

TERMS OF REFERENCE
MODERNIZATION
OF
CEPU TRAINING CENTER

SPONSORED

BY

THE INDONESIAN OIL AND GAS TECHNOLOGY
DEVELOPMENT CENTER "LEMIGAS"
DIRECTORATE GENERAL OF OIL AND GAS
MINISTRY OF MINING AND ENERGY

INTRODUCTION

The Republic of Indonesia, gifted with abundant natural resources and population has intensively promoted her own development program for the last two decades to become one of the countries with the most potential for transition from "developing" to "developed" status, in a comparatively short period. Due to this, improvement of human ability and accumulation of technology and skill are becoming increasingly valued as vital agents for economic growth and the promotion of social welfare in Indonesia.

Since the oil and gas industry is one that should significantly contribute to this objective, it is of great importance to Indonesia that she acquire and apply relevant technology used in the industry, in order to permit operation by the Indonesian people themselves. In this connection, establishment of a well-equipped institute that provides education and training for the oil and gas industry recently became a major concern of the public sector in Indonesia.

LEMIGAS (the Indonesian Petroleum Institute) is a non-profit government agency specializing in oil and gas research and training. LEMIGAS was established in 1965 as the scientific arm of the Directorate General of Oil and Natural Gas of the Department of Mines and Energy.

One of the responsibilities of LEMIGAS is TRAINING: to organize and carry out training and education programmes for workers, engineers, supervisors and executives, in order to meet the increasing demand for skilled personnel, and to maintain or improve the ability or skill of those already employed in the Petroleum Industry. These programmes are open to ASEAN people as well as Indonesians.

The vocational education and training activities are centered at Cepu, a small town in Central Java. The centre is known as Pusedik Migas Cepu (The Training Centre for Oil and Natural Gas).

Cepu was originally chosen as a training centre because the town has several old oil fields, an old refinery, workshops, etc., which are used for training purposes. It has developed its own education and training program, and installed modern facilities such as a laboratory

for primary courses, language laboratories, a library, etc. Other facilities, however, such as the workshops and the refinery, which would play rather essential roles in achieving the goals of this organization, are too old and outdated to be appropriate to the current situation in the oil and gas industry in Indonesia. We believe, it is essential for Indonesia to possess effective tools to enhance her ability to supply engineers and skilled workers to keep up with the industrial advances of these modern times.

On this background, LEMIGAS has a strong demand for a master plan concerning how to modernize the training centre through rehabilitation of the existing facilities as well as acquisition of new facilities and equipment in accordance with the basic concept as indicated in the following section.

Terms of Reference

- I) Project Title : Modernization of Cepu Training Center
- II) Location : Cepu Central Java
- III) Executing Agency : Oil and Gas Technology Development Center.
Directorate General of Oil and Gas.
Dept of Mining and Energy
- IV) Objective : To enhance the ability of the Training Center to supply engineers and skilled workers, to keep up with the recent industrial advances in Indonesia through provision of modern education and training facilities including the most advanced technology with regard to operation and maintenance of modern oil refining facilities.

V) Project Description:

The following items should be modernized in the order of the priorities given here. The realization of the items that have been given top priority here is considered to be indispensable for modernization of the Training Center.

Items	Priority
1) Technical cooperation	1
2) Workshop	1
Replace equipment and tools	
3) Process simulator	1
Install simulators for process units	
4) Vacuum Unit	1
Install new unit	
5) Catalytic Reformer	2
Install new Unit	
6) Topping Unit	3
Install new unit	
7) Wax Unit	3
Replacement of some equipment	

Technical Cooperation

During and in the early stage of the project execution, Indonesian engineers will participate in all activities including the planning and preparations, engineering, construction and process, which forms an integrated on-the-job training for them.

In addition, technical specialists will be made available for a specified period, after completion of the installation or replacement work associated with items (2) through (6) above.

Technical cooperation in programs covering plant operation and maintenance is required. The program should include seminars for Cepu instructors that would be conducted in well industrialized - country(s). Together, these would result in better efficiency in the utilization of Newly installed facilities proposed and would contribute greatly to brushing up and enriching the existing education and training programs.

Workshop

Most of the workshop equipment and tools are too old to use. This equipment and these tools can not properly satisfy the training purposes, because of the poor machining accuracies they allow. It is proposed, therefore, that the top priority be given to replacing the existing workshop equipment and tools with new ones.

Process Simulator

The Training Center cannot accommodate an unlimited number of actual process units. The utilization of process simulators, therefore, would be of great service in the training of process unit operations. In other words, the use of process simulators would assure a proper understanding of operational procedures, as well as safe training for emergency operations, which are otherwise impossible to reproduce. A combination of actual process units and process simulators should be very effective for operational training.

Vacuum Units

No vacuum units are available at the Training Center, though vacuum units are very common items in refineries, as in the case of the topping units. Therefore, the furnaces for the topping units are presently being operated at temperatures above normal firing, in order to produce more feed for the wax units. Such operation, however, causes thermal cracking, resulting in the coloration of products; the installation of new vacuum units would eliminate such problems. Therefore, it is proposed that new vacuum units be installed.

Catalytic Reformer

Catalytic Reformer is another common type of refinery process unit. Accordingly, a similar priority as for vacuum units should be applied to installation of catalytic reformers. For the following reasons, however, we suggest that second priority (Phase 2) be given to catalytic reformers. Our estimation, based on the current oil production (approx. 600 BSD), shows that the yield of naphtha, which is a feed for catalytic reformers, is approx. 120 BSD. Such a small yield, however, makes it difficult to continuously operate the reformer units, which were designed in terms of a minimum capacity of 400 BSD. It should further be noted that the repeat of start-up and shutdown of reformer units involve troublesome problems. In view of catalyst protection, it is undesirable that reformer units be repeatedly started up and shut down, except in special circumstances. Such operations should not be carried out, even during training. The catalytic reformer, therefore, should be installed during the second phase, in line with an increase in the amount of oil production.

Topping Unit

It is desirable that the existing topping unit be modernized for training. This unit, however, is too old to undergo modification. Accordingly, during Phases 1 & 2, the existing unit should be used without modification, and in subsequent Phase 3, should be replaced with a new unit.

Wax Unit

The existing wax unit is a conventional type of wax-processing unit, consisting of the following sections:

- Chiller and filter section
- Sweating section
- Treatment section
- Moulding section.

LEMIGAS suggests the use of processes such as the MEK process or the FULFURAL extraction process in place of the existing wax unit. They can be used in lube oil refining with the aim of removing wax or aromatics and naphthane.

However, the Training Center requires a process unit that is aimed chiefly at wax production. We believe, therefore, that a conventional type of wax-producing unit can best serve this purpose. Little improvement can be expected as a result of the installation of such a unit, as they have so far undergone little technical change, as is indicated by the nomenclature, "conventional". The lowest priority, therefore, has been accorded to the modernization of the wax unit. It is recommended that, of the equipment composing the wax unit, those items that have become obsolete be replaced with new ones.

Offsite Facilities

The assumption is that the required utilities will be supplied from the existing facilities to the maximum possible extent; the offsite facilities that must be added with the installation of new units should be installed phase by phase.

1) TECHNICAL COOPERATION

The following four types of technical cooperation are suggested.

- Participation of Indonesian engineers in all stages of this project, including planning and preparation, engineering and construction

- Training of instructors of Cepu Training Centre in Japan
- On-the-job training for Indonesian engineers
- Dispatch of Japanese technical specialists after installing proposed new facilities and equipment

1.1 Participation of Indonesian Engineers in the Project

As the best expression of this technical cooperation, all stages of this project shall be carried out by an integrated team consisting of Indonesian engineers and Japanese-engineers. In this case work arrangement shall be such that the majority of the work will be carried out by Indonesian-engineers with the assistance and guidance of Japanese - experts.

This type of activities will be carried out from the earliest stage of the project, including the preparations of studies, engineering design implementation, construction, etc.

1.2 Trainer's Training

Since having a well-qualified teaching staff capable of effectively utilizing the renovated training facilities will be of decisive importance to successful operation of "AKAMIGAS", it is strongly desired that plans for incentive training of the current teacher/instructor staff of AKAMIGAS in Japan be developed.

Training in Japan will assure the effective utilization of the latest equipment and the abundance of technical information that is available there.

Emphasis, therefore, will be placed on training in Japan.

(1) Objectives

The major objectives in training the current teacher/instructor staff in a Refresher Training Programme are:

- (a) Updating and upgrading of the participants' knowledge and skills in the technology relevant to their own vocational fields.

- (b) Updating and upgrading the participants' teaching knowledge and skills.
- (c) Enrichment of the regarding participants' general knowledge and experience regarding oil refineries and related industries.

(2) Qualification of Trainees

Trainees for this Refresher Training Programme shall be selected from among the existing teacher/instructor "AKAMIGAS", those who are deemed capable of utilizing their experience to improve the performance of the training center after completion of their refresher training will be selected.

In appropriate number of candidates is to be selected, to ensure covering all of the disciplines taught in the following groups.

- (a) Operations groups
 - Refinery Operations
 - Utility Operations
 - Shipping Operations
- (b) Maintenance groups
 - General Maintenance
 - Rotary Machinery Maintenance
 - Instrument Maintenance
- (c) Other groups
 - Laboratory Testing
 - Marketing Operations
 - Others

(3) Contents of Refresher Training Programmes

In line with the objectives, the Refresher Training Programme shall provide the following:

- (a) Practical and theoretical training on the technology associated with the trainees' vocational fields:
This training will be carried out in classroom training, in-plant training and in field trips.

- (b) Practical and theoretical training on the latest training methods and techniques:

Effective utilization of such training devices as simulators, plant models, audio-visual aids, etc., are to be taught, among other things. Also study visits to Japanese oil refineries to learn about training methods in Japan will be undertaken.

- (c) Theoretical information regarding the petroleum industry in Japan:

This will be reinforced by field trips to oil refineries and related industries.

- (4) Duration and number of trainees

Training programs will last 4 to 8 weeks, depending upon the differing requirements among the various categories of trainees.

1.3 On-The-Job Training for Indonesian Engineers

The following three types of on-the-job training shall be provided for Indonesian engineers for each phase of project execution.

2) WORKSHOP

The following two workshops shall be modernized: rotary machinery workshop and machining workshop.

The rotary machinery workshop shall be provided with various types of pumps, compressors and other rotary machinery that are most commonly used in the hydrocarbon processing industry. Trainers are expected to become acquainted with their structures and functions by disassembling and reassembling these.

The machining workshop shall be equipped with various types of machines and tools such as lathes, milling machines, shaping machines, grinders, including arc- and gas-welders. Workspaces for sheet metal work, piping and hand finishing work that utilize testing and measuring apparatus will also be provided. Here, trainers can learn varieties of practical methods of metal processing that are generally used by maintenance shops in hydrocarbon processing plants.

The existing workshop building will be used. Removal of the existing equipment and installation of the new equipment will be carried out by LEMIGAS.

An appropriate number of supervisors for the installation process will be required. In addition, two technical aid specialists will be required for a period of about one year, to facilitate work using the new equipment and tools.

3) PROCESS SIMULATOR

Many refineries have so far introduced process simulators. It is widely known that the utilization of process simulators is very effective for operational training. It is requested that the equipment and programs be installed at the Cepu Training Center.

LEMIGAS will provide space for the simulator to be installed.

4) PROCESS UNITS

4.1 Topping unit

The topping unit consists of a main crude tower, a naphtha stabilizer, side cut strippers for Kerosene and gas oil, a feed charge heaters, and associated heat exchangers.

Crude oil from storage is charged to the crude tower via the preheat exchangers and charge heater. The stabilizer section produces off-gas, light naphtha, and heavy naphtha.

Kerosene and ga-oil products are withdrawn from the side strippers. Atmospheric residue is a bottoms product of the main crude column.

A full range naphtha (Light Naphtha plus Heavy Naphtha) is to normally be charged to the catalytic reformer.

4.2 Vacuum unit

The vacuum unit consists of a vacuum tower, a charge heater, steam ejector system, and associated heat exchangers.

Atmospheric residues are charged to the vacuum tower via pre-heat exchangers and a vacuum charge heater.

LVGO and HVGO are withdrawn from the vacuum tower as side-cut products. Vacuum residue is bottoms product of the vacuum tower.

HVGO will be charged to the wax unit. LVGO and vacuum residue are to normally be blended for production of fuel oil.

4.3 Catalytic reformer

The Catalytic Reformer consists of the following two major sections.

- Naphtha Hydrogen Desulfurization Section
- Naphtha Catalytic Reforming Section

Straight naphtha (light naphtha plus heavy naphtha) is charged to the naphtha hydrogen desulfurization section, to eliminate sulfur in the feed naphtha.

The desulfurized naphtha is then charged to the catalytic reformer section, to improve the octane number of the product.

The final product, as reformat, is withdrawn from the stabilizer bottom in the catalytic reformer section.

4.4 The Wax Unit consists of the following major sections.

- Chiller and Filter Section
- Sweating Section
- Treatment Section
- Moulding Section

The waxy, heavy, vacuum gas oil (HVGO) is charged to the chiller and filter section where the feed oil is to be cooled and filtered to remove wax cake. The wax cake is then fed to the sweating and treatment sections. Finally, the product wax is fed to the moulding section.

1. Project Title : STRENGTHENING OF THE MINERAL TECHNOLOGY DEVELOPMENT CENTRE LABORATORY.
2. Location : Bandung, West Java
3. Executing Agency : Directorate General of Mines Ministry of Mines and Energy.
4. Objectives : To increase the capacity and capability of the Mineral Technology Development Center in terms of additional facilities, technical services and technical training to enable them to effectively undertake their assigned functions and responsibilities.
5. Project Description : The Mineral Technology Development Center is an agency within the Ministry of Mines and Energy which has its main function:
 - to promote the mining industries with technical/laboratory services, industrial research, studies, consultation, etc.
 - to carry out applied research in mineral technology especially for coal, industrial mineral and metallic mineral by comprehensive investigation concerning their market ability, recovery, processing, mining system etc.
 - to organize and performs training of executive engineers and workmen in order to maintain a level of high quality personnel in the mining industry.

Since 1969 great emphasis has been given to the construction of the laboratory/office building and its facilities and less emphasis to the purchase of equipment and training the personnels.

It is felt necessary to improve the capacity and capability of the Mineral Technology Development Center for the purpose of increasing the mineral benefit in Indonesia.

Scope of works:

Providing Mineral Technology Development Center of Indonesia with adequate laboratory and field equipment to carry out its tasks.

6. Scope of Assistance requested	:	a. expert services:	US \$ 1,000,000
		b. fellowship	: US \$ 1,000,000
		c. equipment	: <u>US \$ 13,000,000</u>
		Total cost	: US \$ 15,000,000

Note for equipment:

- a. EPMA : Election probe mineral analyzer complete with accessories.
- b. Strengthening of laboratory facilities including:
 - 1) Pilot plant scale for briquetting plant equipments
 - 2) Pilot plant scale for industrial mineral utilization equipments.
 - 3) Pilot plant scale for complex sulphide ores processing plant equipments.
 - 4) Pilot plant scale for peat harvesting and utilization, laboratory as well as field equipments.

T E R M S O F R E F E R E N C E

STUDY ON THE REHABILITATION OF CILACAP SPINNING MILL

SPONSORED BY
DEPARTMENT OF INDUSTRY
DIRECTORATE GENERAL OF MULTIFARIOUS MANUFACTURING
INDUSTRIES

I. BACKGROUND AND SUPPORTING INFORMATION

1. Justification of the project

Cilacap Spinning Mill (Patal Cilacap) was erected in 1952 with the capacity of 30.000 spindles (Spinning Unit I). It was expanded in 1962 with additional capacity of new machineries of 30.000 spindles (Spinning Unit II), located in adjacent building.

Presently, both Units with old machineries are difficult to produce a competitive yarns goods compared to the ones produced by new machineries.

In order to get the yarn produced to be competitive, the company needs rehabilitation.

In conclusion to overcome those problems, the machineries of Cilacap Spinning Mill must be rehabilitated as soon as possible.

2. Project title and scope of works

2.1 Project title:

Study on the Rehabilitation of Cilacap Spinning Mill.

2.2 Scope of works:

The rehabilitation of Cilacap Spinning Mill is tightly connected to program of the Government on industrial restructuring of textile industry, and also in connection to the program of driving export of non-oil commodities.

In accordance to the plan of driving export of non-oil commodities, Cilacap Spinning Mill as one of the mills that belongs to the Government is programmed to be rehabilitated soon, in order to be able to produce a competitive export goods, either quality or price, against to another textile goods produced by the advanced textile countries.

3. Institutional framework

The Directorate General of Multifarious Manufacturing, Industries of the Ministry of Industry which is supervising the Cilacap Spinning Mill will be responsible for the execution of the study.

4. Government follow up

On the completion of the study, the Directorate General of Multifarious Manufacturing Industries expects that the study will come out with recommendations for further action to rehabilitate the Cilacap Spinning Mill.

II. OBJECTIVES

1. Immediate objectives

To investigate the possibilities of rehabilitating and innovating the equipments and machineries of Cilacap Spinning Mill in order to get a maximum capacity with a high quality and a low costed yarn (efficiency).

2. Long range objectives

The long range objective of the project are to strengthen and to support a program of driving export of non-oil commodities.

III. PLAN OF OPERATION

On the completion of the study, it is expected that the study will come out with recommendations for a rehabilitation program of the Cilacap Spinning Mill, and further steps can be taken i.e.:

1. Rehabilitation of Spinning Unit II on some machineries in 1984
2. Rehabilitation of Spinning Unit I in 1985
3. Rehabilitation of Spinning Unit II on main machineries in 1986.

IV. EXTERNAL AND GOVERNMENT INPUTS

1. External inputs

The expenses for the experts services for the study should be borne by donor country (the Government of Japan).

2. Government inputs

The Directorate General of Multifarious Manufacturing Industries will provide the necessary counterparts and secretarial supports.

T E R M S O F R E F E R E N C E

STUDY ON THE MODERNIZATION/REHABILITATION OF HOWA
LOOM 52" TO 75" WIDTH AT CAMBRIC'S MILL GKBI

SPONSORED BY
DEPARTMENT OF INDUSTRY
DIRECTORATE GENERAL OF MULTIFARIOUS MANUFACTURING INDUSTRIES

I. BACKGROUND AND SUPPORTING INFORMATION

1. Justification of the project

The textile industry especially the Cambric's Mill GKBI Medari is in general now entering a new and presumably more difficult phase particularly in terms of entering international market. It was presumably due to restrictive policy launched by importing countries, and admittedly in the other hand the domestic producers was unable to meet domestic demand due to the more sophisticated consumers preference and of a structural nature.

To overcome that difficulties mentioned above, cooperative members of GKBI at the same time jointly formulize a policy i.e. to make self sufficiency of fabrics at a reasonable price and with sufficient quality of products for the most part of the society.

Based on that realities, the factory sectors ideally must be able to increase its ability as much as possible to reduce production costs, to increase export sales, to respond flexibly to changes in domestic demand, to manufacture a more wide range of fabrics, and to develop a broader and more efficient resource bases.

To meet these ideals, in accordance with the subject matter, the machineries of Cambric's Mill GKBI Medari must be rehabilitated as soon possible.

2. Project title and scope of works

2.1 Project title:

Study on the odernization/Rehabilitation of Howa Loom 52" to 75" width at Cambric's Mill GKBI.

2.2 Scope of works:

2.2.1 The study will collect and analize information in respect of:

- assesment of condition of machineries
- assesment of level of technology use in factory
- assesment of labour skills to make the most productive use of existing facilities and machineries.

2.2.2 The study will identify the requirements for modernization of the factory as such:

- type of machines
- procurements of machines/equipments
- transfer of technology
- labour training.

3. Institutional framework

Since the supervision of technical operation of Cambric's Mill GKBI lies on the Ministry of Industry, the Directorate General of Multifarious Manufacturing Industries will be responsible for the execution of the study.

4. Government follow up

On the completion of the study, the Directorate General of Multifarious Manufacturing Industries expects that the study will come out with recommendation for further action to rehabilitate the Howa Loom 52" to 75" width at Cambric's Mill GKBI.

II. OBJECTIVES

1. Immediate objectives

The immediate objective is to make study of the factory with the aims:

- to modernize or rehabilitate the machineries
- to improve the product quality level and design
- to make diversification of the products for export purposes
- to improve organization and managerial system
- to develop human resources that includes: transfer of technology, technical and managerial skills and operator.

2. Long range objectives

The long range objective of the project is to strengthen the Cooperative Movement Factory capabilities to meet the domestic and export demands.

III. PLAN OF OPERATIONS

On the completion of the study, it is expected that the study will come out with recommendations for rehabilitation program of the Cambric's Mill GKBI, and further steps can be taken i.e.:

- the government represented by GKBI will assign two counterparts to the foreign experts.
- the International staff will contribute 2 experts with the following expertises:
 - Textile Machineries and Processing Expert
 - Textile design and product development Expert.

IV. EXTERNAL AND GOVERNMENT INPUTS

1. External inputs:

The expenses for the experts services for the study should be borne by donor country.

2. Government inputs:

The Directorate General of Multifarious Manufacturing Industries and Cambric's Mill GKBI will provide the necessary counterparts and secretarial supports.

TERMS OF REFERENCE

STUDY ON THE REHABILITATION/RENOVATION
PULP AND PAPER MILLS

SPONSORED BY
DEPARTMENT OF INDUSTRY
DIRECTORATE GENERAL OF BASIC CHEMICAL INDUSTRIES

Summary :

This Terms of Reference present information about the need for the rehabilitation/renovation of the three paper mills, namely Basuki Rachmat Pulp & Paper Mills, Padalarang Pulp & Paper Mill and Blabak Pulp and Paper Mills.

The basic objectives of the study is directed toward and investigation on:

- The possibility of these mills to improve their operation which mean to reduce the production cost, improve both the quality of the product and the production capacity.
- The possibility of these mills to expand and to diversity their product.

By the improvement of their operation, the expansion and the diversification of their product, it is expected that they will keep their creditibility in the expanding Indonesian Pulp & Paper Industry.

These three Pulp & Paper Mills belong to The Government Enterprises. The Executing Agency will be The Directorate General of Basic Chemical Industries, Ministry of Industry.

Due to sort of the local fund the Indonesian Government sponsors the to seek a Foreign Technical Assistance to finance and to carry out the study.

The detailed information about the studies consisting of:

- Study on the Expansion of Basuki Rachmat Pulp & Paper Mill
- Study on the Rehabilitation of Blabak Pulp & Paper Mill
- Study on the Rehabilitation of Padalarang Pulp & Paper Mill are given as the following.

T E R M S O F R E F E R E N C E

STUDY ON THE EXPANSION OF BASUKI RACHMAT PULP & PAPER MILL

SPONSORED BY

DEPARTMENT OF INDUSTRY

DIRECTORATE GENERAL OF BASIC CHEMICAL INDUSTRIES

PROJECT AID PROPOSAL

1. Project title : Study on the Expansion of Basuki Rachmat Pulp & Paper Mill.
2. Location : Banyuwangi, East Java, Indonesia,
3. Executing Agency : Directorate General of Basic Chemical Industries.
Ministry of Industry.
4. Objectives : Increasing production efficiency and improvement of product quality.
5. Project Description : For increasing of efficiency and quality improvement of paper product, so the rehabilitation program is directed to equip and to replace several machinery and equipments at Pulp and Paper Plant.
 - 5.1 Pulp Plant : The rehabilitation at Pulp Plant is mainly aimed at improving the quality of pulp produced.
The machinery and equipments to be required are among others:
 - a device to obtain the desired chip mixture.
 - instrumentation for process control.
 - black liquor filter.
 - 5.2 Paper Plant : Rehabilitation at Paper Plant is meant to increase efficiency and to improve quality of the paper produced.
Machinery and equipments to be required for the rehabilitation are as follows:
 - Instrumentation for process control.
 - Modification on Approach Flow System.
 - Flow Box replacement.

- Press Part modification.
- Dryer Part modification.
- Paper Machine's sectional drive reparation.

5.3 Finishing : - Replacement of Sheet Cutter.
- Replacement of rewinder.

6. Project Cost : Foreign Cost US\$1,955,000
Local Cost Rp. 837,500,000

TERMS OF REFERENCE

I. OBJECTIVES OF THE PROJECT

This rehabilitation program is aimed at increasing of efficiency and improvement of paper quality.

Increasing of efficiency is needed for maintaining the level of our production cost, while the improvement of paper quality is to meet the market requirements.

II. BACKGROUND AND SUPPORTING INFORMATION

1. Justification of the Project

- Machinery and equipments at Basuki Rachmat Paper Corporation were formerly designed for manufacturing pulp and paper using bamboo as raw material. This paper mill has been in operation since 1969.

The designed capacity is 30 ton paper per day.

Because of the difficulty of bamboo supply, since beginning 1974 blended raw materials have been used consisting of pipe wood (long fibre), turi, lamtoro, mangrove, bamboo, and other applicable hard woods.

With change-over of the raw materials, adjustment has been made with the machinery and equipment to support operation.

- Beside that, in 1976 optimization of paper machine was done and a chlorine Alkali Plant Unit was established.

The results of programs having been carried out are as follows:

- Paper production increases from 30 TPD to 45 TPD.
- Pulp plant unit is operated to an optimum as possible to compensate the operation of paper machine.
- The requirement for caustic soda and hypo chlorite can be met by chlorine Alkali Plant Unit.

Since 1973 marketing of writing and printing paper has demanded higher requirements.

In order to meet requirements demanded by the market, and thinking carefully about the condition of machinery and equipments as Basuki Rachmat Paper Corporation, then it is considered necessary to perform rehabilitation with several machinery and equipment at pulp and paper plant.

2. Project Name/Intended Activities

This rehabilitation program is intended to replace machinery and equipment at pulp plant and paper plant.

2.1 Pulp Plant

The latest condition of the pulp plant shows to be unable to make pulp stock of stable quality for producing paper that can meet the requirements of paper quality demanded by market, especially on whiteness and strength of pulp.

To improve the quality of pulp, the rehabilitation at the pulp plant is emphasized on:

- completing the equipments to obtain the intended mixture of chips.
- replacing instrumentation for process control at condition, washing and bleaching units.
- installing black liquor filter for increasing of chemical recovery efficiency.

2.2 Paper Plant

The paper produced by the existing machine cannot compete at market.

For quality improvement, mainly on flatness, whiteness and hygroinstability, the rehabilitation at paper plant will cover:

- modification on approach flow system
- replacement of flow box
- modification of wire part
- modification of press part
- modification of dryer part
- reparation on sectional drive of paper machine

The condition of the existing duplex cutter is not good any more, so that $\pm 15\%$ of its output does not meet requirements, e.g. rectangular sheet.

The existing rewinder cannot be run for high speed operation and the reel of paper achieved causes trouble on converting machine.

Therefore, it should be replaced with a new rewinder.

List of Machinery & Equipments

1. Pulp Plant :
 - 1.1 Chip Conveyor & Chips feeder.
 - 1.2 Flow Recording controller & Consistency Recording Controller.
 - 1.3 Black liquor filter.

2. Paper Plant :
 - 2.1 Flow Recording Controller & Consistency Recording Controller.
 - 2.2 Inline Freeness recorder.
 - 2.3 Basic Weight recorder.
 - 2.4 Approach Flow System Equipment.
 - 2.5 Flow Box.
 - 2.6 Accessories for wire part.
 - 2.7 First Press Roll.
 - 2.8 Accessories for dryer part.
 - 2.9 Accessories for Sectional Drive.
 - 2.10 Sheet Cutter.
 - 2.11 Rewinder

T E R M S O F R E F E R E N C E

STUDY ON THE REHABILITATION OF PADALARANG PUPIL & PAPER MILL

SPONSORED BY

DEPARTMENT OF INDUSTRY

DIRECTORATE GENERAL OF BASIC CHEMICAL INDUSTRIES

1. Project Title : Study on the Rehabilitation of Padalarang Pul & Paper Mill.
2. Location : Padalarang West Java.
3. Executing Agency : Directorate General of Basic Chemical Industries, Ministry of Industry.
4. Objective : To carry out a comprehensive feasibility study that would include technical, financial and economic aspects as well as proposed management system.
The result will be used for the implementation of the Renovation of P.N. Kertas Padalarang.
5. Project Description : The Renovation of P.N. Kertas Padalarang is intended to get consistent quality of diversified paper product at maximum efficiency out of the existing plant.
Padalarang mill is old and small, leading is far inland. The study should therefore mainly into the direction of speciality paper production.
6. Scope of Assistance Requested :

a. Expert services	18 mm	:	US\$125,000.-
b. Fellowship	20 mm	:	50,000.-
c. Equipment		:	
			Total : US\$175,000.-
7. Related to Project Aid :

TERMS OF REFERENCE
STUDY FOR THE RENOVATION OF PN. KERTAS PADALARANG

I. INTRODUCTION

1. General

Being the first paper mill in Indonesia, Padalarang Paper Mill started its operation in 1924 with 1 paper machine and supporting facility for straw pulp plant.

In 1931 another paper machine was added. This two paper machine was intended to produce various kind of paper required by the Dutch for her administration need when the Dutch was still occupying Indonesia. Paper produced was from 28 gsm manifold, 60 - 80 gsm ordinary writing-printing, 80 - 120 gsm Watermark bond, up to 200 gsm index board. About 80% of fibrous raw material was own semi bleached straw pulp and the balance was imported wood pulp.

In 1969 minor replacement program was realized after rather long effort and in 1973 further replacement work was done. In 1975 one additional paper machine started operation. This machine is specifically designed for 24 - 26 gsm cigarette paper.

The mill is located 18 km west of Bandung. There is a railway side track to the mill.

2. Existing Facilities

2.1 Equipment and machineries

At present, Padalarang Paper Mill is producing various kinds of paper with the capacity of 7,000 TPA saleable paper consisting of:

- 3,000 TPA Cigarette paper
- 1,300 TPA Special paper
- 2,000 TPA Manifold and W/P paper
- 700 TPA Wrapping and cover paper

Only 20% of required fibrous raw material is self produced from local rice straw, even though capability of cooking unit is 6,000 TPA. This is caused by lack of straw raw material.

The production facilities are as follows:

2.1.1 Pulp Plant, cap. 18 TPD with 5-28 cum batch stationery digesters and 1-24 cum globe rotary digester. Except the globe digester installed in 1975, all remaining equipments are absolute.

2.1.2 Paper Plant I, cap. 6,000 TPD various kind of paper. This plant has 2 small and old paper machines, installed in 1923 and 1931, minor modification in 1973.

Speed and efficiency are low.

2.1.3 Paper Plant II, cap. 3,000 TPA cigarette paper installed in 1975, rather high energy consumption (electric and steam) and very limited control equipment.

While the demand of paper in roll is increasing, the mill has no sufficient and adequate facility for roll. There are only two small, inefficient and very limited capacity of simple winders.

2.2 Utility:

2.2.1 Electrical receiving and distribution

A rather modern substation was installed in 1975 with primary voltage of 6 KV and installed capacity of 3, 120 KVA.

Electrical substation and wiring for pulp plant and paper machine 1 and 2 is very old and absolute.

The PLN (State Electrical Copy) as a source of electrical power will in the near future not supplying 6 KV anymore, but 20 KV instead.

2.2.2 Steam Power Plant

It has 2 old fire tube boilers of 2 TPH of steam each, 1 old water tube boiler of 2,5 TPH of steam, and 1 package water tube boiler of 2,5 TPH installed in 1975. The 3 old boilers consume about 30% higher fuel compared with the package boiler.

2.2.3 Water Supply

The water for the mill is tapped from 2 groups of springs on hill sides at a distance from 3 to 7 Km north of the mill. The output of these springs is about 120 l/sec.

In 1980/1981 two deep wells were explored at the mill site. The output is 15 l/sec each, the quality of water is high iron-mangan content.

Water distribution piping in the pulp plant and paper machine 1 + 2 is old and complicated causing inefficient and high water consumption.

2.2.4 Repair shop

The work-shop is adequate to maintain most of mill repairment including roll grinding.

2.2.5 Laboratory

The laboratory facility is limited.

2.3 Process Control Equipment

There is inadequate process control equipment to maintain the stability of quality. Consistency controller is the only equipment installed, but is very limited.

Control of quality is therefore depended on the experiences and the discipline of the operator.

2.4 Effluent Treatment

The plant is too small to have the equipment to treat the effluent. Effluent from the mill flows to small river which functions as irrigation river, it finally leads to Citarum river before the planned Saguling dam.

II. OBJECTIVES OF THE STUDY

The study is for renovation of PN. Kertas Padalarang so that Padalarang mill could:

- produce consistent and stable quality of deversified paper product
- be able to reduce production cost.

III. SCOPE OF THE STUDY

1. To investigate and to analyze the demand of speciality papers such as NCR, Watermark security, etc. up to 1995.
2. To investigate and to analyze the existing facilities of PH. Kertas Padalarang.
3. To indicate type of products that should be produced and describe whether it is necessary to have additional machineries and other facilities of PN. Kertas Padalarang.

IV. RENOVATION PROGRAMME

The future development of Padalarang should be based on the following limitations:

1. Location: the mill is located far inland. The effluent will pass through farming and densely populated area to the river which leads to Saguling dam.
2. Water supply: the known water source is not excessive.
3. Raw material: conventional straw as a raw material is becoming more and more scarce. Whole straw due to the climatic condition, related to the collection system.

The renovation programme should be in line with:

1. Above mentioned limitations.
2. The fact that paper machine 1 and 2 are small and low speed.

It is therefore planned that the renovation scope would be:

3.1 Case 1:

Utilize the optimum capability of the three paper machines to produce consistent quality.

PN1: main product is watermark and speciality printing paper.

PN2: main product is special thin paper (Onion skin, Carbon base, NCR etc.)

PN3: flexibility to produce various quality of cigarette paper from different type and percentage of textile fiber.

3.2 Case 2:

Reduction of consumption figure for:

- raw material (less losses)
- steam, electric and water
- fuel in the steam production

3.3 Case 3:

Flexibility of the Pulp Plant to process various kinds of nor wood special raw material

Benefit of the project:

- More deversified product of speciality paper
- Production increase of about 30% in the speciality paper
- Lower material losses of about 5% in PM1 and PM2
- Steam consumption: 10 - 15% less
- Electric consumption in PM3: 10 - 13% less
- Fuel consumption in the Boiler Plant: 16% less
- Increase usage of local fibrous raw material

V. STEPS OF STUDY

1. To investigate demand of speciality paper.
2. To investigate the capability of existing facilities of PN. Kertas Padalarang.
3. To decide renovation scope and additional machineries and equipment for PN. Kertas Padalarang, including wherever necessary, to select additional technology and know how.

DIRECTORATE GENERAL OF
BASIC CHEMICAL INDUSTRY.

T E R M S O F R E F E R E N C E

STUDY ON THE REHABILITATION OF BLABAK PULP & PAPER MILL.

SPONSORED BY
DEPARTMENT OF INDUSTRY
DIRECTORATE GENERAL OF BASIC CHEMICAL INDUSTRIES

1. Project Title : Study on the Rehabilitation of Blabak Pulp & Paper Mill.
2. Location : Blabak, Magelang, Contral Java, Indonesia.
3. Executing Agency : Directorate General of Basic Chemical Industries.
4. Objective :
 - A. To rehabilitate the existing pulp & paper mill to increase the production capacity up to 50 tons/day salable paper in average, based on prior study including technical and financial aspects, facing the domestic market situation of the next 5 - 10 years.
 - B. To install a new bagasse C-TMP newsprint grade paper plant, to produce cheap printing paper for text books mostly consumed by elementary school pupils with low income.
5. Project description : The renovation of Blabak Paper Mill is directed to increase the capacity of Blabak Paper Mill by utilizing agricultural waste and to produce various kinds of papers with optimum efficiency, so that the mill is supposed to be able to compete with other domestic paper mills either in price as well as in quality. Although it is forecasted that domestic paper demand will grow year after year, but factually the domestic paper supply seems to grow faster and consequently sharp market competition should be anticipated, so that without above renovation Blabak Paper Mill will not be able to withstand said competition.

6. Project Cost : A. Rehabilitation

(Rough estimate)

Total Cost	US\$11,000,000.-
Local Cost	US\$ 1,000,000.-
Foreign Exchange Cost	US\$10,000,000.-

B. Bagasse C-TMP paper plant

Total Cost	US\$50,000,000.-
Local Cost	US\$11,000,000.-
Foreign Exchange Cost	US\$39,000,000.-

TERM OF REFERENCE
RENOVATION OF P.N. BLABAK PAPER MILL

I. INTRODUCTION

PN. Blabak Paper Mill, a State Enterprise, was built in 1957 by Bank Industri Negara (State Bank for Industry). This was the first Paper Mill built by the Indonesian Government. This Mill was designed by Sindacato Cellulosa Pomilio, Italy, to produce:

- 1) 18 Tons of bleached rice strawpulp per day based on "jerami" (the whole paddy stalk) having a yield assumption of 40%.
- 2) 24 Tons per day printing, writing and wrapping papers based on 60 gsm and a pulp furnish of 75% strawpulp ± 25% woodpulp.

However, the actual performance proved that the strawpulp output only reaches 11-12 tons/day, since the yield of the "jerami" is only half of the assumed yield, i.e. 20%, which the Paper Machine output for paper of 60 gsm is only about 12 tons/day.

Due to this fact, Blabak Mill changes its basic raw material from "Jerami" to "merang" (= upper part of rice straw), which gives a better yield (30 - 33%) and a better pulp quality, so that the pulp output increases to 15 ton/day in average.

Unfortunately the supply of "merang" comes short, because the new rice seed has very short stalk.

The existing open type digester is only suitable for cooking ricestraw and dry cornstalk. The flexibility of utilizing other agricultural waste such as bagasse, hamada grass, etc. available around the plant site, is very limited because of the low pressure of the existing open type digester. It also causes a relatively low pulping yield (around 30% or less), because the pulping material is not well cooked (still semi cooked).

The present consumption figure of bleaching chemical (Calcium Hypochlorite) against o.d. pulp is very big, i.e. 6%, due to the semi cooking condition.

After some modification of the Paper Machine, the paper output

could also be improved to 30 tons/day for paper of 100 gsm and up, but for paper of 60 gsm the output remains about 12 tons/day.

The trouble of making thin papers (60 gsm) is due to frequent paper breaks at the wet section/press parts. To overcome this problem, the furnish of woodpulp could eventually be increased from 10% to 20%.

However, this is limited by the present refining capacity and also the production cost calculation. Therefore, beside the stock preparation improvement to have a better paper quality, the existing Paper Machine should be modified/modernized to increase its productivity and efficiency, as to enable for Blabak Mill to compete in the domestic paper market.

II. OBJECTIVE OF THE PROJECT

1. Rehabilitation of the existing pulp and paper mill to increase the pulping capacity from 15 tons/day to 25 - 30 tons/day and to have a salable paper production output of 30 tons/day based on 60 gsm or 70 tons/day based on 190 gsm (50 tons/day in average), depending on the domestic paper market demand.
2. Installation of a new plant having a capacity of 115 tons/ day Newsprint grade paper using sugar cane bagasse with C-TMP process.
3. Combination of both above items, which is called Renovation of Blabak Paper Mill.

Prior to executing the above objective, a feasibility study on the domestic paper market for a period of the next 5 - 10 years should be carried out.

III. SCOPE OF THE PROJECT

1. Rehabilitation on existing equipments
 - To utilize agricultural waste for pulping material will have a mutual benefit, since it will increase the farmers' income by selling their agricultural waste, while Blabak Mill will be able to utilize this low cost pulping material.

- To increase the pulping efficiency and to improve the pulp quality, the raw material should be well cooked. For this purpose, a pressurized type digester to replace the existing open type digester is recommendable. Due to the limited space available in the Pulp Mill site, a Horizontal Continuous Pressurized/Closed Type Digester is recommended.
 - To minimize paper breaks, the Paper Machine should be modified/modernized, covering:
 1. The existing approach flow system and headbox.
 2. The wire part, press part, dryer section, dry end calender, drive system and auxiliaries.
 3. Installation of size-press complete with kitchen.
 - To improve the paper quality by adding more woodpulp (from 10% to 20%), the Stock-preparation should be modified, especially to increase the refining capacity.
 - To increase the capacity and to have more variety of the final products to be more flexible in the paper market competition, the finishing equipments should be modernized and/or to be added, such as Rewinder, Embossing Machine, modernizing the existing Supercalenders, Sheet Cutter, etc.
2. Installation of a new Bagasse C-TMP Newsprint grade paper plant.
- Considering that cheap textbook paper for elementary schools is still using imported newsprint grade paper, Blabak Paper Mill is planning to produce newsprint grade paper of about 115 tons/day using C-TMP process with sugar cane bagasse as the main raw material, which will be supplied by Madukismo Sugar Mill. Besides, about 15 tons/day selected newsprint waste paper, which is easily obtained from the surrounding area, will be added to the paper furnish.

IV. STEPS OF THE PROJECT

1. Rehabilitation of the existing paper mill

A comprehensive feasibility study comprising technical, financial and economical aspects, based on domestic paper market situation

within the next 5 - 10 years, should be carried out to justify the execution of this rehabilitation project.

2. Installation of a new bagasse C-TMP newsprint grade paper plant

A detailed feasibility study was carried out by Japan Consulting Institute in 1980 - 1981.

However due to the latest price increase of fuel and the Rupiah devaluation recently, this study should be reviewed and revised accordingly.

T E R M S O F R E F E R E N C E

STUDY ON THE RENOVATION OF PT. SEMEN GRESIK

SPONSORED BY
DEPARTMENT OF INDUSTRY
DIRECTORATE GENERAL OF BASIC CHEMICAL INDUSTRIES

I. BACKGROUND AND SUPPORTING INFORMATION

1. Justification of the project

Plant I, consisting of 4 Units and applying the wet process, is operating at a very high production cost due to high moisture content in the slurry and a high maintenance cost. Total capacity of Plant I is 500.000 MT/Yr.

Plant II consists of 2 Units with a dry process and a furnished with counter-type-suspension pre-heaters. This type of pre-heater has the disadvantage of a rather low fuel efficiency compared with the cyclone type pre-heater. Also the spider-caps and spider-legs need a periodical maintenance and replacement which requires a total shut-down of the kiln. The advantage of the counter flow pre-heater is the "plugged-up free" operation. Total capacity of Plant II is 1.000.000 MT/Yr.

2. Project title and scope of work

2.1 Project title: Study on the Renovation of PT. Semen Gresik.

2.2 Scope of work:

- Convert one of four wet kilns to dry kiln with NSP.
- Modified counter flow pre-heater to NSP.
- Change fuel system from oil to coal.

Benefit of the project:

- Reduce energy consumption from
1,705,000 x 10⁶ kcal/year to
1,416,973 x 10⁶ kcal/year on
the same production capacity.
- Possibility to make product diversification in the
remaining three wet kilns.

3. Institutional framework

PT. Semen Gresik is a state owned enterprise which is on the technical side, it is under the supervision of the Directorate General of Basic Chemical Industries, Ministry of Industry.

The Directorate General of Basic Chemical Industries will be responsible for the execution of the study.

4. Government follow up

The Directorate General of Basic Chemical Industries expect that the study will come out with recommendation for renovation of PT. Semen Gresik in the following line:

Case 1 - One train of existing wet plant to be converted to full-dry plant furnished with a precalciner suspension pre-heater (NSP).

- With this conversion the new kiln is expected to produce 3 to 4 times the old capacity (375.000 - 500.000 MT/year).
- The fuel consumption is expected to drop from 1.700 kcal to 750 kcal/ig clinker.
- Remaining 3 Units will be utilized to manufacture special cements.

Case 2 - Gepol counterflow pre-heater of one train of the existing dry-process plant to be replaced by Precalciner suspension pre-heater (NSP).

- Expected benefits will be as follows:
 - a. Production increase from 500.000 MT p.a. to 1.000.000 MT p.a.
 - b. Fuel consumption drop from 900 kcal/kg clinker to 750 kcal.
- As a result of the production increase equipment & machineries down stream and up stream the kiln department should be matched accordingly.

II. OBJECTIVES:

- To investigate the possibility of getting maximum efficiency out of the existing plant through a renovation project.

III. EXTERNAL AND GOVERNMENT INPUTS

1. External inputs:

The expenses for experts services for the study should be provided by the donor country.

2. Government inputs:

The Directorate General of Basic Chemical Industries and PT. Semen Gresik will provide the necessary counterparts and secretarial services.

T E R M S O F R E F E R E N C E

STUDY ON THE REHABILITATION OF CAUSTIC SODA PLANT OF PT. INDUSTRI
SODA INDONESIA

SPONSORED BY
DEPARTMENT OF INDUSTRY
DIRECTORATE GENERAL OF BASIC CHEMICAL INDUSTRIES

I. BACKGROUND AND SUPPORTING INFORMATION

1. Justification of the project

Caustic soda, chlorine and its derivate belongs to the basic inorganic chemicals which used as a wide range of industrial purposes mostly for raw materials and components. Its by-product are not only consumed by large chemical industries for processes but some home industries are consuming too. Production of caustic soda in Indonesia is about 30% of its domestic consumption.

To strengthen the Indonesia's development program which is carried out by the government and supported by its people, the production capacity of caustic soda should be increased properly. Its main raw material is salt which is an unlimited resources of Indonesia it can be extracted easily from the sea. Extracting salt are done in plain areas with a long dry season, mostly on coastal land which can not be used for agricultural purposes. By increasing the production capacity of caustic soda, it will gives a stimulation effect to domestic salt producers which in turn will create new jobs, spreading population, utilizing idle dry coastal land for production means.

Characteristic of caustic soda industry in Indonesia can be specified as follows:

- capital intensive
- high electric consumption
- sophisticated technology
- high care for safety and pollution problems
- low run of investment.

Based on these reasons the development of caustic soda industry should be carried out conceptionally and professionally.

As a commercial unit, PT. Industrial Soda Indonesia, is the oldest caustic soda manufacturing plant in Indonesia with the investment of the Government of the Republic of Indonesia, benefited the Yen Credits as a Japanese War Reparation. The successful contractor was Asahi Glass Co. Ltd. and all equipments were made by Japanese makers. But afterward some small units grew as an integrated plant

attached to paper mills and Mono Sodium Glutamate industry purposely for own consumption of chlorine derivatives.

Plant Capacity Development of PT. Industri Soda Indonesia

Year	Capacity	Machinery Supplier	Condition
1956	10 Tpd NaOH	Asahi Glass Co. Ltd.	Rehabilitated
1971	12 --"	--"	Operating 8 TpdOH
1978	20 --"	Wah Chang Taiwan/ Pestalozza Italy	Operating
1983	10 --"	Sigri/Siemens/UHDE W. Germany	Operating

The development of PT. Industri Soda Indonesia is relatively slow due to its triple mission i.e.:

1. as a business unit
2. as a stabilizer
3. as a development agent

But anyhow due to its life time PT. Industri Soda Indonesia has an experience in using domestic raw materials, the marketing of chlor alkali products in Indonesia and finally the attempts to overcome safety and pollution problems. Even its capacity is still below the economic scale as a state company it has to carry the mission as a development agent.

Viewing the world economic recession begins to end and the demand of chlorine derivative in Indonesia seems promising a new technology of producing caustic soda would be an appropriate choice to be adopted.

2. Project title and scope of work

2.1 Project title:

Study on the Rehabilitation of Caustic Soda Plant of PT. Industri Soda Indonesia.

2.2 The scope of works:

- To convert the old Mercury process cells of PT. Industri Soda Indonesia which was supplied by Asahi Glass in 1970 to "Ion

Exchange Membrane Process" with all its facilities.

- Other additional facilities for chlorine derivatives and caustic soda processing so that the production capacity can fit with the market's demand.
- Technical and supervisory services which shall include:
 - technical supervision to the erection and construction works.
 - technical supervision to the start-up.
- Training services on operation and maintenance of plant at an appropriate plant abroad.

Future benefits of the rehabilitated plant:

- Increasing the production capacity of caustic soda up to the minimum economic scale in Indonesia.
- Eliminating Mercury pollution problems.
- Conserve energy consumption due to limited electric supply in Indonesia.
- Adapting advance technology in producing caustic soda as an investment of technical and operational skill of operators.
- Stimulating rural salt producers by utilizing dry idle coastal land which means giving new opportunities for job seekers.
- To implement PT. Industri Soda Indonesia's mission more applicable.

3. Institutional framework

The government institutional body who sponsored the is the Ministry of Industry of the Republic of Indonesia. Based on its statute as a state owned company, PT. Industri Soda Indonesia is administratively under the Ministry of Finance but technically supervised by the Directorate General of Basic Chemical Industries under the Ministry of Industry, responsibly carrying the mission in developing the chlor alkali industries in Indonesia.

The organization structure of the Ministry of Industry and its Directorate General who has the responsibility to supervise its

subsidiary industries can be describe shortly as follow:

To preserve an equilibrium in the development of industrial sector and preparations for the future which require structural organization the Ministry of Industry is deemed necessary to set up four Directorate Generals among others the Directorate General of Basic Chemical Industries.

Each of the Directorate General has its own specific socio-economic objective bringing about the different working systematization.

In view of these fundamentally dissimilar natuje have to acquire equally different ways of handling, which not only involves matters of procedure but also promotional effort, method of supervision, capitalization, marketing, etc.

The Directorate General of Basic Chemical Industries itself covers of four group of industry, i.e. agrochemical, cellulose and rubber, organic and anorganic chemical industries.

In these grouping PT. Industri Soda Indonesia belongs to anorganic chemical industries which covers an immense range of product including some with a strategic role of play.

The anorganic chemical industry has a far reaching role to play in addition to the significant support rendered by it to the development of basic chemical industry itself.

II. OBJECTIVES

1. Immediate objectives

To investigate the possibility of the rehabilitation of caustic soda plant of PT. Industri Soda Indonesia with the aims:

- To increase the capacity of the existing caustic soda plant up to the minimum economic scale in Indonesia.
- To reduce or eliminate all Mercury pollution problems in caustic soda production.
- To conserve energy consumption per ton caustic soda due to high energy price in Indonesia.

2. Long range objectives

- To adapt new method and technology in caustic soda processing which is easy, simple and safe to operate and maintain, less total energy consumption, superior product quality and pollution free process.
- A high value of skill investment for operators to be familiarized with modern technology.
- To stimulate and develop rural salt producers as main raw material supplier by increasing their product quality any utilizing idle coastal land which is much available throughout the country.
- To implement Pt. Industri Soda Indonesia's mission as a state company more efficient.

III. PLAN OF OPEATIONS

On the completion of the study, it is expected that the study will come out with recommendations for a rehabilitation program of PT. Industri Soda Indonesia, and further steps can be taken i.e.:

1. Detailed study
2. Signing of contract
3. Basic & Detailed Engineering
4. Fabrication and Transportation of Electrolyzer, Membrane and other equipments and materials.
5. The sending of personnel abroad for training
6. Dispatch of foreign expert for supervision
7. Civil work, erection and construction work
8. Installation of Electrolyzer and Membrane
9. Commissioning and start-up
10. Plant Acceptance.

For an overall project schedule is shown in the attached sheet.

IV. EXTERNAL AND GOVERNMENT INPUTS

1. External Inputs

All expenses for the experts services for the study should be borne by donor country.

2. Government Inputs

The Directorate General of Basic Chemical Industries and PT, Industri Soda Indonesia will provide the necessary counterparts and secretarial supports.

TERMS OF REFERENCE
STUDY OF THE DEVELOPMENT OF PROCESSING EQUIPMENT
INDUSTRY

I. INTRODUCTION;

At present there are about 37 Processing Equipments Industries in Indonesia which consist of government owned as well as private enterprises, and capable of producing mostly spare parts, components of machineries and processing equipments, especially for cement, palm-oil factories, rubber mills, fertilizer, petrochemical, paper and thermal power plants. Production in 1982 was around 60,000 ton per year. None of these is able to manufacture a complete plant, from engineering design up to manufacturing process.

The 1982 demand for processing equipment was around 200,000 ton, but the production capability only 60,000 ton which means \pm 30% of total demand due to limited facilities and expertise.

The projection demand for 1985 indicates that Indonesia will consume about 300,000 ton of processing equipments, most of which will have to be produced domestically as stated in GBHN (Indonesian Main State of Guidelines).

The processing equipments industry is a low yield industry and therefore the government should take active participation in this field.

In order to minimize the use of Indonesia foreign exchange and investment required, the facilities of Government owned industries should be fully utilized. In the development of any Processing Equipments industries, it is happened that overlapping on certain type of products between public and private sectors could be allowed to some extent.

While on the other hands, the development plan for the public sector which are being implemented for some times is directed to the regional development, it is expected that the industries could supply the needs of processing equipments and spare parts in that region concerned.

At present there are ten potential Government owned work shops to be developed regarding their experiences in manufacturing spare parts and

component of processing equipments.

These work shops are as follow:

PT. Barata, PT. BBI, PT. Boma Stork, PT. Pupuk Kujang, PT. Semen Padang, PT. IKI Ujung Pandang, PT. Atmindo, PT. PUSRI, PT. Petro Kimia Gresik, and PT. Kertas Leces. The descriptions of each will be given in a separate papers as the attachment of this Terms of Reference.

II. OBJECTIVES OF THE STUDY

1. To develop the processing equipments industry in order to meet the ever increasing demand, it could be done by:
 - a. Optimizing the existing capacity.
 - b. Additional machineries and equipment of factories.
 - c. Combination of the two above.

- a. In developing the processing equipment industry mentioned the study should be concentrated on the ten Government owned enterprises regarding regional development at which enterprise located, and it should be in line with fulfillment of machineries, equipment and spare parts of the region concerned.

III. SCOPE OF THE STUDY

1. To investigate and to analyse the demand for machinery and plant equipments up to 1993. It should be grouped into steel structure, processing equipments and standard items.

The study must indicate the value and weight (in ton) of whole sectors of industry, agriculture, mining, communications, power plants etc.

2. To investigate and to analyse the existing National capacity and capability of machinery and Plant equipments with pay particular attention on the ten government owned enterprises mentioned above.

3. To indicate types of products that should be produced and describe whether it is necessary to have additional machineries and other facilities in order to improve the capacity and capability of the ten enterprises above.

From the ten government owned enterprises above, the priority of Study should be concentrated on the three enterprises below:

4. - PT. Barata - (Surabaya Branch - Ngagel, installed Capacity 35,000 ton per year).
- (Jakarta Branch, installed Capacity 15,000 ton per year).
- PT. BBI - (Indra and Pasuruan units), installed Capacity 25,000 ton per year.
- PT. Boma Stork - To increase the installed Capacity up to 10,000 ton per year.

IV. DEVELOPMENT PROGRAMMES

Development Programmes will be directed to the following activities:

1. To up grade the production capability of National Processing Equipment industries, particularly in design engineering by means of CAD and expertise.
2. Production specialization of the ten government owned factories are as follow:
 - a. PT. Barata will produce heavy steel structures, heavy duty tanks, equipments and Spare parts of Cement factories, sugar and palm-oil factories, and conveyors.
 - b. PT. BBI will produce heavy steel structures, low temperature pressure vessel, conveyors, elevators, containers and tanks.
 - c. PT. Boma Stork will produce machineries and equipments of sugar & palm-oil factories, small boilers, heat exchangers and vessels.

- d. Workshop of PT. Pupuk Kujang and PT. Pusri will produce some of equipment and spare parts, of urea fertilizer factory, and gas storages.
 - e. PT. IKI Ujung Pandang will produce heavy steel structures, off-shore installation equipments and mining installation, water gate, gear wheel and spare parts such as shaft, liner sleeves.
 - f. Workshop of PT. Semen Padang will produce some of equipments and spare part of Cement factory.
 - g. PT. Atmino will produce small boilers with capacity up to 20 ton steam per hour.
 - h. Workshop of PT. Petro Kimia Gresik will produce some of equipments and spare parts of petro-chemical industry.
 - i. Workshop of PT. Kertas Leces will produce some equipments and spare parts of paper factories.
3. The development direction of workshops of private sectors is mainly concentrated on heavy and medium steel structure and simple processing equipments.
 4. It is expected the National production will increase its capacity to meet the increasing demand and also to increase the quantity and quality of the local contents.
 5. To design a new plant which is capable to produce machineries and parts, if it is necessary.

V. STEPS OF STUDY

1. To investigate demand for processing equipments which should be divided into type of group (Steel Structures, processing equipment and Standard items).
2. To investigate National installed capacity and Capability of the ten government owned factories as well as private sectors.

3. To decide additional required machineries for the ten factories above and to analyse it from techno-economic point of view.
4. To select additional technology and engineering design know how.
5. To design a new processing equipment plant which will be capable to produce complete machinery equipments and parts.

DIRECTORATE GENERAL OF BASIC METAL INDUSTRY.

T E R M S O F R E F E R E N C E

TECHNICAL STUDY ON THE RENOVATION OF BILLET STEEL PLANT AND ITS AFFILIATED
FACILITIES OF PT. KRAKATAU STEEL

SPONSORED BY
DEPARTMENT OF INDUSTRY
DIRECTORATE GENERAL OF BASIC METAL INDUSTRIES

I. BACKGROUND AND SUPPORTING INFORMATION

1. Justification of the project

PT. Krakatau Steel has 0.54 m.t. steel works in operation at Cilegon 100 km west of Jakarta. The Existing facilities consist of a 2 m.t. HYL Direct Reduction Plant, 4-65 tonnes electric arc furnaces, two 4 - strand billet casters, continuous wire - rod mill, a bar mill and a medium section mill. The plant has extensive infrastructure facilities including a 400 MW power station, 7200 m³/hr water supply and treatment system, a captive harbour and a well developed housing complex with recreation facilities for steel plant employees.

The plant is expanded to a capacity of 1.6 m tonnes of liquid steel with the addition of 4-130 tonnes electric arc furnaces, two single - strand slab casters and a 88 "semi-continuous Hot Strip Mill with one shearing line & one shearing cum slitting line.

The erection of expanded units was completed in December 1982. The plant is under commissioning for final acceptance by September/October 1983.

The existing facilities as well as the Slab Steel Plant and Hot Strip Mill to be commissioned are a turn-key job by Ferrostaal AG of West Germany, equipped with machinery and equipment supplied from West Germany.

In December 1981, the Company concluded a Technical Assistance Agreement with Kobe Steel, Ltd. of Japan whereby a group Japanese experts have been stationed since January 1982 at Billet Steel Plant with an aim to provide to improve the productivity and efficiency of the plant.

In the course of Japanese technical assistance services, PT. Krakatau Steel has been convinced that the existing of Billet Steel Plant will be capable of producing about 420000 ton per year billet steel only owing to the limitation of capacity of existing continuous casting machines and that the plant will not be productive and economical, unless its equipment and facilities

modified and improved together with the capacity increase of continuous casting and the increase of billet size. The project, therefore will have to be planned in such a way to improve the productivity and efficiency of the billet steel plant, resulting in the production increase of billet steel more than 500,000 ton per year, capable of processing 120 mm square billet into finished products.

2. Project title and scope of works

2.1 Project title:

Technical Study on the Renovation of Billet Steel Plant and Its Affiliated Facilities of PT. Krakatau Steel.

2.2 Scope of the works:

- The study will investigate and identify the present low efficiency and productivity of the plant and all its facilities and then recommend the best methods of improving the plant performance, resulting in the production increase of billet steel more than 500.000 ton/year. On the other hand the improvement of the plant downstream industries/facilities will result in the capability of the facilities to process 120 mm square billet into finished products.

3. Institutional framework

Since the Directorate General of Basic Metal Industries is responsible of the supervision of the technical aspects of PT. Krakatau Steel, the Directorate General of Basic Metal Industries will be responsible for the execution of the study.

4. Government follow up

On the completion of the study, the Directorate General of Basic Metal Industries expects that the study will come out with recommendation for further action to renovate the Billet Steel Plant and its Affiliated facilities of PT. Krakatau Steel.

II. OBJECTIVES

To investigate the possibilities of rehabilitating and modifying the equipments and affiliated facilities of Billet Steel Plant of PT. Krakatau Steel in order to improve the plant productivity and efficiency.

III. EXTERNAL AND GOVERNMENT INPUTS

1. External inputs

The expenses for the experts services for the study should be borne by donor country.

2. Government inputs

The Directorate General of Basic Metal Industries and PT. Krakatau Steel will provide the necessary counterparts and secretarial supports.

EXHIBIT I

MAJOR ITEMS OF RENOVATION
 OB BILLET STEEL PLANT OF P.T. KRAKATAU STEEL

No.	ITEMS (BILLET STEEL PLANT)	OBJECT
1.	Modification of tundish capacity - Redesign of tundish from 3 ton to 7 ton with cover - Tundish car of larger capacity - Modification of ladle stand - Modification of tundish pre-heater - Improvement of existing tundish drying device	Prolongation of sequence, casting time, increase of yield and productivity
2.	Installation of tundish tilting device	Prolongation of tundish life, improvement of sequence casting ratio, and yield
3.	Increasing of continuous billet casting machine	Increase of availability of continuous casting, increase of production
4.	Increase of de-dusting capacity, like - exhaust gas cooling tower - water cooled duct - water cooled jacket for electrode	Reduction of air pollution at Billet Steel Plant

- | | |
|---|---|
| <p>5. Ferroalloy feeding system</p> <ul style="list-style-type: none"> - Ferroalloy bin & structure - to install conveyor - electrical & instrumentation | <p>Automation of Ferroalloy Feeding</p> |
| <p>6. Cooling tower</p> <p>to install new unit consisting of tower, water basin, pump, fan & piping</p> | <p>For possible increase of water cooling panel and modification of dedusting</p> |
| <p>7. Ladle addition system</p> | <p>Increase of productivity</p> |
| <p>8. Water cooling panel consisting of wall water panel and roof water panel for electric arc furnaces of BSP & SSP.</p> | <p>Increase of availability of furnace in order to increase production</p> |
| <p>9. Provision of electro magnetic stirrer, argon gas shrouding, etc. to continuous casting machines.</p> | <p>Improvement of quality</p> |
| <p>10. Provision of indicator to an overload or earthing of electrode</p> | <p>Prevention of electrode breakage</p> |

No.	ITEM (INFRASTRUCTURE)	OBJECT
1.	To increase port capacity Cigading, like - to dredge port basin - to strengthen jetty	For receiving 120,000 ton vessel in order that freight cost be reduced.
2.	Railway network in the factory like - to install new railway between SSP and HSM factory mainly - Procurement of locomotive and carriage	For transport of slab from SSP to HSM replacing slab carrier. For transport of product within factory or outside factories.
3.	Recycling conveyor from export sponge iron storage to storage 1 & 2	Possibility of using export sponge iron storage house for their own use.

(WIRE ROD MILL)

1.	Modernization of finishing area like - to use NO - TWIST block - controlled cooling conveyor	to reduce cobble, improve quality and to increase production of high carbon and cold heading which are now still being imported.
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(SECTION MILL)

1.	Modernization of Section Mill for production of II, beam - To add universal stand	To produce medium II, beam which are still being imported now.
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No.	ITEM	OBJECT
	(RAW MATERIAL SUPPLY)	
1.	Lime calcining kiln	Improvement of productivity
2.	Briquetting facilities for DRI fine	Reduction of raw material cost
3.	Installation of dust collection for DRI/Lime continuous feeding system	Reduction of air pollution

EXHIBIT II

PROVISIONAL PROJECT IMPLEMENTATION SCHEDULE

LEADING MILESTONE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Effective Date of Contract		▽																
Design & Engineering																		
Manufacturing																		
Shipment																		
Ocean & Island Transport																		
Field Works																		
Mechanical Completion																		
Start-up Operation																		

TECHNICAL ASSISTANCE PROPOSAL

1. Project Title : Study on improvement of Jakarta Foundry Centre.
2. Location : Jakarta
3. Executing Agency : Directorate General of Basic Metal Industry
4. Objective : To conduct a study with the aim improving capability of Jakarta Foundry Center so as it will be able to produce ductile cast iron products.
5. Project Description: To equip the JFC with moulding equipments, the assistance would also include technical and financial assesment required for the improvement of production.
6. Scope of Assistance: Expert Service Requested
7. Related to Project Aid: -

TERMS OF REFERENCE

STUDY ON IMPROVEMENT OF JAKARTA FOUNDRY CENTER

SPONSORED BY
DEPARTMENT OF INDUSTRY
DIRECTORATE GENERAL OF BASIC METAL INDUSTRY

I. BACKGROUND AND SUPPORTING INFORMATION

1. Justification of the project

With the assistance of JICA's experts provided through DTA-192 since 1981, the Jakarta Foundry Centre has able, considerably, increasing its production. In order to increase further its production, diversification of product is one of possible ways to be approached. The production of ductile cast iron products is observed as promising activity for the JFC.

In this regards, it is essential to improve the present capability of the JEC by equipping it with necessary equipments, a.o. moulding machine/equipment, and others supporting equipments.

2. Project title and Scope of work

2.1 Project title :

Study on Improvement of Jakarta Foundry Centre.

2.2 Scope of work :

The improvement of Jakarta Foundry Centre is linked with the intention of increasing the production capacity by diversifying its products in order to meet the demand for ductile cast iron products.

With technical improvements as well as machineries, the Jakarta Foundry Centre will be able to produce additional products such as bearing housing, rioling holes cover, etc., besides other products which have already produced.

3. Institutional framework

The Directorate General of Basic Metal Industry will be responsible for the execution of the study.

4. Government Follow up

On the completion of the study, the Directorate General of Basic Metal Industry expects that the study will come out with recommendations for further action to improve the capability of the Jakarta Foundry Centre.

II. OBJECTIVES

1. Immediate objective

To investigate the possibilities of improving the capability of the Jakarta Foundry Centre.

2. Long range objective

Long range objective of the project is to further improve the capability of the Jakarta Foundry Centre in order to achieve production capacity of 3,000 Ton/year of various products.

III. EXTERNAL AND GOVERNMENT INPUTS

1. External input

The expenses for the expert services for the study should be borne by donor country (The Government of Japan)

2. Government input

The Directorate General of Basic Metal Industry will provide the necessary counterparts and secretarial supports.

TECHNICAL ASSISTANCE PROPOSAL

1. Project Title : Study on the Reinforcement and Expansion of Ujung Pandang Shipyard (PT. IKI Ujung Pandang).
2. Location : Ujung Pandang
3. Executing Agency : Directorate General of Basic Metal Industry, Ministry of Industry.
4. Objective : To Study The Possibilities of Reinforcing and expanding PT. IKI.
5. Project Description :
 - 1) The development of shipbuilding industry (including the P.T. IKI Shipyards) will play an important role in the development and participation of the Indonesian Industry and the Indonesian National Economy as a whole, especially in the fourth Five Years Development Plan (Pelita IV) which will be focused on the development of machinery and heavy industries.
 - 2) During he 6 years of operation since P.T. Industri Kapal Indonesia was founded, the yards has proven its capabilities in engaging with tasks provided by opportunities in shipbuilding as well as in shippreparing.
6. Scope of Assistance : - Expert service
7. Related to Project Aid : D - 40

TERMS OF REFERENCE

STUDY ON THE REINFORCEMENT AND
EXPANSION OF UJUNG PANDANG SHIPYARD (PT. IKI UJUNG PANDANG)

SPONSORED BY
DEPARTMENT OF INDUSTRY
DIRECTORATE GENERAL OF BASIC METAL INDUSTRY

I. BACKGROUND AND SUPPORTING INFORMATION

1. Justification of the project

The existing capacity of Domestic shipyard consists of category up to 3.500 DWT for new building and up to 5.000 DWT for repairing. The demand for new building and repairing is continuously increasing. To meet the demand it is necessary to establish development programme for the existing facilities.

The development program for new building category 2.001 up to 5.000 DWT is 9 shipyards and for repairing category 5.000 up to 10.000 DWT is 6 shipyards.

PT. IKI Ujung Pandang as one of the shipyards mention above will improve its facility by constructing additional:

- new building with capacity $2 \times 3 \times 5.000 \text{ DWT} = 30.000 \text{ DWT/year}$.
- repairing with capacity $4 \times 30 \times 7.000 \text{ DWT} = 840.000 \text{ DWT/year}$.

2. Project title and scope of works

2.1 Project title

Study on the reinforcement and expansion of Ujung Pandang Shipyard (PT. JKI Ujung Pandang).

2.2 Scope of works

The scope of study will include among others:

- investigation of necessary facilities for reinforcement and expansion of PT. IKI in order to achieve the capability of new building 30.000 DWT/year and shiprepairing 840.000 DWT/year.
- investigation of financial aspect for reinforcement and expansion of PT. IKI.

in carrying out the above the JICA'S 1981 report should be used as reference.

3. Institutional framework

The Directorate General of Basic Metal Industry will be responsible for the execution of the study.

4. Government follow up

On the completion of the study, the Directorate General of Basic Metal Industry expects that the study will come out with recommendation for further action to reinforce and expand PT. IKI, Ujung-Pandang.

II. OBJECTIVES

1. Immediate objectives

The immediate objective of the study is to analyze the technical and financial requirements for reinforcement and expansion.

2. Long range objectives

To study further development of the PT. IKI Shipyards in various aspects to gain capabilities and performances for export market.

III. EXTERNAL AND GOVERNMENT INPUTS

1. External inputs

The expenses for the experts services for the study should be borne by donor country.

2. Government inputs

The Directorate General of Basic Metal Industry will provide the necessary counterparts and secretarial supports.

Terms of Reference
TECHNICAL ASSISTANCE TO IMPROVE EFFICIENCY AND
PRODUCTIVITY OF RAILWAY ROLLING STOCK
MANUFACTURING OPERATION AT PT INKA

Terms of Reference

TECHNICAL ASSISTANCE TO IMPROVE EFFICIENCY AND PRODUCTIVITY OF RAILWAY ROLLING STOCK MANUFACTURING OPERATIONS AT PT INKA

1. Introduction and Background

The Government of Indonesia has decided, in line with its general policy of developing domestic industries, to create and develop a domestic capability in the manufacture of railway rolling stock, not only to supply the needs of the Indonesian State Railways but also, in the longer term, with a view to exporting. This decision been implemented by the establishment, in May 1981, of PT INKA, a State-owned company under the technical jurisdiction of the Ministry of Communications and the Ministry of Industries.

Since its establishment, PT INKA has been engaged in the production of freight cars and passenger coaches, using Japanese technology, in accordance with its 10-year corporate plan. The scale and complexity of its activities will increase significantly in the coming years, principally as a result in the large orders for electric rail cars for JABOTABEK and other urban services.

Because of the importance of ensuring that these orders are completed on schedule and of minimising their costs, the Government requires technical assistance for the conduct of a review of PT INKA's existing and planned operations with the objective of achieving improvements in economy, efficiency and productivity.

2. Study Scope and Objectives

The principal objectives of the technical assistance services are to :

- (a) identify where existing and proposed manufacturing procedures and practices require improvement;
- (b) prepare an action program for the development and implementation of improved methods;
- (c) advise and assist PT INKA management during the initial phase in the execution of the action program;

The services should also identify any physical constraints which would preclude PT INKA achieving its production targets and, based on this review, make recommendations regarding any additional facilities and equipment required.

The services are to cover all of the main aspects of PT INKA's operations, including :

- (a) procurement and inventory control;
- (b) production planning scheduling;
- (c) work methods and practices, including safety;
- (d) inspection and quality control procedures;
- (e) design;
- (f) accounting, costing and financial management.

The proposed action program should, for each of these areas, specify in sufficient detail :

- (a) the activities which need to be carried out to improve current methods and procedures;
- (b) the expected duration of, and the resource required for, each of these activities and their inter-relationships and sequencing;
- (c) suggested responsibilities for their execution.

The action program should give particular emphasis to personnel development, ranging from "on-the-job" training for factory personnel to overseas secondments or formal training for senior technical and managerial staff.

3. Program, Staffing and Reporting

The services are to be performed in two stages :

- (a) Stage 1, the Review Stage, is to be completed within 3 months, and shall encompass :
 - 1) the review of existing systems, practices, procedures, facilities and equipment;
 - 2) the outline specification of proposed changes to (or new) systems, practices and procedures and of additional capacity needs;
 - 3) the preparation of the proposed action program and its submission together with the review/report.
- (b) Stage 2, the Execution Stage, is to be completed within 15 months and shall encompass :

- 1) the development specification and documentation of new systems, standards and procedures as required by the agreed action program;
- 2) assisting with the introduction of and provision of training in the new/improved methods;
- 3) monitoring the extent to which these methods are being properly maintained and to which they are proving effective.

The expert staff inputs required for the execution of the above services shall be as follows :

1 Industrial Engineer	- 18 months
1 Procurement and Inventory Specialist	- 9 months
1 Design Engineer	- 9 months
1 Accounting and Management Specialist	- 18 months

Terms of Reference

STUDY TO IMPROVE THE AVAILABILITY OF THE
PJKA DIESEL LOCOMOTIVE FLEET1. Introduction and Background

The PJKA "Five and Ten Year Development Plan" anticipated a locomotive availability of 85 % i.e. no more than 15 % of the fleet was to be undergoing repairs, maintenance and inspection in workshops and depots at any one time.

In practice, the availabilities achieved have been considerably less. In 1982/83 in Jawa, for example, around 15 % of the diesel fleet was unavailable because it was undergoing repairs in the workshops, and a further 18 % was unavailable because it was undergoing repairs and routine maintenance in running depots.

The overall effect across PJKA is that around 60 locomotives, representing a capital investment of US\$ 40-50 million, are lying idle awaiting repairs instead of being used productively.

Reasons for this low availability have often been documented, and centre on three factors :

- (i) a general lack of spare parts;
- (ii) the average age of the fleet (18 years in Jawa);
and
- (iii) a lack of suitable machines and equipment in the main loco workshop at Yogyakarta.

A recent 'crash program' (known as KE525) has attempted to improve the situation with purchases of both new locomotives and spare parts. These will begin to arrive in 1983/84 and it is important to ensure this investment is used to best advantage.

2. Study Objectives

The objectives of the study are :

- (i) to investigate in detail the reasons for the low diesel locomotive availability in PJKA and to identify their relative importance, concentrating on the main-line fleet in Jawa, and;
- (ii) to recommend improvements in existing maintenance and procurement practices so as to increase the locomotive availability. These improvements should in general involve low capital outlays.

3. Scope and Reporting

The study should concentrate on the Jawa main-line fleet, covering other regions in PJKA as required. The initial part of the study should consist of a detailed quantitative analysis of the reasons for locomotive unavailability over a sample period, covering both workshops and running depots. In cases where a lack of spare parts is a major factor in locomotive availability the analysis should investigate the reasons for such shortages. This work should be summarised in an interim report about half-way through the study; this report should include an action program which attacks the key problems.

The second half of the study should develop specific improvements to existing maintenance and procurement procedures, including if possible a trial implementation at the Yogyakarta workshop and a selected running depot. Particular consideration should be given to improvements in :

- (i) the current stock control and stock ordering system;
- (ii) the system for handling and distributing imported spare parts; and
- (iii) the range and availability of minor tools and equipment.

These recommendations should be summarised in a second report at the completion of the study.

4. Staffing and Timing

The study shall commence in the first half of 1984 and be of 12 months duration. It shall be undertaken by one foreign expert, assisted by two PJKA counterparts.

The foreign expert should be a locomotive maintenance engineer with experience in the procurement and control of spare parts. One of the PJKA counterparts will be from the Workshops Branch and one from the Traction Branch. These will be assisted by other PJKA staff as appropriate.

Terms of Reference
TECHNICAL ASSISTANCE IN IMPROVING
THE PRODUCTIVITY AND AVAILABILITY OF THE
PPD BUS FLEET

TERMS OF REFERENCE

Technical Assistance in Improving the Productivity and Availability of the PPD Bus Fleet

1. Introduction and Background

PPD is the government-owned city bus operator for Jakarta. Its present (November 1983) fleet consists of (-) double-decker and (-) single-decker buses, of which only about (-) % are operational at any one time. The numbers off the road represent idle assets of the order of US\$ (-) million. Those vehicles which are in operation achieve a utilisation rate of only (-) vehicle-km per annum and an annual productivity of about (-) million passenger-km per vehicle, both of which are low by world standards.

Both PPD management and the Directorate-General of Land Communications (DGLC), to whom PPD is responsible, have long been concerned about these matters. Measures taken in an attempt to improve the situation have included after-sales maintenance assistance agreements with bus suppliers and, during the 1970's, a program of technical assistance by foreign consultants to help raise standards of vehicle maintenance. In spite of these efforts, and particularly of a major program of fleet replacement and expansion during the last five years, when (-) new buses were purchased, the productivity and availability of the fleet are still low. There remains, therefore, an urgent need to review the present operations of PPD and to identify the practical measures which are necessary to raise the performance of the existing fleet.

2. Objectives

The objectives of the technical assistance are as follows :

- (i) To review the workshop, depot and terminal operations of PPD and its related Units ¹;
- (ii) To identify, quantify and document the productivity of these operations and to identify the features which contribute to the low level of bus productivity and availability;
- (iii) To make recommendations for practical operational and management improvements designed to raise the productivity and availability of the existing bus fleet.

Since the main reasons for the present deficiencies concern maintenance and repair practices, a review of the route structure, bus and crew scheduling and other aspects of route operations is excluded from the scope of the study.

It is not expected that the study will result in recommendations for substantial new investments, for example in buses, although the requirements for spare parts, materials and equipment inventories should be identified. The focus of the study will be on maximising the productivity and availability of the present fleet mainly through operational changes. Due regard should however be given to available fleet expansion plans.

¹ In 1979, PPD took over responsibility for operating the fleets of a number of private companies which had been experiencing financial difficulties. These fleets are operated and managed as separate "Units".

3. Scope

The review of existing conditions and operations should include, but not be limited to, the following :

- . the planning and scheduling of bus maintenance and repair work;
- . the availability, suitability and condition of tools and equipment;
- . the standards of technical training of workshop and depot labour, its work methods and productivity;
- . the availability of materials, fuels, lubricants and spare parts, the adequacy of stocks, and the suitability of inventory and procurement procedures;
- . the quality and effectiveness of maintenance and repair work carried out, and the impact of any deficiencies on the operating performance of the bus fleet.

The recommendations made by the Consultant should be associated with realistic targets for the improvement of present operations, so as to allow PPD management to monitor subsequent progress. Where possible, the likely impact of the recommended improvements on the fleet's performance should be clearly identified.

4. Staffing, Timing and Reporting

The study shall be of six months duration. It shall be undertaken by a foreign expert with considerable experience in the management, operations and maintenance practices of a public

bus company. All reasonable assistance and co-operation will be given by PPD management.

The foreign expert will be required to submit two reports :

- . An Interim Report, submitted three months after the start of the study and setting out the Consultant's preliminary findings, particularly on the aspects of PPD's operations which contribute most to low levels of bus productivity and availability;
- . A Final Report, submitted two weeks before the end of the project, to allow time for review and discussion, which sets out the Consultant's detailed findings, conclusions and recommendations.

Terms of Reference
STUDY TO IMPROVE THE EFFICIENCY OF
-GOVERNMENT-OWNED SHIP MAINTENANCE, REPAIR
AND DOCKING FACILITIES

TERMS OF REFERENCE

Study to Improve the Efficiency of Government-Owned Ship Maintenance, Repair and Docking Facilities

1. Introduction and Background

The Indonesian Government's policies for Repelita IV (1984/85 - 1988/89) place considerable emphasis on the development of an efficient domestic maritime transport system to support the planned growth in non-oil exports. Following a study (the Integrated Sea Transport Study, or ISTS) by Dutch consultants, a program has been prepared for major investments in ports, shipping, navigational aids and associated projects and for the introduction of operational changes designed to enable a restructuring and streamlining of the shipping system.

Among the problems identified in the ISTS were the high costs and low productivity of domestic shipping services. The reasons were many, but they include the existence of a large number of small shipping companies with inadequate management capability, an aged shipping fleet, inappropriate route structures and, important for the present study, inadequate ship maintenance and repair practices.

Under the Maritime Sector Development Program (MSDP), attention is being given to these deficiencies. Measures will be taken to replace old and obsolete vessels and to improve shipping company management. In addition the role of Indonesian ship maintenance, repair and docking facilities has been recognised, and a Master Plan is being prepared for rationalising and upgrading such facilities to allow Indonesian docks and shipyards to improve their maintenance and repair services and to provide increased capacity to cater for the needs of the projected domestic fleet.

The Master Plan is being prepared by Indonesian consultants with assistance from two Norwegian dockyard experts. It is due for completion in February 1984. It will be mainly concerned with the longer term development of domestic ship repair and maintenance facilities, and with identifying the capital investments required to provide sufficient future capacity.

There is, however, an urgent need to address the more immediate operational and management problems of Indonesian dockyards to ensure that their efficiency and productivity is maximised in the interim period. With domestic vessels presently out of operation for maintenance and/or repair for an average of 45 days per year, largely for reasons associated with dockyard efficiency, it is apparent that significant cost savings may be gained by low-cost improvements in dockyard performance.

2. Objectives

The objectives of the study are as follows :

- (i) To review ship maintenance and repair operations in selected Government-owned dockyards;
- (ii) To identify, quantify and document the productivity of dockyard operations and to identify situations where present repair/maintenance practices are inefficient;
- (iii) To make recommendations for operational and management improvements designed to raise the level of efficiency and productivity of the dockyards reviewed.

It is not expected that the study will result in recommendations for substantial new investments. These will be addressed by the current Master Plan study. The focus of the study will be on maximising the utilisation of dockyard facilities, equipment and labour through low-cost operational changes. Due regard should however be given to the proposals made in the Master Plan study.

3. Scope and Reporting

The review of existing conditions and operations will concentrate on a sample of Government-owned dockyards drawn, following discussions with the nominated Project Officer (see below), from the list provided in Annex I. It will include, but not be limited to, an examination of the following aspects of each dockyard's operations :

- . the planning and scheduling of maintenance and repair work;
- . the suitability and quality of equipment and its maintenance and utilisation;
- . the adequacy of repair/maintenance specifications and orders submitted by ship owners, and their implications for work planning and scheduling;
- . the availability of materials and spare parts for both ship repair/maintenance and for general dockyard operations, and the adequacy of materials and parts inventories and ordering procedures;
- . procedures for the allocation of labour, and the productivity of labour in specific dockyard activities;

the quality and effectiveness of maintenance and repair work carried out.

It is envisaged that the recommendations for each dockyard will include specific proposals for improving each of the above aspects, where they are found to be deficient.

In making his recommendations, the Consultant should also suggest productivity targets for each important component of dockyard operations which may provide a basis for the subsequent monitoring of progress by the dockyard's management and by the Direktorat Jasa Maritim in the Directorate-General of Sea Communications.

The Consultant will be expected to submit the following reports (20 copies) to the Project Officer (see below) :

- (i) An Inception Report, submitted within one month of the commencement of the study and setting out in detail the proposed approach to the study, the expected output, and a detailed work program for its completion. This Inception Report will be based on the results of a preliminary examination of the dockyards selected.
- (ii) Interim Reports, one for each dockyard studied, setting out the findings of the detailed operational review of each dockyard and any preliminary recommendations for efficiency improvements.

- (iii) A Final Report, summarising the findings and conclusions for each dockyard and setting out the Consultant's detailed recommendations for improving the utilisation of resources in each dockyard and the efficiency of its component operations.

On receipt of the Final Report, and following a two-month review by the Direktorat Jasa Maritim and by the dockyards' management, the Consultant may be requested to continue his assistance by helping each dockyard to implement those of his recommendations which have been accepted.

4. Staffing and Timing

The study will be completed in two phases, each taking six months. The first phase will comprise the review of selected dockyards and the preparation of recommendations, and will culminate in the Final Report described above. The second phase, for which a work program will be agreed after receipt of the Final Report, will involve the provision of assistance in implementing the recommendations of the first phase.

The study will be conducted by one (1) specialist in dockyard operations, assisted by part-time counterparts assigned from Direktorat Jasa Maritim. He will report to a nominated Project Officer assigned from the Direktorat.

Annex I

List of Government-Owned Ship Repair Yards

P.T. Dok Tanjung Priok

P.T. Dok Surabaya

P.T. Ippa Gaya

P.T. Pelita Bah

P.T. KODJA

P.T. Dok Walame

ROPEWAY RENOVATION IN CONNECTION
WITH OECF GRAND (JAPAN)

The use of ropeway as a means of transportation of Butas product from mining area to the harbour area begin as from the first mining operation in Pulau Buton which at that time manage by a Dutch company NV.Mijnbouw en Cultuur - maatschappij Buton (NV.MMB).

These ropeway continously used by the Government of Indonesia (Direktorat jalan - jalan dan jembatan, Perusahaan Aspal Negara) after it was taken over - from the NV.MMB in 1954 and operate until 1975.

1. The Ropeway.

The ropeway use in this mining operation is made by a West Germany - manufacturer Pohlig Heckel Bleichert (PHB) in 1928 and begin to operate in the area since 1931.

The length of the ropeway is 13 Km connecting Kabungka mining area and city port of Banabungi. (see attachment 1)

The capacity design by the manufacturer are 20 ton/hour with the maximum working hour are 10 hours/day.

After it was taken over by the Indonesian Government the capacity of - these ropeway decrease gradully every year up to the limmit of 6 ton/hour. This condition is being consider as not efficiently and economically to be - continue the operation and by the year of 1975, this ropeway operation is - closed.

The decreasing of the capacity of the ropeway mainly caused by :

1. The difficulty of finding the spare-parts specially for the main engine.
2. The difficulty of replacement of the overhead cable.
3. The difficulty of replacement of the bucket.
4. The degradation of overhead cables poles caused by the lack of maintenance.

2. Efforts to rehabilitate the ropeway.

Severals efforts has been made to rehabiilitate the ropeway in order to keep it in functions as a means of transportation of Butas product from the mining area to the harbour ; such as replacement of the main engine from the old - steam engine to the new diesel engine with the capacity of 50 HP at 500 RPM. On the other hand the seriously deterioration on the several parts of the sys - tem of the ropeway and the lack of funds for maintenance and rehabilitation - caused in 1975 ropeway operation as a means of transportation are closed.

3. Butas production plan.

In accordance to the needs of Ditjen Bina Marga in coming Pelita IV, Butas - production planning are decided as follow :

- First year

First year	1.300.000 ton.
Second year	1.400.000 ton.
Third year	1.500.000 ton.
Forth year	1.650.000 ton.
Fifth year	1.900.000 ton.

To meet the production target mention above, base on study made by a consultant firm, the means of transportation to carry out the Butas product from mining area to the harbour consist of three alternatives such as ;

3.1. Using on highway dumptruck :

Base on the capacity of the dumptruck exist in Indonesian market 18 tons, for the production of 1.500.000 ton/year. The needs are 43 units of dump-truck with the value around Rp. 3.500.000,000.

The advantages of using these dumptruck are relatively low cost of investment and the procurement process takes short of time and the disadvantages of it are the operation cost relatively high and limited mobility to operate during the night time.

3.2. Using the ropeway.

The advantages of using ropeway are the operation cost relatively low and can be operate during day or night. The disadvantages are high cost of investment and the procurement process take a long time.

3.3. The combination.

The ropeway capacity which are going to be procure should at least can handle half of the production capacity needed and the other half can be handle by the dumptruck. In these case equipment needed consist of :

- 1 (one) ropeway with the capacity of 300 tons/hour or 734.000 tons/year.
- 22 (twenty two) units of dump truck 18 tons/unit or equal to 770.000 tons/year.

With the refference to the result of the study and to the production target in the years to come, rehabilitation or procurement of the ropeway, is a must. This conclusion is made base upon :

- 1. Less of operational cost for the long term operation.
- 2. Safety and security in the operation.
- 3. Energy conserved if its compared to the dumptruck.
- 4. Relatively low cost for maintenance.
- 5. Longer life time of the equipment.
- 6. Reduce accident due to the negligence of the operator.
- 7. Will not hampered the public road or highway.

4. Rehabilitation.....

4. Rehabilitation/Procurement Plan.

From that brief description mention above we could make a conclusion that if the functions of the ropeway are going to be use actively as a means of transportation for Butas product from the mining area to the harbour, totally rehabilitation and improvement in the lifting capacity should be done to meet the requirement as mention above or the new investment program in procuring the new ropeway with the capacity of 300 tons/hour.

- 0 -

TERM OF REFERENCE
PROVISION FOR FIELD LABORATORY EQUIPMENTS
FOR SOILS AND BITUMINOUS TESTING

CCTCEER 1983



MINISTRY OF PUBLIC WORKS
DIREKTORATE GENERAL OF HIGHWAYS
INDONESIAN ROAD RESEARCH INSTITUTE

Jalan Raya Timur 264, Phone : 78251 - 78252 Bandung - Indonesia

TERM OF REFERENCE
PROVISION FOR FIELD LABORATORY EQUIPMENT
FOR SOILS AND BITUMINOUS TESTING

I. B A C K G R O U N D

In the executions of road works, either in new construction or improvement including maintenance, testing laboratories play an important role.

For example, in design activities the laboratory provides data on the soil condition along the projected route and also data on the quality of aggregates to be used with the necessary building materials.

In construction activities the laboratory plays an important role in quality control. Without quality control it is impossible to obtain a product which meets the technical specifications required.

Quality control activities need adequate laboratory facilities which are supported by skilled and experienced laboratory personnel.

At present existing laboratory facilities to support quality control activities are inadequate throughout Indonesia, only a limited number of projects have access to their own laboratory facilities. A great number of road projects for betterment and maintenance need to be supported by adequate laboratory facilities to carry out quality control. These facilities should be easily moved from project to project so portable laboratories for quality activities can fulfil the need mentioned above.

There are now 26 provincial laboratories in the 27 Provinces of Indonesia. They are administratively under the provincial public works office and the Directorate General of Highways provides technical support to run the laboratories.

Their capacities vary according to available equipment and personnel and can be divided into 3 groups. The first group consists of 10 provinces, namely, Aceh, North Sumatra, West Sumatra, South Sumatra, Lampung, Special District Jakarta, West Java, East Java, South Sulawesi and Central Sulawesi which are provided with equipment

to carry out geotechnical surveys, and quality control for road and concrete works.

The second group consists of 12 provinces which are Riau, Jambi, Central Java, Yogyakarta, Bali, West Nusa Tenggara, West Kalimantan, East Kalimantan, Sout East Sulawesi, North Sulawesi and Irian Jaya. Their capability covers simple soil surveys and quality control for road and concrete works.

The third group consists of 4 provinces (Bengkulu, East Nusa Tenggara, East Timor and Maluku), which are only capable to carry out road quality control. One province (central Kalimantan) does not yet have laboratory equipment.

The equipment available at the provincial laboratories mentioned above are in very limited number which sometimes hinders providing badly needed services especially for quality control.

Some provinces cover an extensive area some have a great number of road projects at one time, so the provision of adequate numbers of field laboratories must be considered important.

Besides, the provincial laboratories can be then be directed to support survey and design works carried out locally.

II. SCOPE OF WORKS

1. To supply 20 units of field laboratory equipments for soils and bituminous testing, i.e. to support quality control of road works in the provinces.

The total cost for 20 units are :

— proquirement of equipment	:	900,000	\$
— handling cost	:	100,000	\$
<hr/>			
TOTAL	:	1,000,000	\$

2. Provision of field laboratory equipment is to be in package or units consisting of laboratory equipment for soils and aggregates testing, and asphalt mixes testing. Details of these packages can be found in table 1 (see appendix 1).

3. Twenty units are going to be provided which are founded from a separate allocation. These units are proposed to be distributed as stated in table 2. (see appendix 2).

The distribution is taking into consideration the location of asphalt mixing centres, density of projects and areal size of provinces.

Bandung, October 1983

DIRECTORATE GENERAL OF HIGHWAYS

TABLE 1

LIST OF THE FIELD LABORATORY EQUIPMENTS FOR SOILS AND BITUMINOUS TESTING

TOTAL : 20 UNITS

No.	ITEMS	Specification are similar to	Quantities
1.	SOIL TESTING		
	1.1. Compaction set, consist of :		
	one standard proctor mould	Soiltest CN-405	20
	one standard proctor hammer	CN-415	20
	one modified compact. mould	CN-404	20
	one modified compact. hammer	CN-416	20
	one straight edge	CN-838	20
	one sample ejector	P-103	20
	one mixing spoon	CN-995	20
	one mixing trowel	CN-840	20
	one spatula	P-85	20
	one mixing pan	LT-607	20
	one aluminium pan 10 inches diameter	LT-605	20
	one wash bottle	G-10	20
	three dozen moisture can	LT-30	60
	1.2. CBR for laboratory test set consist of :		
	one mechanical loading press 6000 lbs capacity	Soiltest CN-702	20
	one proving ring	PR-60	20
	twelve CBR lab. moulds	CN-450	240
	one spacer disk	CN-393	20
	twelve filter screen	CN-556	240
	six swell plate	CN-400	120
	twelve tripod attachment	CN-401	240
	four swell dial indicator	LC-8	80
	twelve surcharge weight	CN-557	240
	twelve slotted surcharge	CN-558	240
	one steel cutting edge	CN-407	20
	1.3. Specific gravity test set, consist of :		
	eight picnometer bottles of 100 cc capacity	Soiltest G-343	160
	one porcelain mortars and pestles	G-73	20
	one hot plate, 1000 watts, 220 volts/50 cycle	L-265-8	20

No.	ITEMS	Specification are similar to	Quantities
	1.4. Atterberg limit test set consist of :		
	one standard liquid limit device	Soiltest CL-209	20
	one ASTM grooving tool	CL-218	20
	one mixing disc	G-52	20
	one flexible spatula	P-85	20
	one 100 cc graduated cylinder	G-18	20
	two dozen moisture cans	LT-30	40 doz
	one cassagrande grooving tool	CL-217	20
	one plastic limit plate	CL-250	20
	1.5. Grain size analysis test set		
	six hydrometer jar	Soiltest CL-271-6	120
	one mechanical stirrer electrical power 220 v/50 cycle	CL-272	20
	two dispersion cup	CL-274	40
	one hydrometer scale 0-60 gr.	CL-277-A	20
	one unit sieve 8 inches diameter of no. 10,20,30,40,60,80,100, 200, brass cover and pan	ASTM Standard	20 unit
	one 50 ml graduated cylinder	Soiltest G-44	20
	one doz sample box	LT-20	20 doz
	1.6. Sand density cone set :		
	one sand cone	Soiltest CN-992	20
	one replacement jug	CN-993	20
	one field density plate	CN-994	20
	one spoon	CN-995	20
	one steel chissel of 1 inch	CN-998	20
	one rubber mallet	CN-999	20
	one sand scoop	CN-502	20
	one doz 1 gallon field cans	CN-996	20 doz
	one bag Ottawa sand	CN-501	20 bag
	1.7. Speedy moisture content test 26 grams capacity	Soiltest MC-321	20
	1.8. Gradation testing for aggregate :		
	one unit ASTM standard sieve for aggregate with opening of 3 1/2", 3", 2 1/2", 2", 1 1/2", 1", 3/4", 1/2", 3/8", no. 8, 10, 16, 20, 30, 40, 50, 80, 100, 200 brass cover and brass pan	Soiltest with the following catalog : CL-371-3 1/2 CL-371-3 etc.	20 unit
	one aggregate shaker, 220 volt 50 cycle and 16 kgs capacity	CL-404-8	20

No.	ITEMS	Specification are similar to :	Quantities
	one sieve brushes for fine	Soiltest CL-315	20
	one sieve brushes for coarse	CL-316	20
	two doz. alluminium cans	LT-80	40 doz
2.	BITUMINOUS TESTING		
	2.1. Marshall test set		
	one stability compression machine completed with one 6000 lbs proving ring 220 volt/50 cycles	Soiltest AP-156-8	20
	two stability compaction molds	AP-166	40
	one stability compaction hammer	AP-165	20
	one mold holder	AP-167	20
	one stability mold	AP-169	20
	one dial flow indicator	AP-171-M	20
	One pedestal	AP-172	20
	one waterbath 220v/50 cycle	AP-150A-4	20
	one brass extractor	AP-168	20
	2.2. Centrifuge extractor 1500 grams capacity 220v/50 cycle, completed with :		
	one filter disc	Soiltest AP-177	20
	one extractor bowl	AP-191	20
	one bowl cover	AP-192	20
	one bowl nut	AP-193	20
	2.3. Portable core drill set		
	one core drill machine 7 hp 4 cylinder	Soiltest DR-1304	20
	one 9" extension shaft	DR-1306	20
	one water removal assembly with pump and bowl	DR-1308	20
	one 18" strap wrench	DR-1315	20
	one "AW" sliding iron	DR-322 W	20
	two diamond bit 4" diameter	DR-1340	40
	one expanding adaptor	DR-1341	20
	2.4. Metal thermometer		
	one 0-100°C metal thermometer	Soiltest G-201	20
	one 0-250°C metal thermometer	G-203	20
	2.5. Accesories and tools		
	one heavy duty solution	Soiltest L-500	20
	one triple beam scale	L-415	20
	one triple beam balance	L-817	20
	one analytical balance	L-700	20

No.	ITEM	Specification are similar to :	Quantities
	one generator, 3 kva. 220 volt/50 cycle	Soiltest L-18-A	20
	one double wall oven 1500 w, 220 volt/50 cycle	L-18-A	20
	one laboratory thermometer	G-171	20
	one plastic funnels	G-122	20
	one pound sodium hexameta- phosphate	CL-288A	20 lbs

Bandung, October 1983

DIRECTORATE GENERAL OF
HIGHWAYS

TABLE 2
LIST OF FIELD LABORATORY EQUIPMENT DISTRIBUTION

PROVINCE	FIELD LABORATORY EQUIPMENT
1. D.I. Aceh	1 unit
2. North Sumatera	1 unit
3. Riau	1 unit
4. West Sumatera	2 units
5. South Sumatera	1 unit
6. Bengkulu	1 unit
7. Lampung	1 unit
8. Jakarta	1 unit
9. West Java	2 units
10. Central Java	1 unit
11. Yogyakarta	1 unit
12. East Java	2 units
13. West Kalimantan	1 unit
14. East Nusa Tenggara	1 unit
15. South Sulawesi	2 units
16. North Sulawesi	1 unit
TOTAL	20 units

Bandung, October 1983

DIRECTORATE
GENERAL OF HIGHWAYS

D - 25

D - 26

D - 27

PLANT RENOVATION PROGRAMME PROPOSAL

DIRECTORATE GENERAL CIPTA KARYA
MINISTRY OF PUBLIC WORKS
REPUBLIC OF INDONESIA

NOVEMBER 1983

The Government of Indonesia through the Directorate General of Housing, Building, Planning, and Urban Development (Cipta Karya) is seeking assistance from external Technical Co-operation Agency to help-finance the renovation programmes which will soon be launched this year covering the following aspects :

- a. Renovation of numerous work-shops within the Directorate General Cipta Karya;
- b. Renovation of numerous treatment plants for water supply;
- c. Renovation of numerous drainage facilities;
- d. Renovation of numerous solid wastes handling facilities; and
- e. Renovation of the various Training Centres and facilities.

In conformance with the above, the Directorate General herewith proposes four renovation programmes for external funding consideration.

Jakarta, November 1983.
Directorate General Cipta Karya

1. Project Title : Renovation of Sawah Lunto Water Supply System
2. Location : Sawah Lunto, West Sumatera Province
3. Executing Agency : Directorate General of Housing, Building, Planning and Urban Development (Cipta Karya), Ministry of Public Works.
4. Objectives : The water supply system is experiencing degradation of its system and the water produced has been depleted over the last decade. Water losses in the pipe system are exceeding 65 %. The Directorate of Sanitary Engineering within Cipta Karya has prepared a renovation programme as how to alleviate the above problems by a.o. replacement of the deteriorated raw water pumps and its related piping within the plant and rehabilitation of the transmission mains and distribution networks.
Assistance is sought by the Directorate to renovate the treatment plant/ production facilities. Through this renovation programme it is hoped that the city will be able to serve more people with potable water. This renovation of the existing plant is to bring back the actual design production capacity to normal again.
5. Assistance Requested :
- | | | |
|--------------------|---------------|----------------------|
| a. Expert services | : 5 manmonths | = US\$ 50,000 |
| b. Equipment | : (various) | = US\$ 400,000 |
| c. Others | : none | = -- |
| | | Total = US\$ 450,000 |
6. List of Equipment : 1. 3 units of Raw water pumps @ 30 l/sec of H=400 m each.
2. Related special piping for raw water, 2,500 m of Ø 250 mm.
3. Miscellaneous accessories

1. Project Title : Renovation Programme for Solid Wastes Handling.
2. Location : Selected medium and small size towns.
3. Executing Agency : Directorate General of Housing, Building, Planning and Urban Development (Cipta Karya), Ministry of Public Works.

4. Objectives : Although cities and towns in Indonesia have some means of handling its solid wastes matters, the Government with its limited funds has not started with the overall abatement programme to overcome the pollution caused by improper handling and disposal of the city solid wastes. Several pilot studies have been executed to find the least-cost solution for solid waste management.

The major problem is how to contemplate with the final disposal methods and to find solutions whether landfill system or incineration system will be the answer for future measures to be taken. The Government is seeking external assistance for the execution of the necessary study.

For immediate and interim solution the Directorate has prepared a renovation programme as how to cope with the most needed transport facilities to dispose the solid wastes to the disposal sites and introduce the proper method of sanitary landfill.

To support this renovation programme, assistance is sought for the supply of transportation equipment, landfill machineries. Cities and towns selected will act as demonstration plots in-line with the Government aims to study the appropriate method for solid wastes handling.

5. Assistance Requested :
- | | | |
|---------------------|---------------|-----------------------|
| a. Expert services | : 5 manmonths | = US\$ 50,000 |
| b. Equipment | : (various) | = US\$1260,000 |
| c. Others/ training | : | = US\$ 40,000 |
| | | Total = US\$1,350,000 |

6. List of Equipment :
- | | |
|--|---------------|
| 1. 80 units solid waste disposal trucks | =US\$ 800,000 |
| 2. 4 units solid waste compacter | =US\$ 140,000 |
| 3. 4 units Dozers | =US\$ 320,000 |
| 4. Spare-parts (cost included in 1,2, and 3) | |
| US\$1,260,000 | |

1. Project Title : Renovation of Workshop Equipment for Structural and Material Test.
2. Location : Directorate of Building Research (DBR)- Bandung.
3. Executing Agency : Directorate General of Housing, Building, Planning and Urban Development (Cipta Karya), Ministry of Public Works.
4. Objectives : The present condition of the research facilities owned by DBR for testing of building materials and structures could not cater the requirements for reliable and accurate test result. Most of the equipment and instruments are of pre-war age and although very well maintained, will need renovations in order to be able to accomodate the increased testing needs in this era of development.
- Various trainings were received by the staff of DBR in conjunction with the bilateral technical co-operation with Japan, the Netherlands and United Nations Development Programmes.
- The above well-trained staff is now able to handle up-to-date equipment and instruments and through this renovation programme it is hoped that DBR will be in a position to increase its services in the field of testing and research.

5. Scope of Assistance Requested :

- | | | |
|------------------------|---------------|---------------|
| a. Expert services | : 3 manmonths | = US\$ 22,500 |
| b. Equipment | : (various) | = US\$100,000 |
| c. Fellowship/training | : 2 manmonths | = US\$ 7,500 |

T o t a l = US\$130,000

6. List of Equipment :
- | | |
|---|---------------|
| 1. Universal testing machine | = US\$ 50,000 |
| 2. Structural Testing Set (jacks, actuating, etc) | = US\$ 25,000 |
| 3. Dynamic triaxial machine | = US\$ 25,000 |
| | US\$100,000 |

1. Project Title : Renovation of Printing Workshop for Dessi-
mination of Research Results and Information.
2. Location : Directorate of Building Research (DBR)- Bandung.
3. Executing Agency : Directorate General of Housing, Building, Plan-
ning and Urban Development (Cipta Karya),
Ministry of Public Works.
4. Objectives : The existing printing workshop owned by DBR
was established a decade ago. Although it is
still operational, this workshop could not
cope with the increased printing load to sup-
port DBR in dessiminating the results of tes-
ting and informations regarding research fin-
dings.
Through this renovation programme, DBR will be
able to increase its activity in dessimination
of informations and results of its activities.

5. Assistance Reuested

- | | | |
|--------------------|--------------|--------------|
| a. Expert services | : 1 manmonth | = US\$ 7,500 |
| b. Equipment | : (various) | = US\$45,000 |
| c. Training | : 1 manmonth | = US\$ 2,500 |

Total = US\$55,000

6. List of Equipment

- | | |
|---------------------|-------------|
| 1. Printing machine | =US\$30,000 |
| 2. Cutting machine | =US\$ 7,000 |
| 3. Composer | =US\$ 4,000 |
| 4. Screen Camera | =US\$ 3,000 |
| 5. Stencil machine | =US\$ 1,000 |

US\$45,000

EQUIPMENT FOR RENOVATION OF HYDRAULIC LABORATORY FACILITIES.-

1. Project Title : Equipment for Renovation of Hydraulic Laboratory Facilities.
2. Location : Institute of Hydraulic Laboratory, Bandung (West Java)
3. Executing Agency : Directorate General of Water Resources Development, Ministry of Public Works.
4. Objective : The Institute of Hydraulic engineering located in Bandung (West Java) as one of the institution under the Directorate General of Water Resources Development plays an important role in observing hydraulic phenomena for various kind of purpose especially for irrigation project. To support this activities, the reasonable and suitable facilities are needed to utilize limited water resource effectively. To enable the Institute in conducting their duties especially in applying the new method of technology Development, the modern equipment are needed to replace the existing one that already out of date (before 1965 product) and are not available in Indonesia.
5. Project Description : - To supply fifteen (15) sets of Water level Gauge consisting of :

	Quantity	Price
a. Savo type including voltage transfer	5 set	¥ 5.000.000
b. Supersonic type	5 set	¥ 6.000.000
c. Capacity type including extension card.	5 set	¥ 5.500.000
Sub total		¥ 16,000,000

- To supply nine (9) sets of velocity measurement consisting of :

	Quantity	Price
a. Supersonic type	3 set	¥ 7,500,000
b. Propeller type	3 set	¥ 3,600,000
c. Magnetic type	3 set	¥ 3,600,000
Sub total		¥ 14,700,000

- To supply three (3) ats of Sediment transportation measurement supersonic type
¥ 4,500,000.-

- To supply three (3) sets of pressure meter
¥ 4,500,000.-

- To supply five (5) sets of time recorder of 6 element ¥ 7,500,000.-

6. Scope of Assistance
required

- a. Experts Service : -
- b. Equipment : ¥ 47,700,000
- c. Fellow Ship : -

7. Related to Project
Aid

: -

PROPOSED SCOPE OF SERVICES FOR THE STUDY FOR THE
REHABILITATION/MODERNIZATION OF THE LUZON GRID TRANSMISSION SYSTEM

1. Review and analysis of recent power system outages. Recommendations on immediate corrective measures to prevent repetition of similar occurrences.
2. Recommendations on short and long range corrective measures including periodic preventive maintenance schedules to attain the same objective.
3. Review of the present protective systems and equipment including relaying, lightning arresters, circuit breakers, insulation coordination and grounding. Recommended improvements thereon.
4. Review of the proposed protective systems and equipment for the Luzon Grid Transmission System in the future.
5. Identification of transmission lines and substations that should be upgraded and/or their installation accelerated. Recommended improvements thereon.
6. Review on the excitation and governor systems in the power plants and their coordination with under - and over - frequency relays.
7. Review on the necessity of NPC's fault locator and monitoring equipment.
8. Review of the load-shedding schemes presently adopted by NPC-MERALCO in the Luzon Grid.
9. Training of personnel on system operation, maintenance and protection.

Proposed Study For The Rehabilitation/Modernization Of Luzon Grid Transmission System

Background

Electricity for the island of Luzon is supplied by the National Power Corporation (NPC), a government-owned utility, through a number of generating stations, transmission lines and substations serving private utilities and electric cooperatives which distribute to ultimate consumers. NPC also serve directly some industrial customers not otherwise connected to a utility or cooperative.

The existing generation stations total 4324 MW of installed capacity. These include hydro, oil-fired and geothermal power plants as shown in the attached 1982 NPC annual report. The latest addition is a 300 MW pumped storage hydro plant, the first of its kind in the ASEAN region. Under construction are a nuclear power plant (620 MW) in Bataan, a coal-fired station (300 MW) in Batangas and a geothermal plant (110 MW) in Laguna which will all be commissioned by 1984/1985.

The transmission system consists of 230 KV, 115 KV and 69 lines which extend from north to south of the island aggregating 6,670 circuit kilometers (Exhibit A). The latest addition to the system is the Cagayan Valley sub-grid which include a 230 KV line connecting the Ambuklao Power Plant to Tuguegarao and Magat Hydro in Cagayan together with associated 69 KV lines and substations. This sub-grid was financed under an OECF loan. These are indicated on page 17 of the 1982 NPC annual report.

Additional transmission lines which are planned and under construction include a 500 KV EHV line that will connect Naga to Kalayaan (1st stage) and thence to the San Jose Substation (2nd stage) designed to transmit geothermal power from Tiwi, Manito and Mt. Labo geothermal fields and ultimately from the Tongonan and Biliran geothermal reservations in Leyte.

NPC customers are served through load-end substations which step down the voltage 230 KV/115 KV to 69 KV/34.5 KV. The aggregate capacity of these substations is 7900 MVA. Additional 230 KV and 115 KV substations under construction total 3160 MVA.

Need For Rehabilitation/Modernization Study

The original planning of the Luzon Grid was started in the early 1950's when the Ambuklao and Biñga hydros were constructed. Since then additional lines and substations were added to the system to extend the service areas covered. A number of the existing lines and substations had been extended and/or expanded to accomodate growth in power demand.

On August 22 and September 15 this year, the Luzon Grid has experienced total system outage following the occurrence of line to line and line to earth faults. NPC investigation and analysis of these incidents tend to indicate an immediate need for outside technical assistance for a general review and analysis of the design, operation and maintenance of the Luzon Grid.

Such a review and analysis should include the effect and implications of planned additions to the grid over at least the next 10-15 years which may require an extensive program of rehabilitation, renovation and/or modernization of the present components of the Luzon Grid, especially the protective and relaying scheme.

Request For Japanese Cooperation and Assistance

Considering that Japan had been the major supplier of the machinery, equipment and materials of the existing transmission lines and substations in the Luzon Grid and that financing therefor had been through various OECF and Eximbank credits, NPC would like to request technical cooperation and assistance to this project under the terms and conditions of the Plant Renovation Program of the Japanese Government as announced by Prime Minister Nakasone.

JUJ/04 Oct. 1983

NATIONAL POWER CORPORATION
POWER TRANSMISSION SYSTEM
As of 31 July 1983

I. Transmission Lines (Length in circuit kilometers)

A. Existing

<u>Transmission Voltage (KV)</u>	<u>Luzon</u>	<u>Visayas</u>	<u>Mindanao</u>	<u>Total</u>
230	2873.58	-	-	2873.58
138	-	223.60	1435.67	1659.27
115	443.93	-	-	443.93
69	2442.49	613.85	1111.40	4167.74
34.5	67.73	39.28	67.87	174.88
23	21.00	-	-	21.00
13.8 and Below	819.84	45.73	21.00	886.57
T O T A L	<u>6668.57</u>	<u>922.46</u>	<u>2635.94</u>	<u>10226.97</u>

B. Under Construction

230	688.0	-	-	688.00
138	-	390.0	403.12	793.12
115	15.0	-	-	15.00
69	324.82	542.0	455.0	1321.82
T O T A L	<u>1027.82</u>	<u>932.0</u>	<u>858.12</u>	<u>2817.94</u>

II. Substation (Capacity in MVA)

A. Existing

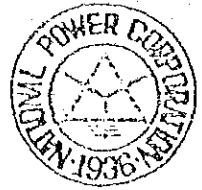
<u>Substation Voltage (KV)</u>	<u>Luzon</u>	<u>Visayas</u>	<u>Mindanao</u>	<u>Total</u>
230	5068.0	-	-	5068.0
138	-	771.7	945.0	1716.7
115	2030.4	-	-	2030.40
69	746.33	160.33	351.2	1257.86
34.5	58.1	10.7	7.7	76.50
T O T A L	7902.83 =====	942.73 =====	1303.9 =====	10149.46 =====

B. Under Construction

230	3012.50	-	-	3012.5
138	-	340.0	240.0	580.0
115	150.0	-	-	150.0
69	-	-	-	-
T O T A L	3162.5 =====	340.0 =====	240.0 =====	3742.5 =====

REPUBLIKA NG PILIPINAS

Pambansang Korporasyon Sa Elektrisidad
(NATIONAL POWER CORPORATION)



October 4, 1983

Mr. Eduardo G. Corpuz
Assistant Director General
NEDA, Amber Avenue
Pasig, Metro Manila

Dear Mr. Corpuz:

In response to your letter of 21 September 1983, we are pleased to submit herewith a proposal for Japanese cooperation and assistance for the Study for the Rehabilitation/Modernization of the Luzon Grid Transmission System.

As a result of the incidents of total outage of the system on August 22 and September 15, there is an urgent need for a general review and analysis of the various components of the Luzon Grid, especially the overall protection and relaying scheme. Such review and analysis will include recommendations for the rehabilitation, re-design, reinforcement and/or modernization of critical and sensitive components of the Grid to ensure stability and reliability of the service.

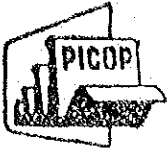
Since a major part of the equipment, machinery and materials of the existing transmission lines and substations, as well as those under construction, were supplied by Japanese manufacturers and financed by OECF and Eximbank of Japan, we believe that this project proposal will eminently qualify for assistance under the Plant Renovation Program of the Japanese Government.

We respectfully request your immediate indorsement of the proposal to the Embassy of Japan for their consideration.

Very truly yours,

GMB
G. Y. MITCHON
President *10/10/83*

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Jun Lagalag
10/5/83 2:11 PM
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PAPER INDUSTRIES CORPORATION OF THE PHILIPPINES

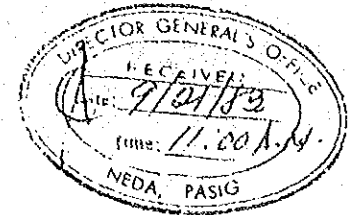
A. SORIANO CORP. - GENERAL MANAGERS

7/FNC BUILDING, 39 BULHODIA EXTENSION, MAKATI, METRO MANILA
P. O. BOX 52 COMMERCIAL CENTER, MAKATI, METRO MANILA, PHILIPPINES
(TEL. NO. 82-2011 MAIN EXCHANGE)

MILL SITE:
BISLIG, SURIGAO DEL SUR
MINDANAO
DD MARIA CRISTINA, BALQ-I
LAKAO DEL NORTE
MINDANAO

September 16, 1983

National Economic Development Authority
NEDA Sa Pasig Building
Amber Avenue
Pasig, Metro Manila



Attention: Mr. Eduardo G. Corpus
Assistant Director General

Gentlemen:

We understand that there is a plan by the Japanese Government to extend financial assistance to the ASEAN countries in the form of soft loans to finance the modernization/renovation of existing Japanese plants and equipment. We also understand that it is your office which accepts, screens, selects and approves applications for endorsement to the Japanese Renovation Financing Program.

In this regard, we would like to propose the modernization/renovation project for our existing pulp and paper mill which was procured basically from Japan for financing under this loan program.

The Paper Industries Corporation of the Philippines (PICOP) is registered with the Board of Investments (BOI) as a pioneer enterprise engaged in the manufacture of vital commodities such as newsprint and kraft containerboard and wood products, such as plywood, lumber and logs for the local and export market, thus, contributing to the country's foreign exchange earnings and savings. Our company is the largest and only fully integrated wood-based industrial complex in the country. Our plant is located in Eastern Mindanao which makes it a key factor in the economic development of the region employing directly some 10,000 employees.

Ownership

The Company is a public corporation and presently has 11,000 shareholders. The Government through the National Development Company and the Development Bank of the Philippines owns 43.7% of the Company's stocks. San Miguel Corporation and the A. Soriano Corporation own a combined 42% of the shares.

...2/

Letter to Mr. E. G. Corpus,
Asst. Director General, NEDA

September 16, 1983

If you will recall, last June 17, 1983 we submitted to your Industry and Utilities Staff updated data on our proposed pulp and paper mill expansion as contained in our November 1982 Long Term Plan. The report also provided for a review of the timetable on the expansion in the light of current developments in the paper market and in the Philippine and world economy.

Our review of the Long Term Plan confirms the need for expansion of our capacity but by 1985 instead of 1989 as stated in our Long Term Plan. Also, we have found out that modernizing and renovating our existing newsprint machine is a better alternative than acquiring a second-hand machine as contemplated in the Long Term Plan. This, we believe, will put us in a better position to expand our facilities on a larger scale at a later date.

The contemplated modernization of our existing newsprint machine involves its speeding up from its present rate of 700 MPM to 915 MPM increasing its capacity from 86,000 MT/year to 118,200 MT/year. It also involves expanding the mechanical pulp line by 130 MTBD/day.

We expect ordering of equipment to take place by the first quarter of 1984 and installation to be made within one year so as to have the modernization operational by mid-1985.

Estimated cost of the project would be approximately about P333 million to cover cost of machinery and equipment and installation but excluding interest and pre-operating costs during the construction period. Foreign components are initially estimated to cost ¥ 4.3 billion (See attached schedule showing the major equipment components) and will be supplied by Japanese manufacturers.

Letter to Mr. E. G. Corpus,
Asst. Director General, NEDA

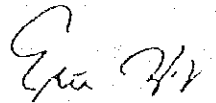
September 16, 1983

Enclosed herewith is the Information Sheet which contains more detailed information and data about the Company.

We hope for your kind attention and assistance for the favorable endorsement of this request.

Very truly yours,

PAPER INDUSTRIES CORPORATION
OF THE PHILIPPINES



EVARISTO M. NARVAEZ, JR.
Vice President - Finance

Encls. a/s
EMN:aes

PAPER INDUSTRIES CORPORATION OF THE PHILIPPINES

(SCHEDULE 1)

PROJECT: Speed-up Existing Newsprint Machine from 700 MPM to 915 MPM.
Increasing capacity from 86,000 to 118,200 MT/yr.

FACILITIES:	Yen Equivalent of Foreign Cost in ¥ 000	ESTIMATED COST (P'000)		
		FOREIGN	LOCAL	TOTAL
PAPER LINE (1985)				
1. Stock Prep/Misc.	¥627,700	P 31,385	P 12,130	P 43,515
2. Bel-Bands & Head Box	522,900	26,145	1,000	27,145
3. Press Section Rebuild	435,800	21,790	1,310	23,100
4. Dryer Section Rebuild	323,700	16,185	1,000	17,185
5. Roll Finishing	225,800	11,290	1,000	12,290
6. Crating/freight/Ins./ Duties	300,560	15,028	13,791	28,819
7. Const. Equip. Rental	-	-	3,700	3,700
8. Contingency	-	-	15,000	15,000
Sub-Total	¥2,436,460	P121,823	P 48,931	P170,754
FIBER LINE (1985)				
1. Mech. Pulping (130 MTBD/DAY)				
Sub-Total	¥1,848,000	P 92,400	P 70,200	P162,600
TOTAL	¥4,284,460 =====	P214,223 =====	P119,131 =====	P333,354 =====

CONVERSION RATE = ¥ 20 to P1.00

PAPER INDUSTRIES CORPORATION OF THE PHILIPPINES

INFORMATION SHEET

1. COMPANY BACKGROUND

A. Brief History

PICOP was organized by the well-known industrialist, the late Don Andres Soriano, and was incorporated and registered with the Securities and Exchange Commission on April 1, 1952 as Bislig Industries, Inc., its present name having been adopted on May 27, 1963. PICOP took over the research and development work on the manufacture of pulp and paper products from Philippine hardwoods begun by San Miguel Brewery, Inc. (now San Miguel Corporation) in the early 1950's. It also initially engaged in logging and eventually expanded into pulp and paper operations in 1971.

On July 1, 1969, PICOP acquired as its wholly-owned subsidiary Bislig Bay Lumber Co., Inc., a company founded earlier by the late Don Andres Soriano to lay the groundwork for the establishment of the integrated timber and paper industrial complex he had envisioned. Three years later, on May 31, 1972, the two companies were consolidated into a single working unit to ensure the industrial complex of a steady and reliable source of wood raw materials.

On January 18, 1977, PICOP acquired Rustan Pulp and Paper Mills, Inc. and took over the management of its pulp and paper mill in Iligan, Lanao del Norte. The acquisition was fully supported by the government in pursuance of its objective to rationalize the country's pulp and paper industry, particularly the kraft container-board sector, due to the limited size of the market relative to the capacity of the industry.

Today, PICOP stands as the largest fully-integrated timber products and paper company in Southeast Asia with total assets in excess of P2.0 billion. The sawtimber processing complex of PICOP is one of the most modern in the country and has an annual designed capacity to produce 154,000 cubic meters of plywood, 23,500 cubic meters of

veneer, 49,500 cubic meters of lumber, and 5,162 cubic meters of blockboard. Its pulp and paper mill in Bislig, a pioneering effort in the production of newsprint from 100% short-fiber hardwoods, has an annual designed capacity to produce 86,000 metric tons of newsprint and 70,000 metric tons of kraft containerboard. Its pulp and paper mill in Iligan has an annual designed capacity to produce 24,000 metric tons of kraft containerboard, 14,000 metric tons of clay-coated board, and 4,000 metric tons of abaca pulp.

Forest Concessions

PICOP operates two forest concessions located on the eastern coast of Mindanao within the Municipalities of Bislig, Barobo, Tagbina, Binatuan and Lingig in the province of Surigao del Sur; Cateel and Baganga in the province of Davao Oriental; Compostela and Monkayo in the province of Davao del Norte; and San Francisco, Trento, Rosario and Bunawan in the province of Agusan del Sur.

The forest concessions are covered by Timber License Agreement (TLA) No. 43 encompassing 115,545 hectares, and TLA No. 47 embracing 67,137 hectares. Of the total combined area of 182,682 hectares, 170,108 hectares consist of permanent production forests.

The original term of TLA No. 43 expired on April 26, 1977 and it has been renewed to expire on April 26, 2002. TLA No. 47, also granted originally for 25 years, expired on June 30, 1981 and has been renewed for another 25 years until June 30, 2006.

On November 15, 1982, PICOP obtained Industrial Tree Plantation Lease Agreement (ITPLA) No. 96 covering 54,300 hectares out of its existing forest concession and entitling PICOP to develop the area into industrial tree plantations with various incentives.

PICOP's forest concessions are covered by a tropical rain forest of varying ages dominated by the dipterocarp species, commercially known as Philippine Mahogany, which consist, among others, of red and white lauan, tangile, almon, bagtican and mayapis. Other timber species found in lesser quantity include apitong, yakal, guijo, toog, binuang and loktob.

The forest concessions fall under the second climatic type of the Philippines, i.e., without a distinct dry or wet season, with a maximum rain period from November to April. The average annual rainfall in the forest concessions normally reaches 4,300 millimeters or 170 inches.

U. Management

A. Soriano Corporation (ANSCOR), a corporation incorporated under Philippine laws, was appointed General Managers of PICOP on January 2, 1964. The Management Contract expired on January 2, 1974, but was renewed on the same date for another ten-year period. Under the Management Contract, PICOP agrees to pay ANSCOR for its services an annual management fee equivalent to 10% of PICOP's net income after management fee and income taxes, or P1.5 million, whichever is higher.

The members of the Board of Directors and principal officers of PICOP as of August 31, 1983 are as follows:

<u>Name</u>	<u>P o s i t i o n</u>
Andres Soriano, Jr.	Chairman of the Board and Chief Executive Officer
Juan de Ibazeta	Vice Chairman of the Board
Antonio L. Carpio	Chairman of the Executive Committee and Director
Robert D. Stratton	President, Chief Operating Officer and Director
Rogelio C. Salazar	Executive Vice-President- Operations and Director
Gerardo Agulto, Jr.	Director
Don M. Ferry	Director
Jose Antonio Garcia	Director
Hans M. Menzi	Director

<u>Name</u>	<u>Position</u>
Teodoro Q. Peña	Director
Eduardo J. Soriano	Director
Edgardo L. Tordesillas	Director
Juan C. Tuvera	Director
Fernando Z. Vicente	Director
Rolando M. Zosa	Director
Pedro M. Picornell	Senior Vice President
Jose C. Ibazeta	Vice President - Treasurer
Evaristo M. Narvaez, Jr.	Vice President - Finance
Anconio R-Infante	Vice President - Secretary
Pedrito M. Aragon	Vice President - Paper Marketing
Godofredo P. Peñas	Vice President - Timber Products Marketing
Spencer E. Balmer	Vice President - Manufacturing
Ricardo G. Santiago	Vice President - Resource Management

D. Ownership Structure

PICOP became a publicly-held corporation in 1970, one the first companies in the wood industry in the Philippines to offer its shares of stock for public ownership. As a natural resource development company, PICOP is required under the Philippine Constitution to have at least 60% of its capital stock owned by Filipino citizens.

The authorized capital structure of the Company as of August 31, 1983 is as follows:

<u>AUTHORIZED</u>	<u>NO. OF SHARES</u>	<u>AMOUNT</u>
Common	240,000,000	₱1,200,000,000
Preferred	60,000,000	300,000,000
TOTAL	<u>300,000,000</u>	<u>₱1,500,000,000</u>

Pursuant to the Strategic and Financial Plan implemented by PICOP in December 1981, the total issued and outstanding shares of the Company as of August 31, 1983 are as follows:

ISSUED AND OUTSTANDING

Common	58,771,571	₱ 293,857,855
Preferred	52,785,451	263,927,255
TOTAL	<u>111,557,022</u>	<u>₱ 557,785,110</u>

The major stockholders of PICOP are as follows:

<u>Stockholders</u>	<u>Total Shares</u>	<u>%</u>
National Development Co.	30,000,000	26.90%
San Miguel Corporation	24,210,555	21.71
A. Soriano Corporation	23,393,724	20.98
Development Bank of the Phils.	18,766,095	16.83
International Paper Corp.	2,866,521	2.57
Rustan Group	2,619,111	2.33
Roxas & Co., Inc.	769,307	0.69
Anscor Land Mgt. & Devt. Corp.	477,290	0.43
Renato Chua	271,998	0.24
Andres Soriano, Jr.	207,495	0.19
Jose M. Soriano	180,393	0.16
The Insular Life Assurance Co.	155,578	0.14
T O T A L	<u>103,918,067</u>	<u>93.17%</u>

E. Marketing Agreement

PICOP's paper production is marketed exclusively in the Philippines by PICOP Trading Corporation (PTC), a wholly-owned subsidiary of the Company. Under the agreement, PTC shall purchase the entire quantity of paper rolls which PICOP may manufacture and make available for local or domestic sales. The existing contract commenced on May 1, 1982 and will expire on May 1, 1989.

PICOP's production of timber products such as logs, plywood, lumber and veneer for export and local consumption are marketed directly by PICOP's Timber Products Marketing Division.

F. BOI and CB Registration

PICOP is registered with the Board of Investments (BOI) under Republic Act 5186 on a preferred pioneer status for its pulp and paper operations and on a preferred non-pioneer status for its integrated plywood and veneer mills. The industrial tree plantations are also registered with the BOI as a preferred pioneer enterprise under the Agricultural Priorities Plan.

PICOP is registered with the Central Bank of the Philippines as an export-oriented company. As such, PICOP has an assurance on the availability of foreign exchange for its requirements; is qualified to avail of swap facilities offered by the Central Bank; and is given preference in securing foreign long-term loans. PICOP's export letters of credit are also rediscountable with the Central Bank.

II. ECONOMIC IMPORTANCE

A. Contribution to GNP/BOP

As of the end of 1982, PICOP ranked No. 32 in sales among the top 1,000 Philippine corporations listed by Business Day with a gross revenue amounting to P970.6 million.

Contribution to Gross National Product (GNP) totalled to P3.823 billion for the past five years for an average of P765.0 million per annum over the five-year period.

<u>Year</u>	<u>Net Sales</u>	<u>Contribution to GNP*</u>
	(Amounts In P million)	
1978	P 857	P 626
1979	1,125	832
1980	1,193	903
1981	1,073	763
1982	<u>919</u>	<u>699</u>
Total	P <u>5,167</u>	P <u>3,823</u>

* Measured on the basis of Net Sales adjusted for cost of raw materials (long-fiber pulp, chemicals and fuel).

The gross contribution of the company to the Balance of Payments consisted of : (1) direct foreign exchange earnings from exports of timber products totalling US\$184 million for the five-year period from 1978 to 1982, or an average of US\$37 million per annum and (2) indirect foreign exchange savings corresponding to PICOP's paper production, which, if imported, would have an estimated CIF value ranging from US\$57 million in 1978 to US\$60 million in 1982, or an average of US\$64 million per annum.

After deducting foreign exchange payments for purchases of equipment, raw materials and supplies, as well as amortizations on foreign exchange loans, the net contribution to BOP was estimated to amount to US\$154 million for the years 1978-1982, or an average of US\$31 million per annum.

<u>Year</u>	<u>Forex Earnings</u>	<u>Forex Savings</u>	<u>Forex Payments</u>	<u>Net Contribution to BOP</u>
1978	\$ 40	\$ 57	\$ 61	\$ 36
1979	50	68	97	21
1980	42	65	83	24
1981	35	71	65	41
1982	17	60	45	32

Amounts in \$ million

B. Employment Generation

At present, PICOP employs about 8,750 personnel, most of whom are based in its mill site at Bislig, Surigao del Sur.

Indirectly, additional employment to some 20,000 people is also generated from other support industries such as the independent tree farmers, pulpwood hauling contractors, repair shops and other service facilities and business establishments in the community populated by some 85,000 people coming from different parts of the country.

Government Revenues

Revenues that were derived by government from PICOP are summarized as follows:

<u>Year</u>	<u>Sales Tax</u>	<u>Forestry Charges</u>	<u>Others*</u>	<u>Total</u>
(Amounts In P Million)				
1978	P 2.4	P 3.5	P 0.3	P 6.2
1979	6.7	4.2	2.4	13.3
1980	16.8	5.7	8.9	31.4
1981	6.0	13.7	7.7	27.4
1982	8.4	11.7	10.2	30.3

* Miscellaneous fees and licenses including local taxes.

D. Linkages with Other Industries

Industries to which PICOP is linked forward include the following:

1. Newsprint

- a. Publishing and printing
- b. Office and schools supplies

2. Containerboard

- a. Packaging
- b. Carton box end-users, such as fruit exporters, processed food producers, and other non-food consumer-related industries

3. Plywood

- a. Construction
- b. Housing

Backward linkages to PICOP include the following industries:

1. Agro-forestry farmers who supply a portion of PICOP's wood requirements
2. The transportation industry, including contract pulp-wood haulers and inter-island shipping
3. Chemical manufacturers
4. Repair shops and other service-oriented small and medium scale industries within the Bislig community.

E. Community Development

PICOP continues to play a major role in the socio-economic development of the community, not only in the Bislig area, but also in neighboring municipalities and provinces. Among the significant contributions of PICOP to community development are the following:

1. Skills Development - PICOP continues to institute technical skills development and training programs and seminars for employees, employee dependents, out-of-school youths, farmers and cooperatives; covering such matters as community development, organization and operation of cooperatives, leadership training, and agro-forestry technology.

2. Education - PICOP is subsidizing the operations of two privately-run schools in the Bislig area whose standards are at par with the best in the country. In addition, it is providing financial assistance to various public schools located within the area.
3. Housing - PICOP is supporting housing development in the Bislig area thru its employee housing program and its resettlement projects for kaingeros.
4. Health - A hospital established and operated by PICOP in Bislig provides medical and health services and facilities to the community.
5. Transportation - PICOP has established a network of roads and bridges to facilitate the flow of people, goods and services in the area. It also constructed airport facilities which have since been turned over the government for operation.

In recognition of its socio-economic contributions to its employees and the surrounding community, PICOP was named "Employer of the Year" in 1979 by the Personnel Management Association of the Philippines.

PAPER INDUSTRIES CORPORATION
OF THE PHILIPPINES

FIRST PHASE OF THE PULP AND PAPER MILL
EXPANSION PROJECT

I PROJECT BACKGROUND

Newsprint provides an essential social service as a carrier of information. The government recognizes the strategic value of newsprint manufacturing and shows considerable concern not only in providing information at the least possible cost but also as a major industrial undertaking of critical economic importance.

It will be recalled that not too long ago, the Philippine government has proposed the newsprint project as the Philippine entry to the Asean Complementation Program.

While this project was later on withdrawn because of uncertainty of the wood supply within the area being considered then, the Philippine government has retained a newsprint expansion project as one of the country's eleven major industrial projects. In this regard, consultants who were hired by the government for the evaluation of the ASEAN Newsprint project, opined that a newsprint project could only be viable if established within the Bislig area because of the advantages offered by existing facilities, infrastructures and adequate wood resources. Thus, PICOP has been chosen as the corporate vehicle to undertake the newsprint expansion in this government-sponsored pulp and paper project.

Because of the foregoing considerations, PICOP continues to enjoy government support. The Philippine government, thru the National Development Company and the Development Bank of the Philippines are now major stockholders of PICOP, owning close to 43% of PICOP's equity. It has

active involvement in the general management of PICOP by its majority representation in the Board of Directors and thru its representation in the PICOP Executive Committee. It has given financial assistance to PICOP in the form of loans (Industrial Fund Loans and advances) and of guarantees on PICOP's foreign loans.

PICOP is registered with the Board of Investments (BOI) on a preferred pioneer status for its pulp and paper mill and as such enjoys certain tax incentives and government priorities. PICOP has also been granted an Industrial Tree Plantation Lease Agreement (ITPLA) allowing PICOP to develop an area of about 54,000 hectares into industrial tree plantations of fast growing tree species. Because of its timber manufacturing facilities, PICOP is also registered as an export oriented industry enjoying certain privileges and priorities over non-registered enterprises.

With these continuing support of the government, PICOP with its resources hopes to attain the financial viability envisioned in the company's long-term plan thru the timely expansion of its pulp and paper mill facilities.

Long-Term Plan of PICOP

In support of this proposed expansion project, PICOP together with the National Development Company as the major government investment arm in PICOP, devised a long-term plan to ensure that its operations will be viable and self-sustaining on a long-term basis.

An important component of the Long-Term Plan is the timely expansion of the company's pulp and paper manufacturing facilities to meet the growing market demand and to maximize the benefits that may be realized from the expected abundant supply of plantation wood and to optimize the use of the infrastructures already in place.

PICOP has conceived of a two-phased expansion program for the next ten years. The first phase which covers the five-year period (1984-1988), calls for the modernization of the present newsprint machine and the transfer of the kraft machine from Iligan to Bislig which would increase newsprint production capacity by about 40% and kraft containerboard capacity by 70%.

The second phase which covers the next 5 years from 1989 to 1993 will involve the addition of a new newsprint machine and the conversion of the existing newsprint machine to a printing and writing paper machine. This second phase of the expansion will increase PICOP's newsprint capacity by another 40% plus the facility to produce printing and writing papers at about a third of newsprint capacity.

Rationale for Expansion Program

The first phase of the expansion program will enable PICOP to continue its dominance in the domestic paper market, at least until the late 1980's. At present, PICOP controls about 95% of the domestic market of newsprint and about 80% of the local kraft containerboard market. The expansion program will also enable PICOP to venture into the ASEAN market for newsprint,

preparatory to its bigger expansion program envisioned for the next 5 years (1989 to 1993).

PICOP is confident that it can compete with success in the ASEAN market for newsprint. PICOP is still the largest fully integrated pulp and paper mill in Southeast Asia, operating at efficient levels of production. It has developed the technological know-how and perfected the process of producing newsprint and containerboard from short-fibered tropical hardwood at reasonable costs, and to date is the only company in the world with such a capability. Its paper products have attained quality comparable to world standards. PICOP's proximity to the ASEAN market results in a competitive position vis-a-vis North American and European suppliers. With the expected hook-up to the National Power Corporation Mindanao grid towards the end of this year, PICOP's production costs will be greatly reduced making its cost more competitive.

The second phase of the expansion program will enable PICOP to continue its dominance in the local market for newsprint and at the same time build up its ASEAN market base. It will also enable PICOP to gain entry into the more lucrative fine printing papers which at present are dominated by imports.

II PROJECT DESCRIPTION

This presentation covers the first phase of the two-phase expansion project. Both phases are envisioned to be on stream within the decade. The first phase is expected to be operational by the second half of 1985, while the second phase is scheduled for completion by 1989.

The first phase of the expansion project involves the following:

1. Modernization of the Newsprint Machine (PM-1)

The present newsprint machine will be modernized by 1985, increasing production capacity from 86,000 MTPY to 118,200 MTPY, to satisfy the domestic demand through 1990. The machine speed capacity will be increased from 700 MPM to 915 MPM and machine efficiency from 80 to 89%. The following major components will be modified:

- a) Stock Preparation - additional 50 TPD repulping capacity shall be installed. Existing pulp cleaning system shall be improved with additional hi-density cleaners and centri cleaners.
- b) Headbox - existing headbox will be replaced with a new and larger capacity headbox of proven design (converflow).
- c) Fourdrinier - a top wire and water removal equipment (Bel Bond) will be added to the existing fourdrinier to gain speed and product quality improvements.
- d) Press Section - modification of the press section with additional press nip is required for efficiency improvement as well as the reduction of sheet moisture entering the dryers.

- e) Dryer Gear Speed Reducer - existing dryer gear speed reducer will be replaced with higher capacity to attain the projected machine speed of 915 MPM.
- f) Calender Stack - the new stack will improve product finish and allow flexibility in reel building.

2. Improvement of the Kraft Machine (PM-2)

The press section of the existing kraft machine will be improved by the addition of top felts to both presses which will result in less moisture entering the dryers, increase production capacity from 70,000 MTPY to 77,000 MTPY and reduce imported softwood pulp content in the LB grades.

3. Increase in Pulp Mill Capacity

To supplement the virgin pulp requirement for the Newsprint expansion program, a new mechanical pulping plant has to be installed with a capacity of 140 MTBD/day.

4. Iligan Machine

The Iligan Kraft machine, which is presently inactive will be relocated to Bislig to produce primarily high-basis weight kraft containerboard for consumption of converters who cater to exporters utilizing corrugated containerboard boxes the raw materials of which are presently being imported. The relocation of Iligan paper machine will add 43,000 MT to the Bislig mill's kraft containerboard capacity bringing total capacity to 120,000 MT a year.

III PROJECT TIMETABLE

If given the approval to proceed with the project by January 1984, the final plans, equipment specifications and supplier selection will be undertaken by February to April 1984. Ordering of foreign equipment will follow from May to July 1984. Fabrication of equipment will take from 10 months to one year and delivery is expected by May 1985. Installation of the TMP mill is slated in 3 months from May to July 1985. Work on the existing newsprint machine to increase its speed will be scheduled in July 1985. Commercial production is expected in September 1985 after the scheduled debugging operations the month before. Work on the improvement on the existing Bislig kraft machine will start in September 1985 after the newsprint machine build up and debugging have been completed and is expected to be completed by October 1985. Commercial production is scheduled in November after the debugging operations in October.

The machineries at Iligan will be dismantled starting June 1984. Installation at Bislig will begin in June, 1985. Civil engineering works start on January 1985 to be completed by September 1985.

IV PROJECT COST (PRELIMINARY)

PROJECT : Speed-up of Existing Newsprint Machine from 700 MPM to 915 MPM
Increasing Capacity from 86,000 to 118,200 MT/year and Rebuild
of Kraft Machine to Increase Capacity from 70,000 to 77,000 MT/
Year. This will also involve transfer of Iligan Plant to Bislig.

<u>PAPER LINE</u>	Yen Equivalent of Foreign Cost (¥'000)	<u>Estimated Cost (P'000)</u>		
		<u>Foreign</u>	<u>Local</u>	<u>Total</u>
1. Stock Prep	¥ 375,257	P 23,880	P 1,100	P 24,980
2. Bel-Bond & Head Box	522,971	33,280	350	33,630
3. Press Section Rebuild	435,914	27,740	650	28,390
4. Dryer Section Rebuild	392,150	24,955	800	25,755
5. Roll Finishing	414,464	26,375	927	27,302
6. Piping/Wiring/Electrical Equipment/ Instrument, Rebuild/and Others	386,257	24,580	13,976	38,556
7. Crating/Freight/Insurance/Fees/ Duties	311,221	19,805	20,000	39,805
8. Construction Equipment Rentals	-	-	3,500	3,500
9. Contingency	<u>141,430</u>	<u>9,000</u>	<u>4,000</u>	<u>13,000</u>
Sub-Total	<u>¥2,979,664</u>	<u>P189,615</u>	<u>P45,303</u>	<u>P234,918</u>

	Yen Equivalent of Foreign Cost (¥'000)	Estimated Cost (P'000)		
		Foreign	Local	Total
<u>FIBER LINE</u>				
1. Equipment (Includes instrumentation, pipings, painting, and wiring materials)	¥1,500,321	P 95,475	P 3,750	P 99,225
2. Lighting Paraphernalia	79,986	5,090	600	5,690
3. Insulation, Concrete/Process Structures, Fees & Others	-	-	21,280	21,280
4. Crating, Freight, Insurance, Fees/Duties	215,129	13,690	12,570	26,260
5. Construction Equipment Rental	-	-	2,820	2,820
6. Contingency	<u>89,964</u>	<u>5,725</u>	<u>4,000</u>	<u>9,725</u>
Sub-Total	<u>¥1,885,400</u>	<u>P119,980</u>	<u>P45,020</u>	<u>P165,000</u>

KRAFT MACHINE REBUILD (PM-2)

1. Press Rebuild	¥ 198,000	P 12,600	P 200	P 12,800
2. Piping/Concrete/Painting/Others	220	14	1,280	1,294
3. Crating, Freight, Insurance, Fees/Duties	36,536	2,325	1,575	3,900
4. Construction Equipment Rental	-	-	300	300
5. Contingency	<u>11,786</u>	<u>750</u>	<u>385</u>	<u>1,135</u>
Sub-Total	¥ <u>246,542</u>	P <u>15,689</u>	P <u>3,740</u>	P <u>19,429</u>

	Yen Equivalent of Foreign Cost (¥'000)	Estimated Cost (P'000)		
		Foreign	Local	Total
<u>SOFTWOOD PULPER</u>				
1. Equipment (Including instrumentation, piping, painting and wiring)	¥ 200,043	P 12,730	P 300	P 13,030
2. Lighting/Insulation	19,957	1,270	330	1,600
3. Concrete Substructure/Process Structural/Building/Chests/Others	-	-	4,360	4,360
4. Crating, Freight, Insurance, Fees/Others	30,014	1,910	1,750	3,660
5. Construction Equipment Rental	-	-	390	390
6. Contingency	<u>12,493</u>	<u>795</u>	<u>1,165</u>	<u>1,960</u>
Sub-Total	¥ <u>262,507</u>	P <u>16,705</u>	P <u>8,295</u>	P <u>25,000</u>
TOTAL PLANT EQUIPMENT COST	¥5,374,113	P341,989	P102,358	P444,347
ILIGAN MILL TRANSFER	51,857	3,300	53,700	57,000
WORKING CAPITAL	<u>-</u>	<u>-</u>	<u>65,000</u>	<u>65,000</u>
TOTAL PROJECT COST	<u>¥5,425,970</u>	<u>P345,289</u>	<u>P221,058</u>	<u>P566,347</u>

BRIEF ON PICOP PAPER FACILITIES AND RESOURCES

The integrated pulp and paper mill complex of the Paper Industries Corporation of the Philippines (PICOP) located in Bislig, Surigao del Sur, consists of the following major plants:

1. Newsprint Paper Machine - 86,000 MTPY of Newsprint
2. Kraft Paper Machine - 70,000 MTPY of Kraft Containerboard
3. Kraft Pulp Mill - 115,000 MTPY of Chemical Pulp
4. Chemical Pulp Bleach Plant - 42,000 MTPY of Bleached Chemical Pulp
5. Refiner Groundwood Pulp Mill - 42,000 MTPY of Mechanical Pulp

In support of the above facilities are several ancillary plants such as:

1. Chemical Recovery System for recovering expensive cooking chemicals used in the kraft pulp mill process. These consist of one high pressure (1250psig) chemical recovery boiler (60 TPH), recausticizing plant, and a lime kiln (100 TPD)
2. Chemical Plants for the production of caustic soda and chemicals used for bleaching - These plants include the electrolytic plant (12 TPD of caustic), liquid chlorine plant, sodium hypochlorite plant and hydrochloric acid plant.

The energy requirement of the PICOP Bislig mill complex is supplied by the following high pressure steam boilers and electric power generators whose combined generating capacity is more than enough to supply the current mill requirements.

Steam

1. One (1) oil-fired power boiler (1250 psig) - 180 TPH
2. Two (2) wood/oil-fired bark boilers (1250 psig) - 114 TPH each
3. One (1) recovery boiler (1250 psig) - 60 TPH
4. Three (3) wood-fired bark boilers (400 psig) - 27 TPH

Electric Power

1. One (1) back pressure steam turbo-generator - 20 MW
2. One (1) condensing type steam turbo-generator - 30 MW
3. Two (2) Pielstick diesel-driven generators - 11.45 MW each

The PICOP Iligan Mill complex located in Maria Cristina, Balo-i, Lanao del Norte consists of several manufacturing facilities, namely:

1. Cylinder Paper Machine - 24,000 MTPY of kraft containerboard
2. Coating Machine - 14,000 MTPY of clay-coated board
3. Kraft Pulp Mill - 15,750 MTPY of chemical pulp
4. Abaca Pulp Mill - 4,000 MTPY of abaca pulp

Since August 1980, the pulp and paper mill in Iligan has ceased operations as a result of deteriorating market conditions and high operating costs. The abaca pulp mill on the other hand is presently leased to a Japanese group exporting abaca pulp to Japan.

Wood Resources

The annual falcata requirement for newsprint production is 429,000 cu. m. The annual mixed red lauan requirement for containerboard production is 344,000 cu. m.

PICOP operates two forest concessions located on the eastern coast of Mindanao within the provinces of Surigao del Sur, Davao del Sur, Davao Oriental, Davao del Norte and Agusan del Sur. The forest concessions are covered by Timber License Agreement (TLA) No. 43 encompassing 115,545 hectares, and TLA No. 47 embracing 67,137 hectares. Of the total combined area of 182,682 hectares, 170,108 hectares consist of permanent production forests.

PICOP manages its forest concessions on a sustained expanding yield basis. Its forest management plan blends two silvicultural systems: selective logging and plantation forestry whose aim is perpetuating the dipterocarp forest for the production of sawtimber and complemented by short-rotation tree plantations on suitable areas for the production of pulpwood and sawtimber.

PICOP has developed industrial tree plantations within its forest concessions and these are planted to fast-growing species such as bagras, falcata and pines. As of October, 1983, tree plantation area totalled 43,325 hectares. In addition to its own wood resources, the company has tapped individual tree farmers to supply part of its pulpwood needs. At present, there are 4,021 private tree farmers registered

with PICOP Agro-Forestry who have developed tree farms totalling 27,623 hectares as of October 1983.

Technology

PICOP initially produced newsprint using 100% mixed tropical hardwood pulp. Over the years, it pioneered in the use of falcata for newsprint by utilizing this species for mechanical pulp production. In 1979, trial runs were made to manufacture newsprint using 100% falcata pulp; by 1981, PICOP made a breakthrough by producing newsprint exclusively out of Albizzia falcataria, a fast growing pulpwood species developed in the company's industrial tree plantations. Newsprint made out of 100 percent falcata is stronger and brighter than newsprint produced from mixed tropical hardwood.

Kraft containerboard is produced using 100% tropical hardwood (red lauan) pulp for corrugating medium and 80% mixed hardwood pulp and 20% softwood pulp for linerboard. Research is presently being undertaken in the use of bagras species, another pulpwood species planted in the company's industrial tree plantations for containerboard production. Bagras has similar density as lauan and is reported to result in higher mullen on kraft than lauan. In semi-chemical pulping, research results show that bagras produces a higher concora than falcata; this would be an advantage in making corrugating medium.

CELLOPHIL RESOURCES CORPORATION

I. Company Background

Cellophil Resources Corporation (CRC) was organized on May 4, 1973, as the only local producer of long-fiber kraft pulp which would supplement or replace imported pulp used in the manufacture of linerboard for corrugated boxes and sack kraft for cement bags.

In 1973, CRC acquired a 100,000-hectare concession of pure and mixed Benguet pine stands. Subsequently, CRC acquired another 90,000 hectares of concession contiguous with the former concession, thus increasing its inventory of wood to 20.6 million cubic meters.

In 1976, CRC entered into a turn-key contract with Spie Batignolles, a French contractor, for the supply, engineering, construction and erection of a 200 tons per day pulp mill. The mill, which uses the sulfate or kraft process with a chemical recovery system, was constructed starting August, 1977 in a 50-hectare lot at Tayum, Abra.

In 1978, Presidential Letters of Instruction No. 658 and 658-A were issued, promulgating the transfer of ownership of CRC from the Herdis Group to a regional cooperative. Pending the organization of the cooperative, the state-owned National Development Company (NDC) received and now holds in trust the shares of CRC. The management of CRC was also transferred to NDC in March, 1981. CRC is jointly owned by NDC and the Development Bank of the Philippines (DBP), with DBP holding the majority.

In 1980, guarantee runs for the mill were conducted by the French contractor, but these fell short on both capacity and quality specifications. The mill was not accepted and a court suit was lodged against the contractor. Under NDC management, the mill was modified by CRC staff with Stadler-Hurter as engineering consultants. The mill is now capable of producing 150 tons per day pulp of acceptable quality.

NDC's entry marked key changes in both achievements in mill modification and long-term strategy for CRC. NDC developed the long-term strategy of CRC forward integrating into paper products which use hardwood pulp produced from both concession and tree plantation hardwoods.

II. Rehabilitation of CRC

Rehabilitation of CRC requires (1) forward integration into paper products, and (2) the development of tree plantations close to the mill. CRC will have to integrate papermaking facilities with its existing pulp mill to assure a captive market for its pulp, thus maximizing utilization of the pulp mill (to produce up to 66,000 tons per year), and at the same time make use of short-fiber wood from the concession and cheap pulpwood from tree plantations.

CRC is, therefore, considering the acquisition of paper machines which will produce linerboard and corrugating medium and/or fine paper.

A. Linerboard and Corrugating Medium

For the linerboard/corrugating medium alternative, CRC is considering either to (1) to convert the existing pulp machine, without prejudice to its present function as pulp machine, to linerboard/corrugating medium paper machine, or (2) to install a separate paper machine line for the production of 30,000 tons linerboard and corrugating medium per year. Estimated cost for the conversion is \$5 million, while that of the separate paper machine line is \$20 million.

CRC may then sell all of its 30,000 tons per year linerboard and corrugating medium production to the DOMEX market (mainly the users of boxes for banana exports) which consumes about 30,000 tons per year. About 20,000 tons unbleached pulp will also be sold to local and export markets.

B. Fine Paper

For the fine paper alternative, CRC is also considering the acquisition of a 25,000 tons per year paper machine. Acquisition of an existing integrated mill (consisting of pulp mill, bleach plant and paper mill) of such capacity is being contemplated, but a new paper mill and a new bleach plant may be acquired if a cheap source of financing is available. Total investment cost for a fine paper complex is estimated \$46 million, consisting of \$25 million for a 30,000 tons per year paper machine, \$15 million for a 66,000 tons per year bleach plant, and \$6 million for auxiliary plants compatible with the bleach plant.

Under this alternative, CRC will sell 30,000 tons fine paper per year in the local market and 36,000 tons long-fiber and short-fiber pulp in the local and export markets.

C. Lumber Production

To maximize the value of its wood resources, CRC needs to extract high grade logs and lumber from sawtimber portion of trees, and to produce pulp from sawmill waste, forest residues and tree plantations. Sawmill waste can be recovered most economically if CRC installs a 150,000 cu.m. per year (input) sawmill in the pulp mill site. Estimated cost for such a sawmill is \$2 million.

D. Industrial Tree Plantation

To assure continuous supply of cheap wood for pulp and fuel, CRC is developing plantations of 5,000 hectares Ipil-ipil (short fiber) and 15,000 hectares of Carribean pine (long fiber). With ipil-ipil pulpwood and fuelwood maturing in 5 years and pine pulpwood in 15 years, CRC will become a cost competitive producer of pulp and paper on a worldwide basis. Estimated project cost is \$5 million, resulting to wood cost of \$15/cu.m. for Ipil-ipil and \$23/cu.m. for Carribean pine.

JICA