MID-TERM EVALUATION REPORT OF THE EDIBLE OIL PROCESSING AND DISTRIBUTION PROJECT - BURMA (Project No. 482-0006)

Contract No. PDC-1406-00-7006-00,
Work Order No. 7

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July 1988

UNITED STATES OF AMERICA
AGENCY FOR INTERNATIONAL DEVELOPMENT

Consulting Services: YES [ ] NO [X]

1. Country of Performance: Burma

2. Indefinite Quantity Contract: PDC-1406-I-00-7006-00, Delivery Order No.: 07

3. CONTRACTOR (Name and Address): Development Associates, Inc. 2924 Columbia Pike Arlington, VA 22204-4399 DUNS NO. 07-485-2252	4a. ISSUING OFFICE: Agency for International Development AID/M/SER/OP/OS/ANE Washington, D.C. 20523 4b. ADMINISTRATION OFFICE: Agency for International Development AID/M/SER/OP/OS/ANE Washington, D.C. 20523
5. PROJECT OFFICE: Douglas R. Pickett ADO/Burma	6. SUBMIT VOUCHERS TO: Controller USAID/Thailand APO San Francisco, CA 96346
7. EFFECTIVE DATE: May 27, 1988	8. ESTIMATED COMPLETION DATE: September 24, 1988
9. ACCOUNTING AND APPROPRIATION DATA: Amount Obligated: $49,754 Ceiling Price: $49,754 Appropriation No.: 72-1151021 Allotment No.:	PIO/T No.: 482-0006-3-50097 Project No.: 482-0006 Budget Plan Code: HDAA-85-27482-AG-13

10. The United States of America, represented by the Contracting Officer signin this Order, and the Contractor agree that: (a) this Order is issued pursua to the Contract or Agreement specified in Block 2 above and (b) the entire Contract between the parties hereto consist of this Order and the contract specified in Block 2 above.

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DUPLICATE ORIGINAL

ACKNOWLEDGEMENTS

The team expresses its gratitude to all of the people who contributed to the Edible Oilseeds Processing and Distribution Project evaluation and who provided invaluable assistance to each of the team members. Our special thanks go to Dr. Than Htaik, Director General, Cottage Industries Department, and to U Ten Win and U Tin Htut, Director and Deputy Director of the project. We owe much to Mr. Douglas Pickett, the USAID/Burma Project Officer, and the three USAID/Burma secretaries, Esne Kingham, Susan Ba Hla and Cho Mar Oo. The hospitality, friendliness and kindness we received in Burma were greatly appreciated, and we thank one and all for their assistance.

Respectfully,

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ABBREVIATIONS

AID	- Agency for International Development
ACDI	- Agricultural Cooperative Development International
BARD	- Burma Agricultural Research and Development (Project)
CID	- Cottage Industries Department
CD	- Cooperative Division
EOPD	- Edible Oils Processing and Distribution Project
GDP	- Gross Domestic Product
GOB	- Government of Burma
K	- Kyat (Unit of Burmese Currency)
MOC	- Ministry of Cooperatives
MOP	- Maize and Oilseeds Production (Project)
PP	- Project Paper
Pro Ag	- Project Agreement
PACD	- Project Action Completion Date
PIO/C	- Project Implementation Order/Commodity
PIO/T	- Project Implementation Order/Technical Services
PIO/P	- Project Implementation Order/Participant Training
TA	- Technical Assistance
USAID/B	- United States Agency for International Development in Burma
PD	- Planning Division of the Ministry of Cooperatives

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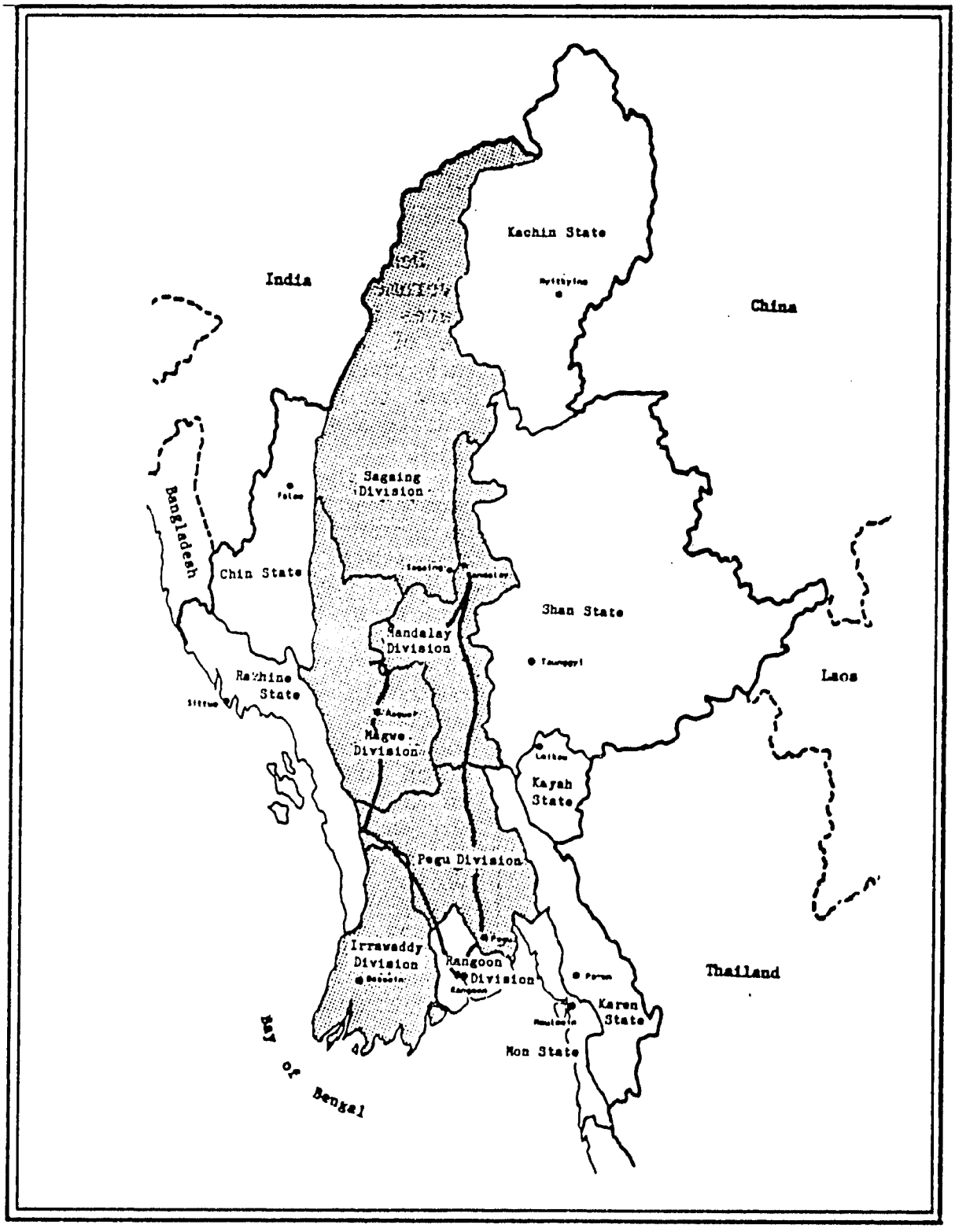


I. EXECUTIVE SUMMARY

A. Introduction

Traditionally rice has been the most important agricultural crop in Burma. Following rice, oilseeds as a group are perhaps the most important food item in the Burmese diet (i.e., edible oils). The first agricultural priorities identified by AID when it returned to Burma in 1982 were programs to increase maize and oilseeds production, and upgrade edible oil processing and agricultural research and development capabilities. For administrative reasons, oilseed production activities were separated from oil processing in the first AID project, Maize and Oilseeds Production, as approved in June 1981. Further in-country assessments led to follow-on projects which identified the need for oilseed research and processing projects. Agreements for an agricultural research and development project and an edible oil project were approved on August 29, 1985.

This is a mid-term evaluation of the Burma Edible Oil Processing and Distribution Project (482-0006), called for in the Project Paper (PP), agreed to in the Project Grant Agreement, and noted in the AID/Washington Asia Near East Bureau's Evaluation Plan. It is a formative evaluation. Its purpose is to:

(1) measure progress toward the accomplishment of stated purposes, goals, and objectives;

(2) analyze and describe the present setting of the project and assess the validity and appropriateness to that setting of stated project purposes, goals and objectives;

(3) identify problems and constraints of design and implementation which are impeding or may impede the attainment of project objectives; and

(4) formulate objective, realistic recommendations for action by project implementors to overcome obstacles and/or increase the probabilities for project success.

The method of evaluation included briefings, visiting participating institutions to observe work in progress, and reviewing relevant documents for conformity to stated goals, purposes, and objectives.

B. Issues

The Evaluation Team found that two major issues confront the project, and the team believes these issues should be resolved as further implementation is considered. The issues are:

(1) Inconsistencies between the project authorization and the Project Agreement concerning repayment and terms of loans for commodities, and handling of those repayments for future use; and

(2) The great disparity in actual versus scheduled inputs (funding) between AID (54 percent) and the Burmese Government contributions (6 percent).

If these issues can be resolved satisfactorily, the project should be continued under a revised implementation plan such as that recommended in later sections of this report.

C. Problems and Contributions

Many of the project's over-riding problems stem from faulty design and erroneous assumptions based on a very optimistic implementation plan, considering the realities of the Burmese socio-economic environment. Problems of untimely commodities, lack of candidates for training, non-utilization of planned short-term technical assistance, and lack of follow through during the early stages of project implementation have all led to delays. Personnel changes within USAID/Burma and the GOB also contributed to implementation problems. The team's overall impression of the Edible Oil Processing and Distribution Project (EOPD) is that it is a needed effort.

Although the project has experienced implementation delays and is behind schedule, progress has been made in achieving stated objectives. In-country technical assistance (TA) has been provided by an Agriculture Cooperative Development International (ACDI) three-man team consisting of an engineer and two master mechanics. They have been on the project since October 1986. One Hundred Sixteen (116) of a planned 262 person-months of long and short-term training in the United States is underway. A central quality control laboratory and three mill laboratories are in place. Commodities have been ordered to install ten mill laboratories. Two short-term consultants have been

in country; one management and one metalurgist. The workshops have begun upgrading, and equipment for further upgrading is due in country in 60-90 days. Rehabilitation has begun on six oil mills utilizing existing materials and equipment. Standardized oil expeller worms and cages have been designed and a prototype is being installed at the Prome oil mill.

In a larger context, AID assistance in the agricultural sector since 1982 has contributed to the development of a cadre of trained researchers, managers and agricultural agents who are now actively working in crop production. AID's agricultural production assistance has focused on secondary crops, such as maize and oilseeds, which are less heavily state-controlled than rice, the national staple crop, and for which there is substantial domestic demand. The Maize and Oilseed Project (482-0005), which ended in March 1988, surpassed each of the production and yield objectives established at project design. The follow-on Burma Agriculture Production Project (482-0007) will use the same strategy as the earlier one, disseminating unsophisticated technology through a proven delivery system. During 1988, AID will help the Burmese add an important information component designed to measure the effect of increased production at the individual farm level. A joint study of the costs, prices, distribution, uses, and effects of fertilizer on Burmese agriculture will be completed and presented to the Government of Burma during FY 1988.

With a basic agricultural production foundation in place, new technologies can be employed. The Agriculture Research and Development Project (482-0012) is establishing a research base to develop new technologies, seeds and cultivation practices for oilseed crops and other crops grown in association with these. These advances are essential to sustain and increase the yield potential of oilseed and other crops. It is also contributing importantly to the institutional development of the Agricultural Research Institute, which is Burma's primary agricultural research organization.

Increased yields of edible oilseeds have indicated both a shortage of capacity for processing oilseeds, low rates of recovery, and poor quality of edible oils. Thus, the AID-financed Edible Oil Processing and Distribution Project is increasing yields and quality of edible oils through renovation and upgrading existing oilseed mills.

D. Summary Findings and Recommendations

The implementation agencies responsible for project progress have continuously been beset with problems in this project. Even so, progress is visible to those who visit the project activities and review the relevant documents. The Evaluation Team believes that it has identified important problem areas (constraints) and that the reactions (recommendations) address the major constraints impacting on project implementation. No changes in project purpose, goal, or Project Action Completion Date (PACD) have taken place nor are any contemplated. A summary of the findings and recommendations include the following:

(1) Much of the equipment and new material that have been ordered for the workshops and oil mills are scheduled to arrive later in Burma and some are due when the master mechanics are scheduled to leave the country. One master mechanic should be present to ensure that those commodities are utilized as intended.

Recommendation: AID and Agriculture Cooperative Development International (ACDI) should increase the technical assistance of one master mechanic by 12 man-months.

(2) The TA team members must make daily decisions in collaboration with the Ministry of Cooperatives (MOC) project manager, the project director and other counterparts. This requires close daily contact, and the PP explicitly stipulates that training activities be carried out. Improved project implementation can only be realized by "closer" coordination of project activities. This cannot be achieved if the offices of all participants are not easily available to both.

Recommendation: USAID/Burma require that the TA team as originally intended be quartered with MOC counterparts in MOC-furnished facilities as soon as possible.

(3) The long-term training program is behind schedule and there is not sufficient time for participants to obtain the planned Master's degree. There is little enough time for one-year special training programs.

Recommendation: USAID limit the Master's degree program to the four presently selected and not accept one-year special trainees after December 1988.

(4) The Cottage Industries Department (CID) and the Planning Division (PD), located in the MOC, are benefiting greatly from short-term training. However, nominations of training candidates and their approval by SRUB have been very slow.

Recommendation: MOC should make every effort to increase the short-term training component in order to utilize the training time left.

(5) SRUB approvals and untimely inputs for short-term consultants/trainers have resulted in several cancellations of planned short-term training programs.

Recommendation: SRUB and ACDI should resolve in-country utilization of short-term TA. Two-month long stays instead of one-month stays would be more appropriate.

(6) There are certain inconsistencies between the Project Authorization and the Project Grant Agreement with respect to Government lending for private and cooperative purchases of AID-financed equipment and supplies.

Recommendation: Appropriate authorities should amend the Project Grant Agreement to rectify inconsistencies.

(7) AID and SRUB present level of expenditures are 54 percent and 6 percent respectively of that planned.

Recommendation: AID should decrease the authorized project funds from $9,500,000 to $6.9 million.

(8) According to the project paper and AID procedures, funds accumulated from the sale of commodities at CIF prices should be paid into a special account to be reutilized as agreed upon by USAID/Burma and MOC.

Recommendation: SRUB should insist on repayment from those obtaining commodities. These funds should go into an account which will be utilized to sustain the goals and objectives of this project.

(9) Though not following the design described in the Project Paper, initial work by the TA team represents a logical improvement in project design and has established "confidence" in the project.

Recommendation: Complete the "Burma design" prototype in a workshop, then install the completed parts for trial runs.

(10) Too many institutions are involved in all phases of the oil mill rehabilitation program and some areas of work may be done by institutions which do not have the most to gain. (Decisions made by committees rather than by technicians.)

Recommendation: Realign the rehabilitation efforts as follows:

- Workshops should be responsible for expeller rehabilitation repairs, sales, etc.
- Oil mills personnel should be responsible for mill physical rehabilitation, processing efficiencies, preventive maintenance, and in process quality control (QC).
- MOC should be responsible for central QC, standards, regulations, training, data collection and policies.

(11) A revised project implementation plan has been submitted and approved, but the Evaluation Team could find no confirming records in the files. The commodity input has been revised, i.e., solvent extraction plant dropped, but there is no agreement in the files.

Recommendation: USAID/Burma and MOC should review decisions made and bring records up to date.

(12) After a slow start, oil mill rehabilitation is starting to progress at a reasonable rate. However the verifiable indicator of 10 to 15 completely rehabilitated mills is unrealistic within the time constraints of the project. An in-place capability to produce equipment, process efficiently, and sustain revisions is more important than counting a given number of machines (45 to 60 mills in various stages of implementation).

Recommendation: Reduce the PACD verifiable indicator to 10 mills capable of producing at 75 percent capacity, and an inplace capability to expand to other mills.

(13) The MOC project manager is also the manager of a German and an ADP project. This results in a heavy workload for him and he is unable to give his full attention to the USAID/Burma project, which should require a full-time position for management.

Recommendation: That the MOC nominate and assign a full-time project manager to the project.

(14) The PP planned for approximately 95 new hire employees for the MOC. Presently, MOC has 89 vacancies and it appears the vacant positions will go unfilled.

Recommendation: Recruit and fill 2 or 3 positions only, i.e., a trained engineer and economist.

Finally, both the SRUB and the EOPD Project would greatly benefit from a move toward decentralized government decision-making on routine travel, training, short-term training, and expenditures.

E. Project Design and Policy Implications

The findings and conclusions of the evaluation indicate that the project purposes and goals remain achievable. However, the expected outputs will not be reached unless important design revisions are agreed upon.

The Project Paper's development targets, even though the Evaluation Team recommends a design change, are still appropriate to GOB needs, and will produce benefits originally envisioned.

II. PROJECT SETTING

A. Overview

Burma is predominantly an agricultural country. Sixty percent of Burma's export earnings come from agriculture, and the agriculture sector contributes 46 percent of Gross Domestic Product (GDP), employing about 53 percent of the labor force. Rice is the principal agriculture crop grown. It exceeds all other crops combined in area planted, production and value. It is the basic staple of the Burmese diet. Other important food crops are maize, sesame, peanuts and several different types of pulses. Cotton and sugar cane are also grown on substantial acreages, as are a growing number of horticultural crops, both fruits and vegetables. Wheat is increasing in importance in the north. The potential for expansion in these and other crops is great.* Oilseeds (as a group) rank second in importance to rice. The processed edible oils are a basic and important consumption item in daily food intake. Presently, it is assumed that production of oilseeds is insufficient to meet the domestic demand for edible oils. Inasmuch as the demand is probably elastic, anticipated oilseed production increases will be readily absorbed by the market without severe price fluctuations (assuming moderate expansion of supply over time). The AID-funded Maize and Oilseeds Production Project (MOPP) is the keystone for increased oilseed production, and this project (EOPD) is the keystone for an increased supply of processed edible oils. An expansion in supply of processed edible oils should result in: (1) a reduction in imports of edible oils, and (2) increased farm income for producers.

The problems of low returns to farmers, disparaties in private and cooperative edible oil retail prices, and unresponsiveness of the cooperative to supply/demand situations and market conditions continues to plague the agriculture sector. This was the context for the AID grant to Burma to increase edible oil supply.

*Source: Maize and Oilseeds Production Project, USAID/Burma, Midterm Evaluation Report, February 1, 1985, pg. 5.

The information gathered by the team indicates that prices paid to producers are distinctly two-tiered. Presently, the cooperatives establish a price, which in effect is a commodity support price, below which the price does not fall. The private sector price is always higher than the cooperative price. The reason is that the price paid by the private sector must be high enough to overcome the incentives offered by the cooperative, i.e., special supplies of consumer goods and production inputs allocated for sale at low prices to farmers who sell oilseed to the cooperative.

During this past season (1987-88) cooperatives paid 60 Kyats per basket for groundnuts and 151 Kyats per basket for sesame while the private sector paid 100 Kyats per basket for groundnuts and 197 Kyats per basket for sesame. (See the following Table 1.)

TABLE 1

AVERAGE ANNUAL PRICES PAID TO PRODUCERS

(Kyats per Basket)

Year	Cooperative Sector		Private Sector	
	Groundnuts	Sesamum	Groundnuts	Sesamum
1978-79	26.9	80.8	34.9	111.2
1979-80	25.1	90.0	40.4	128.7
1980-81	30.6	114.6	46.6	146.9
1981-82	26.	98.8	44.3	142.3
1982-83	33.1	117.7	52.4	164.3
1983-84	44.0	137.0	61.0	182.0
1984-85	NA	NA	NA	NA
1985-86	NA	NA	NA	NA
1986-87	68.2	163.4	91.4	212.8
1987-88	60.0	151.3	100.0	197.4

Even though Burma produces most of its own food, it imported in the past substantial amounts of palm and refined soybean oil, which drains scarce foreign exchange reserves. Imports of edible oil have been reduced in recent years.

AID's involvement in this project was a direct result of AID's recognition of the need for an increased and improved edible oilseed supply. In support of the USAID/Burma position, the Burmese Government has also pursued policies and set targets which recognize the importance of the edible oil deficit and requested donors for ideas and assistance.

Continuous policy dialogue between AID/Burma and the Ministry of Cooperatives has been instrumental in the MOC focus on the need to narrow the gap between cooperative and private oilseed prices.

Donor programs and project implementation activities must conform to the socio-economic environment of Burma; therefore, it is important to understand the role and importance the cooperative plays in every Burmese life.

The Cooperative Societies of Burma presently operate under an archaic set of laws and by-laws which were generally formulated in the 1970s or before. The first cooperative structure was introduced into Burma in 1904 as a government sponsored and administered movement. The original goal was to provide credit to farmers. From this setting, cooperatives changed little until 1970 when the Revolutionary Council published the new cooperative plan of 1970.

The Cooperative Plan

The Revolutionary Council, headed by General Ne Win, came into power on March 2, 1962, and announced the Burmese Way to Socialism as its governing policy. The Council's attitude towards cooperatives is clearly cited in para. 10 of the Burmese Way to Socialism as follows:

> "In order to carry out socialist plans, such vital means of production as agricultural and industrial production, distribution, transportation, communication, external trade, etc., shall be nationalized. All such national means of production will have to be owned by the State or Cooperatives or Collective Unions. Amongst such ownership, State-ownership forms the main basis of Socialist Economy. State-ownership means ownership by the people, whereas ownership by Co-operatives or Collectives means group-ownership by respective concerns but as all forms of ownership will have to operate within the framework of Socialist National Planning they are interdependent."

Later, in accordance with the earlier policy declaration, the Revolutionary Council published a comprehensive Cooperative Plan in May 1970, to be implemented by the Ministry of Cooperatives. "The long-term aim is to expand the number of cooperatives and increase their membership to cover all peasants and workers unifying them in the direction of eliminating the middle-man thereby serving the interest of both the producers and consumers." The main objectives of the 1970 Cooperative Plan are to:

(1) "Distribute the legitimate benefits of the co-operatives to the producers of goods and to the consumers for their relief and welfare by doing away with the middle-man and his exploitation,"

(2) "Encourage the Union citizens to carry on trade through co-operative societies rather than individually in accordance with the necessity to trade in groups for the advancement of the national economy, and

(3) "Encourage the peasant and workers to take an active part in business by forming co-operative societies."

In 1972 the demarcation of the national economy into State, Cooperative and Private Sector was announced. Then under the leadership of the Burma Socialist Programme Party and with the assistance and cooperation of the Central People's Workers' Council and Peasants Council, the implementation of the Cooperative Plan of 1970 proceeded in spite of all organizational and other difficulties.

Surprisingly, in view of the foregoing, Burmese cooperatives operate with a degree of autonomy. Cooperatives are financially independent, raising capital from members and from loans, and paying income taxes on retained earnings ("profits"). No government budget support is provided for any cooperative organization. The extent of direct central government control over cooperatives is, therefore, circumscribed.

Generally, the structure of the cooperative societies and the inter-related diffusion of power somewhat mitigates the effect of the central power and does not automatically translate into rational price adjustments at the local level in wholesale purchase of oilseeds, or retail sale of edible oil. AID/Burma and the Ministry of Cooperatives have, in fact, had open and constructive dialogue on the problems of low return to the farmer, and disparities in prices paid for farm crops by the private sector and cooperatives.

B. Donor Assistance to the Oilseed Processing Industry

In 1983, the Ministry of Cooperatives supported the concept of an overall AID/ADB combined effort utilizing AID and Asian Development Bank (ADB) resources for an oilseed processing project. AID grant financing would fund engineering services, technical assistance and training. ADB loan financing would fund the capital project inputs. The proposed project was not formally endorsed by the Burmese government primarily because the AID-financed project would have financed much more technical assistance than commodities. The Burmese Government normally requires a substantial commodity/equipment component.

In 1984, the planned ADB intervention in the oilseed subsector stalled. Therefore, in order to be responsive to the immediate needs of the Burmese government, an AID-funded EOPD project was developed to provide technical assistance and training to upgrade the capability of the MOC participating cooperatives and provide equipment to upgrade the efficiency of existing oilseed mills and Industrial Producers' Cooperatives.

Recently (1988), the Asia Development Bank (ADB) signed an agreement to furnish SRUB with 10 completely new Japanese-constructed oil mills. Each of the mills will have a capacity of 24 tons per day. They are to be located as follows:

Magwe Division	Mandalay Division	Sagaing Division
Pakokku	Myingyan	Monywa
Myete	Nyaung-U	Sagaing
Magwe	Madaya	
Pegu Division	**Mon State**	
Nyaunglebin	Kyaik Hto	

Currently, no construction has started on these mills, so this schedule will be revised. The EOPD project is scheduled to rehabilitate a mill at Nyaung-U. We are told that when the new mill is in operation, the rehabilitated mill will be relocated. The new location has not been determined.

The Federal Republic of Germany has also agreed to erect a new oil mill at Katha in Sagaing Division. It also is to be a 24 tons per day mill. Arrangements for this mill are being finalized.

C. External Factors

Obviously, weather and farm input and output prices can significantly affect the profitability of oilseed processing and, therefore, the success of the project. Since credit is a part of the input package needed to increase production of oilseeds for processing, it will have an affect on the project. The following sections describe, in general terms, other external factors impacting on the project.

The government has recently "freed-up" several farm crops in an effort to improve the performance of the agricultural sector. The following is a direct quote from the latest report to the Pyithu Hluttaw on Financial, Economic and Social Conditions for 1988/89.

> "With a view to stabilizing farm income, and for the smooth flow of commodities and price stability, nine principal crops including paddy have been revoked from the State control list, and are classified non-controlled commodities in 1987/88. Accordingly, amendments to the Rights of the Private Enterprise Law have also been effected to facilitate the processing, trading and handling of these crops by any State citizen beginning from 1987 harvest. A new system was introduced in collecting land revenue and water taxes for full realization of the revenue, whereby the farmers were to pay land revenue with specified planned crops in lieu of cash.
>
> "A review of the performance of the agriculture sector during 1987/88 shows that sown acreage under paddy, groundnut and cotton declined while sown acreage under wheat, maize, matpe, pedisein, sorghum, butter bean, gram, sunflower, rubber and coffee showed an increase compared with the previous year."

The above is cited because these policy changes are indicative of the GOB's desire to increase productivity in the agricultural sector.

Foreign exchange rates and foreign exchange availability have different effects on the modern and traditional subsectors of agriculture in Burma. While the modern and/or irrigated and mechanized subsector benefits from implicit subsidies for imports such as tractors and petroleum and a priority status for

credit and foreign exchange, the scarcity of foreign exchange, given the implicit and sometimes explicit taxes on exports, has contributed to declining conditions of capital stock and some output declines. The traditional small farm subsector depends much less on imported inputs, but also suffers from low producer prices for exportable cash crops such as groundnuts and edible oils.

The recent decision to "free-up" several of the more stringently controlled commodities is indicative of a calculated move toward increased participation in the economy of private sector entrepreneurs. Without access to inputs, markets, and price incentives, however, the farmer will not be in a position to respond and will not attain the target levels projected by government. Government action will allow private entrepreneurs to enter upon the scene and a more realistic market equilibrium will probably result.

Credit and Investment Climate

Lack of credit is a limiting factor in agricultural production. Funds are needed for the full range of agricultural activities including financing recurrent inputs, purchase of tools and equipment, storage, infrastructure, etc. In an effort to allocate the scarce available resources to the many sectorial demands for credit funds, the GOB has instituted sectorial targets, and a credit ceiling for short-term, medium and long-term credit. As a result, all sectors are constrained by a serious lack of budgetary funds. In effect, this credit limitation has channeled available credit to short-term loans which realize rapid pay-back. Fortunately for the agricultural sector, the GOB recognizes the significance of the agriculture sector to the economy. The agriculture sector is recognized as the most important contributor to the economy and receives approximately 35 percent of the total budgetary allocations. Even so, agricultural production remains at a low level due to the lack of credit availability.

It is recognized that within the context of Burma's macro-economic situation, which leads to very scarce credit resources, credit programs to aid agriculture and agro-industry will be difficult to implement. The current situation facing the SRUB seems to preclude any possibility of innovation in this area. Progress in this area will need to be preceded by an improved and stabilizing macro-economic environment.

It is certain that investments in modernization and intensification of existing facilities can produce rapid and significant production and processing increases as well as reduce costs. The potential interaction between production and processing increases and the macro-economic situation can be summed up as follows:

Burma has considerable potential for developing its economy through improvement in yields and agro-industrial processing capacity. It would seem prudent to attempt to improve agricultural output through better price incentives which would have to be achieved by a foreign exchange policy which keeps agro-production and processing internationally competitive and the prices of imported foods relatively high. However, this policy would imply a shift in income distribution from urban to the rural population. To some extent, this shift has started. A more attractive solution would be if farmers' incentives could be improved by new technical packages which increase total factor outputs. Such improved packages may shift an increasing number of farmers out of subsistence agriculture, creating dynamic interlinkages with the other sectors of the economy.

D. Evaluation Methodology

This mid-term progress evaluation is the first of two major reviews as specified in the Project Paper and agreed to in the Project Grant Agreement.

Both the Project Grant Agreement and the PP stipulate that the mid-term progress evaluation must:

(1) measure progress toward the accomplishment of stated purposes, goals and objectives;

(2) analyze and describe the present setting of the project and assess the validity and appropriateness to that setting of stated project purposes, goals and objectives;

(3) identify problems and constraints of design and implementation which are impeding or may impede the attainment of project objectives; and

(4) formulate objective, realistic recommendations for action by project implementors to overcome obstacles and/or increase the probabilities for project success.

The Evaluation Team's findings, conclusions and recommendations are to be used by the Ministry of Cooperatives, AID/Burma and the technical assistance contractor (ACDI), singly and jointly, to illuminate decisions on future project implementation plans on ways and means of improving project performance.

The evaluation end focus was on progress towards the goals, purposes, and outputs delineated in the Project Paper and Grant Agreement. It was carried out in conjunction with the two-member MOC/CID team which had begun the necessary preparatory work before the arrival of the AID-funded team. Judgement on the progress of the project was based on personal interviews with key Burmese personnel in the Rangoon office, with field trip contacts with cooperative mill management, farmers, workshop owners, community leaders, with other Burmese Government employees and with USAID staff (see List of Contacts in Appendix C). Many reports, studies, and other printed materials provided the quantitative data used in the evaluation (see Appendix D). Twenty-seven of the Team's total 90 person-days in country were spent in the field analyzing the operations of the oilmills and workshops selected as participants for the project. Additionally, the Team interviewed one small Hsi-zone press operator and a small private expeller mill operator.

The Evaluation Team received excellent cooperation from staff and personnel at all levels in MOC, CID and USAID, and the Technical Assistance (TA) team members. Formal and informal briefing sessions were held with all three institutions and the TA team during the period of review to discuss significant issues and to clarify questions which developed during the evaluation. The general organization of the evaluation report is based on: Asia Near East Bureau Procedural Guidelines for Evaluation, February 1986, and the instructions set forth in the scope of work prepared by USAID/Burma.

III. PROJECT DESCRIPTION

A. The Project

The project is designed to upgrade and expand edible oil processing in Burma and support the activities planned under the Maize and Oilseeds Production Project (482-0005) over a five-year period by focusing on: (a) increasing the capabilities of the Ministry of Cooperatives (MOC) to plan, implement, monitor and evaluate projects; (b) instituting greater management/production measures in the Industrial Producers' Cooperatives; (c) upgrading the efficiency of edible oil processing in both the private and cooperative sectors; (d) improving the quality of edible oil produced; and (e) improving edible oil distribution. The project's purpose will be accomplished by: (a) providing technical assistance and training to increase the capability of indigenous organizations to plan, implement and evaluate programs to improve production, quality and distribution of edible oil; and (b) providing raw materials, equipment and commodities required to reproduce components for the rehabilitation of oilseed mills. The Ministry of Cooperatives (MOC) has overall responsibility for the implementation of the project. The MOC works through its Cooperative Department to improve overall sector planning, and its Cottage Industries Department (SID) is responsible for project implementation and supervises the technical assistance effort. Both Departments receive technical assistance, training, and commodities to upgrade and improve their skills.

The project focuses on upgrading approximately 10 to 15 percent of the top 400 mills, i.e., 40-60 mills. Ninety-five percent of these 2,000 mills are in private hands and share equally with the cooperatives in their efficiency and upgrading potential. It is essential, therefore, that this project rehabilitate mills in both sectors in order to capture that portion of the population of mills most capable of being rehabilitated with moderate investment.

Most mechanical skills in Burma are housed in regional Industrial Producers' Cooperatives. These cooperatives own and operate workshops equipped with workshops in Burma. They vary in organization, focus, assets and skill

levels. However, in all instances their membership consists of skilled persons who pool their talents and expertise to provide a one-stop service to prospective customers. Some of the members own specialty shops outside the cooperative framework and continue to provide their services as private entrepreneurs. A typical workshop has a little over 100 members.

Most workshops derive the major source of their income from the rebuilding of vehicles. Some of these vehicles are acquired as surplus from the Burmese government and others are purchased after being written off by their owners after having been involved in accidents. However, all workshops derive some part of their income from the manufacture of screw-press mill components.

Four of these workshops will carry out the rehabilitation, manufacture or repair of screw-press mill components under the project. These four are located in the same areas as the 15 oilseed mill sample selected for analysis.

Project Outputs and End of Project Status

Under the Cooperative Department of the Ministry of Cooperatives, the Planning Division is responsible for research, data collection and analysis, economic planning, coordination of donor inputs, and major project preparation. The Planning Division is now staffed with 33 people; 85 percent hold B.Sc. degrees, but this number will be increased to 128 over the next two or three years. An internal appraisal of the Planning Division concluded that it has skill deficiencies in certain areas of its responsibility.

The Planning Division's skills in data collection, storage, retention and analysis will be greatly enhanced under the project; so will its project preparation, appraisal, monitoring, and evaluation. By the end of the project, the Planning Division should be more fully staffed with skillful professionals supported by appropriate equipment and tools to carry out their responsibilities.

The Cottage Industries Department currently has 298 positions. A pending reorganization would bring its staff levels up to 512. The divisions of the

Cottage Industries Department that will receive assistance under the project are the Innovation, the Technical Services, and the Training and Education Divisions.

The Innovation Division is responsible for quality control of the cooperatives' edible oil and for the development of new and the adaptation of existing technologies. This division also maintains a technical library for CID.

The Technical Service Division is responsible for such things as physical plant design, assistance with technical problems, upgrading of existing plants, and the construction of new plants. These two divisions channel their services to local level plants and entities through the Training and Education Division, which has branches all over the country.

The Training and Education Division provides training in edible oil technology to cooperatives through seminars, symposia, in-country programs, and practical problem solving at site facilities.

The capabilities of the Cottage Industries Department will be greatly enhanced under the project, which will enable it and its divisions to carry out future programs in upgrading existing screw-press mills, operating new ones, and preparing to begin work on solvent extraction plants. This upgrading will be done by additional equipment for the Innovation Division laboratory (including a lab-size solvent extraction plant), information dissemination equipment, technical assistance, and training.

At the end of the project, the Cottage Industries Department should have better trained personnel and managers with a working knowledge of modern oil processing operations. The Cottage Industries Department's information dissemination activities will have been enhanced and its outreach expanded to provide information and technical assistance to cooperatives and related private sector facilities. Additionally, the Cottage Industries Department will be able to carry out an expanded program of quality control work and will be able to continually update skills through the facilities of an expanded library.

Workshops participating in the project will be provided equipment, tools, raw materials, and technical assistance to improve their operations, particularly in the manufacture of screw-press parts. At the end of the project, these workshops should be better equipped, more productive, safer to work in, and more responsive to expanding their work beyond vehicle repair and more toward oil processing technologies.

The 40-60 screw-press mills participating in the project, both cooperative and private, will undergo major rehabilitation. These mills will also adopt annual maintenance procedures and better managerial techniques, safety measures, and improved storage or seed oil and cake. At the end of the project, these mills should be more efficient, extracting more oil from a unit of seed cheaper and faster. They should also be able to handle more than double the tonnage of seed they now handle with less pressings and resulting in better quality products. The seed-cake resulting will have less oil content, thus increasing its storage life and improving its marketability. The guiding documents used by the evaluation were the Project Paper (PP) and the Project Grant Agreement.*

These two documents identify inputs and outputs and generally describe the project. The project log frame was used by the team as a guide to coherent organization and benchmark measurements (see Appendix B).

B. Intended Beneficiaries

The Project Paper targets local organizations (oilseed processors) as the major beneficiaries of this project. Specifically, this group of beneficiaries will benefit directly from "training in improved management techniques and planning."

Consumers will benefit by increased production of a better quality and more sanitary oil product at reduced cost due to increased plant efficiencies. This is expected to result in improved nutrition for infants, children and women.

*The Project Grant Agreement is presented in Appendix F.

Producers will benefit from correspondence demand for edible oils and price increases in the market place. Finally, the workshops will benefit directly from training in technical and managerial skills.

The Economic Analysis Section of the Project Paper gives further insight as to intended benefits of this project and are as stated below:

Economic Analysis - Benefit Statement:

Introduction. Benefits that will accrue to the economy of Burma as a result of this project are many. First, there are direct benefits which are clearly attributable to the project: those that are readily quantifiable and others that, though they are tangible, do not lend themselves to quantification. Next, there are the indirect benefits which will accrue to the national economy of Burma but cannot be easily attributed to the project without assumptions and qualifications that could raise questions as to their magnitude, if not validity. Examples of indirect benefits are: savings in foreign exchange expenditures for importation of edible oil that would be needed without the project, employment generation, and stimulation of agricultural production to meet the demand created by increased processing capacity. Finally, there are benefits resulting from the multiplier, or spread effect, when more and better machinery stimulates other commercial activity.

IV. THE PROJECT AND ITS PROGRESS

A. Institutional Development

The Ministry of Cooperatives has overall responsibility for the implementation of the project. The MOC is working through its Cooperatives Department to improve overall sector planning, and its Cottage Industries Department is responsible for project implementation and oversight and supervises the technical assistance effort. Both Departments are receiving technical assistance, training, and commodities to upgrade and improve their skills.

1. Planning Division (PD) Progress

The project has the responsibility to upgrade the planning division of the MOC through a training program and technical assistance, mainly through short-term TA. The Project Paper assumed that the planning division would increase its staff from 33 people to a total of 128 during the period 1985-88. This did not happen and the assumption was faulty; hence, the planning division did not have the qualified personnel and could not afford to release the required number of people for training.

Only one long-term trainee for a Master's degree in Macro Economic Planning is in training and under the short-term program two persons received training in Project Management and two in Project Planning and Evaluation for 3 1/2 months each. If the division can nominate other persons for training, there is still a possibility of training an additional 6 persons for a total of 26 months. This should considerably improve the quality of the Department.

The PD has also had the opportunity to receive a total of 12 person months in short-term technical assistance. Nothing has been done in this respect since country permits for these TA experts were not processed in time. With the time left, it is doubtful that this opportunity for the division upgrading can occur.

2. Oilseed Quality Control Progress

Since 1979 CID has been collecting samples of oilseeds, oilcakes, and oils from selected oilmills throughout Burma, from both cooperatives and the private sectors. In the early days, analyses were performed only at the laboratories of the state organization because CID did not have the necessary laboratory equipment. However, during the period 1981-82, basic laboratory equipment for a central reference laboratory was purchased and the first analysis program of oilseeds, cakes, and oils was initiated. The first analysis work was that of determining oil, moisture, rancidity, color and value of product. Most of the first samples were found to have a high residual oil and moisture content. Many of the oil samples had a high free fatty acid content and many were found to be rancid.

It was soon determined that in order to upgrade the capacity for research in fats and oils (to improve quality control), more and better equipment would be required. Since laboratories were non-existent at the oil mills, the government supported a "priority" program to provide the necessary equipment to analyze and provide a quality control system for oilseeds, oilcakes, and edible oil products.

The EOPD project is to supply the urgently needed laboratory equipment for the Central CID Reference Laboratory and for the laboratories at selected oil mill facilities.

The PP specifies that approximately ten mills will be provided with modern laboratory equipment. Some of the equipment, including a spectrophotometer, refractometer, turbiditymeter, among others, have arrived and have been installed in the CID laboratory. Also, a laboratory is in place at the cooperative oil mill in Mandalay and Prome. The equipment for eight additional mills have arrived in-country and will be installed at the mills as the rehabilitation program progresses.

The Innovation Division also received considerable strengthening through the training program. Presently two participants are in training for master's degrees in human nutrition and chemical engineering while one participant

receives a one-year training program in analytical instrumentation. Further, two laboratory technicians returned from a short-term training in quality control and instrumentation. This training has assisted the technicians so that they can now work independently. They both set up a lab in the Prome oil mill.

Approximately $121,000 dollars have been obligated (105 percent of the total).

3. Technical Services Division of CID

The technical division of CID, which is responsible for plant designs, rehabilitation of plants, construction and solving of technical problems and which works closely with the Innovation Department, profited from the project through training of its employees. One employee is presently in the U.S. for a master's degree in Fat and Oil Technology and one mechanical engineer will return in July 1988 from a one-year special training in order to act as a counterpart to one master mechanic.

4. Training and Education Division of CID

This department, which is a new department under CID and which was transfered only recently from the Ministry of Education, is responsible for training and the arrangement of training courses and seminars in the area of technology and trade.

No training has been provided to this division through the project. The CID technical library, which will receive books and equipment in the amount of $68,000, has been transferred to the Innovation Department. This division could benefit greatly from short-term TA to upgrade their planning and administration.

B. Workshop Improvements

The role of the Industrial Producers' workshops was outlined in the PP (Pg 36) to "undertake all rehabilitation of mills. This role will be to manufacture or

rebuild parts as required to assist mill owners in the installation of relatively sophisticated equipment and parts."

The PP also stated that the workshops are to be "provided with materials such as hard steel and with additional machinery, tools and safety equipment as well as technical assistance and training to carry out this work," and "all technical aspects of the project are routine activities. The project will simply improve upon these activities."

In general, the plan was to:

(1) upgrade the workshops' capability, capacity and quality; and
(2) use workshops to fabricate and rebuild expeller parts.

The TA Team has been working with the shops and has had mixed success. However, overall this part of the project seems to be going very well and would not appear to be as far behind schedule as the Major Implementation Events would indicate. The major problem has been the slip in schedule for equipment and material delivery.

A potential problem could arise if technical assistance in the form of short-term training for the proper use and maintenance of machine tools does not occur. Most of this training will be necessary and can do the most good after the machine tools and equipment arrive.

Commodities for upgrading the four target workshops, and fabrication of required parts are "in the pipeline." The most urgently needed ones are at sea and should be available within ninety days.

Under guidance of and sometimes to the amazement of the Technical Assistance Team (TAT), the IPC workshops have been fabricating expeller parts from available materials and with existing equipment. Except for measuring instruments and TAT input, this condition prevailed until one of the ST/TA

consultants, Dr. Peter F. Wieser, introduced basic heat treating techniques.* Some of the workshops now perform hardfacing, chill casting, alloying and tempering heat treatments. Also, they have been shown how to increase output through mass production and machining.

A description of the targeted workshops follows:

- Pegu is the only syndicate workshop in the project. A new manager, replacing the recently deceased one, initially was slow in communicating decisions. This situation is improving. There is ongoing hands-on training. Major equipment on order includes the following:

milling machine	cut-off saw
radial drill	shapers
heat treating furnace	blanchard.

- Meiktila is highly skilled at all levels and innovative in the main skill areas. They have excellent foundry skills and electroplating capacity. They need some help in mass production techniques. They have already implemented new machining, casting and heat treating skills provided by the TAT. Machinery on order includes:

  milling machine tools,
  hand tools, and
  chemicals.

- Naung Yoe is a highly motivated older, but clean, workshop. They have a superior work force trained at the local technical school with graduate engineers and metalurgists on staff. They have sufficient electric power and natural gas. They have excellent foundry skills and are innovators in producing parts. They could use some help on mass production techniques; however, they have increased daily production of cage bars from an initial less than 2 to a current 60 and have a goal of over 150. Equipment on order includes an induction furnace which will make them capable of casting steel parts.

- Sein Pan is the newest cooperative society and consists of over 50 private, established independent shops joined together for the benefits of cooperative purchasing, marketing and complementing talents. They are erecting a new building, have strong and eager management, a large variety of skills, and the potential to be the best and largest workshop in Burma. Equipment ordered includes:

  Milling machines
  Lathes
  Surface grinders
  Induction furnace
  Misc. tools and materials.

*See Appendix G.

Throughout this project, and in other written reports, reference is made to "inferior" Burmese parts. This phase bears clarification in that it infers poor workmanship. This is most definitely not the case. The IPC workshops have done a remarkable job of using what is available.

There is no high strength steel available in Burma. There are two steel mills. One in Rangoon produces reinforcing bars and the other in Maymyo produces pig iron. None of the IPC workshops currently have facilities to cast steel. They do, however, most ingeniously make quality iron castings from scrap cast iron. Also there is no local acetyline supply for oxy-acetylene burning and cutting. Therefore, any large pieces of cast iron must be either sawed or broken into sizes small enough to charge their blast cupolas. Tools available in the workshop were suitable and most skillfully used to rebuild internal combustion engines. They were not suitable for mass producing and machining expeller parts to the tolerences required.

C. Oil Mill Rehabilitation

The project consists primarily of the rehabilitation of 15 oil mills and upgrading of four workshops. The oil mills in general are old (40-50 years) and require extensive modification and rebuilding.

In many instances the AID project paper, ACDI proposal, Project Grant Agreement and Implementation Plan do not agree particularly in details, and most of these do not coincide with the actual work in progress.

To establish a reasonable work plan for oil mill rehabilitation, the PP properly noted (Pg 89, first line) that "Procurement of materials to fabricate spare parts to support the 15 oil extraction mills should be the number one priority." This is also reinforced by the PP, Table 6. Major Implementation Events (Pg. 24) which shows "Issue PIO/C for first commodities needed for TA Team" scheduled for one month following "Project Agreement Signature" and "Arrival of first group of commodities" scheduled for two months prior to "arrival of TA Team at post." Again these are labeled as Major Events.

The PIO/Cs for the commodities referred to above, and shown in Table C. II Equipment Vehicles and Material Specifications (pg. 102, PP), were not issued prior to the TA Team's arrival at post. In fact, the TA Team put considerable effort into issuing these PIO/Cs .

A comparison of the implementation as scheduled and actual will readily point to the problem. Two of probably the most important early events were not properly handled. First, the PIO/Cs for the first group of commodities were not issued as required during month one after Project Agreement. Second, the TA contract was not awarded during month seven after Project Agreement.

Except for the ingenuity of the TA Team, Burma's IPC workshops and the willingness of the oil mill management, the two delays above could have caused a twenty-six month delay in the implementation plan.

The Project Paper in many areas developed misleading and sometimes erroneous data. The TA Team found that the original estimates of work to be done were greatly underestimated.

The TA Team, soon after arrival, determined that due to lack of material, data, specifications or manuals, the oil mills had substituted improper materials and parts. They modified operating methods to suit local conditions, i.e., multiple pressing and little or no steam tempering or cooking, resulting in poor performance in all evaluative areas.

Methods of rehabilitation suggested by the Project Paper in some ways could not be employed. Furthermore, and perhaps of greater importance, is the fact that most expeller gearcase transmissions were in extremely poor condition, due in part to age, but more to the lack of bearings, gears, good lubricating oil and grease, and resulting in failure of most thrust bearings. The oil mills and most workshops have tried over the last 50 years to repair and/or substitute these bearings. Local repairs last only a few weeks and each breakdown results in extensive damage to the gears and shafts. Because of this, most of the expeller pressing shafts rotate in an elliptical pattern to such an extent the pressing parts are ground undersized and productivity is reduced by as much as 80 percent in some instances.

In addition, no actual manufacturer data, specifications, manuals or parts and therefore no knowledge existed in Burma regarding proper sizes and shapes of pressing parts, even if proper materials to make them were available in sufficient quality.

Obviously, oil mills could not be rehabilitated until:

(1) the transmissions were repaired; and

(2) until proper replacement parts were either manufactured in Burma or purchased from the outside.

It was apparent that a new plan must be developed providing for the repair of transmissions and the ability to manufacture according to specifications.

The TA Team determined that oil expelling machines most suitable for rehabilitation were made by at least four different suppliers and were of differing designs. A decision was made to quickly bring some of these machines close to the original design and standards using best available material and technology (BAT). Then in order to reduce the machine complexity, standardize parts and reduce the number of various parts, a further decision was made to convert all machines to a single, basic common "Burma design." This design includes a cage bar barrel of constant diameter and a worm shaft of diminishing volume (to account for lost oil volume). The diminishing volume is accomplished by increasing the shaft diameter and decreasing the worm pitch.

The team developed the following strategy:

1) To import bearings, gears and special parts from original manufacturers.

2) Import materials and machinery to manufacture needed replacement parts.

3) Design new parts made of materials readily available and employ existing skills as much as possible.

4) Transfer sufficient technology to manufacture parts of "special" quality (i.e., cast iron alloys); employ heat treatment techniques to improve parts' longevity.

Based on this new plan, it was essential that workshop upgrading be given the highest priority as a basic element to self-sufficiency and as an intermediate measure because it was known that important materials could not arrive in Burma during the first year of the project.

Two main differences exist between the PP and the actual mill rehabilitation design as implemented by the TA Team. First of these is that the PP called for bringing the expellers back to near original specifications. This would have meant specifying and making close to 300 separate parts. The TAT standardized the expeller design to the "Burma design" cage and worms, adaptable to all machines, which requires less than 10 separate parts. This was a good decision which should simplify and expedite the project.

The second difference is that the PP was based on fabricating steel worm shafts by welding, machining and heat treating steel assemblies. Working with available materials, equipment and technology, the TAT has been fabricating specially alloyed cast iron worms, collars and cage frames. This also has been a wise decision based on the then, and now, existing lack of material and equipment. As of this writing, raw material, i.e., steel stock, has little chance of delivery before September or October.

Under the revised implementation plan, six oil mills started rehabilitation by working on boilers and steam systems with available materials. The workshops also used available material to make parts as directed by the TA Team. Installation of these parts and some process modifications, i.e., increased expeller speeds and two feeding one for a second pass, resulted in immediate production increases and less oil retained in the cake. When the next expellers wear parts are made with the forthcoming harder materials, the increased production can be maintained for longer periods before tear down and rebuilding is necessary.

The addition of TAT designed, and workshop fabricated, steam-traps along with condensate return systems has resulted in as much as 25 percent fuel saving and will also increase the efficiency of the boilers for longer periods between tube cleanings. While there are problems associated with starting up the "Burma design" prototype in Prome, other oil mills have heard of the initial

results and are anxious to get inputs for their mills. While we were there for our survey, the Sagaing mill told Dr. Prue that they would like to have a Quality Control Laboratory installed. They had resisted this previously.

Oilseed mills rehabilitated under the EOPD project will be capable of producing at least 200 percent more edible oil when measured against the start of project status. This has already been shown to be feasible in the mills where initial rehabilitation work and process changes have been made as the following statistics indicate:

Mill	Start of Project		Current	
	Lb/Day	R.O.C.	Lb/Day	R.O.C.
Mandalay	23,320	10/11	43,200	7.5
Sagaing	21,600	8.4	36,000	8.4
Magwe	49,280	7.2	75,600	7.2
Prome	4,560	8.6	10,750*	7.5
Taungtha	2,940	7.9	6,500*	7.5
Meiktila	3,390		10,750*	7.5
Total	104,970		182,800	

ROC = Retained oil in cake, percent.

*Projected capacity based on data from 8 hours operation.

The above figures are based on initial rehabilitation efforts only.

Operating under the same conditions of percent oil in seeds and cake, the above represents a 174 percent increase in output. However, if we consider that the rehabilitated expellers will also give a lower residual oil in the cake, the above figures represent an increase which is consistent with the results predicted in the Project Paper.

An output specified in the PP is "Rehabilitated screw-press oil mills processing at a minimum of 75 percent capacity...." The standard capacity, worldwide, for a six-inch diameter main pressing shaft is 500lb./hr. with 15HP applied. A 15 HP "Burma design" expeller is expected to be capable of pressing 400 lb/hr.

Recommendation:

Project direction for the oil mills and workshops should be changed slightly from the initial implementation plan and the revised TAT plan.

First Priority -- Successfully install the Prome "Burma Design" prototype expeller. This may be done by taking the expeller cage to a workshop for assembly which will provide the following:

1. Availability to machine tools for any required fitting.
2. Hands-on training for workshop personnel in expeller fit-up.
3. Lessen tensions existing at mills because of misfitting parts.

The above would also be another step in making the workshops the expeller rebuilder. They should emerge from the project with the skills, equipment and designs to fabricate and repair expellers. Each workshop should have their own expeller expert who would be trained and knowledgeable. Since oil mill repair will initially be a small part of the workshop's business, the expeller technician will have to sell their services to all mills. Since they have the most to gain, this is the logical subsector to sustain and expand the repair and fabrication technology. It is feasible and desirable that the workshops stock sufficient spare parts to rebuild oil expellers on short notice.

Oil mill TA should be aimed at preventative maintenance, process analysis and development, quality control and sanitation. More emphasis should be put on drum cleaning and handling. They should be encouraged at every opportunity to develop a buy/sell price policy based on seed and oil quality. MOC-CID should concentrate on central quality control to back up all plant laboratories; research into industry wide problems, i.e., adulteration, aflatoxism, product standards; development of information and products; and extension services for the industry. They could organize and sponsor seminars starting with the available ST/TA staff; develop training courses for area technical schools (note remark on Naung Yo IPC workshop); organize annual meetings where oil mill managers get together to share problems and solutions, or for oil mill managers to air problems with workshop managers to arrive at solutions. Also MOC should work for the above mentioned Quality/Price relationship.

Second Priority -- Complete the drum cleaning facility at Mandalay and prove the expected benefits of extended storage life and better quality delivered product resulting from better sanitation.

High quality oil cannot be produced in an unsanitary plant. If a clean, high quality oil is produced, stored in proper clean tanks and if sanitary containers are used for distribution, the shelf life of the oil will increase dramatically and then distribution problems will be much easier.

D. Project Inputs

1. Technical Assistance: Current Status vs. Planned

Technical assistance has been provided by a three-member expatriate team that works through the MOC to provide assistance to strengthen the Ministry, its cooperative workshops, and private and cooperative oil mills. The TA includes also a short-term component of more than 12 experts involving short visits to Burma mainly for training and advice in special areas, and which should supplement the three-man consultant team. The short-term consulting team is also discussed in the training section.

The TA Team was interviewed and selected jointly by AID and MOC. They arrived in country in October 1986, fourteen months after signing of the Grant Agreement, four months later than scheduled in the Project Paper.

At that time, most of the support commodities had not arrived and transportation was not available to visit the project sites. Until the arrival of their personal vehicles on April 9, 1987, six months later, the team had to hire temporary transportation. Presently their personal vehicles are being used for project vehicles, awaiting the issue of government 4-wheel drive project vehicles. However, at the present rate of vehicle supply, the last car will be received after the Project Assistant Completion Date (PACD).

At the suggestion of the Ministry of Cooperatives, the project area has been divided into two major sectors. The Northern Sector has been assigned to one master mechanic stationed in Mandalay and the Southern Sector to the

other master mechanic stationed in Rangoon. The Team Leader is coordinating the activities of both sectors and acts as chief advisor in respect to oilseed processing. His change saved considerably on travel time by the team, but there are no provisions made for office facilities in Mandalay and the master mechanic is greatly dependent on office equipment of an Australian development team.

The TA Team must be commended for their work progress and for the quality which has been achieved in spite of the lack of transportation, long decision-making, and approval procedures by MOC and with practically no commodity arrivals, which forced them to work entirely with local material. This achievement was, no doubt, due to the technical skills of the team members.

Soon after team arrival in the country, the team discovered that the Project Paper had in many areas developed misleading and sometimes erroneous data. Methods of rehabilitation suggested by the Project Paper, simply stated in some ways, could not be employed. The team, therefore, developed a new implementation plan which was more realistic for actual conditions.

The team, although not stated in their scope of work, spent considerable time writing qualifications for selection criteria for participant trainees (long- and short-term ones), designed and selected training programs and orientations.

One of the major responsibilities of the TA Team is the writing of the specifications for the PIO/C, and the Mission depends heavily on their input in getting the commodities into the country.

Especially in the Northern Sector of the Mandalay Region, good progress has been achieved and relations between cooperatives and the technical advisor are excellent. Travel requests are promptly granted since it concerns only the Mandalay Region, and since the master mechanic lives within the region, approval can be granted within an hour on the regional basis.

It seems that the team was mainly selected due to their technical skills and to a lesser extent because of being familiar with work conditions in

developing countries, as the PP proposed. In some instances insensitivity to Burmese culture by some team members put considerable strain on the project and is damaging to the U.S./Burmese relationship, which is supposed to be enhanced by this project. This situation even puts a strain on the relationship within the MOC. The TA Team must make every effort to explain to their counterparts the reasoning for their actions and decisions. It must be a part of the training. Many misunderstandings in the past seem to have originated because of not understanding some actions and therefore reluctant cooperation occured.

According to the PP, both departments will receive technical assistance and training.

To achieve these objectives, the Evaluation Team believes that the TA Team must seek to build trust, professional credence, respect and rapport. It is also implicitly implied that the TA Team will be officed with their MOC counterparts in order to readily commute with each other and to provide the MOC with technical assistance and training in order to upgrade MOC capabilities. Relocating the TA Team's office to the TA Team Leader's home was not in the best interest of the project and has resulted in delays in project implementation.

Further, placement of the computer in the Team Leader's home may have been necessary under the circumstances, because of the lack of necessary electrical services. However, such action has mainly precluded the teaching/training of counterparts in computer technology.

The largest problem that the project now faces is the late arrival of many parts, materials and equipment. Some of the commodities may arrive when the master mechanics are due to return home.

The Evaluation Team therefore suggests that taking, in consideration the interests of the project and within the present contract arrangements with ACDI, the person months of one master mechanic should be increased from 37 to 48. This would allow the presence of one master mechanic to work with the Team Leader to the end of the project.

Under the PP arrangement, twelve short-term consultants should give advice and training at 12 person months to the workshops and mills in mechanical repairs and equipment operation, at 12 person months to the CID in metallurgy, nutrition, quality control and material handling, and 12 person months to DP in areas of planning, economic analysis, statistics and financial analysis. Only two consultants, a metallurgist and a commodity expert, have been utilized at this time.

ACDI should make every effort to submit qualified experts for country approval to the MOC. The Evaluation Team suggests that a carefully prepared work plan schedule for at least one-year at a time be submitted to the MOC to be approved in one package.

Recommendations:

- The evaluation team recommends that the TA Team be officed with MOC counterparts as soon as possible.
- The TA should be increased by 12 person-months for one master mechanic to insure that late-arriving materials are able to be used efficiently in the project.

2. Training: Current Status vs. Planned

The comprehensive training plan of the project consists of long-term academic training, short-term overseas training, overseas observation tours and in-country training. The trainees will be chosen from the two Ministry of Cooperative Departments: the Cooperatives Department, responsible for sector planning, and the Cottage Industries Department. The purpose of the training program is to increase the capabilities of the MOC to plan, implement, monitor and evaluate projects and in general to upgrade and improve skills of individuals involved in the project's program to ensure sustainability of the project purposes after project completion. According to the PP, the project will provide funding for long-term training (5 M.Scs and 6 one-year training) participants in the U.S.A., 20 participants for short-term special training in the U.S., and 45 participants for observation tours overseas.

The following chart depicts the actual implementation of project-related long- and short-term training:

Long-term Academic Training

The PP did not assume that the TA Team would be involved in the planning of long-term trainees. The first group of trainees should have been selected by the MOC and AID and then sent off for the spring semester in 1986. All the nominated long-term candidates should have been in training not later than the fall semester of 1987. However, due to a lengthy selection procedure by the MOC and a lack of knowledge regarding types of study available and subject course outline, most of the training candidate selections occured when the TA Team arrived.

The first six long-term trainees finally started their program in the fall semester of 1987. This is one and one-half years behind schedule and none of the planned remaining five trainees (one MSc degree candidate and four one-year trainees) had left the country by June 1988. The names of the five candidates have been forwarded to the cabinet and are awaiting cabinet approval, a very lengthy procedure for which no provisions have been made in the original PP implementation plan (and also in the revised one by the TA Team). Four of the six participants in training are M.Sc. degree candidates in macro economic planning, human nutrition, food technology and chemical engineering and two are non-degree candidates for one year's study in mechanical engineering and analytical instrumentation.

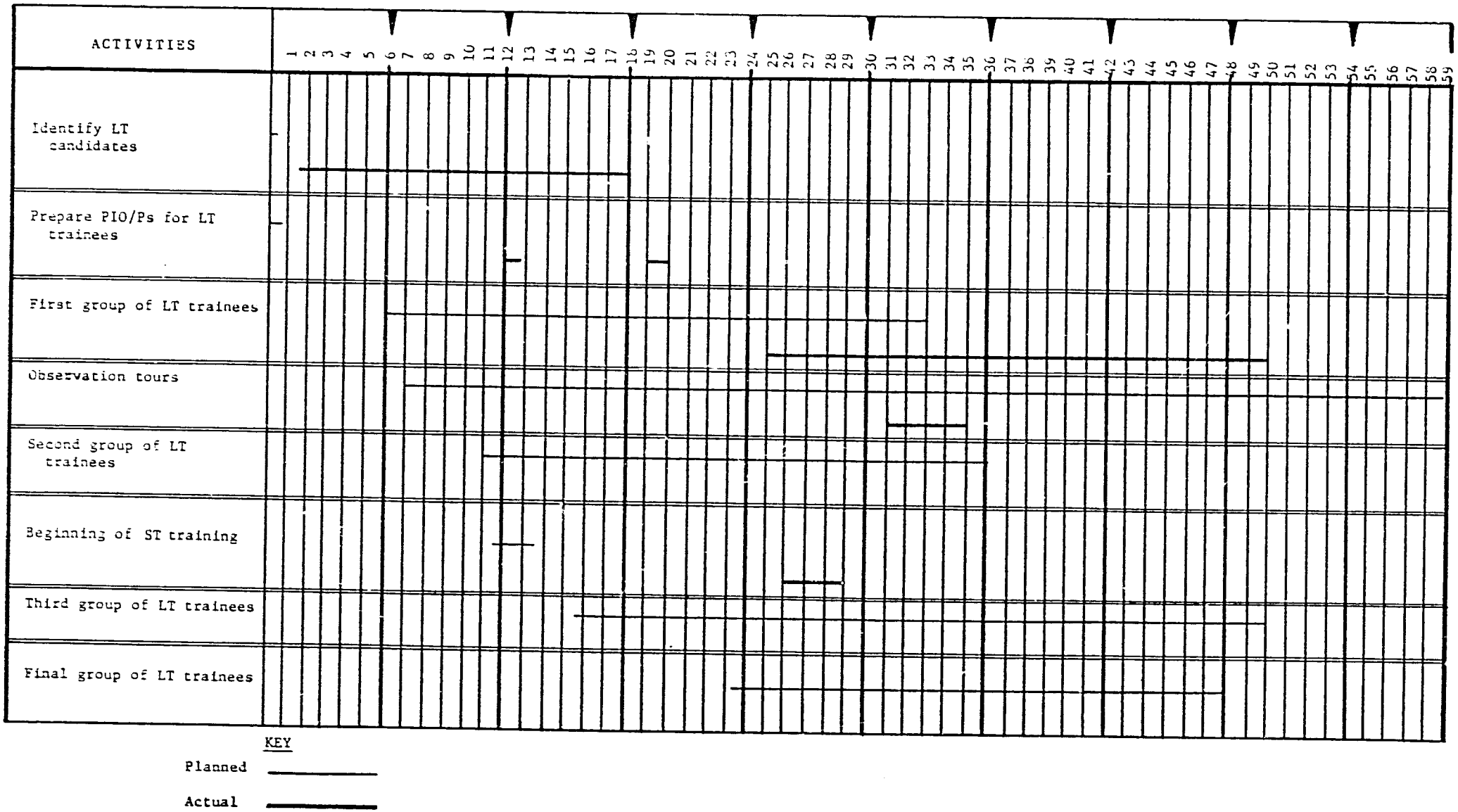
The remaining fields of training are supposed to be in economics (engineering), industrial engineering, metallurgy, computer programming and fats and oils chemistry.

There may be time enough in the project to train candidates for a non-degree if they could enter the program before the end of 1988. There is certainly no time left for a Master's degree training. The evaluation team had the impression that economists could make the largest impact in Burma and therefore training should be emphasized in this field.

FIGURE 1

TRAINING - IMPLEMENTATION OF ACTIVITIES CHART

(Months After Project Agreement)



Short-term Overseas Training

Twenty trainees totaling 70 person months are planned in the PP for out-of-country training. Ten should be chosen from the Cooperative Department in Planning Division to be trained in project management, business management, project planning and evaluation, financial management and oilseed and oil strategy, totaling 30 person months.

Presently, four persons have been trained totalling 12 person months in the field of project management and project planning and evaluation, which amounts to 35 percent of the planned training at about 50 percent of project completion.

Ten persons from the Cottage Industries Department should be trained in edible oil processing, nutrition, use of laboratory and quality control and computer maintenance totalling 30 person months. Presently, four persons have been trained totalling 12 person months in the field of computer maintenance and use of laboratory and quality control. This approximately meets the target for this program.

Short-term training has been fruitful, as has been evident to the Evaluation Team from conversation with superiors of returned trainees. It was pointed out that they can now work on their own and are able to make decisions which they were unable to make prior to their training.

The short-term training program, in terms of types at training, has been slightly altered from the PP version in the new implementation plan provided by the contractor; however, the originally proposed number of persons and person months were not changed.

This is one of the project's programs that is not lagging too far behind schedule and has some flexibility.

Observation Tours

According to the new implementation plan, a total of nine tours consisting of not more than five persons instead of the original 15 person per tour

each are planned to the U.S., Europe and South East Asia in order to visit oil seed extraction facilities and to observe the operation of oilseed expellers/presses, solvent extraction, oil refinery, bottling and distribution systems, and expeller manufacturing techniques. As of the date of this evaluation, two tours have been conducted: one to the U.S. and the other to Europe. It is doubtful that this program will reach its target by PACD at the present rate of tour frequency.

It seems that these tours are the most expensive part of the training program and are of doubtful value. Should there be a cut in project budget funds, this program should be cut first.

Training for Ministry of Cooperatives

Type Areas	No. of Persons: Entity (Revised) by PACD	No. of Persons: Planned	Person/Month: Present	Person/Month: Planned by PACD	Person/Month: Present	Skills Implementation Plan
Short-term	PD	10	4	40	12	Project management, Business management, Financial management, Oilseed and oil strategy
Short-term	CID	10	4	30	12	Edible oil processing Nutrition, use of laboratory and quality control Instrumentation, computer maintenance
Long-term	PD	1	1	24	24	Financial analysis and macro-economic planning
Long-term	CID	10	5	168	60	Fats and oil chemistry metallurgy, food technology, human nutrition, mechanical engineering, computer programming
Observation	MOC Coop	45	10	45	10	Oil extraction, oil expelling, refining, bottling, distribution

In-Country Training

About 12 short-term specialists are proposed to visit Burma one or more times to advise, instruct and train department and division personnel. This program is described in the PP as short-term TA, but probably will provide more training through seminars and workshops than straight TA. In total, 36 person months of training/TA are planned (12 pm for workshops, 12 pm for CID and 12 pm for PD). The training/TA will cover the following areas:

- data collection, analysis, computer programming, marketing, project design, macro and section planning;
- solvent extraction operation, instrumentation, metallurgy, nutrition, quality control;
- financial analysis and macro-economic planning; and
- chemistry, packaging, oil extraction, refining, bottling, and distribution.

Mill and workshop personnel will receive informal on-site training and informal courses established by the ILO from the long-term master mechanics and the short-term specialists in the following areas:

- Machine shop operation metal fabrication, hardfacing and heat treatment;
- Quality control and calibration of precision measurement tools;
- Knowledge of steel products and their application;
- Mechanical properties, machinability, and weldability;
- Knowledge of product safety requirements and ability to establish an acceptable safety program;
- Preventive maintenance (for machine shop equipment);
- Operation of new equipment;
- Installation of new equipment; and
- Use of precision measurement tools and their application.

More specific training will be directed to the following:

- blue prints and blue print reading;
- boiler rebuilding and condensate systems;
- manufacture of steam traps and steam water separators;
- cooker design and manufacture;
- expeller parts manufacturing and hardfacing;
- chilled casting; fabrication of storage tank and vessels; Drum cleaning, maintenance and modification;
- development of field facilities; and
- proper oilseed storage facilities.

Further, the TA Team will set up from time to time seminars in certain areas and daily hands-on training will occur at the job site.

Presently, only one commodity procurement advisor and a specialist in metalurgy and casting methods visited the project for one month. The latter one held several short training sessions in metalurgy and casting methods at different sites of the project. From interviews of participants, it was concluded that this type of workshop was most successful and learned experience was put to practical use by several workshop participants, as was observed by the Evaluation Team. Several of these experts should have been recruited; however, the major constraint in the past was the slow country approval of these experts, who usually have a busy schedule and can be available only by advanced appointment for a specific time frame. In spite of the six-months' time for the Burmese Government to approve these experts, late visa issues and therefore last minute deferrals of start-up training dates resulted in cancellation by the experts since they had other commitments for the time frame and were unable to change their schedule. Hence, two of these experts' visits were cancelled. Another expert was cancelled the last minute due to health reasons. The Evaluation Team had the impression that ACDI, who is responsible for these short-term TA/trainees in their contract, did not put enough effort into the selection and presentation of enough experienced short-term experts. Also, it seems

that the Ministry prefers to grant visas for two to three months to fewer experts rather than one-month visas to several more instructors.

Only one workshop was conducted by the TA Team in Mandalay; however, it was successful since it convinced several township councils of the benefits from the project program and they changed their policies in favor of oil mill rehabilitation and changes in production policies.

Recommendations:

- No long-term participants should be sent for training after the end of 1988.
- All efforts should be made by ACDI and especially the SRUB to arrange for in-country training by experts in special subject matters. Two-month long stays instead of one-month stays should be arranged if it speeds up the country clearance process.
- Observation tours should be discontinued.

3. Procurement and Commodities

This project has a rather large equipment and commodity import program. The total commodity part of the Project Paper is U.S. dollars 4,316,000, which is 45 percent of the total project costs. SRUB expects a large part of the project costs to be in the form of commodities; on the other hand, it is required for project support. The project requires imported parts such as bearings, gears, etc., from the original manufacturers of oil mill equipment since these parts cannot be produced in Burma. Imported materials such as certain steel and machineries to manufacture needed replacement parts in Burma must also be imported. Other procurements were required for vehicles for the TA Team for private and project use, laboratory equipment for the oil quality control laboratory, books for the library, household furnishings for the TA Team, a bench solvent extraction plant, and $250,000 were required for a purchase agency in the U.S.

These purchase plans have been altered for various reasons but have not been recorded in the project files or officially approved to alter the project

inputs. The following chart shows the current status of commodity procurement including the amount earmarked as compared to the PP amounts.

Commodity Procurement Status

	PP	Present	
Equipment for Workshops	$1,495,000	629,000	
Material for Mills	$1,623,000	1,140,000	
Bench Model Solvent Extraction Plant	$ 500,000	-0-	cancelled
Vehicles	$ 78,000	35,000	
Procurement Services	$ 250,000	250,000	
Laboratory Equipment	$ 115,000	121,600	
Household Furnishings	$ 105,000	80,000	
Library Books	$ 100,000	28,000	
Office Supplies	0	40,800	
TOTAL	$4,266,000	2,324,400	

The project is now in its 34th month and only a few commodity items directly related to the progress of the project work in the mills or in the workshops have arrived in Burma. What has arrived as of this date is some laboratory equipment, a few hand tools, three vehicles and household furnishings for the TA Team. Even the household furnishings, for which the PIO/C was written in time (September 1987), arrived at the project site 16 months later, or 4 months after the team arrived in country (since it took 10 months to clear the items through the Burmese customs).

The household furnishings were planned to arrive in month 10, but actually arrived in month 17. The first commodity group for the workshops and mills should have arrived in month 19 and the last of the shipment should have been distributed between months 25 and 36. Now, in month 34, nothing has arrived and the first major sea shipment containing workshop equipment

purchased from U.S. government surplus cannot be expected before month 35. Major materials such as steel for the workshops and spare parts for the mills have just been tendered for by supplies in June 1988 and will probably not arrive in country before December 1988 (the 40th month of the project). Only one shipment consisting of steam traps and special steel arrived by air in March 1988 and has just now (3 months later in July) been cleared by customs.

The reasons for the delay in commodity arrival are many, but many of them could have been avoided if an AID personal service contractor experienced in commodity imports had been employed by the Mission. He could have advised and prevented many of the pitfalls that the project experienced in the beginning. Many of these mistakes are now being avoided and commodity import should be accelerated.

The reasons for the delay are as follows:

(1) The Mission followed the specifications as outlined in the PP for PIO/C before the TA Team arrived and received approval from the ECC. After the TA Team arrival and a subsequent workshop survey, they made 436 revisions to the machinery list in January 1987 and resubmitted the list to ECC. ECC was reluctant to change their earlier approval and they returned the list in June 1987 with only one revision, demanding that proper specification must be written for all new items before approval can be given. Specifications were written and final ECC approval came on November 15, 1987.

(2) Some PIO/Cs were held up in the Washington AID procurement office for six months claiming there were too many small PIO/Cs. They combined some very unrelated PIO/Cs and made mistakes in the process of translations which resulted in further delays and complications during customs clearance in Burma.

(3) The procurement consulting company RONCO, an 8(a) company, had no experience in shipping and procurement of highly technical equipment and material. Frequent confirmation and approval from the TA Team was required until they assigned a more experienced person for the procurement and shipping.

(4) Commodities arriving in Rangoon are held for an inordinate length of time by customs. This has mostly resulted from two problems:

a. Customs will only release commodities with the Bill of Lading, first copy. When items are transhipped, the second shipper holds the "first" copy and issues a "true" copy which is not acceptable to Burma Customs. MOC has found a way to work around this.

b. If the wording on the Bill of Lading does not match wording on the ECC list, it will not be released. This problem was amplified when the Purchasing Agent had commodities directly shipped from suppliers. The problem has been handled by having all shipping papers originate with the Purchasing Agent. Wording on the documents is telexed to the TA Team in Rangoon who edits and telexes the revised version back to the Purchasing Agent.

(5) There was also a considerable delay in ordering the books for the library. After lengthy correspondence between USAID/Burma, AID procurement in Washington and RONCO, it was decided that the American Overseas Book Company should be the purchasing agent, but this resulted in further delays since their contract with AID had expired. A price quotation and list of available books was finally received, reviewed and approved by AID/Burma and sent on to the TA Team for their review. It is being reviewed and revised by AID/Burma as of this writing.

Several items, such as the solvent pilot plant valued at $500,000, have been cancelled. Solvent systems research does not seem to be applicable in Burma at the present time since the electric power at CID is not sufficient and solvent plants require strict safety precautions which are difficult to enforce in Burma. The major reason was that the ECC decided that foreign exchange could be utilized more effectively on other material. The Evaluation Team could not find any documentation in the project file that approved such a major change in project inputs.

Decorticators for sunflower seed in the amount of $75,000 were also cancelled. With these cancellations and most of the required material and equipment specifications ordered to ensure sufficient material to upgrade the required oil mills during the project time, approximately $1,941,600 is left unearmarked for procurement. The Evaluation Team believes that $503,000 should be sufficient for the additional purchase of items such as alloy ingots, welding rods, tools, etc., to last for the remaining time of the project. Hence, the project inputs for the procurement of equipment for workshops and rice mills should be reduced by $1,500,000.

Financial Arrangement for Commodities

In order to finance the commodities, cooperatives and private mills (which according to the PP should have equal access to funds) should be able to borrow from the Myanma Economic Bank at the same interest rates. This point was covered in Covenant #4 of the Project Authorization which states "The

Cooperating Country shall covenant that it shall make every effort to ensure that loans made available to cooperatives, private sector organizations and other entities in furtherance of the objectives of the Project shall be made available at an interest rate not to exceed six (6) percent per annum over a period of twelve (12) years, except as AID may otherwise agree in writing."

The same point is covered in the Project Grant Agreement; however, it does not refer to the private sector and the explicitly stated loan interests are changed. The Project Grant Agreement Covenant C states "Loans to Implementing Agencies: The Grantee shall make every effort to ensure that loans made available to cooperatives and other entities in furtherance of the objectives of the Project shall be made available with similar terms and conditions which are applicable to those projects implemented by the Cooperatives under bilateral grant assistance."

From interviews with SRUB officials, the Evaluation Team concluded that the government does not have any intention of providing loans to the private sector under these terms.

The Evaluation Team thinks that AID/Burma and AID/Washington ANE should decide how to rectify the inconsistency between these two documents, either by project amendment that would also include all revisions to inputs and outputs of the project, or by an amendment in the project authorization.

USAID/Burma clarified a related point also in PIL No. 14 dated March 16, 1988, since it was omitted in the Project Grant Agreement and very vaguely expressed in the PP. This PIL described that workshops and mills are expected to pay for the C.I.F. costs of equipment imported and that: "it is AID's policy that the local currency proceeds generated from the sales of the commodities would be returned to the grantee's implementation agency, in this case to the Ministry of Cooperatives, for uses that would be agreed upon between the Ministry of Cooperatives and AID/Burma." Presently, cooperatives pay only for customs duties and other local charges associated with the import and local transport of the important commodities. The MOC stated verbally that it does not have a system for charging the workshop and mills, but that they are accounting for those charges should such a system be developed. Other bilateral donor projects are working on the same basis.

Recommendations:

- AA/ANE and AID/Burma resolve the inconsistency between the project authorization and the Project Grant Agreement regarding the payment of loan funds to the private sector.

- Urge the SRUB to develop a system to make it possible to charge payments for import commodities into a special account to be regenerated for development work.

4. Host Country Inputs

New Staff Employment

Overall, the Project Paper assumed that CID would bring the employment level up to 512 from 298. Presently, the approved level is 402. There are actually 313 employees and 89 vacancies. It will probably take several years until a reorganization is approved, which would result in a much higher employment level. Activities of the new hire employees are not specified in the PP.

Most of the new staff are employed by the Training and Education Division. There is certainly a shortage in mechanical engineers in the Technical Division and the Division could clearly benefit from the addition of two or three well-trained engineers. SRUB is falling behind in its contribution to the project, only 7 percent of targeted funds have been contributed to the project. The team suggests that MOC utilize some of these unused funds to hire qualified personnel to be sent for participant training, if such persons cannot be found in the present staff.

Since AID would not normally want to encourage increased government intervention, particularly in the current economic environment, the Evaluation Team recommends that AID not ask for fulfillment of this part of the PP.

Note: New hire recurring salary obligations (for 95 employees) will be about $37,000 annually for the SRUB, if the average salary is only Kyats 200 per month.

Host Country

The host country inputs are detailed in Appendix E. They are summarized below:

(1) Port handling costs and inland freight for all imported items under the project.

(2) Land and buildings for production and processing activities, office space, a limited number of vehicles, and in-country travel.

(3) Salaries for trainees and replacements, supervisors and support staff, language training and other local costs, financial and in-kind including loan administration costs associated with the project.

(4) Utilities, support staff, office space, vehicles and drivers, office equipment and suppliers, and in-country travel for the technical assistance team.

(5) Local expenditures for laboratory and library supplies and facilities, including administrative and operating costs of the facilities.

(6) Operation and maintenance costs by four workshops and 60 mills for fabrication, rehabilitation, and annual rebuilding and maintenance of expeller parts.

The host country contribution understates the magnitude of the government's involvement in the project because of the relatively low monetary value of expenditures for staff and the low salaries in the cooperative and private sector.

Actual host country expenditures are shown in the following tables.

TABLE 2

BURMESE CONTRIBUTION (FROM CID)
EXPENDITURE FOR THE EOPD PROJECT
(In Kyats)

Sr. No.	Particulars	1986-87 Actual	1987-88 Actual	1988-89 Estimated
1.	Labour	1426	16295	10000
2.	Duty & Taxes	-	71431	30000
3.	Rent	55533	44166	100000
4.	Transportation	17645	130	10000
5.	Office Supplies	2974	1178	5000
6.	Fuel	-	7565	27000
7.	Telephone & Telex	-	460	15000
8.	Electricity	-	19720	50000
9.	Books and Newspapers			1000
10.	Raw Material			46000
11.	Printing & Publishing		385	5000
12.	Expenditures	127794	30340	190000
13.	Maintenance			
	(a) Machinery		300	10000
	(b) Building		7360	6000
	(c) Vehicles		625	5000
14.	Training		-	40000
15.	Salaries	65325	98205	109000
	Total	270697	298160	659000

TABLE 3

BURMESE CONTRIBUTION (FROM SOCIETIES)
EXPENDITURE FOR THE EOPD PROJECT
(In Kyats)

Sr. No.	Particulars	1986-87 Actual	1987-88 Actual	1988-89 Estimated
1.	Duty & Tax	-	-	107033
2.	Transportation	-	-	4800
3.	Salaries	38850	38850	38850
	Total	38850	38850	150683

TABLE 4

TOTAL BURMESE CONTRIBUTION
(In Kyats)

Sr. No.	Particulars	1986-87 Actual	1987-88 Actual	1988-89 Estimated
1.	Cottage Industries Dept.	270697	298160	659000
2.	Societies	38850	38850	150683
	Grand Total	309547	337010	809683

As of this report, the project inputs by both host country and USAID are below projections. This is illustrated by the following chart.

TABLE 5

PROJECTED vs. ACTUAL EARMARKED EXPENDITURES
(Figures shown in $1000s)[1/]

Country	Projected	Actual	Deficit
SRUB	1,835*	108	1727=93%
USAID	6,181	3,335	2846=46%

[1/]Calculated at $1.00=6.00 Kyats.

The shortfalls are due to the late arrivals of commodities, subsequent reduction of mills for rehabilitation, and lack of candidates for U.S. training.

According to the Project Grant Agreement in Annex 1, Para. B.5(3)b(4), the SRUB must provide for vehicles, in-country travel, support staff, office equipment and supplies, and under project covenants (f) IX they must furnish temporary lodging for non-Burmese personnel when travelling away from their duty station. The payment for these expenses were not paid by SRUB and had to be paid out of the AID foreign exchange in the form of contract amendments. With only 7 percent of SRUB's supposed project contributions paid, SRUB should be more responsible and adhere to the Project Agreement between the U.S. and SRUB.

5. Project Expenditure Status

July 1988 is the 34th month of project implementation, counted from the date of signing of the Project Grant Agreement. In comparing the actual expenditure and earmarked commodity purchases with those proposed in the PP at the 34th month of implementation, only about one-half of available funds were spent, $3,335,000 vs. $6,181,000 (see Table 6 and Figure 2).

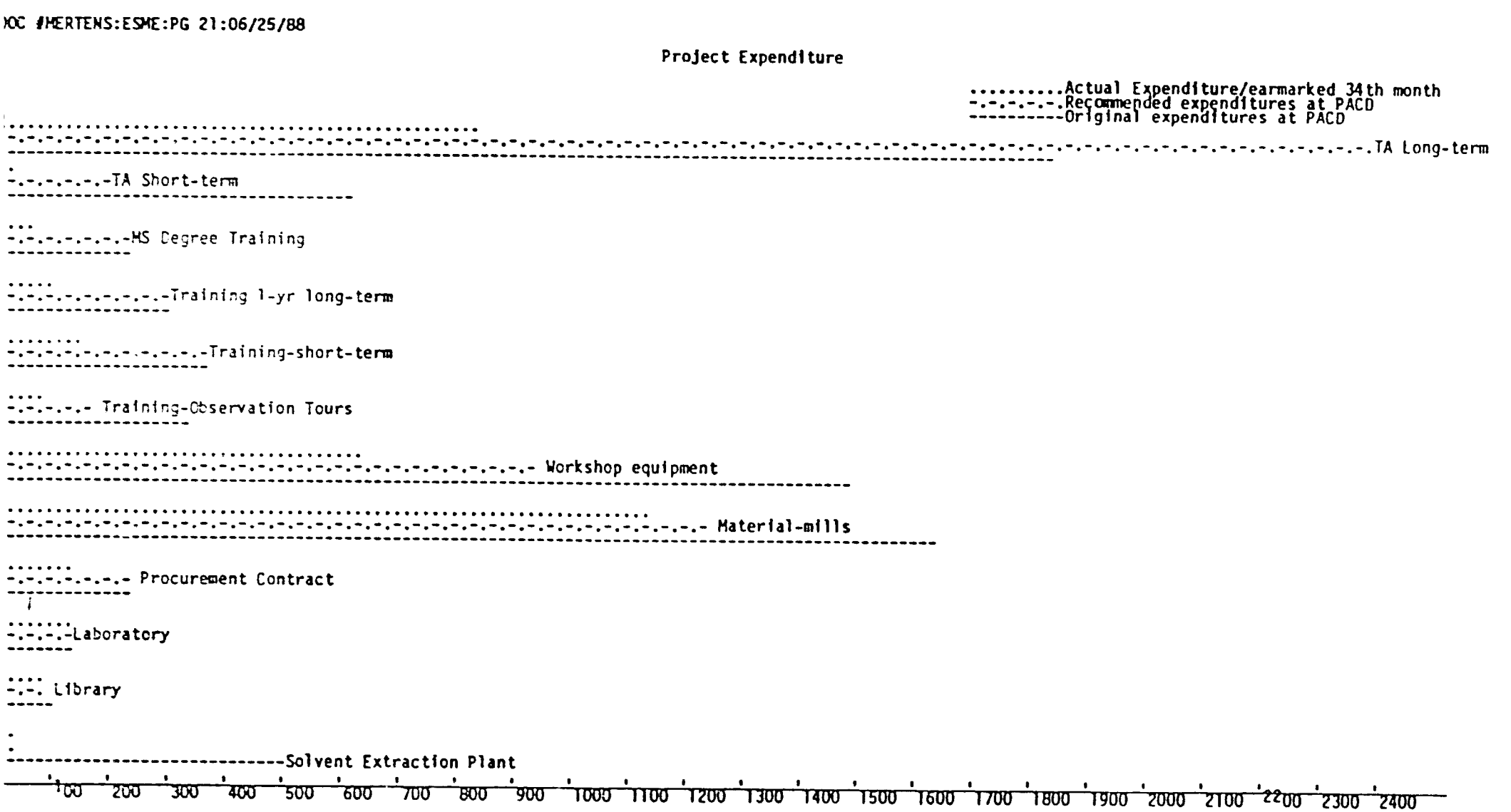
Table 6

PROJECT EXPENDITURES

Inputs	Present Actual Inputs at 34th Month of Implementation		PP Inputs Expected at 34th Month of Implementation		PP Inputs Expected at PACD		Present Revised Inputs Expected at PACD	
I. Technical Assistance								
a) pm long-term	63	($ 850)	75	($1,020)	120	($2,047)	132	($2,236)
b) pm short-term	2	($ 15)	18	($ 270)	36	($ 275)	12	($ 180)
II. Training								
a) py M S degrees	3	($ 56)	6	($ 104)	12	($ 208)	10	($ 262)
b) py 1-yr training	2	($ 96)	6	($ 117)	6	($ 169)	6	($ 300)
c) pm short-term	24	($ 149)	35	($ 217)	70	($ 305)	70	($ 435)
d) pm observation	10	($ 74)	20	($ 148)	45	($ 861)	20	($ 148)
III. Equipment and Commodities								
a) Equipment for workshops earmarked/expended		($ 629)		($1,495)		($1,495)		($ 984)
b) Material for mills earmarked/expended		($1,140)		($1,623)		($1,623)		($1,288)
c) Procurement Service (contract)		($ 125)		($ 125)		($ 250)		($ 250)
d) Laboratory Equipment earmarked/expended		($ 121)		($ 115)		($ 115)		($ 121)
e) Decorticator		($ 0)		($ 50)		($ 50)		($ 0)
f) Library Material earmarked/expended		($ 69)		($ 100)		($ 100)		($ 69)
g) Solvent extraction plant		($ 0)		($ 500)		($ 500)		($ 0)
Total		($3,324)		($5,884)		($7,998)		($5,973)
					Inflation	($ 478)		($ 244)
					Contingency	($1,024)		($ 683)
						($9,500)		($6,900)

This table was designed by the Evaluation Team taking into consideration Table 5, "Projection of Project Expenditures," the log frame of the PP and the proposed changes of input and outputs of this evaluation.

Figure 2


KOC #MERTENS:ESME:PG 21:06/25/88
Project Expenditure
.....Actual Expenditure/earmarked 34th month
-.-.-.-.-.Recommended expenditures at PACD
----------Original expenditures at PACD
TA Long-term
TA Short-term
MS Degree Training
Training 1-yr long-term
Training-short-term
Training-Observation Tours
Workshop equipment
Material-mills
Procurement Contract
Laboratory
Library
Solvent Extraction Plant
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
1400
1500
1600
1700
1800
1900
2000
2100
2200
2300
2400

The Evaluation Team recommends that AID revise the input targets to a more realistic one that could be reached within the time frame left for project implementation. The new possible input will cost in total approximately $6,900,000 vs. the project authorized amount of $9,500,000. The Mission will be able to reduce the L.O.P. funding by $2,600,000 to be used for other purposes.

The savings of project funds will occur in the following areas:

(1) The short-term TA has been reduced to 12 person months vs. 36 since it is unlikely that more than 3 experts per year will receive country clearance in the time left for the project.

(2) There will be only one additional observation tour, since the team thinks very little actual economic returns will result from these tours.

(3) Most commodities and equipment for workshops and oil mills to be rehabilitated during the remaining project period have been ordered. An additional amount of $503,000 has been provided in the budget for additional new material purchases.

(4) The solvent extraction plant in the amount of $300,000 has been cancelled by the ECC of SRUB since they think that foreign exchange can be better utilized on other commodities.

(5) The sunflower decorticators have been cancelled.

(6) The inflation factor was unusually large and has been halved, which still seems to be high.

(7) More than 10 percent of the project budget was contingencies. This has been reduced considerably, but is still large for 2 years of project implementation remaining.

Recommendation:

AID should write a project amendment and reduce authorized project funds from $9,500.00 to $6,900,000.

V. PROJECT OUTPUTS AND NARRATIVE

A. Edible Oil Consumption Per Capita

The major goal of the project is to obtain self-sufficiency in which oil production and the domestic average per capita consumption should be raised to 8.76 kg (20 lbs)/year by 1993/94 (from 5 kg/year 1984) in order to provide 10 percent of the total average energy requirement.

From the following calculations, it seems that these consumption levels are approaching the target levels (see Table 7).

TABLE 7

OIL CONSUMPTION PER CAPITA

	GROUNDNUTS	SUNFLOWER	SESAME
Acreage	1,500,000	550,000	3,347,333
Yield/Acre/Lbs	592	928	223
Prod. Yield Basis	888,000,000	510,400,000	746,447,940
Prod. Econ Report	821,328,000	448,192,000	514,331,990
Average Prod.	854,664,000	479,296,000	630,390,000
Consumption/Loss	42,733,200 (5%)	9,585,920 (2%)	6,303,900 (1%)
Seeds Saved	75,000,000(50lbs/a)	11,000,000(20lbs/a)	33,473,333(10lbs/a)
Lbs for Oil Ext.	736,930,800	458,710,080	590,612,767
Oil Extraction	316,438,080(42.94%)	189,447,260(41.3%)	280,344,170(7,12/lb

Groundnuts	316,438,080 lbs	
Sunflower	189,447,260 lbs	
Sesame	280,344,170 lbs	
	786,229,510 lbs	38,595,000 popl.
	20,37	lbs/capita

Having taken production numbers of oil seed crops and having arrived at similar production numbers calculated from oil seed acreage and yield data taken from the "Report to the Pyithu Hluttaw on the Financial, Economic and Social Conditions" of the SRUB from 1988/89 and having used the average of these two numbers as a base for calculation of oil seeds for oil extraction, it seems that present oil consumption/capita is 20.37 lbs. If the losses between harvest and processing are 5 percent, then the consumption/capita is 19.91 lbs. Some recent production data, which differ from that of the 1988/89 Financial, Economic and Social Consolations report to the Pyithu Hluttaw, suggest that only 16.73 lbs. of domestic oil are consumed per capita. An additional half-pound of oil originating from imports is consumed yearly.

This does not include edible oil extracted from rice bran by solvent extraction, which is insignificant and has been declining to one-fifth of total edible oils in 1987/88 (from the three previous years). Oil on the free market sells about double the price than in the government shops, which is about in line with other commodities which sell at the same ratio. There seems to be no real shortage in edible oil at present.

B. Intermediate Outputs

The following project outputs are from the Project Paper and show the expected end-of-project status but do not contain intermediate annual targets. Progress toward immediate goals specified in the attachments to the Project Paper, the SRUB plans or in the Technical Assistance Reports is discussed in the narrative.

FIVE-YEAR PLANNED OUTPUTS:	ACTUAL PROGRESS JULY 1, 1988
1. Institutional Strengthening	
a) MOC capacity to perform data collection, storage retention, and analysis is established. Also, capacity to perform project preparation, appraisal, monitoring and evaluation is established.	Two persons received a total of seven months' training in Project Planning and two received training in project management for the same length of time. One person is presently in training for a Master's degree in Major Economic Planning. Additional training can be performed during the rest of the project. The Planning Division of the MOC should have been strengthened considerably after project closure.

b) MOC/CID (Innovation Division) capacity to provide reliable quality control information is established.	This Department of CID profited the most from the project. Three long-term trainees and two short-term trainees were chosen from the Innovative Division personnel. Laboratory equipment to enable oil quality control was supplied.
c) MOC/CID (Technical Service Division) capacity to develop needed physical plant designs, assess technical problems, and redesign of existing plants established.	One long-term participant from degree training and one engineer for one-year training received funding under this project.
d) MOC/CID (Training and Education Division) capacity to plan and conduct training programs in order to upgrade existing screw-press mills and become the resource center for improved management and technology established.	No training or TA has been funded for this division under the project as of this date of evaluation.
e) Cooperative workshops' capacity to manufacture improved oil mill screw-press parts established. Screw-press diagnostic and repair capability established.	Project commodities are 21 to 24 months behind schedule. Meanwhile TA Team has implemented one ST/TA on heat treatment; upgraded procedures, facilities and output. See narrative for expected EOP status.
2. Oil Mill Operations Upgraded	
a) Oil mill rehabilitation efforts.	Project commodities are 21 to 24 months behind schedule. Meanwhile, operating procedures upgraded, steam consumption reduced and boiler efficiency increased in 6 mills.
b) Screw-press mills rehabilitated and producing better oil, oilseed cake more efficient and sanitary. Preventive maintenance capability established.	Initial efforts to return expellers to near specifications results in 100%+ additional and cleaner oil. Work started on rehabilitation. O.M. will require more training. See narrative for EOP status.

C. Output Narrative

In this section the Evaluation Team's observations, assessments and comments address the specific instructions and topics specified in the scope of work. Additionally, the team has incorporated comments considered important by them.

The Project Grant Agreement and the Project Paper goals and purposes are identically stated, and basically the objectives are the same. However, the Grant Agreement more clearly enunciates the objectives of the project. These objectives are shown below (with specified targets underlined for emphasis).

Participating Entities and Expected Outputs

Screw-Press (Expeller) Oilseed Mills. Of the estimated 2,000 screw-press oilseed mills in Burma, approximately 20 percent (400 mills) operate more or less efficiently, but their productivity could be significantly increased with moderate investment. Of the remaining mills, 60 percent are inefficient and would require major investments to bring their efficiency and productivity to a break-even point.

The project will focus on upgrading approximately 10 to 15 percent of the top 400 mills. Ninety-five percent of these 2,000 mills are in private hands and share equally with the cooperatives in their efficiency and upgrading potential. It is essential, therefore, that this project rehabilitate mills in both sectors in order to capture that portion of the population of mills most capable of being rehabilitated with moderate investment. As a consequence, this will enable the country to achieve the greatest possible gain to Burma's oilseed processing industry under this project. The initial fifteen mills to be rehabilitated (9 cooperative and 6 private) will undergo complete rehabilitation. It is estimated that up to an additional 45 mills will also undergo degrees of rehabilitation and upgrading. These additional mills are yet to be selected, but are expected to comprise the same cooperative/private sector ratio as identified in the initial 15 target mills. Criteria other than existing and potential efficiencies in the selection of which mills to

rehabilitate will depend on factors such as accessibility, responsiveness of owners, private mill/cooperative mill mix, and proximity to one of the Industrial Producers' Cooperatives.

Industrial Producers' Cooperatives (Workshops). Significant mechanical skills in Burma are found in regional Industrial Producers' Cooperatives. These cooperatives own and operate workshops equipped with relatively modern machinery and well-trained mechanics. There are five such workshops in Burma. They vary in organization, focus, assets and skill levels. However, in all instances their membership consists of skilled persons who pool their talents and expertise to provide one-stop services to prospective customers.

Four of these workshops will carry out the rehabilitation, manufacture or repair of screw-press mill components under the project. These four are located in the same areas as the 15 oilseed mill sample selected for analysis. The only workshop that will not participate in the project will be the Industrial Producers' Cooperative in Rangoon.

The following comments are in answer to the specific evaluation questions regarding workshop and oilmill rehabilitation.

(1) The project is not progressing according to plan. The PP plan has been changed (for the better) and verbally agreed to.

(a) Project inputs were basically appropriately targeted.

(b) Inputs are not being delivered on a timely basis.

(c) Inputs seem to be having the anticipated results.

(d) Constraints hindering project implementation are untimely inputs and travel restrictions.

(e) The TA Team, CID, workshops; and oil mills have performed well. AID, PSA and MOC performed poorly in the initial implementation but seem to have improved.

(f) There are management issues to be resolved. These revolve around TA Team manning and office facilities.

(2) Changes in project setting include a new Project Director who is just starting to make timely decisions. Initial long decision times have contributed to late inputs.

(a) Policy issues do not seem to have arisen from the changes.
(b) Procedural issues seem to have been settled.

(3) The PP project design does not remain appropriate and some adjustments are required. These include revised conditions, implementation targets, and assumptions as well as the implementation plan.

(4) If project funding is reduced, the revised implementation plan reflecting new targets and indicators will still result in a favorable EOP status.

(5) Project impacts at this time seem to be favorable on the workshops and oil mills. Oil mills will initially see the most benefit, but the workshop benefits have the best potential for long-range growth.

D. Project Management, Organization and Operation

The project implementation is a joint effort by USAID/Burma, the MOC and the TA consultant. It requires close collaboration between all three components. The implementation duties and program of the three organizations are discussed below.

AID/Burma

An AID project manager is responsible for all project matters on the AID side and is monitoring project progress based on an implementation plan. He is the AID contact person with higher officials of MOC and other SRUB officials connected with the project. He receives the specifications for commodities from the TA Team, writes the PIO/C and monitors their processing in Washington by AID/procurement and the purchase agency, RONCO (which has a procurement contract for the project and processes the shipping of the commodities). The manager's main concern is that the project funds will be utilized according to AID's rules and regulations.

During the time of the signing of the Project Grant Agreement on August 29, 1985, and the arrival of the TA Team, the AID project manager, according to the PP, was responsible for: (a) writing the RFP for the TA contract; (b) selecting jointly with MOC some long-term training candidates and writing PIO/P

in time to enable student admission in the spring semester of 1986; (c) writing PIO/C for commodities required for the TA Team; (d) receiving proposals for the TA Team; and (e) selecting jointly with the MOC the same.

Apparently the implementation plan and timing as presented by the design team is too optimistic and does not recognize the ability of a small mission with limited personnel and the cumbersome approval process of the MOC.

The first PIO/Cs were written two months after signing the Project Agreement, but since some commodities were held in the Rangoon customs for over one year, the total time required from ordering the commodities until arrival at the project was between 12 and 16 months instead of 9 months as originally planned.

The long-term trainees were also delayed and were sent off after the TA Team arrived (26 months after Project Agreement signature instead of the projected six). The causes of these delays have been described in the training and commodity section of the report.

MOC

The overall responsibility for management and implementation of the project rests with the Ministry of Cooperatives, which consists of the Cooperative Department (responsible for the expansion and development of cooperatives in Burma) which supplies the Project Director of the project and the Cottage Industries Department (the technical department for promotion of small and medium scale industrial cooperatives) which supplies the Project Manager.

The project management team within the Ministry should include a technical team from which one full-time qualified technical counterpart should work closely with each TA Team member. Presently there are three counterparts assigned to the TA Team; however, some of the counterparts are not qualified in their supposed field of expertise. CID has only four mechanical engineers in its employment. One of them is on long-term training and will return in August 1988 to be available as a counterpart. Two other engineers have been detailed to work with a German and a UNDP project and the fourth one is in charge of the production division. Therefore, one master mechanic has as a counterpart a

chemical engineer while the other one has the manager of oil mills of the Mandalay Division of Cooperative Society as his counterparts.

The MOC project manager must approve all travel by the TA members and major plans such as which oil mill to rehabilitate or upgrade. In reality, such approval decisions are passed on from the project manager to the director general and then to the Deputy Minister or the Minister and often to the Cabinet. Hence, every approval can take from three days to several months, causing long project implementation delays which at the present state cannot be rectified and project goals will not be reached at PACD.

The MOC is also required to provide free lodging for TA members travelling away from duty stations. This has not been done and TA travel expenses are being paid out of the AID part of the ACDI contract.

A further constraint is that the MOC project manager is also the manager of a German and an ADB project. This results in a heavy workload for him, and he is unable to give his full attention to the AID project which should require a full-time position for management.

Technical Assistance Team

The Technical Assistance Team is responsible for the technical implementation of the project. They write commodity specifications, suggest which oil mills to upgrade and the methods for it. They are the technical advisor and are responsible for the training. All their activities are within the jointly approved (by AID and MOC) implementation plan that they developed. They work closely with the MOC and write progress reports to the project manager in the Department of Cottage Industries Development. A copy of all their reports is being sent to the AID project manager. They are working under the contract agreement with AID and must abide by AID regulations for contractors.

Recommendations:

1. Propose to the Minister to authorize travel one month ahead of time for a certain amount of days for certain persons to travel to special places in the country's regions per month. Then delegate to the Project Director to

fill in the dates prior to the travel in order to avoid further project implementation delays and ultimately deobligation of unused project funds to be returned to the US treasury and, therefore, the loss of foreign exchange for the MOC.

2. MOC should make every effort to hire an additional mechanical engineer and should assign the engineer who will return from training as the counterpart to one master mechanic. Further, assign one mechanic from the workshops to each master mechanic when working at the oil mill to ensure continuity after project completion.

3. The MOC should nominate and assign a full-time project manager to the project.

This completes the body of our evaluation report on the Burma Edible Oil Processing and Distribution Project. Following are seven appendices that are intended to help put the evaluation in perspective. They are A) the evaluation scope of work; B) the project's logical framework; C) a list of persons the Evaluation Team interviewed; D) a list of documents reviewed; E) a list of host country inputs to the project; F) the project grant agreement, and G) Consultancy Report on Casting and Heat Treating Workshops. Each is directly related to the text of the study and included here for ease of reference.

APPENDICES

APPENDIX A

EVALUATION SCOPE OF WORK

SCOPE OF WORK
Edible Oils Processing and Distribution Project
-482-0006-

I ACTIVITY TO BE EVALUATED

This evaluation is to be a formative, mid-term progress evaluation of the AID/Burma-assisted Edible Oils Processing and Distribution Project (EOPD, Grant Number 482-0006). EOPD was authorized by AID/Washington on February 12, 1985. The Project Grant Agreement was signed on August 29, 1985. The Project Assistance Completion Date (PACD) is September 30, 1990.

EOPD is located in the Ministry of Cooperatives of the Government of the Socialist Republic of the Union of Burma (SRUB). AID/Burma's planned contribution to EOPD, subject to the availability of funds, is valued at $9.5 million, $9.35 million of which is to be provided through the Project Grant Agreement. The planned SRUB contribution is valued at $4.7 million.

II. BACKGROUND INFORMATION

The Edible Oil Processing and Distribution Project (EOPD, 482-0006) is one of three AID-assisted agricultural sector projects currently active in Burma. Together, the three projects seek to deal comprehensively with the development of an important sub-sector of the agricultural economy, namely oilseeds. One project, the Burma Agricultural Research and Development Project (BARD, 482-0012), is focused on improving the capability of the Burmese agricultural research organization to conduct effective research on oilseeds and other crops grown in association with them. One project, the Burma Agriculture Production Project (BAPP, 482-0007) concentrates on increasing Burmese oilseeds production and improving nutritional standards through work focussed sharply on peanuts, sunflowers, sesame and other crops that are grown in conjunction with them. EOPD, the subject of this formative evaluation, is focused on improving Burma's ability to process and distribute edible oils efficiently.

Thus, the three projects - BARD, BAPP and EOPD - together constitute a well-rounded program dealing with the four most important facets of oilseeds sub-sector development - research, production, processing and distribution. The projects were designed to work together for that purpose and, while their designs intentionally permit each project to stand or fall on its own merits, evaluation of any one of them should bear in mind its relationship to the over-all, integrated program.

The AID/Burma agricultural program's current focus on oilseeds and associated crops should be viewed in the context of history. AID was very active in Burmese economic development during the 1950s and early 1960s. There was a withdrawal of AID assistance to Burma in the mid-sixties, however, and only in 1980 was the relationship re-established. In this new beginning, it was agreed through negotiations that AID would support a small development assistance program encompassing selected aspects of needed work in agriculture and health. With respect to Agriculture, the sub-sector chosen for initial work was oilseeds, and a production project was designed to lead off the effort. A grant agreement was signed on October 26, 1981, and the Maize and Oilseeds Production Project (MOPP, 482-0005) came into being. MOPP, which will reach its PACD on March 31, 1988, has been highly successful in reaching the objectives set for it. Production targets were largely surpassed, seed farms and seed processing units were firmly established, and a solid foundation was created for expanded U.S.-Burma cooperation in agricultural development. (See MOPP Final Evaluation Report dated June, 1987) The BAPP effort continues the line of MOPP activities. BARD and EOPD expand the line to include other important aspects of oilseeds development work.

MOPP and BAPP are large projects, each with an AID funding contribution of $30 million. The planned AID contribution to BARD is valued at $11.3 million, and to EOPD at $9.35 million. Thus, overall, AID's life-of-project funding for the Burmese agricultural sector since 1981 amounts to $80.65 million. The corresponding value of Burmese Government planned contributions is estimated to total $53.3 million.

MOPP, BARD and BAPP are all located in the Agriculture Corporation of the Ministry of Agriculture and Forests. EOPD is located in the Ministry of Cooperatives, where implementation responsibility is assigned primarily to the Cottage Industries Department.

The EOPD Project Agreement was signed on August 29, 1985. On August 8, 1986, AID signed a contract with Washington, D.C.-based Agricultural Cooperatives Development International (ACDI) for the provision of technical assistance services under the project. ACDI in turn signed a sub-contract with EPE, an Ohio-based technical consulting firm, for the provision of engineering services and some personnel. A three person team of long-term advisors - an engineer/Chief of party and two master mechanics - was recruited for service. The team arrived in Burma in October, 1986, and commenced

its work immediately thereafter. Thus, at the scheduled time of this evaluation, in the Spring of 1988, EOPD will have been "on the books" for 31 months or more than two and one-half years. The technical assistance team of experts will have been active in Burma for 16 months.

III. PURPOSE OF THE EVALUATION

This mid-term evaluation, called for in the Project Paper, agreed to in the Project Grant Agreement, and noted in the AID/Washington Asia Near East Bureau's Evaluation Plan, will be a formative evaluation. It will:

(1) measure progress toward the accomplishment of stated purposes, goals and objectives;

(2) analyze and describe the present setting of the project and assess the validity and appropriateness to that setting of stated project purposes, goals and objectives;

(3) identify problems and constraints, of design and implementation, which are impeding or may impede the attainment of project objectives; and

(4) formulate objective, realistic recommendations for action by project implementors to overcome obstacles and/or increase the probabilities for project success.

The evaluation team's findings, conclusions and recommendations will be used by the Ministry of Cooperatives, AID/Burma and the technical assistance contractor (ACDI), singly and jointly, to illuminate decisions on future project implementation plans and on ways and means for improving project performance.

IV. PROJECT DESCRIPTION

EOPD is intended to assist the Government of Burma in (1) improving the efficiency and productivity of existing edible oil expeller facilities in both the cooperative and private sectors, and (2) strengthening the capability of the Ministry of Cooperatives, and the cooperative sector in general, to plan and implement delivery of technical services to edible oils producers in Burma. The goal of the project is "to attain self-sufficiency in edible oils production by increasing the quality and quantity of edible oils produced and distributed in Burma." The purpose of the project is "to upgrade and expand existing oil mills and increase the capability of indigenous organizations to undertake programs to improve edible oil processing and distribution." (See Project Grant Agreement; Annex 1: Amplified Description, copy attached, for a general summary of the project's objectives, resources, relationships and implementation plans.)

To place in perspective the summary provided above and in the referenced attachment, it is necessary to refer briefly to a few salient aspects of the country setting in which the project exists. Burma, a country of over 38 million people and vast resource potential, has recently been classified by the United Nations as a least developed country (LDC). Rice is by far its most important food crop, followed by maize, oilseeds, horticultural crops (fruits and vegetables) and wheat. Oilseed crops are comprised mainly of peanuts, sunflowers and sesame, although niger, mustard and rape are also grown in small quantities. The production of oilseeds has historically been insufficient to meet the domestic demand for edible oils, a very important part of the Burmese diet, and the country has had to import edible oils to make up the deficit. It should be noted here that Burma's demand for edible oils appears to be elastic, and that the country can apparently, therefore, absorb as much oil as it can produce.

The government decided a few years ago to implement a broad program of crop diversification to strengthen the country's agriculture sector. Oilseeds crops have received increased resource allocation priority as a result of that decision. The U.S. is helping in this area, as are Germany and the Asian Development Bank. AID/Burma's current agricultural assistance project portfolio focuses heavily on oilseeds research, production, processing and distribution. The latter two elements of this general focus are dealt with by EOPD.

There are about 2000 screw-press oilmills operating in Burma. Most of these are small, privately-owned and operated ventures, but there are also a significant number of mills owned by government-sponsored cooperative societies and a few very large privately-owned mills. In terms of numbers, roughly 85 percent of all mills are private sector operations. Except for a handful of new mills established in the last five years, Burma's oil expelling operations rely almost exclusively on technologies and equipment that are out-dated and inefficient. Physical plants have not been maintained adequately; nor have spare parts been available, either through importation or domestic manufacture. The mills are in deplorable condition and are operating at production levels far below their rated capacities. Additionally, the oils and by-products they produce are of generally poor quality and contain many impurities which further depress their value as well as being hazardous to health.

V. STATEMENT OF WORK

The evaluation team, consisting of four experts drawn from the specialist fields identified elsewhere in this Scope of Work, will devote approximately one month in Burma to the investigation, analysis and reporting required by the exercise. Additionally, the three team members coming from the U.S. will spend two working days in AID/Washington at the beginning of the exercise for orientation and consultation, and the team leader will spend five working days after departing Burma in completing and preparing the final evaluation report for submission. (See Estimated Budget.)

In Burma, the evaluation team will work with Ministry of Cooperatives and AID/Burma personnel assigned by their respective organizations. The team will have access to all project locations and activities, and will be provided as fully as possible with essential materials and information it deems necessary for the completion of its task. It is expected that the team will spend one week to ten days travelling outside of Rangoon to observe project work and meet project personnel and beneficiaries at and near workshops and oilmills associated with project activities.

General Approach

The team will follow the procedural guidelines laid down for AID project evaluations by the Asia Near East Bureau's Evaluation Office. In general, the team will seek to fulfill the purpose of the evaluation articulated in Section II of this Scope of Work. Specifically, in order to fulfill that purpose, the team will study project documentation; read background materials on Burma, its economy and institutions; interview knowledgeable people in and around the project, including project personnel and beneficiaries (real and

intended), Government and donor organization officials; analyze, synthesize and interpret data; collate information; and, finally, articulate clearly an account of the methodology and analytical procedures used, the findings (evidence), the conclusions (interpretations, judgments) reached, and the recommendations made.

Specific Questions To Be Answered

The sponsors (AID/Burma and the Ministry of Cooperatives) expect the evaluation to provide answers to a number of specific questions. In responding to these questions, and to others which may arise in the course of the evaluation, the team should examine the project's objectives, design and implementation plans in the light of accrued project experience and, to the extent possible within time and resource availabilities, search for causes and effects.

The specific questions are:

(1) Is the project progressing according to plan?
  (a) Are project inputs appropriately targeted?
  (b) Are inputs being delivered on a timely basis?
  (c) Are inputs having the anticipated results?
  (d) What are the constraints and problems hindering accomplishment of the project purpose?
  (e) Which elements have performed well? Which poorly?
  (f) Are there management issues needing resolution?

(2) What changes in the project setting have occurred since start-up, and how have they affected the project?
  (a) Are there policy issues rising from changes in the setting? If so, what?
  (b) Are there procedural issues rising from changes in the setting? If so, what?

(3) Does the project design remain appropriate today?
  (a) Are modifications/adjustments needed? If so, what?

(4) If project funding availability is reduced, how might the project be modified to respond effectively to the altered circumstance?

(5) What project impacts are foreseen at mid-term?
  (a) Impacts on beneficiaries?
  (b) Impacts on institutionalization?
  (c) Impacts on policy?

VI METHODS AND PROCEDURES

The five weeks programmed for this evaluation include eighty-four person days (4 team members x 28 work days = 112) in Burma and eleven person days in the United States. The U.S. time is to be divided into two parts: six person days in Washington, D.C. before travel to Burma (3 team members x 2 work days = 6) and five person days after departing from Burma (by the team leader only). Thus, a total of 126 person days is programmed, all inclusive.

Full accomplishment of the evaluation's purpose will require tight scheduling and hard work on the part of the evaluation team members. A six-day work week will be necessary, as will close coordination of the contributions of individual team members. All U.S. team members will attend the AID/W pre-evaluation orientation/consultation exercise. All U.S. team members will travel up-country to visit project activities. The U.S. team members should arrive in and depart from Burma on the same dates.

The methods and procedures for undertaking the evaluation can be categorized into four main phases, as follows:

1. Preparation
2. Field Work
3. Analysis
4. Reporting

Preparation

Preparation will include two working days at AID/Washington for orientation and consultations to be arranged for the team by Asia Near East Bureau staff on behalf of AID/Burma. AID/Burma will provide copies of EOPD documentation and background reading material to be given to team members prior to the AID/W sessions.

Field Work

Given the relatively small number of project work sites expected to be active during the time of the evaluation, it seems feasible for the evaluation team to visit most if not all sites during an eight day field trip by road. Therefore, it will probably not be necessary for the team to rely on cross-sectional analysis techniques based on a randomly-chosen, stratified sample of project activities. However, it may be necessary for a division of labor to be worked out in terms of site coverage in order for the study team to be exposed as fully as possible to all project dimensions.

In addition to the planned field trip, the team will need to meet with

a variety of functional offices in Rangoon-based organizations and in Divisional Headquarters outside of Rangoon. The latter will be accomplished during the tour of project sites. The former will precede and follow the field trip, and there will be considerable temporal overlap, particularly after the field trip, between the field work and analysis phases of the evaluation procedure.

Analysis

The team will be free to use whatever analytical methods it thinks appropriate to its needs. On an as needed basis, and to the extent possible, AID/Burma will provide the team with access to its Wang personal computer facilities. This facility offers Lotus 123, dBase II and selected other spread sheet capabilities as well as Wang Word Processing. It should be noted, however, that Wang software programs are not directly compatible with IBM equipment or other IBM compatible equipment. (Due to Government of Burma restrictions, the U.S. team members will not be authorized to bring computer equipment into the country.)

Reporting

(See Section VIII)

VII. COMPOSITION OF TEAM

AID/Burma and the Ministry of Cooperatives envision a four person team of experts to undertake this evaluation. Two experts will be contracted from an independent outside consulting firm. One expert each will be supplied by USAID and the Ministry of Cooperatives. The composition of the team will be as follows:

1. Team Leader/Economist/Agri-business Specialist (Contract)

   This expert should have strong academic and experiential credentials and demonstrated capability in evaluative analysis and in written articulation of concepts. A specialization in micro-economic analysis would be highly desirable, as would actual development-oriented work experience in developing countries. Demonstrated capability to understand and articulate concepts relating to effective small business management is essential. Knowledge of cooperatives would be a valuable asset. Knowledge of Asia and Asian economic circumstances would be valuable assets. Finally, experience in conducting project design and evaluation exercises and familiarity with USAID requirements would be most useful.

2. Mechanical/Systems Engineer (Contract)

This expert should have strong academic and experiential credentials and demonstrated capability to deal effectively with process-oriented systems and their analysis. Knowledge of edible oils processing systems, especially oil expeller systems, would be highly desirable. Previous experience in the implementation of development projects would be helpful, as would be actual experience in conducting project design and evaluation activities.

3. Chemist (Ministry of Cooperatives)

4. Project Management Specialist (USAID)

VIII. REPORTING REQUIREMENTS

The evaluation team is required to submit to AID/Burma a full and complete report on the evaluation. The report should consist of no more than 100 pages, plus appendices, and be carefully edited to insure clarity and provide an accurate record of the activities undertaken in order to produce the report.

A Format of the Report

1. Basic Project Identification Data Sheet
(See outline attached)
2. Executive summary: three pages, single spaced.
(See outline attached)
3. Body of the report. The report should include a description of the country context in which the project was developed and is being carried out and provide information (evidence and analysis) on which its conclusions and recommendations are based. It should end with a full statement of conclusions and recommendations. Conclusions should be short and succinct, with the topics concerned identified by short sub-headings related to the questions posed in the Statement of Work. Recommendations should correspond to conclusions. Whenever possible, the recommendations should specify who should take recommended actions.
4. Appendices. These should include at a minimum the following terms:
   a. The Evaluation Scope of Work.
   b. The project's Logical Framework and, if not already

included in the body of the report, a brief summary of the current status/attainment of original and modified inputs and outputs.

c. A bibliography of documents consulted.
d. An itinerary listing the people consulted and places visited by the team.
e. Other appendices may be developed to present detailed information pertinent to the evaluation.

B. Submission of the Report

At the conclusion of the field portion of the evaluation and at least four working days prior to leaving Burma, the team will present to AID/Burma a complete draft version of final report. Before departure, the team will meet with selected AID/Burma and Ministry of Cooperatives representatives to debrief them on the evaluation exercise and discuss the report and its findings, conclusions and recommendations. At this meeting the team will note comments and suggestions made by the audience and make reference to those in the final version of the report.

The final report will be due at AID/Burma's Washington, D.C. pouch address not later than one month after the departure of the evaluation team leader from Burma.

Ten bound copies of the final report should be delivered to:

Evaluation Officer
ANE/DP/E, Room 6663
Agency for International Development
Washington, D.C. 20523
(Phone 202-647-7087)

Five bound copies of the final report should be sent by express DHL package service to:

Agricultural Development Officer
AID/Burma
U.S. Embassy
581 Merchant Street
Rangoon, Burma

Forty-five bound copies of the final report should be mailed to AID/Burma via the diplomatic pouch:

Agricultural Development Officer
AID/Burma
Agency for International Development
Washington, D.C. 20520

APPENDIX B

LOGICAL FRAMEWORK

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Life of Project:
From FY 85 to FY 89
Total U.S. Funding $9.5 Million
Date Prepared: November 1984

Project Title & Number: Edible Oil Processing and Distribution (482-0006)

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Program of Sector Goal: The broader objective to which this project contributes:	Measures of Goal Achievement:		Assumptions for achieving goal targets:
To attain self-sufficiency in edible oil production.	Domestic edible oil production equals 20 pounds per capita (estimated to require production of 415,600 mt/yr. by 1994).	- Census and Statistics data - Agriculture Corporation Records - Ministry of Cooperative Records - Special Reports	- SRUB priorities on edible oil production and consumption remainunchanged. Continued political/social stability and economic growth. - Pricing relationships between oilseeds and other crops remain favorable.
Project Purpose: To upgrade and expand oil mills and increase the capability of indigenous organizations to plan, implement and evaluate programs to improve edible oil processing and distribution.	Conditions that will indicate purpose has been achieved: End of project status. 1. Oilseed mills processing 220% greater quantities of oilseeds than present (initial 15 mills processing 45,100 mt oilseeds by year 5). 2. Functioning technical and analytical libraries servicing MOC and cooperatives. 3. CID laboratory implementing quality control testing for 50% of cooperatives. 4. Continuing in-country training program for oil extraction operators. 5. MOC has developed and is implementing a national program to improve edible oil production and distribution. 6. Trained staff performing functions appropriate to their training.	- Oilseed Mill's Financial Statement and Records - MOC Records - Project Records/Evaluation - Site Visits - Special Survey	Assumptions for achieving purpose: - Production of oilseeds does not decrease. - Mandate for cooperatives involvement in oilseed processing remains adequately strong to allow cooperatives to purchase adequate oilseeds. - That acceptable economic incentives are provided to combine in capturing adequate raw materials. - That inputs and technical services can be delivered as planned in an acceptable form. - MOC able to recruit and retain quality personnel.

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Life of Project:
From FY 85 to FY 89
Total U.S. Funding $9.5 Million
Date Prepared: November 1984

Project Title & Number: Edible Oil Processing and Distribution (482-0006)

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Inputs:	Implementation Target (Type and Quality)	- Contractor Records and Reports	Assumption for providing inputs:
	1. AID	- MOC Records	- Conditions precedent are met on schedule.
	Technical Assistance	- Project Records	
	a. 10 py long-term resident technical advisors	- Project Audits	- Qualified participants are selected and processed on schedule.
	b. 36 pm short-term TA	- Site Visits	
	2. Training		- Contractor selection, procurement and staffing proceeds on schedule.
	a. 15 py 2 years MS degrees		
	b. 6 py 1 year training		- Commodities moved to project sites expeditiously.
	c. 70 pm short-term training		- Contingency allowance for escalation in costs of TA, training and commodities proves adequate to meet needs.
	d. 45 pm observation tours		
	3. Equipment and Commodities		
	a. Equipment for Workshops ($1,495)		
	b. Materials for Mills ($1,623)		
	c. Bench Model Solvent Extraction Plant ($500)		
	d. Vehicles ($78)		
	e. Procurement Service Agent ($250)		
	f. Standard Reference Laboratory Equipment ($115)		
	g. Household Furnishings ($105)		
	h. Library Reference Materials ($100)		

Inputs:	AID	SRUB	TOTAL
Technical Assistance	2,546	161	2,707
Training	861	133	949
Equipment & Commodities	4,316	230	4,546
Operation & Maintenance	—	4,199	4,199
Evaluation	250	21	271
Inflation	478	—	478
Contingency	1,049	—	1,049
TOTAL	9,500	4,744	14,244

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Life of Project:
From FY 85 to FY 89
Total U.S. Funding $9.5 Million
Date Prepared: November 1984

Project Title & Number: Edible Oil Processing and Distribution (482-0006)

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Outputs: 1. Rehabilitated screw-press oil mills processing at a minimum of 75% capacity with a recommended program of annual maintenance in place. 2. Upgrade capacity and capability of workshops. 3. Returned participant trainees in place with MOC and other local organizations. 4. Fully equipped and staffed reference laboratory. 5. Fully equipped and staffed reference library in Cottage Industries Department. 6. Planning Division will be fully staffed (increase of ___) and selected participants trained. 7. CID Divisions; Innovation, Technical services, training and Education Divisions, trained in place.	Implementation Target (Type and Quality) Oil Mills: 15 mills completely rehabilitated with an additional 30-45 mills to be upgrade to varying degrees. Library: 500 new books 20 periodical subscriptions 15 technical journals/publications Mill/Workshop Equipment/Materials: Machine equipment ($1,495,000) Raw materials (41,623,000) 6 vehicles Training Staff: 6 MS degrees 7 other long-term trainees 30 short-term trainees 45 observation tour participants Operating Laboratory: $615,000 new equipment	- MOC Records - Project Records - Project Audits - Site Visits	Assumptions for achieving outputs: - Responsible SRUB and other employees will be identified and released for in-country and overseas training. - Timing and quality of inputs to meet project requirements.

9003y/7.88

APPENDIX C

LIST OF CONTACTS

MEETINGS IN WASHINGTON, D.C.

TUESDAY, 31 MAY

D. Weller
G. Miller
F. Mertens
J. Reaves

WEDNESDAY, 1 JUNE

D. Weller, AID/W ANE/TR/ARD
J. Meenan, AID/W ANE/PP
K. Millar, ACDI/ASIA
E. Young, AID/B Mission Dir
J. Annania, AID/W ANE/TR/ARD
G. Miller
F. Mertens
J. Reaves

WEDNESDAY, 1 JUNE

S. Gillette, OICD/ASIA PT
G. Miller
F. Mertens

MEETINGS IN BURMA

SATURDAY, 4 JUNE - PICKETT'S HOUSE

D. Pickett, USAID/B/Ag Officer
D. Perry, ACDI/Team Leader
R. Flick, ACDI/W
J. Lewis, ACDI/W
D. Zaleski, ACDI/B
G. Miller
F. Mertens
J. Reaves

MONDAY, 6 JUNE - PERRY'S HOUSE

D. Perry
J. Reaves

MONDAY, 6 JUNE - AID OFFICE

D. Pickett, Ag Officer
T. Parker, Deputy AID Rep
M. Hempel, Summer Hire
G. Miller
F. Mertens
T.A. Prue, MOC/CID
J. Reaves

JUNE 6, 1988 - Cottage Industries Department

1. Dr. Than Htaik
   Director General
   Cottage Industries Department

2. U Tin Win
   Project Manager
   EOPD Project

3. U Tin Htut
   Asst. Director
   EOPD Project

4. Daw Tin Moe Set
   Financial Officer
   EOPD Project

5. Mr. Gene Miller

6. Mr. Jasper Reaves

7. Mr. Frank Mertens

8. Mr. Douglas Pickett

JUNE 7, 1988 - Ministry of Co-operatives

1. U Tin Win
   Project Manager
   EOPD Project

2. U Tin Htut
   Asst. Director
   EOPD Project

3. Daw Tin Moe Set
   Financial Officer
   EOPD Project

4. Daw Cho Cho
   Chemical Engineer (Procurement)
   EOPD Project

5. U Min Lwin
   In Charge of Training
   EOPD Project

6. U Than Win
   Chemical Engineer
   Cottage Industries Department

7. U Myint Thein
   Asst. Procurement Officer

8. Mr. Gene Miller

9. Mr. Jasper Reaves

10. Mr. Frank Mertens

11. Mr. Douglas Pickett

TUESDAY, 7 JUNE - PERRY'S HOUSE

D. Perry
G. Miller

JUNE 8, 1988 - PEGU SYND

1. U Aun Kyaw Myint. (Chairman, Co-op Synd.)
2. U Sein Shwe (Head of Branch). Divisional Co-op Office
3. U Saw Shwe (")
4. U Aye Ko (Vice Chairman; Co-op Synd.)
5. U Myo Myint (E.C. Oil Mill; Co-op Synd.)
6. U Lwin Oo (E.C. Workshop ")
7. U Tin Oo (E.C. Transport ")
8. U Khin Maung Htwe (Engineer Workshop; Co-op Synd.)

JUNE 9, 1988 - MEIKHTILA TOWNSHIP CO-OP OIL MILL

1. U Thein (Chairman; Township Co-op Society)
2. U Win Hlaing (E.C. OIL Mill ")
3. U Kyi Win (E.C. " ")
4. U Kyaw Mya (Supervisor)
5. U Hla Aung (Township Co-op Officer)
6. U Tin Win (Asst " ")

JUNE 9, 1988 - MEIKHTILA WORKSHOP

1. U Aung Shwe (E.C. Workshop)
2. U Soe (Advisor Workshop)
3. U Tin Aung (Vice Chairman)
4. U Hla Aung (T.C.O.)
5. U Tin Win (Asst T.C.O.)

JUNE 10, 1988 - MANDALAY SYND

1. U Than Aung (Chairman; Mdy Synd)
2. Mr. Burgess (T.A. Team)
3. U Sein Hla (Manager)

4. U Nyan Din (Vice Chairman)
5. U Soe Win (Secy:)
6. U Khin Maung (Joint Secy)
7. U Kyaw Mya (E.C. Oil Mill)
8. U Tin Hlaing (")

JUNE 10, 1988 - SEIN BAN WORKSHOP

1. U Chit pe (Chairman, Sein Ban Works
2. U Kyaw Sein (Secy: "
3. U Pu (E.C. ")
4. U Tun Aye (E.C. ")
5. U Hla Saung (" ")
6. U Nyein Maung " ")
7. U Hla Shain " ")
8. U Win Thein " ")
9. U Shwe Maung (T.C.O.)
10. Daw Betty Kyaw Than (Dy. T.C.O.)

JUNE 11, 1988 - SAGAING SYNE: OIL MILL

1. U Khin Maung Thein (Vice Chairman)
2. U Hla Thaung (")
3. U Thaung Shwe (Secy:)
4. U Toe Myint (Joint Secy:)
5. U Myint Thein (E.C. Oil Mill)
6. U Kyaw Din (E.C. Oil Mill)

JUNE 14, 1988 PAGAN - NYAUNG OO CO-OP OIL MILL

1. U Sein Win (E.C. Oil Mill)
2. U Bo Gyi ( )
3. U Myint Maung (Manager, Oil Mill)

JUNE 15, 1988 - MAGWE TOWNSHIP CO-OP

1. U Min Aung (Vice Chairman Co-op Soc:)
2. U Khin Maung Win (Secy:)
3. U Aung Maung (E.C.)
4. U Mya Hun (")
5. U Khin Maung (Manager)
6. U Nyunt Tin (")
7. Daw San Nwe Yee (")
8. U Myo Aung (T.C.O.)
9. Daw Thet Thet Shein (Dy. T.C.O.)
10. Daw Kyi Kyi Sein (Asst T.C.O.)

JUNE 16, 1988 - PROME OIL MILL

1. U Aye Ko (Vice Chairman, Co-op Synd)
2. U Win Kyi (" ")
3. U Myo Myint (E.C. Oil Mill)
4. U Khin Maung Htwe (Engineer Workshop, Co-op Synd)
5. U Khin Maung Myint (Manager)

JUNE 28, 1988 - Ministry of Cooperatives

1. U Myo Myint
   Director General
   Cottage Industries Department

2. U Tin Aung
   Director
   CID

3. U Tin Win
   Project Manager
   EOPD Project

4. U Tin Htut
   Asst. Director
   EOPD Project

5. Dr. Tun Aung Prue
   Evaluation Team Member (Burmese Side)

6. Daw Tin Moe Set
   Financial Officer
   EOPD Project

7. Daw Cho Cho
   Chemical Engineer (Procurement)
   EOPD Project

8. U Min Lwin
   In Charge of Training
   EOPD Project

9. U Than Win
   Chemical Engineer
   CID

10. Mr. Douglas R. Pickett
    Project Officer
    EOPD Project

11. Mr. Gene Miller
    EOPD Evaluation Team Leader

12. Mr. Jasper Reaves
    Evaluation Team Member

13. Mr. Frank Mertens
    Evaluation Team Member

APPENDIX C

METTINGS IN WASHINGTON D.C.

TUE 31 MAY

D. Weller
G. Miller
F. Mertens
J. Reaves

WED 1JUNE

D. Weller AID/W ANE/TR/ARD
J. Meenan AID/W ANE/PP
K. Millar ACDI/ASIA
E. Young AID/B Mission Dir
J. Annania AID/W ANE/TR/ARD
G. Miller
F. Mertens
J. Reaves

WED 1JUNE

S. Gillette OICD/ASIA PT
G. Miller
F. Mertens

MEETINGS IN BURMA

SAT 4 JUNE 88 PICKETT'S HOUSE

D. Pickett
D. Perry
R. Flick
J. Lewis
D. Zalaski
G. Miller
F. Mertens
J. Reaves

MON 6 JUNE 88 PERRY'S HOUSE

D. Perry
J. Reaves

MON 6 JUNE 88 AID OFFICE

D. Pickett
T. Barker
M. Hempel
G. Miller
F. Mertens
T.A. Prue
J. Reaves

06/06/88 - Cottage Industries Department

1. Dr. Than Htaik
   Director General
   cottage Industries Department

2. U Tin Win
   Project Manager
   EOPD Project

3. U Tin Htut
   Asst. Director
   EOPD Project

4. Daw Tin Moe Set
   Financial Officer
   EOPD Project

5. Mr. Gene Miller

6. Mr. Jasper Reaves

7. Mr. Frank Mertens

8. Mr. Douglas Pickett

06/06/88 - Ministry of Co-operatives

1. U Tin Win
   Project Manager
   EOPD Project

2. U Tin Htut
   Asst. Director
   EOPD Project

3. Daw Tin Moe Set
   Financial Officer
   EOPD Project

4. Daw Cho Cho
   Chemical Engineer (Procurement)
   EOPD Project

5. U Min Lwin
   In Charge of Training
   EOPD Project

6. U Than Win
   Chemical Engineer
   Cottage Industries Department

7. U Myint Thein
   Asst. Procurement Officer

8. Mr. Gene Miller

9. Mr. Jasper Reaves

10. Mr. Frank Mertens

11. Mr. Douglas Pickett

06/08/88 PEGU SYND.

1. U Aun Kyaw Myint. (Chairman, Co-op Synd.)
2. U Sein Shwe (Head of Branch). Divisional Co-op Office
3. U Saw Shwe (")
4. U Aye Ko (Vice Chairman; Co-op Synd.)
5. U Myo Myint (E.C. Oil Mill; Co-op Synd.)
6. U Lwin Oo (E.C. Workshop ")
7. U Tin Oo (E.C. Transport ")
8. U Khin Maung Htwe (Engineer Workshop; Co-op Synd.)

06/09/88 MEIKHTILA TOWNSHIP CO-OP OIL MILL

1. U Thein (Chairman; Twonship Co-op Society)
2. U Win Hlaing (E.C. OiL Mill ")
3. U Kyi Win (E.C. " ")
4. U Kyaw Mya (Supervisor)
5. U Hla Aung (Township Co-op Officer)
6. U Tin Win (Asst " ")

06/09/88 MEIKHTILA WORKSHOP

1. U Aung Shwe (E.C. Workshop)
2. U Soe (Advisor Workshop)
3. U Tin Aung (Vice Chairman)
4. U Hla Aung (T.C.O.)
5. U Tin Win (Asst T.C.O.)

06/10/88 MANDALAY SYND

1. U Than Aung (Chairman; Mdy Synd)
2. Mr. Burgess (T.A. Team)
3. U Sein Hla (Manager)
4. U Nyan Din (Vice Chairman)
5. U Soe Win (Secy:)
6. U Khin Maung (Joint Secy)
7. U Kyaw Mya (E.C. Oil Mill)
8. U Tin Hlaing (")

06/10/88 SEIN BAN WORKSHOP

1. U Chit pe (Chairman, Sein Ban Workshop)
2. U Kyaw Sein (Secy: ")
3. U Pu (E.C. ")
4. U Tun Aye (E.C. ")
5. U Hla Saung (" ")
6. U Nyein Maung " ")
7. U Hla Shain " ")
8. U Win Thein " ")
9. U Shwe Maung (T.C.O.)
10. Daw Betty Kyaw Than (Dy. T.C.O.)

06/11/88 SAGAING SYNE: OIL MILL

1. U Khin Maung Thein (Vice Chairman)
2. U Hla Thaung (")
3. U Thaung Shwe (Secy:)
4. U Toe Myint (Joint Secy:)
5. U Myint Thein (E.C. Oil Mill)
6. U Kyaw Din (E.C. Oil Mill)

06/14/88 PAGAN - NYAUNG OO CO-OP OIL MILL

1. U Sein Win (E.C. Oil Mill)
2. U Bo Gyi (")
3. U Myint Maung (Manager, Oil Mill)
4. U Sein Win (T.C.O.)
5. U Mya Thaing (Secy:)

06/15/88 MAGWE TOWNSHIP CO-OP

1. U Min Aung (Vice Chairman Co-op Soc:)
2. U Khin Maung Win (Secy:)
3. U Aung Maung (E.C.)
4. U Mya Hun (")
5. U Khin Maung (Manager)
6. U Nyunt Tin (")
7. Daw San Nwe Yee (")
8. U Myo Aung (T.C.O.)
9. Daw Thet Thet Shein (Dy. T.C.O.)
10. Daw Kyi Kyi Sein (Asst T.C.O.)

06/16/88 PROME OIL MILL

1. U Aye Ko (Vice Chairman, Co-op Synd)
2. U Win Kyi (" ")
3. U Myo Myint (E.C. Oil Mill)
4. U Khin Maung Htwe (Engineer Workshop, Co-op Synd)
5. U Khin Maung Myint (Manager)

06/28/88 - Ministry of Cooperatives

1. U Myo Myint
   Director General
   Cottage Industries Department

2. U Tin Aung
   Director
   CID

3. U Tin Win
   Project Manager
   EOPD Project

4. U Tin Htut
   Asst. Director
   EOPD Project

5. Dr. Tun Aung Prue
   Evaluation Team Member (Burmese Side)

6. Daw Tin Moe Set
   Financial Officer
   EOPD Project

7. Daw Cho Cho
   Chemical Engineer (Procurement)
   EOPD Project

8. U Min Lwin
   In Charge of Training
   EOPD Project

9. U Than Win
   Chemical Engineer
   CID

10. Mr. Douglas R. Pickett
    Project Officer
    EOPD Project

11. Mr. Gene Miller
    EOPD Evaluation Team Leader

12. Mr. Jasper Reaves
    Eavluation Team Member

13. Mr. Frank Mertens
    Evaluation Team Member

APPENDIX C (Cont'd.)

Revised Itinerary for the EOPD Mid-Term Evaluation Team 06/03/88

June

4 Sat	Arrive Rangoon (Pickett & Tin Win meet at airport, take to hotel)
5 Sun	Free day
6 Mon	AM - AID/B; PM - meeting at CID (Dr. Than Htaik, U Tin Win, Perry); AID/B
7 Tue	AM - desk time. PM - meetings with MOC & ACDI Project Personnel; Dinner at Picketts
8 Wed	Drive to Yezin, visits enroute to Pegu workshop and oilmill (BARD GH)
9 Thu	Drive to Mandalay, visits enroute to Meiktila workshop and oilmill (Emb GH)
10 Fri	In Mandalay - Visits to oilmill and workshops, Coops Office (Emb GH)
11 Sat	In Mandalay - Visits to Sagaing oilmill(s) and Syndicate Office (Emb GH)
12 Sun	In Mandalay - Visit Maymyo, sight see, etc. (Emb GH)
13 Mon	Drive to Pagan - Visits Enroute to Thaungtha, Nyaung Oo Oilmills (Hotel)
14 Tue	Drive to Yenanchaung - Visits enroute to Mt. Popa & Nyaung Yoe workshop (GOB GH)
15 Wed	Drive to Prome - Visits Enroute to Magwe; Prome Oilmills (GOB GH)
16 Thu	Drive to Rangoon
17 Fri	Desk time, team mtgs
18 Sat	
19 Sun	Free Day
20 Mon	Meetings with other donors, other ministries, as needed
21 Tue	
22 Wed	
23 Thu	
24 Fri	
25 Sat	
26 Sun	
27 Mon	
28 Tue	
29 Wed	
30 Thu	

Field Trip (8)
Miller
Reaves
Mertens
Prue
Perry
Tin Htut
Pickett
Driver

APPENDIX D

LIST OF DOCUMENTS REVIEWED

LIST OF DOCUMENTS REVIEWED BY THE EOPD EVALUATION TEAM

1. Edible Oil Processing and Distribution Project Scope of Work
2. A Review of AID's Agricultural Sector Strategy in Burma, November 1984
3. Memo to EOPD Evaluation Team from Richard Perry, dated June 18, 1988 concerning Mr. J. Reaves Tele Con 6/18/88
4. AID Project Implementation Report for EOPD as of March 31, 1988
5. An article: "BOARD HEARS BURMA PROJECT SUCCESS" from ACDI Brief
6. Memo to AA/ANE, Julia Chang Bloch from ANE/PD, Ronald F. Venezia, concerning his trip report to Burma
7. List of EOPD Project Implementation Letters (PILS)
8. A Book: "FOOD CHEMISTRY," Reinhold Organic Chemistry and Biochemistry Textbook Series
9. Letter to Jerry Lewis, Vice President, ACDI, from Richard Perry enclosing EOPD's Major Events from August to December 1987
10. Field Report for Burma Observational Visit by Mark J. Olson
11. Article (1) on Burma's EOPD Project
12. Article (2) on Burma's EOPD Project
13. Consultancy Report on Casting and Heat Treating Workshops for the EOPD Project by Peter Wieser of Wieser and Associates
14. Memo to Doug Pickett from Richard Perry, dated February 10, 1988, concerning the Mid-term Evaluation
15. Letter to Jerry Lewis, Vice President, ACDI, from Richard Perry enclosing EOPD Annual Report
16. Letter to U Tin Win, Project Manager, EOPD Project, from Richard Perry, dated September 28, 1987
17. Abbreviated Statements of Work for Mr. Polder (Mechanical Engineer)
18. Letter to Neil Edin ACO, Bangkok, from ACDI concerning the EOPD/ACDI Contract
19. Economic Overview of Burma from Thomas F. Miller, dated January 24, 1987
20. Waiting for the Bogyoke, a Consultant's report by David I. Steinberg, dated February 20, 1988

21. Project Evaluation; Chapter 12 of AID HANDBOOK 3, Effective date September 30, 1982.

22. The Socialist Republic of the Union of Burma Report of the Pyithu Hluttaw on the Financial, Economic and Social Condition of Burma for 1988/1989, by the Ministry of Planning and Finance

23. The Project Grant Agreement for the EOPD Project, dated August 29, 1985

24. AID Evaluation Occasional Paper No. 16; Synthesis of AID Evaluation Reports; FY 1985 and FY 1986

25. Country Development Strategy Statement, Burma for FY 1987, dated April 1985 by AID/Washington

26. Maize and Oilseeds Production Project (482-0005), Mid-term Evaluation Report, dated February 1985.

27. EOPD Project Paper, dated November 1984

28. Letter to Doug Pickett from U Tin Win, Project Manager, dated June 28, 1988, enclosing the Project Activities

29. EOPD Equipment and Material Report

30. An article on "PEANUTS"

31. General Description and Numbers of Township in Magwe Division

32. Naung Yoe Mechanical Repairing and Production Co-op Society; Manufacturing Report, dated June 14, 1988

33. A Report on the Sagaing Division Co-op Oil Mills

34. Progress of Rehabilitation of Oil Mills in Upper Burma, for the Period February 1987 to May 1988, by Mr. Derrick Burgess, Master Mechanic

35. Mr. Gene Miller Evaluation Team Leader; EOPD Implementation Programs and Schedule

36. Burma Solicitation No. 482-0006 EOPD by ACDI

37. Annual Report, 1987, Agricultural Co-op Development International

38. Asia Near East Bureau Procedural Guidelines for Evaluation by ANE/DP/Evaluation, dated February 1986

39. Memo from Maureen Norton, ANE/PD/E on Near East Evaluation Summaries, FY 1985

40. Edible Oil Processing and Distribution Project Implementation Plan by Mr. Douglas R. Pickett, ADO, AID/BURMA

41. 1970 Union of Burma Cooperative Society Law

APPENDIX E

HOST COUNTRY INPUTS

APPENDIX E

Estimated Cost of Host Country Contribution

I. Support for TA (10 person years)

- Utilities ($2,000/yr)	$ 20,000
- Furnishings ($2,000/house)	8,000
- Vehicle maintenance	18,000
- Fuel	5,000
- Office space	20,000
- Support staff	40,000
- Supplies	20,000
- In-country travel	20,000
- Administrative staff	10,000
Sub-total	$ 161,000

II. A. Overseas Training (297 Person months)

- Salaries while overseas (K 700/month)	$ 24,500
- Allowance (K 2,000/Participant)	16,500
- Training and salaries for replacements while in overseas training	30,000
- In-country travel	10,000
- Language instruction (11 students)	8,500
Salaries while in language (4 mos/student)	
Instruction costs (K 2,000/student)	
Language laboratory space	
- Training materials	5,000
- Administrative support	10,000
- Other training expenses	5,000
Sub-total overseas training	$ 109,500

B. On-the-job training

- Salaries while on training	
Oil mills (100 person months)	8,000
Workshops (60 person months)	5,000
- In-country travel	5,000
- Other training expenses	5,000
- Sub-total on-the-job training	$ 23,000
Sub-total training	$132,500

III. Commodities

- Laboratory supplies and facilities (local costs)	$ 100,000
- Library materials	20,000
- Office equipment and supplies	60,000
- Vehicles (3)	30,000
- Miscellaneous	
Sub-total	$ 230,000

IV. Operations and Maintenance for Ministry

- Laboratory space	$ 50,000
- Salaries of administrative personnel involved in project not included above	50,000
- Office space	50,000
- Maintenance of MOC facilities	50,000
- Other operating costs	20,000
Sub-total	$ 220,000

V. Operations and maintenance for 60 mills and 4 workshops

Labor for rehabilitation work in mills (21,880/mill)	$ 1,312,000
Labor for annual maintenance ($6,240/mill/yr.)	1,310,000
Additional Annual Labor for seed handling ($2,201/mill)	528,000
Investment by mills for additional storage ($2,000/mill)	120,000
Labor expended by workshops to fabricate parts ($2,892/mill)	175,000
Labor expended by workshops to fabricate cooker modifications ($200/mill)	12,000
Labor expended by workshops for annual rebuilding oil screw and cages ($2,310/mill)	406,000
Prorated charges for use of existing machinery in Workshops to fabricate oil mill parts	108,000
Investment by Workshops for expansion of facilities ($2,000/Workshop)	8,000
Sub-total Operations and Maintenance	$ 3,979,000

VI. Evaluation $ 21,000

TOTAL BUDGET FOR HOST COUNTRY CONTRIBUTION $ 4,722,500

APPENDIX E (Cont'd)

LABORATORY EQUIPMENT STATUS

DOC#BUDGET:MERTENS:SBH:6/24/88
UNDER MILLER/DR. PRUE'S CHART

BUDGET

USAID		$115,000
SRUB	67,900 Kyats =	$ 9,700
	TOTAL =	$124,700

EXPENSES

USAID	46,185.95 + 25,145.10 =	$ 7,133.04
SRUB	Kyats 71,431 =	10,204.40
	TOTAL =	$ 81,535.44

APPENDIX F

PROJECT GRANT AGREEMENT

APPENDIX F

PROJECT GRANT AGREEMENT

BETWEEN

THE SOCIALIST REPUBLIC OF THE UNION OF BURMA

AND THE

UNITED STATES OF AMERICA

for the

BURMA EDIBLE OIL PROCESSING AND DISTRIBUTION PROJECT

(482-0006)

Dated: August 29, 1985

Table of Contents
Project Grant Agreement

A.I.D. Project No. 482-0006

Project Grant Agreement

Dated August 29, 1985

Between
The Socialist Republic of the Union of Burma ("Grantee")

And
The United States of America, acting through the Agency for International Development ("A.I.D.").

Article 1: The Agreement

The purpose of this Agreement is to set out the understandings of the parties named above ("Parties") with respect to the undertaking by the Grantee of the Project described below, and with respect to the financing of the Project by the Parties.

Article 2: The Project

SECTION 2.1 Definition of Project. The Project, which is further described in Annex 1, is designed to assist the Grantee in improving the efficiency and productivity of existing edible oil expeller facilities in both the private and cooperative sectors; and to strengthen the capabilities of the Ministry of Cooperatives and the cooperative sector in the planning and delivery of technical services. The Grant shall include, but not be limited to, provision of training, technical assistance, procurements of steel and other raw materials, spare parts, machinery and workshop equipment, as well as laboratory equipment and library reference material. Annex 1, attached, amplifies the above definition of the Project. Within the limits of the above definition of the Project, elements of the amplified description stated in Annex 1 may be changed by written agreement of the authorized representatives of the Parties named in Section 8.2, without formal amendment of this Agreement.

SECTION 2.2 Incremental Nature of Project

(a) A.I.D.'s contribution to the Project will be provided in increments, the initial one being made available in accordance with Section 3.1 of this Agreement. Subsequent increments up to a project total of $9,350,000 will be subject to availability of funds to A.I.D. for this purpose, and to the mutual agreement of the Parties, at the time of a subsequent increment, to proceed.

(b) Within the overall Project Assistance Completion Date stated in this Agreement, A.I.D., based upon consultation with the Grantee, may specify in Project Implementation Letters appropriate time periods for the utilization of funds granted by A.I.D. under an individual increment of assistance.

Article 3: Financing

SECTION 3.1 The Grant.

To assist the Grantee to meet the costs of carrying out the Project, A.I.D., pursuant to the Foreign Assistance Act of 1961, as amended agrees to grant the Grantee under the terms of this Agreement an amount not to exceed Five Million Eight Hundred and Sixty Thousand United States ("U.S.") Dollars ($5,860,000) ("Grant"). The Parties, as members of the Colombo Plan for Cooperative Economic and Social Development in Asia and the Pacific, consider the Grant to be bilateral assistance provided under the Plan. The Grant may be used to finance foreign exchange costs, as defined in Section 6.1, and local currency costs, as defined in Section 6.2, of goods and services required for the Project.

SECTION 3.2 Grantee Resources for the Project

(a) The Grantee agrees to provide or cause to be provided for the Project all funds, in addition to the Grant, and all other resources required to carry out the Project effectively and in a timely manner.

(b) The resources provided by Grantee for the Project over its life will be not less than the equivalent of U.S. $4,744,000, including costs borne on an "in-kind" basis.

SECTION 3.3 Project Assistance Completion Date

(a) The "Project Assistance Completion Date" (PACD), which is September 30, 1990, or such other date as the Parties may agree to in writing, is the date by which the Parties estimate that all services financed under the Grant will have been performed and all goods financed under the Grant will have been furnished for the Project as contemplated in this Agreement.

(b) Except as A.I.D. may otherwise agree in writing, A.I.D. will not issue or approve documentation which would authorize disbursement of the Grant for services performed subsequent to the PACD or for goods furnished for the Project, as contemplated in this Agreement, subsequent to the PACD.

(c) Requests for disbursement, accompanied by necessary supporting documentation prescribed in Project Implementation Letters, are to be received by A.I.D. or any bank described in Section 7.1 no later than nine (9) months following the PACD, or such other periods as A.I.D. agrees to in writing. After such period, A.I.D., giving notice in writing to the Grantee, may at any time or times reduce the amount of the Grant by all or any part thereof for which requests for disbursement, accompanied by necessary supporting documentation prescribed in Project Implementation Letters, were not received before the expiration of said period.

Article 4: Conditions Precedent to Disbursement

SECTION 4.1 First Disbursement. Except as A.I.D. may otherwise agree in writing, prior to any disbursement for the upgrading of oilseed mills and related technical assistance or the issuance of any documentation pursuant to which disbursement will be made, the Grantee shall furnish, in form and substance satisfactory to A.I.D. a statement identifying the various agencies and offices of the Grantee responsible for implementation of the Project and designating individuals in each such agency or office responsible for coordinating Project components.

SECTION 4.2. Procurement of Laboratory Equipment. Except as A.I.D. may otherwise agree in writing, prior to any disbursement for the procurement of laboratory equipment, and the bench-type solvent extraction plant, or the issuance of any documentation pursuant to which disbursement will be made, The Grantee shall furnish to A.I.D., in form and substance satisfactory to A.I.D., evidence that the new laboratory facility of the Cottage Industries Department of the Ministry of Cooperatives is functional (with operating utilities and program safety equipment on line); a listing of staff that will be trained to use new equipment; and a listing of laboratory equipment and materials to be used.

SECTION 4.3 Notification. When A.I.D. has determined that the conditions precedent specified in Section 4.1 and 4.2 have been met, it will promptly notify the Grantee.

SECTION 4.4 Terminal Dates for Conditions Precedent. If all of the conditions specified in Section 4.1 and 4.2 have not been met within 90 days from the date of this Agreement, or such later date as A.I.D. may agree to in writing, A.I.D., at its option, may terminate this Agreement by written notice to the Grantee.

Article 5: Special Covenants

SECTION 5.1. Project Evaluation. The Parties agree to establish an evaluation program as 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; and

(d) evaluation, to the degree feasible, of the overall development impact of the Project.

SECTION 5.2. Project Covenants

(a) Clearance of Goods: The Grantee shall cause to process and clear expeditiously, and store and distribute properly, all goods financed under the Project.

(b) Inter-agency Relationships: The Grantee shall cause to ensure that each agency and office of the Grantee responsible for carrying out the Project will cooperate to the maximum extent possible with the Ministry of Cooperatives in carrying out the Project.

(c) Loans to Implementing Agencies: The Grantee shall make every effort to ensure that loans made available to cooperatives, and other entities in furtherance of the objectives of the Project shall be made available with similar terms and conditions which are applicable to those projects implemented by the Cooperatives under bilateral grant assistance.

(d) Mills to be Rehabilitated: The Grantee shall make every effort to ensure that private as well as cooperative mills benefit significantly from rehabilitation activities financed under the Project and that upon request by A.I.D. it shall furnish to A.I.D. annual work plans and other planning and implementation documents identifying in advance of rehabilitation mills to be upgraded.

(e) Contract Mills: The Grantee shall make every effort to ensure that where private mills are to be utilized on a contract basis for the processing of oilseeds for township cooperatives or cooperative syndicates, private mills rehabilitated under the Project shall be given preference over other private mills for such contracts. The Grantee shall covenant that it shall make every effort by adjusting township procurement levels to provide sufficient oilseeds on a custom basis to such rehabilitated private mills or other means to ensure that such rehabilitated private mills operate at a capacity equal to that of cooperative mills rehabilitated under the Project.

(f) Project Personnel: The Grantee shall provide to non-Burmese personnel assigned to the Project the following privileges, immunities, exemptions and benefits:

(i) The personnel shall be granted exemption from income or other taxes on salaries and allowances paid out of the project funds;

(ii) The personnel shall be granted exemption from import and other duties on personal and household effects as granted to Colombo Plan experts in Burma; such goods are to be shipped within 3 months after the first arrival of the personnel concerned in Burma;

(iii) The personnel assigned to Burma more than 12 months shall be granted exemption from import duties on one motor vehicle per employee on condition that it is re-exported or re-sold to a privileged person (or duty paid on its assessed value at the time of sale in Burma under the rules and

regulations in force in Burma); the motor vehicle should not exceed 2000 cc engine capacity and should be imported within 12 months after the first arrival of the personnel concerned in Burma;

(iv) The Grantee shall permit the said personnel and their families to enter Burma free of charge, and shall promptly issue residency visas and all other appropriate entry, exit or work visas, permits and identity documents necessary to enable such personnel and their families to reside and carry out their duties in Burma until the Project is completed;

(v) The Grantee will facilitate movement of project supplies by providing appropriate customs and wharfage facilities in the port closest to the project site and will be responsible for expeditious transport of such supplies to the project site;

(vi) The Grantee shall assume all liability for and shall hold such experts and their families harmless from all claims and liabilities resulting from performance of their assigned duties or residence in Burma, except as caused by wilful misconduct or gross negligence;

(vii) The Grantee will arrange for the safety of the Project personnel, project and personal equipment both at the project location, in transit and on any other official or representational activity in Burma.

(viii) The Grantee shall provide such personnel and their families free medical care other than dental at Government hospitals;

(ix) The Grantee shall provide free furnished temporary lodging for the said personnel when first arriving in Burma and when travelling away from duty station. Residential accomodation at project site will be provided to the personnel and their families and will be financed under the Grant as described in Annex 1.

(x) The Grantee, however, will not be held liable for any injury or death caused to the personnel assigned to the Project by accidents arising out of and in the course of their employment in Burma. Such foreign personnel are expected to be covered by insurance in connection with their assignment in accordance with the laws of his country.

(g) Trainees: The Grantee shall require all Burmese Government employees trained under the Project to serve in positions relevant to their training for periods of time at lease equal to the length of their training, under Burmese Government rules and regulations.

Article 6: Procurement Source

SECTION 6.1. Foreign Exchange Costs. Disbursements pursuant to Section 7.1 will be used exclusively to finance the costs of goods and services required for the Project having, with respect to goods, their source and origin, and with respect to services their nationality, in the United States (Code 000 of the A.I.D. Geographic Code Book as in effect at the time order are placed or contracts entered into for such goods and

services) ("Foreign Exchange Costs"), except as A.I.D. may otherwise agree in writing, and except as provided in Annex 2, the Project Grant Standard Provisions, Section C.1(b), with respect to marine insurance. Ocean transportation costs will be financed under the Grant only on vessels under flag registry of the United States except as A.I.D. may otherwise agree in writing. Training financed under the Grant may be undertaken in the United States or in third countries in accordance with the provisions of A.I.D. Handbook 10.

SECTION 6.2. Local Currency Costs. Disbursements pursuant to Section 7.2 will be used exclusively to finance the costs of goods and services required for the Project having their source and, except as A.I.D. may otherwise agree in writing, their origin in Burma ("Local Currency Costs"). To the extent provided for under this Agreement, "Local Currency Costs" may also include the provision of local currency resources required for the Project.

Article 7: Disbursements

SECTION 7.1. Disbursements for Foreign Exchange Costs

(a) After satisfaction of conditions precedent, the Grantee may obtain disbursements of funds under the Grant for the Foreign Exchange Costs of goods or services required for the Project in accordance with the terms of this Agreement, by such of the following methods as may be mutually agreed upon:

(i) by transmitting to A.I.D., with necessary supporting documentation as prescribed in Project Implementation Letters, (A) requests for reimbursement for such goods or services, or, (B) requests for A.I.D. to procure commodities or services in the Grantee's behalf for the Project; or

(ii) by transmitting to A.I.D., to issue Letters of Commitment for specified amounts (A) to one or more U.S. banks, satisfactory to A.I.D., committing A.I.D. to reimburse such bank or banks for payments made by them to contractors or suppliers, under Letters of Credit or otherwise, for such goods or services, or (B) directly to one or more contractors or suppliers, committing A.I.D. to pay such contractors or suppliers for such goods and services.

(b) Banking charges incurred by the Grantee in connection with Letters of Committment and Letters of Credit will be financed under the Grant unless Grantee instructs A.I.D. to the contrary. Such other charges as the Parties may agree to may also be financed under the Grant.

SECTION 7.2. Disbursements for Local Currency Costs.

(a) After satisfaction of conditions precedent, the Grantee may obtain disbursements of funds under the Grant for Local Currency Costs required for the Project in accordance with the terms of this Agreement, by transmitting to A.I.D., with necessary supporting documentation as prescribed in Project Implementation Letters, requests to finance such costs.

(b) The local currency needed for such disbursements may be obtained by acquisition by A.I.D. with U.S. dollars by purchase, or from local currency already owned by the U.S. Government. The U.S. dollar equivalent of the local currency made available hereunder will be the amount of U.S. dollars required by A.I.D. to obtain the local currency.

SECTION 7.3. Other Forms of Disbursement. Disbursements of the Grant may also be made through such other means as the Parties may agree to in writing.

Article 8: Miscellaneous

SECTION 8.1. Communications. Any notice, request, document or other communication submitted by either Party to the other under this Agreement will be in writing or by telegram or cable, and will be deemed duly given or sent when delivered to such Party at the following address:

To the Grantee:

Director General
Cottage Industries Department
Ministry of Cooperatives
Rangoon

To A.I.D.:

A.I.D. Representative
Embassy of the United States of America
Rangoon.

All such communications will be in English, unless the Parties otherwise agree in writing. Other addresses may be substituted for the above upon the giving of notice. The Grantee, in addition, will provide USAID/Rangoon with a copy of each communication sent to A.I.D.

SECTION 8.2. Representatives. For all purposes relevant to this Agreement, the Grantee will be represented by the individual holding or acting in the Office of the Director General, Cottage Industries Department and A.I.D. will be represented by the individual holding or acting in the Office of A.I.D. Representative, U.S. Embassy, Rangoon, each of whom, by written notice, may designate additional representatives for all purposes other than exercising the power under Section 2.1 to revise elements of the amplified description of the project in Annex 1. The names of the representatives of the Grantee, with specimen signatures, will be provided to A.I.D., which may accept as duly authorized any instrument signed by such representatives in implementation of this Agreement, until receipt of written notice of revocation of their authority.

SECTION 8.3. Standard Provisions Annex. A "Project Grant Standard Provisions Annex" (Annex 2) is attached to and forms part of this Agreement.

IN WITNESS WHEREOF, the Socialist Republic of the Union of Burma and the United States of America, each acting through its duly authorized representative, have caused this Agreement to be signed in their names and delivered as of the day and year first above written.

For the
GOVERNMENT OF THE
SOCIALIST REPUBLIC OF THE
UNION OF BURMA

By: _____

Name: Dr. Maung Shein
Title: Deputy Minister
Ministry of Planning
and Finance

Date: August 29, 1985

For the
GOVERNMENT OF THE
UNITED STATES OF AMERICA

By: _____

Name: Charles B. Salmon
Title: Charge d'Affaires

Date: August 29, 1985

Burma Edible Oil Processing and Distribution Project

A. SUMMARY PROJECT DESCRIPTION

The Burma Edible Oil Processing and Distribution Project is designed to upgrade and expand edible oil processing in Burma and support the activities planned under the Maize and Oilseeds Production Project (482-0005) over a five year period by focusing on: (a) increasing the capabilities of the Ministry of Cooperatives (MOC) to plan, implement, monitor and evaluate projects, (b) instituting greater management/ production measures in the Industrial Producers' Cooperatives, (c) upgrading the efficiency of edible oil processing in both the private and cooperative sectors, and (d) improving the quality of edible oil produced, and (e) improving edible oil distribution.

The project purpose will be accomplished in two ways. The first is by providing technical assistance and training to increase the capability of indigenous organizations to plan, implement and evaluate programs to improve production, quality and distribution of edible oil. The project will finance long-term training for 5 MSc's and 6 one-year training participants in the U.S. An additional 20 participants will receive short-term specialty training in the U.S. and 45 participants will be sent on observation tours to other countries in the Asia region. Technical assistance will be provided for 120 months long-term and 36 months short-term. The second method of accomplishing the project purpose will be by providing raw materials, equipment and commodities required to reproduce components for the rehabilitation of oilseed mills. The total life of project budget is estimated at $14.094 million of which AID will provide 66 percent ($9.35 million) and the Government of Burma will provide 34 percent ($4.744 million in kyat equivalent) subject to the availability of funds to each of the Parties.

The project is designed to be implemented over six years.

B. DETAILED PROJECT DESCRIPTION

1. Project Goal: The goal of the Burma Edible Oil Processing and Distribution Project is to attain self-sufficiency in edible oil production by increasing the quality and quantity of edible oil produced and distributed in Burma.

2. Project Purpose: The purpose of the project will be to upgrade and expand existing oil mills and increase the capability of indigenous organizations to undertake programs to improve edible oil processing and distribution. Specifically the project will focus on: (a) increasing the capabilities of the Ministry of Cooperatives (MOC) to plan, implement, monitor and evaluate projects, (b) instituting greater

management/production measures in the Industrial Producers' Cooperatives, (c) upgrading the efficiency of edible oil processing in both the private and cooperative sectors, (d) improving the quality of edible oil produced, and (e) improving edible oil distribution.

The project purpose will be accomplished by: (a) providing technical assistance and training to increase the capability of indigenous organizations to plan, implement and evaluate programs to improve production, quality and distribution of edible oil; (b) providing raw materials, equipment and commodities required to reproduce components for the rehabilitation of oilseed mills.

3. Participating Entities: The indigenous entities identified to participate in the project are as follows:

a. The Ministry of Cooperatives (MOC). The MOC will have overall responsibility for the implementation of the project. The MOC will work through its Cooperative Department to improve overall sector planning, and its Cottage Industries Department will be responsible for project implementation and oversight and will supervise the technical assistance effort. Both Departments will receive technical assistance, training, and commodities to upgrade and improve their skills.

b. Screw-Press (Expeller) Oilseed Mills. Of the estimated 2,000 screw-press oilseed mills in Burma, approximately 20% (400 mills) operate more or less efficiently, but their productivity could be significantly increased with moderate investment. Of the remaining mills, 60% are inefficient and would require major investments to bring their efficiency and productivity to a break-even point.

The project will focus on upgrading approximately 10%-15% of the top 400 mills. Ninety-five percent of these 2,000 mills are in private hands and share equally with the cooperatives in their efficiency and upgrading potential. It is essential therefore that this project rehabilitate mills in both sectors in order to capture that portion of the population of mills most capable of being rehabilitated with moderate investment. As a consequence, this will enable the country to achieve the greatest possible gain to Burma's oilseed processing industry under this project. The initial fifteen mills to be rehabilitated (9 cooperative and 6 private) will undergo complete rehabilitation. It is estimated that upto an additional 45 mills will also undergo ranging degrees of rehabilitation and upgrading. These additional mills are yet to be selected, but are expected to comprise the same cooperative/private sector ratio as identified in the initial 15 target mills. Criteria other than existing and potential efficiencies in the selection of which mills to rehabilitate will depend on factors such as accessibility, responsiveness of owners, private mill/cooperative mill mix, and proximity to one of the Industrial Producers' Cooperatives.

c. Industrial Producers' Cooperatives (Workshops). Significant mechanical skills in Burma are found in regional Industrial Producers' Cooperatives. These Cooperatives own and operate workshops equipped with relatively modern machinery and well-trained mechanics. There are 5 such workshops in Burma. They vary in organization, focus, assets and skill levels. However, in all instances their membership consists of skilled persons who pool their talents and expertise to provide a one-stop service to prospective customers.

Four of these workshops will carry out the rehabilitation, manufacture or repair of screw-press mill components under the project. These four are located in the same areas as the 15 oilseed mill sample selected for analysis. The only workshop that will not participate in the project will be the Industrial Producers' Cooperative in Rangoon.

4. Project Outputs and End of Project Status:

a. Upgraded Planning Division (PD) of the MOC. Under the Cooperative Department of the Ministry of Cooperatives, the Planning Division is responsible for research, data collection and analysis, economic planning, coordination of donor inputs, and major project preparation. The Planning Division is now staffed with 33 people (85% hold B.Sc. degrees), but this number is expected to significantly increase over the next two or three years. An internal appraisal of the Planning Division concluded that it has skill deficiencies in certain areas of its responsibility.

The Planning Division's skills in data collection, storage, retention and analysis will be greatly enhanced under the project; so will its project preparation, appraisal, monitoring, and evaluation. By the end of the project, the Planning Division should be more fully staffed with skillful professionals supported by appropriate equipment and tools to carry out their responsibilities.

b. Upgraded Cottage Industries Department (CID) of the MOC. The Cottage Industries Department currently has 298 positions and a pending reorganization would further increase staff levels. The divisions of the Cottage Industries Department that will receive assistance under the project are the Innovation, the Technical Services, and the Training and Education Divisions.

The Innovation Division is responsible for quality control of the cooperatives' edible oil and for the development of new and the adaptation of existing technologies (such as the development of weaning foods) for cooperative products. It is staffed by chemists, physicists, botanists and engineers. It also maintains a quality control laboratory.

The Technical Service Division is responsible for such things as physical plant design, assistance with technical problems, upgrading of existing plants, and the construction of new plants. These two divisions channel their services to local level plants and entities through the Training and Education Division, which has branches all over the country.

The Training and Education Division maintains a technical library for CID, and provides training in edible oil technology to cooperatives through seminars, symposia, in-country programs, and practical problem solving at site facilities.

The capabilities of the Cottage Industries Department will be greatly enhanced under the project, which will enable it and its divisions to

carry out future programs in upgrading existing screw-press mills, operating new ones, and preparing to begin work on solvent extraction plants. This upgrading will be done by additional equipment for the Innovation Division laboratory (including a lab-size solvent extraction plant), information dissemination equipment, technical assistance, and training.

At the end of the project, the Cottage Industries Department should have better trained personnel and managers with a working knowledge of modern oil processing operations. The Cottage Industries Department's information dissemination activities will have been enhanced and its outreach expanded to provide information and technical assistance to cooperatives and related private sector facilities. Additionally, the Cottage Industries Department will be able to carry out an expanded program of quality control work and will be able to continually update skills through the facilities of an expanded library.

c. Upgraded Capacity and Capability of Industrial Producers' Cooperatives (Workshops). Workshops participating in the project will be provided equipment, tools, raw materials, and technical assistance to improve their operations, particularly in the manufacture of screw-press parts. At the end of the project, these Workshops should be better equipped, more productive, safer to work in, and more responsive to expanding their work beyond vehicle repair and more toward oil processing technologies.

d. More Efficient, More Productive Screw-Press Mills. Screw-press mills participating in the project, both cooperative and private, will undergo major rehabilitation. These mills will also adopt annual maintenance procedures and better managerial techniques, safety measures, and improved storage of seed oil and cake. At the end of the project, these mills should be more efficient, extracting more oil from a unit of seed cheaper and faster. They should also be able to handle more than double the tonnage of seed they now handle with less pressings and resulting in better quality products. The seed-cake resulting will have less oil content thus increasing its storage life and improving its marketability.

5. Project Inputs.

a. AID Inputs. AID inputs will consist of grant funds for training, technical assistance and commodities, as follows:

(1) Training. Training will be provided in three ways: long-term, short-term and observation tours.

Proposed Training for Ministry of Cooperatives

Type	Entity	No. of Persons	Person/ months	Skill areas
Short term	PD	10	40	Data collection, analysis, computer programming, marketing project design, macro and sector planning
Short term	CID	10	30	Solvent operations, instrumentation, metallurgy, nutrition, quality control
Long term	PD	1	24	Financial analysis and macro-economic planning
Long term	CID	10	168	Chemistry, metallurgy, quality control, nutrition, packaging, solvent extraction
Observation Tours	MOC Coop	45	45	Oil extraction, oil expelling, refining, bottling, distribution

(2) Technical Assistance. Technical Assistance (TA) will be provided through the MOC to its subordinate entities and to workshops and screw-press mills, both cooperative and private. The TA will consist of two distinct parts: long-term and short-term. Long-term technical assistance advisors will be stationed in Burma and will work with the involved entities on a daily basis. The efforts and expertise of these resident advisors will be augmented by short-term experts who will visit Burma for short durations.

Long-term TA will consist of 10 person-years to be provided through the Cottage Industries Department during the life of the project. The TA team will consist of three persons, a team leader and two other experts. The team leader will be an expert in oil extraction and refining and will oversee the overall TA effort for the four years (48 months) of the project implementation. The team leader will work with other members of the team and with project entities in defining and arranging for short-term TA and training requirements. The other two experts will be qualified master mechanics who will work with the Workshops and screw-press mills in manufacturing mill parts and in rehabilitating, maintaining, and operating these mills. A total of 72 person-months of services will be required from the master mechanics, or a total or 120 person-months of long-term TA.

The short-term technical assistance will be provided to the Planning Division, to the Cottage Industries Department and to the Workshops and mills. The Planning Division will receive 12 person-months of this TA in planning, economic analysis, statistics, and financial analysis. The Cottage Industries Department will also receive 12 person-months of short-term TA in metallurgy, nutrition, quality control, material handling and similar skills. The Workshops and mills will receive 12 person-months in areas such as mechanical repairs, equipment operation and safety procedures.

In total, there will be 36 person-months of short-term TA, probably involving visits by more than 12 experts, some visiting Burma more than once.

(3) Commodities. Project funds will be used to finance a variety of equipment, machinery and materials. An illustrative list of such commodities follows:

(a) Library Materials and Computer Software. Assorted materials to upgrade the reference libraries and some computer software to enhance the capability of the Planning Division's computer facility.

(b) Standard Reference Laboratory. Used to analyze seed-cake and oil samples.

(c) "Bench" Solvent Extraction Plant. With a capacity of about 25 kg/hr for demonstration purposes.

(d) Shop Equipment, Tools and Spares. Equipment includes electric welding equipment, carbonizing and heat treatment, pipe benders and sheet metal rollers, vices, clamps, various handtools, gauges, micrometers, etc.

(e) Raw Materials. Materials used in the manufacture of oil mill parts and components.

(f) Off-the-Shelf Components. These are components that would be hard to manufacture by the Workshops. Examples include ball be rings, motors, generators and similar components.

(g) Packaging/Distribution. Equipment introduced to support better cleaning methods (steam) of barrels now being used for transporting oil as well as improving the loading, unloading and repair of barrels.

(h) Mobile Equipment. Procurement of a mobile lab, a mobile workshop, and caravan-type mobile housing units.

b. Host Country Inputs. The project inputs to be provided through funding by the Burmese Government are summarized below:

(1) Port handling costs and inland freight for all imported items under the project.

(2) Land and buildings for production and processing activities, office space, a limited number of vehicles, and in-country travel.

(3) Salaries for trainees and replacements, supervisors and support staff, language training and other local costs, financial and in-kind including loan administration costs associated with the project.

(4) Utilities, support staff, office space, vehicles and drivers, office equipment and suppliers, and in-country travel for the technical assistance team.

(5) Local expenditures for laboratory and library supplies and facilities, including administrative and operating costs of the facilities.

(6) Operation and maintenance costs by four Workshops and 60 oil mills for fabrication, rehabilitation, and annual rebuilding and maintenance of expeller parts.

6. Interaction of Project Entities. AID grant funds will be used to procure the services and commodities listed. The Burmese Government, in turn, will grant the value of the services portion of AID inputs (technical assistance and training) to the Cooperative Workshops and the mills. The Government will also grant the value of all commodities, training and technical assistance to the MOC or its subdivisions. The rest of the commodities will be made available to the four Cooperative Workshops and the mills on a loan basis, and will include C.I.F. Rangoon prices of all commodities plus any import duties and taxes. The terms of the foreign exchange portion of the loan will be similar to the terms and conditions which are applicable to the projects implemented by the Cooperatives under bilateral grant assistance. The loans to the Workshops and mills will be administered by the MOC project management team through the Myanma Economic Bank. Debt service payments by the Workshops and mills will be made to that bank.

The Workshops will utilize their newly acquired and original equipment and materials to manufacture screw-mill parts and components and will assist the mills in major rehabilitation efforts. The Workshops will provide their services to all participating mills. The availability of workshop services to all mills will be a condition of their participation in the project. Charges made to mills will be the same.

The AID financed portion of the project grant funds will not be available to the mills for rehabilitation. Those mills that wish to borrow for that purpose will do so from the Myanma Economic Bank at prevailing rates.

The technical assistance team will work with the Workshops and the mills to smooth out the process and expedite project progress.

C. FINANCIAL PLAN AND BUDGET

The total project cost is estimated at $14.094 million. The AID contribution is $9.35 million (all grant) with the Burmese contribution at $4.74 million. The AID contribution will cover foreign exchange costs for technical assistance, as well as include $500,000 for local currency costs required for local support staff and local costs for consultants, training, commodities and evaluation. The Burmese Government, cooperatives, and private firms will contribute labor for rehabilitation efforts and maintenance, investment in expanded facilities, space for laboratory, personnel and administrative expenses and other local costs.

The following budget summarizes the estimated contributions of the Parties over the life of the Project. The budget is illustrative, and may be changed by the Parties by Project Implementation Letter. Contingency funds may be allocated to other line items by the same method. Annual funding increments of the Parties are subject to the availability of funds to the Parties, and mutual agreement of the Parties to proceed.

Of the individual components of the project, technical asistance and support costs will be $2.45 million (17%) of the total project costs and training will be $1.0 million (7%) of the total cost. Total equipment and commodity costs (including contractor support costs) will be $4.66 million (33%) of the total project costs. It is estimated that $4.2 million will be used for operation and maintenance activities. A total of $1.53 million has been budgeted for inflation and contingencies.

The Burmese Government will contribute 7 percent of the total technical assistance expenditures and 13 percent of the training costs in the form of salaries, replacement personnel, training support, training materials and other local costs. Contributions by the Ministry, Workshops and mills for operations and maintenance are estimated to be the kyat equivalent of $4.2 million. This is largely comprised of labor for fabrication of mill parts by the Workshops and their installation into the estimated 60 mills to be rehabilitated.

ILLUSTRATIVE LIFE OF PROJECT BUDGET
(U.S.$ '000)

Source	AID		HOST COUNTRY		TOTAL
	FX	LC	FX	LC	
Technical Assistance	1,986	300	--	161	2,447
Training	861	--	--	133	994
Equipment and Commodities:[1]					
for Workshops and Mills	3,360	--	--	200	3,560
for Ministry of Cooperatives	865	--	--	--	865
Operations and Maintenance	--	--	--	4,199	4,199
Contractor Support Costs	--	200	--	30	230
Evaluation	250	--	--	21	271
Inflation	478	--	--	--	478
Contingency	1,050	--	--	--	1,050
TOTAL	8,850	500	--	4,744	14,094

[1] includes installation, maintenance and service charges

FX = Foreign Exchange Expenditures

LC = Local Currency (Kyat) Expenditures

D. ADMINISTRATIVE ARRANGEMENTS AND TECHNICAL ASSISTANCE TEAM

1. Overview: The three major actors in project implementation and monitoring, the MOC, AID/Burma, and the TA consultant, will coordinate closely at all stages of the project. Therefore, a coordinating mechanism such as regular meetings to assess progress and identify and relieve constraints, will be adopted.

The roles of the three major actors are discussed below.

2. Host Country Role: Primary coordination for the project will be with the Ministry of Planning and Finance and in particular with the Director-General of the Foreign Economic Relations Department. Overall responsibility for managing and implementing the project rests with the Ministry of Cooperatives which consists of two major departments:

a. The Cooperative Department which is responsible for the expansion and development of cooperatives in Burma and for statutory functions; and

b. The Cottage Industries Department which is a technical department established to promote small and medium scale industrial cooperatives.

A project office will be set up under the Cottage Industries Department auspices which will serve as the focal point for day-to-day project implementation, monitoring of progress and evaluation. The Planning Division of the Cooperative Department will be represented in the project office.

A project management team formed within the Ministry will consist of a full-time project manager and technical staff. Each AID-financed technical consultant will work with a full-time technical counterpart in offices provided and maintained by the Ministry of Cooperatives.

3. AID/Burma Responsibilities: The AID Office will assign a USDH officer as project manager to assist the Burmese Government in project implementation and to oversee project monitoring. The project manager will be responsible for all project matters on the AID side. This person will work closely with counterparts in the MOC and will be the main contact point between the AID Office and the MOC. The project manager will assist in developing a detailed project implementation plan and will monitor project progress based on that plan.

4. The Technical Assistance Team: The Technical Assistance (TA) team will play a crucial role in implementing the project, once they are in-country. They will share offices at the MOC with counterparts and will work closely with them on a day-to-day basis. They will be carefully selected to ensure that they are experts in their fields who also have familiarity with working conditions in developing countries. The TA team for the Burma Edible Oil Processing and Distribution Project will consist of three long-term (120 month) and 12 short-term (36 months) consultant position.

The team leader will be an expert in oil extraction and refining and will oversee the contract TA effort during project implementation. He will liase with the Project Director and other staff of the Ministry, as appropriate. The team leader will also work closely with the AID/Burma project manager and will be responsible to him for all contractual matters. He will also provide to AID copies of all reports and correspondence which are submitted to the Burmese Government.

The other two experts (72 months) will be qualified master mechanics who will work with the Workshops and screw-press mills in manufacturing mill parts and in rehabilitating, maintaining, and operating these mills.

Except where permanent Burmese Government housing is available and acceptable for contractor occupancy to all Parties, the local costs of providing permanent housing for the TA team will be funded under the Project. AID/Burma will locate, lease and renovate suitable housing in advance of the arrival of the TA team, and will turn over responsibility to the TA team for maintenance and payment of utility bills after their

arrival. The local costs of rental, renovation, repairs, maintenance, and utilities for permanent housing for the TA team are included in the budget.

AID/Burma, using funds not included in this Agreement, will also purchase, import and register through the U.S. Embassy vehicles and household durables needed for support of the TA team. AID/Burma will retain title to such items until they are no longer required to support A.I.D.-financed personnel assigned in Burma and such items shall be transferred to the Grantee free-of-charge after completion of the project.

5. Procurement Services Agent (PSA): The Procurement Services Agent will be responsible for the actual procurement of project commodities, and will follow AID procurement procedures which are outlined in the Procurement Plan of this Project Paper (see Procurement Plan, below).

E. Training

The AID Office will work with the MOC to identify as many of the eleven long-term training candidates as possible at the earliest possible time. Every effort will be made to place qualified candidates in appropriate U.S. institutions as early as possible. This initial number will be selected for study beginning the spring semester of 1986. A second group of long-term trainees will be placed beginning the fall of 1986. The remaining trainees will be admitted subsequently as they are identified and have achieved English language proficiency. Those candidates who do not have the required English language capacity will be provided some short-term training at the expense of the MOC. All long-term candidates should be in training not later than the fall semester of 1987. The AID Office will preapre PIO/P's to cover all long-term training and the Office of International Training will assist in processing and backstopping these candidates. Approximately 20 candidates from the MOC will be selected for short-term training and 45 for observation tours. Short-term training will involve periods anywhere from 1-4 months per person, and will include academic courses, seminars conducted by other than universities, on-the-job training, familiarization tours, etc. The exact training vehicle will be selected to meet the particular requirements of the candidate and the training objective.

The same procedures will apply to short-term training. However, in all cases, short-term training will be conducted in accordance with a training plan based on the recommendations of the TA team. The TA team will be responsible for all short-term training and their home office will assist in the identification of suitable courses and other training possibilities to meet the goal of the training. Short-term training could be conducted in the U.S. or in third countries. It is anticipated that the majority of this training will take place in the U.S.

6. In-Country Training: The TA team will also be responsible for conducting a program of training in Burma to upgrade existing skills and prepare a cadre of trained officers to complement out-of-country training

efforts. The TA team will draw heavily on short-term experts to provide in-country training. It is expected that all levels of the MOC and cooperative organizations at Division level and below will benefit from this effort.

F. Evaluation

1. Mid-Term Evaluation: A major evaluation, to be performed in collaboration among Burmese Government, AID and outside consultants, is scheduled in July 1987 and/or July 1989.

2. Final Impact Evaluation: A Final Impact Evaluation is scheduled in 1989-90.

3. Funding Arrangements: Project funds will be used to pay for the costs of U.S. consultants required to assist in the mid-term evaluation as well as the final Impact Evaluation in 1989-90. It is estimated that up to $250,000 in grant funds plus Burmese Government-funded local costs will be required. AID/Washington technical assistance and guidance will be needed to help in defining the scope of the evaluations and to recruit qualified evaluation team members.

G. Contract and Procurement Plan

1. General: There will be several procurement actions to be undertaken in connection with this proposed project including procurement of technical assistance and related commodities and raw materials required for the rehabilitation of the oilseed mills.

2. Technical Assistance: All project technical assistance (long-term and short-term), will be procured under one direct AID contract to be signed with a firm or institution (or a joint venture of firms and/or institutions) of U.S. source and origin.

Local cost support for the contractor financed from the Burmese Government includes office space, some equipment and supplies, secretarial and administrative support, fuel, drivers and maintenance for project vehicles.

3. Commodities and Vehicles: These items will be procured on a competitive basis in accordance with regular AID commodity procurement procedures.

The actual purchases of project commodities will be handled by a procurement services agent (PSA). Any PSA selected must be able to demonstrate a proven record of successful experience under similar conditions, and must possess the necessary level of resources and back-stop capability. The selection of the PSA will be by open, competitive bidding.

4. Procurement Plan: AID grant-financed purchases under this project will include approximately $1,495,000 worth of workshop equipment and machinery, $1,622,800 for steel, boilers, spare parts and supplies for the oil mills to be upgraded, $50,000 for decorticators, $115,000 for laboratory equipment, $500,000 for a model solvent extraction plant/refinery, $100,000 for library reference materials, $105,000 for household furnishings and furniture, and $78,000 for vehicles. Including procurement and shipping, total U.S. financed commodity costs are $4,325,000. All procurements will be made according to AID regulations and good commercial practice. The Burmese Government will be responsible for Burmese customs clearance and transport of commodities to project sites. As stated in Section 6.1, the source and origin of all commodities purchased with foreign exchange shall be the U.S., unless AID agrees otherwise in writing. All commodities shall be shipped on U.S. Flag Vessels, unless AID agrees otherwise in writing (See Section 6.1 and Standard Provision C.6.).

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Project Grant Agreement Standard Provisions, Annex 2

Project Grant Standard Provisions Annex

Definitions: As used in this Annex, the "Agreement" refers to the Project Grant Agreement to which this Annex is attached and of which this Annex forms a part. Terms used in this Annex have the same meaning or reference as in the Agreement.

Article A: Project Implementation Letters

To assist Grantee in the implementation of the Project, A.I.D., from time to time, will issue Project Implementation Letters that will furnish additional information about matters stated in this Agreement. The parties may also use jointly agreed-upon Project Implementation Letters to confirm and record their mutual understanding on aspects of the implementation of this Agreement. Project Implementation Letters will not be used to amend the text of the Agreement, but can be used to record revisions or exceptions which are permitted by the Agreement, including the revision of elements of the amplified description of the Project in Annex 1.

Article B: General Covenants

SECTION B.1. Consultation. The Parties will cooperate to assure that the purpose of this Agreement will be accomplished. To this end, the Parties, at the request of either, will exchange views on the progress of the Project, the performance of obligations under this Agreement, the performance of any consultants, contractors, or suppliers engaged on the Project, and other matters relating to the Project.

SECTION B.2. Execution of Project. The Grantee will:

(a) carry out the Project or cause it to be carried out with due diligence and efficiency, in conformity with sound technical, financial, and management practices, and in conformity with those documents, plans specifications, contracts, schedules or other arrangements, and with any modifications therein, approved by A.I.D. pursuant to this Agreement; and

(b) provide qualified and experienced management for, and train such staff as may be appropriate for the maintenance and operation of the Project, and, as applicable for continuing actvities, cause the Project to be operated and maintained in such manner as to assure the continuing and successful achievement of the purposes of the Project.

SECTION B.3. Utilization of Goods and Services.

(a) Any resources financed under the Grant will, unless otherwise agreed in writing by A.I.D., be devoted to the Project until the completion of the Project, and thereafter will be used so as to further the objectives sought in carrying out the Project.

Article B: General Covenants (Continued)

(b) Goods or services financed under the Grant, except as A.I.D. may otherwise agree in writing, will not be used to promote or assist a foreign aid project or activity associated with or financed by a country not included in Code 935 of the A.I.D. Geographic Code Book as in effect at the time of such use.

SECTION B.4. Taxation

(a) This Agreement and the Grant will be free from any taxation, duties or fees imposed under all laws in effect in the territory of the Grantee. No funds provided under the Grant shall be used to pay or finance any tariffs, customs duties, taxes, levies, demurrage or similar charges or fees imposed under laws in effect in the territory of the Grantee.

(b) (1) All contracts and contractors financed under the Grant, including any consulting firms and any personnel of such contractor except for citizens or permanent residents of Burma, and any property, supplies, materials, equipment, commodities, funds or transactions relating to such contracts and contractors and

(2) all commodity procurement transactions financed under the Grant are exempt from all identifiable taxes, tariffs, customs duties, security deposit requirements, demurrage, license fees, storage charges or similar levies or public charges imposed under laws in effect in the territory of the Grantee. The Grantee will promptly issue all notices and documents necessary to give effect to the exemption.

SECTION B.5. Reports, Records, Inspections, Audits.

The Grantee will:

(a) furnish A.I.D. such information and reports relating to the Project and to this Agreement as A.I.D. may reasonably request;

(b) maintain or cause to be maintained, in accordance with generally accepted accounting principles and practices consistently applied, books and records relating to the Project and to this Agreement, adequate to show, wihout limitation, the receipt and use of goods and services acquired under the Grant. Such books and records will be audited regularly in accordance with generally accepted auditing standards, and maintained for three years after the date of last disbursement by A.I.D.; such books and records will also be adequate to show the nature and extent of solicitations of prospective suppliers of goods and services acquired, the basis of award of contracts and orders, and the overall progress of the Project toward completion; and

Article B: General Covenants (Continued)

(c) afford authorized representatives of a Party the opportunity at all reasonable times to inspect the Project, the utilization of goods and services financed by such Party, and books, records, and other documents relating to the Project and the Grant.

SECTION B.6. Completeness of Information. The Grantee confirms:

(a) that the facts and circumstances of which it has informed A.I.D., or caused A.I.D. to be informed, in the course of reaching agreement with A.I.D. on the Grant, are accurate and complete, and include all facts and circumstances that might materially effect the Project and the discharge of responsibilities under this Agreement.

(b) that it will inform A.I.D. in timely fashion of any subsequent facts and circumstances that might materially affect, or that it is reasonable to believe might so affect, the Project or the discharge of responsibilities under this Agreement.

SECTION B.7. Other Payments. Grantee affirms that no payments have been or will be received by any official of the Grantee in connection with the procurement of goods or services financed under the Grants, except fees, taxes, or similar payments legally established in the country of the Grantee.

SECTION B.8. Information and Marking. The Grantee will give appropriate publicity to the Grant and the Project as a program to which the United States has contributed, identify the Project site, and mark goods financed by A.I.D., as described in Project Implementation Letters.

Article C: Procurement Provisions

SECTION C.1. Special Rules.

(a) The source and origin of ocean and air shipping will be deemed to be the ocean vessel's or aircraft's country of registry at the time of shipment.

(b) Premiums for marine insurance placed in the territory of the Grantee will be deemed an eligible Foreign Exchange Costs, if otherwise eligible under Section C.7(a).

(c) Any motor vehicles financed under the Grant will be of United States manufacture, except as A.I.D. may otherwise agree in writing.

(d) Transportation by air, financed under the Grant, of property or persons, will be on carriers holding United States certification, to the extent service by such carriers is available. Details on this requirement will be described in a Project Implementation Letter.

SECTION C.2. Eligibility Date. No goods or services may be financed under the Grant which are procured pursuant to orders or contracts firmly placed or entered into prior to the date of this Agreement, except as the Parties may otherwise agree in writing.

SECTION C.3. Plans, Specifications and Contracts. In order for there to be mutual agreement on the following matters, and except as the Parties may otherwise agree in writing:

(a) The Grantee will furnish to A.I.D. upon preparation:

(1) any plans, specifications, procurement or construction schedules, contracts, or other documentation relating to goods or services to be financed under the Grant, including documentation relating to the prequalification and selection of contractors and to the solicitation of bids and proposals. Material modifications in such documentation will likewise be furnished A.I.D. on preparation;

(2) such documentation will also be furnished to A.I.D., upon preparation, relating to any goods or services, which, though not financed under the Grant, are deemed by A.I.D. to be of major importance to the Project. Aspects of the Project involving matters under this subsection (a) (2) will be identified in Project Implementation Letters.

(b) Documents related to the prequalification of contractors, and to the solicitation of bids or proposals for goods and services financed under the Grant will be approved by A.I.D. in writing prior to their issuance, and their terms will include United States standards and measurements;

(c) Contracts and contractors financed under the Grant for engineering and other professional services, for construction services, and for such other services, equipment or materials as may be specified in Project Implementation Letters, will be approved by A.I.D. in writing prior to execution of the contract. Material modifications in such contracts will also be approved in writing by A.I.D. prior to execution; and

(d) Consulting firms used by the Grantee for the Project but not financed under the Grant, the scope of their services and such of their personnel assigned to the Project as A.I.D. may specify, and construction contractors used by the Grantee for the Project but not financed under the Grant, shall be acceptable to A.I.D.

SECTION C.4. Reasonable Price. No more than reasonable prices will be paid for any goods or services financed, in whole or in part, under the Grant. Such items will be procured on a fair and, to the maximum extent practicable, on a competitive basis.

SECTION C.5. Notification to Potential Suppliers. To permit all United States firms to have the opportunity to participate in furnishing goods and services to be financed under the Grant, the Grantee will furnish A.I.D. such information with regard thereto, and at such times, as A.I.D. may request in Project Implementation Letters.

SECTION C.6. Shipping.

(a) Goods which are to be transported to the territory of the Grantee may not be financed under the Grant if transported either: (1) on an ocean vessel or aircraft under the flag of a country which is not included in A.I.D. Geographic Code 935 as in effect at the time of shipment; or (2) on an ocean vessel which A.I.D. by written notice to the Grantee has designated as ineligible; or (3) under an ocean or air charter which has not received prior A.I.D. approval.

(b) Costs of ocean or air transportation (of goods or persons) and related delivery services may not be financed under the Grant, if such goods or persons are carried: (1) on an ocean vessel under the flag of a country not, at the time of shipment, identified under the paragraph of the Agreement entitled "Procurement Souce: Foreign Exchange Costs," without prior written A.I.D. approval; or (2) on an ocean vessel which A.I.D., by written notice to the Grantee, has designated as ineligible; or (3) under an ocean vessel or air charter which has not received prior A.I.D. approval.

(c) Unless A.I.D. determines that privately owned United States-flag commercial ocean vessels are not available at fair and reasonable rates for such vessels, (1) at least fifty percent (50%) of the gross tonnage of all goods (computed separately for dry bulk carriers, dry cargo liners and tankers) financed by AI.D. which may be transported on ocean vessels will be transported on privately owned United States-flag commercial vessels, and (2) at least fifty percent (50%) of the gross freight revenue generated by all shipments financed by A.I.D. and transported to the territory of the Grantee on dry cargo liners shall be paid to or for the benefit of privately owned United States-flag commercial vessels. Compliance with the requirements of (1) and (2) of this subsection must be achieved with respect to both any cargo transported from U.S. ports and any cargo transported from non-U.S. ports, computed separately.

SECTION C.7. Insurance

(a) Marine insurance on goods financed by A.I.D. which are to be transported to the territory of the Grantee may be financed as a Foreign Exchange Cost under this Agreement provided (1) such insurance is placed at the lowest available competitive rate, and (2) claims thereunder are payable in the currency in which such goods were financed or in any freely convertible currency. If the Grantee (or government of Grantee), by statute, decree, rule, regulation, or practice discriminates with respect to A.I.D.-financed procurement against any marine insurance company authorized to do business in any State of the Unites States, then

all goods shipped to the territory of the Grantee financed by A.I.D. hereunder will be insured against marine risks and such insurance will be placed in the United States with a company or companies authorized to do a marine insurance business in a State of the United States.

(b) Except as A.I.D. may otherwise agree in writing, the Grantee will insure, or cause to be insured, goods financed under the Grant imported for the Project against risks incident to their transit to the point of their use in the Project; such insurance will be issued on terms and conditions consistent with sound commercial practice and will insure the full value of the goods. Any indemnification received by the Grantee under such insurance will be used to replace or repair any material damage or any loss of the goods insured or will be used to reimburse the Grantee for the replacement or repair of such goods. Any such replacements will be of source and origin of countries listed in A.I.D. Geographic Code 935 as in effect at the time of replacement, and, except as the Parties may agree in writing, will be otherwise subject to the provisions of the Agreement.

SECTION C.8. U.S. Government-Owned Excess Property. The Grantee agrees that wherever practicable, United States Government-owned excess personal property, in lieu of new items financed under the Grant, should be utilized. Funds under the Grant may be used to finance the costs of obtaining such property for the Project.

Article D: Termination; Remedies

SECTION D.1. Termination. Either Party may terminate this Agreement by giving the other Party 30 days written notice. Termination of this Agreement will terminate any obligations of the Parties to provide financial or other resources to the Project pursuant to this Agreement, except for payments which they are committed to make pursuant to noncancellable commitments entered into with third parties prior to the termination of this Agreement. In addition, upon such termination A.I.D. may, at A.I.D.'s expense, direct that title to goods financed under the Grant be transferred to A.I.D. if the goods are from a source outside Grantee's country, are in a deliverable state and have not been offloaded in ports of entry of Grantee's country.

SECTION D.2. Refunds.

(a) In the case of any disbursement which is not supported by valid documentation in accordance with this Agreement, or which is not made or used in accordance with this Agreement, or which was for goods or services not used in accordance with this Agreement, A.I.D., notwithstanding the availability or exercise of any other remedies under this Agreement, may require the Grantee to refund the amount of such disbursement in U.S. Dollars to A.I.D. within sixty (60) days after receipt of a request therefor.

(b) If the failure of Grantee to comply with any of its obligations under this Agreement has the result that goods or services financed under the Grant are not used effectively in accordance with this Agreement, A.I.D. may require the Grantee to refund all or any part of the amount of the disbursements under this Agreement for such goods or services in U.S. Dollars to A.I.D. within sixty days after receipt of a request therefor.

(c) The right under subsection (a) or (b) to require a refund of a disbursement will continue, notwithstanding any other provision of this Agreement, for three years from the date of the last disbursement under this Agreement.

(d) (1) Any refund under subsection (a) or (b), or (2) any refund to A.I.D. from a contractor, supplier, bank or other third party with respect to goods or services financed under the Grant, which refund relates to an unreasonable price for or erroneous invoicing of goods or services, or to goods that did not conform to specifications, or to services that were inadequate, will (A) be made available first for the costs of goods and services required for the Project to the extent justified, and (B) the remainder, if any, will be applied to reduce the amount of the Grant.

(e) Any interest or other earnings on Grant funds disbursed by A.I.D. to the Grantee under this Agreement prior to the authorized use of such funds for the Project will be returned to A.I.D. in U.S. Dollars by the Grantee.

SECTION D.3. Nonwaiver of Remedies. No delay in exercising any right or remedy accruing to a Party in connection with its financing under this Agreement will be construed as waiver of such right or remedy.

SECTION D.4. Assignment. The Grantee agrees, upon request, to execute an assignment to A.I.D. of any cause of action which may accrue to the Grantee in connection with or arising out of the contractual performance or breach of performance by a party to a direct U.S. Dollar contract with A.I.D. financed in whole or in part out of funds granted by A.I.D. under this Agreement.

APPENDIX G

CASTING AND HEAT TREATING WORKSHOPS

APPENDIX G

CONSULTANCY REPORT ON

CASTING AND HEAT TREATING WORKSHOPS FOR THE EDIBLE OILSEED PROJECT IN BURMA

contract # 482-0006-C-00-6060-00

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February, 1988

F: QWE-2-85-45

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EXECUTIVE SUMMARY

The writer visited Burma to participate in the edible oil processing project to 1) evaluate Burmese manufacturing sources for repairing and producing replacement parts for oil processing machinery, 2) teach applicable methods in workshops at the cooperatives, and 3) make suggestions for fut e improvements.

The experience gained from this visit to Burma and the trials that were conducted by the writer with the aid of the cooperatives and ACDI personnel indicate that the workshops will be able to supply replacement parts for the two most important components, namely press worms and cage bars.

To enable the workshops accomplish these objectives four essential techniques were demonstrated:

Alloying of gray cast iron to realize greater hardness i.e. wear resistance of the cast worms.

Pack carburizing of steel to realize the necessary carbon content of steels used for cage bars with adequate hardness i.e. wear resistance after hardening.

Hardening of cast iron press worms and cage bars by heat treatment.

Design, construction and operation of heat treating furnaces needed for hardening operations.

Cast iron press worms will enable oil coqperatives achieve greater efficiency in their oil extraction when compared to the worn parts currently in use. The use of steel, rather, than cast iron, was delayed until suitable melting facilities become available to the workshops.

To operate effectively and provide satisfactory end products it will be most helpful if a number of programs be considered:

Continuing education and training for operating personnel in foundry and heat treating activities.

Supply of auxiliary equipment and services to monitor and control melting and heat treating operations: thermo-couples, chemical analysis, and hardness testers.

Provide for the availability of certain alloys that help achieve greater product quality: FeSi inoculants and Cr-Mo master alloy, or Cr, Mn and Mo alloys, FeSi inoculants.

Provide for the availability of printed information for self help and study by workshop personnel in the area of foundry and heat treatment.

The writer is pleased to have been associated with this project and would like to compliment the people at the cooperatives for their enthusiasm and considerable skills that they have brought to this project. Their hospitality during the visit has been greatly enjoyed.

INTRODUCTION

The writer was invited to participate in this project to provide assistance in developing Burmese sources for the repair and replacement of machinery parts for existing oilseed processing facilities. The writers task was limited to metallurgical considerations and concentrated primarily on pressing worms and cage bars (Figures 1 and 2).

Cage bars are assembled inside a press as indicated by the cross section of a press in Figure 3. The pressing worms rotate inside the cylindrical cavity of this press. The rotation of the worms compresses the seed and forces it forward while pressing it against the cage bars. Cage bars and pressing worms are subject to wear. For cage bars, wear is limited to the exposed narrow face of the bar. In the case of the pressing worms, wear is severe along the outside diameter of the flights and on the cylindrical worm body.

In addition to wear, cage bars are subject to bending along their length. The requirments for these components are therfore hardness to resist wear, and a limited amount of ductility to prevent brittle facture under the bending stresses imposed in service. Normally such properties are achieved by specifying low or medium carbon steel in conjunction with gas or liquid carburizing techniques followed by hardening.

In addition to wear, pressing worms are subject to shear and tensile stresses. Shear stresses develop where the flight joins the cylindrical worm body. Tensile stresses are significant inside the cylindrical worm body where the body is indexed to a shaft via a rectangular slot. The rotational movement of the shaft is transmitted to the worm via this slot and causes tensile stresses across the remaining cylinder wall. Note that the slot configuration represents a stress raiser which requires that special attention be given to the interplay of material strength and wall thickness. The requirements for this part are therefore hardness to resist wear and significant strength. This combinations can be realized with either hardfacing of a steel, or surface hardening a low alloy steel, or carburizing a low alloy steel that is subsequently hardened. In any case, steel is the preferred material because it can be repaired by building up worn areas with weld overlays, and by applying hardfacing in selected areas.

SCOPE OF WORK

To address the metallurgical concerns and to deal with the problems of developing Burmeses sources for replacement parts the work performed during the writers visit to Burma encompassed the following principal areas:

1 Planning and orientation in Rangoon, Jan. 11 - 17.
2 Visit oil cooperatives and metal working shops in Mandelay, Jan. 18 - 20.
3 Teach and develope metallurgical skills, improve metallurgical facilities. Training programs were held in Meiktila (Jan. 25-30), Naung Yoe (Feb. 1-2), and Pegu (Feb. 5).
4 Preliminary summary report and recommendations to Dr. Than Htaik in Rangoon, Feb. 5.

The following sections deal with the major issues involved in developing Burmese sources for replacement parts.

TRAINING PROGRAMS

At each of the three locations (Meiktila, Naung Yoe, and Pegu) the training courses emphasized the needs of the edible oil processing project:

1 Melting and alloying of gray cast iron, as well as white martensitic alloy iron (Ni-hard).
2 Heat treatment, hardening, of cast irons and steel.
3 Pack carburizing of steel.
4 Heat treat furnace design.

Other topics were introduced by personnel attending the workshops. Some examples are melting and casting of aluminum and copper base alloys, alloy selection for specific applications (automotive brake drums, sleeve bearings, aluminum pistons for diesel engines, etc.), and charge make-up for cast iron melting.

A written plan had been developed in advance for the longer workshop in Meiktala. Deviations from this and similiar plans were necessary depending on the local facilities, regional interests, and our progress with practical demonstrations in the areas of hardening, carburizing, and heat treatment.

MANUFACTURE OF PRESSING WORMS

Steel would be the preferred material of construction for pressing worms as indicated earlier in the introduction. Since melting facilities for steel are not available at the cooperative workshops attention was focused on cast iron as a substitute. Gray iron is produced routinely by the workshops. A brief description of the melting facilities currently available at the workshops is presented in Appendix A. The disadvantage of cast iron worms is that they cannot be repaired by welding. They are, however, expected to significantly boost the performance of oil presses when compared to the worn steel components that the writer observed at the oil cooperatives. There are several alternatives for producing pressing worms from cast iron with

wear resistance.

1a Gray cast iron, hardened by heat treatment.
1b Low alloy gray iron, hardened by heat treatment.

2 chilled cast iron.

3 Ni-Hard, white, martensitic iron.

The first option of hardening cast iron pressing worms applies to unalloyed as well as low alloy grey cast iron. Alloying with 0.5 % to 1 % Cr, and 0.3 to 0.5 % Mo will increase the Brinell hardness after hardening from about 460 HBN (~48 HRc) to about 520 HBN (~ 55 HRc). To maintain machinability of the I.D. area hardening can be limited to the flight and the outside diameter of the worm body if rapid cooling from the inside diameter is prevented during the quenching operation. This can be accomplished by preventing the quenching medium from entering the bore, using sand and clay as a seal as indicated in Figure 4.

Chill casting is another technique of producing a hard outside surface that resists wear better than ordinary gray cast iron. For this purpose a permanent metal mold of, for instance, gray cast iron, can be used. A second method is to chill only the flights using a composite mold of sand with embedded chills. The thickness of the chills, and the temperature of the permanent mold have to be regulated to limit the chilling action to the outside diameter. In this way the metal along the inside diameter zone will solidify in the normal gray manner and thereby maintain machinability. Late additions of ferro-silicon as an inoculant are another important tool for controlling the degree of chill formation, particularly when chills and permanent molds are used.

The third alternative, the use of a Ni-hard composition, instead of gray cast iron, is of technical interest. The production of Ni-hard is too ambitious with the present facilities at the workshops, it should be considered when facilities for chemical analysis, metallography, and temperature control have been developed. There are several Ni-hard alloy compositions. Type A is of particular interest for this wear application; it contains 3.3 to 5 % Ni and 1.4 to 3.5 % Cr. The chromium level is selected according to the cross section of the part, to assure the formation of carbides instead of graphite. The amount of nickel is subject to similiar considerations and serves to insure conversion of the matrix to hard martensite, rather than the softer components of pearlite and ferrite. Ni-hard requires only a 4 h stress relief at 400 to 450 F after shake-out of the casting from the mold. The major disadvantage of this alloy is that the I.D. is practically non-machinable. Dimensional changes are ordinarily accomplished by grinding only.

Low alloy iron production was demonstrated at the Meiktila

workshop during this workshop, but the attempts to cast Ni-hard failed due to difficulties in controlling the alloy dissolution and recovery in the small melting units. The method of alloying that worked quite well was to stirr chromium into the stream of liquid metal while the iron was cast into a simple mold. The ingot produced in this manner was then remelted without difficulty as part of the charge in a subsequent heat. This method of alloying is not very practical and lacks consistency in alloy recovery. A master alloy that can be charged just like melting stock would remove these problems and should be considered in the future.

MANUFACTURE OF CAGE BARS

Cage bars can be produced from a range of carbon and lov alloy steels. The core of these bars should have some ductility to accomodate the strain involved in straightening operations after quenching. To harden the surface only, one can either surface harden a high carbon steel, or one can carburize the bar surface and subsequently harden it by quenching the bar. In either case, the carbon content, rather than the alloy content are important because carbon controls the hardness of martensite formed upon quenching. The alloy content determines the depth to which martensite forms during quenching and has only minor effects on hardness. For the small cage bar cross section of 3/8 x 3/4 in. alloy content is not needed, carbon steel is sufficient.

Surface hardening requires more sophisticated tools than observed at the workshops. Pack carburizing was therefore chosen and demonstrated as a viable method for the Burmese workshops.

CARBURIZING

Carburizing to a depth of 0.05 inches below the surface may require up to 16 hours, depending on the temperature as indicated below:

Carburizing Temp. F	Carburizing Time h
1500	16
1600	8
1700	4
1800	2

Common carburizing teperatures are between 1600 and 1700F. The carburizing time for these temperatures is 8 and 4 hours respectively.

Liquid and gas carburizing methods are more controllable than pack carburizing because they utilize much more extensive and sophisticated controls and equipment. They offer the advantages of greater uniformity in carburization depth, and direct

quenching from the carburizing temperature. In this case these advantages, however are more than offset by the low capital cost and simplicity of pack carburizing.

Besides an ordinary heat treating furnace the only equipment needed for pack carburizing consists of containers in which the parts to be carburized are packed along with the carburizing medium. The containers can be made of sheet or plate steel. They should be air tight, and closed with a lid, having only small vent holes that prevent a pressure build-up when the container is heated. They should be large enough to allow 1/2 to 2 inches of carburizing material to surround the parts to be carburized. Shallow rather than square or round carburizing boxes are preferred because the heating time of the carburizing box is shorter with smaller thickness dimensions.

The carburizing mix used for demonstration in Burma consisted of 80 % charcoal, 20 % coke, and 20 % sodiumcarbonate (Na_2CO_3). The particle size for parts with small holes or teeth is usually held between 6 and 8 mesh. Compound losses vary with the specific process and may amount to 25 %.

Surface hardness values of about 60 HRc were achieved after hardening cage bars during the trials.

HARDENING

A hardening heat treatment for carbon and low alloy steels, or most cast irons consists of a heating cycle, referred to as austenitizing, followed by rapid cooling, quenching, to form a hard constituent, referred to as martensite. The hardened part is then tempered to reduce the brittleness of the martensite, and to lower the residual stresses introduced by the quenching operation. Because tempering reduces the hardness a compromise between the needs for toughness and hardness must be made. For severe wear applications tempering may be limited to 400 F, while temperatures up to 1350 F may be chosen when toughness is the primary goal.

For steel the austenitizing temperatures are commonly between 1550 and 1650 F. For cast irons they are about 100 F higher. For cast irons it is also important to hold the part at the austenitizing temperature longer. One hour per inch of thickness is advisable for cast iron to assure solution of sufficient carbon that later produces the hardness in martensite formed upon quenching.

Cast irons are commonly quenched in oil to prevent the formation of quench cracks. For carbon steels water is the preferred quenching medium unless the part geometry is particularly crack sensitive. Oil is preferred for crack sensitive parts of carbon and low alloy steels.

The temperature of the quenchant significantly affects the cooling rate. Higher quenchant temperatures reduce the cooling rate and therefore lower the hardness after quenching.

Salt, usually 10% in water, is often used to accelerate the cooling rate, and hence the hardness of the quenched part. This is due to the reduced formation of steam. The cooling rates of parts in salt solutions are also less sensitive to temperature variations of the quenchant.

Vigorous stirring of the quenchant is important in every case. Stirring enhances the uniformity of the quench, particularly in parts of complex geometry. Stirring also enhances the effective cooling rate in water because it breaks up and removes the insulating film of steam from the part/quenchant interface.

OTHER HEAT TREATING OPERATIONS

Heat treating processes for many other purposes exist besides hardening. The most common ones are normalizing and annealing for either maximum softness or machinability.

The principal differences between these and hardening are the cooling rate from the austenitizing temperature. The term anneal usually implies slow cooling of the work piece in the furnace. The term normalizing ordinarily indicates intermediate cooling rates that are obtained when the work piece is removed from the furnace and allowed to cool in still air.

A given part can be heat treated repeatedly. It can be softened after hardening, or vici versa. A given heat treatment can also be repeated if the desired result was not achieved in the first heat treatment attempt.

HEAT TREATMENT FACILITIES

Heat treatment facilities include the furnace, materials handling equipment for charging and discharging the work piece from the furnace, and provisions to control the cooling rate from the heat treating temperature.

Furnaces: It is common practice to have separate furnaces for austenitizing and for stress relieving or tempering. The reasons are the differences in refractory requirements of the furnace, burners, thermo-couple requirements, as well as the practicality of executing several heat trat operations in a given time.

In any case, the primary requirement for any furnace is the ability to achieve the desired temperature uniformly, and without direct impingement of burner flames.

The importance of temperature unformity is readily understood if

the effect of temperature is considered for the case of carburizing. A 100 degree F difference can mean that the depth of carburisation varies beyond acceptable limits as indicated by the previously discussed data. Similiarly, the hardness after tempering is strongly temperature dependent. A plus or minus 20 F variablity within the working zone of a furnace is considered quite good for many operations. Temperature uniformity is controlled by the number of burners, their spacing from each other, and the flow pattern of combustion gases within the furnace.

Direct impingement of flames on the work piece is to be avoided because it causes hot spots with the ensuing soft and hard spots after heat treatment, and because it causes excessive local scaling.

To achieve non-impingement the burner(s) must be installed to allow for a circular flow pattern of the combustion gases around the work piece(s). Figure 5 shows burners at opposite walls of a horizontal furnace, together with suitably placed furnace "furniture" upon which the work piece(s) are placed. A similiar effect is achieved in vertical furnaces with tangentially placed burners. The furnace "furniture" in this case can be simple brick; its primary purpose being only to provide a relatively non-reactive surface for the work to rest upon, and to provide space for debris, such as ash and scale (Figure 6).

Refractory brick, ceramic, cast iron, and high alloys steels are used for furnace "furniture". Data in Table I provide some information on the useful life of such metal parts, and their composition.

A furnace suitable for carburizing and austenitizing was built in Meiktila from local materials as indicated in Figure 7. It was fired with powdered solid fuel that was passed through a preheating bed of coke and charcoal. The preheater insured rapid ignition of the solid fuel and complete combustion before the combustion gases exited the furnace. Powdered coal, coke, charcoal and saw dust are suitable fuels. The latter was used most of the time because of its low cost. However the former have a higher combustion value and heat the furnace faster. The particle size of the solid fuel must be adjusted to insure that the particles are burned completely before the combustion gases can carry them from the furnace.

The furnace was operated without difficulty for hours between 1700 and 1800 F. Difficulties did exist, however, when the preheater was omitted.

Materials Handling Equipment: Suitable tongues or other equipment must be made available for charging and discharging furnaces. Furnaces are usually charged hot and the tongues ensure operator comfort and facilitate that the charge is placed properly. These tongues are even more important for the discharging operation

when the discharged parts are to be quenched. This operation must be performed rapidely, to prevent the work piece from cooling from the austenitizing temperature befor being plunged into the agitated quenching medium.

Quenching Facilities: Quenching media have been disussed earlier. When more than one piece is to be quenched the size of the quench tank and the degree of quenchant agitation are important. Larger tanks are needed when more than one piece is to be quenched to avoid excessive heating of the quench medium and loss of hardness in the quenched part. Agitation is helpful to minimize the effect of quenchant temperature and to ensure uniformity of the quench.

CONCLUSIONS AND RECOMMENDATIONS

The workshops visited by the writer have the capability of producing cast press worms from cast irons.

The workshops have also been shown, and learned successfully the manner in which a furnace for heat treating and carburizing can be built and operated with locally available materials. This, in conjunction with the heat treating (hardening) techniques, that were demonstrated on location, will enable them to process press worms and cage bars to the desired hardness for wear resistance in oil extraction equipment.

As in every situation where new techniques are introduced a period of learning, mistakes, corrections and improvements should be expected. Several courses of action are suggested in this regard to shorten the transition period and to accelerate the process of producing suitable parts:

1) Refresher and repeat courses especially with regard to heat treatment may be desirable at 1/2 to 1 year intervals. In the United States, and Europe courses of this type are made availble on a routine basis to operating personel from foundries and heat treating businesses. A similiar practice, geared to Burmese needs, would therefore be expected to pay long term dividends to Burma also.

2) To produce quality products consistently measuring techniques and devices need to be introduced, and made widely available. These include:

- 2A Brinell hardness testers for irons
- 2B Rockwell hardness testers for steels
- 2C Thermocouples for liquid metal and especially for heat treating furnaces.
- 2D Centralized chemical analysis and metallography services. For these to be effective they must be rapid, results must be provided within days rather than weeks.

3) Several books, listed in Appendix B, are recommended for widespread distribution among workshops. These aids will help personnel to initiate and carry out their own efforts to improve facilities and techniques because in every workshop the Burmese personel were eager to learn, and in most cases capable to read English texts.

4) There are some areas where lack of raw materials severly hampers progress and the quality of the end product. Ferro-silicon for use as inoculants in gray cast iron is one of these materials. Ferro-alloys, such as Fe-Mn, Fe-Cr, and molybdenum alloys are others. These issues are mentioned here even though they may be larger than those that can be handled by the current program.

5) For the purpose of the project purchase of a Cr-Mo master alloy would be of considerable benefit because it will make it possible to produce pressing worms to higher hardness and hence greater wear resistance. With the proper ratio of Chromium to Molybdenum in the master alloy the workshops will be in a much better position to consistently produce a cast iron with e.g. 0.5 Cr, and 0.3 Mo than if ferro-chromium and molybdenum sponge or alloy were obtained separately.

6) Ultimately a facility for melting steel should be considered for the cooperatives. Such a facility would be useful to this project, however, it would find widespread use in many other areas that the workshops are currently interested in. Castings as well as ingots could be produced in this manner. There are two approaches to be chosen from: 6A) A side blown converter that uses liquid iron as the principal charge from the currently available shaft furnaces or cupolas and 6B) an induction furnace that would utilize scap as the primary melting stock. The converter would have to handle between 3 and 6 tons to be technically feasible and could be used primarily for producing carbon and some low alloy steels. The induction furnace has neither size limitations nor limitations on the kind of cast iron, steel, or high alloy to be produced.

TABLE I: FURNACE MATERIALS AND FURNITURE

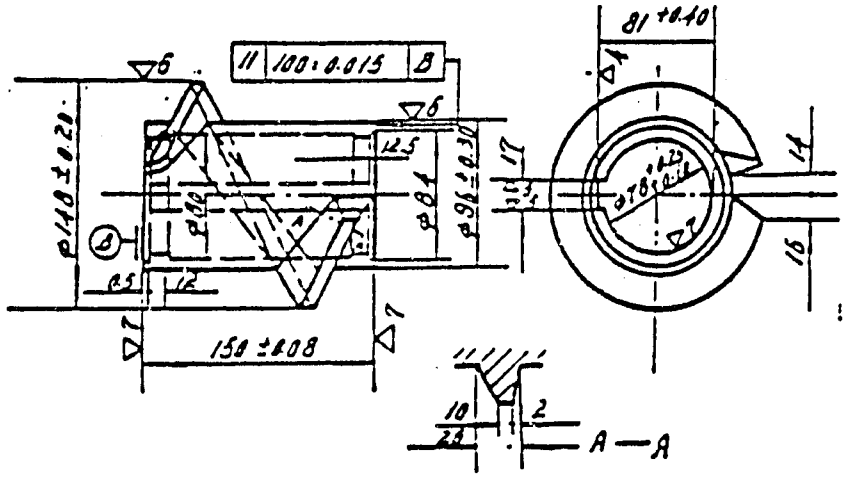
For estimating comparative operating costs of different designs of fuel-heated furnaces, it is safe to assume that firebrick linings will last for 5 years at temperatures below 1900 F and for one year above 2000 F. The life of metal parts thar are properly designed for stress and for usual furnace conditions will be approximately as follows:

Working Temperature F	Cast Iron years	Heat Resisting Alloys years
below 1400	5	...
1700	1	3
1800	1/2	2
1900	1/12	1.5
2000	not used	1/2

The nickel and chromium contents of certain heat-resisting alloys commonly used in furnace parts include:

Furnace Temp. below 1400F		Furnace Temp. above 1400F	
Nickel %	Chromium %	Nickel %	Chromium %
25	20	63	18
18	8	60	12
8	18	38	18
..	26	35	15
..	18	30	10
		12	28
		11	25

其余▽3
Other



技术要求：

Technical Demands;

1. 表面渗炭深度为0.8～1.2毫米。

   Depth of surface carburization, 0.8～1.2mm.

2. 热处理硬度48～55HRc。

   Heat-treated hardness, 48～55HRc.

3. 两端面不平行度不得大于100:0.015毫米。

   Max. error in parallelism of two endfaces, 100:0.015mm.

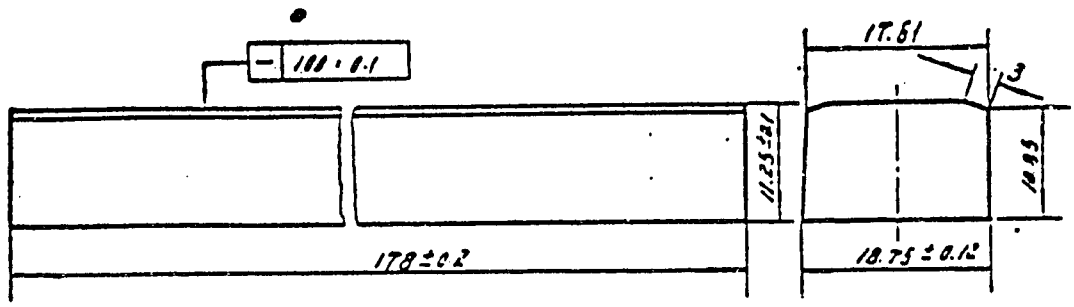
4. 螺距：146

   Pitch, 146

件名 Part name	#3 挤压蜗杆 #3 Pressing worm	材料 Material	20	件数 Quantity	1	件号 Part No.	200—8—8

FIGURE 1

全部V6
Total



技术要求：

Technical Demands;

1. 表面必须平整光洁，不得有毛刺、起线、黑斑、裂纹等缺陷。
   The surface must be even, smooth and brilliancy, without faults such as burs, black spots, cracks and etc.
2. 表面渗炭深度为1～1.5毫米。
   Depth of surface carburization, 1～1.5mm.
3. 热处理硬度56～62HRc。
   Heat-treated hardness, 56～62HRc.
4. 不直度允差100:0.1。
   Max. error in straightness, 100:0.1.

件名 Part name	短柱条 Cage bar, short	材料 Material	20	件数 Quantity	44	件号 Part No.	200—16—32

FIGURE 2

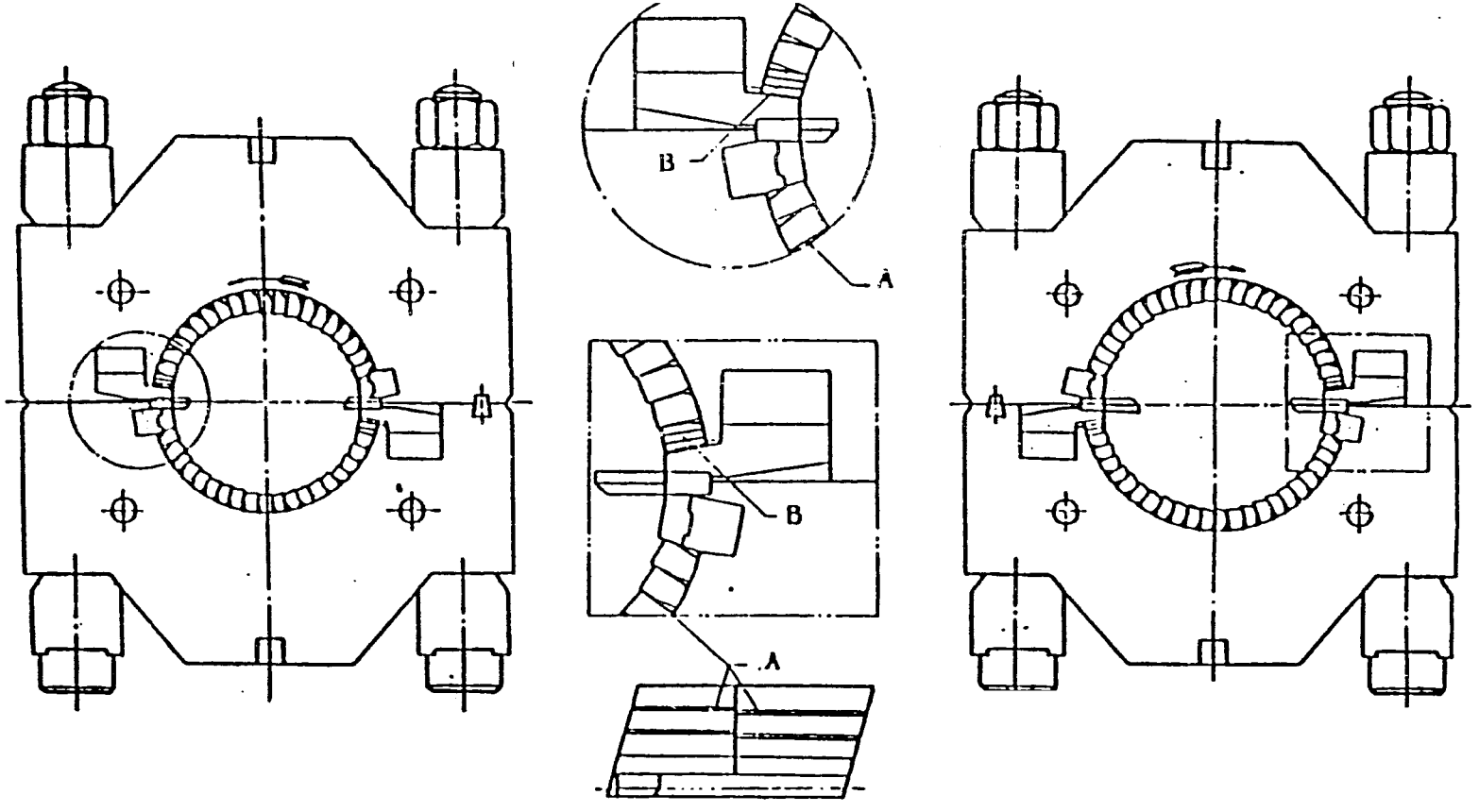


图 2(2) Fig. 2(2)

A. 垫片：垫在两挡条之间使油脂从挡条隙缝中挤出。

B. 垫板：在挡条经过垫片调节隙缝之后，其最后余隙用垫板充实。

A. Spacing strip, It is to be placed between cage bars so that the oil can force its way throuth the gaps between them.

B. Lining bar, After the gaps between cage bars have been adjusted by spacing strips, the gaps that are still present should be stopped up by the lining bars finally.

FIGURE 3

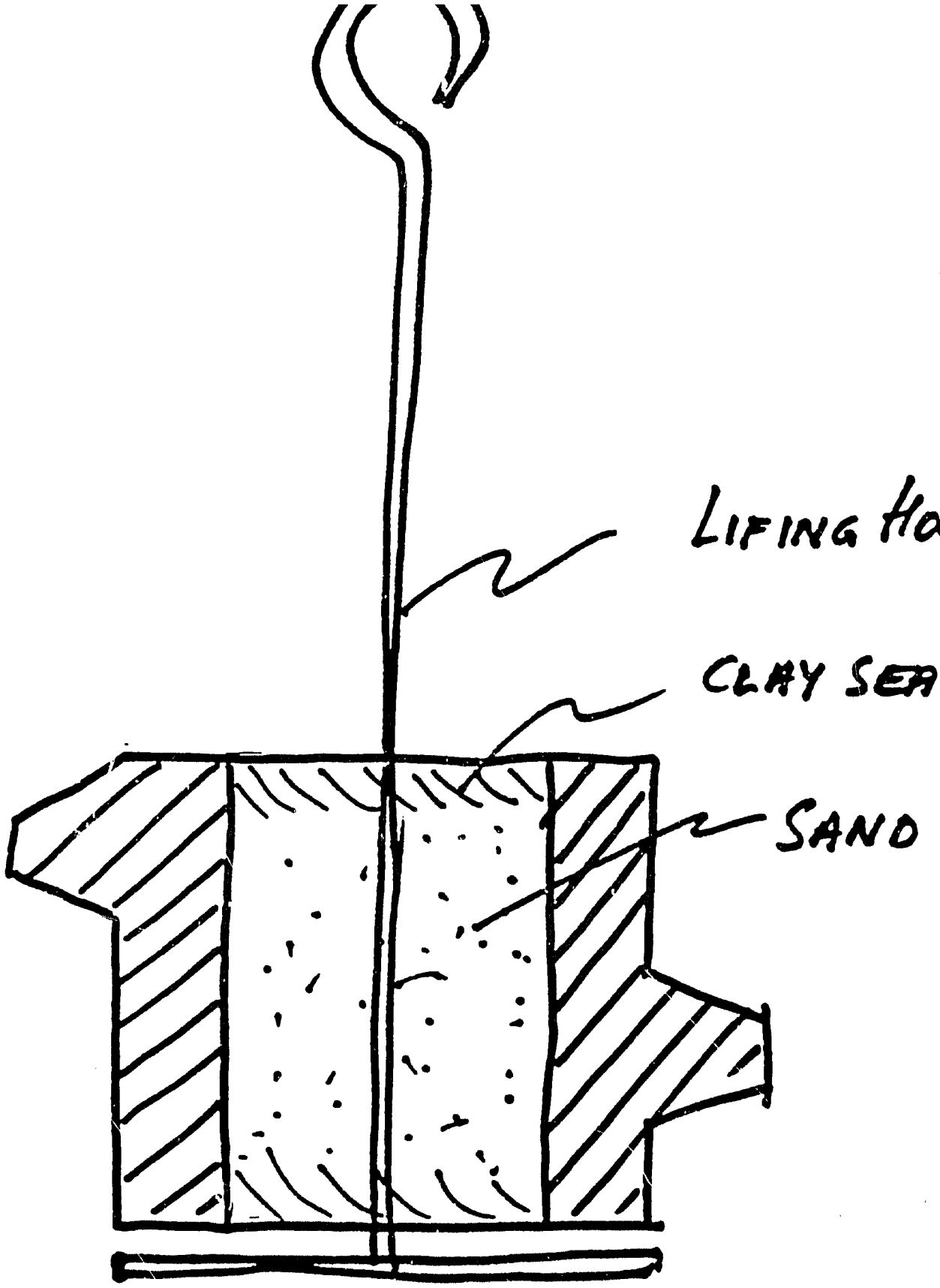


FIGURE 4 : CROSS SECTION OF PRESSING WORM SEALED TO LIMIT THE QUENCHING ACTION OF THE QUENCHANT TO THE FLIGHTS AND OUTSIDE DIAMETER.

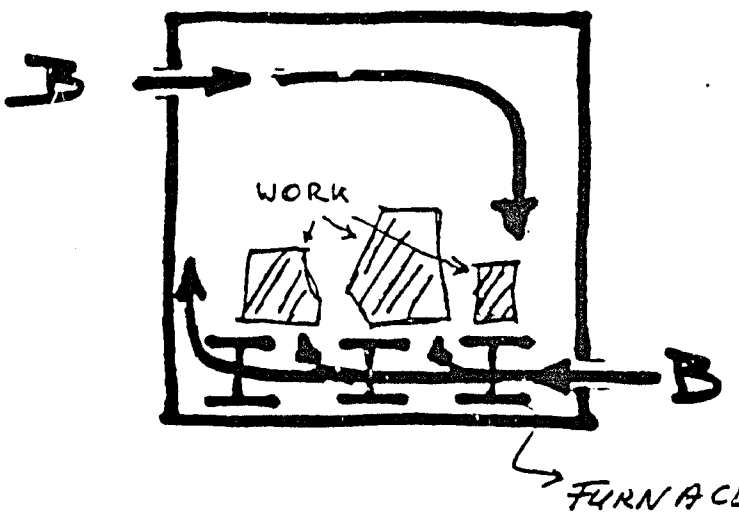


FIGURE 5

CROSS SECTION OF HORIZONTAL, SIDE FIRED FURNACE TO ACHIEVE CIRCULATING PATTERN OF FLAME AND COMBUSTION GASES

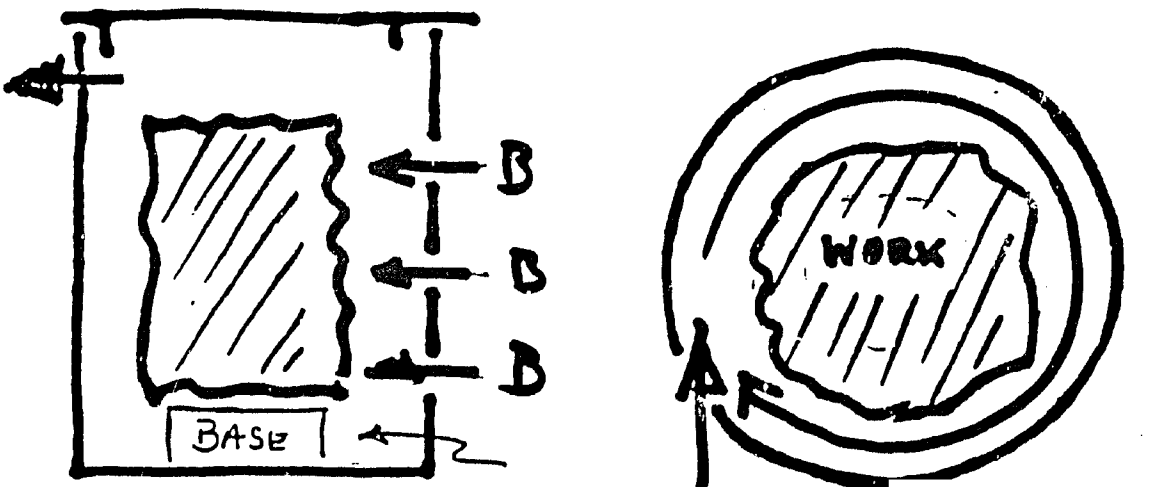


FIGURE 6

VERTICAL FURNACE WITH 3 TANGENTIALLY ORIENTED BURNERS TO ACHIEVE CIRCULATING PATTERN OF FLAME AND COMBUSTION GASES.

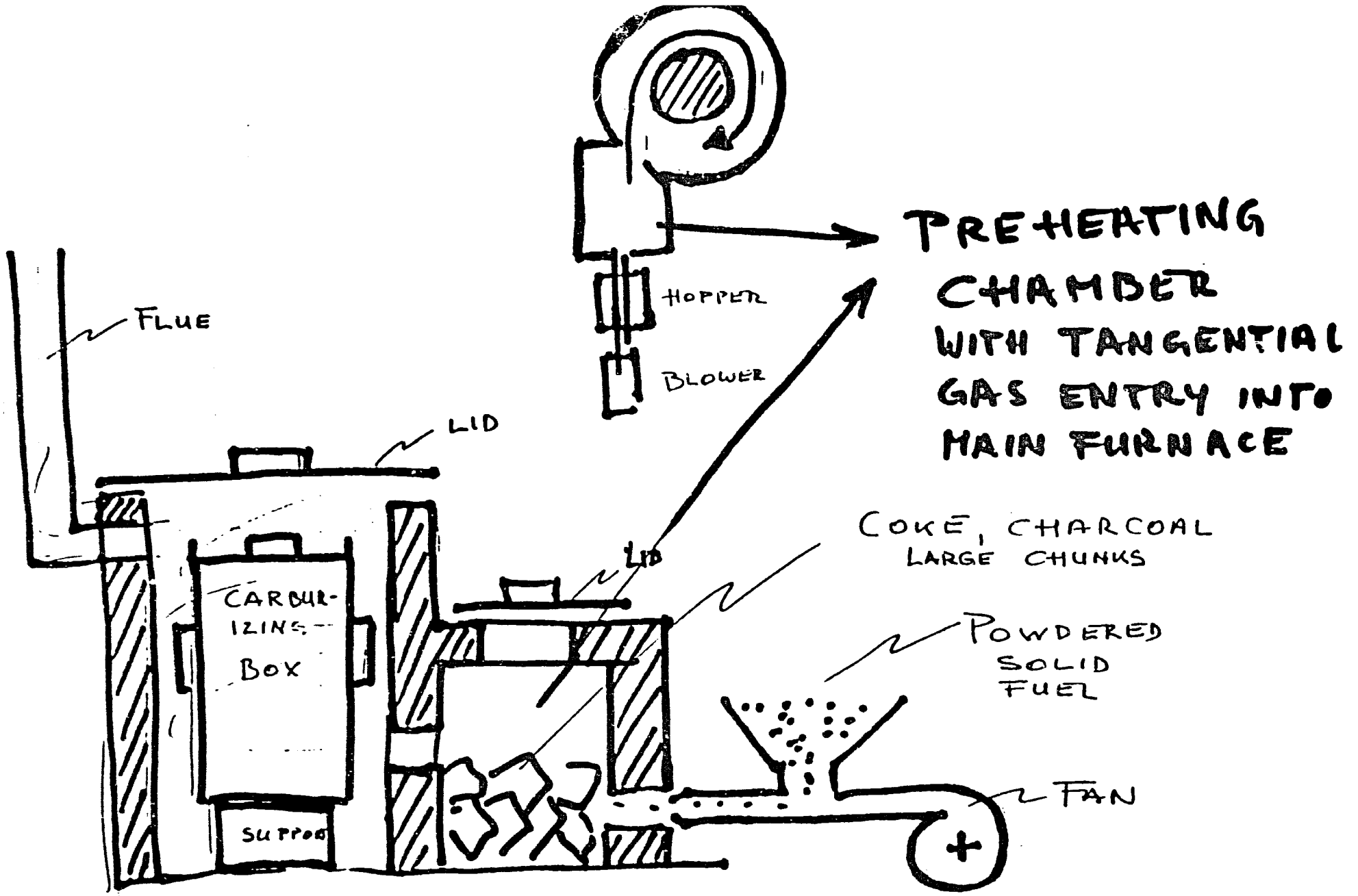


FIGURE 7: SCHEMATIC OF MEIKTILA HEAT TREAT

APPENDIX A: MELTING, MOLDING, AND HEAT TREATING FACILITIES

Melting: The workshops at Meiktila, Naung Yoe, and Pegu had one or several small shaft furnaces, similiar to cupolas, for melting cast iron. A typical heat size for melting cast iron was 100 lbs. These were "home made" type units, typically consisting of a shorter, 12 in tall, two foot diamter, cylindrical bottom vessel, with a taller, 4 foot, cylinder on top; both were lined with a blend of sand and clay.

Starting with a charcoal fire in the bottom vessel the unit was charged with either coke, sea coal, charcoal, or combinations thereof. The metallic charge was then placed on top. Either cast iron scrap, returns, pig iron, or combinations thereof were used for this purpose. Air was then blown via a 2 to 3 in. diameter hole in the side, near the bottom of the upper cylinder, and an electric motor driven blower. New fuel and metal were added as the initial fuel burned and the charge descended slowly down the shaft. When the melter felt that most of the metallic charge had been melted, the upper cylinder with fuel remaining in it was removed. Fuel floating on the molten iron was skimmed off, a cover of burned rice hulls was added to reduce heat losses and the metal was poured with the lower portion of the furnace serving as the pouring ladle.

Mini-cupolas, with dropping bottoms, and an entirely stationary structure, including a wind box and tuyeres were seen in Naung Yoe, and at a foundry society affiliated with the Rangoon Institute of Technology.

For these melting operations four techniques were demonstrated during the visit for immediate application:

1) The use of lime, in quantities of 1/5 the coke charge, to fluidize the slag, raise the metal temperature and achieve greater carbon pick-up.

2) The ability to substitute with greater flexibility pig irons from different sources as metal charge, and petroleum coke as fuel.

3) The use of chill samples as a tool for monitoring cast iron quality.

4) The use of ferro-silicon inoculants to improve and control the iron quality.

Molding: Sand and clay for molding varied with the local supply (from the back yard, or the closest river bank). These materials were blended manually. Most of the parts cast were molded with the original part serving as the pattern. Mounted patterns were not observed but appear to be known. Also observed was a sophisticated metal mold for casting aluminum pistons for diesel

engines, with several parts making up a collapsible metal core. The majority of molds and cores were dried with charcoal embers. A mold wash of graphite or coke powder suspended in water was frequently used. In art foundries religous and historical figurines were typically produced by the lost wax process.

Heat Treatment: Heat treatment facilities were virtually non-existent, other than charcoal fires for heating small parts prior to forging and later quenching. A misapplied quenching operation was observed where the operator allowed the work piece to cool to a bluish grey color before the quench. The operator explained that his procedure consistently gave high hardness.

Besides the electrically heated furnace for malleabilizing iron castings in the foundry society near Rangoon only two other furnaces were observed. Both furnaces were about 7 feet long, about one square foot in cross section and had been built to heat small diameter rods or ribbons for hot rolling. One of these furnaces was fired by two propane gase burners. The burners had been mounted on one side, near mid length, about two feet apart. The other furnace was saw dust fired. The flame entered the heating chamber at one end, heating the full length of the small diameter wire, and burning towards the opening at the other end that was used for charging the furnace and withdrawing heated work.

APPENDIX B: RECOMMENDED LITERATURE

1 ASM Metals Handbook, Vol. 4., Heat Treating, 9th. Edition, Current cost: $ 98.00, ASM Members: $ 78.00.

2 Heat Treaters Guide: Standard Practices and Procedures for Steel, ASM, ISBN: 087170-141-3. Current cost: $ 121.00, ASM Members: $ 96.80.

3 Iron Castings Handbook, Editors: C.F. Walton and T. Opar, 1981, available from Am. Cast Metals Association, $ 27.50.

4 Principles of Metal Casting, Heine, Loper, Rosenthal, AFS: $ 55.00.

5 Cupola Handbook, AFS, $ 120.00, AFS Members: $ 60.00.