	2. Loan	1. Grant	2. Loan	1. Grant	2. Loan
(1)				7,000	43,000	14,211	(32,962)	21,211	10,038
(2)									
(3)									
(4)									
TOTALS				7,000	43,000	14,211	(32,962)	21,211	10,038

10. SECONDARY TECHNICAL CODES (maximum 6 codes of 3 positions each)						11. SECONDARY PURPOSE CODE	
12. SPECIAL CONCERNS CODES (maximum 7 codes of 4 positions each)							
A. Code							
B. Amount							

13. PROJECT PURPOSE (maximum 480 characters)

To increase the capacity of irrigation agencies and farmers' groups to implement sustainable irrigation systems in selected Eastern Islands of Indonesia.

14. SCHEDULED EVALUATIONS				15. SOURCE/ORIGIN OF GOODS AND SERVICES			
Interim	MM YY	MM YY	Final	MM YY	MM YY	MM YY	MM YY
	07 88			10 94			
				<input checked="" type="checkbox"/> 000 <input checked="" type="checkbox"/> 941 <input checked="" type="checkbox"/> Local <input type="checkbox"/> Other (Specify)			

16. AMENDMENTS/NATURE OF CHANGE PROPOSED (This is page 1 of a _____ page PP Amendment.)

This amendment modifies the project purpose, reduces the USAID and GOI contributions to the project, includes a new contribution by OECF Japan, reduces the physical outputs to the minimum required to meet the project objectives and streamlines implementation in order to meet the project purpose by the revised PACD of March 31, 1995.

17. APPROVED BY	Signature	Charles F. Weden		18. DATE DOCUMENT RECEIVED IN AID/W, OR FOR AID/W DOCUMENTS, DATE OF DISTRIBUTION
	Title	Director, USAID/Indonesia		
			Date Signed	MM DD YY
				01 24 94
			MM DD YY	

SMALL SCALE IRRIGATION MANAGEMENT PROJECT
497-0347
PROJECT PAPER AMENDMENT NO. 1

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LIST OF ACRONYMS

ADB	-	Asian Development Bank
BAPPENAS	-	National Development Planning Board
CASER	-	Centre for Agro-Socioeconomic Research
DGWRD	-	Directorate General of Water Resources Development
DIR	-	Director's Implementation Review
DPU	-	Provincial Public Works
EOPS	-	End of Project Status
FY	-	Fiscal Year
GOI	-	Government of Indonesia
ISF	-	Irrigation Service Fee
ISPAN	-	Irrigation Support Project for Asia and the Near East
LP3ES	-	Institute for Social and Economic Research, Education and Information (NGO)
NGO	-	Non Government Organization
NTB	-	West Nusa Tenggara
NTT	-	East Nusa Tenggara
OECF	-	Overseas Economic Cooperation Fund, Japan
O&M	-	Operation and Maintenance
PACD	-	Project Assistance Completion Date
P2AT	-	Groundwater Development Project
PJR	-	Project Justification Report
PRIS	-	Provincial Irrigation Services, under DPU
PSC	-	Personal Services Contract
PU	-	Public Works/Ministry of Public Works
PVO	-	Private Voluntary Organization
SSIMP	-	Small Scale Irrigation Management Project
SulSel	-	South Sulawesi
TA	-	Technical Assistance
USAID/A.I.D.	-	United States Agency for International Development
WUA	-	Water User Association
WUAO	-	Water User Association Organizer
WB	-	World Bank
YIS	-	Yayasan Indonesia Sejahtera (NGO)

PROJECT AUTHORIZATION

AMENDMENT NUMBER 1

Name of Country: **Indonesia**

Name of Project: **Small Scale Irrigation Management Project**

Project Number: **497-0347**

1. Pursuant to Section 103 of the Foreign Assistance Act of 1961, as amended, the Administrator of the Agency for International Development authorized the Small Scale Irrigation Management Project (497-0347) for Indonesia on August 7, 1985. That authorization is hereby amended as follows:

a. Paragraph 1. is modified by deleting the words and figures

"Forty Three Million United States Dollars (\$43,000,000) in loan funds and Seven Million United States Dollars (\$7,000,000) in grant funds",

substituting therefore

"Ten Million Thirty Eight Thousand United States Dollars (\$10,038,000) in loan funds and Twenty One Million Two Hundred Eleven Thousand United States Dollars (\$21,211,000) in grant funds."

b. Paragraph 1. is modified to delete the last sentence and replace it with the following:

"The planned life of this Project is nine and a half years from the date of initial obligation, except as USAID may otherwise agree in writing."

c. Paragraph 2. is modified to delete the first sentence and replace it with the following:

"The Project purpose is to increase the capacity of irrigation agencies and farmers' groups to implement sustainable irrigation systems in selected Eastern Islands of Indonesia."

2. Except as amended herein, the Project Authorization dated August 7, 1985 is unchanged and, as amended, remains in full force and effect.



Charles Wedgn
Director
USAID/Indonesia

1/24/94

Date

Clearances:		Date:
AEE:RNishihara	(in draft)	10/28/93
PPS:VMiedema	(in draft)	11/23/93
LA:TRiedier	<u>TR</u>	<u>12/20/93</u>
CM:PShirk	<u>N/A</u>	_____
FIN:GEidet	<u>GE</u>	<u>1/4/93</u>

f

i. Project Summary

1.1. Background

The Small Scale Irrigation Management Project (SSIMP) was obligated in August 1985 and was planned as a eight year project finishing on September 30, 1993. The project's design reflected the Government of Indonesia's recent shift in policy from achieving self-sufficiency in rice to development of the Eastern Islands which are generally more suited to more diversified agricultural production. Since the water resources of the eastern islands are quite different from those of Java, where most irrigation development has occurred, and the institutions of these islands are less experienced, the project was designed to strengthen provincial institutions and to support more decentralized decision making. Additionally, a major effort to increase farmer participation in development and management of irrigation systems was included, together with several other policy issues.

1.2. Initial Project Focus

The goal of SSIMP is to expand agricultural production by diversifying production, increasing cropping intensity and improving water reliability. The project purpose was originally stated as: to design and apply irrigation technologies and management systems in support of diversified cropping patterns in selected Eastern Islands.

The principal outputs planned were the design, construction and operation and maintenance of 10 surface irrigation systems in two provinces and development and implementation of groundwater irrigation programs in three provinces. The implementation of a Water User Association Organizer (WUAO) program is to establish viable farmers' organizations at all of the project sites. The Provincial Irrigation Services (PRIS) were also to develop site selection criteria, conduct analyses of sites to establish their feasibility, and develop management and maintenance plans and performance monitoring systems. Other outputs include trained provincial level staff and special studies dealing with policy, management and technical issues.

From the outset the project faced difficulties. The Technical Assistance (TA) team was not fielded until two years into implementation due to contracting issues. An over-ambitious design and unrealistic implementation schedule, combined with unavoidable implementation problems, has hindered the implementation of the project since then. The result is that, although substantial progress has been made in some areas, the project is far from meeting its original physical targets.

The purpose of this amendment is to modify the project purpose to more accurately reflect the increased concentration on institutional development and policy work, to scale down the physical outputs to the minimum required to meet the project purpose, and to streamline implementation in order to meet the project purpose by March 31, 1995, with a reduced USAID management staff requirement. The original and

revised purposes, outputs, inputs and project assistance completion dates (PACD) are summarized in Figure 1, page 3.

1.3 Revised Project Purpose and End of Project Status

The purpose and end of project status indicators (EOPS) are revised to reflect implementation progress and increased emphasis on policy development and institution building within the implementing agencies of the GOI.

The revised Project Purpose is:

To increase the capacity of irrigation agencies and farmers' groups to implement sustainable irrigation systems in selected Eastern Islands.

Evidence of achievement of the project purpose will include the following end-of-project indicators:

- Directorate General of Water Resources Development (DGWRD) will have begun to apply policies and improved policy implementation procedures developed under SSIMP in its other irrigation projects;
- Sustainable surface and groundwater irrigation systems will be operating in three provinces and demonstrating principles underlying this project;
- Water Users Associations (WUAs) will be participating in design, construction, operation and maintenance of medium scale surface and small scale groundwater irrigation systems;
- Non Government Organizations (NGOs) will have developed the capability to support WUAs in the provinces; and
- Provincial irrigation departments and private contractors will be using better design and construction methods in their surface and groundwater projects.

1.4 Revised Funding, PACD and USAID Management Requirements

The revised funding requirement is \$31.2 million of which \$10.0 million is loan and \$21.2 million is grant financed. These funds have already been obligated.

The original PACD of September 30, 1993 has been extended by six months to March 30, 1994 for the surface water program. The original extension allowed the construction of the second surface irrigation site and the initial operations and maintenance work at both sites. The second PACD extension will enable completion of

Figure 1

Small Scale Irrigation Management Project
Comparison of Original and Revised Objectives

Goal: To expand agricultural production by diversifying production, increasing cropping intensity and improving water reliability (no change)

	Original	Revision
Purpose:	To design and apply irrigation technology and management systems in support of diversified cropping patterns in selected Eastern Islands.	To increase the capacity of irrigation agencies and farmers' groups to implement sustainable irrigation systems in selected Eastern Islands of Indonesia.
Outputs:	<p>Design, construction and operation of 10 surface systems (24,700 Ha).</p> <p>Groundwater irrigation in 3 provinces (5200 Ha).</p> <p>WUAO program at all sites.</p> <p>18 Masters level trainees. 24 workshops. 10– 17 Special Studies plus site profiles.</p>	<p>Design of 7 systems. Construction and operation and maintenance of two surface systems with A.I.D. funding and one system with OECF funding (7150 Ha). O&M demonstration program at 1 site, and possible early O&M at Kalimantanong II. Groundwater irrigation in 3 provinces (450 Ha USAID, 600 Ha OECF).</p> <p>WUAO program at all sites suitable for national replication and institutionalization.</p> <p>27 Masters level trainees. In–country training for over 300 staff. Ten Special/Policy Studies plus ten site profiles and 3 environmental analyses.</p>
Inputs:	<p>A.I.D. \$50 million G.O.I. \$40 million</p>	<p>A.I.D. \$31.2 million G.O.I. \$13.5 million OECF \$12.9 million</p>
PACD	9/93	3/95

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all construction activities and enable an expansion of O&M activities throughout the Awo and Kalimantan II command areas.

The Project Paper called for a USAID project management staff of two USDH staff and 4 FSN professionals. From June 1992 the project has been managed by one US Direct Hire (1/2 time) and two FSN professionals. Additionally a US hire PSC has assisted in the implementation of the policy agenda. The reduced USAID management staff availability and the increasing USAID oversight requirements have been taken into account in the redesign.

1.5 Policy Agenda

The Director's Implementation Reviews of 1990 and 1991 determined that the project should be redirected to have a much greater policy emphasis than originally designed. This change is reflected in the SSIMP Strategy Statement of August 1991. This decision was based on the implementation experience and the need to make policy makers aware of issues, such as water resource development in the Eastern Islands, where policy decisions are needed or policy implementation needs to be strengthened.

The four principal policy areas are as follows:

a. Farmer Organizations

While the GOI has adopted a policy that farmer organizations should be established in all irrigation systems, it has not established a suitable mechanism for establishing those organizations. The Sederhana Reassessment Study found that formal organizations as outlined in the Presidential Decree do not exist in many schemes, although traditional organizations perform many water management functions. Through SSIMP, NGOs are carrying out Water User Association Organizer (WUAO) programs at surface and groundwater irrigation sites. Results from these programs will be the subject of a policy dialogue with the GOI with the assistance of a PSC irrigation program advisor.

b. Sustainable Operations and Maintenance

Related to the farmer organization program is the need for instituting a locally financed operations and maintenance program. The World Bank is taking the lead in developing a pilot Irrigation Service Fee program which may be instituted countrywide. USAID is supporting this program through a special study which will document examples of farmer participation in O&M and in planning for implementing ISF at SSIMP sites.

c. Decentralization

One of the major emphases of SSIMP has been to promote decentralized

irrigation services. This involves devolving functions, such as design and contracting, which were formerly held at the central level to provincial level authorities. Also, greater responsibility for operations and maintenance is being provided to sub-provincial level staff and certain O&M responsibilities are being assumed by farmers themselves. An important aspect of this process is building up the capability of local officials and farmers to handle these responsibilities. Under SSIMP, TA staff have developed and are assisting on the implementation of a training plan with provincial level GOI staff to strengthen staff in key areas.

d. Water Resource Policies

As competing demands for Indonesia's limited water resources increase, the GOI will need to make well informed decisions regarding water resource allocations among competing uses. Additional information is needed, for example, on investment trade-offs between irrigation development in the Eastern Islands versus efforts to intensify existing irrigable land and/or reduce losses of productive irrigable land in increasingly urbanized Java. The irrigation program advisor will assist BAPPENAS and the DGWRD in preparing a more specific policy agenda and in synthesizing available data which can be input for the policy decision process.

A PSC irrigation policy advisor has been recruited to work with the DGWRD and BAPPENAS in the formulation of an irrigation and water resources policy agenda, conducting policy analyses, assisting in analysis of investment decisions and bringing forward policy issues raised by the SSIMP field program. This position is key to assuring that the lessons learned under SSIMP are brought to the attention of policy makers and discussed in a policy framework.

The implementation schedule of policy studies is shown in Figure 2, page 6.

1.6. Other Donor Coordination

Japanese cooperation has been a key feature of this project. The OECF is financing the Tiu Kulit dam in NTB which was designed under SSIMP. OECF is also conducting a groundwater development project in cooperation with USAID in NTT. Consultants from OECF have been fielded and construction of the Tiu Kulit project is proceeding and major groundwater work is underway.

A key feature of the Japanese program is that they have agreed to adopt the USAID/SSIMP approach in their components of the project. This includes the intensive approach to farmer participation as well as groundwater site selection criteria, surface irrigation design standards, etc. Additionally, the GOI has contacted OECF as well as other donors for financing of those irrigation sites designed under the project but which will not be financed by USAID. OECF has indicated interest in funding two of the

Policy Agenda

Implementation Schedule

Policy Objective	Project Actions/Outputs	Responsibility	Location	When
1. Strengthened Farmer Organizations	<ul style="list-style-type: none"> - WUAO Program for Kal. II, Awo & Tiu Kulit - WUAO Program for SulSel G.W. program - WUAO Program for NTT - Sederhana Study - Evaluation of farmer organization Program and follow-up policy dialogue on recommendations 	LP3ES	SulSel/NTB	91-95 (on-going)
		Local Consultant YIS ISPAN ISPAN/PSC	SulSel NTT Java/NTB/SulSel NTB/NTT/SulSel	92-93 (completed) 91-92 (completed) completed 92 (completed)
2. Sustainable O&M	<ul style="list-style-type: none"> - Natl. Pump Irrigation Study and follow-up Seminar - O&M Study and follow-up seminar - O&M Program <ul style="list-style-type: none"> - Program at Kal. II & Awo - Program at neighboring site - Special Study on Crops and Cropping for Groundwater - Program of agricultural intensification in NTT - Crop Diversification and Marketing Study - Final Report Evaluation and follow-up policy dialogue on recommendations - Development of Irr. Services Fee (ISF) - Assessment of ISF program in Indonesia 	ISPAN/CASER/ Ford	National	91-92 (completed)
		T.B.D.	SulSel/NTB	94/95 (plan)
		TA	NTB/SulSel	92-95 (on-going)
		TA	NTT	91 (completed)
		TA	NTT	92-93 (on-going)
		TA	NTB/NTT/SulSel	92 (completed)
		T.B.D.	NTB/NTT/SulSel	94
		TA	NTB/SulSel	93
		T.B.D./PSC	Java/SulSel	94
		3. Decentralized Irrigation Services	<ul style="list-style-type: none"> - Training Needs Assessment - Overseas training program - In-country and on-the-job training program - Staffing Assessment for NTT - Policy Dialogue concerning staffing for Eastern islands - Environmental Assessments of Project sites - Lessons Learned Special Study and follow-up policy dialogue - Study to assess turnover program and assess potential for farmer management at SSIMP sites 	TA
USAID/DGWRD	Thailand			Phase I - completed Phase II - cancelled
TA/DGWRD	NTB/NTT/SulSel			Phase I - completed Phase II - on-going
TA	NTT			91 (completed)
USAID	NTT			91 (completed)
TA	NTT/NTB/SulSel			91 (completed)
TA	NTB/NTT/SulSel			91 (completed)
PSC/T.B.D.	NTB/NTT/SulSel			94/95
4. Improved Water Resource Policies	<ul style="list-style-type: none"> - Irrigation and Water Resources Research Plan, ARSSP funding - Water Resources Investment Study - Follow-up Policy Dialogue - Water User Association Assessment 	Winrock	Jakarta	completed
		Winrock/PSC	Jakarta	92 (completed)
		USAID	Jakarta	92-93
		ISPAN	TBD	93-94

T.B.D. = To be Determined

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surface irrigation sites designed under SSIMP as well as continuing groundwater development work.

2. Project Amendment Rationale

This project amendment is the result of a number of factors, including a shift in emphasis from infrastructure development to institutional development and policy concerns, a reduction in USAID and GOI funding, delays in project implementation, and a requirement to reduce the USAID staff management time imposed by complex projects.

Although other donors have made substantial commitments to the irrigation sector, this project still maintains its relevance. In fact there is even a greater policy commitment by the GOI to the development of irrigation in Eastern Indonesia than in 1985 when the project was obligated. This is due to the requirement to meet increasing food demands and the loss of irrigated land in increasingly urbanized Java. The project is instituting new technologies for both surface and groundwater irrigation development and in strengthening the agencies involved in selected Eastern Islands.

The Mission and GOI will meet their commitments through modifications to the project which are acceptable to all parties. This project amendment reduces the project budget, includes OECF as a co-financier, streamlines the management of the project, shifts the emphasis from infrastructure to institutional development and places greater emphasis on policy development.

As a result of the Director's Implementation Review (DIR) held in 1989, a Strategy Statement was prepared. This document presented a revised implementation schedule and budget for achieving EOPS by the PACD. The strategy proposed changes in the project including a greater emphasis on policy development, scaling down of the construction of surface and groundwater sites, an improved GOI management system, and improved contracting and Mission management procedures.

As a result of the DIR held in 1990, further reductions in the construction of surface and groundwater sites were proposed and the budget was further revised and reductions in A.I.D. funding were identified. An Action Memo (see Annex C) was approved to proceed with the planning and implementation of the surface water program contingent upon meeting certain critical dates relating to the implementation of the program. A second Action Memo (see Annex D) set a timetable for phasing down the groundwater component and established critical dates for its implementation. The Mission has monitored these critical dates and has acknowledged progress in meeting these dates. Annex E shows the progress in meeting these dates.

The rationale for amending the project is to document the extensive changes that have evolved. These changes can be summarized as follows:

- Construction of ten surface irrigation systems (19,500 ha) is reduced to

construction of two sites (5350 ha) with USAID funding and OECF funding for one additional site (1800 ha). USAID funding for preparation of designs and assistance in obtaining other donor funding for the four other sites which have proven feasible.

- Reduction in the planned groundwater development from 5200 ha to 450 ha under USAID funding and 0 ha under OECF funding.

- Greater emphasis on institutional development, particularly in-country training and the development of improved management systems.

- Greater emphasis on farmer participation with the objective of developing a model suitable for national replication and institutionalization.

- Cooperation with the OECF which will provide \$12.9 million in funding. USAID will fund the WUAO programs at Tiu Kulit and at the NTT groundwater sites (Both OECF funding).

- Reduction of the A.I.D. funded portion of the Project budget from \$50 to \$31.2 million and reduction of the GOI funded portion of the budget from \$39.7 to \$13.5 million (GOI portion will represent 30% of total project cost).

By March 31, 1995, construction of all groundwater sites and the three surface water sites (Kalimantong II, Tiu Kulit and Awo) will be completed. The Project will install O&M systems at all of the USAID funded surface and groundwater sites. The Project will also develop procedures and provide training and demonstrations to ensure that maintenance systems developed under the project will be sustained. The second PACD extension to March 31, 1995 will allow the project to test the O&M for at least two cropping seasons and strengthening either the established farmers' organizations and O&M staff.

3. Project Description

3.1 Project Components and Outputs

3.1.1 Improved Irrigation Technologies

The technical assistance team has worked closely with Provincial Irrigation Service (PRIS) staff and local engineering consultants to improve the quality of irrigation designs and to assure that these designs are appropriate to local conditions, taking into account engineering concerns as well as economic, social and environmental concerns. PRIS has completed studies of ten surface irrigation sites. Of these, final designs have been prepared for six systems, one system requires further final design work, which would be carried out with GOI or another donor funds prior to construction, and three systems were found to be not feasible based on technical considerations. Three of the foregoing projects are scheduled for construction in 1992 (2 with USAID funding and 1

**SSIMP PHASE I SURFACE WATER SUBPROJECTS
STATUS OF DESIGN ACTIVITIES as of DECEMBER 1992**

Activity	Awo	Salomekko	Ponre -Ponre	Selli Coppobulu	Raja Telaga	Tiu Kulit	Kalimantong	Gapet	Batujai Kiri	Surabaya
<u>Data Collection :</u>										
Rainfall and Stream flow Equipment	•	•	•	•	•	•	•	•	•	•
Hydrologic Data	o	o	o		o	o	o	o	o	o
Rapid Rural Irrigation Appraisal	•	•	•	•	•	•	•	•	•	•
Household/Farm Survey	•	•	•	1)	1)	•	•	•	•	•
<u>Study Reports/Certification :</u>										
Environmental Baseline Investigation	•	•	•	1)	1)	•	•	•	•	1)
Environmental Assesment Report	•	•	•			•	•	•	•	
Project Justification Rept.	•	•	•	2)	2)	•	•	•	•	2)
DGWRD Certification	•	•				•	•	•		
<u>Local Consultant Design :</u>										
L.C. Preliminary Design	•	•	•	•						
L.C. Final Design	•	•	•			•	•	•	•	
Contract Documents	•	•	•			•	•	•	•	
<u>Tendering/Construction :</u>										
Prequalification	•					•	•			
Invitation/Issue Documents	•					•	•			
Award of Contracts	•					•	•			

• = Completed
o = In Progress

1) = Activity was Initiated then stopped
since project found to be infeasible

2) = Loan comprehensive report proposed to
complete project activity

with OECF funding). The remaining four sites are being considered for funding by other donors. Figure 3 on page 9 provides the status of these outputs.

In addition to improving design technologies, TA staff will work with PRIS staff and staff from other local government agencies and WUAs to assure that completed systems are sustainable. In addition to preparation of manuals and the training of O&M staff and farmers for O&M through the WUAO program, demonstration sites will be developed by PRIS with TA assistance where farmers in the new systems will observe and take part in proper water management practices. Additionally, a special study will be carried out to review the performance under the Irrigation Service Fee (ISF) program and design the ISF program for SSIMP sites. This combination of activities, carried out prior to the PACD along with a written commitment from the GOI to include O&M funding in the annual budget process after the PACD, will help to assure the sustainability of the irrigation systems constructed under the project.

The project has carried out hydrogeological studies, exploratory drilling and production drilling at sites in NTB, NTT and SulSel. Additionally, sites were developed in these three provinces to test and demonstrate the technology being used. Groundwater work was phased out in NTB province in 1991 and distribution systems will be constructed in SulSel and NTT where productive wells were developed in GOI FY1991/92. It is expected that in total 51 sites serving 450 ha will be developed with USAID funding.

3.1.2 Strengthening Provincial Public Works Management

In addition to the physical outputs the project will have a number of outputs focused on strengthening Provincial Public Works management capabilities. Probably more important than the physical designs themselves is the process by which these designs were prepared. Provincial Public Works offices contracted with private local consultants for the design work. The TA contractor worked closely with PU in preparing scopes of work and in monitoring the progress of the local consultants. This is the first time many of these local firms have had this degree of responsibility and have prepared designs of this level of sophistication. The process has required close cooperation between PU, the local consultants and the TA team. This process will be continued under the remaining life of the project with activities shifting to supervision of construction and initiation of operations and maintenance.

One of the major outputs of the groundwater component has been the establishment of the groundwater development office in SulSel. This office was established in 1988 in fulfillment of an original Condition Precedent of the Project. Other outputs include the training of PU staff as detailed in Annex F, the establishment of site selection criteria for groundwater, preparation of site profiles and Project Justification Reports, preparation of Environmental Analyses, establishment of water users groups and the preparation of operations and maintenance manuals.

3.1.3 Beneficiary Participation

The PRIS offices involved in the Project are expected to continue to include farmers in the entire process of irrigation development. Farmers have been involved in the preparation and review of designs of surface irrigation systems. A process of "design socialization" has been developed whereby farmers review the proposed designs and make suggestions for design improvements. Negotiations are then held between the WUAs and PRIS staff to evaluate the farmers' suggestions and determine which will be incorporated. Farmers will be involved in the construction process through participating in construction, in providing local materials, and in participating in construction reviews. As construction is completed farmers will assume control of the tertiary blocks of irrigation systems and will be responsible for the operation and maintenance of these units. Project funded TA will provide training and assist in the coordination of these activities.

3.1.4 Policy Studies

Policy studies and the services of a water resources policy advisor are important to meeting the overall objectives of the Project. It is critical that the lessons learned at the field level be transmitted to policy makers. Policy studies and associated follow-up activities such as workshops, briefings, etc. are useful in disseminating results and raising awareness of policy makers. Local institutions in cooperation with Project funded TA have carried out a number of policy studies that are intended to guide the policy formulation and implementation process. Additional studies will be designed and carried out by the GOI with the assistance of the policy advisor. A list of policy studies and their implementation status is shown in Figure 4, page 12.

3.2 Project Inputs

Under the revised project, USAID funds totaling \$31.2 million (\$10.0 million loan and \$21.2 million grant) will provide technical assistance, construction funding, commodity procurement, training, and special studies as follows:

- Over 50 person years of long-term technical assistance in engineering, social science, agricultural economics, agronomy to assist in the development of medium scale surface irrigation systems and small scale groundwater irrigation systems in Eastern Indonesia.
- funding for the services of NGOs to implement the farmer participation program at surface and groundwater sites.
- funding for construction of 2 surface irrigation sites and 51 groundwater demonstration sites.
- training of 27 GOI staff at the Masters degree level, short term training provided to 12 staff and in-country training provided to over 300 staff and farmer beneficiaries.

Figure 4

Summary of SSIMP Studies, Workshops and Evaluations

No.	Item	Budget Line Item (\$)		Status	Contractor
		Special Study	TA		
1.	Design of Management System and WUAO Training of SSIMP	19,922		Completed Dec. 1986	LP3ES
2.	SSIMP Workshop	18,771		Completed Feb. 1988	ISPAN
3.	Mid-Term Evaluation of the SSIMP	90,876		Completed May, 1989	ISPAN
4.	Mid Term Workshop for SSIMP	32,527		Completed Feb. 1990	ISPAN
5.	Environmental Assessment Studies:		100,000		
	Awo			Completed	Harza
	Salomekko			Completed	Harza
	Tiu Kuliit			Completed	Harza
	Kalimantong II			Completed	Harza
	Gapet			Completed	Harza
	Batujai Kiri			Completed	Harza
	Ponre-Ponre			On-going	Harza
6.	Reassessment of Sederhana and HPSIS System	173,269		Completed Sept. 1991	ISPAN, PPA
7.	Study of Lessons Learned SSIMP Phase I		x	Completed Sept. 1991	Harza
8.	Private Sector Capability to Support Groundwater Development in SSIMP Areas		x	Completed Dec. 1991	Harza
9.	Recommended crops for well irrigation system in NTT, NTB and SulSel provinces		x	Completed Dec. 1991	Harza
10.	National Pump Irrigation Policy Study	341,355		Draft report Feb. 1992	ISPAN, CASER
11.	Water Resources Investment Strategy Study	226,000		Feb. '92	Winrock International
12.	Design of a Research Plan for Irrigation and Related Water Resources Policy Formulation in Indonesia		ARSSP	Jun. '91	RAD International Inc. KCNobe and RAYoung
13.	WUAO Evaluation - Surface Water - Groundwater	109,000		July-Sept 1992	NA
14.	O&M Studies	180,000		Oct-Dec '92	NA
15.	Water Requirement Studies NTT, NTB & SulSel	150,000		Jan-Mar '93	NA
16.	Final workshop		x	Planned	Harza
17.	SSIMP Final Evaluation	120,000		Planned	

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- procurement of project vehicles, computer and office equipment and field equipment.
- funding of ten special studies.

The GOI will contribute \$13.5 million, \$11.5 million in cash and \$2.0 million in-kind to support the following:

- salaries, per diem and travel costs of GOI counterparts participating in the Project.
- support to the TA team (office space, guards, drivers, fuel, electricity, office furniture, etc.)
- procurement of right-of-way for the irrigation systems and donations of land from the farmers for tertiary works.
- fifty per cent of the contract costs of surface and groundwater sites developed under the project.
- provision for all taxes and duties.

Although the GOI contribution is reduced, it still represents 30% of the total USAID/GOI project. Additionally the GOI is providing an estimated \$0.3 million to the OECF/GOI project and will provide additional funding for the construction of the remaining 4 sites where other donor funding is being sought.

4. Implementation Plan

Figure 5 summarizes the overall implementation plan of SSIMP from January 1992 through the PACD.

4.1 Technical Assistance

For the period March 1, 1992 through the PACD, March 31, 1995, Technical Assistance will be provided by an institutional contractor. Under this Direct AID contract 12 person years of expatriate and 27.5 person years of local technical assistance will be provided to support supervision of construction of surface sites, operations and maintenance activities, and support for groundwater development. Annex E includes the budget, organization plan and staffing plan for the Phase II TA. In addition a PSC water resources policy advisor will be the key staff member implementing the policy agenda.

4.2 Surface Irrigation Program

Construction at two sites (Kalimantong II and Awo) are carried out under host country contracts (three contracts per site) with USAID reimbursing 50% of contract costs exclusive of taxes. USAID also funds the host country contract for the WUAO program at these two sites and the Tiu Kulit site. The GOI supervises construction with their own staff augmented by construction management staff provided under the TA contract. O&M activities involve PRIS staff assisted by O&M staff under the TA contract. O&M demonstration sites was identified in October 1992 and specific activities were identified shortly thereafter in the TA contractor's workplan.

4.3 Groundwater Development Program

Drilling programs were carried out in SulSel and NTT in GOI FY 91/92. Construction of distribution systems at 47 sites in SulSel and NTT are being carried out under contract with private firms with USAID reimbursing 50% under an existing Fixed Percentage Reimbursement Agreement (FPRA). USAID is also funding the provision of local consultants for design and supervision of construction services in SulSel and NTT under host country contracts. The WUAO program in SulSel is funded under the host country contract there, while in NTT under a continuing grant to a PVO. Additionally 7 demonstration sites (4 in NTT and 3 in NTB) were completed as of March 30, 1992.

4.4 Commodity and Equipment Procurement

Final local commodity procurement actions were completed during GOI FY 91/92. A U.S. procurement action with the PIO/C issued in January 1992 was also completed. Only minor procurement actions are contemplated under the Phase II TA contract.

4.5 Training

In-country and third country short term training activities are carried out under the direction of a training advisor. Training activities concentrate on operations and maintenance emphasizing farmer participation in cooperation with the WUAO program. It is planned to train approximately 100 staff members in-country and up to 5 persons in selected short-term training courses in third countries.

4.6 Special Studies

Special studies (see Figure 4, page 12) have been developed and managed by the Water Resources Policy advisor. Studies are being carried out through buy-ins to existing AID/W contracts or through IQCs. Local consultants have and are involved in all of these studies.

Small Scale Irrigation and Management Project (SSIMP)
 Project No. 497-0347; Loan No. 497-T-092A-01
 Financial Plan as of September 1993

(\$000)

Project Element	Obligation		Adjustment		Revised	
	Grant	Loan	Grant	Loan	Grant	Loan
Technical Assistance	16,720	1			16,720	1
Training	295	982		(19)	295	963
Equipment & Commodities	236	538		(126)	236	412
Contingency	322	131		(131)	322	0
Construction, Surface Water	1,736	7,586		(319)	1,736	7,267
Construction, Ground Water	0	1,391			0	1,391
Special Studies	1,036	0			1,036	0
Special Studies/Pilot Act.	974	4	(108)		866	4
Total:	21,318	10,632	(108)	(595)	21,211	10,038

Figure 6

SSIMP Procurement Plan and Method of Financing						
	Item	Financing Method	Procurement Method	Status	Amount	
					Grant	Loan
I.	Construction: Surface Water					
	Survey and Design	DR	Host Country Contracts	C	–	1,444
	Construction (Awo+Kal.II)	DR	Host Country Contracts	CC	1,486	5,823
	O&M	DP	Direct Contracts	P	85	–
	Supervision & Monitoring	DR	Force Account	PC	165	–
IA.	Construction: Groundwater					
	Demonstration Sites	DP	Force Account (PIL)	C	–	53
	Drilling Program	DR	Host Country Contracts	C	–	340
	Distribution Systems	DR	Fixed Percentage Reimb.	PC	–	670
	Local Consultants	DR	Host Country Contracts	PC	–	328
II.	Equipment and Commodities					
	Local Procurement	DR	Host Country Contracts	C	106	412
	U.S. Procurement	DP	Direct Contract (PIO/C)	C	130	–
III.	Training					
	Overseas Training	DP	Direct Contracts (PIO/P)	C	160	933
	In-Country Training	DP,DR	Force Account (PIL)	PC	135	30
IV.	Special Studies/Pilot Activities					
		DP	Buy-in, PSCs or IQC	C	1,732	4
		DP	Under TA	C	100	–
		DP	Miscellaneous	C	70	–
V.	Technical Assistance					
	Institutional Contractor	DP	Direct Contracts	CC	15,490	–
	PSCs/IQC/Pasa	DP	Direct Contracts	CC	370	1
	WUAO Program					
	Surface	DR	Host Country Contracting	PC	800	–
	Groundwater	DP	Grant to NGO	C	60	–
VI.	Contingency				322	0
	Total				21,211	10,038

Procurement Methods:

Notes: DP = Direct Payment, DR = Direct Reimbursement,

Status: C = completed, P = planned, PC = Partial Completed

IP = In Progress, CC = Contracting Completed

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5. Cost Estimates and Financial Plan

The project budget as amended is shown in Table 1, page 16. USAID funding is financing activities using three methods: i) direct payment by USAID; ii) pre-financing by the GOI with reimbursement from USAID ; and iii) fixed percentage reimbursement. The amended procurement plan and method of financing is shown in Figure 6, page 17.

6. Monitoring and Evaluation

As discussed in the Project Paper, the monitoring and evaluation system for SSIMP is structured to address three related information needs: i) monitoring irrigation development; ii) monitoring institutional development; and iii) evaluating project management and impact.

Monitoring irrigation development has been carried out primarily with the preparation of Project Justification Reports and Environmental Analyses. Monitoring during the construction phase is primarily through the TA Contractors monthly reports which are structured specifically for this purpose. Performance monitoring during the operations and maintenance phase will make use of existing monitoring methods of PU which were developed with the assistance of the World Bank and ADB funded consultants, and which report key data on cropping patterns and intensity, production, income, etc.

Monitoring Institutional Development has been carried out through Contractors reports and through the Lessons Learned special study. Evaluating project management and impact has been carried out through the Midterm evaluation and the Director's Implementation Reviews. A special study to evaluate the WUAO program and to guide the institutionalization of this program was conducted in 1993, and a final evaluation will be conducted prior to the PACD in 1995. This evaluation will emphasize the institutional development and policy aspects of the project as well as the achievement of purpose level objectives.

7. Summaries of Analyses

7.1 Economic Analysis

The economic analysis of the amended SSIMP was conducted to assist in developing a better understanding of the implications of scaling back the project's civil works component and expanding its focus on institutional development. As such, the analysis compares the USAID and GOI costs projected as necessary to complete all essential project activities on or before the new PACD against the projected benefits to be derived from those activities. The full analysis is presented in Annex G.

The analysis addresses only those additional USAID and GOI SSIMP costs to be incurred during the period covered by the Project Paper Amendment -- i.e., 1 October 1992 to 31 March 1995. In this sense, the analysis seeks to provide guidance to project management in answering the key managerial question -- Do the projected benefits to be derived from continuing SSIMP activities through the PACD justify the anticipated USAID and GOI investments needed to complete those activities?

With this objective in mind, the analysis treats all project costs incurred prior to the end of FY 1992 -- i.e., 30 September 1992 -- as "sunk" costs. It also respects the opinion of USAID project managers to the effect that essentially no sustained benefits can be expected from SSIMP activities initiated prior to 30 September 1992 unless the incremental investments projected in the Project Paper Amendment are undertaken prior to the PACD to complete essential activities. :

For purposes of this analysis, the new -- or incremental -- project costs necessary to complete all anticipated activities over the period of the Project Paper Amendment -- i.e., 1 October 1992 to 31 March 1995 -- are estimated as \$ 11.107 million from USAID and \$ 7.207 million from the GOI. After completion of the surface and installation of the groundwater irrigation systems, O&M costs will be incurred as specific to each system. These costs will be incurred after the PACD but are projected in the analysis.

Three categories of benefit flows are projected from the activities to be financed under the Project Paper Amendment. They are:

- ◆ Direct net benefits from increased agricultural production;
- ◆ Secondary benefits from construction and operations of the new irrigation systems; and
- ◆ Tertiary benefits to be derived from SSIMP policy studies.

Quantitative analysis of the direct costs and benefits from installation of new irrigation capacity was possible on the basis of the secondary data available from SSIMP project justification reports. Secondary and tertiary benefits are discussed in the analysis only in qualitative terms.

The SSIMP base case analysis of the aggregated direct benefits versus project costs yielded the results shown below.

Text Table 1
Results of the SSIMP Base Case Economic Analysis

Evaluation Criterion	Value
Net Present Value at 5 %	\$ 36,521,501
Net Present Value at 10 %	\$ 9,147,214
Benefit/Cost Ratio at 5 %	2.92
Benefit/Cost Ratio at 10 %	1.53
Economic Internal Rate of Return	14.58

As the remaining project implementation period is very short and major changes in estimated costs are not expected before the PACD, the sensitivity analysis has been limited to four alternative scenarios. They are:

- ◆ Construction costs for both surface and groundwater increase by 20 percent [Case 1];
- ◆ Operations and maintenance costs for the three surface irrigation systems increase by 20 percent [Case 2];
- ◆ Operations and maintenance costs for the three surface irrigation systems decrease by 20 percent as a result of new policies for improved O&M systems [Case 3]; and
- ◆ Project benefits increase by 25 percent as a result of farmers in the irrigation systems devoting more hectarage to higher value crops [Case 4].

The changes in the criterion values of these alternative scenarios proved to be modest. The economic internal rates of return [EIRR] ranged between 13.06 and 17.54 percent. Considering that incremental secondary and tertiary project benefits will be generated as discussed in the analysis -- but have not been evaluated in quantitative terms -- it is likely that, if an ex poste SSIMP EIRR were to be recalculated when these incremental benefits could be quantitatively evaluated, the analysis would yield an EIRR significantly higher than 15 percent.

As 12 to 15 percent is generally thought to be a very acceptable rate of return on an investment on agricultural infrastructure in Indonesia, the proposed USAID and GOI investments under the SSIMP Project Paper Amendment should be judged as economic under prevailing criteria.

7.2 Technical Analysis

7.2.1 Design

Design work on the ten originally selected surface irrigation sites has occupied substantially more time and effort than those originally envisaged in the Project Paper. Detailed review of designs at the time the TA team arrived in 1987 indicated substantial shortcomings, both in terms of data availability and analysis. This resulted in a three stage design process involving preliminary design as the basis for the Project Justification reports and Environmental Analyses; detailed survey work and collection and analysis of hydrological, foundation and other data; and final designs and preparation of tender documents and specifications. All design work has been carried out by local engineering firms under contract to PRIS with the work thoroughly reviewed by TA and PRIS staff. This process has resulted in designs of high quality and the preparation of documents suitable for international tender. It has also resulted in institutional benefits to the PU officials involved and has substantially increased the skills of the local engineering firms involved.

Based on the successful design process for the surface program, a similar process has been developed for the groundwater program. Local consultants have now been contracted by P2AT in SulSel and NTT to design and supervise construction of the groundwater sites. P2AT and TA staff review the work prior to submission for final review by USAID's engineering staff.

7.2.2 Construction

All construction is carried out according to plans and specifications which have been reviewed and approved by the TA consultants and USAID's engineering staff. Construction work is carried out by local construction firms under host country contracts with the Ministry of Public Works. Selection of construction contractors for surface irrigation works has been through international tender according to Handbook 11 procedures. USAID is involved in the review of all steps in the tendering process. Groundwater drilling and construction of irrigation systems has been through locally tendered contracts.

For the surface irrigation systems the Ministry of Public Works is responsible for the supervision of construction, although responsibility for certifying progress payments is jointly shared with the TA contractors. Experience has shown that an independent construction management team helps to assure the quality of the completed work. An on-the-job training program in construction supervision practices will enhance the skills of the PU staff. Frequent meetings are scheduled between the TA construction management team, PU staff and the construction contractors to monitor progress and provide necessary direction to the contractors.

For the groundwater program, a TA hydrogeologist has monitored the drilling contracts and local TA civil engineers have monitored construction of the

distribution systems. USAID engineering staff are responsible for reviewing the work of the TA staff as well as conducting independent inspections of work in progress and of completed works.

7.2.3 Operations and Maintenance

The project will develop O&M procedures and train GOI staff and farmers in the implementation of the O&M system. The GOI and WUAs will assume full responsibility for O&M at the conclusion of the Project. Normal GOI practice is that once construction of surface irrigation systems is completed then the systems are transferred to the subprovincial level which is then responsible for budgeting and carrying out O&M activities. Under SSIMP the projects are to be transferred to local authorities as soon as possible after construction with farmers assuming responsibility for O&M of the tertiary level canals concurrently.

In addition to preparation of manuals, training of O&M staff and training of farmers for O&M through the WUAO program, the project will work at sites near to those under construction and develop them as demonstration sites. At these sites farmers in the new systems will observe and take part in proper water management practices with their neighbors. Additionally a special study will review the experience under the pilot Irrigation Service Fee program and design the implementation of the ISF to the SSIMP sites. This combination of activities to be carried out prior to the PACD and a commitment from the GOI to undertake O&M subsequent to the PACD will help to assure the sustainability of the irrigation systems.

At the groundwater irrigation sites, the bulk of which are in NTT, the normal PU practice is to subsidize O&M for an initial period after construction and then turnover the systems to farmer management. In actuality the GOI will continue to provide servicing, repairs and replacement (if necessary) for pumps and engines. Farmers must contribute all O&M costs through their water users organization. The project will establish and strengthen these organizations through the WUAO program. Additionally, due to lack of experience with intensive agriculture, farmers require training in improved agricultural practices. Also, there is very little agricultural research specific to NTT and, for example, selection of proper varieties and availability of seed are problematic. Under the TA contract an expatriate agronomist designs and works with local authorities to carry out a program of agricultural intensification at the SSIMP sites.

7.3 Institutional Analysis

Decentralization and increasing the capacity of local authorities requires good management and support at the central level. The midterm evaluation recommended the establishment of a project management structure with clearly assigned responsibilities. From this recommendation the GOI proposed a new management structure comprised of a working group and a steering committee. This restructuring placed the overall coordination of the project in Bina Program (the Planning and Programming Directorate) of DGWRD. This is a logical arrangement for a project as broad

as SSIMP. It also opened up the opportunity to work with the staff of Bina Program on policy issues and to expand the policy emphasis of the project.

PU capability has generally been good both on the technical side and in terms of contracting capability. The Project Paper includes a discussion of contracting procedures. During the implementation of the project AID staff have become more fully aware of issues in GOI contracting and have taken steps, such as to require advertisements of contracting opportunities, to improve the competitive aspects of contracting. A.I.D. regulations require capability assessments of host government contracting agencies. The first of these assessments was completed in July 1992. Based on the results of similar assessments conducted of other branches of the Ministry of Public Works and based on past contracting performance, we expect that DGWRD will meet the capability requirements.

7.4 Social Soundness Analysis

The Project Justification Reports prepared for each subproject include an analysis of the social considerations and specific analysis of gender and age specific participation in agriculture. For the Awo site the PJR found that although they only account for about 22% of the total agricultural labor input for paddy, women contribute in much greater amounts to activities such as harvest of secondary food crops, household garden production, the storage and sale of secondary food crops, livestock management and family finances.

The PJR identified a number of potential issues associated with the development of the surface irrigation systems. A number of these, such as the provision of livestock watering points, are being addressed through the design socialization process developed under the WUAO program. Other potential negative secondary effects of the project are: i) the possibility of increased water-related diseases; ii) the need to modernize land titles; and iii) increased demands for services and infrastructure in the irrigated area. All of these fall under the responsibility of local government. Project activities, such as coordination meetings, serve as means for raising awareness of local officials to these issues.

7.5 Environmental Analysis

Environmental Analyses were conducted for each of the surface irrigation sites to be constructed under SSIMP. For the two sites to be constructed with AID financing, these Environmental Analyses were reviewed in AID/Washington by the Bureau Environmental Coordinator and were approved. These analyses as well as the Analysis for the Tiu Kulit subproject which is being funded by the OECF were reviewed through the GOI Amdal process and were approved. Additionally, an environmental analysis covering all of the groundwater sites was prepared and approved through the same AID and GOI processes.

As part of the Monitoring and Mitigation Plan for the Awo and Kalimantanong II sites, a program of monitoring land use changes in the watershed area was proposed. The Phase II TA contract includes short term services of an environmental specialist and a remote sensing specialist to assist the GOI in establishing this monitoring program as well as to provide assistance on the other aspects of the monitoring program, water resources monitoring and biological resources monitoring.

SSIMP
Revised Log Frame

March, 1992

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	IMPORTANT ASSUMPTIONS	MEANS OF VERIFICATION
<p>Program or Sector Goal:</p> <p>To expand agricultural production by diversifying production, in – creased cropping intensity and improving water reliability</p>	<p>Measures of Goal Achievement:</p> <ul style="list-style-type: none"> – Average cropping intensity increased by the addition of at least one crop per year – Areas irrigated achieve 4T/ha per season (padi equivalent) – Non – padi crops grown in at least one season 	<ul style="list-style-type: none"> – Favorable weather conditions. – Agricultural prices remain a production incentive for farmers – Labor supply relatively constant. – Agricultural inputs freely available. 	<ul style="list-style-type: none"> – Baseline Survey – Project monitoring system
<p>Project Purpose:</p> <p>To increase the capacity of irrigation agencies and farmers groups to implement sustainable irrigation in selected eastern islands.</p>	<p>Conditions Expected at End of Project:</p> <ol style="list-style-type: none"> 1. Directorate General of Water Resources Dev. (DGWRD), Ministry of Public Works, Jakarta applying Policies developed in this project in other irrigation projects; 2. Sustainable surface and groundwater irrigation systems operating in three provinces and demonstrating principles underlying this project; 3. Water Users' Association participating in system design, construction, operation and maintenance. Some WUA Federations formed; 4. NGOs with capability to support Water Users' Association in three provinces; 5. Provincial irrigation departments and private contractors using better design and construction methods in their surface and groundwater projects. 	<ul style="list-style-type: none"> – Lack of appropriate irrigation facilities an important constraint to higher productivity and crop diversification. – Irrigation management problems are serious constraints to food production. – Farmer involvement in systems results in improved design, construction and management. – Alternative water delivery options to run – of – the river are economical; – Assistance to – and key role for – private sector in groud water program acceptable to GOI. 	<ul style="list-style-type: none"> – Field inspection – Site profiles – Project monitoring reports – Project reports – Evaluation
<p>Outputs:</p> <p>Strengthened PU Management Provincial staff trained in new/ improved technologies and management systems.</p> <p>Improved Technologies 7 Medium scale surface irrigation systems designed Groundwater dev. plans prepared 3 Medium scale irrigation systems constructed. 316 small scale groundwater irrigation systems constructed.</p>	<p>Magnitude of Outputs:</p> <ul style="list-style-type: none"> – 27 participants receive M.A. degrees in engineering and related fields – In – country training provided to over 300 GOI staff in design, construction and O&M of irrigation systems. – Training for WUAO staff. – On the job and on – site training for GOI staff, WUA members and local private contractor staff. <p>17,692 hectares designed; 8 environmental analyses and Project Justification Reports prepared. Assessments of target groundwater acquifers in 3 prov. 7150 hectares under irrigation.</p> <p>1050 hectares under irrigation.</p>	<ul style="list-style-type: none"> – GOI willing to allow WUAO program to act as catalyst for farmer participation. – Farmers accept and utilize new physical and institutional infrastructure. – Procedural or other delays do not extend construction beyond PACD. <p>– Planned Surface and Groundwater systems prove feasible (technical, environmental, economic, social, agronomic).</p>	<ul style="list-style-type: none"> – Field inspection – Project reports – Copies of documents produced – GOI decrees – Special studies reports

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	IMPORTANT ASSUMPTIONS	MEANS OF VERIFICATION																																																		
<p>Beneficiary Participation</p> <ul style="list-style-type: none"> - WUAs formed at surface sites - WUAs formed and responsible for systems management at groundwater sites - NGOs serve as catalyst in development of WUAs for surface and groundwater sites. <p>Policy Studies</p> <ul style="list-style-type: none"> - Special Studies - Seminars, Workshops, Evaluation - Coordination with other donors 	<p>45 organizations 316 organizations</p> <p>2 NGOs</p> <p>Studies prepared on</p> <ul style="list-style-type: none"> - effectiveness of water user associations under SSIMP and Sederhana - role of private sector in groundwater development - privatization of irrigation schemes - effective implementation of irrigation service fees <ul style="list-style-type: none"> - 8 Environmental Studies - 3 Implementation Workshops - 2 Evaluations - Collaboration in presentations - Shared reports and papers - Regular meetings 																																																				
<p>Inputs</p> <table border="1" data-bbox="140 1063 526 1356"> <thead> <tr> <th></th> <th colspan="4" style="text-align: center;">(US\$000)</th> </tr> <tr> <th></th> <th>USAID</th> <th>GOI</th> <th>OECE/Japan</th> <th>Total</th> </tr> </thead> <tbody> <tr> <td>I. Construction (Surface)</td> <td>9,003</td> <td>11,113</td> <td>7,564</td> <td>27,680</td> </tr> <tr> <td>IA. Construction (Groundwater)</td> <td>1,391</td> <td>1,532</td> <td>1,619</td> <td>4,542</td> </tr> <tr> <td>II. Equipment/Commodities</td> <td>648</td> <td>120</td> <td>122</td> <td>890</td> </tr> <tr> <td>III. Training</td> <td>1,258</td> <td>67</td> <td>-</td> <td>1,325</td> </tr> <tr> <td>IV. Special Studies/Pilot Activities</td> <td>1,906</td> <td>-</td> <td>-</td> <td>1,906</td> </tr> <tr> <td>V. Technical Assistance</td> <td>16,721</td> <td>-</td> <td>2,660</td> <td>19,381</td> </tr> <tr> <td>VI. Contingency</td> <td>322</td> <td>668</td> <td>932</td> <td>1,922</td> </tr> <tr> <td>Project Totals</td> <td>31,249</td> <td>13,500</td> <td>12,897</td> <td>57,646</td> </tr> </tbody> </table> <p>Doc. Doc. a:III.narrative</p>		(US\$000)					USAID	GOI	OECE/Japan	Total	I. Construction (Surface)	9,003	11,113	7,564	27,680	IA. Construction (Groundwater)	1,391	1,532	1,619	4,542	II. Equipment/Commodities	648	120	122	890	III. Training	1,258	67	-	1,325	IV. Special Studies/Pilot Activities	1,906	-	-	1,906	V. Technical Assistance	16,721	-	2,660	19,381	VI. Contingency	322	668	932	1,922	Project Totals	31,249	13,500	12,897	57,646		<p>-GOI and AID funds will be available in a timely manner</p>	<p>-GOI budgets and reports -Project reports and financial data</p>
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**MINISTRY OF PUBLIC WORKS
DIRECTORATE GENERAL OF WATER RESOURCES DEVELOPMENT
DIRECTORATE OF IRRIGATION I**

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Jakarta, December 22, 1993.
Our ref : 14.02.02.Ai/ABLN/383

Mr. Richard Nishihara
Project Officer SSIMP-USAID
c/o American Embassy
Jl. Medan Merdeka Selatan 3-5
JAKARTA

Subject : Small Scale Irrigation Management Project.
- Proposal for PACD extension.

Dear Mr. Nishihara,

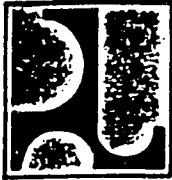
As you might be well aware, the Project Assistance Completion Date (PACD) for SSIMP will due on March 31, 1994. During the project period we realize that many of the project purposes have been accomplished, however, some programmed activities have been delayed due to the numerous delays in project implementation since its inception. The result has been that the end activities of the project i.e. construction of irrigation facilities and implementation of sustainable O&M programs may not be accomplished within USAID's PACD.

Considering the importance of the development of a sustainable O&M program as well as the establishment of sustainable WUA's program as a part of SIDCOM phases while the maintenance period of irrigation system is also still to be ensured, we would like to propose to extend the Project Assistance Completion Date for another year up to March 31, 1995 to make sure that all of the project goals can be realized.

The activities should be achieved during the extension period will consist but not limited to the following :

- To complete the operation test of the system during the contractors maintenance period.
- To establish the project O&M programs.
- Strengthening of the WUAs including federation of the WUAs and introduction of the national ISF program.
- Additional training for O&M.
- Assistance to P2AT in NTT to complete formation of WUAs.
- Additional training to farmers in NTT in operation of groundwater systems.

27



MINISTRY OF PUBLIC WORKS
DIRECTORATE GENERAL OF WATER RESOURCES DEVELOPMENT
DIRECTORATE OF IRRIGATION I

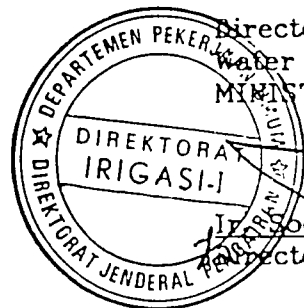
JL. PATTIMURA 20/7. PHONE : 7208803, 714260 - 7398604 KEBAYORAN BARU - JAKARTA KODE POS 12042 TELEX : 47430 IRIGASI LA FAX. 7203961

- 2 -

We understand that there is still the remaining budget available on USAID contribution for SSIMP (uncommitted funds) which we believe can be used to finance the above activities during the extension period.

We would be pleased to have your favourable reply at your earliest possible time.

Yours sincerely,

Directorate General of
Water Resources Development,
MINISTRY OF PUBLIC WORKS,

I. Soenarno MSc.
Director of Irrigation I.

C.C.:

1. Director General of Water Resources Development.
2. Director of Planning and Programming, DGWRD.
3. Director of Irrigation II, DGWRD.
4. Head Bureau of International Cooperation, MPW
5. Head Bureau of Water Resources and Irrigation, Bappenas
6. Head Bureau of Bilateral Economic Cooperation, Bappenas
7. Chief Sub Dit. of Foreign Aid Adm., DGWRD

-----ssimp2/hdg/bpra/abln/17-18-----

6



2045 Annex C

UNITED STATES OF AMERICA
AGENCY FOR INTERNATIONAL DEVELOPMENT
AMERICAN EMBASSY
JAKARTA, INDONESIA

ACTION MEMORANDUM FOR THE ACTING DIRECTOR

THRU: Marcus Winter, *M Winter*
Graham B. Kerr, ARD/RRM

FROM: Herbert G. Blank, ARD/RRM *H Blank*

SUBJECT: SSIMP: Decision regarding Project Completion

PROBLEM: Your decision is required regarding the completion of the surface irrigation program of the Small Scale Irrigation Management Project.

BACKGROUND: During the 1989 Director's Implementation Review (DIR) the Mission decided to develop a new strategy for SSIMP and defer consideration of a PACD extension until the 1990 DIR. A new strategy statement has since been approved by the Mission. The strategy provides a greater policy focus to the project and has guided implementation actions throughout the year.

During the first in-house meetings of the 1990 DIR it became obvious that by the current PACD very few of the planned project outputs would be achieved. ARD prepared an analysis of three options for completion of the surface water component of the project and these options were discussed at the DIR held on November 30, 1990.

DISCUSSION: The results of the analysis are a recommendation for a conditional, limited one year PACD extension to September 30, 1994, which will achieve the following:.

- Seven systems designed
- Construction of surface systems at Kalimantan II in NTB as well as at two additional sites -- Awo in SULSEL, and Tiu Kulit in NTB (latter funded by OECF)
- Adequate time to institute WUAO and O&M activities at these sites as well as 2-3 additional sites (to be identified) providing experience for field-based policy dialogue
- Activities during the extension period will be focused on the WUAO and O&M programs at completed surface and groundwater sites, on institutionalization of these programs and on implementation of other policy agenda items
- No new construction activities during the extension period

Policy advisor in place for three years, policy dialogue concerning irrigation development in Eastern Indonesia, WUAO and O&M programs, privatization and local resource mobilization completed.

The estimated A.I.D LOP funding level is \$39 million, which represents an \$11 million reduction in the PP LOP estimate. An additional obligation of \$6 million is required. (Note: Budgetary and LOP cost implications of the review of the SSIMP groundwater component are not yet included in these figures, subject to the conclusions of that review).

The Phase II TA contract will cover the three year period from 9/91 through 9/94 in the areas of construction supervision, O&M, and groundwater. A.I.D. regulations require that this procurement be completed.

ARD staff of 3.5 professional and one secretary will be required.

The extension would be conditional. If any of the following critical dates for surface water construction is not met then the construction for that site would be cancelled and the PACD extension reconsidered:

- Completion of design for Awo - January 31, 1991
- Issuance of tender documents for construction of Awo - April 1, 1991
- Award of tenders for construction of Kalimantanong II - June 1, 1991
- Award of tender for Awo - February 1, 1992.

Attachment A is a detailed analysis of the outputs and costs of the proposed program. Attachment B is the schedule for the completion of the surface irrigation program.

RECOMMENDATION: That you authorize planning and implementation of the surface water program to proceed assuming a limited, conditional PACD extension of one year. The decision to extend the project will be made on February 1, 1992 based on meeting the stated critical dates in the surface water construction program.

I would like to review construction procedures for site 2 & 3.

Approved: _____

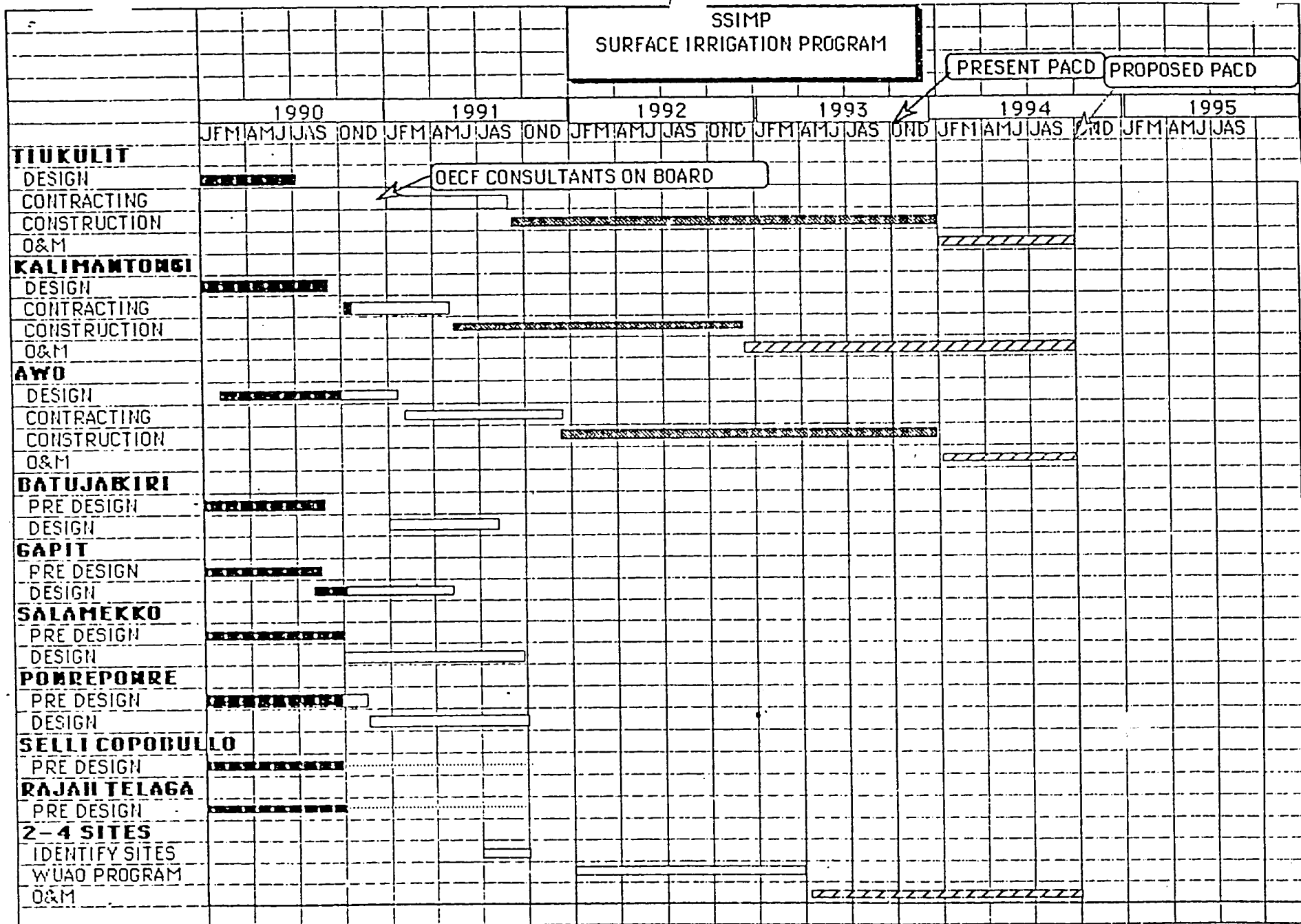
Disapproved: _____

Date: 12/21/90

Clearance: PPS:GLewis _____

Date: 12/21/90

ARD/RRM:HBlank:j es





UNITED STATES OF AMERICA
AGENCY FOR INTERNATIONAL DEVELOPMENT
AMERICAN EMBASSY
JAKARTA, INDONESIA

ACTION MEMORANDUM FOR THE DIRECTOR

THRU: Lee Twentyman, DD *[Signature]*
FROM: Herbert G. Blank, ARD/RRM *[Signature]*
SUBJECT: Small Scale Irrigation Management Project: Decision
Regarding Completion of Groundwater Irrigation Program

PROBLEM: Your decision is required regarding the completion of the groundwater irrigation program of the Small Scale Irrigation Management Project.

BACKGROUND: The 1990 Director's Implementation Review (DIR) included a field trip to NTT. Based on observations at the site and in subsequent meetings the Mission has agreed that modifications need to be made to the program to improve the speed of implementation and to decrease the management workload to Mission staff.

DISCUSSION: The following actions are being taken as a result of discussions and analysis:

- All groundwater activities in NTB province will be phased out in GOI FY 1991/92 and no PACD extension of groundwater activities in the other two provinces (NTT and SulSel) will be considered.
- Drilling of exploratory and production wells with USAID financing will be discontinued after GOI Fiscal Year 1991/92).
- All construction of irrigation distribution systems will be under Fixed Percentage Reimbursement Agreements (FPRA).
- The DGWRD and USAID will make every effort to field the groundwater Water User Association Organizer (WUAO) program in NTT through a grant to YIS by March 30, 1991 and in SulSel through one local consultant contract for design, supervision and the WUAO activities to be awarded by June 30, 1991.

- Two additional GOI professional staff will be assigned to work full time on SSIMP in NTT and a revised organization chart showing project responsibilities will be developed and installed for NTT by July 30, 1991.
- USAID will continue to provide TA in NTT and SulSel through the PACD and the GOI will contract with Local Consultants to assist in irrigation system design, supervision of construction and in SulSel for implementation of the WUAO program. The GOI will prefinance this activity and contracts (1 per province) are to be executed by June 30, 1991.
- The National Pump Irrigation Study, which is to be completed by February, 1992, should continue to receive high priority.

With the foregoing arrangements in place the progress of implementation will increase and result in the following by the PACD:

- Improved methods of analysis developed with TA assistance and adopted for
 - (1) technical and socioeconomic selection of groundwater irrigation sites,
 - (2) environmental analysis of potential groundwater irrigation areas,
 - (3) improved shallow well development programs,
 - (4) improved drilling, contracting and well construction methodology, and
 - (5) improved distribution system design criteria.
- WUAO program tested in two provinces including systems for organizing and motivating farmers and monitoring system performance
- 86 groundwater systems constructed and operating including 49 in NTT, 24 in SulSel and 13 in NTB

The estimated AID portion of the cost of the revised groundwater development program is estimated at \$5.1 million inclusive of TA. Incorporating the foregoing changes with the recent changes in the surface water program results in a Life of Project (LOP) AID funded budget of \$39.0 million. This represents an \$11 million net reduction of the mortgage and of the PP LOP estimate.

The following is a summary of critical actions/dates:

- Mar 30, 1991 WUAO program in place for NTT
- Apr 30, 1991 PIL issued providing the procedures of the FPRA and committing funds for GOI FY 91/92 program
- Jun 30, 1991 Additional staff and new organization in NTT
- Jun 30, 1991 Local consultants in place (NTT and SulSel)
- Mar 30, 1992 Phase out of NTB complete, drilling programs complete in NTT and SulSel.

Not meeting any of these dates may be grounds for termination of the groundwater program at the time of the missed date.

Attachment A is a detailed analysis of the outputs and costs of the proposed groundwater program. Attachment B is the proposed overall LOP budget for incorporation in the revised financial plan.

RECOMMENDATION: That you authorize continuation of the modified groundwater component of SSIMP according to the conditions and critical dates as described herein.

Approved: *[Signature]*

Disapproved: _____

Date: 3/8/91

ARD

Clearance:		Date:
ARD/RRM: GKerr	<u><i>[Signature]</i></u>	<u>2/19</u>
ARD MWinter	<u><i>[Signature]</i></u>	<u>2/19</u>
PPS: GLewis	<u><i>[Signature]</i></u>	<u>3/1</u>

ARD/RRM HBlank *[Signature]*

file:b:gwater

I have cleared with the following in mind:

- We reassess the need for a \$4.3 million obligation in FY91. We will budget, at current expenditure rates, to carry the project to 4th quarter FY92.

- We respond to the request for one more system and a one year PACD extension. We are not prepared to oblige.

Then we reassess the contingency line item. I believe we have a \$35 million LOP here, and don't want to obligate then turn around and deob. (loan or grant either way)

We need the \$4.3 million in order to fund Phase 1. The budget...

Plan of Outputs and Costs for SSIMP Groundwater Program

Attachment A

Activity	Output (1)	Units	Province				Status	Plan	AID Cost (\$000)		Comments
			Sulsel	NTB	NTT	Other			Loan	Grant	
Groundwater Pilot Program	7 systems	systems		4	3		6 compl., 1 underway		(2)		
Dug wells	35 wells	wells	10	0	25		4 in design	complete 9/91	0		Construction through 'force-account' Wells const'd by farmers, systems by P2AT Assume 44 of 77 explor.drill will be production wells. FPRA Issued by May 1, 1991
Drilled wells	44 wells + analysis	wells	14	9	21		14 in tender process	complete 9/93	75		
Distrib. Syst.	86 systems	systems	24	13	49		FPRA letter issued	complete 9/93	325		
Local Cons.	designs 2 prov.	systems	24		41		preparation of TOR PIO/T in clearance	complete 9/93	600		Local consul. for NTT and SulSel WUAO program for GW in NTT
O&M & WUAO	86 WUAs	WUAs	24	13	49			complete 9/93		270	
Equip. & Commod	Field & off. equip		x	x	x		\$60k purchased	\$500k plan	200	300	\$300,000 US source/origin 2 for NTT and 4 for
Equipment	Cars		-	3	5		8 veh. & 9 mc.purchased	addl 6 veh.	15	65	
Vehicles	Motorcycles		2	3	4						
Training	3 Master Degraes	degrees	1		2		1 complete	3 by 9/91	0		Prov. P2AT staff
Long Term	31 trainees	trainees	6	6	3	16	25 complete	31 by 9/91		0	Prov. P2AT staff
In-country I	15 trainees	trainees	5	5	5			15 by 9/92		20	Prov. P2AT staff
In-country II	30 trainees	trainees	10	10	10			30 by 9/93		50	Prov. P2AT staff
On-the job tmng											
Special Studies											
Nat. Pump Study	1 policy study	studies	x	x	x		underway	complete 2/92		327	ISPAN and CASER, funding w/ Ford covered by surface water
Lessons Learned	1 policy study	studies	x	x	x			complete 8/91		0	
Environment	3 g'water PILs	reports	1	1	1		1 complete 11/90	3 by 9/91		0	Harza
Other Act	Workshops, Evals							final eval 8/93		100	
Other Studies										100	To be determined
Technical Assist											
Initial Harza	Data coll./Expl.						completed 4/90				
Harza Extension	Exploration						underway				
TA Phase II	g'water expansion						draft TOR	complete 10/91			
Program Advisor	Policy analysis						CBD notice 12/15/90	field 9/91-9/93		2100	6 per/years expatriate, 12 py local
PSC and Misc	Baseline, coord						completed	field 6/91-6/93			Covered by surface water
							Total		1785	332	

Notes: (1) Does not include OECF outputs

(2) Costs are additional to funds committed as of 12/31/91

file PLGW\k1

REVISED FINANCIAL PLAN
GRANT AGREEMENT AMENDMENT NO. 5

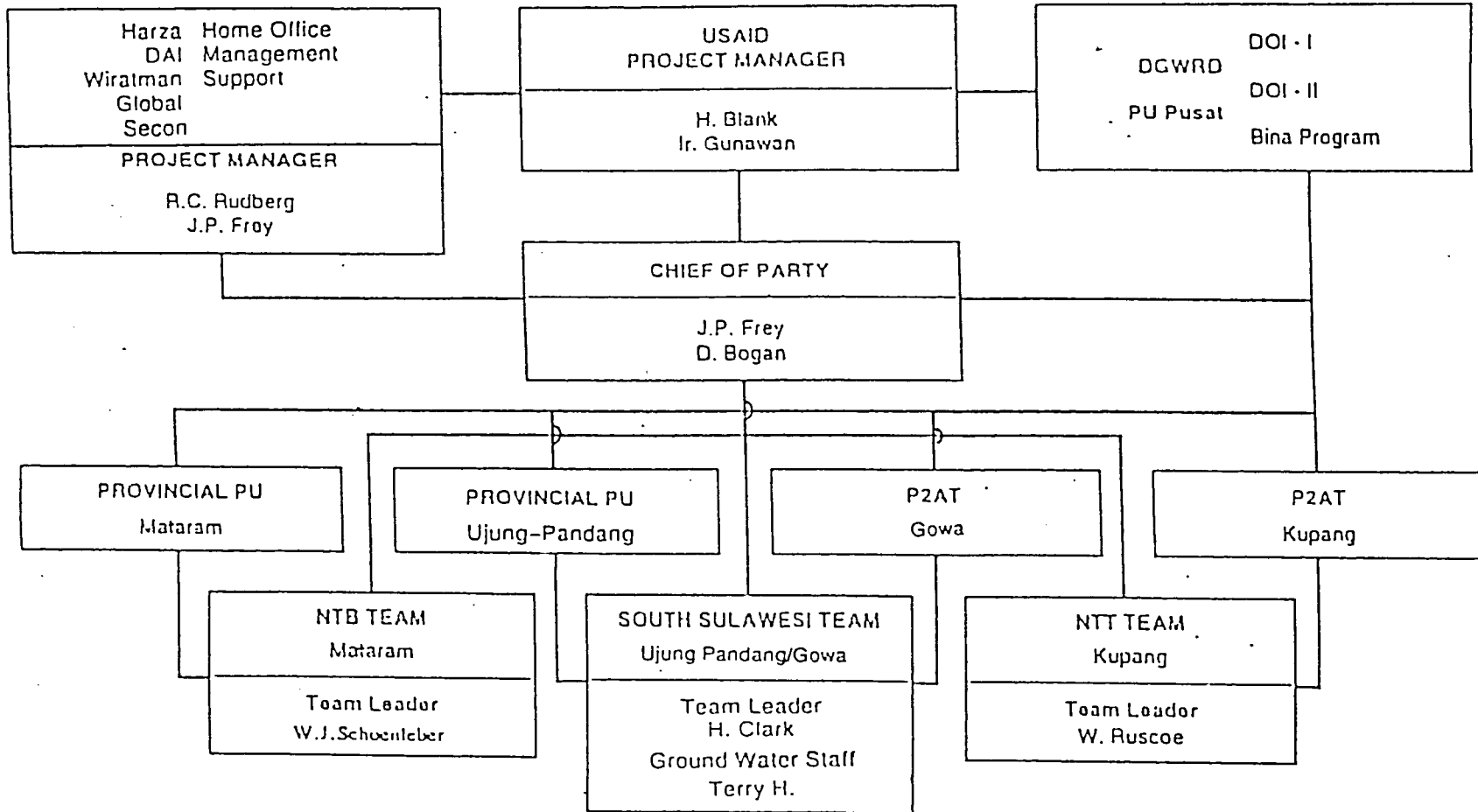
SMALL SCALE IRRIGATION MANAGEMENT
PROJECT 497-0347
SUMMARY COST ESTIMATES (\$000)

	Obligations to Date			Revised Obligations*			Anticipated USAID	USAID Totals			GOI Contribution	OECF Contribution	Total LOP Funds
	Grant	Loan	Total	Grant	Loan	Total		Grant	Loan	Totals			
1. Construction, Surface water	399	9100	9499	273	9015	9288		273	9015	9288	11113	7564	27965
2. Construction, Groundwater		2000	2000	0	1623	1623		0	1623	1623	1532	1619	4774
3. Equipment and Commodities	80	3253	3333	365	623	988		365	623	988	120	122	1230
4. Training	87	1313	1400	311	1019	1330		311	1019	1330	67		1397
5. Special Studies	2451	4	2455	2004	4	2008		2004	4	2008			2008
6. Technical Assistance	10444	1	10445	16720	1	16721	2965	19685	1	19686		2660	22346
7. Contingency	1941	1962	3903	29	348	377	14700	14729	348	15077	668	932	16677
	15402	17633	33035	19702	12633	32335	17665	37367	12633	50000	13500	12897	76397

*After FY 1991 obligation of \$4.3 million grant and deobligation of \$5.0 million loan funds.

file: amend5A

TA TEAM PHASE II ORGANIZATION PLAN



OVERSEAS TRAINING PROGRAM

No.	Participants	Training Institute/ Site Institute	Degree	Date Completed
1.	Soeprapto Budisantoso	Virginia Polytechnic Inst. and State Univ. Blacksburg,	M.S.	May 1989
2.	M. Basuki Hadimulyono	Colorado State Univ. Fort Collins, Colorado	M.S.	June 1989
3.	Idrus Said	Univ. of Kentucky Lexington, Kentucky	M.S.	Aug. 1989
4.	Zaini Basri	Colorado State Univ. Fort Collins, Colorado	M.S.	Dec. 1989
5.	Burhanuddin Hanafi	Oklahoma State Univ. Still Water, Oklahoma	M.S.	Aug. 1990
6.	Uki Basuki	Northrup Univ. Inglewood, California	M.S.	March 1990
7.	Budi Satrio	New Mexico State Univ. Las Cruces, New Mexico	M.S.	May 1990
8.	Nurjaya	Colorado State Univ. Fort Collins, Colorado	M.S.	Jan. 1990
9.	Hartopo	Texas A.M. Univ. College Station, Texas	M.S.	Feb. 1991
10.	Amat Muchlis	Colorado State Univ. Fort Collins, Colorado	M.S.	Dec. 1989
11.	R. Winuludji	Cornell Univ. Ithaca, New York	S.I.	May 1988
12.	Rusly M. Amin	Cornell Univ. Ithaca, New York	S.I.	May 1988
13.	Marsidik	Univ. of Roorkee, New Delhi	M.S.	Dec. 1988
14.	T.S. Abadi Putra	same as above	M.S.	June 1989
15.	Ayi Hasanuddin	s.a.a.	M.S.	Dec. 1988
16.	Sakiyoto	Anna University Madras - India	M.S.	Mar. 1989
17.	Syafwan - Syafar	s.a.a.	M.S.	Mar. 1989
18.	Winarto	s.a.a.	M.S.	Mar. 1989
19.	Toto Perbata	s.a.a.	M.S.	Mar. 1989
20.	Syafrullah	s.a.a.	M.S.	Mar. 1989
21.	Imam Santoso	s.a.a.	M.S.	Mar. 1989
22.	Djoko Munandar	s.a.a.	M.S.	Mar. 1989
23.	I Nengah Dhiun	s.a.a.	M.S.	Mar. 1989
24.	Muhammad Sutomo	s.a.a.	M.S.	June 1989
25.	Sukatno	s.a.a.	M.S.	June 1989
26.	Suyudi	s.a.a.	M.S.	June 1989
27.	Sabirin Chaniago	s.a.a.	M.S.	Apr. 1989
28.	Triwibawanto	s.a.a.	M.S.	Apr. 1989
29.	Endang Supriadinata	s.a.a.	M.S.	Mar. 1989

Table 1 (cont.)
SSIMP TRAINING ACTIVITIES

PROGRAMS / TOPICS	LOCATION	DURATION	TOTAL PARTICIPANTS	IMPLEMENTING AGENT	1990				1991				STATUS
					1	2	3	4	1	2	3	4	
II. TECHNICAL TRAINING (GROUND WATER)													
o Introduction to Groundwater Development	Surabaya	4 weeks	18	BDP	*								Completed
o Site Selection	NTT	1 week	11	TA						*			Completed
o Well Design, Testing and Construction	NTT	1 week	12	TA							*		Completed
o Operation and Maintenance of Wells, Pumps and Irrigation Conveyance Systems	NTT	1 week	12	TA								*	Completed
III. PROJECT MANAGEMENT SKILLS TRAINING													
o On-Site Seminars	Sulsel/NTB	1 week	30	ITB									Completed
o Mini-Seminars	Sulsel/NTB	3 days	30	ITB									Completed
o Bali-Seminar	Bali	1 week	30	ITB									Completed
IV. PERSONAL SKILLS DEVELOPMENT													
o Computer Courses	Sulsel/NTB		23	Local computer schools	*	*							Completed
o English Courses	Sulsel/NTB		40	UnHas/UnRam	*	*							Completed
o Short-Term Overseas Training (AIT)	Bangkok, Thailand	8 weeks	2	BDP/AIT							*		Completed
			1	BDP/AIT								*	On going

Economic Analysis for Project Paper Amendment

Executive Summary

The economic analysis of the amended SSIMP was conducted to assist in developing a better understanding of the implications of scaling back the project's civil works component and expanding its focus on institutional development. As such, the analysis compares the USAID and GOI costs projected as necessary to complete all essential project activities on or before the new PACD against the projected benefits to be derived from those activities.

The analysis addresses only those additional USAID and GOI SSIMP costs to be incurred during the period covered by the Project Paper Amendment -- i.e., 1 October 1992 to 31 March 1994. In this sense, the analysis seeks to provide guidance to project management in answering the key managerial question -- Do the projected benefits to be derived from continuing SSIMP activities through the PACD justify the anticipated USAID and GOI investments needed to complete those activities?

With this objective in mind, the analysis treats all project costs incurred prior to the end of FY 1992 -- i.e., 30 September 1992 -- as "sunk" costs. It also respects the opinion of USAID project managers to the effect that essentially no sustained benefits can be expected from SSIMP activities initiated prior to 30 September 1992 unless the incremental investments projected in the Project Paper Amendment are undertaken prior to the PACD to complete essential activities.

For purposes of this analysis, the new -- or incremental -- project costs necessary to complete all anticipated activities over the period of the Project Paper Amendment -- i.e., 1 October 1992 to 31 March 1994 -- are estimated as \$ 11.107 million from USAID and \$ 7.207 million from the GOI. After completion of the surface and installation of the groundwater irrigation systems, O&M costs will be incurred as specific to each system. These costs will be incurred after the PACD but are projected in the analysis.

Three categories of benefit flows are projected from the activities to be financed under the Project Paper Amendment. They are:

- ◆ Direct net benefits from increased agricultural production;
- ◆ Secondary benefits from construction and operations of the new irrigation systems; and
- ◆ Tertiary benefits to be derived from SSIMP policy studies.

Quantitative analysis of the direct costs and benefits from installation of new irrigation capacity was possible on the basis of the secondary data available from SSIMP project justification reports. Secondary and tertiary benefits are discussed in the analysis only in qualitative terms.

The SSIMP base case analysis of the aggregated direct benefits versus project costs yielded the results shown below.

Text Table 1
Results of the SSIMP Base Case Economic Analysis

Evaluation Criterion	Value
Net Present Value at 5 %	\$ 36,521,501
Net Present Value at 10 %	\$ 9,147,214
Benefit/Cost Ratio at 5 %	2.92
Benefit/Cost Ratio at 10 %	1.53
Economic Internal Rate of Return	14.58

As the project implementation period is very short and major changes in estimated costs are not expected before the PACD, the sensitivity analysis has been limited to four alternative scenarios. They are:

- ◆ Construction costs for both surface and groundwater increase by 20 percent [Case 1];
- ◆ Operations and maintenance costs for the three surface irrigation systems increase by 20 percent [Case 2];
- ◆ Operations and maintenance costs for the three surface irrigation systems decrease by 20 percent as a result of new policies for improved O&M systems [Case 3]; and
- ◆ Project benefits increase by 25 percent as a result of farmers in the irrigation systems devoting more hectarage to higher value crops [Case 4].

The changes in the criterion values of these alternative scenarios proved to be modest. The economic internal rates of return [EIRR] ranged between 13.06 and 17.54 percent. Considering that incremental secondary and tertiary project benefits will be generated as discussed in the analysis -- but have not been

evaluated in quantitative terms -- it is likely that, if an ex poste SSIMP EIRR were to be recalculated when these incremental benefits could be quantitatively evaluated, the analysis would yield an EIRR significantly higher than 15 percent.

As 12 to 15 percent is generally thought to be a very acceptable rate of return on an investment on agricultural infrastructure in Indonesia, the proposed USAID and GOI investments under the SSIMP Project Paper Amendment should be judged as economic under prevailing criteria.

Economic Analysis for Project Paper Amendment

I. Introduction

The Small Scale Irrigation Management Project [SSIMP] was designed to increase agricultural production in Indonesia through improved water supplies and irrigation system management. In terms of infrastructure development, the original intention of the SSIMP was to construct ten surface irrigation systems [24,700 hectares] in two provinces and to put in place wells to pump groundwater for irrigation of 5,200 hectares in three provinces. The surface and groundwater development combined was to have expanded irrigated agricultural land in the country by a total of 29,900 hectares.

In order to support the Government of Indonesia's [GOI's] efforts in the development of the lesser-developed eastern islands, the original project sites were selected in the provinces of Nusa Tenggara Barat [NTB], Nusa Tenggara Timur [NTT], and Sulawesi Selatan [SulSel]. Given the existing water shortage and climatic conditions in these provinces, crop diversification was identified as a major element of the project design. Strengthening provincial institutions, participation of Water User Associations [WUAs], and water resources policy studies were made an integral part of the SSIMP to facilitate program development in these areas.

The project was initiated in 1985 and was scheduled to be implemented over an eight year year, with an original Project Activities Completion Date [PACD] of 30 September 1993]. The total project cost was estimated to be \$ 90 million, with a USAID contribution of \$ 50 million in the form of a loan and a grant. The original economic rate of return was estimated at 20 percent. The project included formal training of GOI staff, development of WUAs, and enhancing the PRIS and small private contractors through continuous on-the-job training.

Due to unexpected delays during the project's initial start-up and design, as well as other constraints, it became apparent that the SSIMP could not be completed as planned. This necessitated a scaling back of the project to the development of three surface irrigation systems [Kalimantong II in NTB, Awo in SulSel and Tiu Kulit in NTB] comprising a total of 7,150 hectares and parallel development of groundwater resources for areas in the three provinces totaling 450 hectares. The revised total project cost was estimated at \$ 45.8 million, including Japanese funding for certain discrete activities.

With growing GOI interest in institutional development, development of sustainable operations and maintenance [O&M] and water resources policies, the project's focus on these areas was increased. The PACD for the SSIMP was also revised to 31 March 1994.

This economic analysis of the amended project has been conducted to develop a better understanding of the implications of scaling back the civil works component and the expanded focus on institutional development. The analysis is presented as one component of the Small Scale Irrigation Management Project [SSIMP] Project Paper Amendment. As such, it compares the USAID and GOI costs projected as necessary to complete all essential project activities on or before the new PACD against the projected benefits to be derived from those activities.

The analysis addresses only that additional portion of total USAID and GOI SSIMP costs to be incurred during the period covered by the Project Paper Amendment -- i.e., 1 October 1992 to 31 March 1994. In this sense, the analysis seeks to provide guidance to project management in answering the key managerial question -- Do the projected benefits to be derived from continuing SSIMP activities through the PACD justify the anticipated USAID and GOI investments needed to complete those activities?

Given this limited objective, the present effort should in no sense be viewed as an ex post economic analysis of the entire course of the SSIMP. It is rather in economic terms a partial analysis of investments to be incurred vis-a-vis benefits to be derived from activities in the final phase of the project. With this objective in mind, the analysis treats all project costs incurred prior to the end of FY 1992 -- i.e., 30 September 1992 -- as "sunk" costs. It also respects the opinion of USAID project managers to the effect that essentially no sustained benefits can be expected from SSIMP activities initiated prior to 30 September 1992 unless the incremental investments projected in the Project Paper Amendment are undertaken prior to the PACD to complete essential activities.

II. Project Activities to be Funded Under the Project Paper Amendment

As projected in the Project Paper Amendment, incremental investments by the USAID and the GOI during the period from 1 October 1992 to the PACD will fund the following specific activities:

◆ **Technical Assistance**

The balance of two technical assistance contracts -- one with an American engineering company and the other with a local non-governmental organization [NGO];

◆ **Participant Training**

Short-term participant training in the United States and/or third countries;

◆ **Completion of Three Surface Water Irrigation Systems**

Funding will be provided to complete construction in three irrigation systems. These systems include: Kalimantanong II in NTB [2,850 hectares]; Awo in SulSel [2,500 hectares]; and Tiu Kulit in NTB [1,800 hectares];

◆ **Completion of Groundwater Irrigation Systems**

Funding will be provided to complete installation of groundwater pump irrigation systems in three provinces -- NTB, NTT and SulSel -- [450 hectares];

◆ **Policy Studies in Support of Improved Irrigation Management**

Funding will be provided to support a technical assistance specialist and completion of a series of national policy studies related to improved operations and maintenance policies for irrigation management and to institutional development of WUAs; and

◆ **General Project Support**

GOI funding [cash and in-kind] will be provided in general support of SSIMP activities.

III. Projected Costs for Completion of SSIMP Activities

Text Table 1 presents a summary of the USAID and GOI costs projected for the SSIMP through the PACD. The table shows total SSIMP costs projected as \$ 42.008 million, of which USAID will contribute \$ 29.008 million and the GOI will contribute \$ 13 million.

Text Table 1
Cost Summary for the SSIMP Through the Anticipated PACD
(in U.S. \$)

Cost Category	Technical Assistance	Training	Equipment/ Commodities	Construction of Surface Systems	Construction of Groundwater Systems	Special Studies/Pilot Activities	General Project Support	Total Project Cost
USAID Costs Through FY 92	12,631,000	1,051,000	592,000	2,159,000	262,000	1,206,000	0	17,901,000
GOI Costs Through FY 92	0	121,000	99,000	3,694,000	317,000	0	1,562,000	5,793,000
Projected USAID Costs in FY 93	2,700,000	100,000	0	5,073,000	400,000	570,000	0	8,843,000
Projected GOI Costs in FY 93	0	0	0	5,580,000	440,000	0	223,000	6,243,000
Projected USAID Costs in FY 94	1,350,000	0	0	674,000	0	240,000	0	2,264,000
Projected GOI Costs in FY 94	0	0	0	741,000	0	0	223,000	964,000
Total New USAID Costs Through PACD	4,050,000	100,000	0	5,747,000	400,000	810,000	0	11,107,000
Total New GOI Costs Through PACD	0	0	0	6,321,000	440,000	0	446,000	7,207,000
Total USAID LOP Costs	16,681,000	1,151,000	592,000	7,906,000	662,000	2,016,000	0	29,008,000
Total GOI LOP Costs	0	121,000	99,000	10,015,000	757,000	0	2,008,000	13,000,000

Of total SSIMP costs, USAID had contributed \$ 17.901 million prior to 30 September 1992. In the same period, it is estimated that the GOI contributed a total of \$ 5.793 million. For purposes of this analysis, these SSIMP costs are considered as "sunk" costs. They are reported here only as a complete record of SSIMP costs over the life-of-the-project [LOP].

For purposes of this analysis, the new -- or incremental -- project costs necessary to complete all anticipated activities over the period of the Project Paper Amendment -- i.e., 1 October 1992 to 31 March 1994 -- are estimated as \$ 11.107 million from USAID and \$ 7.207 million from the GOI.

After completion of the surface and installation of the groundwater irrigation systems, O&M costs will be incurred as necessary specific to each system. Since these costs will be incurred after the PACD and are projected elsewhere in this analysis.

IV. Projected Benefits from SSIMP Activities

Three categories of benefit flows are projected from the activities to be financed under the Project Paper Amendment. They are:

- ◆ **Direct Net Benefits from Increased Agricultural Production**
- ◆ **Secondary Benefits from Construction and Operations of the New Irrigation Systems**
- ◆ **Tertiary Benefits to be Derived from SSIMP Policy Studies**

Quantitative analysis of the direct costs and net benefits from installation of new irrigation capacity was possible on the basis of the secondary data available from SSIMP reports. Benefits flowing from the second and third categories are discussed in qualitative terms.

A. Direct Net Benefits from Increased Agricultural Production

The direct net benefits generated by SSIMP activities are represented by the incremental value of agricultural production from three newly constructed surface irrigation systems [Kulimantong II, Awo and Tui Kulit] and from installation of groundwater pumping systems for irrigation at three different provincial sites.

The information needed to calculate these net benefits was obtained from four SSIMP reports:

- ◆ SSIMP. [1990]. Project Justification Report -- Kalimantan II Project. Directorate General of Water Resources Development, Ministry of Public Works, Jakarta, Indonesia.
- ◆ SSIMP. [1991]. Project Justification Report -- Awo Irrigation Project. Directorate General of Water Resources Development, Ministry of Public Works, Jakarta, Indonesia.
- ◆ SSIMP. [1989]. Project Justification Report -- Tiu Kulit Dam Project. Directorate General of Water Resources Development, Ministry of Public Works, Jakarta, Indonesia.
- ◆ Harza Engineering Company. [1991]. An Economic Assessment of Ground Water Projects. Small Scale Irrigation Management Project [SSIMP], Jakarta, Indonesia.

According to the authors, the information contained in these reports was collected from farm-level surveys and interviews. Except for some minor updating of economic prices for agricultural prices and use of a uniform U.S. dollar/Indonesian Rupiah conversion rate to put the four irrigation system analyses on an equivalent basis, the data contained in the reports were assumed to be current.

Summaries of the incremental values for agricultural production in each of the three surface irrigation systems can be found in Annex Tables 2,3 and 4. Estimated direct net benefits from groundwater irrigation systems can be found in Annex Table 5. A complete presentation of the estimated direct net benefits from both surface and groundwater systems can be found in Annex Table 6. And, finally, Annex Table 7 presents a summary of the base case SSIMP undiscounted economic benefit and cost flows over a 50 year period and the net benefit stream for the project.

B. Secondary Benefits from Construction and Operations of the New Irrigation Systems

In addition to the direct benefits which could be quantified in this analysis, SSIMP activities will generate secondary benefits. These benefits result from the forward and backward linkages established with local industries as construction

of new irrigation facilities proceed and as the land in the new irrigated systems is brought under more intensive use.

An example of the short-term employment effect to be generated is in construction of the Kalimantan II system. Project engineers estimate that project construction will employ a peak labor force of approximately 900 workers. Of these workers, approximately 750 will be unskilled laborers, 100 will be semi-skilled and skilled -- e.g., equipment operators, drivers, mechanics, carpenters -- and about 50 will be technical and managerial personnel. As this employment is generated from project investments, the wages generated will have multiplier effects in the local economy.

Over the longer term, it is projected that agricultural intensification will more than double the service area job opportunities in the Kalimantan II area creating an additional 415,000 workdays per year of local employment. Another effect of intensification will be that labor patterns will be more evenly spread out over the year contributing to area settlement stability.

Through intensification of crop production, higher incomes and consumption levels will be realized among farm households in the project areas. This, in turn, implies better diets and improved health status for the project populations, and a more productive work force. Increased incomes and stabilized employment opportunities should combine to reduce patterns of out-migration and enhance family and community welfare.

The SSIMP activities should provide opportunities for institution building at the local level. With increased and stabilized production from the new irrigation systems, farmers will benefit from increased opportunities to jointly process, store and market agricultural commodities and from bulk purchases, transport and storage of key agricultural inputs.

In addition, it is expected that the quality of the commodities produced will improve, as more stable water supplies should reduce crop damage to a minimum and allow for more even maturing of crops. Improved quality will, in turn, contribute to better marketability of commodities.

Finally, it is expected that the SSIMP through building and upgrading roads and bridges in the service areas of the new irrigation systems will improve the mobility of the target population, lower transaction costs in purchasing inputs and marketing outputs, and in general improve economic and social opportunities.

C. Tertiary Benefits to be Derived from the SSIMP Policy Studies

SSIMP objectives include support to the GOI in the implementation of policies in the areas of decentralization, beneficiary participation, strengthening the private sector's role in the development and management of groundwater, and sustainable operation and maintenance. The GOI's programs in these areas have proceeded faster than was anticipated when designing the original SSIMP. The GOI made a policy decision in which allocation of resources would be shifted more in favor of operations and maintenance programs to protect existing investments instead of investing in new irrigation infrastructure and launched a decentralized management program in irrigation which made possible the turnover of small systems to the farmers.

The GOI plan to develop an investment strategy in water resources and to better plan allocations of water between agriculture and municipal and industrial uses for the second 25 year development plan required a number of studies. In light of this, the need for expanding the scope of the SSIMP policy studies was recognized by the project staff and revisions were made in the Project Paper Amendment. An irrigation policy advisor was employed under the SSIMP to work with BAPPENAS and DGWRD to design a number of studies and coordinate their implementation.

The four principal policy areas identified in the Project Paper Amendment and the expected benefits from each of the studies are discussed below.

1. Decentralization

Building up the capability of local officials and WUAs is key to the success of a decentralization program. On-the-job training through the technical assistance team, as well as short-term in-country and third-country training, are being provided under SSIMP. The capabilities of private sector contractors are being enhanced by the technical assistance team that is overseeing the construction program. The knowledge gained by the GOI staff and the contractors includes: irrigation system design, construction techniques, quality control measures, and the role of the beneficiaries in the design and construction phases of the project.

The national study of WUAs planned under the SSIMP includes a training evaluation component. Recommendations will be made on how to restructure the on-going training and on the development of a long-range program for enhancing the capabilities of the WUAs and the GOI staff directly involved in the management of the irrigation systems.

2. Participation of Water Users

Participation of WUAs as planned is indispensable to the success of the sustainable O&M program in Indonesia. This fact is now well recognized by the GOI. Given USAID's experience and earlier programs in WUA development in Indonesia, USAID will support the GOI's efforts in the development of its program and supporting policies in this area.

The pilot program for the participation of WUAs in the SSIMP sites indicates that farmer input in the design and construction phase has greatly facilitated the process of obtaining the rights-of-way for construction of distribution systems, the provision of labor, and has provided the farmers with a sense of ownership in the irrigation system. This also lays the foundation for participation of WUAs in the O&M and ISF programs. The WUA organizers employed through an NGO will provide a model for the WUA development process. The lessons learned from the SSIMP, the turnover, the EOM, and ISF pilot programs will be documented by a policy study and used for formulating a national framework and supporting policies for WUA development in Indonesia.

3. Sustainable Operations and Maintenance

Under the World Bank and Asian Development Bank irrigation systems projects, a major national effort has been in progress since 1987 to turn over small-scale irrigation systems to WUAs, upgrade the irrigation system under the Special Maintenance [SM] program, and to put in place an Efficient Operations and Maintenance [EOM] program to maintain irrigation system performance over time with less frequent, costly rehabilitation.

The EOM program will be fully funded by the fees collected from users within five years. Successful implementation of this program requires the increased capability of the GOI staff and the active participation of the beneficiaries in the identification of improvements to be made, determination of fees in relation to irrigation water received, and the collection of the irrigation service fees.

The GOI's commitment to the ISF program represents a major change in policy towards subsidization and management of irrigation systems. Given the significance of the ISF in establishing a sustainable O&M program for the country, an assessment study of the ISF will be carried out under SSIMP. Given that the ISF program is moving from pilot status to replication on a national scale, identifying areas in need of policy refinement -- i.e., a system that would encourage payment of fees, input of WUAs in the utilization of the

O&M funds, and identification of the administrative level at which the ISF funds are maintained and channeled back to the O&M of the irrigation systems -- will be of great benefit. This study will also support the project's effort in preparing the SSIMP sites for implementation of the ISF.

4. Water Resources Policies

The water resources development program, designed and implemented to attain self-sufficiency and promote economic development, was carried out at a pace faster than the development of policies and procedures to guide it. To correct this, the GOI is now making an effort in the policy development area.

A policy study entitled "Strategy Options for Water Resources Development in Indonesia" was conducted under the SSIMP. This study identified twelve major water resource development and management policy issues and made a series of recommendations. Projections of supply and demand for rice, needs for crop diversification, ranking of investment areas on the basis of economic feasibility, and recommendations for the development and management of groundwater made in this study will prove beneficial when incorporated in the water resources plan.

V. Results of the Base Case Analysis

The SSIMP base case analysis of the aggregated direct net benefits versus the aggregated project costs [Annex Table 7] yielded the results shown in Text Table 2 below.

Text Table 2
Results of the SSIMP Base Case Economic Analysis

Evaluation Criterion	Value
Net Present Value at 5 %	\$ 36,521,501
Net Present Value at 10 %	\$ 9,147,214
Benefit/Cost Ratio at 5 %	2.92
Benefit/Cost Ratio at 10 %	1.53
Economic Internal Rate of Return	14.58

VI. Sensitivity Analysis

As the project implementation period is very short and major changes in estimated costs are not expected at this time, sensitivity analysis has been limited to four alternative scenarios. They are:

- ◆ Construction costs for both surface and groundwater increase by 20 percent [Case 1];
- ◆ Operations and maintenance costs for the three surface irrigation systems increase by 20 percent [Case 2];
- ◆ Operations and maintenance costs for the three surface irrigation systems decrease by 20 percent as a result of new policies for improved O&M systems [Case 3]; and
- ◆ Project benefits increase by 25 percent as a result of farmers in the irrigation systems devoting more hectareage to higher value crops [Case 4].

As can be seen in Text Table 3 below, the changes in the criterion values are relatively modest when the base case values are compared with the alternative values.

Text Table 3
Comparison of Criterion Values for the Base Case and Alternative Scenarios

Criterion Value	Base Case	Case 1	Case 2	Case 3	Case 4
NPV @ 15 % [in 000 U.S.\$]	-\$ 533	-\$ 2,746	- \$ 594	-\$ 435	\$ 334
B/C Ratio @ 15 %	0.94	0.85	0.96	0.97	1.20
EIRR	14.58 %	13.06 %	14.53 %	14.66 %	17.54 %

With only direct net benefits enumerated in these scenarios, the economic internal rate of return [EIRR] ranges between 13.06 and 17.54 percent. Considering that incremental project benefits discussed in Sections IV. B and C above will also be generated but have not been evaluated in quantitative terms, it would appear likely that, if the SSIMP EIRR were to be recalculated at some point in the future when these incremental benefits could be evaluated, the analysis would yield an EIRR significantly higher than 15 percent.

As 12 to 15 percent is generally thought to be a very acceptable real rate of return on an investment on agricultural infrastructure in Indonesia, the proposed USAID and GOI investments under the SSIMP Project Paper Amendment should be judged as economic under prevailing criteria.

Annexes for Economic Analysis

Annex Table 1
Estimated SSIMP Cost Flows [in thousands of U.S. \$]

Project Year	Investment Costs		O&M Costs			Aggregate Cost Flow
	USAID	GOI	Kali. II	Awo	Tiu Kulit	
1	8,843	6,243	0	0	0	15,086
2	2,264	964	0	0	0	3,228
3	0	0	38	8	14	60
4	0	0	38	16	28	82
5	0	0	38	24	28	90
6	0	0	38	32	28	98
7	0	0	38	41	28	107
8	0	0	38	41	28	107
9	0	0	38	41	28	107
10	0	0	38	41	28	107
11	0	0	38	41	28	107
12	0	0	38	41	28	107
13	0	0	38	41	28	107
14	0	0	38	41	28	107
15	0	0	38	41	28	107
16	0	0	38	41	28	107
17	0	0	38	41	28	107
18	0	0	38	41	28	107
19	0	0	38	41	28	107
20	0	0	38	41	28	107
21	0	0	38	41	28	107
22	0	0	38	41	28	107
23	0	0	38	41	28	107
24	0	0	38	41	28	107
25	0	0	127	136	92	355
26	0	0	38	41	28	107
27	0	0	38	41	28	107
28	0	0	38	41	28	107
29	0	0	38	41	28	107
30	0	0	38	41	28	107
31	0	0	38	41	28	107
32	0	0	38	41	28	107
33	0	0	38	41	28	107
34	0	0	38	41	28	107
35	0	0	38	41	28	107
36	0	0	38	41	28	107
37	0	0	38	41	28	107
38	0	0	38	41	28	107
39	0	0	38	41	28	107
40	0	0	38	41	28	107
41	0	0	38	41	28	107
42	0	0	38	41	28	107
43	0	0	38	41	28	107
44	0	0	38	41	28	107
45	0	0	38	41	28	107
46	0	0	38	41	28	107
47	0	0	38	41	28	107
48	0	0	38	41	28	107
49	0	0	38	41	28	107
50	0	0	38	41	28	107

Explanatory Notes for Annex Table 1

1. Investment costs for USAID and GOI as per figures highlighted in Text Table 1. Source was the USAID SSIMP project manager.
2. Estimated operations and maintenance costs for the Kalimantanong II surface irrigation system as per the Project Justification Report -- Kalimantanong II Project [Small Scale Irrigation Management Project, 1990], p. XI-11. Figures assume the following:
 - a. A net command area of 2,336 hectares;
 - b. An annual operations and maintenance cost of Rupiahs 30,000 per hectare, starting the year following completion of construction;
 - c. A mid-project replacement costs of Rupiahs 100,000 per hectare in project year 25; and
 - b. A 50 year project life.
3. Estimated operations and maintenance costs for the Awo surface irrigation system as per the Project Justification Report -- Awo Irrigation Project [Small Scale Irrigation Management Project, 1991], p. XI-11-12. Figures assume the following:
 - a. A net command area of 2,500 hectares;
 - b. An annual operations and maintenance cost of Rupiahs 30,000 per hectare, starting the year following completion of construction and phased linearly over a five year period;
 - c. A mid-project replacement costs of Rupiahs 100,000 per hectare in project year 25; and
 - b. A 50 year project life.
4. Estimated operations and maintenance costs for the Tiu Kulit surface irrigation system as per the Project Justification Report -- Tiu Kulit Dam Project [Small Scale Irrigation Management Project, 1989], p. XI-8. Figures assume the following:
 - a. A net command area of 1,700 hectares;
 - b. An annual operations and maintenance cost of Rupiahs 30,000 per hectare, starting the year following completion of construction and phased linearly over a two year period;
 - c. A mid-project replacement costs of Rupiahs 100,000 per hectare in project year 25; and
 - b. A 50 year project life.
5. All Rupiah to U.S. \$ conversions made at the rate of U.S. \$ 1.00 = Rupiahs 1,845 to be compatible with project benefit calculations in constant 1990 terms.

Annex Table 2
 Estimated Annual Incremental Irrigation Benefits from Kalimantan II Project
 [2000 Economic Prices]

Crop Item	Future Without Project	Future With Project	Incremental Increase Sub-Total
<u>Harvested Area in Hectares</u>			
Tech. Irrigated Paddy		4,672	
Pump Irrigated Paddy	694		
Weir Irrigated Paddy	329		
Rainfed Paddy	1,321		
Tech. Irrigated Soybeans		1,186	
Pump Irrigated Soybeans	300		
Rainfed Soybeans	641		7,044
Tech. Irrigated Mungbeans		1,186	- 3,714 =
Rainfed Mungbeans	429		3,330
<u>Yield Per Hectare in Metric Tons</u>			
Tech. Irrigated Paddy		4.5	
Pump Irrigated Paddy	3.9		
Weir Irrigated Paddy	3.1		
Rainfed Paddy	2.4		
Tech. Irrigated Soybeans		1.2	
Pump Irrigated Soybeans	1.2		
Rainfed Soybeans	0.7		
Tech. Irrigated Mungbeans		1.0	
Rainfed Mungbeans	0.4		
<u>Unit Price in U.S. \$ Per Metric Ton</u>			
Paddy	133.33	133.33	
Soybeans	237.94	237.94	
Mungbeans	372.36	372.36	
<u>Unit Production Costs in U.S. \$ Per Hectare</u>			
Tech. Irrigated Paddy		275.88	
Pump Irrigated Paddy	265.58		
Weir Irrigated Paddy	228.73		
Rainfed Paddy	199.45		
Tech. Irrigated Soybeans		157.72	
Pump Irrigated Soybeans	89.43		
Rainfed Soybeans	73.17		
Tech. Irrigated Mungbeans		155.01	
Rainfed Mungbeans	66.13		

Annex Table 2 [Continued]
 Estimated Annual Incremental Irrigation Benefits from Kalimantan II Project
 [2000 Economic Prices]

Crop Item	Future Without Project	Future With Project	Incremental Increase Sub-Total
<u>Total Value of Production in U.S. \$</u>			
Tech. Irrigated Paddy		2,803,252	
Pump Irrigated Paddy	356,098		
Weir Irrigated Paddy	134,959		
Rainfed Paddy	426,016		
Tech. Irrigated Soybeans		338,753	
Pump Irrigated Soybeans	86,179		
Rainfed Soybeans	100,813		3,583,739
Tech. Irrigated Mungbeans		441,734	- 1,174,526
Rainfed Mungbeans	70,461		= 2,409,213
<u>Total Cost of Production in U.S. \$</u>			
Tech. Irrigated Paddy		1,288,889	
Pump Irrigated Paddy	184,282		
Weir Irrigated Paddy	75,339		
Rainfed Paddy	263,415		
Tech. Irrigated Soybeans		186,992	
Pump Irrigated Soybeans	27,100		
Rainfed Soybeans	47,155		1,659,621
Tech. Irrigated Mungbeans		183,740	- 625,475
Rainfed Mungbeans	28,184		= 1,034,146
<u>Net Value of Production in U.S. \$</u>			
Tech. Irrigated Paddy		1,514,363	
Pump Irrigated Paddy	171,816		
Weir Irrigated Paddy	59,621		
Rainfed Paddy	162,602		
Tech. Irrigated Soybeans		151,762	
Pump Irrigated Soybeans	59,621		
Rainfed Soybeans	53,659		1,924,120
Tech. Irrigated Mungbeans		257,995	- 549,053
Rainfed Mungbeans	41,734		= 1,375,067

Explanatory Notes for Annex Table 2

1. Net command area for Kalimantan II is reported as 2,336 hectares.
2. 479 hectares in Kalimantan I irrigation system to receive water from the Kalimantan II system in the third season, providing additional palawija benefits at this time for this area.
3. For additional details on Kalimantan II system calculations, see Project Justification Report -- Kalimantan II Project [Small Scale Irrigation Management Project, 1990], Chapter XI Project Economics.

Annex Table 3
 Estimated Annual Incremental Irrigation Benefits from Awo Project
 [2000 Economic Prices]

Crop Item	Future Without Project	Future With Project	Incremental Increase Sub-Total
<u>Harvested Area in Hectares</u>			
Tech. Irrigated Paddy		5,000	
Supplementary Pump Irrigated Paddy	550		
Pump Irrigated Paddy	523		
Rainfed Paddy	1,279		
Rainfed Soybeans	121		5,000
Rainfed Mungbeans	759		- 3,914 =
Mixed Upland Cropping	682		1,086
<u>Yield Per Hectare in Metric Tons</u>			
Tech. Irrigated Paddy		4.9	
Supplementary Pump Irrigated Paddy	3.2		
Pump Irrigated Paddy	3.0		
Rainfed Paddy	2.9		
Rainfed Soybeans	0.6		
Rainfed Mungbeans	0.4		
Mixed Upland Cropping	0.3		
<u>Unit Price in U.S. \$ Per Metric Ton</u>			
Paddy	130.08	130.08	
Soybeans	238.48	238.48	
Mungbeans	363.14	363.14	
Maize	135.50	135.50	
<u>Unit Production Costs in U.S. \$ Per Hectare</u>			
Tech. Irrigated Paddy		324.12	
Supplementary Pump Irrigated Paddy	236.86		
Pump Irrigated Paddy	261.79		
Rainfed Paddy	217.89		
Rainfed Soybeans	100.27		
Rainfed Mungbeans	86.72		
Mixed Upland Cropping	61.25		

Annex Table 3 [Continued]
Estimated Annual Incremental Irrigation Benefits from Awo Project
[2000 Economic Prices]

Crop Item	Future Without Project	Future With Project	Incremental Increase Sub-Total
<u>Total Value of Production in U.S. \$</u>			
Tech. Irrigated Paddy		3,186,992	
Supplementary Pump Irrigated Paddy	228,184		
Pump Irrigated Paddy	202,168		
Rainfed Paddy	475,881		
Rainfed Soybeans	15,718		3,186,992
Rainfed Mungbeans	121,409		- 1,125,203
Mixed Upland Cropping	81,843		= 2,061,789
<u>Total Cost of Production in U.S. \$</u>			
Tech. Irrigated Paddy		1,620,596	
Supplementary Pump Irrigated Paddy	130,081		
Pump Irrigated Paddy	137,127		
Rainfed Paddy	278,591		
Rainfed Soybeans	11,924		1,620,596
Rainfed Mungbeans	69,377		- 668,834
Mixed Upland Cropping	41,734		= 951,762
<u>Net Value of Production in U.S. \$</u>			
Tech. Irrigated Paddy		1,566,396	
Supplementary Pump Irrigated Paddy	98,103		
Pump Irrigated Paddy	65,041		
Rainfed Paddy	197,290		
Rainfed Soybeans	3,794		1,566,396
Rainfed Mungbeans	51,491		- 455,827
Mixed Upland Cropping	40,108		= 1,110,569

Explanatory Notes for Annex Table 3

1. The net command area for the Awo irrigation system is estimated as 2,500 hectares.
2. The annual net value of agricultural production in the Awo irrigation system is reduced from \$ 1,110,569 to \$ 1,103,980 to the estimated foregone project benefits [\$ 6,589 per year] resulting from the weir pool inundation caused in construction of the system.
3. For additional details on Awo system calculations, see Project Justification Report -- Awo Irrigation Project [Small Scale Irrigation Management Project, 1991], Chapter XI Project Economics.

Annex Table 4
 Estimated Annual Incremental Irrigation Benefits from Tiu Kulit Project
 [2000 Economic Prices]

Crop Item	Future Without Project	Future With Project	Incremental Increase Sub-Total
<u>Harvested Area in Hectares</u>			
Irrigated Paddy	976	1,700	
Irrigated Soybeans		1,190	
Irrigated Mungbeans		721	
Rainfed Paddy	356		
Rainfed Soybeans			5,000
Rainfed Mungbeans	359		- 3,914
			= 1,086
<u>Yield Per Hectare in Metric Tons</u>			
Irrigated Paddy	2.3	4.9	
Irrigated Soybeans		1.3	
Irrigated Mungbeans		1.1	
Rainfed Paddy	1.9		
Rainfed Soybeans			
Rainfed Mungbeans	0.3		
<u>Unit Price in U.S. \$ Per Metric Ton</u>			
Paddy	130.08	130.08	
Soybeans	238.48	238.48	
Mungbeans	363.14	363.14	
<u>Unit Production Costs in U.S. \$ Per Hectare</u>			
Paddy	148.79	228.11	
Soybeans		140.22	
Mungbeans	65.24	119.25	
<u>Total Value of Production in U.S. \$</u>			
Paddy	453,312	1,083,566	1,740,501
Soybeans		368,929	- 492,422
Mungbeans	39,110	288,006	= 1,248,079
<u>Total Cost of Production in U.S. \$</u>			
Paddy	198,188	387,787	640,628
Soybeans		166,862	- 221,609
Mungbeans	23,421	85,979	= 419,019
<u>Net Value of Production in U.S. \$</u>			
Paddy	255,124	695,779	1,099,873
Soybeans		202,067	- 270,813
Mungbeans	15,689	202,027	= 829,060

Explanatory Notes for Annex Table 4

1. The net command area for the Tiu Kulit irrigation system is estimated as 1,700 hectares.
2. For additional details on Tiu Kulit system calculations, see Project Justification Report -- Tiu Kulit Dam Project [Small Scale Irrigation Management Project, 1989], Chapter XI Project Economics.

Annex Table 5
Estimated Direct Net Benefits from Groundwater Irrigation Systems
[2000 Economic Prices in U.S. \$]

Type of System	Estimated Direct Net Benefits Per Hectare	Number of Hectares Per System	Total Value of Net Benefits
<u>Low Value</u> SulSel Low Intensity System	352	150	52,800
<u>Medium Value</u> Bima Higher Intensity System	545	150	81,750
<u>High Value</u> Oesao High Intensity System	1,033	150	154,950
Total		450	289,500

Explanatory Notes for Annex Table 5

1. The net command area for the three groundwater irrigation systems is estimated as 450 hectares.
2. For additional details on the groundwater irrigation system calculations, see An Economic Assessment of Ground Water Projects [Harza Engineering Company, 1991].

Annex Table 6
Estimated SSIMP Direct Net Benefit Flows [in U.S. \$]

Project Year	Kalimantong Direct Net Benefits	Awo Direct Net Benefits	Tiu Kulit Direct Net Benefits	Groundwater Direct Net Benefits	Aggregated Direct Net Benefits
1	0	0	0	0	0
2	0	0	0	0	0
3	687,534	548,627	414,530	144,750	1,795,441
4	859,417	687,466	518,163	180,938	2,245,984
5	1,031,300	826,304	621,796	217,125	2,696,525
6	1,203,183	965,142	725,428	253,313	3,147,066
7	1,375,067	1,103,980	829,060	289,500	3,597,607
8	1,375,067	1,103,980	829,060	289,500	3,597,607
9	1,375,067	1,103,980	829,060	289,500	3,597,607
10	1,375,067	1,103,980	829,060	289,500	3,597,607
11	1,375,067	1,103,980	829,060	289,500	3,597,607
12	1,375,067	1,103,980	829,060	289,500	3,597,607
13	1,375,067	1,103,980	829,060	289,500	3,597,607
14	1,375,067	1,103,980	829,060	289,500	3,597,607
15	1,375,067	1,103,980	829,060	289,500	3,597,607
16	1,375,067	1,103,980	829,060	289,500	3,597,607
17	1,375,067	1,103,980	829,060	289,500	3,597,607
18	1,375,067	1,103,980	829,060	289,500	3,597,607
19	1,375,067	1,103,980	829,060	289,500	3,597,607
20	1,375,067	1,103,980	829,060	289,500	3,597,607
21	1,375,067	1,103,980	829,060	289,500	3,597,607
22	1,375,067	1,103,980	829,060	289,500	3,597,607
23	1,375,067	1,103,980	829,060	289,500	3,597,607
24	1,375,067	1,103,980	829,060	289,500	3,597,607
25	1,375,067	1,103,980	829,060	289,500	3,597,607
26	1,375,067	1,103,980	829,060	289,500	3,597,607
27	1,375,067	1,103,980	829,060	289,500	3,597,607
28	1,375,067	1,103,980	829,060	289,500	3,597,607
29	1,375,067	1,103,980	829,060	289,500	3,597,607
30	1,375,067	1,103,980	829,060	289,500	3,597,607
31	1,375,067	1,103,980	829,060	289,500	3,597,607
32	1,375,067	1,103,980	829,060	289,500	3,597,607
33	1,375,067	1,103,980	829,060	289,500	3,597,607
34	1,375,067	1,103,980	829,060	289,500	3,597,607
35	1,375,067	1,103,980	829,060	289,500	3,597,607
36	1,375,067	1,103,980	829,060	289,500	3,597,607
37	1,375,067	1,103,980	829,060	289,500	3,597,607
38	1,375,067	1,103,980	829,060	289,500	3,597,607
39	1,375,067	1,103,980	829,060	289,500	3,597,607
40	1,375,067	1,103,980	829,060	289,500	3,597,607
41	1,375,067	1,103,980	829,060	289,500	3,597,607
42	1,375,067	1,103,980	829,060	289,500	3,597,607
43	1,375,067	1,103,980	829,060	289,500	3,597,607
44	1,375,067	1,103,980	829,060	289,500	3,597,607
45	1,375,067	1,103,980	829,060	289,500	3,597,607
46	1,375,067	1,103,980	829,060	289,500	3,597,607
47	1,375,067	1,103,980	829,060	289,500	3,597,607
48	1,375,067	1,103,980	829,060	289,500	3,597,607
49	1,375,067	1,103,980	829,060	289,500	3,597,607
50	1,375,067	1,103,980	829,060	289,500	3,597,607

Explanatory Note for Annex Table 6

1. Direct net benefit flows in the table are taken from the following: Kalimantanong II irrigation system [Annex Table 2]; Awo irrigation system [Annex Table 3]; Tiu Kulit irrigation system [Annex Table 4]; and groundwater irrigation systems [Annex Table 5].

Annex Table 7
Summary of Base Case SSIMP Undiscounted Economic Benefit/Cost Flows

Project Year	Aggregated Direct Net Benefits	Aggregated Project Costs	Net Benefit Stream
1	0	15,086,000	- 15,086,000
2	0	3,228,000	- 3,228,000
3	1,795,441	60,000	1,735,441
4	2,245,984	82,000	2,163,984
5	2,696,525	90,000	2,605,525
6	3,147,066	98,000	3,049,066
7	3,597,607	107,000	3,490,607
8	3,597,607	107,000	3,490,607
9	3,597,607	107,000	3,490,607
10	3,597,607	107,000	3,490,607
11	3,597,607	107,000	3,490,607
12	3,597,607	107,000	3,490,607
13	3,597,607	107,000	3,490,607
14	3,597,607	107,000	3,490,607
15	3,597,607	107,000	3,490,607
16	3,597,607	107,000	3,490,607
17	3,597,607	107,000	3,490,607
18	3,597,607	107,000	3,490,607
19	3,597,607	107,000	3,490,607
20	3,597,607	107,000	3,490,607
21	3,597,607	107,000	3,490,607
22	3,597,607	107,000	3,490,607
23	3,597,607	107,000	3,490,607
24	3,597,607	107,000	3,490,607
25	3,597,607	355,000	3,242,607
26	3,597,607	107,000	3,490,607
27	3,597,607	107,000	3,490,607
28	3,597,607	107,000	3,490,607
29	3,597,607	107,000	3,490,607
30	3,597,607	107,000	3,490,607
31	3,597,607	107,000	3,490,607
32	3,597,607	107,000	3,490,607
33	3,597,607	107,000	3,490,607
34	3,597,607	107,000	3,490,607
35	3,597,607	107,000	3,490,607
36	3,597,607	107,000	3,490,607
37	3,597,607	107,000	3,490,607
38	3,597,607	107,000	3,490,607
39	3,597,607	107,000	3,490,607
40	3,597,607	107,000	3,490,607
41	3,597,607	107,000	3,490,607
42	3,597,607	107,000	3,490,607
43	3,597,607	107,000	3,490,607
44	3,597,607	107,000	3,490,607
45	3,597,607	107,000	3,490,607
46	3,597,607	107,000	3,490,607
47	3,597,607	107,000	3,490,607
48	3,597,607	107,000	3,490,607
49	3,597,607	107,000	3,490,607
50	3,597,607	107,000	3,490,607

Explanatory Note for Annex Table 7

1. **Aggregated direct net benefits in the table taken from Annex Table 6 and Aggregated Project Costs taken from Annex Table 1.**

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7. Summaries of Analyses

7.1 Economic Analysis

The economic analysis of the amended SSIMP was conducted to assist in developing a better understanding of the implications of scaling back the project's civil works component and expanding its focus on institutional development. As such, the analysis compares the USAID and GOI costs projected as necessary to complete all essential project activities on or before the new PACD against the projected benefits to be derived from those activities.

The analysis addresses only those additional USAID and GOI SSIMP costs to be incurred during the period covered by the Project Paper Amendment -- i.e., 1 October 1992 to 31 March 1994. In this sense, the analysis seeks to provide guidance to project management in answering the key managerial question -- Do the projected benefits to be derived from continuing SSIMP activities through the PACD justify the anticipated USAID and GOI investments needed to complete those activities?

With this objective in mind, the analysis treats all project costs incurred prior to the end of FY 1992 -- i.e., 30 September 1992 -- as "sunk" costs. It also respects the opinion of USAID project managers to the effect that essentially no sustained benefits can be expected from SSIMP activities initiated prior to 30 September 1992 unless the incremental investments projected in the Project Paper Amendment are undertaken prior to the PACD to complete essential activities.

For purposes of this analysis, the new -- or incremental -- project costs necessary to complete all anticipated activities over the period of the Project Paper Amendment -- i.e., 1 October 1992 to 31 March 1994 -- are estimated as \$ 11.107 million from USAID and \$ 7.207 million from the GOI. After completion of the surface and installation of the groundwater irrigation systems, O&M costs will be incurred as specific to each system. These costs will be incurred after the PACD but are projected in the analysis.

Three categories of benefit flows are projected from the activities to be financed under the Project Paper Amendment. They are:

- ◆ Direct net benefits from increased agricultural production;
- ◆ Secondary benefits from construction and operations of the new irrigation systems; and

- ◆ Tertiary benefits to be derived from SSIMP policy studies.

Quantitative analysis of the direct costs and benefits from installation of new irrigation capacity was possible on the basis of the secondary data available from SSIMP project justification reports. Secondary and tertiary benefits are discussed in the analysis only in qualitative terms.

The SSIMP base case analysis of the aggregated direct benefits versus project costs yielded the results shown below.

Text Table 1
Results of the SSIMP Base Case Economic Analysis

Evaluation Criterion	Value
Net Present Value at 5 %	\$ 36,521,501
Net Present Value at 10 %	\$ 9,147,214
Benefit/Cost Ratio at 5 %	2.92
Benefit/Cost Ratio at 10 %	1.53
Economic Internal Rate of Return	14.58

As the project implementation period is very short and major changes in estimated costs are not expected before the PACD, the sensitivity analysis has been limited to four alternative scenarios. They are:

- ◆ Construction costs for both surface and groundwater increase by 20 percent [Case 1];
- ◆ Operations and maintenance costs for the three surface irrigation systems increase by 20 percent [Case 2];
- ◆ Operations and maintenance costs for the three surface irrigation systems decrease by 20 percent as a result of new policies for improved O&M systems [Case 3]; and
- ◆ Project benefits increase by 25 percent as a result of farmers in the irrigation systems devoting more hectareage to higher value crops [Case 4].

The changes in the criterion values of these alternative scenarios proved to be modest. The economic internal rates of return [EIRR] ranged between 13.06

and 17.54 percent. Considering that incremental secondary and tertiary project benefits will be generated as discussed in the analysis -- but have not been evaluated in quantitative terms -- it is likely that, if an ex poste SSIMP EIRR were to be recalculated when these incremental benefits could be quantitatively evaluated, the analysis would yield an EIRR significantly higher than 15 percent.

As 12 to 15 percent is generally thought to be a very acceptable rate of return on an investment on agricultural infrastructure in Indonesia, the proposed USAID and GOI investments under the SSIMP Project Paper Amendment should be judged as economic under prevailing criteria.