

4930272
19-110-77-51

210 P

UNCLASSIFIED

DEPARTMENT OF STATE
AGENCY FOR INTERNATIONAL DEVELOPMENT
Washington, D.C. 20523

PROJECT PAPER

Proposal and Recommendations
For the Review of the
Development Loan Committee

THAILAND - Lam Nam Oon Integrated Rural Development

AID-DLC/P-2226

UNCLASSIFIED

DEPARTMENT OF STATE
AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON, D.C. 20523

UNCLASSIFIED

AID-DLC/P-2226

June 16, 1977

MEMORANDUM FOR THE DEVELOPMENT LOAN COMMITTEE

SUBJECT: THAILAND - Lam Nam Oon Integrated Rural Development

Attached for your review are the recommendations for authorization of a loan in an amount not to exceed Four Million Five Hundred Thousand United States Dollars (\$4,500,000) to the Kingdom of Thailand to help in financing certain foreign exchange and local currency costs of goods and services required for the Project.

No meeting is scheduled for this proposal. However, please advise us of your concurrence or objections as early as possible, but in no event later than close of business on Friday, June 24, 1977. If you are a voting member, a poll sheet has been enclosed for your response.

Development Loan Committee
Office of Development Program
Review

Attachments:

Summary and Recommendations
Project Analysis
Annexes A - I

UNCLASSIFIED

TABLE OF CONTENTS

	<u>Page</u>
ANNEXES	i
ABBREVIATIONS AND EQUIVALENTS	iii
PART 1. <u>Summary and Recommendations</u>	1
A. Face Sheet Data	1
B. Recommendations	2
C. Description of the Project	3
D. Summary Findings	5
E. Project Issues	8
PART 2. <u>Project Background and Detailed Description</u>	13
A. Background	13
B. Detailed Description	15
PART 3. <u>Project Analyses</u>	37
A. Technical Analysis including Environmental Assessment	37
B. Financial Analysis and Plan	49
C. Social Analysis	61
D. Economic Analysis	71
PART 4. <u>Implementation Planning</u>	77
A. Administrative Arrangements	77
B. Implementation Plan	84
C. Evaluation Plan	87
D. Conditions, Covenants and Negotiating Status	89

ANNEXES

- A. AID/W PRP Approval Message
- B. Project Technical Details
 1. LNO Location Map
 2. Soils
 - a. Map: Soil Distribution by Class Type
 - b. Map: Soil Distribution by pH Range
 - c. Table: RID Land/Soil Classification
 3. Project Costs
 - a. Cost Estimate: LNO Project Administration Center
 - b. RTG Staffing Pattern and Costs
 4. Summary of O&M Costs
 5. O&M Equipment List/Cost
 6. Construction Schedule
 7. Cropping Pattern
 - a. Crop Plan
 - b. Crop Calendar
 8. Cropping Area, Production, Value Table
 9. RTG Organization Charts
 - a. RID Organizational Chart
 - b. RTG Organizational Structure
 - c. LNO Central Administrative Organization
 - d. LNO Field Management Organization
 10. Technical Advisory Services
 - a. Consultant Scope of Services
 - b. Staffing Plan and Schedule
 11. Operational Research Programs
 12. Summary: Expanded Health and Family Planning Services and PVO Program

- C. Environmental Assessment
- D. Logical Framework Matrix
- E. Project Performance Tracking
 - 1. Project Performance Tracking Network Chart
 - 2. Critical Performance Indicators (CPI)
 - 3. Implementation Schedule
- F. Statutory Checklist
- G. Mission Director's Certification
(Capital-type projects only, per FAA 611(e))
- H. Borrower/Grantee's Application for Assistance
- I. Draft Authorizing document; any other requested approvals

Abbreviations and Equivalents

ADB	-	Asian Development Bank
AED	-	Adult Education Division (MOE)
ARD	-	Office of Accelerated Rural Development (MOI)
BAAC	-	Bank for Agriculture and Agricultural Cooperatives
BOB	-	Bureau of the Budget
BOI	-	Board of Investment
BUREC	-	U.S. Bureau of Reclamation
CBFPS	-	Community-Based Family Planning Services
CDD	-	Community Development Department (MOI)
CLCO	-	Central Land Consolidation Office (MOAC)
CP	-	Condition Precedent
CSC	-	Civil Service Commission
DAE	-	Division of Agricultural Economics (MOAC)
DLD	-	Department of Land Development (MOAC)
DOA	-	Department of Agriculture (MOAC)
DOAE	-	Department of Agricultural Extension (MOAC)
DOCP	-	Department of Cooperative Promotion (MOAC)
DOF	-	Department of Fisheries (MOAC)
DOH	-	Department of Health (MOPH)
DOLA	-	Department of Local Administration (MOI)
DTEC	-	Department of Technical and Economic Cooperation (Prime Minister Office)
ECI	-	Engineering Consultants, Inc.
FA	-	Farmer Association
IBRD	-	International Bank for Reconstruction and Development
LNO	-	Lam Nam Oon
MI	-	Ministry of Industry
MOAC	-	Ministry of Agriculture and Cooperatives
MOE	-	Ministry of Education
MOF	-	Ministry of Finance
MOI	-	Ministry of Interior
MOPH	-	Ministry of Public Health
MRD	-	Mineral Resources Department (MI)
NEARC	-	Northeast Agricultural and Research Center (MOAC)
NEB	-	National Environment Board
NESDB	-	National Economic and Social Development Board
PVO/OPG	-	Private & Voluntary Organization/Operational Program Grant
PWD	-	Public Welfare Department (MOI)
RID	-	Royal Irrigation Department (MOAC)
RTG	-	Royal Thai Government
THEA	-	Home Economics Association of Thailand
USOM	-	United States Operations Mission (Thailand)
WUA	-	Water Users Association

Currency Equivalents

U.S.\$ 1.00 = Baht 20.00
Baht 1.00 = U.S. 0.05

Area Equivalents

1 rai = 0.16 hectare (0.40 acre)
1 hectare = 6.25 rai (2.47 acres)
1 acre = 2.5 rai

A. Face Sheet Data

AGENCY FOR INTERNATIONAL DEVELOPMENT PROJECT PAPER FACESHEET TO BE COMPLETED BY ORIGINATING OFFICE			1. TRANSACTION CODE ("X" appropriate box) <input type="checkbox"/> Original <input type="checkbox"/> Change <input type="checkbox"/> Add <input type="checkbox"/> Delete			PP <hr/> DOCUMENT CODE 3				
2. COUNTRY/ENTITY <p style="text-align: center;">THAILAND</p>			3. DOCUMENT REVISION NUMBER							
4. PROJECT NUMBER <p style="text-align: center;">003-0272</p>		5. BUREAU a. Symbol: ASIA b. Code 04	6. ESTIMATED FY OF PROJECT COMPLETION <p style="text-align: center;">FY 8 1</p>							
7. PROJECT TITLE - SHORT (stay within brackets) <p style="text-align: center;">[Lam Nam Oon Integrated Development]</p>			8. ESTIMATED FY OF AUTHORIZATION/OBLIGATION a. INITIAL <u>09</u> <u>77</u> b. FINAL FY <u>7</u> <u>7</u>							
9. ESTIMATED TOTAL COST (\$000 or equivalent, \$1 =)										
a. FUNDING SOURCE		FIRST YEAR FY <u>77</u>		ALL YEARS						
		b. FX	c. L/C	d. Total	e. FX	f. L/C	g. Total			
AID APPROPRIATED TOTAL		3,205	1,395	4,600	3,205	1,395	4,600			
(Grant)		(100)	(-0-)	(100)	(100)	(-0-)	(100)			
(Loan)		(3,105)	(1,395)	(4,500)	(3,105)	(1,395)	(4,500)			
Other	1.									
U.S.	2.									
HOST GOVERNMENT										
OTHER DONOR(S)							39,296			
TOTALS							43,896			
10. ESTIMATED COSTS/AID APPROPRIATED FUNDS (\$000)										
a. Approp-riation (Alpha Code)	b. Primary Purpose Code	c. Primary Tech. Code	FY <u>77</u>		FY _____		FY _____		ALL YEARS	
			d. Grant	e. Loan	f. Grant	g. Loan	h. Grant	i. Loan	j. Grant	k. Loan
FN	143B	244	100	4,500					100	4,500
TOTALS			100	4,500					100	4,500
11. ESTIMATED EXPENDITURES									100	4,500
12. PROJECT PURPOSE(S) (stay within brackets) <input checked="" type="checkbox"/> Check if different from PID/PRP						[To demonstrate in a typical irrigated area in northeastern Thailand an integrated and coordinated approach to rural development which (a) significantly increases agricultural production and (b) improves the quality of rural life over a broad spectrum.]				
13. WERE CHANGES MADE IN BLOCKS 12, 13, 14, or 15 OF THE PID FACESHEET? IF YES, ATTACH CHANGED PID FACESHEET. <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No										
14. ORIGINATING OFFICE CLEARANCE						15. Date Received in AID/W, or For AID/W Documents, Date of Distribution				
Signature Charles L. Gladson			Date Signed mo. day yr. 04 15 77			mo. day yr. 0 50 27 77				
Title Director, USOM/Thailand										

PART 1. Summary and Recommendations

R. Recommendations

1. Authorization of a loan and grant to Thailand in an amount not to exceed \$4,600,00 for the Lam Nam Oon Integrated Rural Development Project. \$4,500,000 will be for the proposed loan, with terms of 40 years with a 10 year grace period during which interest will be 2% and after which interest will be 3%. The remaining \$100,000 will be for the proposed grant for evaluation.

2. Authorization of certain preimplementation actions specified in Part 4.B.

3. Waiver of source certification requirements for local currency procurement for the reasons set out in Part 4.B.

PART 1. Summary and Recommendations

C. Description of the Project

This Project is a joint RTG/AID integrated rural development effort to increase the quality of life of approximately 10,000 poor farm families in Northeast Thailand. The project includes: (a) the completion of construction of the irrigation system in the Lam Nam Oon project area; (b) construction of a road network for maintaining the irrigation system, doubling as a feeder road system for the farmers; (c) operation of an on-farm water supply system; and (d) an integrated program of community development, agricultural research and extension, provision of farm inputs, farm products marketing, health and family planning services, and adult education

The project is designed so that the local level institutions and communities are identified in the organizational structure and actively participate and have a significant voice during the earliest stages of project planning as well as during implementation--an organizing of the project from the bottom up. The project is designed to ensure that the various activities are introduced in the community in a culturally compatible manner and are effectively coordinated with each other.

The project is also designed so that the various RTG departments and agencies involved in the project coordinate closely and work together as a team, at both the national and local levels. A unique feature, for Thailand, of project management is a single Project Field Director who shall have responsibility and authority to coordinate all field activities of the project.

A separate element of the project is assistance to families resettled from the reservoir area to the upstream resettlement area. This element involves the introduction of modern sericulture activities to the upstream farmers, modeled after and administered in the same fashion as the Sericulture/Settlements Project, under AID Loan No.493-0271.

The major share---almost 90% of total project costs will be provided by the RTG. The A.I.D. \$4.5 million loan will finance portions of the costs of dual purpose equipment for use in constructing and maintaining the irrigation system, of advisory services for all elements of the project, of the rural development activities of each of the RTG Departments directly involved in the project, and of sericulture activities in the upstream area. Grant funding of \$100,000 will be provided for the continuing evaluation program.

PART 1. Summary and Recommendations

D. Summary Findings

USOM and the RTG, with the help of many experts and consultants over several years, have completed a thorough analysis of all aspects of the Lam Nam Oon Project. Our conclusion is that the proposed project is feasible and will contribute significantly to agricultural development in Thailand, primarily by introducing concepts of integrated development.

The design of the project has broadened over time into a truly integrated rural development project but is still built around the original basic intent to bring greater attention of RTG agencies, particularly RID, to on-farm water utilization potentials, problems and solutions.

Even aside from inattention to on-farm use of water already in the Lam Nam Oon reservoir, the pace of construction of basic irrigation work has until recently been discouraging. Performance in the past year has improved considerably and we find ample evidence now of a sincere commitment to move forward on the project both in RID and in the other agencies which have more recently agreed to participate. This is in part a response to the government's very urgent desire to quicken the pace of agricultural development complemented by the catalytic effect of USOM's design assistance.

Managerial considerations are an important part of such a complex undertaking as this project where many agencies are providing complementary inputs. The design therefore includes some organizational features that would be unique in Thailand. They are built around the concept of an authority vested in a single project field director, participation of local government officials, and physical co-location of officials from different agencies to facilitate organizational relationships and promote coordination.

1. Technical. The technical analysis of the project has been difficult because of differing conclusions based on different data by some of the experts who have studied the project. Some of the more serious questions raised have

concerned soil suitability (primarily because of high acidity), water availability and adequacy of the basic irrigation system design. All of these questions have been carefully considered, additional experts have been consulted, and specific solutions to these problems identified. An important development was finding a source of limestone for soil improvement at reasonable cost. It has been concluded that the technical problems are solvable but that foreign consultant assistance will materially enhance and expedite implementation, especially by providing assistance in some of the more sophisticated planning and in relating irrigation engineering and agricultural considerations.

2. Economic. The economic viability of the project looked rather dismal when it was first concluded that the soils in the area would not be suitable for other than rice-rice cropping pattern. The soils situation which proved upon more study not to be a limiting factor, a reduced land consolidation area, and a wider distribution of dry season water all combined to permit a much improved and diversified crop production projection. Now the calculated Internal Rate of Return is 25.8% if prior investments are not considered and 10.1% if they are considered. Sensitivity analyses show the project to be not unduly sensitive to possible variations in the assumptions underlying the calculations.

3. Financial. The heavy investment by the government in facilities to enable project area farmers to substantially increase their crop production and income with very little investment of their own results in extremely high rates of return to individual farmers. For that reason, a covenant is included which pledges the Thai Government to develop within 2 years of Project Agreement signature a cost recovery program under which the Government will share in the benefits generated by the project. Without such a cost recovery program, the expected rate of return to an individual farmer would be as high as 285%. Even with such a program which requires farmers to pay for improvements on their land by taking out loans, rates of return will range from 23% to 43%, which is still high enough to assure farmer support.

Detailed analyses of costs have been made and are reviewed in the appropriate part of this PP. AID will provide less than 11% of the incremental project costs from 1977 on. Financial planning is complete and allocation of budgetary resources reasonably assured.

4. Social. The project design places a heavy emphasis on social welfare considerations and participation of beneficiaries and local governmental institutions so that overall well being of the project participants, not just their incomes, will be improved. Available data establishes that project area farmers are within AID's target population and are among Thailand's poorest. Local customs and social characteristics have been carefully considered and the project design adapted to them wherever possible. No cultural impediments have been found. Women play an important role in the project.

Readiness for Implementation

Basic irrigation facilities construction is well underway, project design is complete and RTG budget requests are in process. The project is ready for implementation.

Statutory Criteria

The project meets all statutory criteria. See Annex F.

Mission Director's 611(e) Certification

The required certification is provided as Annex G.

PART 1. Summary and Recommendations

E. Project Issues

A number of issues were raised by AID/W during its review of the PRP. A short discussion of each issue with references indicating where detailed discussion can be found in the PP follows:

1. Appropriateness of AID Loan

Project activities as designed will require coordinated actions of Thai agencies within an agreed framework and implementation schedule. Specific intermediate targets are established, which will be used to monitor and evaluate progress in project implementation. The involvement of USOM and foreign technical experts will provide a useful external stimulus to good performance. The integrated, concentrated and complementary efforts of various agencies will accelerate farmer utilization of the potentials inherent in irrigated agriculture. RTG commitment to the project can be seen in improved RID construction performance in 1976 and the interest of many other RTG agencies in participating in the project. The existence of a signed loan agreement with a foreign donor (AID) is always taken seriously by the RTG and enhances the project's position in securing funding and cooperation from Thai agencies not directly involved in implementation.

2. Beneficiaries

Discussion of the target population in Part 3.C. establishes that project beneficiaries are without question among Thailand's poor majority. Specific data is not yet available to know whether or not the farmers in the pilot project areas are representative of the total project area. One should note that a more important criterion in selecting pilot project areas was that the soil types be representative. However, the socio-economic survey and observations during site visits indicate general homogeneity of farmers and soils so that those in the pilot areas are likely representative within statistical probabilities.

3. Economic Feasibility

Part 3.D. provides rate-of-return analysis based on both total cost (including dam construction) and incremental cost taking account of the net value of all crops expected to be grown. Rice yield projections have been re-examined and found to be reasonable. (see Part 3.A and Annex B.8.). Sensitivity analyses are provided in Part 3.D.

4. Soil Improvement

Soil improvement and drainage are considered important for the most productive use of the land and project design makes provision for them. A source of limestone within a reasonable distance and at a reasonable cost has been located.^{1/} Application of limestone, fertilizer and pesticides will be among the improved practices farmers will be encouraged to use. Extensive drainage canals will be built as part of the irrigation system. These items are discussed in the technical analysis, Part 3.A.

5. Replicability

The uniqueness of the Lam Nam Oon project design lies in its concentrated, coordinated, multi-element approach to rural area development involving the cooperation of a number of RTG agencies and introducing a greater managership role for local government. Helping RTG planners and implementers apply such an approach and demonstrating its results in quicker and greater benefits to farmers will encourage the RTG to apply it more widely elsewhere in future development efforts.

6. RTG Coordination

A detailed description of the Lam Nam Oon project management organization is provided in Part 4.A. A special feature of this organization is the assignment of a Project Field Director, with overall field project management responsibilities, reporting to the Governor of the Province.

^{1/} Maurice Sorenson: Agrilime Feasibility Survey Report, December 20, 1976.

7. Farmer Organizations

Part 2.B. describes a 3-step plan for development of farmers' organizations based on a bottom to top approach. Existing government and commercial institutions will be relied on for credit, agricultural inputs and marketing in the early years of the project. DOAE is responsible for monitoring this aspect and for making arrangements for coordination as described in Part 2.B. The Marketing Organization for Farmers will provide a follow-on effort to DOAE in the support of comprehensive "package" assistance to farmers.

8. Land Titling and Consolidation

Part 2.B. identifies the project's land consolidation area. The implementation planning for this work is incorporated into the overall project plan and is reflected in the implementation schedule. No special "synchronization" problems are anticipated in the land consolidation work. Land tenure is not an issue in the downstream area; practically all farmers' tenure is secure. Land tenure is a problem in the Resettlement area and is discussed in Part 2.B.2.

9. Main Canal Construction

The project construction schedule provides for orderly and timely completion of the main canals, laterals and other needed irrigation works with target dates that are accomplishable and within RID construction capabilities. See Part 3.A. RID met its targets in 1976 and is proceeding satisfactorily in 1977. Additional equipment to be procured as part of the project will help in meeting construction targets. Budgeted funds in 1976 and 1977 have been adequate and the signing of a loan agreement with AID will represent a firm commitment by the RTG and evidence of the priority it accords to prompt completion of the project. See Part 3.B. for further discussion of costs.

10. Local Cost Financing

Financing arrangements will be through direct dollar/baht conversion as established for recent AID loans to Thailand. The justification for this approach is that Thailand has neither a U.S. commodity-import program nor suitable internal procedures for employing special letter of

credit (SLC) arrangements. The relatively small size of this project and the current U.S. AID program in Thailand does not justify the establishment of these special arrangements. Foreign exchange costs will be loan-financed through established Letter of Commitment procedures.

11. Disbursement Period

A five-year period is necessary to cover the technical assistance and other AID inputs which are designed to assure successful accomplishment of this complex project. Realistic expectations for accomplishing construction work and for pacing of other project elements mandate the five year project implementation period.

12. Logical Framework

The log frame matrix has been revised and delineates intermediate outputs as requested. The matrix is presented as Annex D.

13. Environmental Impact

A discussion of potential effects of the project on the environment is presented as Annex C. In the judgment of USOM and the RTG National Environmental Board, the project will have no significant adverse effects on environmental values and will contribute immensely to the welfare of the region.

14. Role of Women

The role of women is discussed in Part 3.C. Women participated in the design of this project and are well represented in the RTG Departments involved in the project.

15. Beneficiaries (in Resettlement Area)

The AID supported sericulture activity is only part of an overall RTG program in the Resettlement area to assist all families there. See Part 2.B.2. Farmer selection will be the same as for the Sericulture/Settlements Project under which selection in the first year has been successfully completed.

16. Alternatives (in Resettlement Area)

Alternative activities were considered at the PRP stage but abandoned in favor of the sericulture activity which was considered especially appropriate since AID was already supporting an identical activity in other Settlement areas. The RTG supports this approach and PWD has participated fully in making arrangements for carrying out the activity in the Lam Nam Oon Resettlement Area.

17. Feasibility (of Sericulture Activity)

Additional inputs and markets for the additional sericulture activity, a 10% increment, have been considered and are provided for. See Part 2.B.2.

18. Financial Management

Arrangements for channeling funds for different activities are discussed in Part 3.B.1.

19. Evaluation

See Part 4.C. for a discussion of the evaluation planning.

PART 2. Project Background and Detailed Description

A Background

In the early 1960's the RTG requested loan assistance from AID for construction of a number of irrigation projects. Two AID loans were subsequently executed: (1) AID Loan No. 493-H-010 for a total of \$11.1 million to assist in the construction of three dam and irrigation projects, the Lam Pac and Lam Phra Pherng in the Northeast and the Mae Taeng in the North; and (2) AID Loan No. 493-H-013 for \$3.5 million to assist with construction of the Lam Nam Oon dam and irrigation project. The request for LNO loan assistance was originally submitted to USOM by RID in 1963 and was approved in 1967 after a number of feasibility studies were conducted by RID and by the U.S. BUREC.

In mid-1974 NESDB and RID requested another \$3.5 million loan for assistance in completing the on-farm developments of the LNO. Based on preliminary studies jointly conducted by AID/W and Mission personnel a PID was prepared and submitted to AID/W and approval subsequently granted in November 1974 to proceed with the PRP. The PRP was then prepared by the Mission with TDY assistance from several AID technicians and submitted to AID/W as two sub-projects: an upstream resettlement subproject to assist PWD in relocating the farmers dislocated by inundation of the reservoir area, and a downstream subproject directed to assist RID in the on-farm aspects of the irrigation system.

The PRP was submitted to AID/W as an FY 1976 project and approval granted for PP preparation by EAPAC in February 1975, but for only the downstream portion until clarification could be obtained on questionable aspects of the upstream sub-project. The Mission subsequently revised the upstream sub-project and submitted it to AID/W as a Sericulture/Settlements activity with assistance identical to that provided to each of the ten resettlements identified in the USOM Sericulture/Settlements PP. The revised PRP was approved by AID/W in December 1975, and rescheduled as an FY 1977 loan project.

In early 1976 a four-man Design Team was contracted by USOM to assist in preparing the PP. The PP could not be completed at this time because of issues raised by the team's

analysis. Most serious was the team's tentative conclusion, based on the soils data which it used, that a rice-rice cropping pattern was the only viable possibility. Questions were also raised concerning systems design and availability of the large amounts of water needed for a rice-rice cropping pattern. The IRR for the project was calculated to be very low.

The seemingly poor prospects for the project stimulated a series of efforts which resulted in a much improved and now very attractive project. USOM requested that the RTG incorporate additional activities into the project to add more earnings possibilities and social benefits. Analyses subsequent to the team's visit indicated that the soils data used by the team was incomplete; the picture was not as bad as had been thought and a low cost source of limestone for acid soils correction was found. A diversified cropping pattern was therefore possible. The area planned for expensive land consolidation was reduced. These changes reduced water requirements considerably and more farmers will be able to benefit from the use of water in the dry season. All of these changes improved the economic viability of the project dramatically and changed it into a truly integrated rural development project.

Late in 1976 the contract services of two additional specialists provided assistance in the final project design. The PP was prepared by USOM staff and the RTG in early 1977.

PART 2. Project Background and Detailed Description

B. Detailed Description

Logical Framework Matrix

The Logical Framework Matrix, Annex D, provides a synopsis of the description of the project in terms of goals, purposes, outputs and inputs.

Success in achieving the project subsector goal of improving the standard of living for the 10,000 farm families of the LNO area can provide a sound base by which, through replication, the broader goal of the project can be realized--improving the quality of life for others among the poorer families in Thailand whose lands are irrigated or irrigable. The assumption of project replication and other critical assumptions identified in the log frame are essential to achieving project objectives and will be monitored as the project proceeds. The project goal of improving the welfare of the rural poor is consistent with both the U.S. Congressional Mandate and the priorities of the RTG Fourth Five-Year Plan.

The project purpose focuses on increase in agricultural production realized from irrigation as well as on other factors contributing to family well-being; provision of social services, including health care and educational opportunities; and participation in Government and community activities which provides the family a voice in decisions affecting their welfare. A further aspect of the project purpose is to strengthen Thai agencies and institutions supporting the project to better administer and coordinate LNO-related activities and thus achieve a truly integrated rural development project. Measurement of progress will be achieved through on-site observations and interviews, review of project reports, sample household surveys and by annual and periodic evaluations using both indigenous and external evaluators.

The Project

The construction of the Lam Nam Oon dam and irrigation system will benefit that part of the Lam Nam Oon population downstream from the dam, 10,000 farm families who will receive irrigation water, but disadvantaged 1,200 farm families upstream who were displaced when the reservoir was

flooded This project is designed to help the RTG speed irrigated agriculture among the downstream families and also to help in successfully re-establishing dislocated upstream families under an RTG resettlement scheme.

The project is proposed to have a five-year life. Implementation starts at the time of signature of the loan agreement, anticipated for July 1977, and is to be completed by July 1982. Almost all of the activities included in this project continue for the full five-year life of the project. Some few, however, such as the separately funded PVO/OPG programs, are for shorter periods. The integration and implementation of project activities throughout the life of the project are described in Part 4.B. and in Annex E.

The upstream assistance provided under this project, a sub-project entitled Resettlement Area Sub-Project, is the same with only several exceptions, as that which USOM is currently providing through the Public Welfare Department to other Northeast Thailand settlement areas and is fully described in the Sericulture/Settlement PP (AID-DLC/P-2168). Although that project description is not repeated here, the several features of the Lam Nam Oon resettlement sub-project which significantly differ from the standard Sericulture/Settlement program are described in Part 2.B.2 below. To attain a more coherent presentation in this PP, most of the discussion of the Resettlement Area Sub-Project is consolidated in Part 2.B.2.

The description which follows relates primarily to the downstream sub-project--an integrated rural development effort of the public and private sectors and of voluntary organizations to accelerate the benefits of a \$62 million irrigation investment and thus improve the standard of living of the 10,000 downstream farm families.

1. Downstream Sub-Project

The downstream sub-project is comprised of a number of activities described below in the following major project elements: (a) the irrigation system and land improvements, (b) rural development activities, and (c) project organization and management. Following is a description of these project elements.

The Irrigation System and Land Improvements

The LNC project area consists of all the available area downstream from the dam which is to be supplied with irrigation water, an area totalling 185,800 rai (Annex B.2a). Under the project, construction will be completed on the distribution (main/lateral canals) and drainage systems; the project road system; and land improvements, including land consolidation on 26,300 rai, ditches and dikes construction on 159,500 rai as well as the establishment of 3 pilot projects with their associated operational research programs (Annex B.11.). These construction activities, together with irrigation system operation and maintenance (O&M) support to the project, are described below and further discussion is provided in Part 3.A. Given the importance of these activities to meeting the targets of the project, a condition precedent (CP) to disbursement will be the submission to USOM of a comprehensive master plan outlining the engineering, construction and O&M work necessary for the project.

Within the irrigation system water is supplied through two canals, the left and the right main canals, and is distributed to the lateral canals by gravity and/or pumps. The canals and laterals are concrete-lined whereas the on-farm distribution system supplied from the canals and laterals by farm turn-out structures (FTO's), is not lined. As of March 1977 80% of the left main canal and laterals and 30% of the right main canal and laterals were completed. By 1981 both systems will be completed, a total of 345 km. of canal and lateral construction.

The total drainage system, natural watercourse channels supplemented by construction of 300 km. of surface drain ditches, will be completed by 1983. The drains will minimize the hazards resulting from surface flooding and soil erosion, high water tables with attendant waterlogging of the soil, and salt in the groundwater. All these deleterious conditions can be aggravated by discharge of excessive irrigation water onto the land and so, drainage efficiency is dependent on good water management and control. An effective drainage system will ensure improved yields, particularly of upland crops.

Road System - Construction of the irrigation system to date has been followed by upgrading by RID Roadway Division of 36 km. of contractor-constructed main canal

access roads to RTG feeder road standards and of 30 km. of lateral access roads to RTG O&M road standards. By 1980 all feeder roads totalling 70 km. will be completed and by 1981 all O&M roads totalling 330 km. will be completed. Such roads not only provide access to the irrigation system for operations and maintenance but also add important connecting links to the district road net and thus increase mobility and communications for social and commercial purposes as well as provide improved farm-to-market access.

Land Improvements - The planned area for land consolidation has been reduced from 61,000 rai to 26,300 rai and land improvement construction has been rescheduled, as shown in Annex B.6, in order to have the irrigation system and on-farm construction proceed in a balanced manner. The rationale for the reduction in the area to be consolidated and further details on related actions leading to this decision are presented in Part 3.A.

Three pilot projects will be established by RID within the consolidated and the ditches and dikes areas. These pilot projects will be test areas for: (1) conducting a series of operational research programs (Annex B.11) designed to provide guidance in further expansion of the land improvements; (2) introducing and providing innovative activities in agricultural and social development and in family participation (DOAE's model farm villages^{1/} and model farmer/nuclear family concepts, DOF's community fish pond program, etc.); and (3) demonstrating interdepartmental cooperation and the mutually reinforcing aspect of jointly conducting related programs at a common site.

A detailed operational research program designed by RID along the lines outlined by ECI/RID^{2/} (Annex B.11) will be conducted in each of the three pilot project test areas identified above; the first two in 1978, the third in 1979. Results of these tests will provide guidance in good water and soil management and control;

^{1/} The pilot project test areas will be located by RID and DOAE so that each area will embrace a village which will be agriculturally developed in an accelerated and closely supervised manner by the Department of Agricultural Extension--DOAE's model farm village demonstration program (described in Part 2.B).

^{2/} ECI/RID Report: Lam Nam Oon On-Farm Development Project dated January 1977 (Chapter 5).

incremental cost/benefit comparisons for different levels of land improvement investment, on selection of cropping patterns and improved farm production practices; and on other features of irrigated agriculture which can be usefully applied as the construction and agricultural development of the land consolidation and ditches and dikes programs proceed.

Land consolidation (intensive development) is presently being completed on the first of the three pilot projects, a 1,000 rai test area which has a mix of soil types representative of the less fertile farmlands throughout the LNO area. In 1979 an additional 2,000 rai land consolidation pilot test project will be completed. The latter will be located within the area selected for future consolidation and will be comprised of soil types better suited for paddy and upland crops. Guided by results of the test programs land consolidation will be expanded in 1980 and will be completed in 1981, with a total of 26,300 rai consolidated.

Ditches and dikes (extensive development) construction has been completed on 55,000 rai to date but without benefit of on-site tests from which judgments can be made for completing the balance of the program. Accordingly, in 1978 the third, and final, pilot project, a 2,000 rai ditches and dikes test area will be completed. The areas selected for this testing and for the subsequent 1979 land consolidation testing identified above will be of similar character so that comparisons of the levels of land improvements and productivity can be made. As with the intensive development pilot test projects, the results of the ditches and dikes test program will influence the manner in which the program is expanded. The ditches and dikes land improvement program will be completed by 1982 with a total of 159,500 rai extensively developed.

Operation and Maintenance - In the project post-construction period, effective operation and maintenance (O&M) of the main distribution system requires that adequate equipment be available. At the present time O&M on completed portions of the system largely depends on the availability of RID construction force account equipment. Much of this equipment has little remaining useful life. Accordingly, to effect satisfactory O&M, heavy equipment will be provided for the project. The equipment selected has been jointly specified by ECI and RID (Annex B.5) and they confirm its adequacy for the O&M needs of the total project. It is dual

purpose so that it can also be used with other on-site RID force account equipment for completion of the ditches and dikes program and will remain at LNO for O&M purposes.

Although higher costs had been estimated by the design team which visited in early 1976, O&M costs including farmers' labor are estimated at 866/rai. This amount is as calculated by ECI (Annex B.4), and is based on RID's O&M experience to date on other Thailand irrigation projects, as well as from recommendations provided in recent IBRD and ADB reports. It is considered a reasonable level of charges.

It is the stated policy of the RID to have the farmers maintain the irrigation systems below the farm turnout. Since each turnout and drainage system services a number of farmers, maintenance, which is mostly ditch cleaning and repair labor contributed by the farmer, must be a coordinated effort among the water-using families. O&M of this part of the system is vital if good water management and control is to be achieved. Accordingly, RID will assist the farmers in the formation of Water Users Associations (WUA's) so that system maintenance can be conducted in a harmonious, coordinated and responsible manner. Starting with the first full year of the project, 1978, LNO farmers, organized under WUA's will be contributing \$3,000 towards the operation and maintenance of the on-farm irrigation and drainage system. This contribution will be in the form of cash for hired labor plus the farmers' own labor. By the end of project, in 1982, with all 185,800 rai under irrigation, this self-help contribution will total \$139,500.

b. Rural Development Activities

The Agricultural Program

Within the project area, extensive development (ditches and dikes) is now being completed on 55,000 rai, about one-third of the total project area. The land improvements for the first pilot project are completed. Although this pilot project is a consolidated test area, soil conditions are representative of ditch and dikes areas and interim agricultural tests can be usefully applied in establishing the ECI-recommended crop plan (Annex B.7.) within the 55,000 rai, pending activation of the operational research programs.

As the project proceeds, this initial ditches and dikes area will be an important proving ground for introducing the cropping pattern proposed under the project and also for introducing the initial water control and management program. The project crop plan and crop calendar (Annex B.7.) represents a diversification of rice and upland crops based on a water balance which provides all LNO farmers the opportunity for ~~some~~ dry season irrigated agriculture. Soil conditions within the LNO area are less acid than earlier determined, according to the ECI report. Based on this and the findings by Mr. Sorenson that agrilime supply is available and economically viable, dry season irrigated cultivation of the higher value crops is feasible, including fruits/vegetables, peanuts, tobacco, and other upland crops. Tobacco production, possibly the crop with highest economic return to the farmer, has already been tested in the LNO, has received enthusiastic response and is expected to expand rapidly.

Part 3.A. provides further discussion and analysis on conditions directly affecting the LNO irrigated agricultural program; e.g., soil conditions, cropping pattern, water control and management, etc. Project activities designed to support the agricultural program are described in the following sections.

Agricultural Research and Extension

The shift to diversified double-crop irrigated agriculture is not just a simple extension of the farming practices used in rainfed rice monoculture. It requires of the farmer a higher level of farm management and technological competence--and this in a relatively short time since gradual change is not feasible. Early success will encourage him to continue, early failure may cause him to backslide and revert to single cropping.

It is recognized the farmer needs a great deal of help in this difficult transition. The help provided by this project is based on detailed and linked agricultural research and extension plans implemented with adequate supervision and technical advisory services by the RTG. The DOA and DOAE are the primary sources of research and extension assistance and are providing to the LNO a total research and extension support program. Activity plans and a detailed budget covering the 5-year life of the project have been submitted to USOM by both Departments (Annex B.3.).

Basic and applied research support by DOA will include inputs from various Northeast Thailand experimental station and agricultural institutions; Sakon Nakhon rice and upland crops stations; Nakhon Phanom horticulture station; Khon Kaen University and NEARC (Tha Phra) for vegetable and other specialty crops, pasture development and livestock production, etc. The Kalasin FAO farm will provide an applied research program at the on-farm level to the LNO similar to the comprehensive support it is now extending to Lam Pao, Lam Phra Pherng, and Nam Pong irrigation projects. And DOA will provide training support, primarily centered from Kalasin, for agricultural extension agents and farmer leaders in the management of irrigated multiple cropping system demonstrations.

Sakon Nakhon is not one of the Northeast provinces in which the DOAE/IBRD/USOM is initially activating the National Extension Outreach Program. The LNO does however, require a very considerable agricultural extension support effort in order that farmers quickly acquire the higher level of farm management and technological competence necessary to successfully shift to irrigated agriculture. Because of this need and also because of the opportunity to test innovative agricultural features under the LNO's expanded scope of integrated rural development DOAE is providing the LNO a total extension support. This includes cadre, facilities and a program similar to that provided to selected provinces under the National Agricultural Extension Programs, as described in the Agricultural Extension Outreach PP (AID-DLC/P-2216). In the LNO, as in the Outreach Program, the local farm leaders, "model" farmers, are the contacts through which extension training is transferred.

DOAE is also sponsoring additional programs for the project in which integration with the activities of associated agencies is an important aspect. These include:

- Establishing model farm villages to demonstrate irrigated agriculture technology on a large scale, with the villages located so as to collaborate in RID's operational research and pilot project program.
- Jointly developing with CDD and DOCP a 3-step program in creating sound farmer organizations.
- Testing the nuclear family concept, based on model farmer participation with PVO/OPG and other program trainees, as a means of maximizing the spread effect of training.

Given the importance of these activities DOA and DOAE will provide to USOM as a CP prior to loan disbursement their respective detailed project plans, with each plan integrated closely with the other. The plans will be LNO project-specific; i.e. will be designed on the basis of the ECI/RID-recommended cropping pattern (Annex B.7.) and implementation advanced in accord with the construction schedule by which farmland is brought under irrigation (Annex B.6) Each plan will have a "feedback" information system for evaluating research and extension results and for redesigning the programs, as necessary.

The DOA and DOAE agricultural research and development plans will include a specific program for meeting the input, credit, advisory services, marketing outlet and other needs of the agricultural elements of the project. The DOAE will assume primary responsibility for ensuring that these needs, collectively termed "package", are coordinated with appropriate institutions, such as the BAAC and the Marketing Organization for Farmers. Under "packaged" assistance 3,500 metric tons of agrilime will be provided and used in 1978, rising to 27,500 tons in 1982; 35% of participating farmers will receive institutional credit in 1978, rising to 75% in 1982. Motivated by a well-planned, effective and continuing research and extension support program channeled to and through model farmers at the local level 500 farmers will be accepting and using results of the research and extension program in 1978. By 1982, at end of project, acceptors will number practically all of the 10,000 LNO farmers.

To attain this rate of transition requires convincing proof in the form of large scale farm production demonstrations. This is provided by DOAE's model farm village program developed in concert with RID's operational research projects in the pilot project areas. Under the model farm village program 37 villagers will be operating demonstration farms in accordance with RTG farm production recommendations by 1978 and by 1982, 185 villagers will be engaged.

Community Development and Occupational Promotion

The Community Development Department (CDD) is providing to the project a strong leadership role at the local level to integrate the project into community life. CDD's project activities include a mix of basic and special programs designed to increase both the social and economic benefits to be realized by the farm families and the local communities. An activity plan and a detailed budget covering the 5-year

life of the project have been submitted to USOM by CDD (Annex B.3.). A summary of the CDD program follows.

In developing a basic program for the LNO CDD will evaluate the types of assistance provided by other agencies and adjust its traditional village-level program to support other agency programs and/or fill communal needs not covered by others. The CDD basic program falls mainly into two categories.

- Occupational development activities--included will be assistance in the culture of high market value special crops of a type not normally included in an extension effort, i.e., mushroom production; and backstopping THEA's nutritional program and the MOAC garden cropping program, e.g. vegetable production techniques.
- Women, children and youth activities such as organized athletics, vocational training; e.g. weaving/dyeing.

In addition to the basic programs CDD will take the leading role to ensure that the overall LNO project fits into the existing cultural and social pattern of the communities with least disruption and with positive receptivity among the villages. To achieve this CDD will conduct a project promotion and public relations effort to obtain widespread awareness, interest and participation among the villagers and will also act as the point of contact and coordinator for integrating new activities into community life.

Another special activity of CDD will be to lay the foundation for establishing soundly based and well attended and managed Farmer Associations and Cooperatives throughout the LNO project area. At start of project CDD will mount a special effort to obtain maximum active membership not only in their own occupational activities groups, but in other community-based groups such as the Water Users Associations. An early awareness of the advantages of group action will encourage villagers in a subsequent transition to FA's and to Coops.

In yet another special activity CDD will establish the Saraphi Project in a LNO demonstration village. This project concentrates on agricultural and human resources development and has proven to be effective elsewhere in Northeast Thailand in improving the standards of living of a Thai community collaborating as a unit. The emphasis of Saraphi includes reinforcing agricultural and other on-farm programs supported by others, and to fill gaps in such programs. For the LNO, gaps exist in livestock and pasture development--the Saraphi Project will focus on this and other farm production opportunities. Human resources and community development under Saraphi Project will also have a particular focus on leadership training and in promoting local projects of self-help nature. To date, Saraphi Project has only been tested in a rainfed environment. Its installation in the LNO provides a test as to the effectiveness of the program under irrigated agricultural conditions.

Under CDD's Saraphi Project the villagers initially selected will be carefully screened and the program advanced in a measured manner. Accordingly, during the first year 15% of the village will be participating and by the end of the five-year project 80% of the families will be full participants.

On the basis of positive community acceptance of the project and increased assistance available under this project a somewhat larger than traditional participation by the LNO villagers in the basic CDD programs will be achieved. That is, during the first year 400 families will be actively participating in CDD occupational promotion activities such as livestock and special crops development, and in women, children and youth activities such as organized athletics, weaving and dyeing, and carpentry. By the end of the project most (7,600) of the LNO families will have participated and received such CDD help.

Fisheries Program

The Department of Fisheries (DOF) has developed a program for an expansion of fish production in the LNO reservoir and in training and assistance to establish community and family fish ponds. At the present time fish density in the LNO reservoir is about 8 kg./rai and, with total fish harvesting at about 3 kg/rai/year, provides gainful employment to about 300 families. The DOF will stock the reservoir with one million fingerlings (5 cm.) per

year over the life of the project to increase density to 30 kg/rai. At this density it is anticipated that over 1,000 families can be provided with a good income from fish harvesting. To provide adequate fishing access to and from the reservoir the DOF will construct roads and provide a fish landing and marketing center at a selected reservoir site.

In addition to the reservoir assistance program DOF will provide training and assistance in establishing pond fish culture in the downstream area. Under the community fish farming assistance program 100 families will be assisted in fish pond culture in 1978 and each year thereafter, reaching a total of 500 families assisted by 1981.

The DOF also will backstop another program whereby fish production will be increased by training Boy Scouts in artificial propagation, a USOM-supported PVO/OPG activity. Training will be provided to 100 Scouts in 1978 and another 100 in 1979. Boy Scouts trained under this program, if of a family in which other members have received other types of training, will be encouraged to participate in the nuclear family program of transferring skills received.

Farmer Organizations

This project which will create new activities among many families, train leading farmers in new technology and through them transfer the technology to other farmers, requires increasingly large amounts of inputs and credit for farm production. These and many other activities and inputs cannot be effected on a one-to-one basis between agent and beneficiary; group action is necessary.

In the LNO only 25% of the population are members of any credit group, Farmer Association or Cooperative. For this project it is recognized that many non-member families will not initially want, nor be able to join in formal, registered associations, even though improved credit availabilities and other advantages accrue. To maximize the opportunities available through group action and to get villagers receptive to organizing themselves CDD will concentrate efforts at start of project on obtaining maximum active membership in the informal associations, such as the CDD occupational groups, the WUA's formed by RID, and the village small farmer units created under the National Agricultural Extension Program. From this initial informal

base the DOAE and DOCP will promote increased representation in formal, registered and legalized Farmer Associations (FA's) and ultimately, Cooperatives--a 3-step process.

In this project CDD occupational groups, the first step in the process, will increase from 10 in the first year to 150 in the fifth year. Presently established FA's and Coops will be strengthened and new ones created so that by the end of the project there will be an FA active in each of the 12 Tambons and a Coop active in each of the 3 Districts.

Credit and Marketing

Nationally, we project adequate funds to meet small farmers' credit needs. (See the comments in Part 3.D.4. of the Agriculture Extension Outreach PP, AID-DLC/P-2216) A sizeable number of Lam Nam Oon farmers are already making use of credit facilities. According to the Socio-Economic Survey, 41% are borrowers with debt averaging about \$54/family. Three quarters of the total outstanding amount is institutional credit, (i.e , from the BAAC, cooperatives, farmers associations, etc.) and the remainder is from relatives and friends.

Credit for project inputs, \$78/family in the first year and increasing thereafter, will continue to be supplied from these lending sources and from the three commercial banks which, like BAAC, have branch offices in nearby Sakon Nakhon. DOAE will develop schemes on a pilot scale to invoke these institutions in packaging credit with agricultural inputs. Emphasis will be given to the FA's and Coops as these are increased in number and their credit worthiness established.

Increased crop production from the LNC for the first few years can be absorbed by local demands and handled through existing outlets. As production continues to rise thereafter a positive marketing assurance must be developed. To help meet this need a marketing survey to be conducted by the DAE or by a Thai consultant firm will be funded under this project to identify preferred crops, market outlets, seasonality of demand, transportation/storage/processing facilities needed, organizations and investment requirements and other pertinent marketing information. Based on marketing needs as determined from the survey DOAE and the Marketing Organization for Farmers, working with BOI, will take the lead in assuring necessary marketing outlets.

Expanded Adult Education Services

The General Education Department of the Ministry of Education is decentralizing non-formal education by shifting more of the administrative and operational responsibility and authority to the provincial level, and is being institutionalized there as the Life-Long Education Center (LEC). Sakon Nakhon has been selected as one of the sites scheduled for LEC's in Northeast Thailand and thus will be in close support of the LNO. On the basis of findings from a recent adult education needs assessment conducted by the Adult Education Division (AED) assistance to the LNO project will include provision of mobile services for trades training and adult vocational training, formation of special interest groups for short term training courses, and establishment of newspaper reading centers in all villages.

Under the LNO Project AED training will be provided in short and long-term courses in a number of skills with 51 training classes provided in 1977 and 151 provided annually thereafter, for a total of 755 classes provided by 1982.

Expanded Health and Family Planning Services and PVO Programs

Nationwide the Department of Health (DOH) has medical health centers at district and Tambon level. Government health stations at village level consist of a midwife facility, but these are few and at present there is little prospect of increase due to DOH budget restrictions. Although no such village midwife facilities are established in the LNO, nor are any anticipated, there is a health center at every district and Tambon. To assist the LNO Project with expanded services DOH will provide advanced training to DOH staff at every LNO medical center. With increased skills the DOH staff will be able to provide improved diagnostic services and medical treatment during village visits thus reducing the number of referrals to health centers.

For the LNO additional assistance in health, family planning and other social services will be available under a program which consolidates the contributions of a number of PVO's and also integrates this with other LNO activities. The PVO's involved are assisted under USOM OPG's and include the Home Economics Association of Thailand (THEA), Boy Scouts, and 4-H, with overall coordination for these programs in one of the project area villages to be provided by the Community Based Family Planning Services (CBFPS). Annex B.12

provides a summary of the PVO's and their programs, as well as the manner in which they are joined in the LNO to mutually reinforce each others activities.

To bring health services to every village CBFPS will have 17 village agents trained and installed in the first and every year thereafter until all 85 are in place by 1981. To upgrade district and Tambon health center staff expertise the MOPH will train 3 health center workers in the first 3 Tambons in 1977 and the balance of 9 workers in the remaining 9 Tambons in the second year.

Under the PVO/OPG assistance to the Thai Home Economic Association (THEA) 20 family members in a pilot LNO village will have received home economics and nutritional training in 1977, 50 more in 1978, and 45 more in 1979, the final year of this program, for a total of 115 family members trained.

c. Project Organization and Management

The third important element of the project is the proposed organization of the project to meet its objectives. As described above and as illustrated in Annex B.9.b., the project involves the direct participation of a number of RTG departments from a number of ministries. Coordination at the national level, and consolidated project operational management at the field level are essential and unique components of the project design.

At the national level, project policy, direction and coordination will be provided from the National Irrigated Agriculture Committee through the National Coordinating Committee for the LNO Integrated Rural Development Project, which, in turn, will appcint members and vest day-to-day project administrative responsibilities at the national level in a senior level working committee (Annex B.9.c.). At the field level, policy direction and coordination will be provided by the Provincial Coordinating Committee chaired by the Governor of Sakon Nakhon.

Project field operation/management will be headed by a Project Field Director and will include three Assistant Field Directors as well as Team Leaders from the various RTG departmental cadres. This organization and how it will function is more fully described in Part 4.A.

Another unique feature of field operations is that the field management and support will be physically located at the project dam site in the LNO administration center. Centralizing the locale for various agencies' personnel and their base of operations within the LNO, and subordinating their individual inputs to a single project management authority will provide a needed integration and coordination among the various activities.

Technical Advisory Services

The project provides for strengthened management through technical advisory services to each of the major elements. The consultants and their Thai counterparts will reside at the project area, with offices at the LNO Administration Center. The contractor's scope of services and staffing plan and schedule are detailed in Annexes B.10.a and B.10.b respectively, and a further discussion is provided in Part 4.B.

Training

The DOAE agricultural extension program provides training down to the level of the "model" farmer who, in turn, trains and assists the other farmers he represents. Other project activities such as the CBFPS, THEA, Boy Scout fish propagation program, etc., also train family members (Annex B.12). Where more than one type of training is provided to different members of the same family (nuclear family) spread effect may be better achieved by the family acting as a team in transferring their newly acquired skills to their peer group.

Under this project 100 model farmers/nuclear families will have received training in the first year with 400 in each year thereafter, for a total of 2,000 trained by 1982. Spread effect will be achieved by each such family having successfully assisted 4 neighbor families so that all 10,000 families will have been trained by 1982.

Grant-funded training for selected key project personnel will be provided, mostly third country observation/training courses.

Evaluation:

Evaluation of project progress will be conducted annually with a focus on implementation progress, principally inputs and outputs. In 1979, 1981 and upon project completion more thorough evaluations will measure purpose achievement and reassess sector and sub-sector goals. Outside evaluators will help conduct these special evaluations. A further discussion is provided in Part 4.C. The evaluations will be grant-funded at the cost level and schedule shown in Part 4.C. DAE plans to install cost and returns bookkeeping procedures on 100 farms.

2. Resettlement Area Sub-Project

USOM and the RTG have taken the position that the plight of farmers in the upstream resettlement area is an important consideration in project design.

In the resettlement area, the target population consists of those farm families residing in the Public Works Department Land Settlement area located on the west bank of the Lam Nam Oon reservoir. The Settlement was established in 1969 to provide land to farmers displaced by the reservoir. A socio-economic survey, partially financed by AID, was made by the Center for Applied Economics Research of the Faculty of Economics and Business Administration of Kasetsart University in November-December 1975. A report of the survey findings was submitted in July 1976.

According to the Survey Report, there are 899 farm families (about 5,950 persons) in the Settlement area of 111,482 rai. These families live in 13 villages connected by dirt and soft-faced roads (160 km. total within the Settlement area). Within the Settlement area are 88 shallow wells for drinking water, 2 ponds, a second class health center with a midwife, 6 primary schools (through grade 4), and 2 intermediate schools (through grade 7).

The survey sample included 100 families. For comparison purposes, 50 "non-settler" families living in 4 villages representing 780 families (about 6,020 people) adjacent to the Settlement area were also surveyed. Most of these families were also displaced by inundation of the reservoir but their economic situation seems slightly better than the farmers within the Settlement area. Both groups bear characteristics similar to farmers in the downstream

project area but they are worse off economically. Average data for the settlement families is included in Table A (in Part 3.C. Social Analysis).

The rationale for the USOM/RTG position that a development program is mandatory in the upstream area is that development of the downstream area will bring substantial benefits to farmers served by the downstream irrigation works, benefits which may be perceived as being gained at the expense of farmer displaced by the creation of the reservoir. Development of increased income opportunities and social services for these people is necessary so as not to worsen disparities and to minimize the chances for alienation among groups in and around the project area. From the outset the RTG has viewed the situation and the need in the same way as USOM and has taken steps to deal with the situation.

Aside from giving monetary compensation of \$40/rai for inundated land, the main element of the RTG's program for the area is the Public Welfare Department's Self-Help Land Resettlement Project which was initiated in 1969 within an 111,482 rai area of Government owned forest preserve.

Development activities in the area are complicated by the way in which settlement proceeded. Most of the farmers who had land inundated by the reservoir have chosen to remain near their former homes even though many have not been able to acquire adequate farmland in the area. Some farmers joined the PWD project but remained on their original land until the rising reservoir water levels forced them off. Meanwhile PWD was building roads, clearing initial plots of land and establishing other infrastructure in the resettlement area. Other farmers in the area, without joining the PWD project, took advantage of the access to the new area, cleared land and began farming on land intended for Resettlement project participants. When project participants came into the resettlement villages, many found that their land was already being farmed by others and PWD has been able to allocate an average of only 11.5 rai to Resettlement participants.

Reliable numbers are hard to come by, but in addition to the 899 families legally participating in the PWD's resettlement project there are several hundred other families in the general area who had owned some land that was inundated by the reservoir or who moved in from elsewhere. According to the socio-economic survey conducted

by Kasetsart University, the total number of families in the whole area is 2,312. KU's survey disclosed that 9 out of the 50 families interviewed in the 4 villages adjacent to the Resettlement area said they were farming land within the Resettlement area.

The Cabinet in early 1977 revalidated the purpose and authority of an interministerial committee formed under the previous administration to resolve resettlement area land encroachment issues. Based on PWD and committee decisions taken in April 1977 cadastral and land utilization surveys within the LNO resettlement area are currently being completed to form a basis for informed judgments and resolution of land allocation. Survey results are to be reviewed and a plan of action developed in the next meeting of the committee which is scheduled for mid-May 1977.

However, there seems to be no easy solution to the problem. PWD does not wish to take action that would punish the illegal farmers (e.g. eviction) as they too are poor and include people disadvantaged by the reservoir inundation. PWD is currently considering the possibility of compensating illegal farmers for the cost of land clearing if they will relinquish the land to the rightful owners. These rightful owners would have to repay PWD for land clearing costs but over an extended period of time. Given the importance of resolving this issue the project will require as a covenant to the loan agreement that the RTG continue with positive measures which will reduce and eventually eliminate the problems.

Notwithstanding the above difficulties, PWD has taken and is taking important steps to help farmers disadvantaged by the creation of the dam and reservoir. These steps include the Resettlement Project itself, allocation of land and the installation of infrastructure (roads, schools, health centers, wells). RID is constructing an irrigation system involving pumping, high level reservoir storage, and canal distribution. At the present time construction of Stage I of the irrigation system is complete and installation of the pumps is proceeding. Stage I will serve the majority of the settlers. With operations start scheduled for mid-1977 supplemental irrigation will be possible for the 1977 crop season. When all stages are completed in 1978 the system will provide supplemental wet season irrigation for 18,000 rai and dry season irrigation for 5,000 rai. Total cost of the system is estimated to be \$3.0 million, with \$1.85 million yet to be expended.

PWD plans a pilot project to introduce new crops and as a demonstration area for improved agricultural practices. Fruit trees have already been introduced with PWD extension workers providing technical advice and seedings to the farmers. A handicraft center was established in 1975 to introduce cottage industries and agriculture related skills. So far about 40 women have been trained in cotton dying and weaving providing them an opportunity to add about \$40 per year to household income for part time work. PWD 1977 budget for the Lam Nam Oon Resettlement Project is \$142,000 including salaries, capital improvement, maintenance, etc. The initial actions in establishing the pilot project mentioned above is funded in 1977 at \$4,580.

Adams International which has already successfully introduced tobacco growing in other PWD settlement projects, began operations at Lam Nam Oon in both the downstream and the resettlement areas.

The fisheries activities described elsewhere as an element of the project will have their greatest direct impact on Resettlement Area families who are located near the reservoir shore.

The above is clear evidence of the RTG's real concern for the welfare of upstream farmers. In addition to all of the above, the RTG through PWD has asked that AID participate in the introduction of modern sericulture activities to the Lam Nam Oon Resettlement area with a project modeled after the Sericulture Settlements Project, AID Loan No. 493-T-018. Earlier, AID was asked to help with support for a broadly based irrigated agricultural program. However, based on an early review of the economics of the irrigation works and a discouraging soils report which recommended that deeper rooted crops be emphasized, AID declined to consider these activities for funding. Noting, however, our own emphasis on the need for helping the displaced farmers, we proposed to participate with PWD in a sericulture effort.

The Sericulture Sub-project for Lam Nam Oon will follow exactly the design of the Sericulture Settlements Project. Over a five year period, a total of 150 Lam Nam Oon Resettlement farm families will be trained in the culture of improved varieties of mulberry and hybrid silkworms for producing high quality "warp" silk filament.

Expected cash income from the project for each participating farm family is about \$233 annually before debt service. Financial rate of return to the family is 22.7%.

Each year beginning in 1978, members of 30 farm families (mostly women), will be trained at the DOA Sericulture Division training center at Sakon Nakhon since space at the Surin training center will not be adequate.

The early stages of each silkworm rearing cycle are handled by the farmers on a cooperative basis in Central Young Worm Rearing Houses one of which will be constructed and equipped in 1978, another in 1980, and a third in 1982. A central mulberry plantation will be established expanding in size as the number of participants increase. Thirty kilometers of main and feeder roads will be upgraded to provide all weather access. Each farm family will establish its own mulberry planting (4 rai) and will construct its own old Silkworm Rearing House for raising the silkworms through the final stages of development and cocoon spinning. Drying facilities for the cocoons will be provided at the Chiang Phin Settlement.

The several analyses presented in the Sericulture Settlements Project Paper apply equally to the Lam Nam Oon sub-project except of course to the extent that the production increment from this sub-project could overtax existing facilities or markets. From our experience to date it is clear that the addition of this sub-project will present no overwhelming administrative burdens to PWD, DOA Sericulture Division, or BAAC. They can readily handle the small incremental effort. While we remain concerned about BAAC's performance, we believe their problems are being identified and worked on by the present BAAC management. Mulberry cuttings are available in abundance from pruning on existing plantations. Sericulture Division's expansion of facilities for producing more silkworm eggs is proceeding and in addition a private firm has established hybrid silkworm egg production facilities in Thailand under an arrangement with a Japanese firm. Prices from this facility are intermediate between Sericulture Division's and imported eggs. With regard to market, the total production from the Sericulture/Settlements project is projected as only about 25% of the domestic demand in 1980 so this should present no problem. Current prices for domestic warp yarn remain adequate and our more detailed cost and price calculations done since preparation of the Sericulture Settlements Project Paper confirm the earlier projections.

AID funds will be used to reimburse PWD for expenditures on the central mulberry plantation, central young worm rearing houses and equipment, farmer training and road improvement. AID will also reimburse BAAC for loans made to farmers for the costs of their old worm rearing houses and equipment, mulberry plantation and initial supply of silk worm eggs. BAAC will use its own funds for loans to the cooperative. (This formulation is slightly different from the Sericulture-Settlements Loan and results in AID's assuming a higher proportion of the credit requirements of the sub-project.)

The RTG through PWD will provide and pay for maintenance of central mulberry plantation and young worm rearing houses, costs of accountant, extension workers and supervisor including their training, vehicles, transportation and other miscellaneous expenses. A detailed year-by-year presentation of costs is given in Annex B.3.

The sub-project will be administered just as if it were one of the settlements in the original Sericulture Settlement Project. PWD is the responsible implementing agency with help from the Sericulture Division of DOA, Cooperative Development Division, BAAC, etc. The flow of AID funds also will be just as in the Sericulture/Settlements Project. Within USOM too, the project officer for the Sericulture/Settlements Project will monitor progress on the Lam Nam Oon Resettlement sub-project.

PART 3. Project Analyses

BLURRED COPY

A Technical Analysis

As of 1975 the irrigable area in Northeast Thailand capable of being served by completed irrigation systems (dams and tanks) totaled 312,000 rai, with another 940,000 rai to be served from systems still under construction. Although all 312,000 rai within the completed service area was being cropped in 1975 under supplemental irrigation in the wet season, farmer cultivation of second crops was light, with only 20% or 60,000 rai effectively placed under dry season irrigated agriculture^{1/}. Subsequently, in 1976 the IBRD reported^{2/} only 20% of the Lam Pao area and 30% of the Nam Pong area as being under dry season cultivation. For 1977 IBRD predicts dry season utilization of irrigable areas on the Lam Pao, Nam Pong and Lam Phra Pierng at a somewhat higher figure, 58% average for all three, but still far below the potential of the systems.

Farmer reluctance to engage in dry season irrigated agriculture is due to a number of reasons; e.g., lack of reliable water supply; high cost of inputs with respect to product price; lack of the technological competence required in irrigated agriculture, coupled with inadequate extension services to provide the needed training; etc. This degree of non-utilization of available irrigation capability compounded by delays both in completion of the physical irrigation systems as well as in the on-farm development aspects of irrigated agriculture demands strong and effective remedial measures.

Accordingly, this project is designed to demonstrate how the benefits of heavy capital investment to provide for irrigated agriculture can be more effectively and quickly realized by the Thai farmer, his community and the economy at large. To bring this about the project focuses on a number of key activities: effective RTG organization and project management, a strong community and village family support to and identification with the project, irrigation systems operating with good water management and control, and farmers trained and successfully engaged in irrigated agriculture production.

1/ IBRD December 1976 Draft Report on Irrigation Program Review.

2/ Monthly and Annual Reports

None of these elements of the project introduce a new concept or impose inappropriate levels of technology. What is introduced, though, is a meaningful integration and coordination among the RTG departments responsible for the various project activities.

Construction Schedule

Construction of the main canals and laterals, originally scheduled for completion in 1977, was rescheduled in 1976 on the basis of the Design Team's recommendations, with a target completion date of 1981. During 1976 construction targets were met and it appears reasonably certain that the 1977 incremental construction targets will be met. Improved construction performance stems primarily from earlier release of budgeted funds for use by contractor and force account. Other contributing factors include more timely provision of engineering and design plans in advance of start of season construction work, and adequate field supervision. This is expected to continue. The target construction increments for 1977 through 1981 are shown in Annex D Output No. 1 and further detailed in Annex B.6. for pilot project and land improvement areas.

Land improvement construction (pilot project, ditches and dikes and land consolidation areas) has also been rescheduled in accordance with the Design Team recommendations in order to have the irrigation system and on-farm construction proceed in a balanced manner. The land consolidation area has, however, been reduced from that recommended by the Design Team based on the rationale presented below in Land Improvements.

Supervision of construction and quality control on force account work has improved but still is a major concern for RID in meeting a tight construction schedule. The project provides for improved supervisory capability among the Thai by means of a technical advisory services contract and retention of consultants (Annex B.10.). The construction management plans, as elsewhere described, will be prepared by RID and consultant team and will provide for close monitoring of construction progress. At the present time all land consolidation work is done under contract and all ditches and dikes construction is by force account. Construction of main canals and laterals is approximately two-thirds force account and one-third contract. Force account construction delays beyond a pre-determined amount

will enable management authorities to increase the amount of contract construction work, a construction schedule control feature recommended by the Design Team.

Operation and Maintenance

The Design Team has identified and emphasized improved practices and efficiencies in O&M of the irrigation system as critical to realization of project objectives, and has stressed the need for adequate RTG budgetary support for this purpose. Annex B.4. provides the cost detail for system O&M (P71/rai) and for the farmers' contribution (P15/rai). It is anticipated that RID will request budget allocation for the required P71 per rai and that WUA's will be effective in obtaining the necessary personnel funds and labor contributions to underwrite the remaining charges. This focuses the need as provided under the project and described in Part 2.B, for an effective RID action in creating the WUA's and the companion effort by CDD to encourage community and social pressures for providing necessary self-help measures among the water users to maintain the on-farm systems.

National policies and implementation directives to effect improved irrigation O&M practices countrywide may well result from the major organization and management study to be undertaken for RID, as described in Part 4.A. For the more immediate O&M needs of the LNO the project will provide the 3-year services of an O&M engineer and senior counterpart Thai (Annex B.10) to increase system O&M efficiencies and thus establish the base for a reliable water supply program.

As noted by the Design Team, adequate O&M equipment is essential to the success of the project. The Team specified O&M dual-use equipment, stressed the need for early delivery and the setting of realistic yearly targets in machine use efficiency. Accordingly, the project is providing for adequate O&M equipment, with the list amended in accordance with ECI's latest recommendation (Annex B.5.) and RID will take procurement pre-implementation actions to expedite delivery (Part 4.B). To minimize unscheduled equipment downtime and realize target machine efficiencies equipment procurement will include a 25% component for spare parts and the management plan will include operational control measures such as preventive maintenance, spare parts inventory control, etc. For improved budgetary forecasting and control and to better support funding requests for O&M,

equipment replacement, spare parts, etc., it is expected that RID will improve the cost accounting system presently in effect

At the present time within the LNO area the RTG Highway Department is charged with construction and maintenance of major roads and ARD for the secondary, laterite-surfaced roads. As with other previously completed irrigation projects it is expected that maintenance of the RID-constructed LNO system roads which tie in to the existing district road network will be done by the Highway Department and/or ARD.

System Improvements

The LNO Design Team recommended that evaluation and redesign of the system be done on an urgent basis so that new construction work could incorporate an increased carrying capacity in those parts of the system considered underdesigned. However, based on a subsequent and more exhaustive analysis (ECI/RID January 1977 report) involving less land consolidation and a different cropping pattern than that anticipated by the Team, extensive improvements will likely not be needed. Some improvements may be necessary in limited areas and will be done on the basis of observing results after operating the system. If some improvements do prove necessary, there is sufficient freeboard with the present design to enable the lining to be extended upward and thus increase the canal capacity. A contingency fund of \$200,000 has been provided in the project costs for this purpose (Annex B.3, Page 1).

Land Improvements

The recommendation of the Design Team to proceed with land consolidation on 61,000 rai and on a rice-rice crop schedule limited dry season water availability to only the consolidated area. Rice demands much more water than do upland crops. Thus, with the subsequent decision to reduce the consolidated area and with agrilime found feasible for correcting acidic LNO soils upland cropping is viable and dry season water supply can be supplied for all LNO farmers, according to ECI's latest report. The amount of cutting necessary to level the comparatively severe slope areas of the LNO for land consolidation has been a problem, particularly in regard to loss of topsoil and decreased fertility in the shallow soils. Based on results observed to date from construction of pilot project No. 1, a land consolidation test area, land improvements must be carefully

controlled, both in selection of the more level areas (0-2% slope) and in minimizing land cutting; i.e. use of bench terracing techniques. Lessons learned on the feasible economic and technical limits of consolidation as determined from the operational research programs (Annex B.11.) activated in pilot project No. 1 will be further refined as pilot project No. 3 is developed. The best results of both experiments will be applied to the subsequent larger scale development of 26,000 rai in the selected land consolidation areas (Annex B.2 a.).

On-farm erosion will not present a problem, according to ECI's latest report, particularly with land levelling confined to areas of lesser slope. Maintenance of embankments to prevent erosion will, however, continue to be stressed to prevent silting of the canals, undercutting of slabs, etc.

The reduction in area of land consolidation to 26,000 rai from the originally planned 61,000 rai is a technically sound decision since it is directed to areas having better water command, reduces the severity of land cutting for the required land levelling and provides for a more equitable sharing of available dry season water among all the LNO farmers. There has been concern expressed that consolidation will be effected only on areas of highest economic return and that families within the consolidated area will be granted preferential land titling. This is not so. As explained elsewhere in this paper, and shown in Annex B.2.a, the 26,000 rai of consolidated land has been selected on the basis of its more level topography, among other criteria, and contains areas of poorer soils as well as the better soils. Pilot project No. 1 was deliberately located to also include poorer soils so that results based on soils suitability could be directly applicable to the larger consolidated areas.

Based on the DAE survey 72% of LNO households own all their land and another 26% own most. Insecurity of tenure is not presently an issue nor is it expected to be under the land consolidation program. The Land Consolidation Act does not provide preferential treatment on land titling. Present LNO titles are mostly Nor Saw 3¹/₂ and most such title holders will be eligible for full title when the RTG Land Department completes cadastral work in Sakon Nakhon.

¹/₂ A land title deed issued by the Land Department which legalizes land ownership to the holder.

Soil Conditions

Soil distribution by land class and soils suitability is shown in Annexes B.2.a and B.2.c and soil distribution by acidity range is shown in Annex B.2.d. All data is derived from RID Land Classification Report dated December, 1973. Soil analyses for the 1973 ECI report were based on tests conducted by RID of the samplings from approximately 1,800 test borings throughout the LNO area. ECI concludes that the LNO soils are typical of those found throughout Northeast Thailand.

On the basis of data examined by them the Design Team concluded that about 50% of the project area soils were in the pH range of 4.5 - 4.9, an acidic level tolerant of rice production but not of most upland crops. On this basis and in the absence of agrilime to amend the acid soils the Team recommended a rice-rice regime. Subsequently, ECI thoroughly reviewed the soils analyses data contained in the 1973 report and determined that acidic conditions were much more moderate, calculating that about 90% of the area was in the pH range of 5.0 and above, with about 40% above pH 5.5. ECI's pH data was separately checked and confirmed by RID and DLD and the results are considered accurate.

The reason for the significant discrepancy between this and the Design Team analysis lies in the fact that the Team was provided pH data from ECI's 1973 report which had been used by ECI in estimating liming requirements for the project area. This data was based on 82 pit samplings and the number and location of the pits, although apparently adequate for data on the liming requirement, were not representative of total areas of soil throughout the project area. On the other hand, the pH information developed by ECI and RTG subsequent to the Team's departure was based on exhaustive analyses of the approximately 1,800 project area soil samplings as recorded in the 1973 report. Thus, the number and location of the latter provide a much more representative base for determining pH ranges throughout the project area.

Adequate amounts of agrilime are available within a reasonable distance of LNO and are economically priced, based on a survey by the Mineral Resources Department and the preliminary analysis of Mr. Sorenson. Independent observations by other qualified persons corroborate these findings. On this basis it is feasible to correct large areas of the moderately acid LNO soils with

agrilime and produce profitable yields of irrigated upland crops in the dry season. The schedule of agrilime demand for the recommended cropping plan (Annex B.7.a) is shown in Table 1, below.

Water Control and Management

Water supply and demand estimates for project irrigation purposes as well as the results of the computerized studies on LNC reservoir operation and water balances are included in the ECI/RID report of January 1977. Calibration of regulators, as recommended by the Design Team, is an action prerequisite to start of operations of the water management plan, is relatively simple, and will be done by RID. The basis for calculations used in determining available water from recorded streamflows and precipitation balanced against system losses and crop use are similar to those used and accepted for the ADB and IBRD irrigation projects in Northeast Thailand.

Streamflow data is based on actual records maintained at the damsite for the period 1961-71 and effective rainfall probabilities are calculated on the basis of 50% chance of occurrence, as given in the ECI Land Classification Report of 1973. Crop water requirements are provided for six different crop plans, including the water required for land preparation for crops. However, calculations were not carried to the point of detailing water requirements for nursery establishment, nor for upstream resettlement requirements, since these are small, about 1% of total project water requirement for each.

Water balance calculations include the deep percolation rates presented in the 1973 ECI Land Classification Report and are predicated on minimal water losses; i.e. a 90% efficiency in concrete lined canals and field irrigation efficiencies ranging from 80% for rice down to 60% for upland crops. The 1977 ECI report states these efficiency levels can be attained with a well planned, competently staffed and supervised O&M and water management programs. Measures taken to realize these efficiencies will include innovative water conservation and cultural practices, i.e., dike heights will be increased and maintained so as to impound a maximum of precipitation during August and September to carry the crops through to harvest and minimize reservoir water demand; nursery establishment will be done in advance of first rains and be started as early as April

each year; a firm starting and termination schedule for water deliveries will be maintained in the dry season for upland crop irrigation on rotational basis; and cultivation of the local varieties of rice with their lengthy growth cycle (150 days) and high water demand will be replaced by short cycle (120 days) low water demand HYV's.

To maximize dry season irrigable area the water balance established for the project anticipates occasional irrigation shortages. It is reasonable to believe such shortages will be acceptable since the streamflows at the LNO are historically extremely variable and farmers have been exposed to rather severe restrictions in dry season cultivation. The 1977 ECI report identifies the levels of irrigation shortage used as a design criteria in arriving at the recommended water balance. Such shortages do not constitute a cultivation risk to the farmer since under a good water management program and use of a computerized reservoir operation plan such shortages are known in advance of the planting period and previously agreed distributive arrangements will be observed.

Drainage of the irrigable areas, particularly for upland crops, is a critical aspect of good water control and management. Irrigation provides the moisture necessary for plant growth but drainage creates aeration for the root zone by removing excess water. Inducing the farmer to give up presently-productive land for construction of drain ditches is a very difficult problem in irrigation projects around the world. For the LNO, drainage construction is not scheduled to start until 1978 after an initial period of educating the farmer to the long range advantages of this part of the system. Demonstration drainage has already been provided in parts of the LNO and it is expected that acceptance will be forthcoming. The operational research programs to be installed in the pilot project areas will also demonstrate drainage as a necessary part of the on-farm water distribution program. Because of inadequacy of present data the pilot project program will focus a particular effort on determining adequate and acceptable minimums in design of the drainage systems.

Cropping Pattern

The project crop plan and crop calendar (Annex B.7), a balance between rice and other crops, is that recommended in the ECI report. It represents a major shift from the rice-rice pattern recommended by the Design Team, a shift made

possible by the findings that agrilime supply is available and economically feasible. As a result about 50,000 rai (Table 1) of acidic soils will be corrected with agrilime application enabling both wet and dry season production of fruits/vegetables, peanuts and other upland crops.

With regard to cultivation of rice, existing practice is limited almost totally to wet season production of glutinous, of which about 30% is sold and the balance used for household consumption. Under the project an effort will be made to reduce glutinous production to consumption level and replace it with the more profitable less water demanding HYV non-glutinous varieties. Several hundred rai of demonstration farm plots in the LNO are already producing to this pattern and the practice is increasing. Double cropping of rice imposes new problems such as increased labor demand and a short period between harvesting and nursery establishment for the next crop. Testing is underway and will be expanded in the pilot area research projects for needed technological improvements to reduce such problems. For instance, row-seeded rice has the potential for increasing yields and eliminating the need for seedbed preparation and transplanting--this and similar cultural improvements will be pursued in the research program.

The increased yields of rice which will be realized from irrigation, land improvements and agricultural technology are based on the yield levels determined by the Design Team. These yields are included in Annex B.8.

Non-rice crop production is principally perennial fruits; year round cultivation of vegetables; wet season cultivation of cotton and jute, and dry season cultivation of tobacco, peanuts and several other upland crops. All these are presently grown in the LNO and throughout Northeast Thailand, but on a limited scale. The IBRD report also identifies these as the upland crops presently best suited for production in Northeast Thailand. A significant expansion of these crops as planned for the LNO requires in-depth provision of applied and adaptive research; extension service and farmer training; and a complete package of agricultural support assistance--the project plans to provide this full spectrum of support.

Based on experience to date in the Northeast and the LNO itself farmer response to introduction of alternative cash cropping is expected to be positive and is discussed at length in Part 3.C. Social Analysis. Examples of such positive acceptance include cassava and kenaf, crops introduced in recent years to the Northeast, where production expansion has been dramatic. Further, tobacco has been successfully demonstrated this past year in the LNO area by Adams International, has received enthusiastic response and is expected to expand rapidly throughout the project area. Over the past 2 years Adams has successfully introduced tobacco production to 15,000 farm families in the Northeast.

Cropping intensity based on the ECI cropping pattern is 146%. Family labor and hired labor availability will probably be the limiting factor for each household in achieving the maximum economic return from diversified double-cropping. Accordingly, a typical farm production model based on high value crops and on a crop calendar which spreads labor demand as uniformly as possible throughout the year can be expected to give priority, after subsistence rice production, to cultivation of vegetables/fruits, tobacco and peanut crops.

Agricultural Supporting Services

Agricultural research and extension services, extension training and comprehensive agricultural support to all farmers throughout the LNO will be provided principally through the DOA and DOAE. The research and extension programs will be jointly designed by both Departments and plans will be submitted to USOM for consideration and approval prior to signing of the LNO loan agreement. Activity plans and budgets prepared and submitted to date by RTG Departments clearly identify adequate cadre, facilities and funds over the 5-year life of project to make it technically feasible to achieve the shift to double cropping on the basis of the crop plan recommended.

Crop production inputs, extension advisory services, farmer training, credit, marketing outlets, and other agricultural needs are to be provided in an integrated "package" program to be coordinated and administered during the initial project period by DOAE through their model farm village program, and subsequently by MOF to farmers throughout the LNO area.

Organization of farmers in 3 steps, or phases, as described elsewhere in this paper, provides a mechanism whereby farmers can informally group themselves by occupational specialties under CDD and then officially organize themselves as FA's and eventually Coops, as sponsored by the MOAC. The program is organized from the bottom up and is expanded and formalized as the membership of occupational groups perceive the advantages of legal associations and are prepared to assure necessary management and financial responsibilities to make them viable.

Downstream Activities

A number of supporting activities by various RTG public and private sector agencies are provided under this project, as described in Part 2.B, at a funded level for each as shown in Annex B.3. Activity plans and budget details have already been submitted to USOM by each agency. On the basis of this evidence and a familiarity with the capabilities of these agencies in performing satisfactorily on similar activities in the Northeast and elsewhere in Thailand we believe these activities to be soundly based and feasible.

Environmental Impact

Annex C presents the joint USOM/RTG National Environmental Board conclusions on the environmental impact of the project. In addition, in accepting the project, the Asia Project Advisory Committee stipulated that a complete Initial Environmental Examination be completed on this project.

Summary - Technical Soundness

On the basis of the above analysis, we conclude that the technical design of the project is reasonable, cost estimates are reasonably firm, and adequate project planning has taken place.

TABLE 1 - Agrilime Demand Projection

<u>Year</u>	<u>Rai Treated</u>	<u>Rate of Application</u>	<u>M. Tons</u>
1st	10,000	350 Kg.	3,500
2nd	20,000	350 Kg.	7,000
3rd	20,000	350 Kg.	7,000
	10,000	200 Kg.	2,000
4th	20,000	200 Kg.	4,000
5th	20,000	200 Kg.	4,000
		<u>TOTAL:</u>	<u>27,500 M.T.</u> =====

FART 3. Project Analyses

B. Financial Analysis and Plan

1. Financial Plan

Table 2 displays the distribution of project costs for different activities by funding source (U.S. and RTG) and category (foreign exchange and local currency) and by project inputs and outputs. AID funds will pay less than 11% of the total costs and RTG budget funds will pay the remainder. There is an underlying rationale for the split between the RTG and AID for each component. First, the responsibility for major irrigation construction is considered to be the RTG's. USOM was asked to finance the purchase of new equipment needs for the project but agreed to consider only items which, although usable in the early years for construction, are also usable later for operation and maintenance. After reviewing a list of items totalling \$2,186,500 prepared by RID and endorsed by ECI (see Annex B.5.), we decided that AID would finance items totalling only 75% of the estimated equipment cost, leaving the RTG to finance the remaining 25% including such items as vehicles, bicycles, motor-cycles and communications equipment. The equipment cost estimates are based on July 1976 costs, indexed 8% to an estimated July 1977 price level.

For the foreign consultants a similar 75%-25% split was decided on with the RTG's 25% being paid in local currency, primarily to cover local logistics costs. Ten percent allowance is included for escalation and contingency.

AID's disbursement of dollars for the above items will follow usual letter of commitment/letter of credit procedures.

AID will finance 50% of the costs the various RTG agency downstream activities, except for three items to which USOM attaches special importance, and therefore will finance completely: The construction of the Project Administration Center, extra costs involved with having a Project Field Director, and the marketing survey.

Where AID is financing these local currency costs, payment will be made on a reimbursement basis for actual expenditures, except in the case of the Project Administrative Center for which FAR procedures will be used. For Sericulture activities, payment will be made on the same basis as the Sericulture/Settlements Project, i.e. FAR on some items and actual cost reimbursement for the others.

The Ministry of Finance is the RTG agency authorized to enter into external loan agreements on behalf of the Government. However, several agencies will implement various elements of the project and will use AID funds in doing so, as indicated in Annex B.3. By Project Implementation Letter (FIL) issued after the Loan Agreement, USOM and the Ministry of Finance will record the specific amounts from the AID loan authorized for expenditure by each of the implementing agencies. In meeting the usual conditions precedent of the loan, the Ministry of Finance will designate representatives from each agency authorized to request AID loan funds within the agreed limits for each agency. When conditions precedent have been met, USOM will issue PIL's with accompanying PPIA or PIPA's to earmark funds for the various agencies. This approach is simple, will preclude commingling of funds, and will facilitate project implementation by making funds directly available to the agencies responsible for implementation.

All of the costs are derived from firm plans and detailed itemized cost estimates. Backup calculations not included in this PP or its annexes are in USOM files and have been reviewed and found reasonable. In the case of costs for irrigation facilities (O&M as well as construction), cost estimates have also been reviewed by ECI and endorsed by them.

Each of the organizations participating in the project is including provisions for project activities in its budget request for Fiscal Year 1978 which begins on October 1, 1977. Prior experience with budgetary allocations to these organizations has been good and the amounts required for their project activities are only a small part of their total budgets. The largest single budget requirement for this project is RID's which in the year of greatest requirement will be about 4% of its total current annual budget. This is not large and it should be noted also that the IBRD Irrigation Program Review Report dated December 1976 concluded that continuation of its annual budget at

approximately current levels would be sufficient to finance its operations and implementation of projects over the next 15 years. Also the RTG agencies responsible for allocating funds historically have been responsive to the budgetary needs of projects in which foreign assistance donors participate.

After considering all of the above, USOM concludes that financial plans for the project are firm, complete and adequate and that funds for completion are reasonably assured.

LAN NAM OCM INTEGRATED RURAL DEVELOPMENT PROJECT
SUMMARY COST ESTIMATE AND FINANCIAL PLAN

TABLE 2

Page 1

Project No. 493-21-120-272

SOURCE	US \$		RIG		TOTAL	
	AID		FX	LC	FX	LC
	FX	LC				
1. Down Stream Irrigation System/Land Improvement	1,639,500		547,000	29,772,900	2,186,500	29,772,900
2. Down Stream Activities		886,900		789,300		1,676,200
(a) Community Development						
(1) Basic Activity		(40,000)		(40,000)		(80,000)
(2) Special Activity		(168,000)		(168,000)		(336,000)
(b) Agricultural Research (DOA)		(84,000)		(84,000)		(168,000)
(c) Agricultural Extension (DOAE)		(181,000)		(181,000)		(362,000)
(d) Expanded Adult Education Services		(166,500)		(166,500)		(333,000)
(e) Division of Inland Fisheries		(106,500)		(106,500)		(213,000)
(f) LNO Project Administration		(100,900)		(43,300)		(144,200)
(g) Marketing		(40,000)				(40,000)
3. Technical Advisory Services	1,062,800			340,200	1,062,800	340,200
(a) Long Term Consultants						
(1) Royal Irrigation Department	(540,000)			(180,000)	(540,000)	(180,000)
(2) Department of Agricultural Extension	(120,000)			(40,000)	(120,000)	(40,000)
(3) Community Development Department	(120,000)			(40,000)	(120,000)	(40,000)
(4) Department of Agriculture	(75,000)			(75,000)	(75,000)	(23,000)
(b) Short Term Consultants	(90,800)			(30,200)	(90,800)	(30,200)
(c) Contractor Backstopping	(75,000)			(25,000)	(75,000)	(23,000)
(d) Consultant Vehicles 1/	(42,000)				(42,000)	(42,000)
4. Resettlement Activities		307,900		2,726,900		3,034,800
(a) Sericulture Project		(307,900)		(188,300)		(496,200)
(b) Pilot Projects				(185,000)		(185,000)
(c) Irrigation & Pumping System				(2,353,600)		(2,353,600)
5. Contingency & Inflation	492,700	290,200	82,000	5,038,000	484,700	5,238,200
TOTAL	3,105,300	1,395,000	629,000	38,667,300	3,734,000	40,262,300
GRAND TOTAL		5,500,000		39,296,300		43,796,300

1/ Approximately 17% for AID items, 15% for RIG items

- 52 -

LAN KAH OGN INTEGRATED RURAL DEVELOPMENT PROJECT
 CONSISTING OF PROJECT OUTPUTS/INPUTS
 "AID APPROPRIATED"
 US \$

TABLE 2
 Page 3

Project No. 493-21-120-272

Project Inputs	Project Outputs ^{1/}												Total	
	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12		
LOAN FUNDS														
1. Down Stream Irrigation System/Land Improvement Equipment	1,639,500													1,639,500
2. Down Stream Activities														
(a) Community Development				208,000		215,100	140,900		49,900	166,500	106,500			886,900
(1) Basic Activity				(40,000)										(40,000)
(2) Special Activity				(168,000)										(168,000)
(b) Agrl. Research (CGA)						(84,000)								(84,000)
(c) Agrl. Extension (CGAE)						(131,100)			(49,500)					(181,000)
(d) Expanded Adult Education Services										(166,500)				(166,500)
(e) Division of Inland Fisheries											(106,500)			(106,500)
(f) LRD Project Administration							(100,900)							(100,900)
(g) Marketing							(40,000)							(40,000)
3. Technical Advisory Services	589,500													589,500
(a) Long Term Consultants		24,000		132,500	24,000	275,700					26,100			1,026,900
(1) Royal Irr. Dept.	(540,000)													(540,000)
(2) Dept. of Ag. Extension						(120,000)								(120,000)
(3) Community Devel. Dept.							(120,000)							(120,000)
(4) Dept. of Agriculture														(75,000)
(b) Short Term Consultants	(28,000)		(11,500)		(11,500)	(75,000)								(120,000)
(c) Contractor Bookkeeping	(12,500)		(12,500)		(12,500)	(28,200)								(75,000)
4. Resettlement Activities										(11,600)				(11,600)
(a) Sericulture Project										(12,500)				(90,800)
5. Contingency & Inflation	368,900		4,000	57,000	4,000	76,000	24,000		9,000	28,000	22,000		307,900	307,900
Total Loan Funds	2,582,900	28,000	397,500	28,000	525,900	164,900		58,900	194,500	152,800	339,900		4,500,000	

1/ See attached listing for explanation of project outputs.
 2/ This project output is separately funded from other AID & RTC Resources.

- 54 -

LAW AND ORDER PROGRAMS AND PROJECTS
COSTING OF FEDERAL FUNDS AND
NYC APPROPRIATE
US \$

TABLE 2

Page 6

Project No. 493-21-120-272

Project Input	Project Output ^{1/}												Total	
	81	82	83	84	85	86	87	88	89	810	811	812		
1. Down Stream Irrigation System/Land Improvement Including Equipment	27,390,900	2,725,000												30,115,900
2. Down Stream Activities				208,000		213,100	43,300		49,900	166,500	106,500			787,300
(a) Community Development														
(1) Basic Activity				(40,000)										(40,000)
(2) Special Activity				(168,000)										(168,000)
(b) Agri. Research (DOA)						(84,000)								(84,000)
(c) Agri. Extension (DOAF)						(131,100)								(131,100)
(d) Expanded Adult Edu. Svcs.								(49,900)						(49,900)
(e) Div. of Inland Fisheries									(166,500)					(166,500)
(f) LND Project Administration							(43,100)				(106,500)			(149,600)
3. Technical Advisory Services	198,700		5,900	45,000	5,900	79,200					5,000			343,700
(a) Long Term Consultants														
(1) Royal Irr., Dept.	(180,000)													(180,000)
(2) Dept. of Ag. Ext.						(40,000)								(40,000)
(3) Community Dev. Dept.				(40,000)										(40,000)
(4) Dept. of Agriculture						(25,000)								(25,000)
(b) Short Term Consultants	(9,700)		(3,900)		(3,900)	(9,700)					(3,000)			(25,200)
(c) Contractor Backstopping	(9,000)		(2,000)	(5,000)	(2,000)	(5,000)					(2,000)			(25,000)
4. Resettlement Activities													2,726,900	2,726,900
(a) Sericulture Project													(188,300)	(188,300)
(b) Plant Projects													(185,000)	(185,000)
(c) Irrigation & Pumping System													(2,353,600)	(2,353,600)
5. Contingency & Inflation	4,191,000	410,000	1,000	38,000	1,000	34,000	2,000	6,000	22,000	15,000	424,000			5,126,000
TOTAL FUNDS	31,980,600	3,139,000	6,900	285,000	6,900	330,200	43,300	33,900	188,500	174,500	3,130,900			39,205,300

^{1/} See attached listing for explanation of project outputs.

^{2/} This project output is separately funded from other AID and NYC Resources.

- 55 -

LAN HAN OUN INTEGRATED RURAL DEVELOPMENT PROJECT

EXPLANATION OF PROJECT OUTPUT

TABLE 2.

Page 5

Project No. 492-21-120-272

1. Irrigation System and Irrigated Agricultural Land Improvement Completed.
2. A Road Net Completed Providing for Maintenance of the Irrigation System and Increased Mobility, Communications and Access to Markets for the Farmers.
3. On-Farm Operation and Maintenance of the Water Supply and Drainage System Effected.
4. A Community Development Program in which Villegers Actively Participate.
5. A 3-step Organization of Farmers.
6. A Functioning Agricultural Research and Extension Program.
7. Farm Input, Advisory Services and Marketing "Package" Provided.
8. Improved Services Provided for Family Planning, Health and Home Economic/Nutrition.
9. Functioning Model Farmer with Active Nuclear Family Achieving Spread Effect from Training and Assistance which has been received.
10. Life-Long Education Center.
11. Increased Fish Production for Food and Income Purposes Realized from Fish Stocking and Training Programs.
12. Resettlement Outputs.

2. Financial Impact on Individual Farmers

Financial impact is analyzed for two "representative" farmer situations. The starting point for both cases is chosen to be at about the median of data from the Socio-Economic Survey. Both farmers are assumed to have 20 rai of land which will be irrigated by the project. In one case the farmer's land is all in the consolidated area (Table 3) in the other case, it is in the extensive, ditches and dikes (D/D), area (Table 4).

The farmers are assumed to have similar economic status at the beginning and both are projected not to increase income from agricultural activities other than raising crops within the project area. Farmgate prices for rice--not shadow prices--are used in the calculations. Off-farm employment is projected to decrease to zero as the farm increasingly demands more and more of the family's time. Both farmers gradually reach the ultimate average production for their respective types of land in five years. However, the projections assume that increased production lags increased inputs somewhat because the consolidation farmer must overcome problems of soil disturbance and both farmers must go through a learning phase in adopting new practices. The cumulative effect of forgone income and increased cost of inputs is quite severe in the case of the consolidated area farmer, and highlights the importance of demonstrations and the model farmer approach. Average Northeast farmers would probably be restive and slow to adopt required new practices given the initial period of forgone income. But having seen the longer range benefits on demonstration farms, these farmers can be expected to respond energetically. Model farmers will more readily accommodate the apparent risks because of their position in the community and because extension workers will be able to concentrate their efforts and encouragement on them. These considerations are discussed at some greater length in Part 3.C. Social Analysis.

In the long run the farmers stand to benefit handsomely if they seize the opportunity the project affords them. If the farmers are not required to pay for land improvement, the financial rates of return are very high (92% for the consolidated area, 285% for D/D). No great significance should be attached to the magnitude of these IRR's nor the difference between them as the only investment is forgone income for the first year or two and the amount forgone is relatively small for the D/D farmer.

Charging the farmers for land improvement costs still gives lucrative financial rates of return: 22.6% for the consolidated area, 42.9% for D/D. At charges of \$115/rai for consolidation and \$50/rai for D/D, the farmers would easily be able to handle the annual payments of \$270 and \$117 respectively for 20 year loans at 10% interest. The only caveat here is that interest-free grace periods of 4 years for the consolidated area farmer and 3 years for the D/D area farmer would be wise.

The Thai Government has legislation which allows it to charge for land improvements like those planned for this project. There has been to date little progress made in actually initiating such a program. Now, however, the Thai Government is pledged to begin an active program to recover such costs in projects all over the country. Therefore, the authorization for this project includes a covenant pledging the Thai Government to develop within 2 years of Project Agreement signature a program for recovering from the beneficiaries a significant portion of the investment costs in project development, particularly costs related to land improvement. This was believed necessary in order to reduce the amount of governmental subsidy to the project and thus enhance the Government's ability to finance a program of replication of successful project activities. It was also believed that it is important for the benefitting farmers to pay for improvements on their land to increase their involvement in project success. Finally, it was judged that because of the anticipated high returns, a program of cost recovery would not represent a heavy burden on individual farmers. The Thai Government is also pledged to developing an evaluation program for this cost recovery effort.

Table 3

Financial Impact - Consolidated Area Farmer

Year	(US \$)					
	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
A. Off Farm Income	260	225	175	125	50	-
B. Gross Value of Farm Produce	412	410	610	1,110	1,610	2,360
C. Cost of Inputs	50	150	250	350	500	620
D. Net value of Farm Produce <u>1/</u>	362	260	360	760	1,110	1,740
E. Total Income A+D <u>1/</u>	622	485	535	885	1,160	1,740
F. Total Income without Project	622	653	686	720	756	794
G. Benefit stream without having to pay capital cost		-168	-151	+165	+404	+946 etc. (IRR 92%)
H. Benefit stream if \$115/rai paid for development		-2,468	-151	+165	+404	+946 etc. (IRR 22.6%)
I. Annual payment on loan of \$2,300, 4 year grace period w/o interest, repayment, period 20 years w/interest at 10%		-	-	-	-	270.16 etc.

1/ includes subsistence

Table 4

Financial Impact - Ditches & Dikes Area Farmer

(Baht)

Year	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
A. Off Farm Income	260	225	175	125	50	-
B. Gross value of Farm Produce	412	510	860	1,360	1,710	1,994
C. Cost of Inputs	50	150	250	350	400	460
D. Net value of farm crops <u>1/</u>	362	360	610	1,010	1,310	1,534
E. Total Income A&D <u>1/</u>	622	585	785	1,135	1,360	1,534
F. Total Income Without Project	622	654	686	720	756	794
G. Benefit Stream without having to pay capital cost		-69	+99	+415	+604	+790 etc.
H. Benefit stream if \$50/rai paid for development		-1,069	+99	+415	+604	(IRR 285%)
I. Annual payment on loan of \$1,000, 3 year grace period w/o interest, repayment period 20 years w/ interest at 10%					117.46	+790 etc. (IRR 42.9%)
						117.46 etc.

1/ includes subsistence

PART 3. Project Analyses

C. Social Analysis

In the design and projected implementation of the Lam Nam Oon Project, relevant socio-cultural issues have been analyzed and addressed.

Target Population

The project activities are aimed immediately at two target populations: farmer residents of the downstream irrigation area, and settlers in the Public Welfare Department's upstream settlement area on the west bank of the Lam Nam Oon reservoir.

In the downstream area, the target population is 9,891 farm families (70,462 persons) who reside on, and farm, plots within the area. These families live in 12 Tambons comprising 85 villages. There are, in addition, 2,420 non-farm families (17,812 persons) living in townships within the project area. Each Tambon is presently assigned a community development worker and each except one has a second class health center. There are 186 public primary and 4 secondary schools located within the 3 Amphoes of which the project area is a part. (The 3 Amphoes take in 31 Tambons including the 12 Tambons of the project area.) An agricultural cooperative operates within each Amphoe; there are also several farmers associations including at least one Water Users Association. The downstream project area contains 330 kilometers of secondary roads and 79 kilometers of feeder roads. These data were collected from local government offices in the project area in June 1976 by the USOM assistant project officer.

A Socio-Economic Survey of the downstream area was conducted in February of 1976 by the Division of Agricultural Economics, MOAC. For the survey, financed by AID, 329 families were interviewed. The report of the survey gives a good deal of detailed and specific data on farmers' agricultural activities, economic situation, consumption patterns, attitudes, etc. The information is proving valuable in project design and will be extremely important later as baseline data for project evaluation and impact measurement. Overall, the survey data give a picture of farmers in the Lam Nam Oon area that agrees closely with what is known of Northeast farmers generally.

Education level is low. Most (80%) of the heads of households completed only 4th grade; 17% had less education and only 3% had more.

Farming is the only occupation of 35% of the family members aged 15-60 years; 6% have other primary occupations and 53% both farm and perform other work. Most of the other work is non-agricultural. Students account for 5% and unemployed account for only 1%.

Table A provides some idea of the distribution of income stratified by size of land holding. The table also compares average data for the downstream project area and the settlement area with estimates for the Northeast rural sector generally. Within Thailand the Northeast region is very disadvantaged as evidenced by the following estimates of regional GDP/capita in 1976 as reported in the RTG Fourth Five-Year Plan:

<u>Bangkok Metropolis</u>	<u>Central Provinces</u>	<u>Northeast</u>	<u>North</u>	<u>South</u>
\$600	\$297	\$76	\$141	\$201

In comparing project downstream farmers with the rest of the Northeast, note the higher off-farm cash income earnings. We believe this is attributable to employment stemming directly from RID construction work on project irrigation facilities, a temporary phenomenon. The farmers have secure tenure (i.e. land right Nor Saw 3 or better) on 90% of the area. Area rented accounts for 6% and "freely used" 4%. Only 1½% of the farmers do not own land.

Farmers devote 76% of their land to paddy, and 11% to upland, fruit, and vegetable crops. Woodland accounts for 8% of land held while 3% is home site and 2% idle. Thus cropped area is about 27 rai not counting double cropping which is minimal.

All of the farmers produce glutinous rice, with the native variety being more popular than the slightly higher yielding Neau San Pa Tong hybrid. Only 5% of the farmers grow any non-glutinous rice at all. About 58% of the rice grown is consumed or given away to relatives, monks, etc. The remainder is used for seed, feed, to pay laborers, for rent and for sale.

TARGET GROUP CHARACTERISTICS

FARM FAMILY BASES

Table A

	PROJECT DOWNSTREAM AREA ^{1/}						PROJECT SETTLEMENT AREA ^{2/}	N.E. RURAL	
	0-6	6-15	15-30	30-45	45-60	60+			
X IN GROUP	2.8	17.9	38.2	20.4	12.6	8	100%	100%	
RANGE OF LAND HOLDING (RAI)	0-6	6-15	15-30	30-45	45-60	60+			
AVERAGE LAND HOLDING (RAI)	4.5	10.0	21.9	35.6	50	85	30.8	30 ^{3/}	
AVERAGE FAMILY SIZE (PERSONS)	-	-	-	-	-	-	6.6	6.6	7.0 ^{3/}
AVERAGE NET CASH FARM INCOME (\$)	18	53	65	160	252	332	126	62	172 ^{4/}
AVERAGE NET CASH OFF-FARM INCOME (\$)	139	227	264	221	326	355	260	165	204 ^{4/}
AVERAGE TOTAL CASH INCOME (\$)	157	280	329	381	578	687	386	227	376 ^{4/}
AVERAGE INCOME IN KIND (CONSUMPTION) (\$)	67	154	233	272	284	320	236	151	250 ^{5/}
AVERAGE TOTAL INCOME (\$)	224	434	562	653	862	1007	622	378	626 ^{5/}
AVERAGE CASH SPENT ON CONSUMPTION (\$)	73	214	283	304	510	450	312	330	

^{1/} Report on the Socio-Economic Survey of the Downstream Portion of the Lam Nam Oon Project - 1976.

^{2/} Socio-Economic Survey on Lam Nam Oon Self-Help Land Settlement - 1975.

^{3/} DOAE 1975 Crop Survey.

^{4/} Based on unpublished DOAE data for NE Region agricultural family net cash income in 1974 brought to common year (1976) with Lam Nam Oon Surveys by applying 1974-76 NE Region consumer price index change (1.17 per BOT) and real growth in NE Regional GNP/capita (4% per NESDB).

^{5/} Estimated.

The sale of rice accounts for 52% of cash farm income. Sale of livestock accounts for 35% while the sale of other crops such as kenaf, vegetables, cassava, corn, fruit, and kapok accounts for 13% of cash income. The greatest share of products are sold through local markets (48%) and middlemen (44%), Farmers groups and cooperatives handle less than 4% of the total sales.

Forty percent of the farmers reported having outstanding debt. Of those indebted, 45% had obtained their loans from the BAAC, 24% from cooperatives and farmers groups, 12% from merchants and 20% from relatives and friends. Average debt was \$54.

Acceptance of New Farm Practices

Of particular relevance to the success of this project is the question of receptivity of villagers to adopting new farming techniques and new crops. Assuming the transfer of technology is at a level appropriate to the educational background and experience of the farmer; that economic incentives in providing profitable rate of return are proven; and that there is no significant disruption of traditional social and cultural patterns of behavior, Northeastern villagers will readily accept new crops and farm techniques. The growing of new crops such as kenaf, tapioca and tobacco in response to market demands is clear evidence of farmers' receptivity to, and acceptance of, change, if warranted in terms of his assessment of risk and economic return. The farmers must perceive the cash income resulting from acceptance of innovative practices as more than compensating for funds and time (labor) expended.

The success of Adams, International in involving 15,000 Northeastern farm families in expanding production of tobacco within a two-year period is striking evidence of their receptivity to new practices and crops, once they are convinced that the new crop and technology are viable and profitable. This conviction is a product of the adequacy of the extension effort, the packaging of the credit and other inputs, and the assurance of marketing channels. The Lam Nam Oon project takes all these elements into consideration with the objective of assuring increased farmers' productivity and economic profit.

TARGET GROUP CHARACTERISTICS

Table A

FARM FAMILY BASES

	PROJECT DOWNSTREAM AREA ^{1/}						PROJECT SETTLEMENT AREA ^{2/}	N.E. RURAL	
	0-6	6-15	15-30	30-45	45-60	60+			
% IN GROUP	2.8	17.9	38.2	20.4	12.6	8	100%	100%	
RANGE OF LAND HOLDING (RAI)	0-6	6-15	15-30	30-45	45-60	60+			
AVERAGE LAND HOLDING (RAI)	4.5	10.0	21.9	35.6	50	85	30.8	30 ^{3/}	
AVERAGE FAMILY SIZE (PERSONS)	-	-	-	-	-	-	6.6	6.6	7.0 ^{3/}
AVERAGE NET CASH FARM INCOME (\$)	18	53	65	160	252	332	126	62	172 ^{4/}
AVERAGE NET CASH OFF-FARM INCOME (\$)	139	227	264	221	326	355	260	165	204 ^{4/}
AVERAGE TOTAL CASH INCOME (\$)	157	280	329	381	578	687	386	227	376 ^{4/}
AVERAGE INCOME IN KIND (CONSUMPTION) (\$)	67	154	233	272	284	320	236	151	250 ^{5/}
AVERAGE TOTAL INCOME (\$)	224	434	562	653	862	1007	622	378	626 ^{5/}
AVERAGE CASH SPENT ON CONSUMPTION (\$)	73	214	283	304	510	450	312	330	

^{1/} Report on the Socio-Economic Survey of the Downstream Portion of the Lam Nam Oon Project - 1976.

^{2/} Socio-Economic Survey on Lam Nam Oon Self-Help Land Settlement - 1975.

^{3/} DOAE 1975 Crop Survey.

^{4/} Based on unpublished DOAE data for NE Region agricultural family net cash income in 1974 brought to common year (1976) with Lam Nam Oon Surveys by applying 1974-76 NE Region consumer price index change (1.17 per BOT) and real growth in NE Regional GNP/capita (4% per NESDB).

^{5/} Estimated.

The sale of rice accounts for 52% of cash farm income. Sale of livestock accounts for 35% while the sale of other crops such as kenaf, vegetables, cassava, corn, fruit, and kapok accounts for 13% of cash income. The greatest share of products are sold through local markets (48%) and middlemen (44%), Farmers groups and cooperatives handle less than 4% of the total sales.

Forty percent of the farmers reported having outstanding debt. Of those indebted, 45% had obtained their loans from the BAAC, 24% from cooperatives and farmers groups, 12% from merchants and 20% from relatives and friends. Average debt was \$54.

Acceptance of New Farm Practices

Of particular relevance to the success of this project is the question of receptivity of villagers to adopting new farming techniques and new crops. Assuming the transfer of technology is at a level appropriate to the educational background and experience of the farmer; that economic incentives in providing profitable rate of return are proven; and that there is no significant disruption of traditional social and cultural patterns of behavior, Northeastern villagers will readily accept new crops and farm techniques. The growing of new crops such as kenaf, tapioca and tobacco in response to market demands is clear evidence of farmers' receptivity to, and acceptance of, change, if warranted in terms of his assessment of risk and economic return. The farmers must perceive the cash income resulting from acceptance of innovative practices as more than compensating for funds and time (labor) expended.

The success of Adams, International in involving 15,000 Northeastern farm families in expanding production of tobacco within a two-year period is striking evidence of their receptivity to new practices and crops, once they are convinced that the new crop and technology are viable and profitable. This conviction is a product of the adequacy of the extension effort, the packaging of the credit and other inputs, and the assurance of marketing channels. The Lam Nam Oon project takes all these elements into consideration with the objective of assuring increased farmers' productivity and economic profit.

Initial Acceptors

Various surveys, including the Lam Nam Oon Socio-Economic Survey, have noted the natural caution of villagers in being the first to risk adoption of innovative practices. However, on the basis of experience with the acceptance of new crops in the Northeast, it is recognized that farmers will quickly follow the example of successful fellow farmers. The initial acceptor should be a formal or informal leader of the community and one who has sufficient resources to assume a risk. The successful innovations in order to be accepted by other farmers should be the result of resources, in financial, equipment or labor force terms, within the poorer farmers' means and ability to obtain. If so perceived, farmers will follow the lead of the initial village acceptor. The Lam Nam Oon project takes the above patterns of thought and behavior into consideration. Experimental programming in land consolidation, land titling, and on-farm improvement are built into the project as well as demonstration plots, initial acceptor nuclear families, model villages, etc.

Most of the LNC developmental activities undertaken by line departments and other agencies in this project will be initially focused on members of selected leading farm families who will act as representatives for a number of the neighboring families. These local leaders will, in turn, assist the families within their group by imparting to them improved skills and advanced technology in which local leaders have been trained thereby achieving spread effect.

Limiting Factors on Acceptance of New Crops

One factor contributing to the reluctance of Northeast Thai farmers to shift from rice to alternative cash crops is the psychological commitment to the food staple, rice, grown for home consumption purposes. For the most part, the villagers are not prepared to shift to alternative cash crops, however certain the profitable economic return on investment might be, if such crops are grown at the expense of rice produced for home consumption. The Lam Nam Oon project does not envisage such substitution, as new crops would not be competitive to rice but would be grown as second crops during the dry season. However, the project envisions a shift from glutinous to non-glutinous rice except for enough to feed the individual farm family. Further, since rice yields would actually be raised under this project,

It might be possible to gain villagers' acceptance of new cash crops as an alternative to some portion of that rice grown for sale.

Credit and Marketing Facilities

Other factors affecting the acceptance of new cash crops in the dry season and the substitution of new crops in the wet season concern the availability of effective credit and marketing facilities. Such credit and marketing facilities for new crops would either have to be developed or existing workable arrangements for the rice trade adapted. As noted in the Lam Nam Oon Socio-Economic Survey, farmers in the project area are basically satisfied with traditional marketing arrangements undertaken by local merchants. However, such traditional arrangements might be unresponsive to specific input requirements for new crops and innovative farming technique. Thus, the Lam Nam Oon project provides for the progressive development of credit and marketing cooperatives. In the interim traditional forms of credit and marketing through local merchants could be utilized. It is also politic, as a means of avoiding antagonism of influential local merchants and traders, to concentrate efforts to develop credit and marketing cooperatives for the new crops to be grown in dry season, allowing traditional credit and marketing mechanisms for rice to continue at initial stages of the project.

Participation of Farmers

The farmers are being given an opportunity to participate in the project design to the extent feasible. Their attitudes and opinions developed in the socio-economic survey represent a significant input in the final design of the project. In addition, one of the principal innovative features of this Lam Nam Oon project is the involvement of the Department of Community Development in coordination of specific development activities at the village level and the active encouragement of farmers' participation. The Department of Community Development has had both experience and success in the selection, training, and development of local leaders and involving these leaders and their fellow farmers in making decisions affecting the socio-economic development of their communities. Community Development Coordinating Committees have been successfully established and would also be a part of this Lam Nam Oon project. The Department of Community Development also has worked very effectively in organizing

and supporting the activities of various farmers groups and associations. In the Lam Nam Oon project, the Department of Community Development will not only help to organize such groups but will identify such groups' interests and activities with specific development subject fields. This approach can certainly be profitably replicated elsewhere.

Water-Users Associations

The Lam Nam Oon project provides various institutional mechanisms through which farmers' participation may be more effectively realized. One of these is the Water Users Associations. Such associations are to be strengthened and expanded under the project. Many observers of the Thai scene have commented on the independence orientation of the Thais. However, these analysts have tended to overlook traditional patterns of communal cooperative behavior, and it is these patterns that serve as a basis for more formalized farmers groups and associations. Villagers often form an informal cooperative, grouping to build a large fish trap, operate and guard it and share in the proceeds. Mutual assistance in the planting and harvesting of rice, house building, and in village merit activities related to community development goals indicate that there are no traditional barriers to the formation of formal farmer associations. In the Lam Nam Oon Socio-Economic Survey, 94% of the farmers indicated their willingness to share costs and undertake feeder ditches and dikes. However, it should be recognized that the effectiveness of such associations rests on other factors such as managerial competency, lack of trust where cash commitment is concerned, etc.

Relationship Between Villagers and Government Officials

This project, through a variety of techniques including an extension program directed at nuclear families, demonstration farmers and model villages, provides the framework for the effective dissemination of technical information in terms understandable to the farmer. However, extension efforts are dependent on the behavior and attitudes of the agents in their contact with the villagers. Such behavioral patterns are of special significance in this project as there will be more than normal frequency of contact between government officials and villagers because of the extensive on-farm agricultural innovations as well as the innovative

developmental activities undertaken by a variety of government agencies, e.g., Department of Fisheries, Division of Adult Education, Department of Community Development, etc.

The project design recognizes the need to re-orient traditional patterns of behavior of officials in their relations with the villagers. The Department of Community Development is charged, under this project, with the responsibility of assuring that government officials appreciate the need to avoid treating villagers as inferior and to listen constructively to the expression of their views and needs. The Community Development Department also has the responsibility under this project to promote awareness of, and commitment to, the project on the part of the villagers, and encourage their active participation. The villagers will be encouraged to make their needs known and to assess the relevance of advice tendered. The use of the Department of Community Development to actively participate in orientation and training of both officials (including extension agents and subject matter specialists) and villagers with a view to alleviating tension caused by stereotyped views; changing traditional attitudinal biases, creating mutual trust and confidence and encouraging a constructive dialogue between villagers and officialdom is a model that can be replicated in other development projects throughout Thailand.

Thus, one of the expected results of this project, as in the case of the Agricultural Extension Outreach Project, will be the improvement in the working relationships between villagers and officials. This more positive relationship will lead to strengthening of political bonds between the rural areas and the Government, and this, in turn, will result in economic development and change being achieved in a socially and politically stable context.

Government Coordination and Administration

The Lam Nam Oon project provides some models in the area of coordination of Government activities and their administration. This project envisages a variety of innovative developmental activities that will complement each other, e.g., agricultural research and extension, community development training and organization, home economics and nutrition advisory services, reservoir fish stocking and community/household pond culture, expanded health/family planning services, expanded adult education services, credit and marketing systems, etc.

The MOAC endorses the role of the Provincial Governor's office as the responsible agency for the administrative coordination of these various developmental efforts at the project site. The Governor's office will have an overall supervisory role in coordinating and integrating the various developmental activities of the different Government departments. This is a significant departure from the traditional central control approach to development as acted out by agencies of the Thai Government. Improved coordination will also result from the centralization of all project field personnel, facilities, services, etc., on a common site in the LNO area. This model of coordinated, integrated rural development can be profitably replicated throughout Thailand.

His Majesty the King's new palace, reservoir and agricultural crop testing area just south of the project area should work to the benefit of the project due to royal family attention, patronage and a politically stabilizing influence.

Role of Women

Women participated in the project planning and design of this project through the composition of the Kasetsart University survey teams which were composed of 50% women. In the field interviews undertaken, farm family wives were the principal respondents for descriptive, statistical and attitudinal data. For the home economics and nutrition component of the developmental activities, women section chiefs have actively participated in the project design.

In terms of the project implementation, it should be noted that 70% of first class District health center staff and 90% of second class Tambon health center staff are women, mostly from the local area.

The THEA developmental project will have at the field level about 130 female home economics and nutrition specialists providing training and advisory services to eight pilot villages nationwide, of which one will be selected within the LNO project area. All LNO villagers have primary schools and 50% of primary school teachers are women. The cadre of Department of Community Development officials will include female specialists assisting in the development of women and youth groups, nutritional foods activities, and child care centers to be set up where care cannot be provided by the extended family.

In terms of beneficiaries of project implementation, female members of selected nuclear leading farm families will play key roles, firstly as recipients of the training received and subsequently as agents (trainers) in assisting in upgrading the skills of women members of their peer village group. For a few such families, it is proposed to test the effectiveness of the family acting as a team in extending this type of assistance to their neighbor families, i.e., the husband being the "contact" (DOAE) farmer; the wife being the village health agent (CBFPS) or home economics beneficiary (THEA); a son acting as the Boy Scout representative under the PVO/OPG village fish propagation project; and a daughter as the 4-H representative under the PVO/OPG - Yuwa Kasikom Project.

In the Settlement area, the sericulture activity is especially women oriented. The women carry out most all of the principal tasks connected with sericulture. It has been decided that three out of ten on-site sericulture managers under the Sericulture/Settlements project are to be women. AID will urge that a qualified woman manager also be sought for the Lam Nam Oon Settlement sericulture activities under this project.

Developmental Disparities Between Project Area and the Neighboring Region

It is recognized that not everyone will benefit equally under this project, i.e., farmers in the consolidated area will benefit most, other downstream farmers to a lesser extent and the settlement farmers the least. Those in the region outside the project area will not benefit directly but might profit indirectly, through either their own initiative or through replication by Government agencies of developmental activities.

In conclusion, there are no significant socio-cultural obstacles to the successful implementation of the Lam Nam Oon project. The project is designed to take into consideration the socio-cultural realities and to utilize such patterns where feasible to strengthen the viability of the project. This project, through its innovative approaches to integrated community development, in administrative as well as technical terms, can be successfully replicated and thus have a most salutary impact on national development goals.

PART A Project Analyses

D. Economic Analysis

1. Project Benefits

Project benefits are calculated on the basis of alternate cropping plan 6 as included in ECI's report (Annex B.7.a.). A summary is given in Table 5 and the backup calculation is included as Annex B.8. The cropping plan was developed by ECI using crop recommendations of Peter Kung, FAO Senior Agricultural Officer at the Northern Agricultural Development Center, Chiang Mai, in part and those of others who considered results from the Kalasin crop research station work and the soils analyses which had earlier been done by ECI, RID and others. As explained in the ECI report, the cropping plan was designed to optimize use of available water and to provide irrigation water during both wet and dry seasons to the entire project area. Thus all farmers will have an opportunity to participate directly in project benefits, not just those in land consolidation areas as would have been the case with earlier plans. Obviously, the plan is only suggestive; farmers' decisions as influenced by later circumstances including prices, market conditions, labor requirements, input costs, research results, and extension efforts will determine what is actually grown.

Calculation of net benefits from cropping takes into account the pace of land improvement work and is based on irrigated use of ditches and dikes areas beginning in the year after completion of each increment, longer in the case of consolidated areas to make some allowance for initial soil disturbance. Yields are calculated to increase slowly as farmers adopt new practices such as improving soil through liming, adding fertilizer etc. Input costs include provision for liming (at the rate recommended in the Agrilime Survey Report of December 1976), fertilizer, pesticides, and hired labor. Ultimate yields are based on estimates in ECI's Land Classification Report (1973) for medium suitability soil with improved practices and are considered by most experts with whom USOM has talked to be reasonable. Prices are based on best estimates of farmgate prices from MOAC data except that shadow prices are used for rice (\$100/MT for glutinous, \$120/MT for non-glutinous) in economic rate of return calculations. These shadow prices reflect the

prevailing world price for rice with allowance for transportation and other costs. Ultimate production from year 7 onward assumes that 93% of the land is cropped in the wet season; overall cropping intensity for the project is 1.465.

To test for sensitivity to factors influencing production value in direct proportion (i.e. extent of second cropping, price and yields), analysis is made for lesser increases with ultimate gross production value 20% lower than expected. Production input costs were not adjusted for this analysis. Actually, as can be seen by the relative magnitude of the numbers, the project is insensitive to changes in the cost of production inputs (though not insensitive to the use of those inputs). Calculation was also made for sensitivity to pace of adoption with ultimate production not reached until year 12.

Only direct crop benefits are included in the economic calculations. Indirect benefits from greater livestock raising opportunities, improved roads, health and education services, employment and multiplier effect were disregarded although they will certainly be substantial.

Data from the Socio-Economic Survey such as rice yields, crops grown etc., were used to estimate total present production, the starting point for the project. To be conservative in calculating the incremental benefit from the project, it was assumed that a 5% improvement in production results would have occurred each year through year 7 were the project not undertaken at all.

2. Project Costs

Project costs used for economic analyses derive from data elsewhere in this PP and are summarized in Table 6. The irrigation system costs are based on RID records for the period 1967-1975. Costs thereafter are RID estimates as verified and modified by ECI in its current report and include all costs associated with the dam construction (which was completed in 1973), as well as main canals, laterals, land improvement (consolidation and ditches and dikes), drainage, roads, etc.

Irrigation operation and maintenance includes pumping costs, plus other operation and maintenance costs for a total of ₱71/rai. In addition, equipment which will be used for maintenance work after project completion is all

SUMMARY OF PROJECT BENEFITS

Table 3

Year	Crop	Rainfed	Ditch/Dike		Consolidated		Total Area	Gross Prod. Value \$1,000	Total Prod. Cost \$1,000	Net Prod. Value \$1,000	Net Benefit Without Project \$1,000	Incremental Benefit \$1,000
			Wet	Dry	Wet	Dry						
0 (1976)	Rice	124	20	-	-	-	144	3,025	400	2,625		
	Other	-	5	9	-	-	14	750	100	650		
	Total	124	25	9	-	-	158	3,775	500	3,275	3,275	0
1 (1977)	Rice	124	20	-	-	-	144	3,260	505	2,695		
	Other	-	5	-	-	-	14	900	230	670		
	Total	124	25	9	-	-	158	4,160	795	3,365	3,440	75
2 (1978)	Rice	94	20	-	-	-	140	3,610	815	2,795		
	Other	-	35	20	-	-	29	1,990	540	1,450		
	Total	94	55	20	-	-	169	5,600	1,355	4,245	3,610	+ 633
3 (1979)	Rice	90	40	-	2	1	133	3,840	1,230	2,610		
	Other	-	17	37	-	1	55	3,950	1,140	2,810		
	Total	90	57	37	2	2	188	7,790	2,370	5,420	3,790	+ 1,630
4 (1980)	Rice	70	50	-	2	1	123	4,310	1,235	3,075		
	Other	-	27	53	-	1	81	6,370	1,760	4,610		
	Total	70	77	53	2	2	204	10,680	2,995	7,685	3,980	+ 3,705
5 (1981)	Rice	43	68	-	4	2	117	4,520	1,255	3,265		
	Other	-	34	64	-	2	100	8,775	2,250	6,525		
	Total	43	102	64	4	4	217	13,295	3,505	9,790	4,180	+ 5,610
6 (1982)	Rice	20	94	-	12	6	132	6,230	1,550	4,680		
	Other	-	35	74	2	8	129	11,215	2,710	8,505		
	Total	20	129	74	14	14	251	17,445	4,260	13,185	4,390	+ 8,795
7 (1983)	Rice	-	111	-	24	13	148	8,250	1,865	6,385		
	Other	-	35	75	2	11	121	11,605	2,735	8,870		
	Total	-	146	75	26	24	271	19,855	4,600	15,255	4,610	+ 10,645

Summary of Project Costs
(\$1000)

Table 6

Year	Irrigation System	Irrigation O & M	Technical Assistance	Research	Extension	Community Development	Proj. Admin & Marketing Study	Total
1967-1976	25,101							
1977	3,386	124						3,510
1978	6,085	195	528	70	158	144	134	7,314
1979	5,074	202	451	25	51	40	11	5,854
1980	5,555	280	211	25	61	42	12	6,186
1981	6,541	369	121	25	50	68	13	7,187
1982	3,630	500	50	25	42	40	14	4,301
1983	468	660	-	25	42	-	-	1,195
1984 & thereafter	-	660	-	25	42	-	-	727
Total 1977-1983	30,739							
Grand Total	59,840							

charged in the year in which purchased. The \$71/rai figure includes all costs to the farm turnouts, Farmer inputs (in-kind labor) are not charged. ECI's latest calculations included as Annex B.4. provide the basis for this estimate. Sensitivity analysis shows that the impact on rate of return of an error as high as 50% in O&M is not great. Sensitivity to higher construction costs (but not other costs nor benefits) was also tested.

Only costs of the physical infrastructure and activities impacting directly on agricultural development are considered. Although important to the overall project, normal community development, health and family planning, fisheries, and education costs are not charged. These activities are deemed to have their own costs and benefits which are not readily calculable for the purposes of this analysis. However, because of its importance to the project, the extra cost of community development activities--those over and above what would be considered normal activities of the Community Development Department--are charged as costs.

3. Economic Viability

Calculated internal rates of return for various assumptions and based on incremental cost from 1977 onward are presented in Table 7. IRR ranges from 25.8% as the best estimate to 15.2% under worst expectations. Project life is taken as 50 years. The results make quite clear that the project is economically viable and is not unduly sensitive to errors in projections of probable magnitudes. Using an interest rate of 8%, the approximate rate paid on RTG bonds, the project has a net present value of \$62,730,000 and a benefit to cost ratio of 2.95.

Costs incurred in 1976 and prior years are considered sunk costs for the above calculations. If these earlier costs are included, using 8% interest to bring them to their present worth in year 0 (1976), the project is much less attractive. Internal rate of return becomes 10.2%, net present worth \$21,160,000 and benefit to cost ratio 1.29. This demonstrates that restricting project planning and analysis to making irrigation water available without considering on-farm development leads to lost opportunities and may result in mis-allocation of scarce resources.

Internal Rate of Return

Table 1

		Benefit Stream (\$1,000)							IRR %
		1 1977	2 1978	3 1979	4 1980	5 1981	6 1982	7 to 50	
A. Best Estimate	Ben.	-75	+635	+1,630	+3,705	+5,620	+8,795	+10,645	25.8
	Cost	<u>-3,510</u>	<u>-7,314</u>	<u>-5,854</u>	<u>-6,186</u>	<u>-7,187</u>	<u>-4,769</u>	<u>-727</u>	
	Total	-3,585	-6,679	-4,224	-2,481	-1,567	+4,026	+9,918	
B. Ultimate value of gross crop production 20% less than Best Estimate	Beg.	-75	+385	+1,330	+2,705	+3,610	+5,795	+6,675	16.7
	Cost	<u>-3,510</u>	<u>-7,314</u>	<u>-5,854</u>	<u>-6,186</u>	<u>-7,187</u>	<u>-4,769</u>	<u>-727</u>	
	Total	-3,585	-6,929	-4,524	-3,481	-3,577	+1,026	+5,948	
C. Irrigation Construction costs 20% greater in each year than Best Estimate	Beg.	-75	+635	+1,630	+3,705	+5,620	+8,795	+10,645	22.3
	Cost	<u>-4,187</u>	<u>-8,531</u>	<u>-6,869</u>	<u>-7,297</u>	<u>-8,495</u>	<u>-5,589</u>	<u>-727</u>	
	Total	-4,262	-7,896	-5,239	-3,592	-2,875	+3,206	+9,918	
D. Best Estimate but with construction costs subject 50 5% annual inflation	Beg.	-75	+635	+1,630	+3,705	+5,620	+8,795	+10,645	23.8
	Cost	<u>-3,510</u>	<u>-7,618</u>	<u>-6,374</u>	<u>-7,061</u>	<u>-8,597</u>	<u>-5,931</u>	<u>-727</u>	
	Total	-3,585	-6,983	-4,744	-3,356	-2,977	+2,864	+9,918	
E. O&M costs 50% greater than Best Estimate	Ben.	-75	+635	+1,630	+3,705	+5,620	+8,795	+10,645	24.9
	Cost	<u>-3,572</u>	<u>-7,412</u>	<u>-5,955</u>	<u>-6,326</u>	<u>-7,371</u>	<u>-5,019</u>	<u>-1,057</u>	
	Total	-3,647	-6,777	-4,325	-2,621	-1,751	+3,776	-9,588	
F. Ultimate value of crop production not reached until year 12	Ben.	-75	+140	+210	+520	+1,070	+1,960		15.2
	Cost	<u>-3,510</u>	<u>-7,314</u>	<u>-5,854</u>	<u>-6,186</u>	<u>-7,187</u>	<u>-4,769</u>		
	Total	-3,585	-7,174	-5,644	-5,666	-6,117	-2,809		
Year		7	8	9	10	11	12-50		
Ben.		+2,860	+4,000	+5,250	+6,250	+8,500	+10,645	15.2	
Cost		<u>-727</u>	<u>-727</u>	<u>-727</u>	<u>-727</u>	<u>-727</u>	<u>-727</u>		
		+2,133	+3,273	+4,523	+5,523	+7,773	+9,918		

NOTE: Irrigation system construction cost in year 7 is lumped with year 6 for these calculations to accommodate the limitations of the program and number of memory registers of the TI SR-56 computer on which these runs are made. Error introduced is minor.

PART 4. Implementation Planning

A. Analysis of RTG and USOM Administrative Arrangements

1. Thai Implementing Agencies

The project involves a number of RTG implementing agencies at the central Bangkok level and at the project site. A description of the various agencies follows. Several of the agencies bear heavier responsibilities and are more critical to project success. These are discussed first and in somewhat greater detail.

a. The Royal Irrigation Department (RID)

RID was formed in 1904 and since that time has constructed irrigation, flood control and navigation facilities benefitting almost 2 million hectares. Although a part of the Ministry of Agriculture and Cooperatives, it functions in many respects as an autonomous agency. RID has 3,605 Civil Service employees, 33,705 permanent employees (these are regular RTG employees but do not enjoy the same status or benefits as Civil Service employees. Most of the professional/technical staff belong to the Civil Service.), and 10,847 temporary employees. These employees are organized into 22 operating divisions; an organizational chart is presented as Annex B.9.a. Despite notable accomplishments in the construction of dams and basic irrigation facilities, many farmers, especially outside of the central region, are not benefitting from the irrigation works built to serve them. The Lam Nam Oon area is an example.

USOM's assessment that RID has been lacking in its attention to and performance in the on-farm development aspects of the irrigation facilities it builds is confirmed in the IBRD's Thailand-Irrigation Program Review dated December 1976. The IBRD is a major financier of RID projects. Some of RID's needs which the IBRD review identifies are:

(1) More emphasis on reliable and timely delivery of water to farmers' fields through

(a) System upgrading and O&M

(b) Higher standards of water control

- (c) Higher standards of mapping and design (especially needed in the irregular topography of the Northeast)
- (2) Improved organization and management including
 - (a) Greater coordination among divisions during project planning, implementation and operation
 - (b) Assignment of direct project control to single project managers
 - (c) Greater delegation of authority
- (3) Expanded planning and programming capability including evaluation of incremental costs and benefits of varying intensities of on-farm development.
- (4) Greater reliance on contracting as opposed to force account construction.
- (5) Streamlined procurement procedures.
- (6) Improved career development and training programs.

The review report provides the terms of reference for a major organization and management study which RID had agreed to and which is to be financed as part of the IBRD's \$95 million loan for the Phitsanulok Project, a diversion dam on the Nan River with facilities for irrigating 95,000 hectares. The study will provide better definition of the problems and a specific plan for correcting deficiencies. With this focus of attention and by concentrating its efforts on the study's recommendations we believe RID's performance will improve markedly.

USOM believes the IBRD review and its identification of RID's problems are accurate and its proposals for improvement sound. In fact many of the approaches suggested in the IBRD review are fundamental elements of the design of this project. The Lam Nam Oon project will both benefit from the IBRD's efforts and will support them. We share the IBRD view that notwithstanding some present weaknesses, RID is capable of carrying out projects such as this one.

b. Community Development Department (CDD)

The Community Development Department (CDD) was created in 1962 for the purpose of assisting in the development of rural Thai institutions down to the Tambon and village levels and through these institutions, inspire community-based actions to realize improved living conditions for the villagers. The CDD has approximately 4,500 employees working in all provinces providing a basic program which, in addition to broad communal development and infrastructure assistance, includes introduction and training in new occupational activities as well as upgrading skills in traditional rural occupations, educational and health improvement activities, women and youth development plans, child care centers, etc.

The CDD is exceptionally well-fitted to assume the responsibility for coordination and integration of LNO field activities. Technically, the CDD cadre already comprises one of the largest groups of RTG technicians working in the LNO area. CDD activities in the project area include a wide range of training in agricultural, human resources and occupational development skills. Thus, CDD's on-site expertise and on-going assistance at village level will be particularly helpful in obtaining acceptance of the project and encouraging a significant self-help participation in activities. CDD guidance will be valuable in such ways as assisting RID in developing active, responsible Water Users Associations through which O&M labor contribution to on-farm system maintenance is provided and in promoting farmer group formation leading to the creation of soundly-based Farmer Associations and Coops. And at the national level the Director-General of CDD is providing a personal attention which will reinforce interdepartmental cooperation.

Starting in 1966, CDD and Shell Company of Thailand established an experimental Tambon development program in the Northeast, the "Saraphi Project", with the objective of improving the standard of living of a total Thai community which collaborates as a unit and is motivated to provide a maximum of self-help. The rural area selected for the initial and subsequent Saraphi Projects are among the more remote in the provinces and the people comprise the poorer elements. In such areas there is a minimum of field representation and assistance by the various Thai ministries and CDD attempts to fill needed gaps. This project has developed successfully and is currently being expanded to

pilot villages located in 46 provinces. Previous Saraphi Projects have been located only in rainfed agricultural areas. The LNO Saraphi Project will be the first under an irrigated agricultural environment and results tested and proven can thus be important for other irrigated areas.

c. Department of Agricultural Extension (DOAE)

This Department, as its name signifies, is the principal agent for introducing new agricultural technology to Thai farmers. While its ability to reach a large proportion of the Thai farmers has been severely limited, the recently initiated National Agricultural Extension Project, in which AID (Project No. 493-0280) and the IBRD are providing substantial assistance, is designed to overcome this deficiency. The DOAE's organization, capabilities, and plans are discussed in detail in the Project Paper for the AID Agricultural Extension Outreach Project. With the DOAE's commitment to add the Lam Nam Oon as a special (additive) area of the national project in its first year--and to staff the LNO extension effort at the budgetary level indicated in Annex B.3. of this paper, we are confident that DOAE will perform adequately to meet the LNO project objectives.

d. Other Agencies

There are a number of other organizations which will play important roles in the implementation of the project, as described in Part 2.B. At the field level, we are confident that their capabilities to implement the project activities are adequate. At the national level, the Coordinating Committee mechanism has been usefully applied in other projects to encourage cooperation among these departments.

e. Project Management and Coordination

Having described the capabilities and commitment of some of the major RTG Departments in the implementation of this project, it must be recognized that success in meeting overall project objectives will largely depend on the coordinated rather than individual efforts of these organizations. A unique characteristic and exciting opportunity for this project is the design of an integrated project organization to manage, monitor, and coordinate all RTG project activities in the LNO project area.

At the national level, irrigation policy and overall direction and coordination will be provided by the National Irrigated Agriculture Committee. Membership includes senior representatives from line ministries and other major agencies, with the Under-Secretary of State of MOAC appointed as chairman. This Committee is vesting authority for LNO Project policy and implementation guidance at the national level with a National Coordinating Committee (Annex B.9.c.) composed of senior representatives from the ministries involved with the LNO Project, as well as other RTG agencies such as NESDB, BOB, CSC, etc. A senior level working committee will be established, under the chairmanship of the Deputy Director-General of RID (who is also Project Director), to handle day-to-day project issues at the national level.

At the field level the LNO Provincial Coordinating Committee (Annex B.9.d.) is composed of the Provincial Chiefs of the RTG line agencies associated with the project as well as the LNO Field Director and Assistant Field Directors, and is chaired by the Governor of Sakon Nakhon. The Provincial Coordinating Committee translates Central administrative policy and implementation directives and provides guidance on this as well as overall project guidance to the LNO Project Field Director, Assistant Directors, and Team Leaders. The project field management team, which is under the direction of the Provincial Governor, is comprised of the Project Field Director and three Assistant Field Directors: the RID, CDD and DOAE Team Leaders.

Primary implementation coordinating responsibility for the project will be vested in the LNO Project Field Director. Reporting directly to the Provincial Governor, he will head the field management organization, monitoring and reporting on all project activities--their problems and progress--to the Provincial Governor and to the National Coordinating Committee. All project status reports from individual departments or teams will be submitted for his review, comment, and approval. His approval will be required on all requests for disbursement of funds from AID. The leader of the advisory team will report to him on overall project status. The Field Director will also coordinate project activities with other RTG Departments and Agencies not directly involved in the project (ARD, Department of Cooperative Promotion, etc.).

Departmental activities at the project site will be supervised by departmental "Team Leaders". Because of the significance of their activities, the Team Leaders for RID, CDD, and DOAE will be designated as Assistant Field Directors. The personnel of individual departments shall, of course, retain their direct link and be responsible to their parent organizations.

The field management team as well as project technical, managerial and support staff of the various agencies will be located in one administrative center at the project site, which shall be under the direction of the Project Field Director. Centralizing the locale for various agencies' personnel and their base of operations within the LNO, and subordinating their individual inputs to a single project management authority will provide a needed integration and coordination among the various activities.

The consultant firm contracted to provide the technical advisory services for the project (Annex B.10) shall act in an advisory capacity to the project field management organization. Individual members will be accredited to the various project Team Leaders, as identified in Annex B.10. The consultant team shall be resident at the project area.

f. RTG Staffing

The RTG will provide and pay for the additional personnel necessary to carry out project activities. The following table summarizes the additional staff, as detailed in Annex B.3.b., which will be provided by the various departments:

Staff \ Dept.	RID	DOA	DOAE	DOF	PWD	CDD	AED	DAE
Administrative	1	1	2	1	1	4	1	2
Technician	-	4	7	2	7	10	21	5
Secretarial/Clerical	-	-	7	-	-	-	-	4
Labor	-	24	10	-	-	2	-	1
<u>Total</u>	1	29	26	3	8	16	22	12

All of these departments will use existing staff as well in support of the project. RID in particular is already devoting substantial staff. The one additional RID position shown is for the Project Field Director. We have been advised that the position will be filled by the present RID Project Engineer at the site who is very familiar with the project and the area. RID will provide a replacement Project Engineer so that the Project Field Director can devote his full energies to the broader aspects of the project.

2. A.I.D. Monitoring Procedures

AID's monitoring of the project will be carried out by the USOM Project Officer assigned to the project. He will maintain a close working relationship with counterparts in all the RTG Departments directly involved in project activities, and particularly with the Project Field Director. As the project advances the Project Officer will receive reports on the status of activities. He will also monitor the achievement of project targets through frequent field visits to the LNO area.

PART 4. Implementation Planning

B. Implementation Plan

The timing of implementation actions by various agencies is shown in Annex E which includes an implementation schedule and a Project Performance Tracking Network Chart.

Normal RTG implementation procedures will be followed for all expenditures of local currency whether AID or RTG financed. For the most part, the larger expenditures will be by RID for the construction of irrigation facilities and these will be funded wholly by the RTG. The largest single item AID will finance is the construction of the Project Administration Center at about \$60,000 and for which the Fixed Amount Reimbursement (FAR) procedure will be used. Other items which AID will finance will be much smaller and will be handled by periodic reimbursements based on actual costs. USOM is familiar with RTG's normal procedures from involvement in and monitoring of other projects and concludes that these procedures provide adequate control and protection of AID interest. In fact the RTG's procedures conform generally with the USG's own practice except for differences in local custom. Thus USOM will not be involved in review or approval of these RTG actions but will maintain audit rights where AID funds are involved. USOM will, of course, monitor progress of all the work regardless of the funding source.

AID funds may be used to finance purchases in Thailand of commodities and supplies which have their origin in other countries. The amount of these purchases will be small and the usual \$2,500 off-the-shelf procurement authority is sufficient to cover them. However, waiver of the requirement for source-origin certificates is recommended as this would impose a tremendous burden out of all proportion to benefits derived and there is very little likelihood that AID funds would be used to purchase any items whose origin was other than AID Code 899, Free Worldwide.

AID implementation procedures will be followed for the major AID financed foreign exchange procurement; equipment and consulting services. AID Handbook 11 procedures will be stipulated in Project Implementation Letters. RID will be the procurement agent.

The items of equipment which USOM and RID have agreed AID will finance is given in Annex B.5. No changes to the list will be permitted without specific USOM approval in writing. RID has on hand specifications for many of these items as developed with consultants for previous procurements. Existing RID equipment is of many brands and RID has no standardization program or other interest that would prejudice its fair consideration of all brands that will meet minimum essential performance and service criteria under formal competitive bid procedures. RID has had previous experience in international procurement and Thai documentation and bidding procedures are generally in consonance with AID requirements so we perceive no major difficulties on this account. Delays in other recent procurements have occurred because of a cumbersome RTG review and clearance process. The chance for delays in this project will be minimized by conducting a single procurement with concentrated attention and expediting effort. No waivers of AID procurement requirements for equipment are anticipated.

Equipment is needed at the project site by January 1979. The target date for shipment from the U.S. (or other Code 941 country which is unlikely) is August 1978, to allow time for customs clearance, in-country servicing, transport to site, etc. Allowing 8 months for production means Invitations for Bids (IFB's) should be issued in September 1977, bids received in November and awards made in December, 1977. This schedule allows ample time for all actions. It may even be possible to improve these dates and have the equipment in operation before January 1979. Prompt action must be taken on the early steps however and RID should begin refining the specifications and drafting the IFB well before signing of the loan agreement. USOM will work with RID in this effort and will probably call on the services of the Regional Engineer in Seoul and the Regional Contracting Officer in Manila at this stage as well as at the times of AID approval of the IFB and Commerce Business Daily (CBD) advertisement, and the review and approval of bids. We do not presently anticipate the need for other preimplementation actions for equipment procurement but depending on how quickly the loan is approved and signed, and conditions precedent met, we may wish to permit issuance of the IFB's (but not receipt of bids) before conditions precedent are met. Thus, authority is requested for the USOM Mission Director to approve such action if he determines that it is in AID's interest to do so and can be done without creating undue expectations or prejudicing future AID decisions or approvals.

Summary scopes of work for the several consultants are provided at Annex B.10. We anticipate that a single private U.S. firm with established capability in several fields of agricultural development will be able to provide the consultants which are called for. The consultants are needed on the job as soon as possible but not later than January 1978. In order to meet this schedule, several pre-implementation actions are required. Refinement of the scope of work and preparation of an advertisement for the Commerce Business Daily inviting expressions of interest can be done right away, before PP approval. Expressions of interest can be received and an RTG selection of prequalified firms (short list) made by about June 15. USOM would approve the short list and a Request for Proposal for issuance by RID about June 30 provided the PP is approved by then. Proposals can be received and an RTG selection made by about August 30. USOM would approve the selection and commencement of negotiations as soon as possible provided the loan agreement is signed by then thus permitting the consultants to be on board perhaps as early as November or December if the negotiations and letter of credit arrangements proceed apace. Approval of the pre-implementation steps included above is recommended.

Logistics support for the consultants will be provided by the RTG (RID jointly with the agencies to whom the consultants are assigned). USOM-provided logistics support will be nil. Vehicles for the consultants and for the Office of the Project Field Director may be financed by AID if suitable types are available from the U.S.

USOM believes that the complexity and uniqueness of the project require a continued USOM role over the next several years at least, and probably for the full 5 year project period. Thus USOM staffing plans include the continuance of a U.S. project officer, a Thai assistant project officer, and a Thai secretary whose primary responsibility will be the Lam Nam Oon project. In addition, part time assignment of USOM's Thai engineer is contemplated. Assistance needed AID staff outside of USOM includes the Regional Contracting Officer and Engineer already mentioned above, and possibly evaluators mentioned in the following section.

PART 4. Implementation Planning

C. Evaluation Plan

Evaluations of project progress are planned to be held annually beginning in January 1979. The evaluation teams will include participants from RTG agencies, as well as AID; usual practice is to have the team led by two co-chairman, one Thai and one American. Each annual evaluation will focus on implementation progress, principally inputs and outputs.

In 1979, 1981 and upon project completion, the evaluations will be more thorough and will attempt to measure purpose achievement and reassess sector and sub-sector goals. USOM presently plans to call on one or more external evaluators to help conduct these special evaluations.

Socio-economic sample household surveys will be conducted by DAE in 1978, 1980 and 1981 with reports issued not later than December in each of those years. These will provide data for the special evaluations. Farm management records will be maintained and tabulated monthly by DAE over the life of the project for a selected number of farmers and will complement the data received by DAE from its household surveys. Baseline surveys have already been conducted and comprehensive reports issued. Kasetsart University conducted the one in the resettlement area and the Division of Agricultural Economics (DAE) conducted the one in the downstream area.

The timing of the socio-economic surveys coincides with those planned for the Sericulture/Settlements Project and will enable adding the Lam Nam Oon Resettlement area surveys to an existing AID grant to Kasetsart University. In this manner, significant savings can be realized and greater consistency of data assured. The cost for the Lam Nam Oon Resettlement area surveys is expected to be about \$2,500 in each of the three years, for a total cost of \$7,750. AID will grant-fund the anticipated out-of-pocket costs to DAE of the downstream area surveys which, based on cost experience from the baseline survey, will be about \$10,000 in each of the three years, for a total cost of \$30,000. AID will also grant fund a portion (farm book-keeping expenses incurred by the farmer) of DAE's farm management record program. This is estimated at \$3,000/year, for a total of \$15,000. The remainder of the total

\$60,000 budget for evaluations is intended to cover costs of the external evaluators mentioned above, and contingencies.

The socio-economic household surveys already conducted provide excellent baseline data for measuring achievement of key elements of the sub-sector goal and project purpose. However, as the project design progressed, more elements of health and general well-being were identified which had not been considered when the surveys were conducted. Thus we are lacking baseline data in these areas. We intend to correct the deficiency by working with DAE to first identify what administrative data is available and then to build into project reporting and future socio-economic surveys the additional elements that are needed.

PART 4. Implementation Planning

D. Conditions, Covenants and Negotiating Status

1. Conditions Precedent to Project Agreement Signature

Prior to execution of the Project Agreement, the RTG shall have submitted to USOM, in form and substance satisfactory to USOM:

a. Evidence of agreement among the participating RTG agencies on the site selected for the LNO Project Administration Center (the Center);

b. Engineering plans and cost estimates for the construction of the Center;

c. Plans for financing the construction of the Center and for financing its continued operation and maintenance; and

d. A scope of work for a consulting firm to provide technical assistance, to include assistance in the preparation of (a) a comprehensive engineering, construction, and operation and maintenance program for the Project, (b) a detailed operational research program for the pilot project areas, (c) a detailed agricultural research plan and a comprehensive agricultural development plan, and (d) a master community development plan coordinating the development activities of all participating agencies.

e. A request for proposals to provide the services described in D.1.d above, to be issued promptly after Project Agreement signature to prequalified consulting firms selected on the basis of an advertised solicitation of expressions of interests, all in accordance with the procedures prescribed in AID Handbook 11, Chapter 1.

2. Conditions Precedent to Disbursement

The Project Agreement will include the following conditions precedent to disbursement:

a. Prior to the first disbursement under the Loan, or to the issuance by A.I.D. of documentation pursuant to which disbursement will be made, the Borrower will, except as

the Parties may otherwise agree in writing, furnish to A.I.D. in form and substance satisfactory to A.I.D.:

(1) Evidence that the Borrower has appointed a qualified individual to serve as full-time Field Director for the Project and has named the persons to serve as Departmental Team Leaders for each of the participating agencies.

(2) Evidence that the Borrower has established a National Coordinating Committee for the Project, chaired by the Under-Secretary of State, Ministry of Agriculture and Cooperatives, with the Governor, Sakon Nakhon Province and the Deputy Director-General, Royal Irrigation Department, as vice-chairmen, and with representatives of the concerned agencies as members.

(3) A draft contract with a consulting firm, satisfactory to A.I.D., for technical services, to include assistance in the preparation of (a) a comprehensive engineering, construction, and operation and maintenance program for the Project, (b) a detailed operational research program for the pilot project areas, (c) a detailed agricultural research plan and a comprehensive agricultural development plan, and (d) a master community development plan coordinating the development activities of all participating agencies.

b. Prior to disbursement of local currency under the Loan, or to the issuance by A.I.D. of documentation pursuant to which disbursement of local currency will be made, for any purpose other than to finance the salary and related costs of the Field Director for the Project, the Borrower will, except as the Parties may otherwise agree in writing, furnish to A.I.D. in form and substance satisfactory to A.I.D.:

(1) A comprehensive engineering, construction, and operation and maintenance program for the Project;

(2) A detailed operational research program for the pilot project areas;

(3) A detailed agricultural research plan and a comprehensive agricultural development plan; and

(4) A master community development plan coordinating the development activities of all participating agencies.

3. Covenants

The Project Agreement will include the following covenants:

1. Except as A.I.D. may otherwise agree in writing, the Borrower/Grantee will develop and implement a program acceptable to A.I.D. within twenty-four (24) months after Project Agreement signature, to assure the timely allocation of land to participants in the resettlement area project adequate for their needs.

2. The Parties agree to establish an evaluation program as an integral part of the Project. Except as the Parties otherwise agree in writing, the program will include, during the implementation of the Project and at one or more points thereafter, (a) evaluation of progress toward attainment of the objectives of the Project, (b) identification and evaluation of problem areas or constraints which may inhibit such attainment, (c) assessment of how such information may be used to help overcome such problems, in this or other projects, and (d) evaluation, to the degree feasible, of the overall development impact of the Project. Joint evaluations will be conducted annually by Borrower and A.I.D. As inputs for these evaluations the Borrower will (a) prepare periodic reports on Project activities, expenditures, and physical progress, (b) collect and compile, with support from A.I.D., monthly farm management records, and (c) conduct, with support from A.I.D., three socio-economic surveys, one each in 1978, 1980, and 1981, modeled after the baseline socio-economic surveys already conducted.

3. Except as A.I.D. may otherwise agree in writing, the Borrower/Grantee will develop and implement a program acceptable to A.I.D. within twenty-four (24) months after Project Agreement signature, for recovering from the beneficiaries of the Project a significant portion of the Borrower/Grantee's investment costs in project development, particularly costs related to land improvement. This program will be developed in consonance with the Borrower/Grantee's programs for cost recovery in other irrigation projects in Thailand. The Borrower/Grantee will also develop an evaluation plan for its cost recovery program on this project which includes analysis of the social, political, economic and financial effects of the cost recovery program which is implemented.

g. Waivers

The following waivers to A.I.D. regulations are hereby approved:

1. Waiver of source certification requirements for local currency procurement.

2. Waiver of the requirement that no invitation for bidding on A.I.D.-financed commodities be issued until Borrower/Grantee has met initial conditions precedent, provided that the A.I.D. Mission Director has determined that such waiver is necessary to permit implementation of the project on schedule and that it can be granted without creating undue expectations concerning A.I.D. commitment to fund the concerned procurement and without prejudicing future A.I.D. decisions or approvals.

4. Negotiating Status

The project design has been a collaborative effort. While USOM has provided the stimulus for taking an integrated approach and the conceptual "cement" to bind project elements together, individual elements were virtually all designed by Thai agencies. Thus there is acceptance of the design by those who will implement the project.

In addition, USOM provided 40 copies of the draft PP for review by RTG and local government officials. Important parts of the PP were translated into the Thai language to assure widespread understanding. USOM participated in two meetings with Thai officials to review the PP and to agree on project details. One of these meetings was held at the project site and was participated in by the Provincial Governor and members of his staff; the other meeting was held in Bangkok. The Thai participants proposed several changes in the project and the PP which were accepted and incorporated in the final version. USOM believes that the meetings clearly established RTG endorsement of the project and of the PP. The proposed conditions precedent and covenants were reviewed carefully and found acceptable.

An application for the A.I.D. loan has been drafted and is being cleared by RTG agencies. It will have to be submitted to a Cabinet committee for final approval. We anticipate that the letter of application will be forthcoming shortly since there is already widespread knowledge and acceptance of the project and the cabinet has already approved completion of the expanded LNO Project.

TELEGRAM

ANNEX A
Foreign Service of the
United States of America

INCOMING USOM/Thailand

UNCLASSIFIED

Classification

MJA854EHK498
RR RUMJQB
DE RUEHC #2052 0012336
ZNR UUUUU ZZK
R 012031Z JAN 76
FM SECSTATE WASHDC
TO ANEMBASSY BANGKOK 9937
BT
UNCLAS STATE 000052
ADCM
ECON AIDAC
FILES E.O. 11652: N/A

Control: 007
Recd: JANUARY 2, 1976
0944

ACTION:
USOM
INFO:
CDA
ADCM
ECON
FILES

ACTION TAGS:
CARL

SUBJECT: LAM NAM OQN PRP

INFO
D
DD
IA
O/MC:
O/FIN
O/PRM:
LIND.
CHRON
RF

REFS: (A) BANGKOK 26439, (B) BANGKOK 25953,
(C) BANGKOK 25318, (D) STATE 055 558, (E) STATE 045568

1. ASIA PROJECT ADVISORY COMMITTEE (APAC) REVIEWED SUBJECT PRP DECEMBER 15. USOM/T'S ROBERT COHN PARTICIPATED IN REVIEW. COMMITTEE APPROVED PRP AT DOLS 3.5 MILLION LEVEL. USOM AUTHORIZED PROCEED WITH DEVELOPMENT PP WHICH SHOULD ADDRESS OUTSTANDING ISSUES REF (D), IN ADDITION TO FOLLOWING ISSUES RAISED IN REVIEW:

2. COMMITTEE CONCERNED THAT REVISED RESETTLEMENT SUB-PROJECT WILL DIRECTLY BENEFIT ONLY 150 FAMILIES OVER LIFE OF LOAN. PP SHOULD DISCUSS HOW FAMILIES WILL BE CHOSEN AND WHAT WILL BE DONE TO PREVENT INCREASED INCOME DISPARITY WITHIN SETTLEMENT BEING ULTIMATE RESULT OF THIS PROJECT PRESUMABLY LATTER COULD BE PREVENTED BY VIABLE COMPNION RTG EFFORT TO IMPROVE ECONOMIC WELL-BEING FOR BALANCE OF FAMILIES.

3. PP SHOULD PROVIDE EVIDENCE THAT OTHER ALTERNATIVES WERE CONSIDERED FOR RESETTLEMENT SUB-PROJECT, AND THAT RTG FULLY SUPPORTS PROPOSAL.

4. ASSUMING FEASIBILITY ISSUES RAISED REF (E) WILL BE RESOLVED IN SERICULTURE PP, APAC NEVERTHELESS CONCERNED THAT ADDITIONAL ACTIVITIES PROPOSED RESETTLEMENT SUB-PROJECT MAY AFFECT THIS FEASIBILITY. SUBJECT PP SHOULD DISCUSS EFFECTS OF INCREASED DEMAND FOR WORM EGGS, MULBERRY CUTTINGS, AND OTHER NECESSARY INPUTS, AS WELL AS CONSEQUENCES OF ADDITIONAL HYBRID COCOONS RESULTING FROM PROPOSED SUBPROJECT FOR COCOON MARKETING, REELING, AND SILK PRICES.

....2

UNCLASSIFIED

Classification

5. FINANCIAL MANAGEMENT PLAN FOR PROPOSED RESETTLEMENT SUB-PROJECT SHOULD BE EXPLAINED IN DETAIL. PARA AC, REF (C) INDICATES FUNDING WILL BE THROUGH LNO PROJECT WHILE MANAGEMENT AND IMPLEMENTATION IS TO BE PERFORMED BY PUBLIC WELFARE DEPARTMENT. PP SHOULD DISCUSS PRECAUTIONS TAKEN TO MINIMIZE COMINGLING FUNDS FOR ELEMENTS OF SERICULTURE PROJECT AND LNO SUB-PROJECT SUCH AS EXPANSION OF TRAINING CENTER, MANAGEMENT CONSULTANT, AND EVALUATION AND MONITORING THAT ARE COMMON TO BOTH. FUNDING FOR BOTH PROJECTS SHOULD OF COURSE BE READILY IDENTIFIABLE WITH THE PROPER PROJECT. ASSUME USON HAS ALREADY CONSIDERED POTENTIAL PROBLEMS RESULTING FROM BOTH PROJECTS BEING FUNDED IN DIFFERENT FISCAL YEARS: SERICULTURE PROJECT WILL BEGIN BEFORE LNO PROJECT AND THEREFORE FINISH FIRST, AND THAT PROJECTS WILL HAVE DIFFERENT TERMINAL COMMITMENT AND DISBURSEMENT DATES, ETC. THESE SHOULD BE DISCUSSED IN PP

.....2....CN:007

6. ASSUME ROLE OF WOMEN, SOCIAL INCLUDING HUMAN RIGHTS CONCERNS, AND ENVIRONMENTAL IMPACT WILL BE ADDRESSED IN PP SEPARATELY FOR EACH SUB-PROJECT.

7. WOULD APPRECIATE DRAFT OF LOAN AGREEMENT SUBMITTED WITH PP FOR REVIEW.

8. EVALUATION ISSUES RAISED PARATE AG EXTENSION PRP CABLE - (LUN) ALSO APPLY FOR LAN NAM OUN.

9. PLEASE ADVISE AID/W OF PROJECT DEVELOPMENT TDY AND CONSULTANT REQUIREMENTS WITH WORK SCOPES AND PROPOSED SCHEDULING SOONEST.

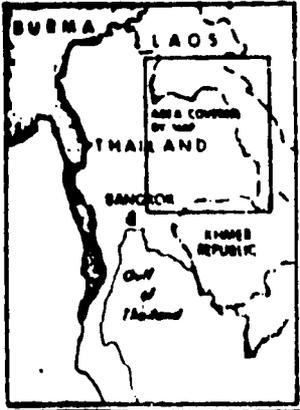
ROBINSON

BT

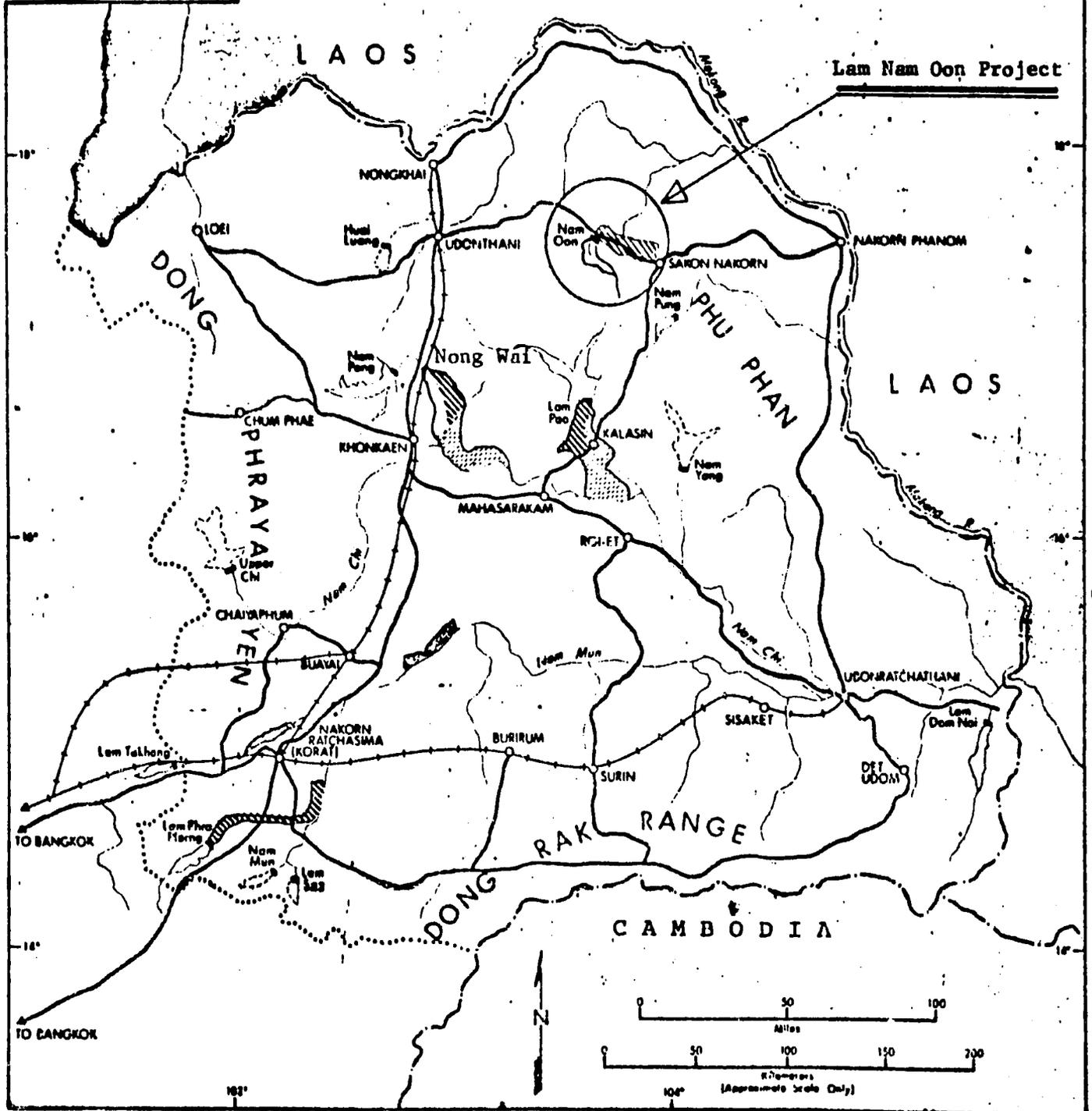
#0052

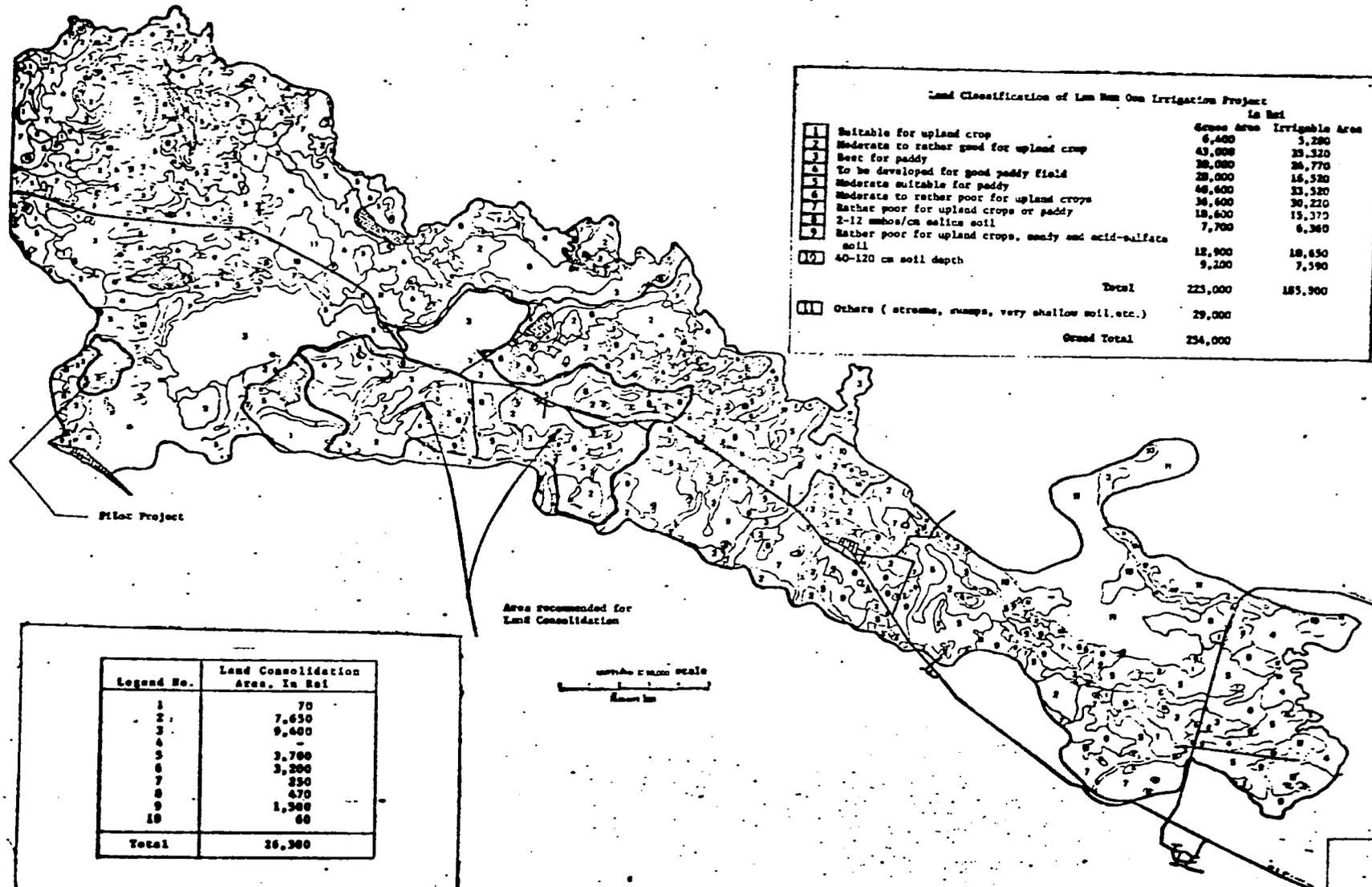
Penori

NORTHEAST THAILAND IRRIGATION PROJECTS



- | | | | |
|--|------------------------|--|--------------------------|
| | Existing reservoirs | | Main roads |
| | Potential reservoirs | | Roads under construction |
| | Existing canal systems | | Railways |
| | Proposed extensions | | Rivers |
| | Project Areas | | Regional boundaries |
| | | | International boundaries |

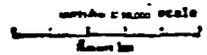




Land Classification of Lam Nam Oon Irrigation Project
In Rai

	Gross Area	Irrigable Area
1 Suitable for upland crop	6,400	5,280
2 Moderate to rather good for upland crop	43,000	35,320
3 Best for paddy	30,000	24,770
4 To be developed for good paddy field	20,000	16,580
5 Moderate suitable for paddy	40,600	33,320
6 Moderate to rather poor for upland crops	10,600	9,220
7 Rather poor for upland crops or paddy	18,620	15,370
8 2-12 mmhos/cm salina soil	7,700	6,360
9 Rather poor for upland crops, sandy and acid-sulfate soil	12,900	10,650
10 40-120 cm soil depth	9,100	7,590
Total	223,000	185,900
11 Others (streams, swamps, very shallow soil, etc.)	29,000	
Grand Total	254,000	

Area recommended for Land Consolidation



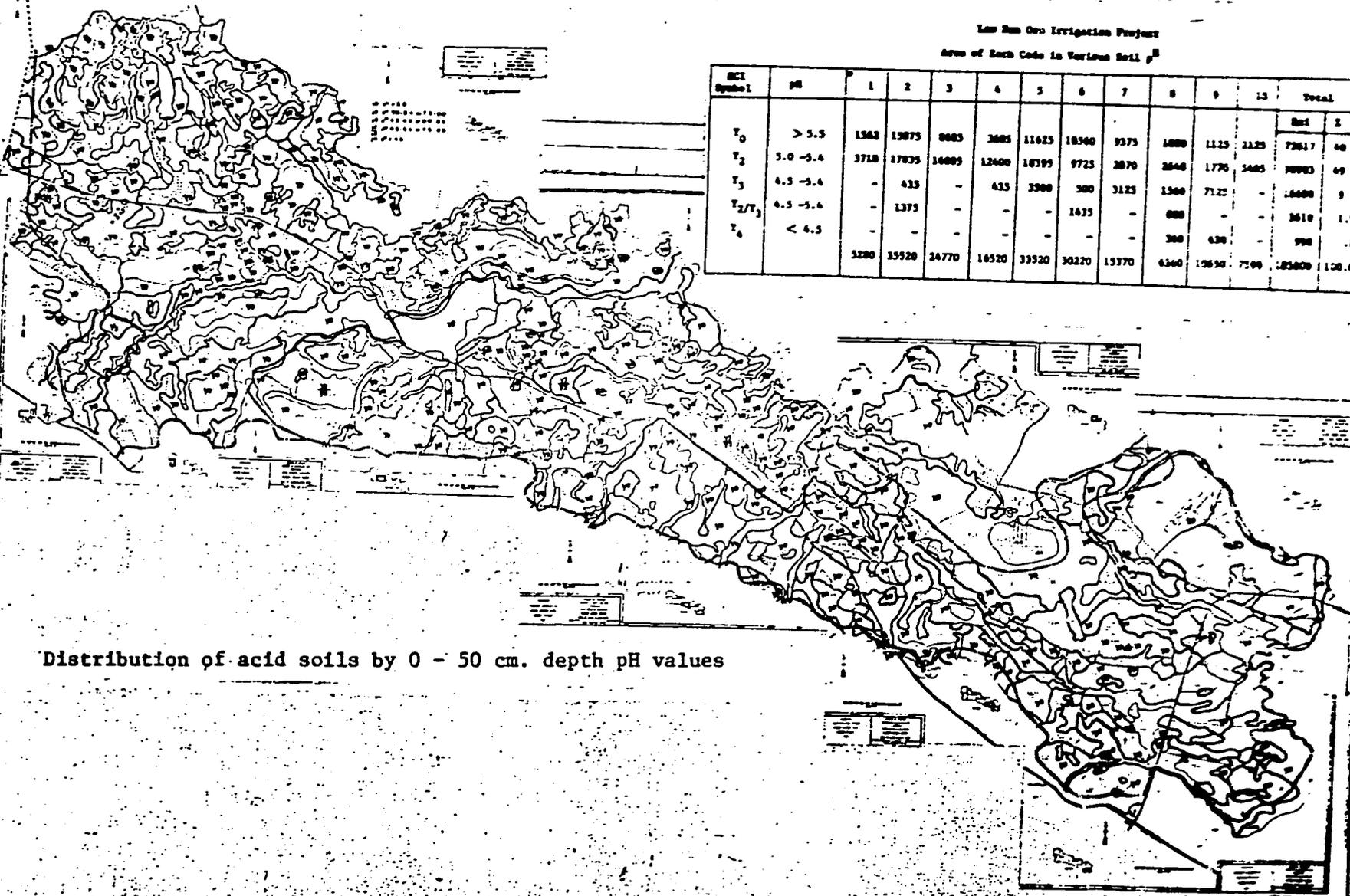
Legend No.	Land Consolidation Area, In Rai
1	70
2	7,650
3	9,400
4	-
5	3,700
6	3,300
7	350
8	470
9	1,500
10	60
Total	26,900

โครงการชลประทาน
ลำน้ำแควน้อย
กรมชลประทาน
กระทรวงเกษตรและสหกรณ์

วันที่พิมพ์: ๑๑/๑๒/๖๕
ที่พิมพ์: กรุงเทพฯ

Low Run On Irrigation Project
Area of Each Code in Various Soil p^H

ECI Symbol	pH	1	2	3	4	5	6	7	8	9	13	Total	
T ₀	> 5.5	1562	13875	8885	3685	11625	18560	9375	18880	1125	2125	72617	48
T ₂	5.0 - 5.4	3718	17825	16885	12400	18395	9725	2870	2848	1770	5485	88923	69
T ₃	4.5 - 5.4	-	435	-	435	3500	500	3125	1560	7125	-	14880	9
T _{2/T₃}	4.5 - 5.4	-	1375	-	-	-	1635	-	888	-	-	3610	1.9
T ₄	< 4.5	-	-	-	-	-	-	-	388	638	-	988	.1
		5280	15528	24770	16520	33520	30220	15370	6360	12830	7500	125800	128.0



Distribution of acid soils by 0 - 50 cm. depth pH values

R.I.D. Land/ Soil Classification

Land Code Soil Class and Land Class (R.I. Land Classification Report Vol. 1 Dec. 1977)

1	<u>5112y2(u2)</u> 6a/2a	<u>5112y2(u2)</u> 6a/2a				
2	<u>21h2p4w3o3</u> 2d/6ad(1/6ad)	<u>5112p2a2(u2)</u> 6a/2ac	<u>6112y2w2(u2)</u> 6a/2ad	<u>5112p2y2(u2)</u> 6a/2a	<u>6112p2a2y2ad</u> 6a/3ad(6a/2a)	
	<u>5112y2(u2)</u> 6a(6a/2a)	<u>5112y2a2</u> 2ac/2ac	<u>6112p2a2</u> 6a/2ad	<u>5112p2y2(u2)</u> 6a/2a	<u>5112p2a2</u> 6a/2ac	
	<u>6112y2w2(u2)</u> 3a/2ad	<u>5112p2y2a2</u> 6a(1/2ac/2ac)	<u>6112p2y2w2(u2)</u> 3a/2ad	<u>6112p2y2(u2)</u> 6a/2ad	<u>5112p2(u2)</u> 6a/2ac	
	<u>6112p2y2w2</u> 65v2q3y3a2	<u>6a/2ad</u> 6a/3ad	<u>5112p2(u2)</u> 6a/2ac	<u>5112p2y2a2</u> 6a/2ac	<u>6112y2a2</u> 6a/2ac	
	<u>65L2y2w2</u> 6a/2ad	<u>5112p2w2</u> 6a/2ad	<u>5112p2y2(u2)</u> 6a/2a	<u>6112p2y2w2(u2)</u> 6a/2ad	<u>5112p2(u2)</u> 6a/2ac	
	<u>5112p2y2(u2)</u> 6a/2a(p)	<u>5112y2a2(u2)</u> 6a(6a/2ac)	<u>6112p2w2(u2)</u> 6a/2ad(F)	<u>6112p2y2(u2)</u> 6a/2a	<u>5112p2a2w2(u2)</u> 3ac/2ac	
	<u>65L2y2w2(u2)</u> 6a/2ac(F)	<u>5112a2</u> 6a/2ac	<u>6112p2y2w2(u2)</u> 6a/2ad	<u>6112p2(u2)</u> 6a/2a	<u>6112p2y2w2</u> 6a/2ad	
	<u>5112y2a2(u2)</u> 6a/2ac(F)	<u>5112y2a2(u2)</u> 6a(6a/2ac)	<u>6112p2y2w2(u2)</u> 3a/2ad(F)	<u>5112a2a2</u> 6a/2ac	<u>5112p2(u2)</u> 6a/2ac	
	<u>6112y2w2(u2)</u> 6a/2ad	<u>6112y2w2(u2)</u> 6a/2ad(F)	<u>5112p2a2(u2)</u> 6a/2ac(F)	<u>5112p2w2(u2)</u> 6a/2ad(F)		
	<u>5112p2y2(u2)</u> 6a/2a(F)	<u>5112p2a2(u2)</u> 6a/2ac				
3	<u>19h2p3y2w2</u> 1/3ad	<u>21h2p4y2w3</u> 1/6ad	<u>19h2w2(u2)</u> 1/3ad	<u>61h2w2(u2)</u> 1/3ad	<u>61h2w2</u> 1/3ad	
	<u>21h2p4y2w3a2</u> 1/6ad	<u>21a2p4y2w3a2</u> 1/6ad	<u>19h2w2(u2)</u> 1/6ad	<u>61h2w2(u2)</u> 1/3ad	<u>611p4y2w2</u> 1/6ad	
	<u>61h2w2</u> 1/6ad	<u>19h2p4y2w2(u2)</u> 1/6ad	<u>611h2y2w2(u2)</u> 1/6ad	<u>21h2p4w3</u> 1/6ad		
	<u>21h2p4w3</u> 2d/6ad(1/6a)	<u>22h2p4y2w3a2</u> 1/6ad(F)				
4	<u>19h2p4w3(u2)</u> 2d/6ad(1/6a)	<u>19h2p4y2w3(u2)</u> 6a/6ad(1/6a)	<u>19h2p4w2(u2)</u> 6a/6ad(2c/3ad)	<u>21h2p4w3</u> 2d/6ad(F) (1/6a)(F)		
	<u>19h2p4y2w3(u2)</u> 6a/6ad(F) (1/6a)(F)	<u>611h2w2</u> 2a/3ad(F)		<u>21h2p4w3</u> 2d/6ad(F) (1/6a)(F)		
5	<u>611h2p3y2w2</u> 6a/3ad	<u>611h2y2w2</u> 2/3ad	<u>5112p2a2(u2)</u> 6a/2ac	<u>6112p2w2(u2)</u> 6a/2ad	<u>611h2w2</u> 2a/3ad	<u>611h2w2(u2)</u> 2a/3ad
	<u>19h2p4y2w2</u> 2a/3ad(F)	<u>19h2p4w3</u> 6a/3ad(6a/2a)	<u>611h2y2a2(u2)</u> 2ac/3ac(2ac/2ac)	<u>611h2w2(u2)</u> 2a/3ad	<u>611h2p4w2(u2)</u> 2a/3ad	
	<u>611h2p3y2w2</u> 2a/3ad	<u>611h2w2</u> 2a/6ad	<u>21h2p4w3</u> 1/6ad	<u>611h2w2</u> 2a/3ad(F)	<u>611h2p4w2(u2)</u> 2a/3ad(F)	
	<u>611h2p3w2(u2)</u> 2a/3ad	<u>611h2w2</u> 2a/3ad	<u>611h2w2(u2)</u> 2a/3ad(F)	<u>19h2p4w3</u> 6a/2ad		

Land Code Soil Class and Land Class

6	<u>5112a2a2</u> 6a/2ac	<u>6112p2y2(u2)</u> 6a/2ad	<u>6a/2ad</u> 6a/3ad	<u>5112a2y2(u2)</u> 6a/2a	<u>5112p2y2(u2)</u> 6a(6a/2a)	<u>611h2w2(u2)</u> 6a/2ad
	<u>6112p2y2a2(u2)</u> 6a/2ad	<u>6112p2y2(u2)</u> 6a/2ad	<u>6112a2y2(u2)</u> 6a/3a(6a/2a)	<u>5112p2y2a2(u2)</u> 6a/2ac(F)		
	<u>6112p2y2(u2)</u> 6a/2a	<u>611h2y2w2</u> 6a/2ad	<u>611h2y2w2(u2)</u> 6a/3a(6a/2a)	<u>5112p2y2a2(u2)</u> 6a/2ac(F)		
	<u>6112a2y2(u2)</u> 6a/2a	<u>611h2p2a2</u> 6a/2ad	<u>65L2y2a2(u2)</u> 6a/2ad	<u>6112p2y2w2</u> 6a/2ad		
	<u>6112p2a2y2w2(u2)</u> 3a/2ad	<u>65L2a2y2w2(u2)</u> 6a/2ad(F)	<u>6112p2y2w2(u2)</u> 6a/2ad(F)			
7	<u>19h2p3y2w2</u> 6a/3ad	<u>19h2p3y2w2</u> 3a/3ad	<u>19h2p3y2w2(u2)</u> 3a/3ad	<u>6112p3y2w2(u2)</u> 3ac/3ac	<u>6112p3w2(u2)</u> 3a/3ad	
	<u>6112p3y2(u2)</u> 6a/3a(6a/2a)	<u>6112p3w2(u2)</u> 3a/3ad	<u>6112p3w2</u> 3a/3ad	<u>6112p3w2</u> 3a/3ad(F)	<u>611h2p4w2</u> 2ac/3ac	
8	<u>611h2p3y2w2</u> 6a/3ad	<u>6112p3a2y2w2(u2)</u> 3a/3ad	<u>611h2a2y2w2(u2)</u> 6a/2ad	<u>6112p3y2w2(u2)</u> 6a/3ad		
	<u>611h2p3y2w2</u> 6a/3ad	<u>2a/3ad</u> 6a/3ad	<u>22h2p4a2y2w2</u> 2a/6ad(1/6a)	<u>6112p3y2w2(u2)</u> 6a/6ad(6a/2a)	<u>22h2p4w2(u2)</u> 3a/6ad(1/6a)	
	<u>611h2y2a2w2</u> 2a/6ad	<u>611h2y2a2w2</u> 1/6ad	<u>22h2p4a2y2w2</u> 2a/6ad(1/6a)	<u>2112p2a2y2w2</u> 3a/6ad(3a/2a)		
9	<u>611h2w2</u> 3a/2ad	<u>65L2a2y2w2(u2)</u> 6a/3ad, (6a/2a)	<u>65L2a2y2w2</u> 6a/3ad	<u>65L2a2y2w2(u2)</u> 6a/3ad	<u>65L2a2y2w2</u> 6a/3ad(F)	
	<u>21h2p4w3(u2)</u> 6a/3a(F)					
10	<u>611h2p3w2</u> 2ac/3ac	<u>6112p3y2w2(u2)</u> 6a/3ad	<u>6112p3y2w2(u2)</u> 6a/3a	<u>6112p3y2w2(u2)</u> 6a/3ac		
11	<u>21h2w2</u> 3a/6a	<u>21h2w2</u> 6a/6ac	<u>611h2p3y2w2</u> 2a/3ad	<u>21h2w2</u> 3a/6a	<u>21h2w2</u> 6a/6a	

ANNEX 2-3. PROJECT COSTS

Page 1

ACTIVITIES	1977 \$000			1978 \$000			1979 \$000			1980 \$000			1981 \$000			1982 \$000			All Years \$000		
	AID	ETC	TOTAL	AID	ETC	TOTAL	AID	ETC	TOTAL	AID	ETC	TOTAL	AID	ETC	TOTAL	AID	ETC	TOTAL	AID	ETC	TOTAL
	Project Elements:																				
1. Downstream Irrigation System/ Land Improvement																					
Land Consolidation	-	-	-	-	-	-	4,600	-	-	-	-	23,000	-	-	32,890	-	-	-	60,490	60,490	-
Ditch and Dike	-	-	-	2,000	-	2,000	20,000	-	-	23,000	-	20,000	-	-	30,700	-	-	-	104,500	124,500	-
O & M	2,483	-	2,483	3,905	-	3,905	4,047	-	4,047	5,609	-	7,364	-	-	9,997	-	-	-	33,427	33,427	-
Feeder Roads	2,057	-	2,057	2,857	-	2,857	3,429	-	3,429	3,429	-	-	-	-	-	-	-	-	12,572	12,572	-
O & M Roads	3,619	-	3,619	6,365	-	6,365	6,365	-	6,365	12,730	-	12,730	-	-	12,730	-	-	-	42,009	42,009	-
Left Bank Canal and Laterals	10,268	-	10,268	10,268	-	10,268	-	-	-	-	-	-	-	-	-	-	-	-	20,536	20,536	-
Right Bank Canal and Laterals	12,296	-	12,296	12,296	-	12,296	10,444	-	10,444	24,592	-	24,592	-	-	24,592	-	-	-	92,220	92,220	-
Construction Work (Exc. Structr., Lining)	17,490	-	17,490	17,490	-	17,490	23,320	-	23,320	23,320	-	23,320	-	-	23,320	-	-	-	104,940	104,940	-
System Improvements	-	-	-	1,000	-	1,000	1,000	-	1,000	1,000	-	1,000	-	-	1,000	-	-	-	4,000	4,000	-
Drainage System	-	-	-	4,685	-	4,685	6,028	-	6,028	6,028	-	9,370	-	-	9,370	-	-	-	35,481	35,481	-
Equipment	-	-	-	32,790	-	32,790	10,940	-	10,940	-	-	-	-	-	-	-	-	-	32,790	10,940	43,730
Manpower/Adm./Engr.	20,000	-	20,000	20,000	-	20,000	17,284	-	17,284	15,000	-	10,000	-	-	10,000	-	-	-	62,284	62,284	-
Pilot Projects	1,000	-	1,000	1,000	-	1,000	1,000	-	1,000	-	-	-	-	-	-	-	-	-	3,000	3,000	-
TOTAL:	70,215	-	70,215	32,790	92,804	125,594	103,517	-	103,517	116,708	-	116,708	130,194	-	130,194	32,957	-	-	32,790	604,399	637,189

MAN for completion of ditch and dike construction in 1983 will be increased to \$13,191,000.
 Drainage will be completed in 1983, with 1983 costs of \$9,370,000.

ANNEX E-3. PROJECT COSTS

Page 2

ACTIVITIES	1977 \$000			1978 \$000			1979 \$000			1980 \$000			1981 \$000			1982 \$000			All Years \$000		
	AID	RTG	TOTAL	AID	RTG	TOTAL	AID	RTG	TOTAL	AID	RTG	TOTAL	AID	RTG	TOTAL	AID	RTG	TOTAL	AID	RTG	TOTAL
	Project Elements:																				
2. <u>Community Development (CDD)</u>																					
a. Basic Activity:																					
1. Activity Supporting fund	15	15	30	84	84	168	50	50	100	50	50	100	50	50	100	-	-	-	249	249	498
2. Salary, wages, honorarium)	91	91	182	100	100	200	110	110	220	120	120	240	130	130	260	-	-	-	551	551	1,102
3. Travel, lodging, per diem)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4. Equipment	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5. Land and Construction	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Total</u>	106	106	212	184	184	368	160	160	320	170	170	340	180	180	360	-	-	-	800	800	1,600
b. Special Activity:																					
1. Salary, wages, honorarium)	-	-	-	320	321	641	317	318	635	317	318	635	317	318	635	317	318	635	1,588	1,593	3,181
2. Travel, lodging, per diem)	-	-	-	512	513	1,025	-	-	-	-	-	-	250	250	500	-	-	-	762	763	1,525
3. Land and Construction	-	-	-	467	467	934	-	-	-	-	-	-	5	5	10	25	25	50	497	497	994
4. Equipment	-	-	-	142	142	284	87	87	174	102	102	204	92	92	184	87	87	174	510	510	1,020
5. Expandable supplies	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Total</u>	-	-	-	1,441	1,441	2,884	404	405	809	424	425	849	684	685	1,369	404	405	809	3,357	3,363	6,720
<u>Grand Total</u>	106	106	212	1,625	1,627	3,252	564	565	1,129	594	595	1,189	864	865	1,729	404	405	809	4,157	4,163	8,320

ACTIVITIES	1977 2000			1978 2000			1979 2000			1980 2000			1981 2000			1982 2000			All Years 2000			
	AID	RTG	TOTAL	AID	RTG	TOTAL	AID	RTG	TOTAL	AID	RTG	TOTAL	AID	RTG	TOTAL	AID	RTG	TOTAL	AID	RTG	TOTAL	
Project Elements:																						
3. <u>Agricultural Research (DOA)</u>																						
Salary, wages, honorarium	-	96	96	192	96	96	192	96	96	192	96	96	192	96	96	192	96	96	192	480	480	960
Travel, lodging, per diem	-	100	100	200	100	100	200	100	100	200	100	100	200	100	100	200	100	100	200	500	500	1,000
Land and Construction	-	150	150	300	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	150	150	300
Equipment	-	300	300	600	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	300	300	600
Expendable supplies	-	50	50	100	50	50	100	50	50	100	50	50	100	50	50	100	50	50	100	250	250	500
<u>Total</u>	-	696	696	1,392	246	246	492	246	246	492	246	246	492	246	246	492	246	246	492	1,680	1,680	3,360
4. <u>Agricultural Extension (DOAE)</u>																						
Salary, wages, honorarium	-	187	187	374	236	236	472	236	236	472	236	236	472	235	235	470	235	235	470	1,130	1,130	2,260
Travel, lodging, per diem	-	58	57	115	58	57	115	58	57	115	58	57	115	58	57	115	58	57	115	288	287	575
Land and Construction	-	1,083	1,083	2,166	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,083	1,083	2,166
Model Farm Villages	-	-	-	123	123	246	226	227	453	113	113	226	36	37	73	499	499	998	-	170	171	341
Equipment	-	170	171	341	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	170	171	341
Expendable supplies	-	51	51	102	56	56	112	56	56	112	56	56	112	56	56	112	56	56	112	275	275	550
Training	-	35	35	70	35	35	70	35	35	70	35	35	70	35	35	70	35	35	70	175	175	350
<u>Total</u>	-	1,584	1,584	3,168	508	507	1,015	611	611	1,222	498	497	995	420	420	840	420	420	840	3,620	3,620	7,240

ACTIVITIES	1977 \$000			1978 \$000			1979 \$000			1980 \$000			1981 \$000			1982 \$000			All Years \$000				
	AID	RTC	TOTAL	AID	RTC	TOTAL	AID	RTC	TOTAL	AID	RTC	TOTAL	AID	RTC	TOTAL	AID	RTC	TOTAL	AID	RTC	TOTAL		
	Project Elements:																						
5. Expanded Adult Education Services:																							
Salary, wages, travel, per diem	-	-	100	99	199	100	99	199	100	99	199	100	99	199	100	99	199	100	99	199	498	497	995
Equipment	-	-	34	34	68	34	34	68	34	34	68	34	34	68	34	34	68	34	34	68	170	170	340
Land, Construction	-	-	2,500	2,500	5,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2,500	2,500	5,000
Expendable supplies	-	-	32	33	65	32	33	65	32	33	65	32	33	65	32	33	65	32	33	65	162	163	325
Total	-	-	2,666	2,666	5,332	166	166	332	160	166	332	166	166	332	166	166	332	166	166	332	3,330	3,330	6,660
6. Division of Inland Fisheries																							
Salary and Wages)	-	-	101	101	202	101	101	202	101	101	202	101	101	202	101	101	202	101	101	202	505	505	1,010
Travel, lodging & per diem)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Equipment	-	-	125	125	250	-	-	-	125	125	250	-	-	-	-	-	-	-	-	-	250	250	500
Land and Construction	-	-	-	-	-	250	250	500	-	-	-	-	-	-	-	-	-	-	-	-	250	250	500
Expendable supplies	-	-	175	175	350	175	175	350	175	175	350	175	175	350	175	175	350	175	175	350	875	875	1,750
Training Costs	-	-	50	50	100	50	50	100	50	50	100	50	50	100	50	50	100	50	50	100	250	250	500
Total	-	-	451	451	902	576	576	1,152	451	451	902	326	326	652	326	326	652	326	326	652	2,130	2,130	4,260
7. Marketing																							
	-	-	800	-	800	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	800	-	800
8. Project Administration Center																							
Land, Construction and Facilities	-	-	1,500	-	1,500	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,500	-	1,500
Administrative Support	-	-	235	105	340	61	115	176	67	127	194	74	140	214	81	154	235	518	641	1,199	-	-	1,199
O & M	-	-	-	45	45	-	45	45	-	45	45	-	45	45	-	45	45	-	45	45	-	225	225
Total	-	-	1,735	150	1,885	61	160	221	67	172	239	74	185	259	81	199	280	2,018	886	2,904	-	-	2,904

ACTIVITIES	1977 \$000			1978 \$000			1979 \$000			1980 \$000			1981 \$000			1982 \$000			All Years \$'000		
	AID	RTC	TOTAL	AID	RTC	TOTAL	AID	RTC	TOTAL	AID	RTC	TOTAL	AID	RTC	TOTAL	AID	RTC	TOTAL	AID	RTC	TOTAL
	Project Elements:																				
9. Technical Advisory Services																					
a. Long Term Consultants																					
(1) RID:																					
Irr. Engr. (48 man-mos.)																					
		-	1,200	400	1,600	1,200	400	1,600	1,200	400	1,600	1,200	400	1,600	-	-	-	4,800	1,600	6,400	
O&M Engr. (36 man-mos.)																					
		-	1,200	400	1,600	1,200	400	1,600	1,200	400	1,600	1,200	400	1,600	-	-	-	3,600	1,200	4,800	
System & On-Farm Design Engr. (24 man-mos.)																					
		-	1,200	400	1,600	1,200	400	1,600	-	-	-	-	-	-	-	-	-	2,400	800	3,200	
(2) DOAE:																					
Agri. Ext. Adv. (24 man-mos.)																					
		-	1,200	400	1,500	1,200	400	1,600	-	-	-	-	-	-	-	-	-	2,400	800	3,200	
(3) CDD:																					
Rural Dev. Adv. (24 man-mos.)																					
		-	1,200	400	1,500	1,200	400	1,600	-	-	-	-	-	-	-	-	-	2,400	800	3,200	
(4) DOA:																					
Agronomist (15 man-mos.)																					
		-	1,200	400	1,600	150	50	200	150	50	200	-	-	-	-	-	-	1,500	500	2,000	
b. Short Term Consultants																					
Soil Scientist, farmers/water users org. spec., hydrologist, agri. economist (17 man-mos.)																					
		-	428	142	570	315	105	420	315	105	420	315	105	420	443	147	590	1,818	604	2,420	
c. (1) Contractor home office technical backstopping (7 man-mos.) and field visits (2 man-mos.)																					
		-	180	60	240	180	60	240	180	60	240	180	60	240	180	60	240	900	300	1,200	
(2) Contractor Regional backstopping (6 man-mos.)																					
		-	120	40	160	120	40	160	120	40	160	120	40	160	120	40	160	600	200	800	
(3) Vehicles (6)																					
		-	840	-	840	-	-	-	-	-	-	-	-	-	-	-	-	840	-	840	
Total:																					
			8,768	2,642	11,410	8,765	2,255	9,020	3,165	1,055	4,220	3,815	605	2,420	743	247	990	21,256	6,804	28,060	

ACTIVITIES	1977 \$000			1978 \$000			1979 \$000			1980 \$000			1981 \$000			1982 \$000			All Years \$000			
	AID	RTG	TOTAL	AID	RTG	TOTAL	AID	RTG	TOTAL	AID	RTG	TOTAL	AID	RTG	TOTAL	AID	RTG	TOTAL	AID	RTG	TOTAL	
	10. <u>Resettlement Area Subproject</u>																					
a. Sericulture Project ^{1/}	-	-	-	1,695	794	2,489	1,085	1,430	2,515	1,291	306	1,797	843	576	1,419	844	860	1,704	6,158	3,766	9,924	
b. Pilot Projects	-	-	-	-	2,000	2,000	-	1,700	1,700	-	-	-	-	-	-	-	-	-	-	3,700	3,700	
c. Irrigation & Pumping Systems:																						
(1) Construction	-	-	-	-	35,372	35,372	-	-	-	-	-	-	-	-	-	-	-	-	-	35,372	35,372	
(2) O&M ^{2/}	-	-	-	-	1,700	1,700	-	2,500	2,500	-	2,500	2,500	-	2,500	2,500	-	2,500	2,500	-	11,700	11,700	
<u>Total</u>	-	-	-	1,695	39,866	41,561	1,085	5,630	6,715	1,291	3,006	4,297	843	3,076	3,919	844	3,360	4,204	5,758	54,938	60,696	

^{1/} For details, see next page.

^{2/} Calculated at \$120/rai of irrigated area
(includes 15% contingency)

Project Elements	1978 \$000				1979 \$000				1980 \$000				1981 \$000				1982 \$000				Total 1978-1982 ^{1/} \$000					
	AID	RTC	BAAC	Total	AID	RTC	BAAC	Total	AID	RTC	BAAC	Total	AID	RTC	BAAC	Total	AID	RTC	BAAC	Total	AID	RTC	BAAC	Total		
10.e. Sericulture Project																										
1. Central mulberry plantations	36	-	-	36	36	-	-	36	48	-	-	48	-	-	-	-	-	-	-	-	120	-	-	-	120	
2. Central mulberry maintenances	-	-	-	-	-	25	-	25	-	49	-	49	-	82	-	82	-	82	-	82	-	238	-	-	238	
3. Central young silk worm rearing houses w/supplies & equipment	400	-	-	400	-	7	-	7	400	-	-	400	-	7	-	7	400	-	-	400	1,200	13	-	-	1,213	
4. Farmers' old silk worm rearing houses w/supplies & equipment *	385	-	-	385	385	-	-	385	385	-	-	385	385	-	-	385	385	-	-	385	2,926	-	-	-	2,926	
5. Silk worm egg supplies *	66	-	-	66	66	-	-	66	66	-	-	66	66	-	-	66	66	-	-	66	330	-	-	-	330	
6. Farmers' mulberry plantation *	73	-	-	73	73	-	-	73	73	-	-	73	73	-	-	73	73	-	-	73	366	-	-	-	366	
7. Cooperative	-	-	-	-	-	-	989	989	-	-	-	-	-	-	-	-	-	-	-	-	-	-	989	-	-	989
8. Farmers' trng. on mulberry plantation & silk worm rearing	34	-	-	34	34	-	-	34	34	-	-	34	34	-	-	34	34	-	-	34	169	-	-	-	169	
9. Road improvement	501	-	-	501	291	-	-	291	85	-	-	85	85	-	-	85	85	-	-	85	1,048	-	-	-	1,048	
10. Houses for Ag. Ext. workers, Accountant & Supervisor	-	300	-	300	-	120	-	120	-	120	-	120	-	120	-	120	-	-	-	-	-	660	-	-	660	
11. Vehicles, gasoline, spare-parts, & maintenance cost for Ag. Ext. workers & supervisor	-	408	-	408	-	126	-	126	-	169	-	169	-	174	-	174	-	174	-	174	-	1,051	-	-	1,051	
12. Salaries for Ag. Ext. workers, Accountant & Supervisor	-	69	-	69	-	124	-	124	-	161	-	161	-	186	-	186	-	196	-	196	-	736	-	-	736	
13. Trng for Ag. Ext. workers & Supervisor	-	18	-	18	-	40	-	40	-	7	-	7	-	7	-	7	-	8	-	8	-	80	-	-	80	
Total:	1,695	794	-	2,489	1,085	441	989	2,515	1,291	506	-	1,797	843	576	-	1,419	844	860	-	1,704	6,158	2,777	989	-	9,924	

* AID funds loaned to farmers through BAAC.

^{1/} Cumulative and incremental amounts are rounded and may not reconcile.

LNO Project Administration Center

Cost Estimate

Electricity : Available from EGAT

Water Supply : Available from LNO existing plant

Land : No Cost

Road : Not required

Office Building : For approx. 45 people. A one-story building, wood and concrete type, 50 m. x 15 m. (including land clearing, compaction, and necessary components - toilet rooms, small operations and/or meeting room, water supply and electric systems, partitions, etc. ₱900,000

Facilities : 200,000

	<u>Amount</u>	<u>Unit Cost</u>	<u>Total Cost</u>
Air conditioner	5	15,000	75,000
Electric fans - ceiling	6	1,000	6,000
- stand	4	1,400	5,600
Wooden desks (special)	8	2,500	20,000
Wooden desks (normal)	36	1,500	54,000
Chairs (special)	8	500	4,000
Chairs (normal)	36	90	3,240
Cabinets (steel)	12	2,000	24,000
Long Table, Chairs, Slide Board, etc. (For Operations Room)			8,160
			<u>200,000</u>

Residences : Wooden houses for 1st Grade Officers, each 8 m. x 10 m. (2 storeys, 3 rooms, @ ₱150,000 each) 300,000

Initial Expendable Supplies - Say 30,000

Final Engineering - Design and Supervision of Construction 25,000

Total ₱1,455,000

Contingency & Misc. 45,000

Grand Total ₱1,500,000

ANNEX B.3.b. RTG STAFFING PATTERN AND COSTS

Page 2

No. of Positions/Grade/Compensation (฿)	1977	1978	1979	1980	1981	Total
Per Diem:						
1 - (C-5), 600/month	7,200	7,200	7,200	7,200	7,200	36,000
3 - (C-4), 500/month	18,000	18,000	18,000	18,000	18,000	90,000
1 - (C-3), 750/month	9,000	9,000	9,000	9,000	9,000	45,000
1 - (C-2), 600/month	7,200	7,200	7,200	7,200	7,200	36,000
Lodging (Type B):						
1 - (C-5), 500/month	6,000	6,000	6,000	6,000	6,000	30,000
3 - (C-4), 400/month	14,400	14,400	14,400	14,400	14,400	72,000
1 - (C-3), 600/month	7,200	7,200	7,200	7,200	7,200	36,000
1 - (C-2), 450/month	5,400	5,400	5,400	5,400	5,400	27,000
Total	263,160	271,800	280,980	290,700	300,960	1,407,600
3. <u>Agricultural Research (DOA)</u>						
Salary:						
1 - Coordinator Chief, 2000/month	8,000	24,000	24,000	24,000	24,000	104,000
16 - Permanent Labors, 750/month	60,000	180,000	180,000	180,000	180,000	780,000
4 - Temporary Labors (LNO), 700/month	11,200	16,800	16,800	16,800	16,800	78,400
Per Diem, Lodging and Gasoline:						
1 - Coordinator Chief, 8 days/month	5,120	15,360	15,360	15,360	15,360	66,560
3 - Experimental Station Chiefs, 8 days/month	20,480	61,440	61,440	61,440	61,440	266,240
1 - Division Chief, Bangkok level, 10 days/month	38,400	115,220	115,220	115,220	115,220	499,280
Gasoline, 350 km./week	10,000	10,000	10,000	10,000	10,000	50,000
Total	153,200	422,820	422,820	422,820	422,820	1,844,480

ANNEX B.3.b. RTG STAFFING PATTERN AND COSTS

Page 7

No. of Positions/Grade/Compensation (B)	1977	1978	1979	1980	1981	Total
Compensation:						
2 - (C-5), 2 x 30	1,660	1,660	1,660	1,660	1,660	8,300
1 - (C-3), 2 x 30	830	830	830	830	830	4,150
3 - (C-1), 1 x 30	1,940	1,940	1,940	1,940	1,940	9,700
Per Diem:						
2 - (C-5), 2 x 60 x 60	7,200	7,200	7,200	7,200	7,200	36,000
1 - (C-3), 1 x 50 x 60	3,000	3,000	3,000	3,000	3,000	15,000
1 - (C-2), 1 x 40 x 300	12,000	12,000	12,000	12,000	12,000	60,000
1 - (C-1), 6 x 30 x 300	54,000	54,000	54,000	54,000	54,000	270,000
Lodging:						
2 - (C-5), 2 x 100 x 60	12,000	12,000	12,000	12,000	12,000	60,000
1 - (C-1), 1 x 80 x 60	4,800	4,800	4,800	4,800	4,800	24,000
1 - (C-2), 1 x 60 x 300	18,000	18,000	18,000	18,000	18,000	90,000
6 - (C-1), 6 x 60 x 300	108,000	108,000	108,000	108,000	108,000	540,000
Travel Expenses:	20,200	20,200	20,200	20,200	20,200	101,000
Hiring Farmer for Bookkeeping 100 x 50	60,000	60,000	60,000	60,000	60,000	300,000
Total	482,010	482,010	482,010	482,010	482,010	2,410,050

ANNEX B.3.b. RTG STAFFING PATTERN AND COSTS

Page 8

No. of Positions/Grade/Compensation (₦)	1977	1978	1979	1980	1981	Total
8. Public Welfare Department, Upstream Sericulture						
a) Extension Workers						
Two workers each at first two year and one each at last 3 year = 7 workers	1550 x 12 x 2 37,200	37,200	18,600	18,600	18,600	130,200
Year 2	1645 x 12 x 2	39,480	39,480	19,740	19,740	118,440
Year 3	1750 x 12 x 2		42,000	42,000	21,000	105,000
Year 4	1860 x 12 x 2			44,640	44,640	89,280
Year 5	1975 x 12 x 2				47,400	47,400
Sub-Total	37,200	76,680	100,080	124,980	151,380	490,320
b) Supervisors						
One supervisor	1750 x 12 x 1 21,000	-	-	-	-	21,000
Year 2	1860 x 12 x 1	22,320	-	-	-	22,320
Year 3	1975 x 12 x 1		23,700	-	-	23,700
Year 4	2100 x 12 x 1			25,200	-	25,200
Year 5	2230 x 12 x 1				26,760	26,760
Sub-Total	21,000	22,320	23,700	25,200	26,760	118,980
Grand Total	58,200	99,000	123,780	150,180	178,140	609,300

OPERATION AND MAINTENANCE

1. Summary of O M & R costs

a. Irrigation System above Farm Turnouts

Personnel	₱ 4,565,000
Materials and supplies	3,400,000
Equipment and vehicle operation and repair	4,000,000
Building maintenance and utilities	<u>300,000</u>

Sub-total ₱12,265,000

b. Electric Pumping Costs ₱ 1,002,000

Sub-total per rai ₱ 71

c. Irrigation System below FTO @ ₱15/rai

Hired personnel	₱ 740,000
Farmer Labor, valued at	<u>2,040,000</u>

Sub-total ₱ 2,780,000

TOTAL O M & R ₱16,047,000

TOTAL PER RAI ₱ 86

OPERATION AND MAINTENANCE EQUIPMENT LIST/COST

<u>Description</u>	<u>No.</u>	<u>Unit Cost^{7/}</u>	<u>Amount</u>
<u>1/</u> Front-end Loader 1.5 cu.yd. (with multi-purpose bucket, rubber tire, 100 HP.)	3	\$ 38,000	\$ 114,000
<u>1/</u> Backhoe Attachments for Loader	3	6,500	19,500
<u>1/</u> Trailing Ditcher for Loader	3	1,500	4,500
<u>1/</u> Land Plane	3	2,000	6,000
<u>4/</u> Backhoe (5/8 cu.yd. 100 HP.)	1	55,000	55,000
<u>2/</u> Dump Truck, 5-6 Ton	6	18,000	108,000
<u>3/</u> Motorized Grader, 60-70 HP.	3	35,000	105,000
<u>4/</u> Motorized Grader, 125 HP.	1	81,000	81,000
<u>4/</u> Excavator, dragline 0.75 cu.yd.	1	220,000	220,000
<u>4/</u> Generator, mobile diesel (25 kva.)	2	8,000	16,000
<u>4/</u> Truck, water tank (1,500 gal.)	3	38,000	114,000
<u>4/</u> Truck, fuel (1,500 gal.)	1	38,000	38,000
<u>3/</u> Truck, Flat-bed (5-6 ton)	3	18,000	54,000
<u>4/</u> Truck, Pick-up (3/4 ton, 4 x 4)*	4	12,000	48,000
<u>4/</u> Mixer, Concrete (10/7 cu.ft.)	2	18,000	36,000
<u>4/</u> Vibrator, Concrete, gas stow	4	2,000	8,000
<u>4/</u> Compressor, (175 ctm.) diesel	1	16,000	16,000
<u>4/</u> Tractor, crawler w/blade 140 HP.	2	90,000	180,000
<u>3/</u> Farm Tractor w/mower	3	10,000	30,000
<u>4/</u> Crane, wheeled, 5 ton	1	70,000	70,000
<u>4/</u> Field Wagon, 4 x 4*	2	12,000	24,000
<u>4/</u> Field Car, 4 x 4*	8	7,000	56,000
<u>5/</u> Motorcycles*	18	900	16,200
<u>6/</u> Bicycles*	180	100	18,000
25 Ton Lowbed, Semi Trailer, 54,000 lb.GW	1	40,000	40,000
Roller, Towed Sheepfoot	2	11,000	22,000
Pumps and Miscellaneous Equipment	L.S.	-	45,000
Communication System**	L.S.	-	160,000
Workshop Equipment	L.S.	-	45,000
	<u>Sub-total</u>		<u>\$1,749,200</u>
	Spare Parts 25% ^{8/}		<u>437,300</u>
	<u>TOTAL</u>		<u>\$2,186,500</u>

- 1/ From Table 7 Annex 1 World Bank Appraisal Report on Northeast Thailand Improvement Project. July/73.
- 2/ Two units per Operating Unit plus 2 for general project use.
- 3/ One unit per Operating Unit.
- 4/ Overall project use.
- 5/ One per zone man.
- 6/ One per gate tender and canal tender.
- 7/ July 1976 cost CIF. Bangkok indexed 8% to July 1977 price level.
- 8/ Essential that a FE fund be provided for this otherwise efficiency will be severely affected.

* These items will likely be financed out of the RTG contribution of \$547,000.

** This item will not be financed by AID funds; it will be financed out of the RTG contribution of \$547,000.

CROP PLAN FOR PROJECT WITH SOIL IMPROVEMENT (RAI)

Annex B.7.a

d ss e	Land Consolidation Area 1,000 families							Ditch and Dike 9,000 families										
	Total	Rice		Tobacco	Jute	Gd.Nut/ Soya	Fruit & Veg. W.S. & D.S.	Total	Rice		Tobacco	Jute	Gd.Nut/ Soya	Sesame	Upland Crop	Fruit & Veg. W.S. & D.S.	Cotto	
		W.S.	D.S.	D.S.	W.S.	D.S.	D.S.		W.S.	D.S.	D.S.	W.S.	D.S.	D.S.	D.S.	D.S. 1/	D.S.	W.S.
70								5,210										
7,650	7,220	-	3,000	-	3,220	500		28,580			27,000		1,580			4,500		
9,400	9,400	9,400					15,370	15,370										
3,700	3,700	3,700					16,520	16,520					6,000					
3,200	3,200				3,200		29,820	29,820										
250	250						27,020	27,020	2				23,020		4,000		14,000	
470	470						15,120	15,120										
1,500						1,500	5,890	5,890										
60				60			9,150									8,500		
							7,530				7,530							
26,300	24,240	13,100	3,000	60	6,420	2,000	159,500	111,300	-	27,000	7,530	24,600	6,000	4,000	13,000	14,000		

Remarks: 1/ Mung bean, sweetcorn and/or Irish potatoes.

2/ A large percentage of Code 6 area is uncropped at present time. Area irrigated will depend upon land clearing and land leveling undertaken, the acceptability of second cropping and the project water supply.

CROP CALENDAR

ANNEX B.7.b

	Fraction in each Transplanting			Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	
	1	2	3													
W.S. Rice L.V.	.25	.50	.25								Land prep and nursery 150 days					
W.S. Rice H.Y.V.	.25	.50	.25								Land prep and nursery 120 days					
D.S. Rice H.Y.V.	.25	.50	.25	120 days								Land prep and nursery				
D.S. Tobacco	.25	.50	.25	100 days								Nursery				
D.S. Mung Bean	.50	.50			75 days											
D.S. Sweet Corn	.50	.50			75 days											
D.S. Sesame	.50	.50			90 days											
D.S. Groundnuts	.50	.50			105 days											
D.S. Soya Bean	.50	.50			105 days											
W.S. Soya Bean	.25	.50	.25							105 days						
W.S. Jute																
Vegetables/Tree Fruits	Year round															
									365 days							

From Cropping Calendar originally developed by Peter Kung. FAO Senior Agricultural Officer, Dec. 1976
Slightly modified for these studies Jan. 1977.

CROP AREA, PRODUCTION AND VALUE TABLE

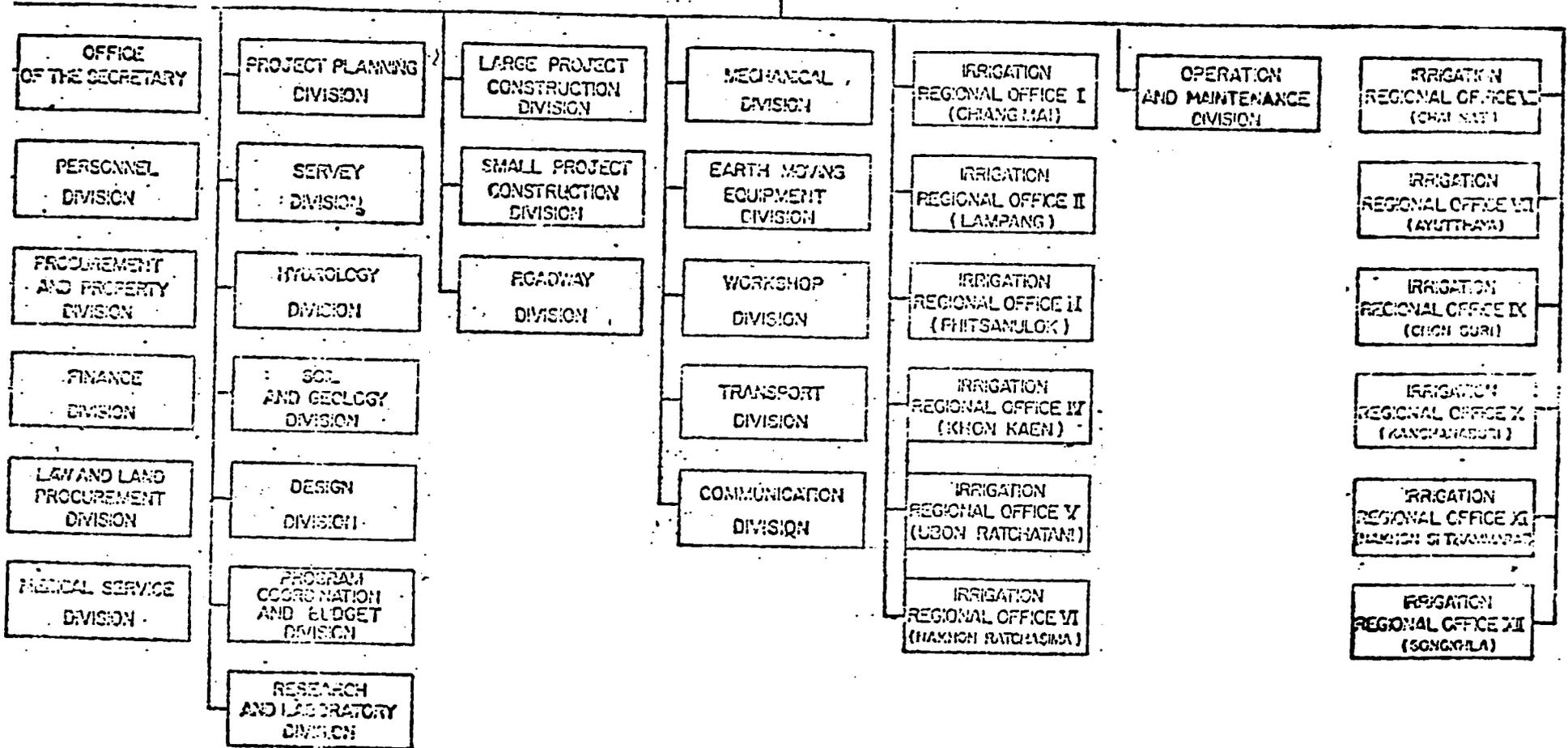
Year Group	Crops	Irrigated		Non-Irrigated		Total Area	Average Yield	Production Total	Farmgate Price	Gross Prod. Value	Cost of Production			Total Prod. Cost	Net Prod. Value
		Area	Yield	Area	Yield						Per Hect	Per Hect	Per Hect		
		1,000 Hect				Kg/Hect		N.Y.		\$/N.Y.		\$1,000			
1 (1977)	GR	183.6	15	-	-	138.6	230	230	31,900	2,000	63,800	73	100	-	54,930
	MCR	-	3	-	-	3	200	200	1,000	2,400	2,400	-	100	-	11,270
	JU	-	1	-	-	1	300	300	300	3,200	900	-	143	-	735
	PB	-	2	-	-	2	150	300	300	2,800	840	-	200	-	440
	FV	-	2	-	-	2	750	5,000	1,000	3,000	3,000	-	300	-	1,200
	TO	-	2	-	-	2	100	200	5,000	1,000	2,000	-	200	-	400
		183.6	23	-	-	137.6	152	720	12,000	11,220	-	200	-	2,200	6,720
										83,190	-		-	13,915	67,275
2 (1978)	GR	93.6	20	-	-	73.6	240	240	27,440	2,000	53,320	100	130	-	33,910
	MCR	-	26	-	-	26	270	270	7,020	2,400	16,850	-	130	-	10,260
	JU	-	3	-	-	3	370	370	1,100	3,000	3,700	-	143	-	843
	PB	-	3	-	-	3	200	1,000	2,800	2,800	2,800	-	203	-	1,413
	FV	-	3	-	-	3	1,000	7,000	1,000	7,000	7,000	-	350	-	2,450
	TO	-	3	-	-	3	85	85	85	6,000	510	-	300	-	300
		93.6	35	-	-	79.6	168	1,600	12,000	22,000	-	230	-	1,200	18,200
										112,030	-		-	27,110	84,910
3 (1979)	GR	89.6	13	-	-	89.6	290	290	27,650	2,000	53,300	173	200	-	32,220
	MCR	-	25	-	-	25	320	320	8,940	2,400	21,500	-	200	-	16,540
	JU	-	3	-	-	3	390	390	1,951	3,000	5,850	-	143	-	725
	PB	-	10	-	-	10	250	2,500	2,800	7,340	7,340	-	303	-	4,040
	FV	-	10	-	-	10	1,200	19,200	1,000	19,200	19,200	-	400	-	6,400
	TO	-	6	-	-	6	200	1,200	5,000	6,000	1,140	-	300	-	600
		89.6	37	-	-	89.6	170	2,432	12,000	22,322	-	293	-	1,770	4,230
										155,835	-		-	30,200	104,440
										272,125	-		-	47,413	224,712
4 (1980)	GR	69.6	20	-	-	69.6	320	320	28,700	2,000	57,400	173	233	-	61,540
	MCR	-	29.3	-	-	29.3	370	370	12,020	2,400	28,850	-	233	-	25,115
	JU	-	7.3	-	-	7.3	410	410	3,075	3,000	6,925	-	143	-	1,090
	PB	-	15	-	-	15	325	5,040	2,800	14,110	14,110	-	303	-	5,970
	FV	-	10	-	-	10	43	1,500	1,000	34,500	34,500	-	450	-	10,350
	TO	-	10	-	-	10	103	420	6,000	2,320	2,320	-	300	-	1,260
		69.6	37	-	-	69.6	180	3,490	15,000	35,350	-	350	-	2,930	8,300
										113,583	-		-	13,737	42,027
										213,583	-		-	30,200	133,690
5 (1981)	GR	42.6	30	-	-	42.6	300	300	23,280	2,000	46,560	173	233	-	65,295
	MCR	-	37.3	-	-	37.3	420	420	18,270	2,400	43,850	-	233	-	35,115
	JU	-	7.3	-	-	7.3	430	430	3,225	3,000	9,675	-	143	-	1,090
	PB	-	20	-	-	20	390	1,170	2,800	22,930	22,930	-	303	-	8,085
	FV	-	13	-	-	13	1,800	46,800	1,000	46,800	46,800	-	450	-	11,700
	TO	-	14	-	-	14	225	623	6,000	3,750	3,750	-	300	-	1,500
		42.6	64	-	-	42.6	180	180	4,000	720	-	200	-	300	420
										265,885	-		-	78,120	195,745
6 (1982)	GR	19.8	40	-	-	19.8	380	380	21,540	2,000	43,080	173	233	-	93,605
	MCR	-	54.3	-	-	54.3	470	470	33,980	2,400	81,550	-	233	-	75,235
	JU	-	7.3	-	-	7.3	450	450	3,375	3,000	10,125	-	143	-	1,090
	PB	-	23	-	-	23	405	10,545	2,800	29,525	29,525	-	303	-	10,010
	FV	-	13	-	-	13	2,000	60,000	1,000	60,000	60,000	-	450	-	13,500
	TO	-	14	-	-	14	135	810	6,000	4,860	4,860	-	300	-	1,800
		19.8	74	-	-	19.8	190	280	4,000	1,320	-	200	-	600	920
										348,910	-		-	83,235	263,635
7 (1983)	GR	-	50	-	-	50	420	420	21,000	2,000	42,000	-	233	-	37,345
	MCR	-	61.3	-	-	61.3	320	320	51,270	2,400	123,050	-	233	-	117,705
	JU	-	7.3	-	-	7.3	450	450	3,375	3,000	10,125	-	143	-	1,090
	PB	-	24.6	-	-	24.6	425	13,175	2,800	36,890	36,890	-	303	-	11,935
	FV	-	13	-	-	13	30	2,700	60,000	1,000	66,000	-	450	-	13,500
	TO	-	14	-	-	14	6	150	900	6,000	4,860	-	300	-	1,800
		-	74.8	-	-	74.8	200	200	6,000	15,000	21,000	-	293	-	4,130
										90,000	-		-	21,000	69,000
										3,200	-		-	1,200	2,000
										397,125	-		-	92,000	305,125

GR = Glutinous Rice
MCR = Non-Glutinous Rice
JU = Jute
PB = Peas - Soybean
FV = Fruit - Vegetable
SE = Sesame
CO = Cotton
TO = Tobacco
MB = Mung Bean

// Shadow price

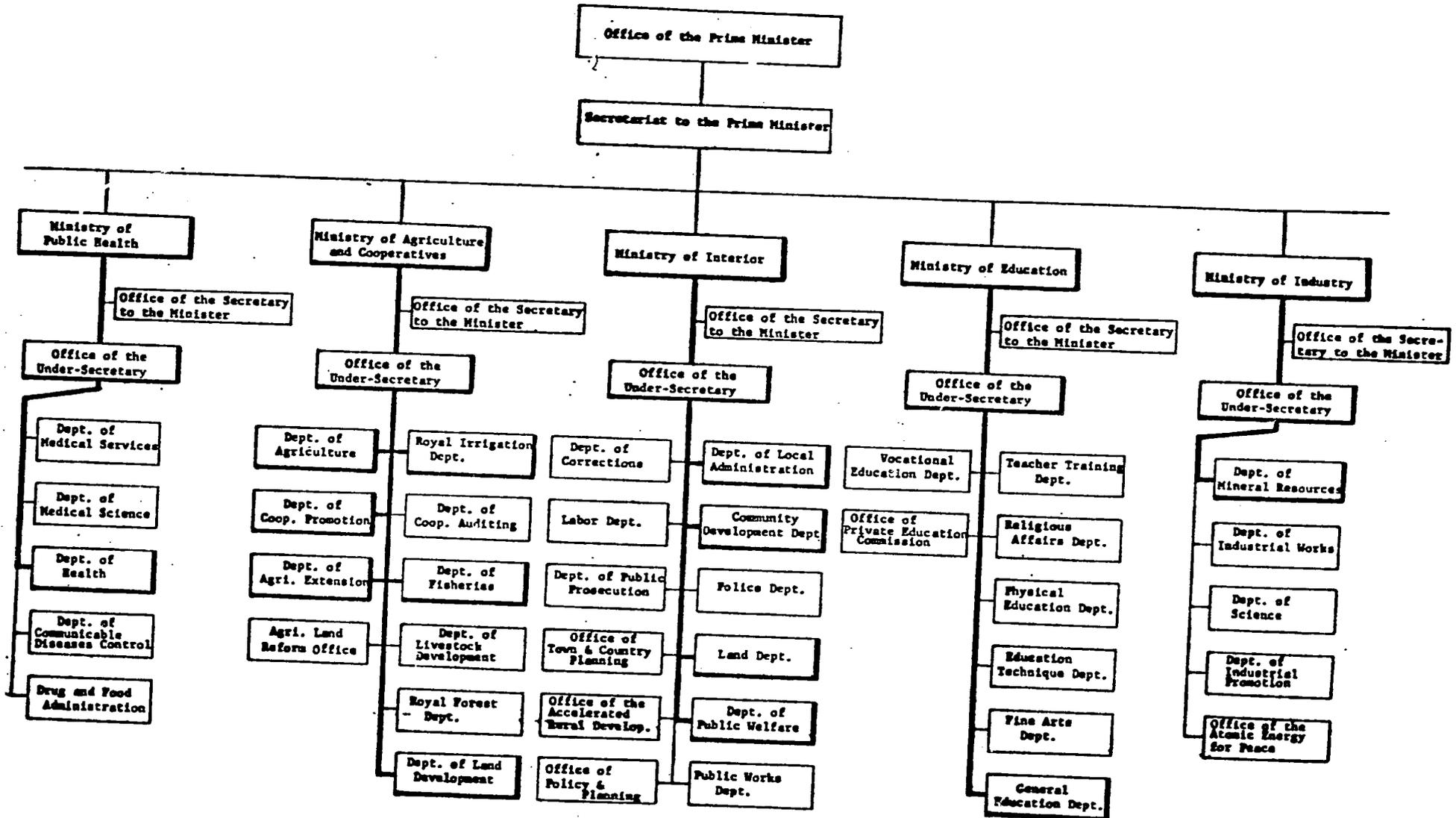
ROYAL IRRIGATION DEPARTMENT

ANNEX B.9.a



HC ORGANIZATIONAL STRUCTURE
OF MINISTRIES AND DEPARTMENTS INVOLVED IN THE LAW FOR ONE PROJECT

ANNEX B-9.b



LNO PROJECT ORGANIZATION

National Irrigated Agriculture
Committee

National Coordinating Committee

LNO Integrated Rural Development Project

Chairman: MOAC Deputy Under Secretary of State

Vice Chairmen: Governor, Sakon Nakhon Province
Deputy Director-General, RID

Project Director: Deputy Director-General, RID

Committee Members

Representatives of CDD, DOAE, DOA, DOF, AED, PWD
MOPH, BAAC, NESDB, BOB, CSC, CLCO

Secretary: LNO Coordinator
(Director, MOAC Projects Division)

LNO Provincial Coordinating Committee

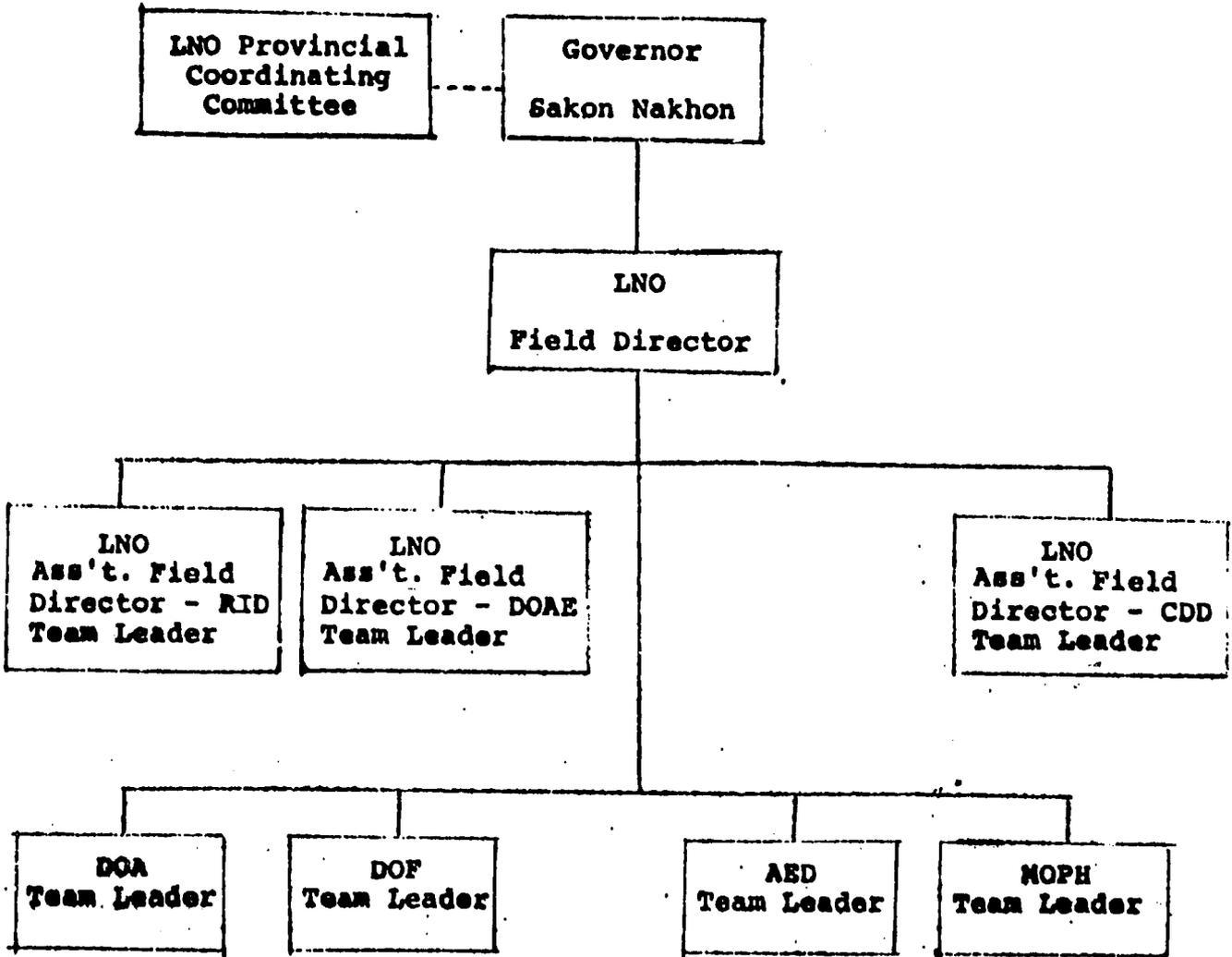
Chairman: Governor, Sakon Nakhon Province

Vice Chairman: LNO Project Field Director

Committee Members

Provincial RTG Agency Chiefs
LNO Project Assistant Field Directors
LNO Project Team Leaders

LNO FIELD MANAGEMENT ORGANIZATION



TECHNICAL ADVISORY SERVICES

1. General

A consulting firm well experienced in agricultural developments similar to the Lam Nam Oon Integrated Rural Development Project will be engaged by the Royal Thai Government to work closely with the Government to ensure successful implementation of the project.

2. RTG Agencies

The consultant would assist, advise or provide technical services to the following agencies as described:

The Ministry of Agriculture and Cooperatives

Royal Irrigation Department
Community Development Department

Department of Agriculture
Department of Agricultural Extension

Department of Cooperative Promotion

The exact counterparting arrangements would be developed in detail and agreed with the Government, a final project management and personnel organization chart would be approved by all concerned parties; the key and senior counterpart and committee personnel would be named; and the Thai technical input required from the Consultant would be established accordingly.

3. Scope of Work

The Consultant's scope of work would embrace the following:

- liaise with the Chairman and Vice Chairmen of the Coordinating Committee, the Provincial Coordinating Committee and USOM, on all matters pertaining to developing the definite project plan, and subsequent project implementation.
- provide overall project management services. In particular, assist RID to develop annual work programs in advance of the construction seasons for the timely award of contracts and the deployment of personnel and labour for force account work, and

assist the Agricultural Extension Department and Community Development Department to prepare phased programs for progressive attainment of objectives.

- assist RID to complete the design of the main irrigation system, design of the main drainage system, design of the irrigation water re-use systems, design of all on-farm works, and design of the project road network.
- assist RID to formulate, develop and implement operation and maintenance procedures specifically for Lam Nam Oon.
- advise RID on the preparation of on-farm grade topographic maps, and any topographic maps required for completion of the main irrigation and drainage systems.
- assist RID and the other agencies to prepare implementation and development programs.
- assist RID to prepare contract documents and specifications for all contract works, and specifications and work schedules for all force account work.
- advise RID on the supervision and management of all construction contracts and activities.
- advise RID on all materials and equipment procurement contracts as necessary, and assist RID to develop schedules for timely materials and equipment procurement.
- Assist RID to implement the project in accordance with project cost control, management information systems, and such other organization and management systems and procedures as may be required of RID.
- Coordinate all operational research programs in the three proposed pilot areas.
- prepare monthly reports for submission to USOM in an approved form using data provided by the concerned agencies.
- advise and assist the Department of Agricultural Extension to develop a well functioning agricultural extension program for the Lam Nam Oon Project.

- advise and assist the Community Development Department to co-ordinate all project community development activities, other than RID's project implementation activities.
- advise and assist the Department of Agriculture to develop an agricultural research program linked with the DOAE.

4. Consultant's Personnel

The Consultant's personnel would be required to form with the various Government agencies, a well co-ordinated project team. As all principal activities would be on site, the Consultant's personnel would be stationed there. The Consultant would, however, be required to maintain liaison services with the Government agencies and USOM offices located in Bangkok. As all principal activities would be carried out at site, the RID Project Management and design staff, with all support services, would also have to be located at site.

The level of effort for consultant service is expected to be approximately as follows:

- Irrigation Engineer	48 months
- O&M Engineer	36 months
- System and On-Farm Design Engineer	24 months
- Agricultural Extension Advisor	24 months
- Rural Development Advisor	24 months
- Agronomist	15 months
- Miscellaneous Specialists (Soil Scientist, Farmer's Institution, Specialist, Hydrology Specialist, Ag Economist, O&M Organization Specialist, Irrigated Agriculture Development Planner, Fisheries etc.)	17 months
- Consultants Home Office Technical Support	7 months
- Project Sponsoring and Bangkok Office Admin. Support	<u>8 months</u>
TOTAL	<u>203 months</u>

PROPOSED CONSULTANT STAFFING PLAN AND SCHEDULE

Annex B.10.b.

POSITION	1978		1979		1980		1981		1982		Man-months
Project Sponsor	-	-	-	-	-	-					2
Irrigation Engineer (Team Leader)									→RID		48
Water Mgmt./O & M Engineer							RID →				36
System & On-Farm Design Engineer							Thai Specialist or RID				24
Agricultural Extension Advisor							DOAE →				24
Rural Development Advisor							CDD →				24
Agronomist							DOA →				15
Hydrology Specialist											1
Soil Scientist							RID →				5
Agricultural Economist											2
O & M Organization Specialist											1
Irrigation Agri. Development Planner											2
Miscellaneous Specialists											6
Home Office Backup											7
Regional Office Backup											6
Thai Specialists, Surveyors, Design Engineers, Draftsmen, etc. as required to supplement RTG technical input.										Total	203

OPERATIONAL RESEARCH PROGRAMS

1. The present status regarding operational research programs is that a pilot area of approximately 1,000 rai (160 ha) has been started in the location shown on Annex B.2.a, and some 50% of this area has been intensively developed at the on-farm level. The cost of implementing this work and the research aims of the pilot area as a whole are not yet clearly recorded. The topography in the area is undulating and topsoil generally throughout the Lam Nam Oon area is shallow. From field inspections, the depth of cut in the land levelling operation was heavy. No attempts were made to stockpile the topsoil, cut the subsoil as required, and then replace the topsoil. The resulting soil classification in the upper horizons therefore varies according to whether the area was cut or filled.

2. Full on-farm development of the Lam Nam Oon area will embrace four broad categories of development, that is, intensive and extensive development in areas suitable for rice and upland crop cultivation. The pilot areas should be selected to yield all data required for planning these developments which is not available from other sources.

3. The existing pilot area is located in that part of the project area which is to be developed extensively. . . . Using RID's land code system, the soils are 60% Code 6, which is moderate to rather poor for upland crops (sandy soils), 35% Code 7, which is rather poor for upland crops and paddy (acidic soils), and 5% Code 2, which is moderate to rather good for upland crops.

Utilizing the existing pilot area to the maximum practicable extent, it is proposed that the following pilot areas be developed, and that detailed methodology be developed for obtaining the described data and carrying out the described studies.

4. Pilot Area 1

This is the existing pilot area. The area to be developed will be adequate for demonstration purposes in the prevailing poor soils.

4.1 Assemble all development cost data to a standard format which will be suitable for all pilot area construction work.

4.2 Map areas of cut and fill with depths of cut and fill. Superimpose on this map, the original land classification data and the location of all soil sampling pits and auger holes. Assemble the relevant original soil classification data. Carry out a detailed soil classification and drainage study on the now mixed soils and superimpose the results on the master plan. Assemble all the new relevant soil classification data.

4.3 The selected cropping patterns anticipate the following predominant use of the lands within the pilot area:

<u>Code</u>	<u>Wet Season</u>	<u>Dry Season</u>
6	Soybean or rice depending on water availability	Groundnuts
7	rice	nil
2	rice, vegetables	Tobacco, vegetables, mungbean, soybean, peanuts

Arrange demonstrations to show the effect of applying various quantities and finenesses of crushed limestone, with and without fertilizer application, on each of the proposed crops and on each representative soil classification.

4.4 Farm use, losses and application efficiencies vary considerably and the values assumed for planning have a significant effect on project reliability benefits. A measure of actual values is also required as a basis for improvement of irrigation techniques.

The methodology selected for measuring on-farm losses etc. will determine the measurements which have to be taken and the number and type of measuring devices. Study sites should be as large as practicable and should be representative in terms of crops, soils, topography, drainage and irrigation patterns, distance from irrigation water sources etc.. Two primary conditions must be met in each study area; the study area must be well bounded and must be adequately irrigated.

Measurement of farm use, losses and efficiencies during the wet season require special techniques and should be deferred until the project personnel have successfully completed an assessment of dry season efficiencies.

Measurements required for development of a water balance and a breakdown of on-farm use and losses will include but not be limited to:

- ground water levels (piezometers)
- meteorological data (rainfall, wind speed, hours of sunshine, solar radiation, maximum and minimum temperatures, relative humidity)
- standard pan evaporation
- frequency, amount and duration of irrigation
- drainage outflows (particular attention must be paid to selecting study areas with clearly defined boundary conditions)
- soil type and detailed classification
- depth to hardpan if applicable
- water depths at commencement at irrigation and end of irrigation
- bund height in ricelands
- soil moisture content at beginning and end of measurement period
- an estimate of boundary outflows and inflows (best to select boundary conditions where these effects are minimized)

- deep percolation
- crop grown, crop calendar, crop growth stage
(separate measurements will be needed for, say,
the land preparation stage)

Care must be taken to ensure that the studies are representative of field conditions and are not of "research quality".

Other items to be included in the pilot area study program would be to ascertain the effect of starting irrigation on May 1st and ceasing irrigation on October 1st. Land preparation practices, both with and without irrigation, need to be ascertained as part of this portion of the study to determine minimum total water demand. Also, the practicability, cost, and effect on yields of raising bunds sufficiently to retain most of the August-September rainfall needs to be included in the research program. This practice would apply only to local varieties, the cultivation of large quantities of which should be discouraged because of its long growth cycle and high water demand.

- 4.5 For effective water management, irrigation water releases must be measured at the point of release from the reservoir and at each significant take-off point in the distribution system. As an incentive for water conservation, the water supplied to the farmer will ultimately have to be measured and the farmer will eventually have to pay for it in some way under a cost recovery program.

Water measurement on the Lam Nam Oon Project should be undertaken on two levels; main system and on-farm system. The main system has constant head orifice measuring devices at each lateral turnout and farm turnout. A system for routine measurement should be established and followed, complete with standard forms, O&M staff, job functions and responsibilities, and data processing procedures. Any additional requirements for measuring device installation, such as staff gages upstream and downstream of control gates, should be identified, constructed and included in the water management plan. An accurate measuring system at the main canal headworks is particularly required.

Pilot Area 1 is close to the headworks and should be used to set up and demonstrate a suitable on-farm measuring system. A review of the cost recovery methods under consideration by RID would be necessary, and the water measurement system should be developed accordingly. Standard recording forms, O&M staff job functions and responsibilities, and data processing systems and procedures should be established to cover all processes up to the point where the farmer could be charged for the water used. At present, water is capable of being measured only down to the "farm turnout", or service area supply point (20-25 farms)

At present, the farmers have little concept of how the system has been designed to operate and, therefore, the farmers at the head of each supply channel can be expected to breach dikes and take the water they want, which is frequently far more than they need or should use for optimum yields, without regard for downstream users or project efficiency. In a rotational irrigation system, the minor channel would be checked off in reaches so that the farmers in that reach could receive water for a given period of time according to the capacity of their inlet structures (usually pipe inlets). If the adjacent farmers do not trust the extension officers to advise them properly on crop stress limits, water requirements etc., they will breach canals or install siphons to get water and the whole rotational irrigation plan will be made meaningless. It is essential to involve the farmers, through the water users' associations, in the measurement of water needs, soil moisture, stress limits and so on in order for them to understand the rotational system and to appreciate the advantages to the project as a whole and to themselves as individuals. Achieving the farmers' cooperation in operation and maintenance of an on-farm system entails very careful nurturing, instruction, and help by the Ministry of Agriculture and Cooperatives through its various Departments. Even though water users associations are to be responsible for on-farm O&M, RID and the other Departments can not divorce themselves entirely from this work in the early days of project development. Later, as lateral based irrigation associations, and hopefully project wide irrigation associations, are developed step by step along sound technical, financial and organizational lines, the level of training, explanation, guidance and involvement by the RTG will decrease.

Such training should be included in the operational research programs for each pilot area.

5. Pilot Area No. 2

A second pilot area should be implemented, in the area to be developed extensively, using extensive on-farm development techniques. The area should be selected to demonstrate two broad categories of agricultural development; rice and upland crop cultivation on the better soils under an extensive development program.

5.1 In this area it is proposed to study three levels of on-farm development

- ditches and dikes, and some farm roads
- ditches and dikes, drainage improvement, minimal land re-shaping, and some farm roads
- ditches and dikes, drainage improvement, minimal land re-shaping, some farm roads and minimal farm boundary re-alignment.

5.2 Prior to starting construction, suitable forms should be prepared to accurately record all cost inputs, and suitable management organizations should be set up to ensure that the required cost data is assembled and processed to a conclusive point.

5.3 As the pre-construction surveying and design input will also vary with the level of on-farm development, time-cards should be completed by all project personnel working on these phases of the work. This data should also be processed to a conclusive point.

5.4 Item 2 of Pilot Area 1 should be followed.

5.5 The selected cropping patterns for the better soils in the extensively developed project area anticipate the following principal land use:

<u>Code</u>	<u>Wet Season</u>	<u>Dry Season</u>
1	Rice, fruit, vegetables	tobacco, vegetables,
2	"	mung bean, soybean
3	rice	peanuts.
4	rice	sesame
5	rice	
6	cotton	groundnuts, soybean, mung bean, sweet corn, irish potatoes

7	rice	-
8	fruit and vegetables	fruit and vegetables
9	jute	-

The pilot area should be selected to include as many of these soils as possible.

Demonstrations should be arranged to show the effects of applying limestone to the soils as for Pilot Area 1.

- 5.6 Farm application efficiencies should be studied as in Item 4, Pilot Area 1.
- 5.7 Water management practices should be studied and demonstrated as in Item 5, Pilot Area 1.
- 5.8 Storm runoff characteristics also need to be studied to enable refinement of assumptions regarding effective precipitation.

6. Pilot Area 3

A third pilot area should be developed in the land consolidation area, using intensive on-farm development techniques, to provide a comparison with the various levels of development in Pilot Area 2. The two areas, Pilot Area 2 and Pilot Area 3, should be as comparable as possible in topography, soil types, drainage, distance from the main canal, cultivated crops etc.

- 6.1 This pilot area should be studied and managed in the same way as Pilot Area 2, except that comparative levels of on-farm development would not be studied.
- 7. The areas of Pilot Areas 1 and 2 will depend on the requirements of the detailed study plan. Areas of 1-3,000 Rai should be adequate.
- 8. To aid the RID forces and Extension Department responsible for water management, crop plans, etc., it is recommended that a computer program be developed and thoroughly tested which will establish desirable cropping plans for the coming dry season and predict probable patterns for the next wet season. Inputs would be:

- reservoir storage at end of September.
- areas in land codes
- land code/crop suitability
- statistical rainfall and runoff for predictions of irrigation shortages and their effect, and for determining effective rainfall
- crop water demands
- farm gate prices of crops
- predicted crop yields
- production ceilings based on market absorption capability
- cost of agricultural inputs.
- restrictive preferences, such as wet season rice being grown on land Code 3 in the land consolidation area first, etc.

Such a program should be established using fully appropriate technology and should not be overly sophisticated.

Considerable water savings have been practicably achieved by using crop stress indicators to dictate irrigation frequencies and durations. Such programs could be computerized and run by project personnel using data collected at district, project or chak level. This practice should not be unduly pursued on the Lam Nam Oon Project, as less sophisticated water management practices have to be made to work smoothly first. However, Lam Nam Oon is short of water and every use of the available resource will ultimately be necessary. Therefore, when developing and building up water management organizations, it is recommended that the various methods of forecasting crop water demands, developing cropping patterns, planning and operating rotational irrigation programs, etc., be presented in training workshops to those personnel responsible for O&M. The intent would not be so much as to use these techniques in the immediate future, but to make the water management personnel familiar with the available techniques, and then to develop a fully endorsed and clearly phased program for progressive development of sound water management practices; practices which utilize the appropriate technology at each step in the development program.

9. To be of any value to future irrigation development planning, both at Lam Nam Oon and elsewhere, the operational research program will require:

- clearly defined objectives and study methodology
- adequate funding for specialist and technical personnel, labor, and measuring devices
- clearly defined physical boundaries to the study areas
- experienced supervision
- attention to detail

Supervision of these studies should be the responsibility of the consultants O&M specialist working in close co-operation with RID's O&M personnel, the consultant's specialist agronomist, and the Extension Department. For greater effectiveness, the studies should be managed as a sub-project by a clearly responsible team, and not by the project team at large.

10. The final design of the operational research program, as prepared by RID and the LNO Consultant Team, shall be integrated with the DOA and DOAE research and agricultural development plans, as described elsewhere. The final design should also be done in close cooperation with the various departments and the departmental Team Leaders of the LNO Project Management Group to ensure that research needs of all support activities are adequately covered.

Summary: Expanded Health and Family Planning
Services and PVO Programs

Basic Program

- A. CBFPS - A 4-year pilot project to find best delivery system(s) at village level using village personnel as the health agent.

Project Activities Suggested for the LNO

1. Test at least 2 delivery systems models.
 2. Add parasitic treatment
 3. Introduce family planning incentives schemes:
 - a) Family based:
 - low cost rental of draft animal (buffalo)
 - loan interest rebate
 - b) Community based: - RTG patronage; i.e. scholarships, education grants, farm supplies subsidy, etc.
 4. Establish "nuclear" families to test the effectiveness of a team concept of husband/wife and sons/daughters to receive and extend the help provided under the CBFPS and related projects, as identified below. For instance, the husband might be the "contact" farmer selected by DOAE for crop extension work; the wife might be the village health agent selected by CBFPS or, alternatively, the home economics/nutrition recipient selected under THEA (PVO/OPG); the son or daughter participating as a 4-H member (PVO/OPG); and a son as selected under the Boy Scout fish propagation program (PVO/OPG).
- B. MOPH - For the LNO the NFPP proposes to provide upgrading training to 1st- and 2nd-class health center staff. This will extend MOPH village health services and result in less referral.

Associated Programs

A. THEA (PVO/OPG)

A 3-year pilot project to provide home economics skills, improved nutrition and family planning assistance in 8 demonstration villages. Of these 2 are planned in the NE the 1st year and it is proposed that 1 of the 2 be located in the LNO.

MOAC will provide 132 female extension agents for training and subsequent assignment to the demonstration villages. CDD is expected to reinforce this activity with the coordination and support of their provincial home economics staff.

B. Boy Scout Fish Propagation Project (PVO/OPG)

A 3-year pilot project to train Boy Scouts in artificial insemination of local carp and to provide fish culture technology to rural fish farmers. The increased fish production will provide cash income and needed protein and thus realize improved nutrition among farm families. Support to this program will also be provided by the Department of Fisheries.

It is proposed that selected villages within the LNO be established as demonstration centers under this project. It is further proposed that such selection be made in concert with the THEA program to realize maximum benefit from the nutrition/home economics assistance.

C. 4-H Program (PVO/OPG)

A 3-year pilot project to strengthen and expand the Yuwa-Kasetkorn (Y-K) Program among the sons and daughters of rural families.

This project will be coordinated with, and assisted by the DOAE and among other objectives will result in improved farming and homemaking practices. As such, it is proposed that some farm families to be represented under this project be jointly selected with THEA and also be the "nuclear" families established under CBFPS.

ENVIRONMENTAL ASSESSMENT

This environmental assessment has been prepared by the USOM staff and reviewed and agreed in principle by the RTG National Environmental Board, pending a decision on the need for an environmental assessment survey of the LNO project area.

The assessment of the impact of the Lam Nam Oon Project on various environmental subject areas is based largely on findings by the Committee for Coordination of Investigations of the Lower Mekong Basin as contained in the report Environmental Effects of Pa Mong dated August 1976. That report is a comprehensive analysis of the probable impact of the proposed Pa Mong dam and irrigation project on 26 different environmental subject areas. Since the Pa Mong project irrigation service area includes much of N.E. Thailand, the Pa Mong environmental study group has analyzed the impact to date of a number of Northeast dams and irrigation systems already constructed and operational, including LNO. The N.E. Thailand experience does, in fact, shape many of the environmental impact conclusions of the Pa Mong report and for this reason the Pa Mong environmental assessments are considered applicable and valid for the LNO project.

Accordingly, it is judged, as was judged for the Pa Mong, that the irrigated agriculture system of the Lam Nam Oon "----should have few adverse effects on environmental values --- but should contribute to the welfare of the (region)".

The following includes an evaluation of the impact of the Lam Nam Oon Project on the more significant of the environmental subject areas:

Use of Chemicals:

For the Lam Nam Oon it is anticipated that use will be made of pesticides, together with fertilizers and other agricultural chemical materials to optimize crop yields. Table 1 is a list of the chemicals that will probably be most used and estimates of their annual rate of application at ultimate full production. Consideration will also be given to other low toxicity insecticides such as Malathion, Sumition, Lannate and Vydate and fungicides such as Maned-B, Paptan, Kelthane, Thiram, Beulate and Tersan. All chemicals used will be pretested and demonstrated under carefully controlled conditions in the field in accordance with applicable regulations under Thai law. No AID assistance is to be provided for the

use or procurement of pesticides. Moreover none of those identified in AIDTO CIRC A-35 dated January 30, 1976, will be used on the project since the RTG has issued Royal Decree No. 1 dated June 29, 1970 (Act Governing Distribution of Toxic Agents) which prohibits distribution and use of 34 dangerously toxic agents, including all of those identified by AID.

Table 1

Fertilizer and Pesticides Requirements at Lam Nam Oon

Following is a rough estimate of fertilizer and pesticide requirement at LNO:

<u>Material</u>	<u>Unit</u>
Agri. lime	M.T. 6000
N (100%)	M.T. 2500
P (100%)	M.T. 1000
K (100%)	M.T. 2500
BHC (or equal)	M.T. 1000
Dimethoate	Kilo-liter 15
Parathion	Kilo-liter 10
Aldrex	M.T. 15
Sevin	M.T. 25
Toxaphene	Kilo-liter 150
Dipterex	M.T. 0.50

Reservoir, Fisheries and aquatic biology:

As is typical of other impoundments (dams, tanks) constructed in N.E. Thailand the Lam Nam Oon reservoir was not cleared of vegetative growth prior to flooding. As a result the nutrients derived from submerged vegetation is expected to support biological activity and aquatic plant growth which in turn, will support a high fish density. To realize the reservoir potential of increased fish production as a food and income resource the Department of Fisheries has started a reservoir foodfish stocking program with the objective of increasing fish density such that present yields are substantially increased. In-migration attracted by the reservoir fishery development is not expected to be extensive and thus overfishing and inadequate income levels from lowered per capita fish harvest is not considered a problem.

Based on experience from other large N.E. Thailand impoundments aquatic growth will not be sufficiently heavy to produce water discoloration, reduce transparency, limit shoreside access or otherwise impair the aesthetic qualities valuable for recreation and tourism purposes. However, it is expected that some nuisance water weeds will develop in both the reservoir and the irrigation systems. Systematic controls will have to be followed to keep this type of growth checked.

Reservoir storage capacity and the ability to release surplus water at controlled rates during periods of exceptionally heavy rains will greatly reduce the destructive effects of flooding.

Ground and surface water:

Year-round application of water on the fields together with seepage from the distribution system can be expected to cause a rise in average ground water levels of about 1-2 meters in low-lying areas and as much as 3-5 meters beneath upland areas. Higher water tables during the dry season together with available irrigation system water will improve domestic water supply and probably result in reduced construction of wells and less maintenance on existing wells. The increase in year-round water supply will enable an increase in fish farming planned throughout the LNO area. Harmful deterioration in ground water quality will not result from the planned irrigation development as adequate drainage will be provided to prevent water logging and possible salinization of soils. With irrigation, ground water discharge will increase due to return flow and probably many smaller streams now intermittently dry will flow permanently and the quality of the water will be improved.

Public Health:

Based on extensive regional research by the Mekong Committee, in cooperation with WHO, it is concluded that positive improvement in public health will occur. However, malaria control measures must be taken. Schistosomiasis (human blood fluke infection) is limited to a small area of the Mekong River and is not considered a menace at the LNO area. The overall improvement in water quality mentioned above will have a beneficial impact on public health.

Erosion, soil depletion:

On-farm erosion will not present a problem, as is evident from the experience of other N.E. Thailand irrigated areas with similar soil and terrain conditions. Canal embankment erosion will have to be carefully controlled, however, with an improved vegetative cover planting and maintenance program. With regard to maintaining soil fertility it is planned that the use of fertilizer, agrilime, trace elements, etc. (Table 1, above) will be strongly emphasized to realize the productivity levels for the double cropping program proposed for the project area. Crops such as cassava which are extremely soil-exhausting in character, are not planned for the LNO.

Impact of double cropping on plant diseases and pests:

The incidence of disease and pest infestation increases with double cropping. This has been particularly noticeable with second crop paddy in the N.E. where the incidence of gall midge and stem borer attack has been a problem. For the LNO a strong plant protection program is planned including pesticides and fungicides use as noted above, and varietal improvement research. In addition to these measures it is anticipated that a large expansion in the area under second cropping, such as will occur in the LNO, will result in less incidence per unit of crop area. Based on predictions of levels of plant protection and agricultural research personnel the research and control programs planned for the project will preclude any significant adverse impact from plant disease and insect attack.

Modification No. 3

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Life of Project ANNEX D Page 1
From FY 1977 to FY 1982
Total U.S. Funding _____
Date Prepared: _____

Project Title & Number: Lam Nam Oon Integrated Rural Development - No.493-21-120-272

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	SPECIFIC TARGETS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Program or Sector Goal: The broader objective to which this project contributes:</p> <p>Improved standard of living for farm families in Thailand whose lands are irrigated or irrigable</p>	<p>Measures of Goal Achievement:</p> <ul style="list-style-type: none"> Per capita income Child mortality Fertility Caloric intake/capita Freedom from parasites Educational level Ownership of radio, bicycle, sewing machine 	<p>Goal Targets:</p> <ul style="list-style-type: none"> percentage increase equal to or greater than national average) absolute decline in deaths/ thousand) absolute decline in children ever born) absolute increase) absolute increase in % of population) increase in % of population age 15-19 having attained level 5 or higher) increase in % of households owning) 	<p>NSO data (census, household surveys, etc.) by region and changwat</p> <p>Special surveys</p> <p>National Nutrition Survey Data</p> <p>NSO data by region and changwat</p>	<p>Assumptions for goal targets:</p> <p>Demonstration of the efficacy of a coordinated/integrated approach with emphasis on farm development will cause Thai agencies to apply this approach in irrigated areas other than Lam Nam Oon.</p> <p>RIC will continue to place high priority on policies to correct income disparities, control population, improve health of its rural population.</p>

Modification No. 3

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Life or Project
From FY 1977
Total U.S. Funding
Date Prepared:

ANNEX D Page 2

by FY 1982

Project Title & Number: Lam Nam Oon Integrated Rural Development - No.493-21-120-272

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	SPECIFIC TARGETS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Subsector Goal:</p> <p>Improved standard of living for 10,000 farm families in the Lam Nam Oon project irrigated area</p> <p>See Sericulture Settlements PF for Sector and Sub-Sector Goals, OVI's, etc. -- except target group for Subgoal is 150 families in Lam Nam Oon Resettlement Area</p>	<p>Measures of Goal Achievement:</p> <p>Per capita income</p> <p>Fertility</p> <p>Child mortality</p> <p>Caloric intake/capita</p> <p>Freedom from parasites</p> <p>Educational level</p> <p>Ownership of radio, bicycle, sewing machine</p>	<p>Subsector Targets:</p> <p>percentage increase half again) as large as national average)</p> <p>absolute decline in children ever born)</p> <p>absolute decline in deaths/ thousand)</p> <p>absolute increase)</p> <p>absolute increase in % of population)</p> <p>increase in % of population age 15-19 having attained Pratom 5 or higher)</p> <p>increase in % of households owning)</p>	<p>Socio-economic surveys for project evaluation</p> <p>(local administrative records)</p> <p>(Socio-economic surveys for project evaluation)</p> <p>(local health records)</p> <p>Socio-economic surveys for project evaluation</p>	<p>Assumption for achieving goal targets:</p> <p>Terms of trade for agriculture do not deteriorate</p> <p>Credit and marketing systems in the project area will be able to meet project needs</p>

Modification No. 3

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

ANNEX D Page 3

Life of Project: _____
From FY 1977 to FY 1982
Total U.S. Funding _____
Date Prepared _____

Project Title & Number: Lam Nam On Integrated Rural Development - No. 493-21-120-272

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	SPECIFIC TARGETS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Project Purpose:</p> <p>To demonstrate in a typical irrigated area in northeast Thailand an integrated and coordinated approach to rural development which (a) significantly increases agricultural production and (b) improves the quality of rural life over a broad spectrum.</p>	<p>Conditions that will indicate purpose has been achieved; End of project status.</p> <p>Net value of crops produced</p> <p>Number of individuals:</p> <ul style="list-style-type: none"> - receiving diagnostic and remedial care in the project area - eating balanced nutritional diet - having vocational skills - practicing family planning - attending village and Tambon government meetings - belonging to 4-H, WUA's, Coops, etc. <p>Functioning community development committees at Changwat level and lower directly involved in project activities.</p> <p>Conformance to PFT schedules</p>	<p>Performance Targets:</p> <p>Increase to \$196 million produced by Lam Nam On farmers at end of year 5, to \$305 million at end of year 7 (in 1977 prices)</p> <ul style="list-style-type: none"> - Increase in % of population <p>CPI's met</p>	<p>DOAE market data, Socio-economic surveys for project evaluation</p> <p>Administrative and project reports</p> <p>Socio-economic surveys for project evaluation</p> <p>On-site observations and interviews</p> <p>On-site observations and interviews</p> <p>RTG and USOM project records</p>	<p>Assumptions for achieving purpose:</p> <p>Individuals will adopt new practices (agricultural, nutritional, health, etc.) if shown to be to their benefit. Pilot and demonstration activities are successful</p> <p>Credit will be available to finance needed inputs</p>

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Life of Project: ARREK D Page 4
From FY 1977 to FY 1982
Total U.S. Funding: _____
Date Prepared: _____

Project Title & Number: Lam Nam Con Integrated Rural Development - No. 493-21-120-272

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS								MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Outputs: (C-1)	Magnitude of Outputs: (C-2)								(C-3)	Assumptions for achieving outputs: (C-4)
		1977	1978	1979	1980	1981	1982	1982		
1. Irrigation system and irrigated agricultural land improvements completed	1. a) Main canal and laterals. incr. (km.) cum. (km.)	40	40	30	40	40	-	-	Project records and reports, site visits	RIG budgets adequate funds Pre-construction activities are completed on schedule; i.e. topographical/cadastral mapping, farmer agreements, etc.
	b) Drainage system incr. (km.) cum. (km.)	-	30	45	45	60	60	80		
	c) Land consolidation area. incr. (rai) (000) cum. (rai) (000)	-	-	2	-	10	14.3	-		
	d) Ditch and dikes area incr. (rai) (000) cum. (rai) (000)	-	2	20	25	26.8	30.7	-		
	e) Number of detailed research plans completed and being applied. incr. cum.	1	1	1	-	-	-	-		
2. A road not completed providing for maintenance of the irrigation system and increased mobility, communications and access to markets for the farmers	2. a) Feeder roads incr. (km.) cum. (km.)	10	10	12	12	-	-	-		
	b) O&M roads incr. (km.) cum. (km.)	30	30	50	100	100	-	-		
3. On-farm operation and maintenance of the water supply and drainage system affected	3. Amount of self-help contribution by farmer to O&M charges (\$ millions)	0.83	0.86	1.19	1.56	2.11	2.79	-		

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Life of Project ANNEX D Page 5
From FY 1977 to FY 1982
Total U.S. Funding _____
Date Prepared: _____

Project Title & Number: Lam Nam Oon Integrated Rural Development - No.493-21-120-272

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS																																																																																																																																
Outputs: (C-1)	Magnitude of Outputs: (C-2)	(C-3)	Assumptions for achieving outputs: (C-4)																																																																																																																																
	<table border="1"> <thead> <tr> <th></th> <th>1977</th> <th>1978</th> <th>1979</th> <th>1980</th> <th>1981</th> <th>1982</th> <th>1983</th> </tr> </thead> <tbody> <tr> <td>4. a) Number of families receiving CDD occupational promotion and other assistance</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td> incr. (00)</td> <td>4</td> <td>12</td> <td>16</td> <td>20</td> <td>24</td> <td>-</td> <td>-</td> </tr> <tr> <td> cum. (00)</td> <td>-</td> <td>16</td> <td>32</td> <td>52</td> <td>76</td> <td>-</td> <td>-</td> </tr> <tr> <td>b) Number of villagers in model villages who participate under Saraphi Project, % of total village families</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td> incr.</td> <td>-</td> <td>15</td> <td>20</td> <td>20</td> <td>25</td> <td>-</td> <td>-</td> </tr> <tr> <td> cum.</td> <td>-</td> <td>15</td> <td>35</td> <td>55</td> <td>80</td> <td>-</td> <td>-</td> </tr> <tr> <td>5. a) Number of Community Development Department occupational groups organized (30 members/group)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td> incr.</td> <td>10</td> <td>20</td> <td>30</td> <td>40</td> <td>50</td> <td>-</td> <td>-</td> </tr> <tr> <td> cum.</td> <td>-</td> <td>30</td> <td>60</td> <td>100</td> <td>150</td> <td>-</td> <td>-</td> </tr> <tr> <td>b) Number of Farmer Associations organized or reorganized. (min. 30 members required)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td> incr.</td> <td>-</td> <td>3</td> <td>3</td> <td>3</td> <td>3</td> <td>-</td> <td>-</td> </tr> <tr> <td> cum.</td> <td>-</td> <td>-</td> <td>6</td> <td>9</td> <td>12</td> <td>-</td> <td>-</td> </tr> <tr> <td>c) Number of Cooperatives organized or reorganized (500 members/Coop)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td> incr.</td> <td>-</td> <td>-</td> <td>1</td> <td>1</td> <td>1</td> <td>-</td> <td>-</td> </tr> <tr> <td> cum.</td> <td>-</td> <td>-</td> <td>-</td> <td>2</td> <td>3</td> <td>-</td> <td>-</td> </tr> </tbody> </table>		1977	1978	1979	1980	1981	1982	1983	4. a) Number of families receiving CDD occupational promotion and other assistance								incr. (00)	4	12	16	20	24	-	-	cum. (00)	-	16	32	52	76	-	-	b) Number of villagers in model villages who participate under Saraphi Project, % of total village families								incr.	-	15	20	20	25	-	-	cum.	-	15	35	55	80	-	-	5. a) Number of Community Development Department occupational groups organized (30 members/group)								incr.	10	20	30	40	50	-	-	cum.	-	30	60	100	150	-	-	b) Number of Farmer Associations organized or reorganized. (min. 30 members required)								incr.	-	3	3	3	3	-	-	cum.	-	-	6	9	12	-	-	c) Number of Cooperatives organized or reorganized (500 members/Coop)								incr.	-	-	1	1	1	-	-	cum.	-	-	-	2	3	-	-		
	1977	1978	1979	1980	1981	1982	1983																																																																																																																												
4. a) Number of families receiving CDD occupational promotion and other assistance																																																																																																																																			
incr. (00)	4	12	16	20	24	-	-																																																																																																																												
cum. (00)	-	16	32	52	76	-	-																																																																																																																												
b) Number of villagers in model villages who participate under Saraphi Project, % of total village families																																																																																																																																			
incr.	-	15	20	20	25	-	-																																																																																																																												
cum.	-	15	35	55	80	-	-																																																																																																																												
5. a) Number of Community Development Department occupational groups organized (30 members/group)																																																																																																																																			
incr.	10	20	30	40	50	-	-																																																																																																																												
cum.	-	30	60	100	150	-	-																																																																																																																												
b) Number of Farmer Associations organized or reorganized. (min. 30 members required)																																																																																																																																			
incr.	-	3	3	3	3	-	-																																																																																																																												
cum.	-	-	6	9	12	-	-																																																																																																																												
c) Number of Cooperatives organized or reorganized (500 members/Coop)																																																																																																																																			
incr.	-	-	1	1	1	-	-																																																																																																																												
cum.	-	-	-	2	3	-	-																																																																																																																												

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Life of Project ANNEX D Page 6
From FY 1977 to FY 1982
Total U.S. Funding _____
Date Prepared: _____

Project Title & Number: Lam Nam Oon Integrated Rural Development - No.493-21-120-272

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS								MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS																													
Outputs: (C-1)	Magnitude of Outputs: (C-2)								(C-3)	Assumptions for achieving outputs: (C-4)																													
		<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>																															
6. A functioning agricultural research and extension program	6. a) Number of farmers accepting and using results of applied research and extension programs. <table border="0" style="width: 100%;"> <tr> <td style="padding-left: 20px;">incr.(00)</td> <td>-</td> <td>5</td> <td>20</td> <td>20</td> <td>20</td> <td>20</td> <td>15</td> <td></td> </tr> <tr> <td style="padding-left: 20px;">cum. (00)</td> <td>-</td> <td>-</td> <td>25</td> <td>45</td> <td>65</td> <td>85</td> <td>100</td> <td></td> </tr> </table> b) Number of farmers engaged in model farm village program <table border="0" style="width: 100%;"> <tr> <td style="padding-left: 20px;">incr.</td> <td>-</td> <td>37</td> <td>37</td> <td>37</td> <td>37</td> <td>37</td> <td>-</td> <td></td> </tr> <tr> <td style="padding-left: 20px;">cum.</td> <td>-</td> <td>-</td> <td>74</td> <td>111</td> <td>148</td> <td>185</td> <td>-</td> <td></td> </tr> </table>	incr.(00)	-	5	20	20	20	20	15		cum. (00)	-	-	25	45	65	85	100		incr.	-	37	37	37	37	37	-		cum.	-	-	74	111	148	185	-			
incr.(00)	-	5	20	20	20	20	15																																
cum. (00)	-	-	25	45	65	85	100																																
incr.	-	37	37	37	37	37	-																																
cum.	-	-	74	111	148	185	-																																
7. Farm input, advisory services and marketing "package" provided	7. a) Agrilims in use, metric ton. <table border="0" style="width: 100%;"> <tr> <td style="padding-left: 20px;">incr.(00)</td> <td>-</td> <td>35</td> <td>70</td> <td>90</td> <td>40</td> <td>40</td> <td>-</td> <td></td> </tr> <tr> <td style="padding-left: 20px;">cum. (00)</td> <td>-</td> <td>-</td> <td>105</td> <td>195</td> <td>235</td> <td>275</td> <td>-</td> <td></td> </tr> </table> b) Number of farmers receiving institutional credit, % of total families <table border="0" style="width: 100%;"> <tr> <td style="padding-left: 20px;"></td> <td>-</td> <td>35</td> <td>45</td> <td>55</td> <td>65</td> <td>75</td> <td>-</td> <td></td> </tr> </table> c) Number of farmers assisted by the Marketing Organization for Farmers. <table border="0" style="width: 100%;"> <tr> <td style="padding-left: 20px;">cum. (00)</td> <td>-</td> <td>-</td> <td>9.9</td> <td>24.8</td> <td>42.7</td> <td>63.6</td> <td>-</td> <td></td> </tr> </table>	incr.(00)	-	35	70	90	40	40	-		cum. (00)	-	-	105	195	235	275	-			-	35	45	55	65	75	-		cum. (00)	-	-	9.9	24.8	42.7	63.6	-			
incr.(00)	-	35	70	90	40	40	-																																
cum. (00)	-	-	105	195	235	275	-																																
	-	35	45	55	65	75	-																																
cum. (00)	-	-	9.9	24.8	42.7	63.6	-																																

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Life of Project ANNEX D Page 8
From FY 1977 to FY 1982
Total U.S. Funding _____
Date Prepared: _____

Project Title & Number: Lam Nam Oon Integrated Rural Development - No.493-21-120-272

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS																																																																
<p>Outputs: (C-1)</p> <p>11. Increased fish production for food and income purposes realized from fish stocking and training programs</p>	<p>Magnitude of Outputs: (C-2)</p> <table border="1"> <thead> <tr> <th></th> <th>1977</th> <th>1978</th> <th>1979</th> <th>1980</th> <th>1981</th> <th>1982</th> <th>1983</th> </tr> </thead> <tbody> <tr> <td>11. a) Reservoir fish density (kg/rai)</td> <td>10</td> <td>15</td> <td>20</td> <td>25</td> <td>30</td> <td>-</td> <td>-</td> </tr> <tr> <td>b) Number of Boy Scouts trained in artificial propagation of fish</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td> incr.</td> <td>-</td> <td>100</td> <td>100</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> </tr> <tr> <td> cum.</td> <td>-</td> <td>-</td> <td>200</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> </tr> <tr> <td>c) Number of families receiving fish culture assistance</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td> incr.</td> <td>-</td> <td>100</td> <td>100</td> <td>200</td> <td>100</td> <td>-</td> <td>-</td> </tr> <tr> <td> cum.</td> <td>-</td> <td>-</td> <td>200</td> <td>400</td> <td>500</td> <td>-</td> <td>-</td> </tr> </tbody> </table>		1977	1978	1979	1980	1981	1982	1983	11. a) Reservoir fish density (kg/rai)	10	15	20	25	30	-	-	b) Number of Boy Scouts trained in artificial propagation of fish								incr.	-	100	100	-	-	-	-	cum.	-	-	200	-	-	-	-	c) Number of families receiving fish culture assistance								incr.	-	100	100	200	100	-	-	cum.	-	-	200	400	500	-	-	<p>(C-3)</p>	<p>Assumptions for achieving outputs: (C-4)</p>
	1977	1978	1979	1980	1981	1982	1983																																																												
11. a) Reservoir fish density (kg/rai)	10	15	20	25	30	-	-																																																												
b) Number of Boy Scouts trained in artificial propagation of fish																																																																			
incr.	-	100	100	-	-	-	-																																																												
cum.	-	-	200	-	-	-	-																																																												
c) Number of families receiving fish culture assistance																																																																			
incr.	-	100	100	200	100	-	-																																																												
cum.	-	-	200	400	500	-	-																																																												

Modification No. 3

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

ANNEX D Page 9

Life of Project: _____
From FY 1977 to FY 1982
Total U.S. Funding _____
Date Prepared: _____

Project Title & Number: Lam Nam Oon Integrated Rural Development - No. 493-21-120-272

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	SPECIFIC TARGETS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Inputs:	Implementation Target (Type and Quantity)	Budget and Implementation Schedule:		Assumptions for providing inputs:
<u>Project Elements:</u>				
1. Irrigation System/Land Improvements/Pilot Project)			
2. Community Development (CDD))			
3. Agricultural Research (DOA))			
4. Agricultural Extension (DOA))			
5. Expanded Adult Education Services)			
6. Division of Inland Fisheries (DOF)) - - - - -	See Annex B-3, Project Costs	a) Loan Agreement	
7. Marketing)		b) Project Records	
8. Project Administration Center)			
9. Technical Advisory Services)			
10. Training)			
11. Evaluation)			
12. Resettlement Area Subproject)			

CRITICAL PERFORMANCE INDICATOR (CPI) NETWORK

COUNTRY Thailand	PROJECT NO. 493-21-120-272	PROJECT TITLE Lam Nam Oon Integrated Rural Development		
MONTH	77	78	79	
<p>Technical Advisory Services/Project Administration/Equipment</p>	<p>① Project Paper reviewed/submitted to AID/W.</p> <p>② Project Paper approved by AID/W.</p> <p>③ RID/USOM selection of prequalified firms</p> <p>④ Engineering plan, cost estimate and financial planning for project administration center completed by RID.</p> <p>⑤ AID Loan Agreement signed</p> <p>⑥ RTG has appointed Project Field Director and Department Team Leaders</p> <p>⑦ RID/USOM issuance of Invitation for Bids (IFB's) for equipment procurement.</p> <p>⑧ Acceptable resolution of land allocation problem by PWD in resettlement sub-project.</p> <p>⑨ RTG FY 1978 budget approved for Lam Nam Oon Project.</p>	<p>RID/USOM award of contract for consultant firm.</p> <p>Consultant team ETA/Thailand</p> <p>RID/consultant completed comprehensive engineering, construction and O&M plan</p> <p>CD/consultant completed community dev. plan.</p> <p>DOA/consultant completes agricultural research plan.</p> <p>DOAE/consultant completed comprehensive agricultural development plan.</p> <p>RID/USOM award of procurement for equipment</p> <p>RID award of contract for construction of Project Administration Center.</p> <p>RID completes construction of Project Administration Center.</p>	<p>Equipment ETA at project site.</p>	
<p>Social Services</p>		<p>DOAE/THEA starts training 20 members of pilot social improvement village.</p> <p>AED/CED completes 51 Life-Long education classes.</p> <p>CBFFS and FRD initiate selection and training for 17 village health agents.</p>	<p>Training 50 members of pilot social improvement village starts.</p> <p>151 Life-Long education classes starts.</p> <p>17 village health agents selection and training start.</p>	

CRITICAL PERFORMANCE INDICATOR (CPI) NETWORK

AND 1000 20 10 70

COUNTRY	PROJECT NO.	PROJECT TITLE		
ON: 77 ✓ CV MONTH	77	78	79	
Irrigation System/Leak Improvement		19 Construction 40 Km. 27 main canal and lateral.	Start construction 30 Km. main canal and lateral. Start construction 30 km. drainage system Test program for 2,000 val ditch and dike area	
Agricultural Development		14 DOAE begins to recruit and assign agri.ext. outreach staff. 15 DOAE AND CD initiate selection and training 100 model farmers/ nuclear families. 16 CD starts to form and train 30 CD occupational groups.	Training 400 model farmers/nuclear families. Start to form and train 30 occupa- tional groups. Start to form and train 3 Farmer Associations. Start to form and train 1 Farmer Cooperative. Marketing package program starts. 20 Initiate fish culture training for 200 selected farmers and boy scouts.	
Evaluation		17 CU and DAE starts socio-economic survey.	18 First project evaluation starts.	
ANALYSIS SCHEDULE PRIORITIES VS FINANCIAL				
EVALUATION SCHEDULE				

DATE	<input type="checkbox"/> ORIGINAL <input type="checkbox"/> REVISION # _____	APPROVED	
80	81	82	
<p>Construction 40 Km. main canal and lateral start. (56)</p> <p>Construction 25 Km. drainage system starts. (57)</p> <p>Ditch and dike test area complete and report available. (58)</p> <p>Developing 20,000 rai of ditch and dike area. (59)</p> <p>Land consolidation test program starts 2,000 rai (60)</p>	<p>Construction 40 Km. main canal and lateral start. (61)</p> <p>Construction 45 Km. drainage system starts. (62)</p> <p>Developing 25,000 rai ditch and dike area start (63)</p> <p>Land consolidation pilot test area complete and report available. (64)</p>	<p>Construction 60 Km. drainage system starts. (65)</p> <p>Developing 26,000 rai ditch and dike area starts. (66)</p> <p>Developing 10,000 rai land consolidation area starts. (67)</p>	<p>Construction 60 Km. drainage system starts (68)</p> <p>Developing 30,700 rai ditch and dike area starts (69)</p> <p>Developing 14,300 rai land consolidation area starts (70)</p>
<p>Training 400 model farmers/nuclear families (71)</p> <p>Start to form and train 40 occupational groups. (72)</p> <p>Start to form and train 3 Farmer Associations. (73)</p> <p>Start to form and train 1 Farmer Cooperative. (74)</p> <p>Marketing Organization for Farmer started (75)</p> <p>Fish culture training for 200 selected farmers and boy scout. (76)</p>	<p>Start training 400 model farmers/nuclear families. (77)</p> <p>Start to form and train 50 occupational groups. (78)</p> <p>Start to form and train 3 Farmer Associations. (79)</p> <p>Start to form and train 1 Farmer Cooperative (80)</p> <p>Fish culture training for 200 selected farmer starts. (81)</p>	<p>Training 400 model farmers/nuclear families. (82)</p> <p>Fish culture training for 200 selected farmers starts. (83)</p>	<p>Training 300 model farmers/nuclear families. (84)</p>
<p>KU and DAE start socio-economic survey (85)</p> <p>Second project evaluation starts (86)</p>		<p>Socio-economic survey starts. (87)</p> <p>Third project's evaluation. (88)</p>	<p>Improved standard of living in the Lam Han Oon project irrigated area</p>

Critical Performance Indicator (CPI)

<u>CPI No.</u>	<u>Date</u>	<u>Prior Action</u>
1	April 77	Project Paper reviewed/submitted to AID/W.
2	May 77	Project Paper approved by AID/W.
3	June 77	RID/USOM selection of pre-qualified firms for Technical Advisory Services.
4	June 77	Engineering plan, cost estimate and financial planning for project Administration Center completed by RID.
5	July 77	AID Loan Agreement signed.
6	Sept. 77	RTG has appointed Project Field Director and Department Team Leaders.
7	Sept. 77	RID/USOM issuance of Invitation for Bids (IFB's) for equipment procurement.
8	Sept. 77	Acceptable resolution of land allocation problem by PWD in resettlement sub-project.
9	Sept. 77	RTG FY 1978 budget approved for Lam Nam Oon Project.

CPI No. Date (First Year, July 1, 1977 - September 30, 1978)

A. Irrigation System/Land Improvement

10 Dec. 77 RID construction 40 km. main canal and lateral.

B. Social Services

11 Jan. 78 DOAE/THEA starts training 20 members of pilot social improvement village.

12 Sept. 78 AED/CED completes 51 Life-Long education classes.

13 May 78 CBFPS and FHD initiate selection and training for 17 village health agents.

C. Agricultural Development

14 Sept. 77 DOAE begins to recruit and assign agricultural extension outreach staff.

15 Nov. 77 DOAE and CD initiate selection and training 100 model farmers/nuclear families.

16 Dec. 77 CDD starts to form and train originated 30 CD occupational groups.

D. Socio-Economic Survey

17 June 78 KU and DAE start survey.

E. Technical Advisory Services

18 Sept. 1, 77 RID/USOM award of contract for consultant firm.

19 Nov. 1, 77 Consultant team ETA/Thailand.

20 Feb. 1, 78 RID/consultant completed comprehensive engineering, construction and O&M plan.

21 Mar. 1, 78 CD/consultant completed community development plan.

22 Mar. 1, 78 DOA/consultant completed agricultural research plan.

23 Mar. 1, 78 DOAE/consultant completed comprehensive agricultural development plan.

CPI No. Date (Second Year, Oct. 1, 1978 - Sept. 30, 1979)

A. Irrigation System/Land Improvement

- | | | |
|----|---------|---|
| 27 | Dec. 78 | RID starts construction 30 km. of main canal and lateral. |
| 28 | Dec. 78 | RID starts construction 30 km. of drainage system. |
| 29 | Dec. 78 | Test program for 2,000 rai ditch and dike main area launched. |

B. Social Services

- | | | |
|----|---------|--|
| 30 | Feb. 79 | Training for 50 members of pilot social improvement village start. |
| 31 | Dec. 78 | 151 Life-Long education classes start. |
| 32 | May 79 | 17 village health agents selection and training start. |

C. Agricultural Development

- | | | |
|----|---------|---|
| 33 | Dec. 78 | Training for 400 model farmers/nuclear families. |
| 34 | Dec. 78 | Start to form and train 30 occupational groups. |
| 35 | Dec. 78 | Start to form and train 3 Farmer Associations. |
| 36 | Dec. 78 | Start to form and train 1 Farmer Cooperative. |
| 37 | June 78 | Marketing package program onwards. |
| 38 | Mar. 79 | Initiate fish culture training for 200 selected farmers and boy scouts. |

F. Equipment

- | | | |
|----|---------|--------------------------------|
| 39 | Jan. 79 | Equipment ETA at project site. |
|----|---------|--------------------------------|

Evaluation

- | | | |
|----|---------|---------------------------------|
| 40 | Feb. 79 | First project evaluation start. |
|----|---------|---------------------------------|

CPI No. Date (Third Year, Oct. 1, 1979 - Sept. 30, 1980)

A. Irrigation System/Land Improvement

- | | | |
|----|---------|--|
| 41 | Dec. 79 | Construction 40 km. main canal and lateral start. |
| 42 | Dec. 79 | Construction 45 km. drainage system start. |
| 43 | Aug. 79 | Ditch and dike test area completed and report available. |
| 44 | Dec. 79 | Developing 20,000 rai of ditch and dike main area based on Aug. 79 report. |
| 45 | Dec. 79 | Land consolidation test program start on 2,000 rai area. |

B. Social Services

- | | | |
|----|---------|--|
| 46 | Jan. 80 | Training for 45 members of pilot social improvement village start. |
| 47 | Dec. 79 | 151 Life-Long education classes start. |
| 48 | Apr. 80 | 17 village health agents selection and training. |

C. Agricultural Development

- | | | |
|----|---------|--|
| 49 | Dec. 79 | Training for 400 model farmers/nuclear families. |
| 50 | Dec. 79 | Start to form and train 40 occupational groups. |
| 51 | Dec. 79 | Start to form and train 3 Farmer Associations. |
| 52 | Dec. 79 | Start to form and train 1 Farmer Cooperative. |
| 53 | Oct. 79 | Marketing Organization for Farmers started onward. |
| 54 | Mar. 80 | Fish culture training for 200 selected farmers and boy scouts. |

Socio-Economic Survey

- | | | |
|----|---------|--------------------------|
| 55 | June 80 | KU and DAE start survey. |
|----|---------|--------------------------|

CPI No. Date (Fourth Year, Oct. 1, 1980 - Sept. 30, 1981)

A. Irrigation System/Land Improvement

- | | | |
|----|---------|--|
| 56 | Dec. 80 | Construction 40 km. main canal and lateral start. |
| 57 | Dec. 80 | Construction 45 km. drainage system start. |
| 58 | Dec. 80 | Developing of 25,000 rai ditch and dike main area start. |
| 59 | Aug. 81 | Land consolidation pilot test area completed and report available. |

B. Social Services

- | | | |
|----|---------|--|
| 60 | Dec. 80 | 151 Life-Long education classes start. |
| 61 | Apr. 81 | 17 village health agents selection and training start. |

C. Agricultural Development

- | | | |
|----|---------|---|
| 62 | Dec. 80 | Training 400 model farmers/nuclear families. |
| 63 | Dec. 80 | Start to form and train 50 occupational groups. |
| 64 | Dec. 80 | Start to form and train 3 Farmer Associations. |
| 65 | Dec. 80 | Start to form and train 1 Farmer Cooperative. |
| 66 | Mar. 81 | Fish culture training for 200 selected farmers start. |

Evaluation

- | | | |
|----|---------|----------------------------------|
| 67 | Feb. 81 | Second project evaluation start. |
|----|---------|----------------------------------|

CPI No. Date (Fifth Year, Oct. 1, 1981 - Sept. 30, 1982)

A. Irrigation System/Land Improvement

- | | | |
|----|---------|--|
| 68 | Dec. 81 | Construction 60 km. drainage system start. |
| 69 | Dec. 81 | Developing of 26,800 rai ditch and dike main area start. |
| 70 | Dec. 81 | Developing of 10,000 rai land consolidation area start. |

B. Social Services

- | | | |
|----|---------|--|
| 71 | Dec. 81 | 151 Life-Long education classes start. |
| 72 | Apr. 82 | 17 village health agents selection and training start. |

C. Agricultural Development

- | | | |
|----|---------|---|
| 73 | Dec. 81 | Training 400 model farmers/nuclear families. |
| 74 | Mar. 82 | Fish culture training for 200 selected farmers start. |

Socio-Economic Survey

- | | | |
|----|---------|--------------------------|
| 75 | June 82 | KU and DAE start survey. |
|----|---------|--------------------------|

CPI No. Date (Sixth Year, Oct. 1, 1982 - Sept. 30, 1983)

A. Irrigation System/Land Improvement

- | | | |
|----|---------|---|
| 76 | Dec. 82 | Construction 60 km. drainage system start. |
| 77 | Dec. 82 | Developing 30,700 rai ditch and dike main area start. |
| 78 | Dec. 82 | Developing 14,300 rai land consolidation area start. |

B. Social Services

- | | | |
|----|---------|--|
| 79 | Dec. 82 | 100 Life-Long education classes start. |
|----|---------|--|

C. Agricultural Development

- | | | |
|----|---------|--|
| 80 | Dec. 82 | Training 300 model farmers/nuclear families. |
|----|---------|--|

Evaluation

- | | | |
|----|---------|---------------------------------|
| 81 | Feb. 83 | Third project evaluation start. |
|----|---------|---------------------------------|

Implementation Schedule

Events Prior to Project Start on July 1, 1977

<u>Events</u>	<u>Date Start - End</u>	<u>Time Required</u>	<u>Responsibility</u>	<u>Remarks</u>
<u>A. Administrative</u>				
1. National Coordinating Committee for LNO Integrated Rural Development Project appointed and function.	- May 31, '77	-	RTG	
2. LNO Provincial Coordinating Committee appointed and function.	- May 31, '77	-	RTG	
3. Orientation for village leaders and all authorities in project area.	June 1, '77 - June 30, '77	-	Committee	
<u>B. Technical Advisory Services</u>				
1. Completion of detailed consultant scope of services.	May 1, '77 - May 31, '77	1 month	RID	
2. Issuance of invitation for expression of interest to CBD.	May 1, '77 - May 31, '77	1 month	RID	
3. Selection of pre-qualified firms.	June 1, '77 - June 30, '77	1 month	RID/USOM	
<u>C. Project Administration</u>				
1. Agreement on site selection.	- June 1, '77	-	RID/other agencies	
2. Completion of engineering plans, cost estimate and financial planning.	June 1, '77 - June 30, '77	1 month	RID	

<u>Events</u>	<u>Date</u> <u>Start - End</u>	<u>Time</u> <u>Required</u>	<u>Responsibility</u>	<u>Remarks</u>
D. <u>Irrigation System/Land Improvement</u>				
1. Main canal and lateral construction completed 195 km.	- Sept. '77	-	RID	
2. Ditch and dike area construction completed 55,000 rai.	- Sept. '77	-	RID	
E. <u>Social Improvement</u>				
1. Pilot social improvement village selection.	- June '77	-	CDD, DOAE CBFPS, THEA	
2. Saraphi Project location selection.	- June '77	-	CDD	

First Year of Implementation Plan (July 1, 1977 - September 30, 1978)

Staffing, Personnel and Construction Features

<u>Events</u>	<u>Date Start - End</u>	<u>Time Required</u>	<u>Responsibility</u>	<u>Remarks</u>
<u>A. Irrigation System/Land Improvement</u>				
1. 40 km. main canal and lateral construction.	Oct. '77 - Sept. '78	12 months	RID	
a) 20 km. feeder road development.	Oct. '77 - Sept. '78	12 months	RID	
b) 80 km. O&M road development.	Oct. '77 - Sept. '78	12 months	RID	
<u>B. Social Services</u>				
1. Saraphi Project Center construction.	Oct. '77 - May '78	8 months	CDD	
a) Staff recruiting and training.	Oct. '77 - Apr. '78	7 months	CDD	
2. First 20 families of pilot social improvement village training.	Mar. '78 - Apr. '78	2 months	DOAE, THEA	
3. 51 Life-Long education classes.	- Sept. '78	12 months	AED/CED	
4. First 17 village health agents selection and training.	Mar. '78 - Apr. '78	2 months	CBFPS, FHD	
5. Advance training for 3 health center workers.	- Mar. '78	1 month	FHD/MOPH	

<u>Events</u>	<u>Date Start - End</u>	<u>Time Required</u>	<u>Responsibility</u>	<u>Remarks</u>
C. <u>Agricultural Development</u>				
1. LNO agri. extension outreach staff recruiting and assignment.	Sept. '77 - Jan. '78	4 months	DOAE	
2. Selection and training 100 model farmers/nuclear families.	Sept. '77 - Feb. '78	6 months	DOAE, CDD, AED and DOAE	
3. Forming and training 30 occupational groups.	Oct. '77 - Feb. '78	5 months	CDD	
D. <u>Socio-Economic Survey</u>				
	June '78 - Dec. '78	7 months	KU, DAE	
E. <u>Technical Advisory Services</u>				
1. Issuance of request for proposals (RFP's)	July 1, '77 - July 31, '77	1 month	RID/USOM	
2. Award of contract for consultant firm.	Sept. 1, '77 - Sept. 30, '77	1 month	RID/USOM	
3. Consultant team ETA/Thailand.	Nov. 1, '77 - Nov. 30, '77	1 month	RID/USOM	
4. Complete comprehensive engineering, construction and O&M plan.	- Feb. 28, '78		RID/consultant	
5. Complete community development plan.	- Mar. 31, '78		CDD/consultant	
6. Complete agriculture research plan.	- Mar. 31, '78		DOA/consultant	
7. Complete comprehensive agricultural development plan.	- Mar. 31, '78		DOAE/consultant	

<u>Events</u>	<u>Date Start - End</u>	<u>Time Required</u>	<u>Responsibility</u>	<u>Remarks</u>
F. <u>Equipment</u>				
1. Completion of detailed equipment specification.	July 1, '77 - July 31, '77	1 month	RID/USOM	
2. Issuance of invitation for expression of interest in CBD.	July 1, '77 - July 31, '77	1 month	RID/USOM	
3. Selection of pre-qualified firms.	Aug. 1, '77 - Aug. 31, '77	1 month	RID/USOM	
4. Issuance of invitation for bids (IFB's).	Sept. 1, '77 - Sept. 30, '77	1 month	RID/USOM	
5. Approval of bids.	Nov. 1, '77 - Nov. 30, '77	1 month	RID/USOM	
6. Award of procurement.	Dec. 1, '77 - Dec. 31, '77	1 month	RID/USOM	
7. Shipment from U.S. Ports.	Aug. 1, '78 - Jan. 31, '79	6 months	RID/USOM	
G. <u>Project Administration</u>				
1. Issuance of IFB's for construction.	Aug. 1, '77 - Aug. 31, '77	1 month	RID	
2. Award of contract for construction.	Sept. 1, '77 - Sept. 30, '77	1 month	RID	
3. Contract start construction.	Oct. 1, '77 - May 31, '77	8 months	RID	

Second Year of Implementation Plan (October 1, 1978 - September 30, 1979)

Staffing, Personnel and Construction Features

<u>Events</u>	<u>Date Start - End</u>	<u>Time Required</u>	<u>Responsibility</u>	<u>Remarks</u>
A. <u>Irrigation System/Land Improvement</u>				
1. 30 km. main canal and lateral construction.	Oct. '78 - Sept. '79	12 months	RID	
a) 12 km. feeder road development.	Oct. '78 - Sept. '79	12 months	RID	
b) 50 km. O&M road development.	Oct. '78 - Sept. '79	12 months	RID	
2. 30 km. drainage system construction.	Oct. '78 - Sept. '79	12 months	RID	
3. Test program for 2,000 rai ditch and dike main area.	Oct. '78 - Sept. '79	12 months	RID	
B. <u>Social Services</u>				
1. 50 families of pilot social improvement of village training.	Nov. '78 - Apr. '79	6 months	DOAE, THEA	
2. 151 Life-Long education classes.	Oct. '78 - Sept. '79	12 months	AED/CED	
3. 17 village health agents selection and training.	Mar. '79 - Apr. '79	2 months	CBFPS, FHD	
4. Advance training for 9 health center workers.	- Mar. '79	1 month	FHD/MOPH	

<u>Events</u>	<u>Date Start - End</u>	<u>Time Required</u>	<u>Responsibility</u>	<u>Remarks</u>
C. <u>Agricultural Development</u>				
1. Forming and training 30 occupational groups.	Oct. '78 - Feb. '79	5 months	CDD	
2. Grouping and training 3 Farmer Associations from previous organized CDD occupational groups.	Oct. '78 - Feb. '79	5 months	DCP, DOAE, CDD and AED	
3. Grouping and training 1 Farmer Cooperative from organized FA's.	Oct. '78 - Feb. '79	5 months	DCP, DOAE, CDD and AED	
4. Marketing "package" programmed.	June '78 onwards		DOAE, BAAC and DCP	
5. Selection and training 400 model farmers/nuclear families.	Oct. '78 - Mar. '79	6 months	DOAE, CDD, AED, and DOA	
6. Fish culture training for 200 selected farmers and boy scouts.	Jan. '79 - Mar. '79	3 months	DIF, CDD and AED	
F. <u>Equipment</u>				
1. Equipment ETA at project site.	- Jan. '79		RID/USOM	
<u>First Evaluation</u>	Feb. '79 - Apr. '79	3 months	RTG/USOM	
<u>Training</u>				
Third country observation/ training visit.	Oct. '78 -		USOM	

Third Year of Implementation Plan (October 1, 1979 - September 30, 1980)

Staffing, Personnel and Construction Features

<u>Events</u>	<u>Date Start - End</u>	<u>Time Required</u>	<u>Responsibility</u>	<u>Remarks</u>
<u>A. Irrigation System/Land Improvement</u>				
1. 40 km. main canal and lateral construction.	Oct. '79 - Sept. '80	12 months	RID	
a) 12 km. of feeder road development.	Oct. '79 - Sept. '80	12 months	RID	
b) 100 km. O&M road development.	Oct. '79 - Sept. '80	12 months	RID	
2. 45 km. drainage system construction.	Oct. '79 - Sept. '80	12 months	RID	
3. Test program for 2,000 rai land consolidation area.	Oct. '79 - Aug. '81	20 months	RID	
4. Developing 20,000 rai of ditch and dike main area.	Oct. '79 - Sept. '80	12 months	RID	
<u>B. Social Services</u>				
1. 45 families of pilot social improvement village training.	Nov. '79 - Apr. '80	6 months	DOAE, THEA	
2. 151 Life-Long education classes.	Oct. '79 - Sept. '80	12 months	AED/CED	
3. 17 village health agents selection and training.	Mar. '80 - Apr. '80	2 months	CBFPS, FHD	

<u>Events</u>	<u>Date Start - End</u>	<u>Time Required</u>	<u>Responsibility</u>	<u>Remarks</u>
<u>C. Agricultural Development</u>				
1. Forming and training 40 occupational groups.	Oct. '79 - Feb. '80	5 months	CDD	
2. Grouping and training 3 Farmer Associations from previous organized CDD occupational groups.	Oct. '79 - Feb. '80	5 months	DCP, DOAE, CDD and AED	
3. Grouping and training 1 Farmer Cooperative from organized FA's.	Oct. '79 - Feb. '80	5 months	DCP, DOAE, CDD and AED	
4. Marketing Organization for Farmers available.	Oct. '79 onward		DOAE, MOF, BAAC	
5. Selection and training 400 model farmers/nuclear families.	Oct. '79 - Mar. '80	7 months	DOAE, CDD, AED and DOA	
6. Fish culture training for 200 selected farmers and boy scouts.	Jan. '80 - Mar. '80	3 months	DIF, CDD, AED	
<u>Socio-Economic Survey</u>	June '80 - Dec. '80	6 months	KU, DAE	
<u>Training</u>				
1. Third country observation/ training visit.	Oct. '79 -		USOM	

Fourth Year of Implementation Plan (October 1, 1980 - September 30, 1981)

Staffing, Personnel and Construction Features

<u>Events</u>	<u>Date Start - End</u>	<u>Time Required</u>	<u>Responsibility</u>	<u>Remarks</u>
<u>A. Irrigation System/Land Improvement</u>				
1. 40 km. main canal and lateral construction.	Oct. '80 - Sept. '81	12 months	RID	
a) 100 km. of O&M road development.	Oct. '80 - Sept. '81	12 months	RID	
2. 45 km. of drainage system construction.	Oct. '80 - Sept. '81	12 months	RID	
3. Developing 25,000 rai ditch and dike main area.	Oct. '80 - Sept. '81	12 months	RID	
4. Land consolidation pilot test area final report.	- Aug. '81		RID	
<u>B. Social Services</u>				
1. 151 Life-Long education classes.	Oct. '80 - Sept. '81	12 months	AED/CED	
2. 17 village health agents selection and training.	Mar. '81 - Apr. '81	2 months	CBFPS, FHD	

<u>Events</u>	<u>Date Start - End</u>	<u>Time Required</u>	<u>Responsibility</u>	<u>Remarks</u>
C. <u>Agricultural Development</u>				
1. Forming and training 50 occupational groups.	Oct. '80 - Feb. '81	5 months	CDD	
2. Grouping and training 3 Farmer Associations from previous organized CDD occupational groups.	Oct. '80 - Feb. '81	5 months	DCP, DOAE, CDD and AED	
3. Grouping and training 1 Farmer Cooperative from organized FA's.	Oct. '80 - Feb. '81	5 months	DCP, DOAE, CDD and AED	
4. Selection and training 400 model farmers/nuclear families.	Oct. '80 - Mar. '81	6 months	DOAE, CDD, AED and DOA	
5. Fish culture training for 200 selected farmers.	Jan. '81 - Mar. '81	3 months	DIF, CDD & AED	
D. <u>Socio-Economic Survey</u>				
<u>Secend Evaluation</u>	June '81 - Dec. '81	7 months	KU, DAE	
	Feb. '81 - Apr. '81	3 months	RTG/USOM	
<u>Training</u>				
1. Third country observation/ training visit.	Oct. '80		USOM	

Fifth Year of Implementation Plan (October 1, 1981 - September 30, 1982)

Staffing, Personnel and Construction Features

<u>Events</u>	<u>Date Start - End</u>	<u>Time Required</u>	<u>Responsibility</u>	<u>Remarks</u>
<u>A. Irrigation System/Land Improvement</u>				
1. 60 km. of drainage system construction.	Oct. '81 - Sept. '82	12 months	RID	
2. Construction 10,000 rai land consolidation area.	Oct. '81 - Sept. '82	12 months	RID	
3. Developing 26,800 rai ditch and dike main area.	Oct. '81 - Sept. '82	12 months	RID	
<u>B. Social Services</u>				
1. 151 Life-Long education classes.	Oct. '81 - Sept. '82	12 months	AED/CED	
2. 17 village health agents selection and training.	Mar. '82 - Apr. '82	2 months	CBFPS, FHD	
<u>C. Agricultural Development</u>				
1. Selection and training 400 model farmers/nuclear families.	Oct. '81 - Mar. '82	6 months	DOAE, CDD, AED and DOA	
2. Fish culture training for 100 selected farmers.	Jan. '82 - June '82	6 months	DIF, CDD & AED	
<u>Socio-Economic Survey</u>	June '82 - Dec. '82	7 months	KU, DAE	

Sixth Year of Implementation Plan (October 1, 1982 - September 30, 1983)

Staffing, Personnel and Construction Features

<u>Events</u>	<u>Date Start - End</u>	<u>Time Required</u>	<u>Responsibility</u>	<u>Remarks</u>
<u>A. Irrigation System/Land Improvement</u>				
1. 60 km. drainage system construction.	Oct. '82 - Sept. '83	12 months	RID	
2. Construction 14,300 rai land consolidation.	Oct. '82 - Sept. '83	12 months	RID	
3. Developing 30,700 rai ditch and dike main area.	Oct. '82 - Sept. '83	12 months	RID	
<u>B. Social Services</u>				
1. 100 Life-Long education classes.	Oct. '82 - Sept. '83	12 months	AED/CED	
<u>C. Agricultural Development</u>				
1. Selection and training 300 model farmers/nuclear families.	Oct. '82 - Mar. '83	6 months	DOAE, CDD, AED and DOA	
<u>Third Evaluation</u>	Feb. '83 - Apr. '83	3 months	RTG/USOM	

Seventh Year of Implementation Plan (October 1, 1983 - September 30, 1984)

Staffing, Personnel and Construction Features

<u>Events</u>	<u>Date</u> <u>Start - End</u>	<u>Time</u> <u>Required</u>	<u>Responsibility</u>	<u>Remarks</u>
<u>A. Irrigation System/Land Improvement</u>				
1, 60 km. drainage system construction.	Oct. '83 - Sept. '84	12 months	ERID	

STATUTORY CRITERIA

COUNTRY CHECKLIST

A. General Criteria for Country

1. FAA Sec. 116. Can it be demonstrated that contemplated assistance will directly benefit the needy? The assistance will directly benefit the needy.
See Description of the Project, Part 1,C.

2. FAA Sec. 481. Has it been determined that the government of recipient country has failed to take adequate steps to prevent narcotics drugs and other controlled substances (as defined by the Comprehensive Drug Abuse Prevention and Control Act of 1970) produced or processed, in whole or in part, in such country, or transported through such country, from being sold illegally within the jurisdiction of such country to U.S. Government personnel or their dependents, or from entering the U.S. unlawfully? To the contrary; the RTG has taken and continues to take strong measures to deny the entry into, sale in, and export from Thailand of narcotic drugs.

3. FAA Sec. 620(a). Does recipient country furnish assistance to Cuba or fail to take appropriate steps to prevent ships or aircraft under its flag from carrying cargoes to or from Cuba? No.

4. FAA Sec. 620(b). If assistance is to a government, has the Secretary of State determined that it is not controlled by the international Communist movement? Yes.

5. FAA Sec. 620(c). If assistance is to government, is the government liable as debtor or unconditional guarantor on any debt to a U.S. citizen for goods or services furnished or ordered where (a) such citizen has exhausted available legal remedies and (b) debt is not denied or contested by such government? No.
6. FAA Sec. 620(e) (1). If assistance is to a government, has it (including government agencies or subdivisions) taken any action which has the effect of nationalizing, expropriating, or otherwise seizing ownership or control of property of U.S. citizens or entities beneficially owned by them without taking steps to discharge its obligations toward such citizens or entities? No.
7. FAA Sec. 620(f); App. Sec. 108. Is recipient country a Communist country? Will assistance be provided to the Democratic Republic of Vietnam (North Vietnam), South Vietnam, Cambodia or Laos? No.
8. FAA Sec. 620(i). Is recipient country in any way involved in (a) subversion of, or military aggression against, the United States or any country receiving U.S. assistance, or (b) the planning of such subversion or aggression? No.

9. FAA Sec. 620(j). Has the country permitted, or failed to take adequate measures to prevent, the damage or destruction, by mob action, of U S. property? **No.**
10. FAA Sec. 620(l). If the country has failed to institute the investment guaranty program for the specific risks of expropriation, inconvertibility or confiscation, has the AID Administrator within the past year considered denying assistance to such government for this reason? **Thailand has instituted the full investment guaranty program.**
11. FAA Sec. 620(o); Fishermen's Protective Act, Sec. 5. If country has seized, or imposed any penalty or sanction against, any U.S. fishing activities in international waters, **Thailand has not seized or imposed any penalty or sanction against, U.S. fishing activities in international waters.**
- a. has any deduction required by Fishermen's Protective Act been made?
- b. has complete denial of assistance been considered by AID Administrator?
12. FAA Sec. 620(q); App. Sec. 504. **No.**
- (a) Is the government of the recipient country in default on interest or principal of any AID loan to the country?
- (b) Is country in default exceeding one year on interest or principal on U.S. loan under program for which App. Act appropriates funds, unless debt was earlier disputed, or appropriate steps taken to cure default?

13. FAA Sec. 620(s). What percentage of country budget is for military expenditures? How much of foreign exchange resources spent on military equipment? How much spent for the purchase of sophisticated weapons systems? (Consideration of these points is to be coordinated with the Bureau for Program and Policy Coordination, Regional Coordinators and Military Assistance Staff (PPC/RC).) These points have been considered by the Administrator, AID in submitting the FY 77 OYB to the Congress. No significant change has occurred since that time.
14. FAA Sec. 620(t). Has the country severed diplomatic relations with the United States? No.
15. FAA Sec. 620(u). What is the payment status of the country's U.N. obligations? The RTG is not in arrears in its U.N. payment obligation.
16. FAA Sec. 620A. Has the country granted sanctuary from prosecution to any individual or group which has committed an act of international terrorism? No.
17. FAA Sec. 666. Does the country object, on basis of race, religion, national origin or sex, to the presence of any officer or employee of the U.S. there to carry out economic development program under FAA? No.
18. FAA Sec. 669. Has the country delivered or received nuclear reprocessing or enrichment equipment, materials or technology, without specified arrangements on safeguards, etc.? No.
19. FAA Sec. 901. Has the country denied its citizens the right or opportunity to emigrate? No.

B. Funding Criteria for Country

1. FAA Sec. 102(c), (d). Have criteria been established, and taken into account, to assess commitment and progress of country in effectively involving the poor in development, on such indexes as: (1) small-farm labor intensive agriculture, (2) reduced infant mortality, (3) population growth, (4) equality of income distribution, and (5) unemployment.

Thailand has committed itself to progress in all of these areas and specifically mentions each as important elements in its recently adopted Fourth-Five Year Plan which establishes strategies to progress in these areas. While AID has not adopted specific criteria, we have begun to organize data which will permit us to monitor progress in these areas.

2. FAA Sec. 201(b)(5), (7) & (8), Sec. 208; 211(a)(4), (7).
Describe extent to which country is:

a. Making appropriate efforts to increase food production and improve means for food storage and distribution.

One of the highest RTG priorities for its Fourth Five Year Plan (1977-81) is to modernize Thai agriculture, promoting more intensive cultivation with higher productivity, especially in poorer areas. The RTG goal is to extend food production and maintain and diversify its presently high level of agricultural exports. A principal emphasis will be on high impact programs combining modern technology packages and support functions in a coordinated fashion for selected commodities and geographic areas. At the same time the RTG will provide greater farmer incentives by shifting internal terms of trade in the farmers' favor through such mechanisms as price support, buffer stock storage, some regulation of the private marketing mechanism, and promotion of cooperatives.

The RTG has recently passed considerable legislation to support this strategy, including

a Land Consolidation Law, Seeds Marketing Law, and an act creating a Marketing Organization for Farmers. In addition, the credit program of the Bank of Agriculture and Agricultural Cooperatives is being greatly expanded with greater emphasis on long-term loans and loans to individual farmers.

- b. Creating a favorable climate for foreign and domestic private enterprise and investment.

The RTG policy is to encourage the development of the private sector and that sector has been a major factor in Thailand continuing good economic performance. The Investment Promotion Act was revised in October 1972 to improve investment guarantees and benefits, and to make promotional policies more flexible and selective. Standard investment incentives include guarantees against nationalization and competition by new state enterprises; authorization to own land, transfer funds abroad, and hire foreign experts; and various tax reductions are available under reasonable controls. More recently the government has shown a renewed determination to improve the investment climate by improved management of its investment programs and approval of some long-delayed investment applications.

- c. Increasing the public's role in the developmental process.

The Fourth Five Year Plan assigns high priority to social goals such as increasing rural income and services to the rural population, amelioration of urban life, and social equity. Reflections of these goals are apparent in the government budgets.

- d. (i) Allocating available budgetary resources to development. Thailand's allocation of budgetary resources to development is substantial and improving - from about 40% during the period 1970-1975 to 42% in FY 1977 and projected at 46% in the Fourth Five Year Plan for 1977-1981.
- d. (ii) Diverting such resources for unnecessary military expenditure and intervention in affairs of other free and independent nations. Defense expenditures are 18% of the budget in FY 1977 and projected to be 17% in 1977-1981. Thailand does not intervene in the affairs of other nations.
- e. Making economic, social, and political reforms such as tax collection improvements and changes in land tenure arrangements, and making progress toward respect for the rule of law, freedom of expression and of the press, and recognizing the importance of individual freedom, initiative, and private enterprise. Thailand's tax structure is heavily weighted towards taxes on international trade and domestic transactions, with relatively low income and property taxes. In line with recommendations made by the World Bank Economic Survey Team of 1974, the RTG has recently established the policy of increasing revenues from direct taxation. In the rural sector, the RTG passed legislation on Land Consolidation and farmland rents in 1974, and a Land Reform Law in 1975, which authorize programs to improve the equity position of small farmers.
- f. Otherwise responding to the vital economic, political, and social concerns of its people, and demonstrating a clear determination to take effective self-help measures. The emphasis on quality of life and social equity in the Fourth Five Year Plan is an indication of the RTG outlook.
3. FAA Sec. 201(b), 211(a). Is the country among the 20 countries in which development assistance loans may be made in this fiscal year, or among the 40 in which development assistance grants (other than for self-help projects) may be made? Yes.
4. FAA Sec. 115. Will country be furnished, in same fiscal year, either security supporting assistance, or Middle East peace funds? No.

PROJECT CHECKLIST

A. General Criteria for Project.

1. App. Unnumbered; FAA Sec. 653(b)

(a) Describe how Committees on Appropriations of Senate and House have been or will be notified concerning the project;

Project was included in FY 77 Congressional Presentation (page 169) for estimated \$3.5 million.

(b) is assistance within (Operational Year Budget) country or international organization allocation reported to Congress (or not more than \$1 million over that figure plus 10%)?

Proposed amount, \$4.5 million, will not increase the Food and Nutrition allocation for Thailand in FY 77 by more than 10% plus \$1 million.

2. FAA Sec. 611(a)(1). Prior to obligation in excess of \$100,000, will there be (a) engineering, financial, and other plans necessary to carry out the assistance and (b) a reasonably firm estimate of the cost to the U.S. of the assistance?

Yes.

3. FAA Sec. 611(a)(2). If further legislative action is required within recipient country, what is basis for reasonable expectation that such action will be completed in time to permit orderly accomplishment of purpose of the assistance?

No further legislative action is required.

4. FAA Sec. 611(b); App. Sec. 101. If for water or water-related land resource construction, has project met the standards and criteria as per Memorandum of the President dated Sept. 5, 1973 (replaces Memorandum of May 15, 1962; see Fed. Register, Vol 38, No. 174, Part III, Sept. 10, 1973)?

Yes.

5. FAA Sec. 611(e). If project is capital assistance (e.g., construction), and all U.S. assistance for it will exceed \$1 million, has Mission Director certified the country's capability effectively to maintain and utilize the project? The Mission Director has so certified. See Annex G.
6. FAA Sec. 209, 619. Is project susceptible of execution as part of regional or multilateral project? If so why is project not so executed? Information and conclusion whether assistance will encourage regional development programs. If assistance is for newly independent country, is it furnished through multilateral organizations or plans to the maximum extent appropriate? No.
7. FAA Sec. 601(a); and Sec. 201(f) for development loans. Information and conclusions whether project will encourage efforts of the country to:
- (a) increase the flow of international trade;
 - (b) foster private initiative and competition;
 - (c) encourage development and use of cooperatives, credit unions, and savings and loan associations;
 - (d) discourage monopolistic practices;
 - (e) improve technical efficiency of industry, agriculture and commerce; and
 - (f) strengthen free labor unions.
- (a) The loan should result in an increase in agricultural commodities available for export from Thailand.
 - (b) The Thai agencies responsible for project implementation will encourage the interest of the private sector in project activity. One private firm, Adams International, has already been invited and is participating in a tobacco growing program in the Project area.
 - (c) The Project design includes the development of informal farmer groups into water user's associations, Farmer's Associations, and Cooperatives.
 - (d) The Project design does not include features dealing with monopolistic practices.

- (e) The Project will result in increasing agricultural productivity (yield/hectare)
- (f) The Project design does not include features dealing with free labor unions.

This Project is not designed to encourage U.S. private trade or investment abroad.

- 8. FAA Sec. 601(b). Information and conclusion on how project will encourage U.S. private trade and investment abroad and encourage private U.S. participation in foreign assistance programs (including use of private trade channels and the services of U.S. private enterprise).
- 9. FAA Sec. 612(b); Sec. 636(h). Describe steps taken to assure that, to the maximum extent possible, the country is contributing local currencies to meet the cost of contractual and other services, and foreign currencies owned by the U.S. utilized to meet the cost of contractual and other services.
- 10. FAA Sec. 612(d). Does the U.S. own excess foreign currency and, if so, what arrangements have been made for its release?

The Thai contribution in cash and in kind is estimated at the local currency equivalent of US\$33.5 million. There is no U.S.-owned local currency available for this Project.

The U.S. does not own excess local currency.

B. Funding Criteria for Project

- 1. FAA Sec. 102(c); Sec. 111; Sec. 281a. Extent to which activity will (a) effectively involve the poor in development, by extending access to economy at local level, increasing labor-intensive production, spreading investment out from cities to small towns and rural areas; and

This activity will effectively involve the poor in development in the following ways:

- (i) RTG agricultural services will be extended to the sub-district and village level where none now exist, providing access to the economy for the poor by increasing their cash income potential.

(ii) Promotion of more intensive single cropping and additional double cropping will more efficiently utilize existing rural labor.

(iii) Productive investments will be induced from other sources, e.g. private sector, commercial banks, as agricultural production expands.

(b) help develop cooperatives, especially by technical assistance, to assist rural and urban poor to help themselves toward better life, and otherwise encourage democratic private and local government institutions?

The Project will encourage farmers' participation in cooperatives and community activities which will involve them more fully in local government. Support, including technical assistance, will be given to cooperatives to enable them better to serve farmers' needs.

2. FAA Sec. 103. Is assistance being made available for agriculture, rural development or nutrition; if so, extent to which activity is specifically designed to increase productivity and income of rural poor.

The Project is specifically designed to increase the productivity and the incomes of poor farmers in the Lam Nam Oon area through an integrated rural development program by a variety of coordinated activities. See Part 1,C, Description of Project.

3. FAA Sec. 110(a); Sec. 208(e). Is the recipient country willing to contribute funds to the project, and in what manner has or will it provide assurances that it will provide at least 25% of the costs of the program, project, or activity with respect to which the assistance is to be furnished?

The total Project costs are estimated at approximately \$38 million of which the U.S. will provide only up to \$4.5 million. The assurance that the RTG will provide the balance of the costs of the Project will be included in the Project Agreement.

4. FAA Sec. 110(b). Will grant capital assistance be disbursed for project over more than 3 years? If so, has justification satisfactory to Congress been made, and efforts for other financing?

No grant capital assistance is provided.

5. FAA Sec. 207; Sec. 113. Extent to which assistance reflects appropriate emphasis on; (a) encouraging development of democratic, economic, political, and social institutions; (b) self-help in meeting the country's food needs;

The major Project purpose is to provide to farmers in the Project area an opportunity to increase their productivity and incomes and to participate in community development activity.

(c) improving availability of trained worker-power in the country;

The Project provides for training of additional agricultural extension agent, and families in improved agricultural practices.

(d) programs designed to meet the country's health needs;

The Project design includes the extension of the availability of health and family planning service to farm families in the Project area.

(e) other important areas of economic, political, and social development, including industry; free labor unions, cooperatives, and Voluntary Agencies; transportation and communication; planning and public administration; urban development, and modernization of existing laws; or

The Project will provide a model for the planning and implementation of integrated rural development activity.

(f) integrating women into the recipient country's national economy

See Role of Women, Part 3C.

6. FAA Sec. 281(b). Describe extent to which program recognizes the particular needs, desires, and capacities of the people of the country; utilizes the country's intellectual resources to encourage institutional development; and supports civic education and training in skills required for effective participation in governmental and political processes essential to self-government.
7. FAA Sec. 201(b)(2)-(4) and -(8); Sec. 201(e); Sec. 211(a)(1)-(3) and -(8). Does the activity give reasonable promise of contributing to the development of economic resources, or to the increase of productive capacities and self-sustaining economic growth; or of educational or other institutions directed toward social progress? Is it related to and consistent with other development activities, and will it contribute to realizable long-range objectives? And does project paper provide information and conclusion on an activity's economic and technical soundness?
8. FAA Sec. 201(b)(6); Sec. 211(a)(5), (6). Information and conclusion on possible effects of the assistance on U.S. economy, with special reference to areas of substantial labor surplus, and extent to which U.S. commodities and assistance are furnished in a manner consistent with improving or safeguarding the U.S. balance-of-payments position.

This Project is directly concerned with raising the incomes and thereby increasing the welfare of farmers in the Lam Nam Oon area. The Project involves the family's participation in more complex and intensive agricultural practices; it also includes non-formal and adult education elements and involvement in community development activities.

The Project will increase productive capacity and contribute to sustained economic growth. The Project involves the coordination of development activities which are inter-related and consistent with the long-range objectives of improving the quality of life for Thailand's rural poor. Information and conclusion as to economic and technical soundness are presented in Part 3, Sections A and D.

Although the Project will increase agricultural production, the potential for competition with U.S. exports is minimal. Moreover, any increase will have the benefit of increasing total world food production.

9. FAA Sec. 201(b)(1). Information and conclusion on availability of financing from other free-world sources, including private sources within U.S. Such assistance for this activity is not currently available from other free-world sources.
10. FAA Sec. 201(b)(2); 201(d). Information and conclusion on (1) capacity of the country to repay the loan, including reasonableness of repayment prospects, and (2) reasonableness and legality (under laws of country and U.S.) of lending and relending terms of the loan. Thailand has the capacity to repay the loan. See Annex A of the Development Assistance Program - Thailand for detailed analysis.
11. FAA Sec. 201(e). If loan is not made pursuant to a multilateral plan, and the amount of the loan exceeds \$100,000, has country submitted to AID an application for such funds together with assurances to indicate that funds will be used in an economically and technically sound manner? The RTG's formal application for an AID loan to finance this activity is in process.
12. FAA Sec. 201(f). Does project paper describe how project will promote the country's economic development taking into account the country's human and material resources requirements and relationship between ultimate objectives of the project and overall economic development? Yes. This Project will result in increasing agricultural production and increase farmers' income in the Project area, and will serve as a model for integrated rural development projects elsewhere in Thailand.
13. FAA Sec. 202(a). Total amount of money under loan which is going directly to private enterprise, is going to intermediate credit institutions or other borrowers for use by private enterprise, is being used to finance imports from private sources, or is otherwise being used to finance procurements from private sources/ Approximately \$595,000 of the loan will be used to finance the costs of advisory services to be procured from non-governmental sources in the United States; approximately \$1,700,000 million of the loan will be used for equipment to be procured from private sources.

14. FAA Sec. 620(d). If assistance is for any productive enterprise which will compete in the U.S. with U.S. enterprise, is there an agreement by the recipient country to prevent export to the U.S. of more than 20% of the enterprise's annual production during the life of the loan?

Assistance is not for a productive enterprise.

CERTIFICATION PURSUANT TO SECTION 611(e)
OF THE FOREIGN ASSISTANCE ACT OF 1961, AS AMENDED

I, Charles L. Gladson, the principal officer of the Agency for International Development in Thailand, having taken into account, among other things, the maintenance and utilization of projects in Thailand previously financed or assisted by the United States, do hereby certify that in my judgment Thailand has both the financial capability and human resources capability to effectively maintain and utilize the capital assistance to be provided under the proposed Lam Nam Oon Integrated Rural Development Project Loan.

In so certifying, I have taken into account the soundness of the Thai economy and the active and significant involvement of officials of those departments and agencies of the Royal Thai Government directly concerned with the Project in its planning and design.



Charles L. Gladson
Director

Date: Apr. 23, 1977

DRAFT AUTHORIZING DOCUMENT

**PROJECT AUTHORIZATION AND REQUEST
FOR ALLOTMENT OF FUNDS PART I**

COUNTRY ENTIRE
THAILAND

PROJECT NUMBER (Optional)
493-0272

BUREAU OFFICE
A SYMBOL **ASIA** B CODE **04**

A PROJECT APPROVAL DECISION

ACTION TAKEN

A APPROVED
 D DISAPPROVED
 DE DEAUTHORIZED

1 TRANSACTION CODE

A ADD
 C CHANGE
 D DELETE

PAF

DOCUMENT CODE
5

6 DOCUMENT REVISION NUMBER

7 PROJECT TITLE (Maximum 40 Characters)

Lam Nam Oon Integrated Rural Development

9. EST. PERIOD OF IMPLEMENTATION

YRS **05** QTRS **0**

10. APPROVED BUDGET AID APPROPRIATED FUNDS (\$000)

A APPROPRIATION	B PRIMARY PURPOSE CODE	PRIMARY TECH. CODE		E. 1ST FY 77		H. 2ND FY		K. 3RD FY	
		C GRANT	D LOAN	F GRANT	G LOAN	I GRANT	J LOAN	L GRANT	M LOAN
(1) FN	143B	244	244	100	4,500				
(2)									
(3)									
(4)									
TOTALS				100	4,500				

A. APPROPRIATION	N. 4TH FY		Q. 5TH FY		LIFE OF PROJECT		11. PROJECT FUNDING AUTHORIZED	
	O GRANT	P. LOAN	R GRANT	S. LOAN	T GRANT	U. LOAN	A GRANT	B. LOAN
(1)					100	4,500	1	1
(2)								
(3)								
(4)								
TOTALS					100	4,500	C. PROJECT FUNDING AUTHORIZED THRU FY 77	

12. INITIAL PROJECT FUNDING ALLOTMENT REQUESTED (\$000)

A. APPROPRIATION	B. ALLOTMENT REQUEST NO.	
	C. GRANT	D. LOAN
(1) FN	100	4,500
(2)		
(3)		
(4)		
TOTALS	100	4,500

13. FUNDS RESERVED FOR ALLOTMENT

TYPED NAME (Chis, SER/FM/FSD)

SIGNATURE

DATE

14. SOURCE/ORIGIN OF GOODS AND SERVICES

000 941 LOCAL OTHER

15. FOR AMENDMENTS, NATURE OF CHANGE PROPOSED

FOR PPC/PIAS USE ONLY	16. AUTHORIZING OFFICE SYMBOL	17. ACTION DATE			18. ACTION REFERENCE (Optional)	ACTION REFERENCE DATE		
		MM	DD	YY		MM	DD	YY

PROJECT AUTHORIZATION AND REQUEST FOR ALLOTMENT OF FUNDS
PART II

NAME OF COUNTRY: Thailand NAME OF PROJECT: Lam Nam Oon
Integrated
Rural
Development

NUMBER OF PROJECT: 493-0271

Pursuant to Part I, Chapter I, Section 103 of the Foreign Assistance Act of 1961, as amended, I hereby authorize a Loan and a Grant to the Kingdom of Thailand, the "Cooperating Country", of not to exceed Four Million Six Hundred Thousand United States Dollars (\$4,600,000) (the "Authorized Amount") to help in financing certain foreign exchange and local currency costs of goods and services required for the Project as described in the following paragraph:

The Project is an integrated rural development effort to increase the quality of life of approximately 10,000 poor farm families in the vicinity of the Lam Nam Oon Dam in Northeast Thailand through (a) the completion of construction of the irrigation system in the Lam Nam Oon Project area; (b) construction of a road network for maintaining the irrigation system, doubling as a feeder road system for the farmers; (c) operation of an on-farm water supply system; (d) an integrated program of community development, including agriculture research and extension, provision of farm inputs, farm products marketing, health and family planning services, and adult education. The Project also includes assistance to approximately 150 farm families resettled from the reservoir area to the upstream Resettlement area through the introduction of modern sericulture activities modeled after and administered in the same fashion as the earlier Sericulture/Settlements Project, No. 493-0271. The A.I.D. loan will finance portions of the costs of equipment to be used in constructing and maintaining the irrigation system, of advisory services for all elements of the Project, of the rural development activities of each of the RTG Departments directly involved in the Project, and of sericulture activities in the upstream area. The A.I.D. grant will finance technical assistance and materials required for in-depth evaluation of Project implementation.

Of the Authorized Amount, Four Million Five Hundred Thousand dollars (\$4,500,000) ("Loan") will be loaned to the Cooperating Country to assist in financing certain foreign exchange and local currency costs of goods and services required for the Project and the remaining One Hundred Thousand dollars (\$100,000) ("Grant") will be granted to Cooperating Country to finance certain foreign exchange and local currency costs of evaluation of goods and services. The entire amount of the A.I.D. financing herein authorized for the Project will be obligated when the Project Agreement is executed.

I hereby authorize the initiation of negotiation and execution of the Project Agreement by the Officer to whom such authority has been delegated in accordance with A.I.D. regulations and Delegation of Authority, subject to the following essential terms and covenants and major conditions and such other terms and conditions as A.I.D. may deem appropriate:

a. Interest Rate and Terms of Repayment

The Cooperating Country shall repay the Loan to A.I.D. in United States Dollars within forty (40) years from the date of first disbursement of the Loan, including a grace period of not to exceed ten (10) years. The Cooperating Country shall pay to A.I.D. in United States Dollars interest from the date of first disbursement of the Loan at the rate of (a) two percent (2%) per annum during the first ten (10) years, and (b) three percent (3%) per annum thereafter, or the outstanding disbursed balance of the Loan and on any due and unpaid interest accrued thereon.

b. Source and Origin of Goods and Services

Except for ocean shipping, goods and services financed by A.I.D. loan funds under the Project shall have their source and origin in the Cooperating Country or in countries included in A.I.D. Geographic Code 941, except as A.I.D. may otherwise agree in writing. Ocean shipping financed under the Loan shall be procured in any eligible source country except the Cooperating Country.

c. Conditions Precedent to Project Agreement Execution

Prior to execution (signature) of the Project Agreement, as authorized above, the Borrower/Grantee will, except as the Parties may otherwise agree in writing, furnish to A.I.D. in form and substance satisfactory to A.I.D.:

1. Evidence of agreement among the participating RPO agencies on the site selected for the LMO Project Administration Center (the Center);
2. Engineering plans and cost estimates for the construction of the Center;
3. Plans for financing the constructing of the Center and for financing its continued operation and maintenance; and,
4. A scope of work for a consulting firm to provide technical assistance, to include assistance in the preparation of (a) a comprehensive engineering, construction, and operation and maintenance program for the Project, (b) a detailed operational research program for the pilot project areas, (c) a detailed agricultural research plan and a comprehensive agricultural development plan, and (d) a master community development plan coordinating the development activities of all participating agencies.
5. A request for proposals to provide the services described in Paragraph 4 above, to be issued promptly after Project Agreement signature to prequalified consulting firms selected on the basis of an advertised solicitation of expressions of interests, all in accordance with the procedures prescribed in AID Handbook 11, Chapter 1.

d. Conditions Precedent to Loan Disbursements

Prior to the first disbursement under the Loan, or to the issuance by A.I.D. of documentation pursuant to which disbursement will be made, the Borrower will, except as the Parties may otherwise agree in writing, furnish to A.I.D. in form and substance satisfactory to A.I.D.:

1. Evidence that the Borrower has appointed a qualified individual to serve as full-time Field Director for the Project and has named the persons to serve as Departmental Team Leaders for each of the participating agencies.
2. Evidence that the Borrower has established a National Coordinating Committee for the Project, chaired by the Under-Secretary of State, Ministry of Agriculture and Cooperatives, with the Governor, Sakon Nakhon Province and the Deputy Director-General, Royal Irrigation Department, as vice-chairmen, and with representatives of the concerned agencies as members.

3. A draft contract with a consulting firm, satisfactory to A.I.D. for technical services, to include assistance in the preparation of (a) a comprehensive engineering, construction, and operation and maintenance program for the Project, (b) a detailed operational research program for the pilot project areas; (c) a detailed agricultural research plan and a comprehensive agricultural development plan, and (d) a master community development plan coordinating the development activities of all participating agencies.

e. Additional Condition Precedent to Loan Disbursements

Prior to disbursement of local currency under the Loan, or to the issuance by A.I.D. of documentation pursuant to which disbursement of local currency will be made, for any purpose other than to finance the salary and related costs of the Field Director for the Project, the Borrower will, except as the Parties may otherwise agree in writing, furnish to A.I.D. in form and substance satisfactory to A.I.D.:

1. A comprehensive engineering, construction, and operation and maintenance program for the Project;
2. A detailed operational research program for the pilot project areas;
3. A detailed agricultural research plan and a comprehensive agricultural development plan; and,
4. A master community development plan coordinating the development activities of all participating agencies.

f. Covenants

Borrower shall covenant the following:

1. Except as A.I.D. may otherwise agree in writing, the Borrower/Grantee will develop and implement a program acceptable to A.I.D. within twenty-four (24) months after Project Agreement signature, to assure the timely allocation of land to participants in the resettlement area project adequate for their needs.
2. The Parties agree to establish an evaluation program as an integral part of the Project. Except as the Parties otherwise agree in writing, the program will

include, during the implementation of the Project and at one or more points thereafter, (a) evaluation of progress toward attainment of the objectives of the Project, (b) identification and evaluation of problem areas or constraints which may inhibit such attainment, (c) assessment of how such information may be used to help overcome such problems, in this or other projects, and (d) evaluation, to the degree feasible, of the overall development impact of the Project. Joint evaluations will be conducted annually by Borrower and A.I.D. As inputs for these evaluations the Borrower will (a) prepare periodic reports on Project activities, expenditures, and physical progress, (b) collect and compile, with support from A.I.D., monthly farm management records, and (c) conduct, with support from A.I.D., three socio-economic surveys, one each in 1978, 1980, and 1981, modeled after the baseline socio-economic surveys already conducted.

3. Except as A.I.D. may otherwise agree in writing, the Borrower/Grantee will develop and implement a program acceptable to A.I.D. within twenty-four (24) months after Project Agreement signature, for recovering from the beneficiaries of the Project a significant portion of the Borrower/Grantee's investment costs in project development, particularly costs related to land improvement. This program will be developed in consonance with the Borrower/Grantee's programs for cost recovery in other irrigation projects in Thailand. The Borrower/Grantee will also develop an evaluation plan for its cost recovery program on this project which includes analysis of the social, political, economic and financial effects of the cost recovery program which is implemented.

g. Waivers

The following waivers to A.I.D. regulations are hereby approved:

1. Waiver of source certification requirements for local currency procurement.

2. Waiver of the requirement that no invitation for bidding on A.I.D.-financed commodities be issued until Borrower/Grantee has met initial conditions precedent, provided that the A.I.D. Mission Director has

determined that such waiver is necessary to permit implementation of the project on schedule and that it can be granted without creating undue expectations concerning A.I.D. commitment to fund the concerned procurement and without prejudicing future A.I.D. decisions or approvals.

Signature: _____
John H. Sullivan

Date: _____