KHMER REPUBLIC

ESTABLISHMENT OF ALUMINIUM

SMELTING INDUSTRY

FINAL FEASIBILITY REPORT

SEPTEMBER 1970

OVERSEAS TECHNICAL COOPERATION AGENCY

GOVERNMENT OF JAPAN

KHMER REPUBLIC

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PREFACE

The Government of Japan, in compliance with the request from the Committee for Coordination of Investigations of the Lower Mekong River Basin (Mekong Committee), entrusted the Overseas Technical Cooperation Agency (OTCA) with the execution of a pre-feasibility study on the establishment of an aluminium smelting industry in Khmer Republic.

In view of the importance of the project, OTCA organized a survey team comopsed of eight members headed by Mr. Eitaro Katayama, Managing Director of the Light Metal Smelters' Association.

The team undertook field surveys in connection with the feasibility of establishing the afore-mentioned industry for twenty five days from November through December 1969, in accordance with the plan of operation for the project.

It is our sincere hope that this report will be of great help to the development of the project thereby making contributions to the industrial advancement as well as the improvement of the people's welfare in the riparian countries.

Finally, on behalf of OTCA, I would like to extend my heartfelt gratitude to officials of the Mekong Committee and the Government of Khmer Republic for their kind cooperation and assistance.

January 1971

Keiichi Tatsuke
Director General

Overseas Technical Cooperation
Agency

LETTER OF TRANSMITTAL

Mr. Keiichi Tatsuke
Director General
Overseas Technical Cooperation Agency

Dear Sir:

Transmitted herewith is a report on the Plan for Establishing an Aluminium Industry in Khmer Republic.

This report contains the findings of a feasibility study carried out from technical and economic viewpoints for the establishment of an aluminium smelting industry at Kompong Som in Khmer Republic, based upon imported alumina and the utilization of electric power from the Sambor project.

The survey team was organized at the request of the Overseas Technical Cooperation Agency, and was dispatched to the proposed site in November, 1969.

The survey team carried out a field investigation in compliance with the Plan of Operation, and formulated a plan for the establishment of an aluminium smelting industry, using the findings of the investigation. This report has been prepared upon further careful studies made on the technical and economic feasibility of the project.

According to the Plan of Operation, Kompong Som is specified as the site for the construction of an aluminium smelting plant. For an aluminium smelting industry, which would require large quantities of raw materials to be imported and would manufacture products to be exported, any location which does not provide marine transportation facilities would be meaningless. In this sense, Kompong Som is the only seaport in Khmer Republic which can possibly provide facilities for marine transportation indispensable to an aluminium smelting industry.

Viewed in this light, an investigation and study were made concerning Kompong Som, and the results of that investigation and study reveal that the location most suitable for the construction of an aluminium smelting plant would be the 'free zone' to be reclaimed in the near future under the extension project of the same port. However, as the reclamation work for this 'free zone' has not yet commenced, the actual location should be finally decided only after conducting a thorough investigation upon completion of the reclamation work.

However, it would be possible to select a site for an aluminium smelting plant in the neighborhood of the 'free zone' if the aluminium smelting plant were not allowed to occupy a greater part of the 'free zone'.

The general outline of the plan of establishing an aluminium smelting industry is as follows:

The construction work is to be carried out in three consecutive stages for the scale of an annual production of 120,000 tons of aluminium. It would be advisable to double this production capacity to obtain more economical operation of the aluminium smelting plant.

The electrolytic pot to be used is of the 100,000 amp. vertical Söderberg type. One system, having 164 electrolytic pots, will be installed in a building, and so a total of 492 electro-

lytic pots will be installed in three buildings. In addition to this, a casting shop, electrical equipment and incidental facilities will also be installed.

The total construction cost of these facilities is estimated at US$117,500,000.- (42.3 billion Yen) or US$979.- for one ton of aluminium. It is inevitable that the construction cost is comparatively high due to the situation under which all construction materials, machinery and devices are to be imported from foreign countries. However, the aforementioned construction cost is well within the international average level, and is considered as reasonable. Besides the amount mentioned above, it will be necessary to procure construction funds amounting to US$123,900,000.- to cover the interest during construction and other expenditures.

It is recommended that long-term loans at low interest rates be obtained from international financial institutions which will take into account the importance of economic development of developing countries procuring the above mentioned construction funds.

The production cost in an ordinary year is calculated as US$446.30 per ton of aluminium, including the interest during construction and the cost of manufactured goods. This production cost is considered reasonable and is well within the limit of the international standard cost.

The cost of materials comprises 57.1% of the total production cost, of which the cost of electric power is as low as 9.1%. Low cost of electric power is very desirable for an aluminium smelting industry, and it may be said that the low rate of 2.5 mills/kWh, at which the power is to be supplied under the Sambor project, is extremely attractive to an aluminium smelting industry which consumes a huge amount of electric power.

It would not be an exaggeration to say that the feasibility of any aluminium smelting project as well as the economical operation of the same depends entirely on the availability of cheap electric power.

As the period of investigation was short, the survey team was not able to carry out an elaborate investigation so as to make a definite and accurate conclusion. Hence, the team tried to grasp the actual situation of the proposed site to the extent absolutely necessary for the preparation of a pre-feasibility report. Therefore, it is requested that the investigation carried out this time be considered a mere preliminary feasibility study. It is also requested that special consideration be given to the implementation of a more detailed investigation for a aluminium smelting industry project in the future, keeping pace with the progress of various other projects.

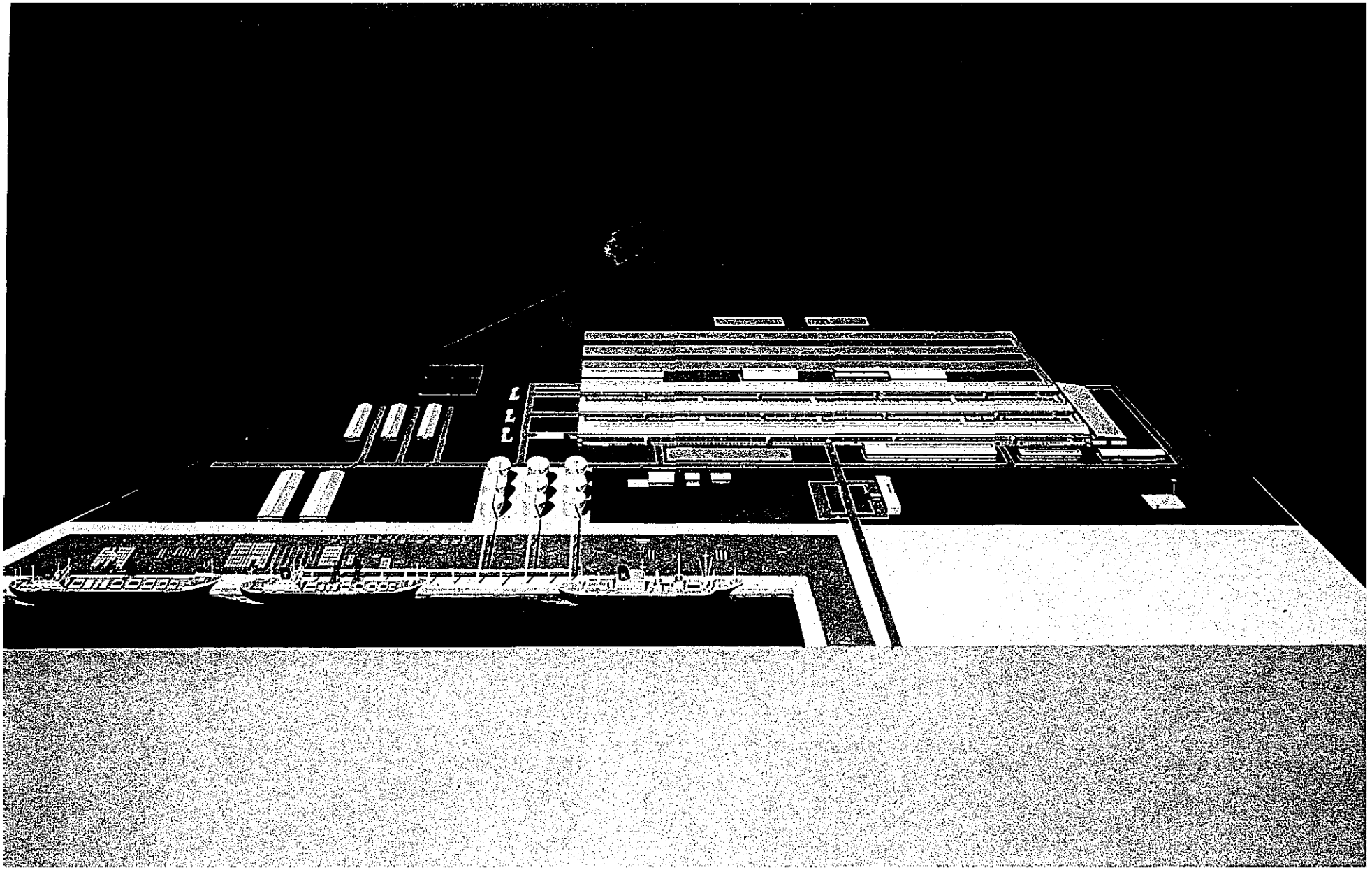
On behalf of the survey team, I would like to express our sincere thanks to all persons concerned for the in valuable cooperation they gave us in connection with the preparation of this report. We are also extremely grateful to all persons concerned in the Government of Khmer Republic, Committee for Coordination of Investigations of the Lower Mekong Basin of ECAFE, and the Japanese Embassy for the generous and helpful cooperation extended to the survey team in connection with the field investigation carried out during this time.

I sincerely wish for the early establishment of an aluminium smelting industry which would follow the early completion of the Sambor project since it will contribute to the industrial and economic development and the welfare of the people of the four riparian countries.

Respectfully yours,

January 1971

Eitaro Kitayama
Leader of the Japanese
Survey Team Concerning
the Plan of Establishing
an Aluminium Smelting
Industry in Khmer Republic



Amount of Construction Cost

Buildings	US$ 38,900,000	(14.0 billion Yen)
Equipment	US$ 78,600,000	(28.3 billion Yen)
Interest during construction	US$ 3,600,000	(1.3 billion Yen)
Miscellaneous expense	US$ 2,800,000	(1.0 billion Yen)
Total	US$123,900,000	(44.6 billion Yen)

1. Site for construction of plant:

   Free Port Zone in Kompong Som City, Cambodia

2. Area required for the plant: 110 hectares

3. Production scale of aluminium ingot (annual production)

1st Stage	40,000 MT
2nd Stage	40,000 MT
3rd Stage	40,000 MT
Total	120,000 MT

4. Production system: Vertical Söderberg type

5. Ampere capacity in electrolytic pot: 100,000 Amp.

6. Number of electrolytic pots:

1st Stage	164 pots
2nd Stage	164 pots
3rd Stage	164 pots
Total	492 pots

7. Construction Period: 5 years (Completion for full operation)

8. Materials required for the construction:

Cement	60,000 tons
Reinforcing bar	15,000 tons
Mold steel	20,000 tons
Concrete pile	60,000 piles

9. Building area 137,000m^2 (Total floor area 226,500m^2)

Electrolytic plant (3 buildings)	75,600 m^2 (151,200 m^2)
Rectifier house (1 building)	9,600 m^2 (19,200 m^2)
Casting factory (1 building)	5,250 m^2 (5,250 m^2)
Others	46,550 m^2 (50,850 m^2)

10. Electrical equipment

    Facilities for receiving power supply
    Intermediate transformers: Three-phase transformer

	90 MVA, 4 units
Rectifiers: Silicon rectifier	820 V 35 KA 4 sets
Substation equipment for power use:	Three-phase transformer 30 MVA, 2 units

11. Casting facilities

Furnace	Heavy oil furnace
"	Electric furnace
Ingot caster	Water-cooling, continuous type
Stacking machine	

12. Furnace operating devices

Supply tapping device	Velocipedic crane
	Half-portal crane
	Vacuum suction type tank
Anode device	Spike pulling crane
	Subframe for lifting bur-bar
	Paste supply car

13. Utilities

Industrial water:	5,000 - 6,000 t/day
Drinking water:	500 t/day
Sea water:	5,000 t/day
Heavy oil and other oils	

14. Harbor facilities and cargo handling facilities

Volume of goods handled	43,000 tons/year
Wharf	2 berths
Water depth of harbor	10 m
Cargo handling facilities	Unloader, belt conveyor, bucket elevator

15. Warehouse and its capacity

Alumina	Volume	60,000 tons
Cryolite	Volume	1,500 tons
Anode paste	Volume	15,000 tons
Repair of lining		
Bed carbon		1,000 tons
Lining paste		750 tons
Bricks		2,000 tons
Cathode bar		750 tons

16. Welfare facilities on separate site

Required area	60,000 m^2
Details of facilities:	Employees houses, swimming pool, assembly hall, shop, dining room.

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CHAPTER I

INTRODUCTION

CHAPTER 1
INTRODUCTION

1.1 CIRCUMSTANCES

During the Thirty-second Mekong Committee Session held in Tokyo in April 1967, Executive Agent Dr. C. Hart Schaaf requested Mr. Kikuo Yasuda, Chairman of Light Metal Smelters' Association, to cooperate in a feasibility study for the establishment of an aluminium smelting industry related to the Sambor Project in Khmer Republic.

Later, a formal request was made in a letter dated March 4, 1968 by Executive Agent Dr. Schaaf addressed to Mr. Akira Yamato, a Japanese representative of ECAFE.

The Japanese Government replied to the above letter stating that the matter would be taken into consideration at a discussion of the Mekong Committee after the final Sambor Project Report had been submitted.

The Sambor Project Report was completed in July, 1969, and was transmitted in September of the same year to the Twelfth Meeting of the Mekong Committee Advisory Board.

At the Forth-second Mekong Committee Session held from September 11 to September 13, 1969 in Bangkok, the Japanese Government announced that it was ready and prepared to study the feasibility of establishing an aluminium smelting industry as a necessary condition for the Sambor Project.

The Japanese Government entrusted the Overseas Technical Cooperation Agency with the Pre-feasibility survey for the aluminium smelting industry project of Khmer Republic, and it was decided that the same agency would nominate the leader and members of the survey team to be dispatched to Khmer Republic.

1.2 OBJECTIVE OF THIS INVESTIGATION

1.2.1 The objective of this investigation is to carry out a Pre-feasibility study to determine the economic and dechnical possibilities of establishing an aluminium smelting plant at Kompong Som (formerly called Sihanoukville) in Khmer Republic by importing alumina and utilizing power from the Sambor Project in compliance with the Plan of Operation.

1.2.2 The following is to be investigated:

(a) Study of the Pre-feasibility of starting an enterprise of exporting surplus aluminium ingot by establishing an aluminium smelting industry in Kompong Som area in Khmer Republic, importing alumina and utilizing power from the Sambor Project.

(b) Determination of the production scale and the site for construction of the plant.

(c) Indication of the amount of investment to be required for the construction of the plant, harbor and other facilities necessary for the import of alumina and the export of surplus aluminium ingot.

Preparation of the provisional layout of the plant, and the equipment for handling raw materials and manufactured goods at the plant and harbor.

(d) Indication of the most advantageous source of supply of raw materials and markets for the manufactured goods.

(e) *Preparation of a Pre-feasibility report which justifies the financial appropriateness* of establishing an aluminium smelting industry.

1.3 AN ADDRESS OF THANKS

On the occasion of submitting this report, the survey team would like to extend its heartfelt thanks to ECAFE, the Mekong Committee, the Government of Khmer Republic and all related authorities concerned for their most generous support and cooperation which were extended to the team during the course of its field investigations, providing the team with all necessary facilities, valuable data, useful information, etc.

It is sincerely hoped that this report will be useful to the Mekong Committee and the Government of Khmer Republic for implementation in the Sambor Project.

CHAPTER 2

CONCLUSION & RECOMMENDATION

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CONCLUSIONS & RECOMMENDATIONS

2.1 PREMISE OF INVESTIGATION

The objective of this investigation is to study the financial and technical possiblities, in compliance with the Plan of Operation, of establishing an aluminium smelting industry at Kompong Som in Cambodia, importing alumina and using the power supply which will be made available by the implementation of the proposed Sambor Project.

The total annual power energy output scheduled under the Sambor Project is 7,000 GWH, of which 4,100 GWH is firm power energy and 2,900 GWH is surplus power energy. It is said that about 2,000 GWH, or almost one half of the firm power energy, can be supplied to the aluminium smelting industry. Moreover, it is scheduled to send power from Sambor to Kompong Som by 345 KV transmission lines of double circuits, and for the aluminium smelting plant, power is to be supplied at the rate of 2.5 mills/kWh at the secondary side of the plant's power receiving facilities.

The main raw material, alumina, as clearly stated in the Plan of Operation, is assumed to be imported. Studies were also made of other raw materials such as anode paste, cryolite and aluminium fluoride on the assumption that tyey too are to be imported.

As Kompong Som is specified in the Plan of Operation as the location of the plant, the suitability of this area was studied.

As the time allowed for this investigation was short and also there were many doubtful points as to the actual conditions of the site, it was not possible to carry out a thorough investigation. Therefore, the survey team tried to grasp the actual conditions of the proposed site only to the extent absolutely necessary. In this respect, thise investigation should be regarded as a preliminary feasibility study.

2.2 CONCLUSION

2.2.1 Location of Plant

Kompong Som will be the location of the aluminium smelting plant specified in the Plan of Operation. As a matter of fact, it is impossible to consider a location without marine transportation facilities, particularly in the case of an aluminium smelting industry which involves the import and export of a huge quantity of raw materials and manufactured goods. It is considered that Kompong Som, the only seaport of Cambodia, is the only location which satisfies the above mentioned requirements.

Under this assumption, an investigation of the Kompong Som area was carried out and studies were made of the results of this investigation. Consequently, the survey team arrived at the conclusion that the most suitable location for the establishment of an aluminium smelting plant would be the free zone on the reclaimed land to be created in the near future under the expansion project of Kompong Som Port. However, only the outer breakwater has already been constructed in this area, and land reclamation has not yet commenced. Therefore, the suitability of this area for the construction of an aluminium smelting plant should be decided upon completion of the said reclamation work.

In anticipation of the future expansion of the plant, 110 hectares of land is being considered as the site for the aluminium smelting plant. This means that the plant will occupy nearly 50% of the 242 hectares scheduled for the industrial area. It seems that the Government of Cambodia intends to invite many light industries to the free zone, and the establishment of an aluminium industry in this free zone would certainly reduce space available for other industries. Another problem is whether it would be possible to retain this area as a proposed site for an aluminium smelting plant without commencing the construction work until the completion of the Sambor Project.

Even if it should be decided to abandon the idea of using the free zone for the above reasons, it would not be difficult to choose a site in the neighboring area of the free zone.

The saite in the industrial area is expected to be leased upon completion of land reclamation.

This aluminium smelting plant will require the exclusive use of two berths, large enough for 20,000-ton class ships to moor alongside. It is expected that the construction of a wharf will be completed as a government project, and the survey team would like to state here clearly that the construction cost of the aluminium smelting industry project does not include the construction of the above-mentioned berths.

2.2.2 Production Scale

The annual production scale of the aluminium smelting plant will be 120,000 tons of aluminium, and the construction of the plant is to be carried out in the following three consecutive stages:

1st Stage	For annual production of 40,000 tons of aluminium ingot
2nd Stage	For annual production of 40,000 tons of aluminium ingot
3rd Stage	For annual production of 40,000 tons of aluminium ingot
Total	Annual production of 120,000 tons of aluminium ingot

The above is considered reasonable, being calculated on the basis of 250,000 kW of firm power energy scheduled to be supplied from the Sambor Power Station.

It is advisable to eventually double the production capacity of the plant, and the survey team is fully confident that such would further increase the profitability of the plant.

In case the Pa Mong Project is carried out in connection with the Sambor Project, it would be possible to increase the production capacity to 240,000 tons so far as the supply of power energy is concerned. With this in mind, a larger space has been reserved for the site under this project to prepare for the future expansion of the plant.

2.2.3 Type and Capacity of Electrolytic pot

The type of electrolytic pot to be used in this project is the 100,000 Amp. vertical Söderberg type. Both Söderberg and Prebake types are being used internationally, and each has its own special features so that it is difficult to choose one out of the two.
It should be noted that larger sized electrolytic pots are tending to be used throughout the world, but 100,000 Amp. electrolytic pot has been chosen for this project in consideration of the situation in Japan, i.e. Japan's long experience in using this type pot in her aluminium industry, and her technical confidence in the construction and operation of such.

2.2.4 Major Equipment

The major equipment include the following, and the tentative layout is as shown in the attached drawing.

Electrolytic factory: The electrolytic pot is the 100,000 Amp. vertical Södergerg type. One line of 164 pots will be installed in two rows in a building. The total number of pots will be 492 in 3 lines.

The plant will be equipped with operating devices for electroytic pots, cranes, bus bars, gas scrubbers, and power distribution lines.

Casting factory: Holding furnaces, ingot casters, and cranes.

Electrical installation:
Main transformer, power transformer, voltage regulator, silicon rectifier, switchboard, cutting switch, and bus bars.

Supplementary equipment:
Loading and unloading facilities, transportation facilities, silo for alumina, warehouse, repair shop, water supply and welfare facilities.

2.2.5 Construction Cost

The construction cost of this project has been estimated as shown in the following table. This is the total amount of the construction cost of earth work, structures, machine foundations and installation work. It is to be noted that this cost does not include the expenses of the construction of the harbor, wharf and other works to be completed under the free port project of the Government of Cambodia.

Unit: US$1,000,000.-
( ) 100 million Yen

Equipment	Building	Machines	Total
Electrolytic factory	19.7 (71)	54.2 (195)	73.9 (266)
Casting factory	3.4 (12)	9.4 (34)	12.8 (46)
Electrical installation	2.2 (8)	2.2 (8)	4.4 (16)
Supplementary equipment, etc.	13.6 (49)	12.8 (46)	26.4 (95)
Total	38.9 (140)	78.6 (283)	117.5 (423)

At present, a construction cost of approximately US$1,000.- is accepted internationally as normal for the annual production capacity of 1 ton of aluminium. The amount of investment per ton of production capacity decreases slightly when the production scale of a plant gets larger, and it is believed that the construction cost decreases to about US$800.- for a plant producing more than 100,000 tons per year. In this project, the construction cost per ton of production capacity has been estimated at US$979. It is inevitable that the construction cost is little higher for this project because most of the construction materials, various equipment for production, machinery and devices, etc., depend upon imports from overseas countries.

It is clearly stated in 'Preinvestment Data for the Aluminium Industry' (United Nations Information ST/CID/9) that the cost of construction of a plant in a developing country is approximately 20% higher than that in an advanced country. Therefore, it could be considered that the construction cost calculated for this project corresponds to the standard international level of developing countries. Interest during construction and general administrative expenses are estimated at US$3,600,000 and US$2,800,000 respectively, and the total amount of funds to be raised is US$123,900,000 (44.6 billion Yen).

As the construction cost will have much influence on depreciation expenses and interest payable which form a large proportion of the cost, it is necessary to obtain a long-term loan at a low interest rate from international financial institutions which will take into account the importance of economic development of developing countries.

2.2.6 Production Cost

The estimated production cost of aluminium ingot in this project is as shown in the following table.

	Cost Per Ton of Aluminium Ingot		Percent of Total
Cost of Raw Materials			
Alumina	US$145.50	(¥ 52,400.-)	32.6%
Electric power	40.80	(¥ 14,700.-)	9.1
Cryolite	11.60	(¥ 4,200.-)	2.6
Aluminium fluoride	10.80	(¥ 3,900.-)	2.4
Paste	41.00	(¥ 14,800.-)	9.2
Others	5.60	(¥ 2,000.-)	1.2
Sub-total	255.30	(¥ 92,000.-)	57.1
Cost of Labor	10.30	(¥ 3,700.-)	2.3
Expenses			
Depreciation expense	71.10	(¥ 25,600.-)	15.9
Cost of repair	34.30	(¥ 12,300.-)	7.7
Tech. guidance	18.30	(¥ 6,600.-)	4.1
Rent (land)	5.70	(¥ 2,100.-)	1.3
Others	8.30	(¥ 3,000.-)	1.9
Sub-total	137.70	(¥ 49,600.-)	30.9
Forging loss	1.70	(¥ 600.-)	0.4
Total manufacturing cost	405.00	(¥145,900.-)	90.7
Interest on equipment	24.40	(¥ 8,800.-)	5.5
Interest on operating fund	8.60	(¥ 3,100.-)	1.9
Direct selling expenses	8.30	(¥ 3,000.-)	1.9
Grand Total	US$446.30	(¥160,800.-)	100.0%

Unit of the cost of raw materials was decided according to the past records of an aluminium smelting plant of the same production system in Japan, and also taking into consideration the special circumstances of this project. All raw materials, with the exception of electric power, are to be imported, and the prices are assumed to include the anticipated future price rise. The cost of labor is calculated only for Cambodian employees. The number of employees is assumed to be 2,200 persons, and a 3% wage raise per year has been taken into consideration. The expenses are depreciation expense, cost of repair, technical guidance cost, and rent for land. The depreciation expense is calculated on the basis of the fixed instalment method, assuming a useful life of 13 years.

The cost of repairs has been calculated as 3.5% of the construction cost, and the technical guidance cost consists of depreciation expense on royalty and payment for technical directors. The rent of the land is decided according to the rent in general industrial areas in Cambodia. Interest on equipment is calculated on the basis of the total construction fund (dividend on capital is excepted) of a loan of 13 years at an annual rate of 7%.
Interest on the operating fund is calculated on inventories at an annual rate of 10% with the possibility of refinancing.

In addition to the above, charges for packaging and shipping are calculated as direct selling expenses. Thus the total manufacturing cost including interest in a normal year comes to US$446.30 per ton of aluminium ingot. The cost of raw materials and the expenses comprise the largest proportion of the total manufacturing cost,being 57.1% and 30.9% respectively. The total amount of these two constitutes 88% of the production cost. According to 'Pre-investment Data for the Aluminium Industry' (United Nations Information ST/CID/9), the production cost at a plant having an annual production capacity of 100,000 tons is calculated at US$450.-/ton. The cost of raw materials comprises 62% or US$279.00 and the general administrative expenses including the depreciation expense comprise 20.2% or US$90.00, while the total of both of these comprises 82.2% of the production cost.

In the case of Japan, the data of the Industrial Structure Research Institute show that the cost of raw materials comprises 65.6% and the expenses 18.8%, while the total of both of them comprises 84.4% of the total production cost. As explained above, the result of the trial estimate of the production cost in this project shows that the total manufacturing cost including interest is US$446.30 per ton of aluminium ingot. The major factors of the cost are within the average international standard, and it could be said that this production cost is as reasonable as that of any developing country. The cheap power rate of 2.5 mills/kWh is certainly attractive to an aluminium smelting industry.

2.2.7 Alumina and Other Raw Materials

Although a mine search for bauxite in Cambodia is scheduled to be carry out under the 2nd Five-Year Program, it would be rather difficult to predict the discovery in the near future of bauxite satisfactory for use as raw material in an aluminium industry.
As an integrated method of production of aluminium through the alumina process from imported bauxite would involve many problems, this project of establishing an aluminium smelting industry is studied on the premise that it would rely upon imports as specified in the Plan of Operation.

Under the existing circumstances, the countries which can supply alumina for this project will be Japan and Australia, but from where alumina should actually be imported must be decided according to the profitability, and it should be left to the judgement of the enterprise which actually implements this project.

It has been decided to import anode paste, cryolite and aluminium fluoride, but it will be necessary to study in the future the economic possibility of producing anode paste domestically.

2.2.8 Demand for Aluminium

The quantity of aluminium now being consumed annually in Cambodia is 400 to 600 tons of aluminium sheet or circles for manufacturing utensils. No drastic increase in the demand for aluminium can be expected in Cambodia. Naturally, most aluminium ingots, which will be produced by the proposed aluminium smelting industry, will have to be exported to those countries who have secondary and tertiary fabricating industries.

However, it is economically desirable to locate the aluminium smelting industry close to the ingot consuming areas. From this view point, it is not necessary to limit the market to Cambodia alone. Rather, it is desirable to carry out an investigation of the demand for aluminium not only in the riparian countries of the Mekong but also in all the ECAFE countries, at the same time taking necessary measures for the development of the market and the aluminium fabricating industry in these countries.

2.2.9 Benefits

Materialization of an aluminium industry based upon this project will not only contribute to the national gain by the profit of the aluminium smelting industry alone, but will also bring about many indirect benefits. In other words, it would contribute not only to the industrial and economic growth of Cambodia but also to the welfare of the people of Cambodia.

First, it will increase employment. This project is scheduled to employ 2,200 Cambodians. Hence, it may serve to improve the labor situation.

Secondly, it will be useful in elevating the general industrial standard of Cambodia. There are many state-owned enterprises in Cambodia, and all of them are equipped with modern facilities. However, most of the private enterprises are extremely small in scale, and the industrial standard is generally considered low.
The weakness of this project is that it lacks the related industries which are absolutely necessary in establishing a large-scaled enterprise like an aluminium smelting plant. However, we are convinced that the related industries will be raised up and reinforced in the future as the main support of the aluminium smelting industry, and the general industrial standard will be greatly elevated.

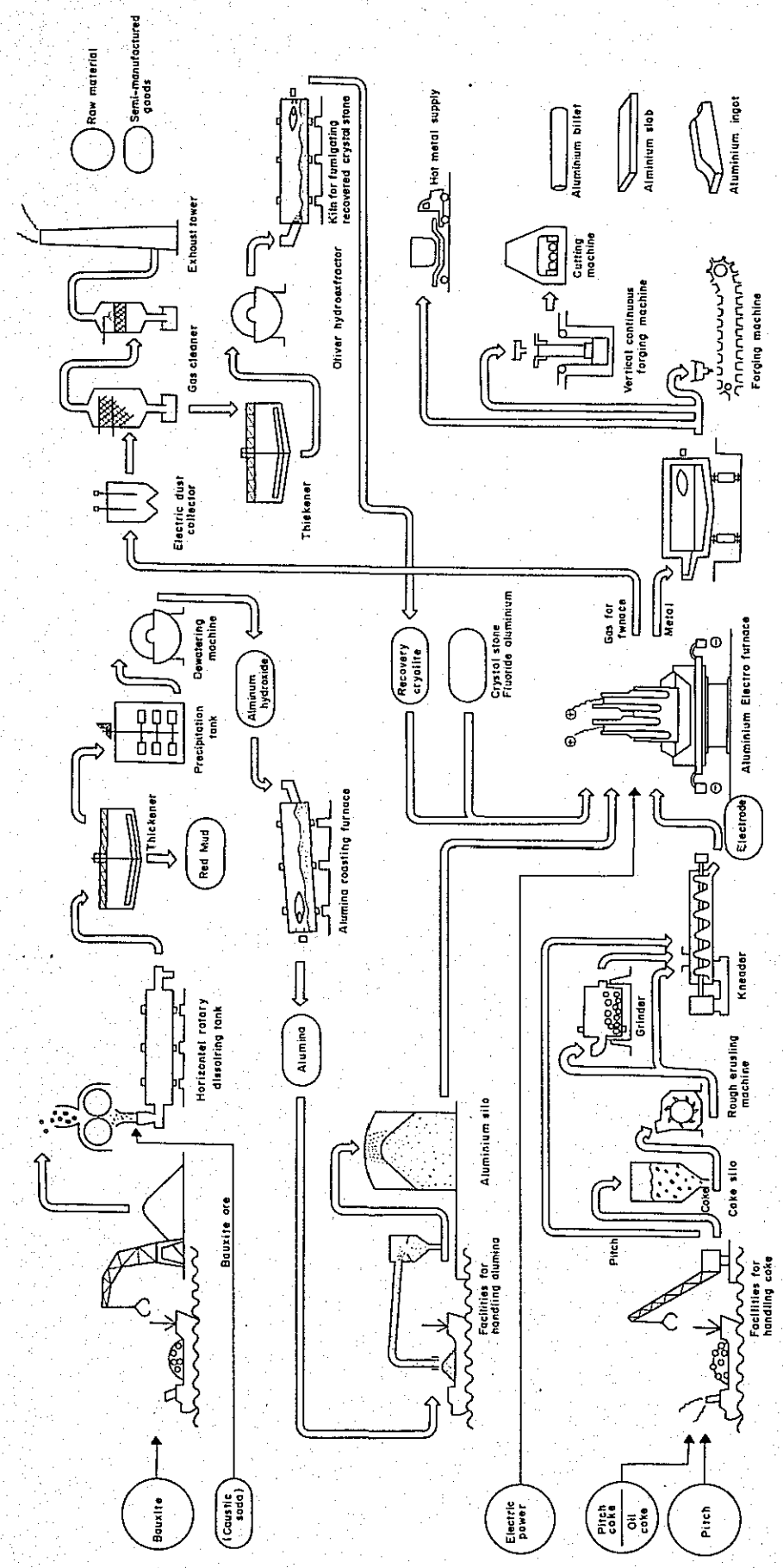
Thirdly, the establishment of an aluminium smelting industry will promote the development of an aluminium fabricating industry, and the export of fabricated aluminium goods will also become possible. Thus it will increase the value of aluminium ingot, as well as play a role in expanding the foreign trade of Cambodia and thereby improving Cambodia's balance of payments in international trade.

2.3 RECOMMENDATION

As the time allowed for this investigation was very short, and there were many doubtful points as to the actual condition of the proposed project site, it was considered that it would be too difficult to carry out an exhaustive investigation, and so the extent of this investigation was limited to merely grasping the actual minimal conditions required for a preliminary Pre-feasibility study.

The survey team has come to the conclusion that the industrial area to be established under the projected Kompong Som Free Port Expansion Project would be the location most suitable for the aluminium smelting plant. However, the outer breakwater is the only thing completed in this area at present, and it is not possible to foresee the site which will be completed in the future after land reclamation is carried out. Naturally, it would be a mistake to arrive at a final conclusion just by relying on the results of investigation carried out this time. In view of the importance of the Pre-feasibility study for the proposed aluminium smelting industry project, the survey team would like to recommend that a further investigation should be undertaken on a full scale in the future in conjunction with the progress of the Sambor Project.

Fig. 1 Diagram Showing Manufacturing Process



CHAPTER 3

ALUMINIUM SMELTING INDUSTRY PROJECT

CHAPTER 3

ALUMINIUM SMELTING INDUSTRY PROJECT

3.1 ALUMINIUM SITUATION OF THE WORLD

3.1.1 History of Production of Aluminium ingot

In 1807, Sir Humphry Davy confirmed the existence of a new metal and called it 'aluminium'. Thereafter, many scientists tried to extract it, and there actually was some aluminium industrialization in France, England and the U.S., but it did not reach the stage of commercial production. Strangely enough, Paul Louis Toussaint Heroult, a French chemist, and Charles Martin Hall, an American university student, in 1886 were concurrently successful in separating alumina into oxygen and aluminium by means of electrolysis in melted cryolite. Since then, this electrolytic process has not changed basically, and it is still the only method of producing aluminium used in modern large-scale aluminium smelting plants.

In 1888, an Austrian chemist Karl Joseph Bayer invented the so-called 'Bayer Process' for producing alumina. This process extracts alumina by dissolving bauxite in an alkali solution. This process has been improved slightly, but no changes have been made in the major process so far. Therefore, with few exceptions, bauxite remains as the most common raw material for alumina. The electrolysis of alumina is carried out by using hydroelectric power or thermal power of petroleum or coal.

The manufacturing process of aluminium ingot is as shown in Fig. 1.

3.1.2 Present Conditions of the Aluminium Smelting Industry

Aluminium is used as a basic material in all modern industries and is called the metal of the 20th century. It has shown the highest growth rate among all practical metals, and now maintains an important position next to iron and steel.

The aluminium smelting industry in all countries of the world is under the monopolistic management of a small number of enterprises since it requires good sources for the supply of raw materials, advanced manufacturing techniques, a well organized production system and large investments. In other words, among the 33 aluminium producing countries, there are no more than three enterprises in any country, with the exception of the U.S., Norway, India and Japan, and there are many countries in which the management is monopolized by a single company.

The majority of the aluminium smelting plants established in 1960's have an annual production capacity of more than 100,000 tons, and some exceed 200,000 tons. The production systems now being commonly used are the Prebaked and the Södergerg systems, but it is difficult to choose between the two.

Electrolytic pots of 100,000 Amp. are quite common, and ultra large pots of 150,000 amp. can be found in the USSR.

In reference to the manufacture of alumina mass production has a great advantage in reducing the production cost, so the production scale of such plants tends to become large.

In the U.S., alumina plants with a production capacity of less than 300,000 tons disappeared several years ago, and today plants with an annual production capacity of more than 1,000,000 tons can be found in many locations.

3.1.3 Conditions of Production of Aluminium Ingot

There were only six countries in the beginning of the 20th century which produced aluminium ingot, and the annual production was as low as 5,700 tons. The number of aluminium producing countries increased to 24 in 1950's, and the annual production reached 4,000,000 tons. Joined by Mexico, Surinam, Romania, Greece, Netherlands, Ghana, Venezuela, Iceland and the Republic of Korea, the number of aluminium producing countries increased to 33 in the 1960's. Including eight firms in the U.S., the number of enterprises is now 63, and the annual production has exceeded 9,000,000 tons in the short period of 70 years.

In 1969, the largest producing country in the free world is the U.S., whose production reached 3,441,000 tons, comprising almost 46.3% of the total production of free world, followed by Canada's 983,500 tons, Japan's 568,800 tons, Norway's 502,200 tons, France's 371,700 tons, West Germany's 262,700 tons. The total production of the free world reached 7,435,700 tons.

Although the figures for the communist countries are based upon some assumptions, the largest producing country is USSR whose production is estimated at 1,450,000 tons, followed by Red China's 130,000 tons, Poland's 96,800 tons, Romania's 89,600 tons, Hungary's 65,400 tons, and Czechoslovakia's 6,200 tons.

World production has reached 9,379,100 tons, the highest in history, showing a growth of 10.7% compared to that of the preceeding year. Moreover, production of aluminium ingot has continued to grow in the past ten years at an 8.7% average growth rate. Regionally, the continent of America has the largest production, 4,569,900 tons, equivalent to 61.5% of the total production of the free world. The continent of Europe produced 1,863,200 tons, the continent of Asia 727,400 tons, the continent of Africa 157,700 tons, and Oceania 117,500 tons. (Note: These figures do not include the production of the communist bloc.)

Aluminium production of the world has been proving repeatedly the old saying that it doubles every 10 years. As the result of this remarkable growth, the production of aluminium exceeded that of all other competing non-ferrous metals in the later half of the 1950's. In volume, aluminium has remained in the top position among all other non-ferrous metals ever since 1940. According to the data of the U.S. Mining Bureau, it is estimated that the demand for aluminium will exceed 26,000,000 tons by 1980 which will be 2 times that of copper, 3 times that of zinc, and 6 times that of lead, and this remarkable growth must be seriously contemplated.

3.1.4 The Conditions Which Are Causing Changes in the Location of Aluminium Smelting Industries

Aluminium satisfies the requirements of all modern industries by its unlimited uses, the abundance of its raw materials, the special characteristics of the metal, and its relatively stable price.

Hitherto, the production of aluminium had been concentrated in the major consuming countries, in other words, the advanced industrial countries. Particularly, the conditions of the high standards of manufacturing techniques, large investments and various other factors such as developed related industries and the markets had formed a barrier against new entry of this

industry not only into the developing countries, but also in the advanced countries. It is only recently that the production of aluminium was commenced in the developing countries which have rich sources of bauxite, hydroelectric power, and labor available at a low cost. Now the barrier against the entry of developing countries into the aluminium smelting industry has finally been removed, and there will be a tendency for the aluminium smelting industry to diffuse hereafter.

In the 1970's, it is anticipated that advanced countries will supply themselves, while developing countries will rapidly become producers.

More than one-third of the aluminium smelting plants in the U.S. are located in the northern part of the Pacific coast and quite a number of the remaining two-thirds are distributed over the valleys in Tennessee and Ohio. In France, most of the plants are concentrated in the districts of the French Alps and Pyrenees. Both of these countries established aluminium smelting industries early as they have cheap and rich suppliers of nydro-electric power. As the above clearly indicates, the greatest factor which controls the location of aluminium smelting industries has been the source of cheap and abundant electric power. However, such power sources in the advanced countries are gradually becoming more and more scarce, and the cost of power generation has risen remarkably. Owing to the above mentioned situation, many advanced countries of the world in recent years have turned their eyes toward potential hydropower sources in the developing countries.

As bauxite resources are maldistributed, existing only in the zone within lat. 20^{o}N. and lat. 20^{o}S. centering around the equator, there is a tendency to locate alumina plants in the area where there are bauxite resources. The shortage of overhead capital is being solved rapidly, and the industrialization plan is being promoted in such a way that the location of aluminium smelting industries tends to be decided in the developing countries regardless of the disadvantages of the geographical location relative to the consumer markets. The eight new aluminium producing countries, namely, Surinam, Romania, Greece, Netherlands, Ghana, Venezuela, Iceland and the Republic of Korea, born after 1964, are good examples of the establishment of aluminium smelting industry in the way mentioned above.

It is almost certain that the expansion and scattering of the aluminium smelting industry based upon the utilization of undeveloped natural resources supplied with extensive international capital and manufacturing techniques will be carried out more extensively in the future.

3.2 LOCATION OF ALUMINIUM SMELTING PLANT

3.2.1 Outline

The survey team investigated Kompong Som City, a proposed site for the establishment of an aluminium smelting plant of annual production capacity of 120,000 tons. Alumina and other raw materials must be imported, but power can be supplied from the Sambor Power Station at low cost.

Since a large quantity (over 300,000 tons) of raw materials must be imported to produce 120,000 tons of aluminium annually the existence of a good harbor is a necessary condition for the economical production of aluminium. Viewed in this light, there is no other area than Kompong Som area in Cambodia which can satisfy this requirement. Kompong Som is in Kampot Province, and there is nothing special which hinders the establishment of an aluminium smelting plant with respect to the topographical, meteorological, harbor or other conditions.

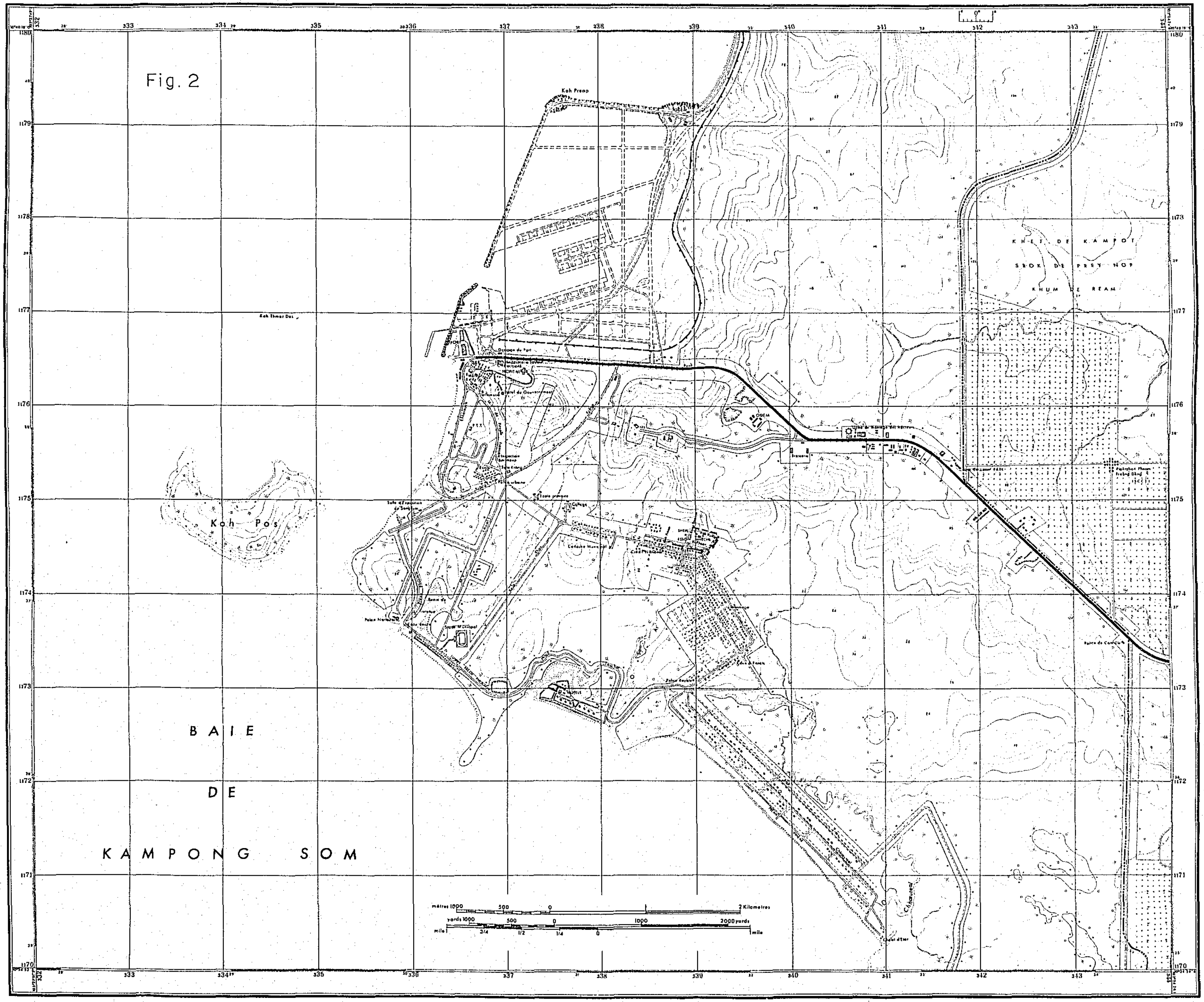

BAIE
DE
KAMPONG SOM
Koh Pos
KHET DE KAMPOT
SROK DE PREY NOP
KHUM DE REAM

Fig. 2

Consequently the survey team, as a result of the investigation conducted at this time, has concluded that this is the best location in Cambodia.

Hence, a Pre-feasibility study was conducted on the construction of an aluminium smelting plant in this area from this point of view.

3.2.2 Outline of the Area

3.2.2.1 Location of Kompong Som City

Kompong Som City is situated at about long. 103°30' E. and lat. 10°40' N. on the eastern entrance of the Bay of Kompong Som

Kompong Som City was developed in the middle of the 1950's as the only seaport of Cambodia, and the Government has organized this city as a special municipality from the standpoint that this is one of the most important areas in Cambodia.

3.2.2.2. Present Condition of Kompong Som City

Until about the 1950's, agriculture, forestry and fishery were the main industries in this area, but the number of people engaged in cargo handling, transportation and other harbor activities increased after the port was opened. With the establishment of a brewery, tractor assembly plant, petroleum refining plant and other government managed plants in recent years, the number of workers in the manufacturing industry is increasing, followed by the gradual growth of commercial and financing institutions. It is said that the population of the city including its neighboring areas is about 20,000.

This city is separated into a southern and a northern region by the arterial road which connects this city with Phnom Penh.

The area north of the arterial road is the area where the harbor and the free zone are situated. This is the area in which the Cambodian Government is planning to establish the expanded harbor, warehouses, and manufacturing industries.

The area south of the arterial road is slated to be used for government and public offices, residential districts and commercial districts with accompanying landscapes. The construction of a town under an excellent "city plan" is in progress. Both the northern and southern areas still have much intact land, and it is possible that this town will grow into a large city depending on the future enforcement of the policies.

3.2.2.3 Traffic Situation around Kompong Som City

With respect to overland traffic, this city is connected with the capital city Phnom Penh by a good arterial road 230 km long. Roads to Kampot City, Kep Special City and to other cities in the eastern area are also well maintained.

It is expected that a railway between Phnom Penh and Kompong Som will inaugurate service in the beginning of 1970. This railway will connect Kompong Som City with Phnom Penh by way of Kampot City and Takeo City, and in future, it will be possible to connect this city with the cities in the northern area such as Pursat and Battambang by rail. It is expected that the resulting interchange of commodities among all these areas will become very economical.

Again, Ream-Kompong Som Airport is situated in the area about 10 km east of Kompong Som City on the arterial road. Since this airport is now being improved and expanded under the 2nd Five-Year Program, it is quite possible that this airport can be used as an international airport in the future.

Kompong Som City is important for traffic because its port is the only sea port in Cambodia which has the facilities to accommodate large-sized ocean liners. Explanation of the harbor facilities will be given later.

3.2.3 Outline of Weather Conditions

The seasons can be classified into the dry season and the wet season which is quite common in the other countries of Southeast Asia. This area of Cambodia has a particularly large annual rainfall, and so the construction of a plant and its operation may be affected by the weather conditions to some extent. Again, as the temperatures are high, there is a possibility that such may affect adversely the operation of the electrolytic pots.

Though there are some problems relative to the weather conditions, these are not fatal defects, and more favorable factors do exist in other aspects of this project.

3.2.3.1 Rainfall

The seasons are clearly divided into two: the rainy season from May to October, and the dry season from November ot April. The statistics of rainfall recorded for the past three years from 1966 to 1968 are as shown in Table 1. These statistics show that the annual mean rainfall for the said three-year period is over 4,000 mm. The average of rainy days during the three months from June to August is about 25 days per month, and the rainfall reaches almost 2,300 mm. It seems that this area often experiences heavy rain in which the amount of rainfall exceeds 140 mm in the short period of 3 hours.

Such heavy rains will become a factor which will prolong the construction period and increase the construction cost. To minimize the damages from such heavy rain, it is absolutely necessary to exercise prudence in planning the construction schedule so that by all means the important outdoor construction work can be completed in the dry season.

Furthermore, it is necessary to give special consideration to the handling of raw materials which should be kept in a dry condition. Facilities for the handling and the storage of alumina should be considered from this viewpoint. As regards to oil coke, the handling of which is rather difficult in the wet season, it is recomended that this material be imported in the from of anode paste.

Table 1 Statistics of Rainfall at Kompong Som City

	Monthly Rainfall (Unit: mm)				Average Number of Rainy Days in the Three-Year Period (Unit: Day)	
	1966	1967	1968	Average for 3 Yeras	Number of Rainy Days	Rainfall of Over 10 mm
Jan	0	10.5	36.5	15.7	1.0	0.7
Feb	5.5	19.0	7.7	10.7	3.3	3.3
Mar	0	0	16.4	5.5	1.0	0
Apr	101.0	159.5	184.0	148.2	14.0	4.7
May	644.0	602.3	174.4	473.6	22.0	13.0
Jun	451.5	1028.5	343.0	607.7	22.3	10.0
Jul	1478.2	882.1	806.2	1055.5	27.3	17.0
Aug	572.5	973.5	412.7	652.9	27.3	15.3
Sep	386.5	280.3	757.0	474.6	23.7	12.0
Oct	614.5	508.2	227.5	450.1	22.0	11.3
Nov	323.5	41.5	37.3	134.1	9.0	3.0
Dec	142.0	0.7	30.2	57.6	6.7	0.6

3.2.3.2 Temperature and Humidity

Statistics of the monthly mean temperature and humidity of Kompong Som City recorded for the three-year period from 1966 to 1968 are shown in Table 2.

The monthly mean temperature for each month is quite stable at 26°C -- 28°C., but the difference between the highest and the lowest for each month is comparatively large, being more than 10°C. During the abovementioned three-year period, the highest was 35.5°C. and the lowest was 15°C.

As shown in Table 2, the temperature in this area is very high compared with the temperature in the major aluminium producing countries of the world. Since such high temperatures could be considered to affect adversely the labor efficiency and productivity, special consideration should be given to the structure of the buildings and other aspects in order to minimize the influence of this unfavorable atmospheric condition.

The humidity is also quite high, and the annual mean humidity for the three-year period recorded is approximately 83%.

Table 2 Temperature and Humidity of Kompong Som City

	Temperature (1966-1968) (Unit : °C)			Humidity (1966-1968) (Unit : %)		
	Mean	Highest	Lowest	Mean	Highest	Lowest
Jan	26.1	32.6	18.2	76.1	91.1	56.8
Feb	27.0	33.7	20.7	79.2	93.6	57.3
Mar	28.1	34.4	21.9	78.1	93.5	58.2
Apr	28.4	35.5	22.2	80.8	93.2	61.6
May	28.1	34.2	21.7	85.6	96.5	69.0
Jun	27.9	33.9	21.8	86.2	95.9	72.7
Jul	26.9	32.9	21.6	89.6	97.6	77.2
Aug	27.0	32.0	22.5	89.6	97.6	80.1
Sep	27.1	32.9	22.0	87.5	96.9	76.1
Oct	26.8	33.3	22.1	86.9	97.2	68.2
Nov	26.2	33.2	21.7	78.9	93.0	59.3
Dec	26.5	32.7	15.0	78.2	93.5	54.1

3.2.3.3 Wind Velocity

According to the statistical data recorded at Kompong Som City for the three-year period from 1966 to 1968, the wind blows from W or SW in the rainy season (May to October) (mostly west wind, followed by SSW, WSW, SW), and from NE in the dry season (November to April) (mostly NNE, followed by NE and SE).

The wind velocity is comparatively small, the maximum instantaneous wind speed recorded in the said three-year period was 11 m. per second.

3.2.3.4 Other Considerations

It is said that the Kompong Som area has never experienced a typhoon, earthquake, seismic sea wave, flood tide, tornado, floods, thunderbolt or such disasters, and this is considered an advantageous factor for the construction of a plant in this area.

3.2.4 Utilities

Utilities necessary for the production of aluminium are the power for motors and lighting (power for electrolysis forms the most important factor in the production of aluminium, and most producers of aluminium treat the power for electrolysis as a raw material), industrial and municipal water supply, heavy oil and other oils and fats.

3.2.4.1 Power for Motors and Lighting

It is the premise of this project that power for electrolysis as well as for motors and lighting will be supplied at low cost from the Sambor Power Station, therefore explanation on power for motors and lighting is omitted.

Since it is not possible, at present, to secure a stable supply of water in the quantity necessary for the production of aluminium in this area, a large-scale development of water resources will be required.

3.2.4.2 Water

In the aluminium smelting industry, water is indispensable for the cooling of casting machines and compressors, for the collection of exhaust gases, and for other purposes. Although the quantity of water required depends on the specifications of the equipment, the shape of the cast metals, and the extent of exhaust gas recovery, a plant with the annual production capacity of 120,000 tons of aluminium will probably require 5,000 to 6,000 tons of cooling water per day, even if circulating water is used for the casting section.

Although the Kompong Som area has much rainfall, there is a big difference between the amount of rainfall in the rainy season and the rainfall in the dry season. Since there is no favorable water source available at present, it is difficult to supply constantly the quantity of water required for the production of aluminium.

Cambodia has a plan of developing the Tuk Sup river as a source of industrial water to secure a supply of 40,000 tons/day of water by 1974. Stable supply of low cost industrial water can only be expected upon implementation of this plan.

As another way of securing a stable supply of water, a suggestion was made about digging a deep well, but this will require a thorough field investigation.

3.2.4.3. Heavy Oil and Other Oils

Other utilities required for aluminium smelting are heavy oil for the casting furnace, gasoline for vehicles, and oils and fats for machinery. As there is a petroleum refinery located on the northern part of the city, the supply is secured.

3.2.5 Harbors

When the main raw materials are not available in the neighboring area, a good harbor is a very important factor when deciding the location of an aluminium smelting plant.

Kompong Som is the only seaport of Cambodia, but it is a good port which can accommodate ships of the 10,000-ton class. Upon completion of the harbor project which is now progressing, this port will become suitable for the establishment of the aluminium industry.

3.2.5.1 Importance of Harbors for Aluminium Smelting Industry

The premise of this plan of establishing an aluminium plant is to import alumina and most of the raw materials from foreign countries. In such a case, a good port is an essential prerequisite.

In other words, under this plan which foresees the import of all the raw materials such as alumina, anode paste, aluminium fluoride, and cryolite, about 2,580 kgs of raw materials will be required for producing one ton of aluminium. Therefore, about 310,000 tons of raw materials is to be unloaded in order to attain an annual production of 120,000 tons of aluminium. Moreover, assuming that most of the aluminium produced is for export, the quantity of materials including auxiliary-materials to be handled at the harbor each year will reach the level of 430,000 tons.

This aluminium smelting industry project strongly demands smooth handling of a huge quantity of materials for both import and export at the harbor, and it also demands that the harbor must be well equipped for accommodating ships as large as possible for the purpose of cutting down on the transportation cost of raw materials and produced goods.

3.2.5.2 History of Development and Present Condition of Kompong Som Port

In the past, the only port which Cambodia could use was the Phnom Penh Port located at the point about 330 km upstream from the estuary of the Mekong. This port was only able to accommodate the 2,000 to 3,000-ton class of ships of a draught of less than 4.1 m. Cambodia had to bear such disadvantages in international trade as the high transportation cost resulting from small quantity transportation and separate shipment of goods, and the long time required for the transportation of perishables.

For Cambodia, which plans the development of national power through expansion of her international trade, the development of a harbor large enough to accommodate ships bigger than the 10,000-ton class has been her earnest wish ever since the country became independent in 1954. Investigation and study of proposed sites for the establishment of a port have been carried out from the time she won her independence.

As a result, the present Kompong Som area was approved as the site most suitable for the construction of a seaport. Harbor construction was commenced in 1955, and some ships began entering the harbor from 1960. In 1965, the 1st stage harbor project, which included the construction of a pier 285 m long and 28 m wide, four ship moorages, two warehouses, lighthouse and other port facilities, was completed. The volume of freight handled at the harbor in 1968 almost reached the level of 748,000 tons, and surpassed Phnom Penh Port far and away.

This port was originally designed and constructed for handling annually 350,000 tons of freight. As the already completed harbor facilities were not satisfactory to meet the increasing demand, a 2nd phase harbor project was commenced, which included the construction of a new harbor on the northern side of the harbor constructed under the 1st phase harbor project. The construction work is already in progress, and two breakwaters, one on the north and one on the south, and a 350-meter pier for mooring two ships of over 10,000 tons were completed as of November 1969.

3.2.5.3 Plan of Future Expansion of Kompong Som Port

The layout of the new port upon completion of the 2nd phase harbor project of the Kompong Som Port of Cambodia is as shown in Fig 3. The total extension of the wharf will be about 3,500 m, and there will be 20 moorings, and the annual volume of freight to be handled at the port will be 1,700,000 tons. The new port is expected to be completed in 1972.

This port has excellent natural conditions such as a group of islands surrounding the Bay of Kompong Som forming natural moles to prevent high-tides, and a natural waterway 400 m wide and over 10 m deep between the mainland Koh Pos island which is located on the opposite shore of the western part of Kompong Som City. If Cambodia's harbor project is completed as

scheduled, this area certainly will possess all necessary conditions for the construction of an aluminium smelting plant which will require the facilities for handling a huge volume of freight.

3.2.6 Plan of Establishing Kompong Som Free Zone

Simultaneously with the expansion of the Kompong Som Port, the Government of Cambodia, with the intention of promoting the economic growth of the country, has passed a law to change the hinterland of this port into a free zone like Hong Kong and Singapore. The government has also decided to grant special privileges to those enterprisers advancing into this free zone.

Though the limits of the free zone and the details of the special privileges have not been fully confirmed, it is advisable that an aluminium smelting plant requiring a large invested capital should be contained in this free zone and receive special legal protection as well as favorable treatment.

3.2.6.1 Objective and Significance of Establishment of a 'Free Zone'

The law concerning the establishment of a free zone at Kompong Som was promulgated in 1960, but the enforcement has been delayed for various reasons. It is expected that this law will come into effect officially from 1970.

The establishment of such a free zone was decided on for the following reasons:-

a) To allow Kompong Som Port to fully display its function as an international freight transit port.

b) To allow the warehouses at Kompong Som Port play the role of the warehouses of the world.

c) To make Kompong Som City an important center of commerce and industry through the establishment of various manufacturing industries (particularly through the invitation of foreign capital).

The Government of Cambodia expects that the materialization of the above plan will contribute to the economic growth of the country.

In this free zone, all commodities regardless of the country of origin, except the contraband stipulated under Article 246 of the Customs Law of Cambodia, are allowed to be brought in duty-free without any restrictions or assignment of quota, and are allowed to be kept in the free zone freely. In 1968, the Government of Cambodia invited various countries of the world to investment in the Kompong Som free zone.

3.2.6.2 Limits of Free Zone

The limits of the free zone announced officially by the Government of Cambodia is the hinterland of the port, about 287 hectares in area, separated by the northern breakwater on the northern part and the western part, and by the railway and the line running parallel to the railway on the eastern part and the southern part. The composition of this free zone is being planned as follows:-

a)	Industrial area	242 ha
b)	Warehouse area	40 ha
c)	Business area (offices and commercial area)	5 ha

To Government of Cambodia is now planning to establish 20 to 30 plants in the industrial area to create new jobs for at least 10,000 workers.

It is scheduled in this aluminium plant project to use 110 ha of land as the site for the construction of the aluminium plant, including the land necessary for future expansion of its production capacity. Since this acreage comprises nearly 50% of the scheduled industrial area, it could be said that this project is contradictory to the policy of the Government of Cambodia, which is based on the idea of establishing as many manufacturing industries in the free zone as possible.

According to the information obtained from the authorities of the Government of Cambodia, there is a possibility of expanding the free zone in the future. For example, the site of a petroleum refining company (government managed) now operating at a point about 7 km north of the North embankment of Kompong Som Port is being treated as a free zone. It is advisable that the Government of Cambodia make clear the limits of the free zone as soon as possible.

3.2.6.3 Favorable Treatment in Free Zone

At present, the special privileges to be granted to the enterprises in the free zone besides exemption from import duties are the followings:-

(A) Special privileges on taxation to be granted only for a period of five years.

a. Exemption from tax on profit (normally 25%).

b. Exemption from registration tax and stamp duty at the time of formation of a company and capital increase.

c. Exemption from tax on income from valuable securities.

d. Exemption from tax on dividends on valuable securities.

(B) Approval of additional depreciation exceeding the legal limit.

(C) Guarantee of non-nationalization for 20 to 30 years.

It is considered that the abovementioned special privileges to be granted to the enterprises of foreign capital in the free zone are based on the stipulations of the Cambodian "Law Concerning Measures for Granting Special Privileges to Foreign Capital." However, it seems that there are many ambiguous parts concerning the details of such special privileges, and it is advisable that such details be made clear as soon as possible.

3.2.7 Definite Location of Aluminium Plant in Kompong Som City

Concerning the plan of establishing an aluminium smelting plant of an annual production capacity of 120,000 tons (240,000 tons when the plant is expanded in the future) in the northern part of Kompong Som City, the definite location for the construction of the plant has been worked out on the assumption that 110 ha of land in the area scheduled for the industrial area will be available.

However, the scheduled industrial area is too small as a whole, and it is advisable that the northern portion of Kompong Som City be investigated and studied before commencing with the construction of the project.

3.2.7.1 Site Required for Aluminium Plant and Its Location

The production scale of the proposed aluminium smelting plant has been tentatively fixed at an annual production of 120,000 tons on the assumption that approximately 30% of the power energy output of the Sambor Project will be made available to the aluminium smelting plant. At present, investigation is being continued in areas other than Sambor for the development of power sources on the Mekong, and there is a possibility of obtaining a large power energy output from other sources at a low cost in the future. In view of the circumstances mentioned above, and with the aim of an economical and efficient management, the layout of the plant has been prepared in such a way that it may increase production capacity to an annual production of 240,000 tons of aluminium in the future.

Based on the above mentioned assumption, a study was made of the Kompong Som free zone from a drawing. Consequently, it was considered most suitable to construct an aluminium smelting plant on a wide-angled triangular shaped site of 110 ha with Koh Preap on the northwest end of the free zone as an apex. (See Fig. 3) Though there is the disadvantage that this triangular srape would create dead space and make the site unnecessarily large, this location was selected fully taking into consideration the general condition of the entire free zone and complying with Cambodia's national policy of establishing many kinds of plants besides an aluminium smelting plant.

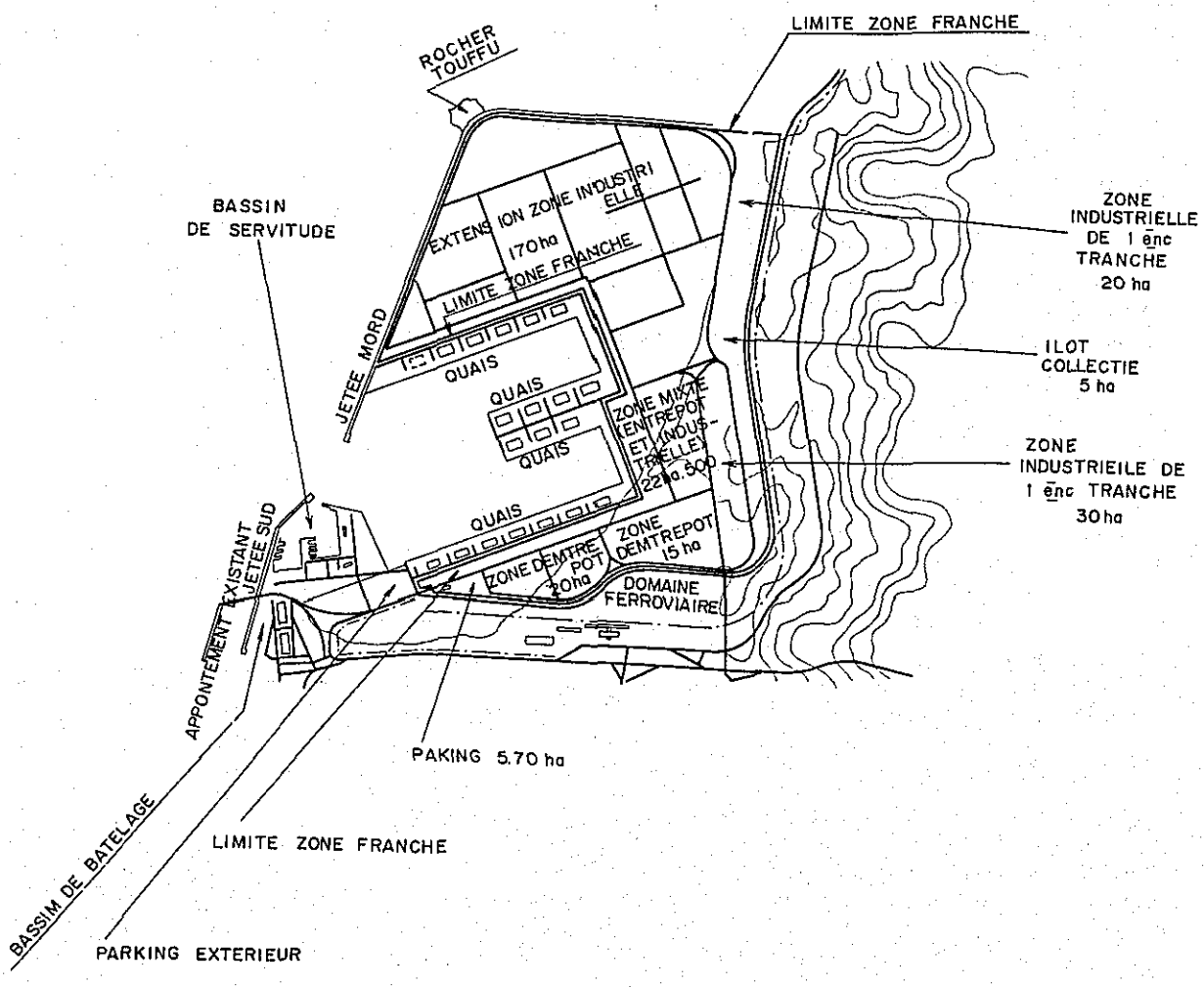
3.2.7.2 Geology of the Site

An aluminium plant requires the installation of heavy machinery. It is generally considered that the required bearing strength of the ground should be 20 tons/m^2. It seems that no geological survey has been conducted on the proposed site, and so no reliable data are available. However, according to the explanation given by a Cambodian official at the site, a stratum of sand stone exists in the area scheduled for reclamation at about 7 m below sea level at the deepest portion, and this stratum is covered with sand. It seems that the geology of the site for the construction of a plant poses no serious problem. Since ground and geology are the important items when making calculations for the foundation of a plant, precise borings should be carried out before preparing the final project drawing.

3.2.7.3 Conditions for the Use of the Free Zone

It is the policy of the Cambodian Government to lease the land in the free zone. It is said that the government is planning to lease the land after leveling it at the rate of 35 Riels (about 63.6 US cents) per m^2 per annum or lower.

Fig. 3 Plan Portant Delimitation de la Zone Franche du Port Autonome de Kompong Som



In the calculation of the profitability of this project, calculation was made on the assumption that an annual rent of 35 Riels (US$0.636) per m^2 would be paid including the future expansion of the site. However, it is desirable that the rent should be lowered and the measures exempting rent on the unused portions of the site should be taken in consideration of the circumstances mentioned under 3.2.7.1 and 3.2.7.2. under which the location and the acreage of the site have been determined.

3.2.7.4. Locations Other Than the Free Zone

There are two difficult problems concerning the location of the aluminium smelting plant. One problem is that the site for the aluminium plant comprises nearly 50% of the scheduled industrial area and this leaves little space for other manufacturing industries. Another problem is whether it is possible to secure the said site by the time the operation of the Sambor Power Station commences which will be some time after 1978.

In case the said site should be judged unsuitable for the construction of an aluminium plant due to these two difficult problems or for other reasons, it would be necessary to investigate the possibility of reclaiming the northern side of the breakwater where Koh Preap joins with the seashore or the possibility of using the level grould on the east side of the railway line running along the northern part of the port which would require the approval of the Government of Khmer Republic to the effect that the site will be treated as a free zone.

3.3 SCALE AND METHOD OF PRODUCTION

3.3.1 Production Scale

According to the Sambor Project Report, it would be possible to obtain firm power of approximately 250,000 kW from the Sambor Power Station in the case that auminium smelting is conducted at Kompong Som. (In the case that Pa Mong Power Station, investigated by U.S., should be established simultaneously, it is said that the total power supply of approximately 500,000 kW will be obtainable for the said aluminium smelting plant. But in this report, the power from Sambor Power Station alone has been taken into consideration.)

The aluminium production capacity calculated on the basis of a power supply of 250,000 kW is 120,000 tons per year.

A plant of an annual production capacity of 120,000 tons can be established in the free zone as studied in section (Location of Aluminium Smelting Factory). An example of the layout of such a plant is as shown in Fig.-6. (See p. 57)

3.3.2 Production Method

The anode of the electrolytic pot for aluminium smelting now being used throughout the world can be classified into the two types. One is the selfbaking anode type and the other is the prebaked anode type, and the choice depends upon the conditions of each country, enterprise and plant. Regarding the merits and demerits of these two types of anodes, the Japanese aluminium smelters' association has made a study of this matter, and the results of the study are as given in the attached reporten titled 'Report of the Symposium for the Study of Manufacturing Techniques of the Aluminium Smelting Plant'. There is little difference in the construction cost and the operating cost for both types if the annual production capacity is around 100,000 tons.

However, the pre-baked anode type is believed to be more advantageous if the production capacity is more than 100,000 tons. As the aluminium smelting plant to be established at Kompong Som will have an annual production capacity of 120,000 tons of aluminium, the cost differences will be negligible in either case. This report has been prepared on the basis that the self-baking anode type will be used in view of the fact that Japanese aluminium smelters have years of experience and confidence in the construction and operation of this type which has been historically employed in Japan.

3.3.3 Current Capacity of the Electrolytic Pot

Though the current capacity of the electrolytic pot varies according to the production scale of each plant, there is a tendency for the capacity to be increased throughout the world. Large pots of 150 kA or even of 200 kA are now being operated or tested. However, the pot operated at 100 kA with a vertical-spike Soederberg anode is being contemplated for this project, since this is the type most commonly and successfully used in Japan, and Japanese engineers are proficient in the construction and operation of the same.

The following table gives the current capacity of the pot, scale of the plant and the production method in the major aluminium smelting plants of the world established since 1960.

Table 3 Aluminium Smelting Plants Established Since 1960

Name of Company	Name of Country	Location of Plant	Production Scale (ton/year) 1967	Production Scale (ton/year) Final	Current Capacity (KA)	Start (Year)
Alswiss	Switzerland	Steg*	30,000		100	1962
S.A.V.A.	Italy	Fusina*	27,000	100,000	100	1963
Aldel	Netherlands	Delfzijl*	32,000	72,000	100	1966
Soral	Norway	Husnes*	60,000	120,000	100-110	1965
State-owned	Romania	Slatina	50,000	75,000	63	1963
Aluminium de Grece	Greece	St. Nicolas*	72,000	105,000	60-65	1964
Valco	Ghana	Tema New *	104,000	147,000	150	1967
Conalco	U.S.A.	Johnsonville	96,000	127,000	100-110	1963
Intalco	U.S.A.	Bellingham*	138,000	207,000	120	1966
V.A.W.	W. Germany	Norf***	45,000		110-120	1962
Pucine	France	Nogueres**	103,000		100	1960
State-owned	Poland	Konin**	48,000	100,000	100	1966
Alnor	Norway	Haavik**	80,000	100,000	140	1967
S.A.K.O.	Sweden	Suntsvall**	30,000	60,000	95	1963
Monte Edison	Italy	Mori**	15,000		100	1964
State-owned	U.S.S.R.	Shelikhova **	160,000	300,000	150	1962
"	"	Krasno-yarssk**	30,000	400,000	150	1966
"	"	Bratsk**	130,000	700,000	150	1964
Showa Denko	Japan	Chiba**	62,000	82,000	100	1962
Sumitomo Chemical	Japan	Nagoya**	50,000		100	1961
"	"	Isoura**	17,000	68,000	100	1967
Mitsubishi Chemical	Japan	Naoetsu**	66,000	106,000	100	1963

* Electrolytic pots with pre-baked poly anodes
** Electrolytic pots with vertical-spike Soederberg anodes
*** Electrolytic pots with continuous pre-baked anodes

Source: Light Metal Smelters' Association

3.3.4 Others (Points at Issue)

3.3.4.1 Study of Pre-baked Anode Type

The self-baking anode type is being employed for this project as stated in 3.3.2. However, judging from the fact that some Japanese smelters are planning to employ the pre-baked anode type and that the number of plants employing the pre-baked anode type is increasing throughout the world as shown in Table 3 of Chapter 3, the pre-baked anode type should be studied once again before the period the construction of the aluminium smelting plant is carried out.

3.3.4.2 Automatic Control

Japan has had much experience in automatic control of the voltage, distance between anodes, aluminium concentration in the bath and anode effect, etc., and this has been briefly taken up in this report. However, positive study should be made for employing more advanced automatic control at the stage of implementation of this project.

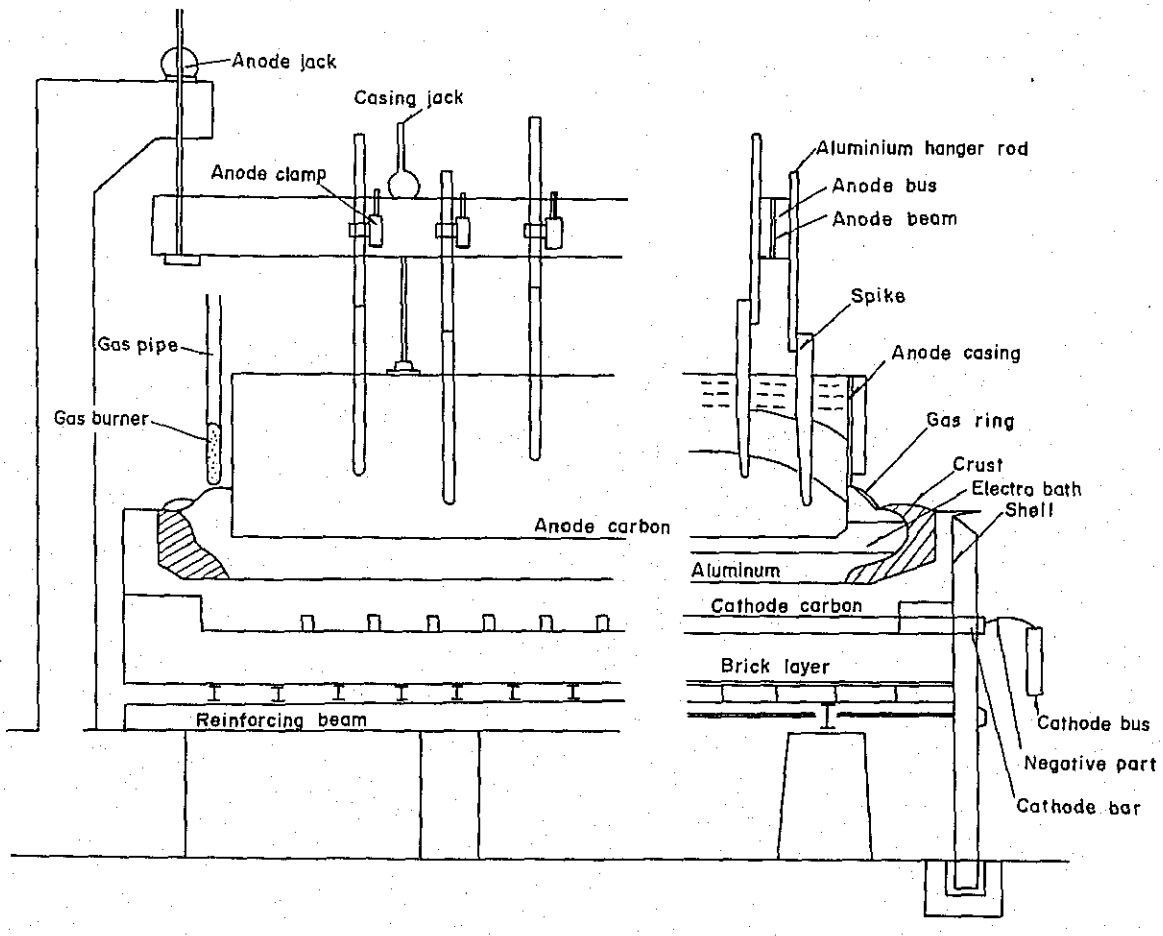
3.4. CONSTRUCTION PLAN

3.4.1 Outline of the Manufacturing Equipment

The outline of the major equipment is as follows:

3.4.1.1. Electrolytic Pot

Fig. 4 VS. Type Electrolytic Pot



3.4.1.1. (1) Lower structure

The equipment which holds the electrolyte and acts as a cathode is called the lower structure and consists of the following:

* Shell Fully reinforced steel shell for the holding of the contents.

* Lining This is the portion made of carbon inside the brick heat insulating layer which serves as the container of the electrolyte and has the electrical function of a cathode electrode. The cathode bar is inserted into this carbon lining.

* Negative part A special connection part made of aluminium and steel plate which form the main part of the cathode side conductor.

(2) Upper structure

The equipment which is hung into the electrolyte inside the lower structure and acts as the anode is called the upper structure, and consists of the following:

* Anode casing Fully reinforced steel case for holding paste carbon in it and is lined with thin aluminium sheet.

* Casing jack Fixed to the top of the anode beam, and used for lifting and lowering the casing as the anode is consumed.

* Aluminium hanger and spike Electric conductor made of processed steel bar and aluminium bar to connect anode carbon with anode bus, forming a main part for supplying power from anode bus to anode carbon.

* Anode beam and anode bus Steel beam for holding the total weight of the Söderberg anode and anode bus is installed on both sides of the anode beam.

* Anode clamp Fixed to the vertical lateral face of anode bus for supporting the aluminium hanger.

* Anode jack Fixed to the jack prop on both sides of electrolytic pot for adjusting the position of anode.

* Gas ring Fixed to the lower part of anode casing, made of cast iron, and serves as the passage for gas.

* Gas burner Fixed to both ends of the anode casing to burn carbon monoxide gas collected through the gas ring.

(3) Bus bar

Connects the electrolytie pot in series and supplies direct current from rectifier to each electrolytic pot. Double entry type is required for the electrolytic pot of 100 KA class.

3.4.1.2. Pot Operation Equipment

(1) Supply and tapping device

* Velocipedic crane Gantry crane equipped with auxiliary devices such as crust crushing drifter, alumina supply tank, slider and shute.

* Tapping device Vacuum suction device and nozzle are fixed to the tank lined with firebrick for tapping aluminium. The tank is hung by a crane through a weighing machine to measure accurately the quantity of tapped aluminium. When the tank has been filled with a specified quantity of aluminium, it is moved to pour the metal into a molten metal transporting car, and the car transports the metal from the electrolytic plant to the holding furnace established in a separate building.

(2) Anode operation equipment

* Spike pulling crane Equipped with spike pulling mechanism and spike transporting device.

* Auxiliary supporting frame for bus lifting Spike supporting frame made of non-magnetic material for bus lifting. Fixed on top of the anode casing to securely maintain the position of anode.

* Paste feeder A battery-operated car equipped with a paste tank and bucket elevator and shute for feeding briquette.

(3) Other equipment

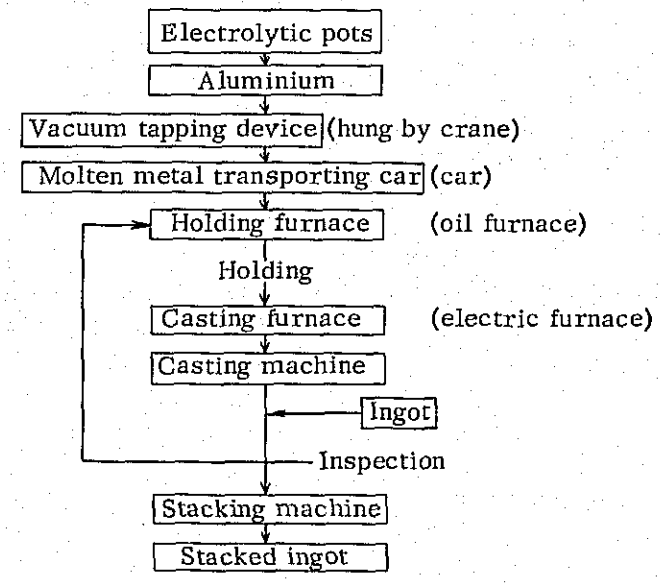
* Shot blaster A device for blasting the surface of used spikes.

* Trailer and tractor For transporting spikes.

* Charging device For charging the batteries of battery operated car.

3.4.1.3. Casting Equipment

The outline of casting is shown below:



Main equipment for casting are as follows:

* Oil furnace
* Electric furnace
* Water cooled casting machine
* Ingot stacking machine

3.4.1.4. Electrical Equipment

The following gives the general outline of the major electrical equipment. (See Fig-5 Skeleton Diagram)

(1) Power receiving and stepdown equipment

* Power receiving equipment

Power is received by two 115 KV circuits and then transmitted to 115 KV double bus bars in the compound through circuit breakers and metering devices, etc.

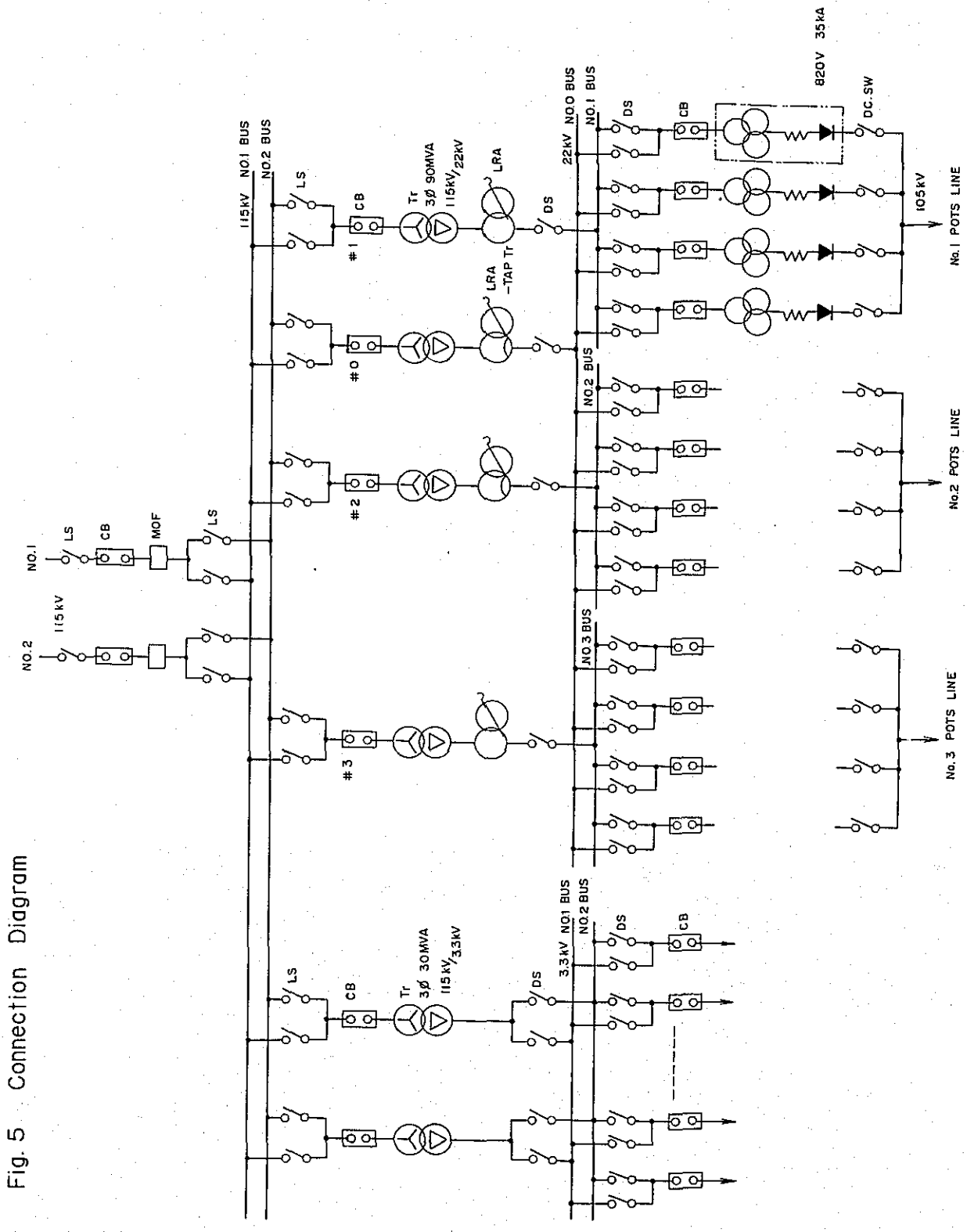


Fig. 5 Connection Diagram

* Intermediate stepdown equipment

22 KV intermediate voltage is obtained from 115 KV receiving voltage. A 90 MVA 3 phase transformer will be installed for this purpose. Four transformers will be installed in the final stage, and one of them is a spare.

To meet the special operating conditions of the electrolytic pots in starting up and other cases, a few voltage regulating transformers are equipped so that the output voltage of the rectifiers can be adjusted in the range between 10% and 100% of the rated value, and also can maintain the required output voltage against variation in the voltage of power source.

The above mentioned stepdown equipment has 3 systems, namely, #1, #2 and #3 and one common system #0.
The following rectifiers have the circuit with which they can obtain power supply from either one of the three systems mentioned above or the common spare #0.

(2) Rectifying equipment

To supply direct current to the electrolytic pots this rectifying equipment will have a 820 V 35 KA silicon rectifier and a rectifier transformer of the same capacity. 3 sets are enough to supply DC current to a system of electrolytic pots respectively and the fourth is a spare. But it is recommended to normally operate 4 sets to obtain better efficiency.

A saturable reactor will be installed between the rectifier transformer and the rectifier of the rectifying equipment for fine adjustment of D.C. current.

(3) Substation equipment for motive power supply

Motive power necessary for the electrolytic plant is stepped down from 115 KV to 3.3 KV by a three phase 30 MVA transformer. Two transformers including a spare will be installed. This 3.3 KV power is distributed to various places in the plant through a switch cubicle.

3.4.2. Outline of Appurtenant Equipment

The main items of the appurtenant equipment are as follows:

3.4.2.1. Storage Equipment

(1) Material balance

The annual requirement of raw materials for producing 120,000 tons of aluminium is estimated as follows:

* Alumina
  1,950 kg/ton x 120,000 tons/year = 234,000 tons/year
  (19,500 tons/month, 650 tons/day)

* Cryolite
  40 kg/ton x 120,000 tons/year = 4,800 tons/year
  (400 t/month, 14 t/day)

* Briquette
  550 kg/ton x 120,000 tons/year = 66,000 tons/year
  (5,500 t/month, 184 t/day)

* Aluminium fluoride
  30 kg/ton x 120,000 tons/year = 3,600 tons/year
  (300 tons/month, 10 tons/day)

(2) Stock

* Alumina
  In consideration of the problem of transportation, a stock of 60,000 tons will be necessary to cover the requirements for 3 months. Naturally, a building for storing 60,000 tons will be required.

* Cryolite
  The minimum stock will be 1,500 tons.

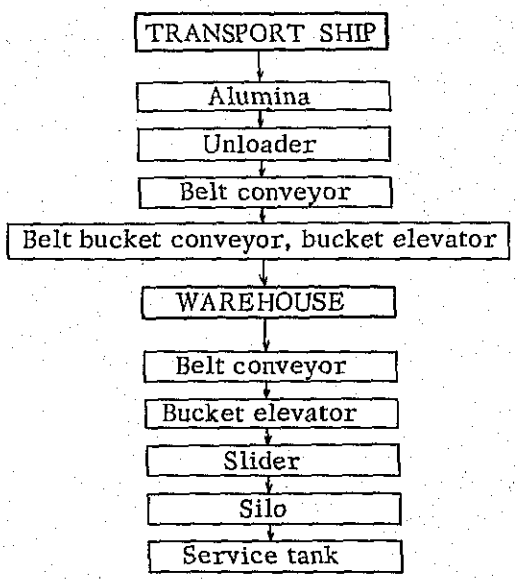
* Briquette
  A stock of 15,000 tons equivalent to 3 months supply has been decided in consideration of transportation.

* Lining materials
  A stock of lining materials to cover the requirements for 4 months should be kept on hand.

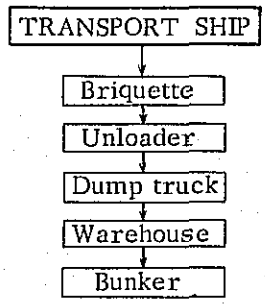
Bed carbon	1,000 tons
Lining paste	750 tons
Bricks	2,000 tons
Cathode bars	750 tons
Others	750 tons

(3) Flow hseet of storage and equipment

* Alumina



* Briquette



(4) Facilities for unloading and storage

* Unloader

A railway will be laid along the newly constructed wharf. This railway will be laid on a firm foundation. Unloader will be operated by one operator.

* Transport facilities

Raw materials unloaded from the ship will be transported to the warehouse by means of belt conveyor and bucket elevator installed at the wharf. Trucks may be used to transport raw materials which the belt conveyor failed to carry.

* Storage for alumina

Alumina transported by belt converyor from the wharf is lifted by bucket elevator to the lower part of the ceiling of the warehouse and dumped into the warehouse for storage.

Warehouse will be of steel structure, and the walls reinforced concrete. The proper storage capacity is, considered to be 60,000 tons.

* Briquette storage house

The proper quantity of the briquette stock will be 15,000 tons. The storage house will be of steel structure and the retaining wall will be reinforced concrete. The method of storing is the same as for alumina.

* Warehouse for miscellaneous articles

A warehouse for keeping various parts necessary for the operation will be built.

(5) Facilities in the compound of the plant for storing raw materials

* Warehouse for secondary raw materials

This warehouse is for storing materials such as cryolite, aluminum fluoride and other secondary raw materials, and a 3 ton crane will be installed.

* Briquette bunker

This is an intermediate storage tank for supplying briquette to the pots.

* Alumina silo and alumina service tank

These are intermediate storage tanks for supplying alumina to the pots.

3.4.2.2. Repair Shop

(1) Mechanical workshop

* Machine tools
  Machine tools for ordinary repair and emergency repair such as lathe, vertical grinder, plain grinder, shaper, milling, drill, and radial drilling machine will be installed.

* Forging equipment
  Most of the tools necessary for the operational purposes are made by forging. Air hammer, furnace, surface plate and jigs will be installed.

* Plate making equipment
  For manufacturing and repair of bunkers, hoppers or piping facilities, oxygen welder, oxygen cutter and electric welder will be installed.

* Tools and jigs
  The mechanical workshop will possess all the necessary kinds of measuring apparatus, tools and repairing tools for use to repair in sufficient quantity.

* Crane
  To provide convenience when manufacturing and repairing machines and devices, an overhead crane will be installed.

* Vehicles
  Crane cars, dump trucks, shovel cars, bulldozers will be installed for both repair and operational purposes.

(2) Electrical workshop

* Workshop
  Hist crane, drying room, insulating test device will be installed for overhaul, inspection, cleaning and testing of motors and small transformers. Machine tools required for the above such as bench drill, grinder, and vice will also be installed.

* Measuring apparatus
  For maintenance and testing of electrical equipment, voltmeter, amperemeter, wattmeter, circuit tester, insulation resistance meter, earthing resistance meter, Braun tube oscillograph, and rectifier testing device will be installed.

(3) Spare parts

The following items should be kept as minimum spares against normal wear and tear and emergency accidents.

* Machines and their parts
  Anode jack, gas rings, anode clamp, bus bars, parts for crane, parts for conveyor, parts for crusher, parts for vehicles and steel materials.

* Lining materials
  Carbon lining paste, bricks, cathode bars for electrolytic pot, bricks and other materials for casting furance.

* Spares for electrical apparatus

Bushing and insulators for transformer and circuit breaker, elements and fuse for silicon rectifier, contact for voltage regulator, and other spares.

3.4.2.3. Laboratory

A laboratory will be established for carrying out chemical analysis of manufactured goods and raw materials. Various apparatuses for chemical analysis and for physical tests will also be installed.

(1) Chemical analysis of aluminium and alloy ingots, 12 elements, namely, Al, Si, Fe, Ti, Mn, Mg, Cu, V, Sb, Zn, Cr can be done at this laboratory. More elements may be added if so desired.

(2) Analysis of raw materials

A set for chemical analysis may be used to analyze alumina fluoride, electrolyte, pitch, soda ash, silica, and heavy oil.

3.4.2.4. Utilities

(1) Water supply system

* *Industrial water*

Daily requirement of approximately 10,000 tons/day will be supplied from outside. A receiving tank of 6,000 ton capacity will be built at the plant from where water will be distributed to all places through water pipes.

* Drinking water

A part of the water from the above mentioned receiving tank will be stored in an elevated tank of 100-ton capacity after being filtered and sterilized to be supplied to all places at the plant. Requirement is about 500 tons/day.

* Sea water

Necessary facilities will be installed for using sea water to cool machines. Requirement is about 5,000 tons/day.

(2) Compressed air equipment

A motor operated compressor equipped with a spare motor will be installed, and compressed air will be distributed to required places through pipes via receiver tank.

(3) Telephone equipment

A cross bar type exchanging machine for 100 circuits will be installed for telephone communication within the plant.

(4) Broadcasting system

A broadcasting system will be installed to announce news, instructions and for record, tape and radio broadcasting.

3.4.2.5. Buildings for General Use

Buildings related to the plant will be arranged and designed modernistically in harmony with the plant.

(1) Administration office

The office will be a building of modern design with excellent interior facilities, and be located at a convenient place in the plant site.
The office building will have sufficient floor space and have rooms such as plant manager's room, department chiefs' rooms, design room, office rooms, conference room, reception room, hall and telephone exchange room.

(2) Rest room and other facilities

Locker room, shower room, dining room, storeroom, clinic, etc. will be established.

(3) Field office

These are offices for the manufacturing sectors, each office equipped with the chief's room, office room, and others.

(4) Club house

A recreation hall for the employees. Can be used also for receiving visitors.

(5) Garage

Garage for sedans, fire-engine, dump trucks, crane trucks, and others.

(6) Lavatory

To be built where necessary.

(7) Guard house

This is a house for guards including a time card room and a night duty room.

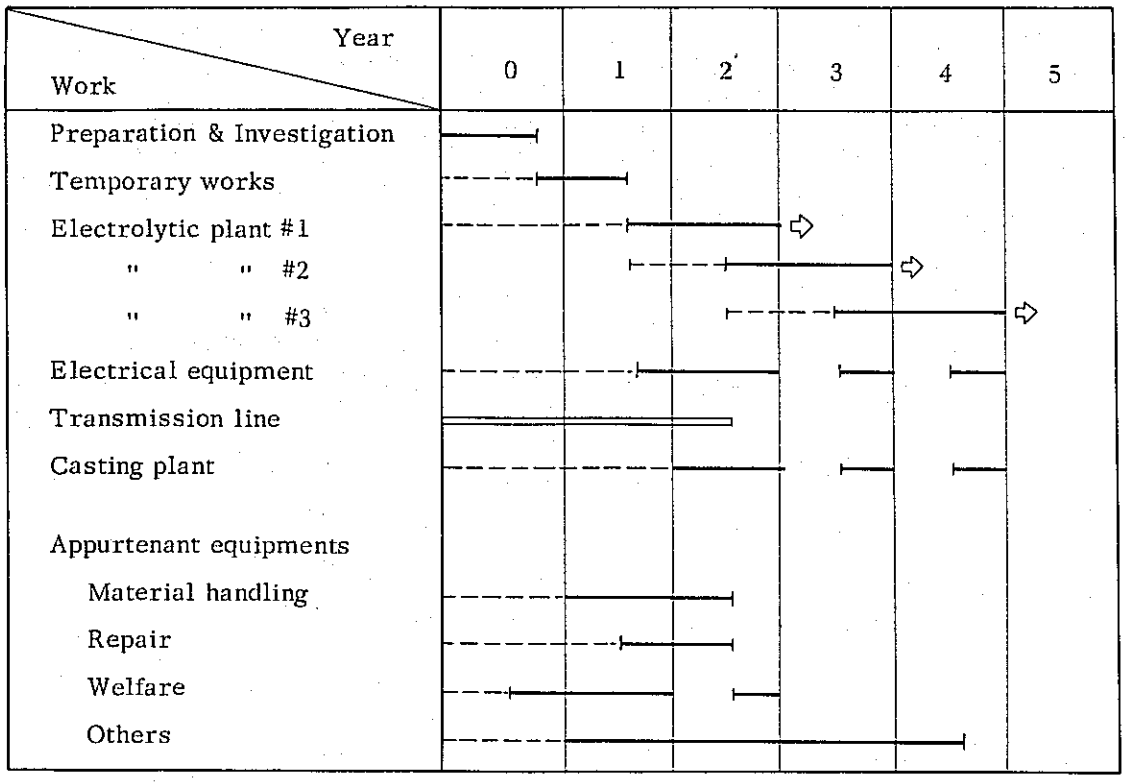
3.4.2.6. Welfare Facilities on Separate Site

Approximately 60,000 m^2 of land separate from the plant site will be secured to build company's residences. The company's residences will be used as quarters for construction supervisors during construction, and upon completion of the plant they will be used as residences for the officers of the company. A hospital will be constructed separately. A swimming pool which serves as water pool for fire prevention, a meeting hall, store, and a restaurant will also be constructed.

3.4.3. Construction Schedule

Construction schedule is shown in Table 4.

Table 4 Field Construction Schedule



(Notes)

Preparation & investigation	Boring and designing
Temporary works	Office room, power & water supply, shipment of drawings, machinery and materials
Electrolytic plant	Aluminium electrolytic plant
Electrical equipment	Equipment for D.C. power source and motive power source
Casting plant	Plant for manufacturing aluminium ingot
Material handling	Facilities for loading and unloading and transportation of raw materials and manufactured goods
Repair	Mechanical workshop and electrical workshop
Welfare	Office rooms, dining room, clinic, change room, etc. in the plant site. Residences and auxiliary facilities outside the plant site.
Others	Roads, fence, gate, utilities, warehouses
Transmission line	115 KV transmission line (design and execution of construction work by an electric power company)

3.4.4. Construction Materials

3.4.4.1. Procurement of Construction Materials

The major materials necessary for the construction of the aluminium plant and supplementary facilities are cement, gravels, sand, reinforcing bars, steel frames, and others. Of these, aggregates are available in sufficient quantity from the quarries near Kompng Som. At present there is only one cement plant in Cambodia with an annual production of 150,000 tons. This quantity is not sufficient even to meet the domestic demand, and a large requirement must be covered with imports when required. This development plan has been worked out on the assumption that the major construction materials other than natural materials like gravels and sand have to be imported. Of course, machinery, apparatuses and other processed materials also have to be imported.

3.4.4.2. Quantity of Major Construction Materials Required

The quantities of major construction materials for the construction of an aluminium plant having a production capacity of 120,000 tons of aluminium per year are roughly estimated as follows:

Cement	60,000 tons
Reinforcing bar	15,000 tons
Shaped steel	20,000 tons
Concrete pile	60,000 pcs.

3.4.5. Construction Cost

3.4.5.1. Prerequisite

(1) Structures

The structures to be built in the compound of an aluminium smelting plant are shown in the following Table 5 together with their specifications:
The construction cost has been calculated on the basis of these specifications.

Fig. 6 Cambodia Sihanoukville Aluminium Smelting Plant

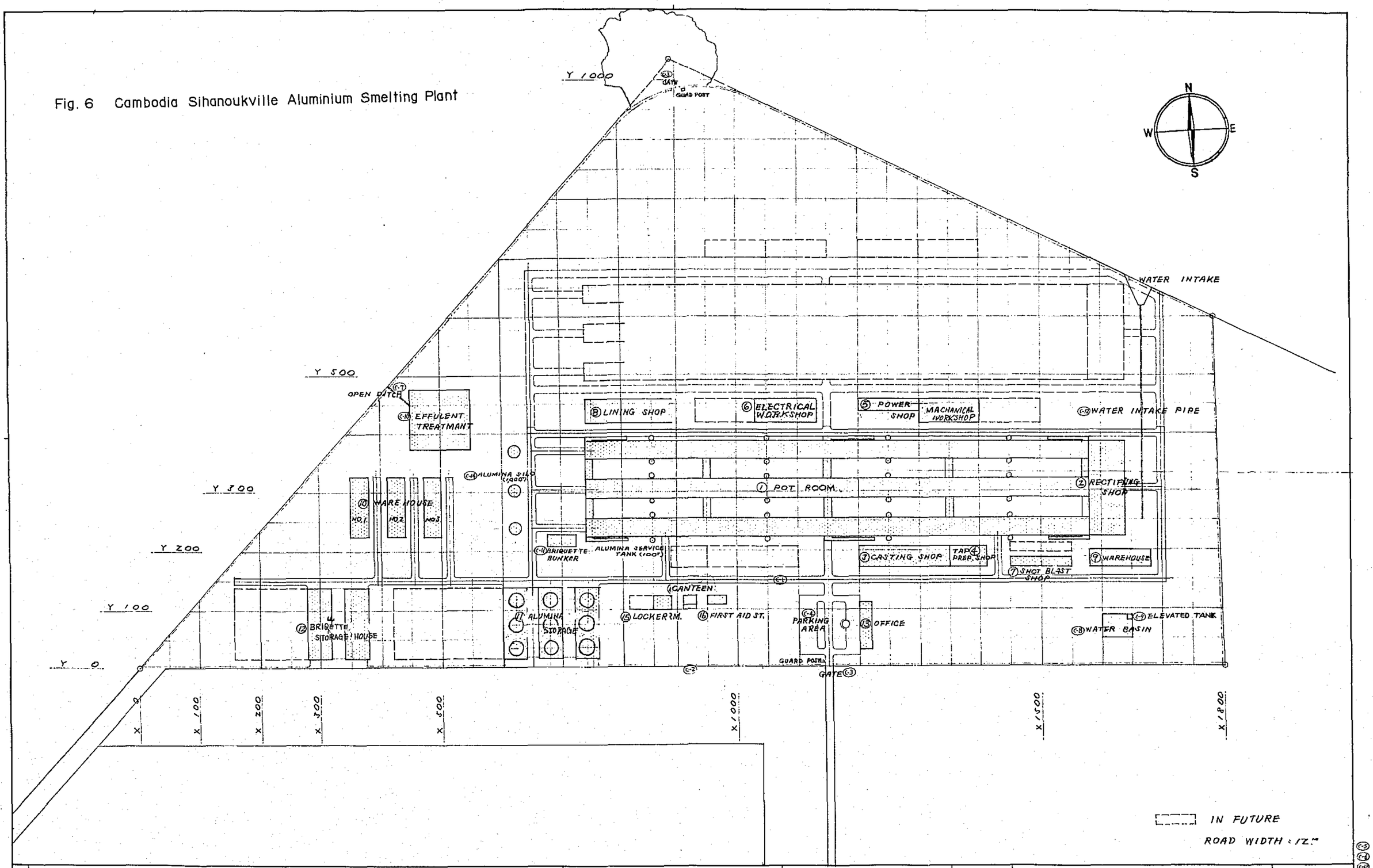


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Table 5 STRUCTURES FOR AN ALUMINIUM SMELTING PLANT (120,000 tons)

Note : S = Steel frame
RC = Reinforced concrete

Classification		No.	Name	Structure	No. of Floors	Building Width (m)	Lenght (m)	Height (m)	No. of Wings	Floor Space (Total floor space) m^2	Remarks
Electrolytic Plant		1	Pot room	S RC	2	30	840	16	3	75,600 (151,200	Including foundation of service tank (100 t), control room 3,000 m^2, corridor 3,600 m^2 and ramp.
		4	Tap preparatory shop	S	1	35	60	11.5	1	2,100	
		7	Shot blast shop	S	1	15	80	9	1	1,200	
		8	Lining shop	S	1	20	100	11	1	2,000	
Appurtenant Equipment	Electric Equipment	2	Rectifying shop	S RC	2	60	160	13.5	1	9,600 (19,200)	
	Casting	3	Casting shop	S	1	35	150	16	1	5,250	
	Repair	5	Power shop	S	1	20	80	11	1	1,600	
		5	Mechanical workshop	S	1	20	100	11	1	2,000	
		6	Electric workshop	S	1	20	50	6	1	1,000	
	Welfare	13	Administration office	RC	3	20	75	12	1	1,500(4,500)	
		14	Dining room	S	2	15	20	7	1	300(600)	
		15	Restroom etc.	RC	2	40	25	8	1	1,000(2,000)	
		16	Clinic	RC	1	15	30	5	1	450	
	Others	9	Warehouse for misc. goods	S	1	30	100	5	1	3,000	
		10	Warehouse for secondary raw materials	S	1	30	100	11	3	9,000	
		11	Warehouse for alumina	S	1	40	120	15	3	14,400	
		12	Warehouse for briquette	S	1	35	100	20	2	7,000	
	Others										Sub-total 137,000 (226,500)
	Others	C- 1	Road	RC		12	4,200			1 series	Road 50,400 m^2 Side ditch 1 m wide, 1 m deep, 840 m l.
		C- 2	Fence	S			4,600			1 set	1.8 m high net fence
		C- 3	Gate, guard house	RC pillar S door		10			2	1 set	Guardhouse 4 m x 8 m = 32 m^2
		C- 4	Parking area							3,000	Garage 8 m x 15 m = 120 m^2 Height = 2.5 m
		C- 5	Drainage for rain water around buildings	RC						1 system	Around each building 0.75 m wide, 7,550 m long
		C- 7	Drain sewer			1.0		1m deep		1 system	Beam 30 m long
		C- 8	Water receiving tank	RC		50	40	3.5 m deep	1	2,000	6,000 tons of industrial water, pump house etc.
		C- 9	Elevated water tank	S				25 m high	1	1 system	Capacity 100 tons piping etc.
		C-10	Sewage treatment tank	RC		100	100	3.5 m deep		10,000	
		C-11	Briquette bunker	S		20	60	25	1	1 set	
		C-12	Piping for sea water for cooling							1 set	400 m
		C-13	Fire fighting facilities								Indoor and outdoor fire alarm
		C-14	Alumina silo						3	1 set	1,000 ton tanks (3)
Welfare Facilities on Separate Site			Residence A			150 m^2 (1 house)		10	10	(1,500)	3 bed rooms, Site 1,000 m^2
			Residence			100 m^2			30	(3,000)	2 bed rooms, Site 660 m^2
			Residence			1,500 m^2			1	(1,500)	Apartment house for 60 persons. Site 5,000-10,000 m^2
			Pool	RC	1	12	25	1.5 m deep	1		
			Hospital	RC	2	12	12	7	1	(300)	Hospital for family members
			Hall, store, dining room							(1,000)	
											Sub-total (7,300)

(2) Equipment

For the estimation of the construction cost, the scope of equipment is limited to the following:

* Electrolytic plant (including foundation and bus bars):
  Electrolytic pots, bus bars, gas collecting devices, pot operation equipment, distribution lines for motive power supply, cranes, etc.

* Casting plant:
  Holding furnaces for melt, continuous casting machines, cranes, etc.

* Electrical equipment:
  Main transformers, transformers for motive power supply, voltage regulating transformers, silicon rectifiers, control boards, switch gears, etc.

* Appurtenant equipment:
  Material handling and transportation (unloading device for alumina, conveyors, vehicles, etc.), repair shop machine tools, welfare facilities, water supply system, warehouse, etc.

(3) Excluded items

The following items are not included in the construction cost of this development plan:

(1) Construction of revetment around the site of the plant.

(2) Wharf construction work

(3) Earth filling on the site of the plant

(4) Construction work for drawing industrial water from the water source

(5) Equipment of 115 KV transmission line

3.4.5.2. Construction Cost

The following table shows the required construction cost calculated on the basis of (1), (2) and (3) of 3.4.5.1.

Table 6 Construction Cost

Unit : 100 million Yen
(US$10,000.-)

Item	Classification		
	Building	Equipment	Total
Electrolytic plant	71 (1,972)	195 (5,471)	266 (7,389)
Electric equipment	12 (333)	34 (944)	46 (1,278)
Casting plant	8 (222)	8 (222)	16 (444)
Appurtenant equipment	34 (944)	31 (861)	65 (1,806)
(Material handling)	(0)	(15) (417)	(15) (417)
(Repair)	(6) (167)	(1) (222)	(7) (389)
(Welfare)	(6) (167)	(1) (28)	(7) (194)
(Others)	(22) (611)	(7) (194)	(29) (806)
Reserve fund	15 (417)	15 (417)	30 (833)
Total	140 (3,889)	283 (7,861)	423 (11,750)

3.4.6. Temporary Works

(1) Temporary office

It is necessary to establish an office for the employees engaged in the construction work. Minimum facilities necessary to function as an office will be installed.

(2) Temporary water supply system

If no appropriate water supply facilities are available in the neighborhood of the construction site, a well has to be dug to obtain drinking water and water for use in the construction work. Water will be pumped up from this well and distributed to places where it is required.

(3) Temporary electrical equipment

To obtain power necessary for the construction work, a transformer for about 5,000 KVA and related electrical apparatus will be installed. This transformer transforms the receiving power to 3.3 KV, and the power which is stepped down will be supplied to respective places in the construction site by either aerial cable or underground cable. Each construction site will be provided with a transformer and switches, etc. to obtain required voltage from the 3.3 KV.

Electrical apparatuses for use in temporary works are those that can be diverted to regular equipment and specifications will be checked upon purchasing them.

If it is not possible to obtain power in the way mentioned above at the early stage of the construction work, a moveable generator must be installed.

CHAPTER 4

PROFITABILITY

OF

ALUMINIUM SMELTING INDUSTRY

CHAPTER 4

PROFITABILITY OF ALUMINIUM SMELTING INDUSTRY

This chapter consists of two parts, the cost planning and the financing program.

In the cost planning, the cost price inclusive of interest which concerns the production of aluminium under this project is calculated.

Accordingly, the cost of raw materials for producing one ton of aluminium is estimated at US$255.30 (¥92,000.-), the manufacturing cost US$405 (¥145,800), and the total production cost US$446.30 (¥160,700).

In the financing program, the equipment and operating funds are explained.

4.1. COST PLANNING

4.1.1. Various Elements of Cost

The unit quantity and the unit price of raw materials were determined on the basis of the records of a smelting plan in Japan using the same method of manufacturing and also in consideration of the special circumstances of this project. All raw materials, with the exception of electric power, are to be imported, and the prices are assumed to include the anticipated future price increases. The contents are as follows.

	Unit Quantity	Unit Price	
Alumina	1.940 tons	US$ 75.00	¥ 27,000.-
Electric power	16,300 kWh	2.5 mills	¥ 0.90
Cryolite	40 kg	US$290.00	¥104,400.-
Aluminium fluoride	30 kg	US$360.00	¥129,600.-
Paste	540 kg	US$ 76.00	¥ 27,360.-
Others *	-	US$ 5.60	¥ 2,000.-

* Materials for reconstruction of electrolytic pot, caustic soda for cleaning, water, heavy oil, etc.

Cost of labor is calculated for 2,200 employees at the rate of approximately US$1.30 (¥455.-) per head per day, and an annual wage increase of 3% is anticipated.

The basis of the calculation of the expenses are as follows:

* Depreciation expense: Useful life 13 years, fixed instalment method
* Cost of repairs : 3.5% of construction cost including cost of reconstruction of electrolytic pot and general repair
* Technical guidance : Classified as royalty for the use of technical know-how and the cost of foreign technicians. Royalty for the use of technical know-how consists of an advance payment of US$2,000,000.- (¥720,000,000.00) which will be depreciated in 13 years, and 2% of sales.

The cost of foreign technicians will be US$2,000,000 (¥720,000,000) per year for 60 persons.

* Land rent : Unit price of US$0.636 (¥227.-), the same as in the general industrial area in Cambodia

* Others : Cost of tests, communication, transportation, office supplies, etc.

* Forging loss of 0.5% has been taken into consideration, and is about US$1.70 (¥600.-).

Interest on equipment is calculated on the basis of the total construction fund (dividend for capital is excepted) by a loan for 13 years at an annual interest rate of 7%. Interest on the operating fund is calculated on inventories at an annual interest rate of 10% with the possibility of refinancing.

In addition, approximately US$8.30 (¥3,000.-) per ton has been added to cover the packaging and shipping as direct selling expenses.

4.1.2. Table of Costs

	Cost (for producing 1 ton of aluminium)	Component Ratio
Cost of raw materials		
Alumina	US$145.50 (¥ 52,400.-)	32.6%
Electric power	40.80 (14,700.-)	9.1
Cryolite	11.60 (4,200.-)	2.6
Aluminium fluoride	10.80 (3,900.-)	2.4
Paste	41.00 (14,800.-)	9.2
Others	5.60 (2,000.-)	1.2
Total	US$255.30 (¥ 92,000.-)	57.1
Cost of labor	US$ 10.30 (¥ 3,700.-)	2.3
Expenses		
Depreciation expense	US$ 71.10 (¥ 25,600.-)	15.9
Cost of repair	34.30 (12,300.-)	7.7
Technical guidance	18.30 (6,600.-)	4.1
Land rent	5.70 (2,100.-)	1.3
Others	8.30 (3,000.-)	1.9
Total	US$137.70 (¥ 49,600.-)	30.9
Forging loss	1.70 (600.-)	0.4
Manufacturing cost	405.00 (145,900.-)	90.7
Interest on equipments	24.40 (8,800.-)	5.5
Interest on operating fund	8.60 (3,100.-)	1.9
Direct selling expenses	8.30 (3,000.-)	1.9
Grand Total	US$446.30 (¥160,800.-)	100.0

4.2. FINANCING PROGRAM

4.2.1. Construction Cost

Details	
Buildings	¥14,000,000,000 (US$ 38,890,000)
Machines	¥28,300,000,000 (US$ 78,610,000)
Interest during construction	¥ 1,300,000,000 (US$ 3,610,000)
Miscellaneous expense	¥ 1,000,000,000 (US$ 2,780,000)
	¥44,600,000,000 (US$123,890,000)

Assuming that a Japanese contractor is going to execute the construction work, 30% of the total construction cost is to be prepaid 8 months prior to the commencement of the construction work for each facility, and the remaining 70% after inspecting the completed construction by bill payable after 150 days from the date of issuance.

As for the construction fund, capital of ¥10,000,000,000 (US$27,780,000) and a loan from the World Bank amounting to ¥34,600,000,000 (US$96,380,000) with a low interest rate (7% per annum is anticipated) are contemplated.
The depreciation expense will be appropriated for the repayment of the loan.

4.2.2. Operating Fund

An operating fund to cover a half month supply of finished goods, ¥1,500,000.- worth of work in process per pot, and a 3 mont supply of raw materials and stock has been considered.
All payments are to be made in cash, however all other legitimate demands for additional debts and credits not contained in this report must also be honored.

4.3. INTERNATIONAL COMPARISON OF THE RESULT OF TAKING A TRIAL BALANCE

The trial balance calculated on the construction and the manufacturing costs in this plan are compared with the international standard, and the profitability of the project is studied from this point of view.

4.3.1. Construction Cost

The construction cost of an aluminium smelting plant is greatly influenced by the conditions of the location as well as by the production scale and the method of production. It is internationally accepted that the construction cost per annual production capacity of one ton of aluminium is approximately US$1,000. The amount of investment per ton of production capacity decreases slightly as the production scale increases, and it is considered that the construction cost decreases to about US$800 when the production scale is over 100,000 tons. There is an implication that the Prebaked type of production system is more advantageous when the production scale is over 100,000 tons. However, the present situation is that both types are being employed throughout the world.

The Söderberg type is assumed in this project, and the production scale set is 120,000 tons annually.
Since most of the construction materials, manufacturing facilities,machines and devices depend upon imports from abroad, the estimated construction cost for this project of US$979.00 is slightly higher than in advanced countries.
However, it is clearly stated in the United Nations Information ST/CID/19 that the construction cost of a plant in a developing country is about 20% higher than that of a plant of the same scale in an advanced country. Therefore, it is considered that the construction cost estimated for this project is in line with the average international standard of the construction cost of a smelting plant to be established in a developing country.
Again, the construction cost exerts much influence over the depreciation expense and the interest payable, which comprise large percentages of the manufacturing cost, and so the introduction of funds of low interest rate is considered necessary when procuring the construction fund. ,

4.3.2. Production Cost

The production cost in this project is estimated at US$446.30/ton as shown in the Table of Costs. The cost of raw materials and the expenses comprise the largest proportion in the production cost, being 57.1% and 30.9% respectively, and the total of these two comes to as much as 88% of the total production cost.

According to the United Nations Information ST/CID/9, the production cost of a 100,000 ton scale plant in an advanced country is estimated at US$450./ton. The cost of raw materials is US$279, comprising 62%, and the general administrative expenses including depreciation expense amount to US$91.- or 20%. The total of these comprises 82.2% of the total production cost. In the case of Japan, the data of the Industrial Structure Research Institute show that the cost of raw materials is 65.6% and the expenses 18.8%, and the total comprises 84.4% of the total production cost. At any rate, the cost of raw mateirals comprises about 60% and the general expenses about 20%, and the total of these comprises over 80% of the total production cost. In the following sections, the cost of alumina and the cost of electric power, which form the major parts of the cost structure in this project, are to be studied.

4.3.3. Cost of Alumina

The major elements of the manufacturing cost of alumina are the purchasing price of bauxite and the cost of fixed capital. Aluminium smelting plants located near bauxite mines can obtain bauxite at a low cost because they can save on transportation cost. However, as most of the bauxite mines are far from the advanced manufacturing countries, the amount of fixed capital for the construction of an aluminium smelting plant becomes large, and the procurement of caustic soda, the main secondary raw material, comes into question. As more benefits can be obtained when the manufacturing scale of an alumina plant is large, there is a trend of expanding the scale of alumina plants.

A comparison of plants with a production scale of 300,000 tons and 600,000 tons shows that the manufacturing cost of the smaller plant is approximately 10% higher. Thus the conditions of location and the manufacturing scale of plants bring about a wide variation in the manufacturing cost of alumina, and it is generally believed that the manufacturing cost per ton varies between US$50.- and US$70.- in the U.S. It is said that the manufacturing cost in Europe is closer to the higher amount. It is stated in the United Nations Information that US$75.- per ton is the price, including the cost of transportation, at which an aluminium smelting plant purchases alumina. The same price of alumina has been applied for this project.

The quantity of alumina required for the production of one ton of aluminium has been assumed at 1940 kgs in consideration of the most recent records of aluminium smelting in Japan. Consequently, the cost of alumina estimated for this project is US$145.50/ton, which comprises approximately one-third of the manufacturing cost of aluminium. This estimate is reasonable in view of international standard prices.

4.3.4. Cost of Electric Power

A huge quantity, amounting to almost 13,000 -- 18,000 kwh of electric power is required for producing one ton of aluminium. Naturally, the cost of electric power is one of the most important elements of the production cost, and a cheap supply of electric power is always a precondition for the selection of a site for the construction of an aluminium smelting plant. Aluminium smelting plants are often located far away from the tertiary processing areas where the cost of electric power is cheap, and the low cost electric power offsets the transportation cost required for the delivery of aluminium ingot to the processing plants.

Hence, many aluminium smelting plants of the world are showing a tendency to locate in the developing countries as they develop their power resources.
This proves that cheap electric power is still highly valued as a factor for reducing the production cost even at the sacrifice of being close to the markets for the processing industries. The present unit price per kwh of electric power ranges between 2 mills and 8 mills. Thus, the cost of electric power for producing one ton of aluminium varies widely, the lowest being approximately US$30.- and the highest approximately US$140.-.
This wide difference of US$110.- alone comprises one-fifth of the selling price of one ton of aluminium. Again, a difference of 1 mill per kwh in the cost of electric power brings about a difference of about US$15.- in the production cost of one ton of aluminium.

The cost of electric power for this project is low in comparison with the international standard cost, because the use of electric power at 2.5 mills per kwh is possible for this project upon implementation of the Sambor power project. This low cost of electric power forms the backbone of the conception, significance, and profitability of this project. Assuming that the unit power consumption is 16,300 kwh, the cost of electric power for this project is US$40.80 which is less than 10% of the production cost.

APPENDIX

REPORT ON THE SYMPOSIUM FOR THE STUDY OF MANUFACTURING TECHNIQUES OF THE ALUMINIUM SMELTING PLANT

Section 1 Direction for Reinforcement of Plants and Equipment

Following directions should be introduced in the future project of establishing or expanding plants.

(1) Expansion of plant scale

(2) Employment of larger pots

(3) Reduction of raw materials consumption

(4) Mechanization of operations

(5) Automatic control

(6) Improvement of working conditions

(7) Anti-pollution considerations

(8) Shortening of the construction period

Section 2 Necessity of Large Production Scale and Its Merits

The expansion of the production scale of an aluminium smelting plant is now a world-wide trend. For example, more than half of the smelting plants started since 1960 were installed to produce more than 100,000 tons a year as shown in Table 1.

Enlargement of the production scale has the following merits.

(1) Reduction of unit construction cost, particularly that of administration and other overheads costs.

(2) Reduction of operating cost

  (a) Reduction of fixed cost

  (b) Reduction of job steps

  (c) Cost reduction through purchase of raw materials in large quantities

(3) More efficient use of land

Section 3 Necessity of Enlarging Electrolytic Pot and Its Merit

The shift to larger pots is a recent world-wide trend which keeps pace with the expanding production scale of aluminium smelting plants throughout the world. Most of the pots built in recent years have a current capacity of 100 kA or more, with some having a current capacity as high as 150 kA.

It is generally accepted that increasing the current at each cell in a plant of fixed size gives the following advantages.

(1) A large capacity cell saves electric power through reduced heat loss.

(2) Reduced raw materials consumption.

(3) Labor saved due to reduction in the number of pots for unit production.

(4) Saving on unit floor space and construction cost. Of course it should be taken into consideration that the distortion of the pot shell and the formation of cracks on the anode which will affect adversely the life of the pot and its operation will change the proper maximum capacity.

Section 4 Method of Smelting

Although there is no question about the superiority of the basic electrolysis process now in use in many countries, choice between the two pot types must be made through the evaluation of such factors as plant location, power supply, production scale, labor supply and others. This comparison leaves some difficulties because no pre-baked type has yet been experienced at new plants in Japan. However, the following characteristics can be pointed out.

(1) Pre-baked

Based on the records of foreign companies, evaluation is made under the hypothesis that a new plant would be built in Japan. In general, this type seems to have the following advantages with some qualifications;

1) Advantageous at larger Pot size.

Inceased current capacity is expected for improving raw material yields, reduction of workers at the pot as well as equipment cost, but there are disadvantages such as the shortened life of the pot, distortion of the pot shell body, and restrictions on the anode effect.

As the problem of the anode can be solved by employing the Pre-baked type, it could be said that enlargement of the pot size will simplity the matter.

2) The Pre-baked type is more advantageous from the standpoint of construction cost if the annual production capacity is over 100,000 tons. In the case of using the Pre-baked type, equipment for manufacturing the anode will be required, but this equipment does have the advantage that when the production scale is large the construction cost of the pot becomes much lower compared with the Soederberg type. For this reason, the Pre-baked type is advantageous with respect to the total construction cost of a smelting plant if its production capacity is more than 100,000 tons.

3) The Pre-baked type consumes less electric power. As the Pre-baked type uses the baked anode it is possible to reduce the voltage drop in the anode thereby reducing the unit electric power consumption by approximately 1,000 kWh per ton. This merit is especially important in Japan where the unit power rate is high.

4) Though the cost of the Pre-baked anode is comparatively high, the consumption of the anode itself is smaller and stabilized operation is possible.

The Pre-baked type is disadvantageous as far as the cost of the anode is concerned because the anode must be manufactured in a separate process and it eventually produces some waste which has to be recycled.

However, the net amount of anode consumption is smaller for the Pre-baked type, and as the quality of anode is stablized, even an unskilled operator can operate the put properly. Again the disadvantage from the standpoint of anode cost is not very significant since automatic control of the anode manufacturing process has been greatly improved.

5) Fluoride saving

As the Pre-baked anode has little tar or moisture, the amount of fluoride consumption is smaller compared with that of the Soederberg type.

6) Working conditions for electrolytic operation are better for the Pre-baked type. The anode is baked in a separate furnace of the Pre-baked type, which practically prevents tar fumes from being generated around the electrolytic pot. This improves the working environment greatly, and is desirable for better working efficiency and also for the hiring of workers.

7) Pre-baked type is suitable for process control.

It is anticipated that the importation of process control for the electrolytic process will be realized hereafter in order to reduce cost through saved labor and stabilized operation, and the Pre-baked type is claimed to be easier for operating it.

(2) Söederberg type

Ten years of competition between the two types of anodes have raised the level of technology of both types to the present degree.

It is now a general tendency for the Pre-baked type to be employed more than the Soederberg type, particularly in new projects.

This is based on the fact that the Pre-baked type is more advantageous for a plant having an annual production scale of over 100,000 tons from the standpoint of the construction cost.

However for the expansion of an existing plant employing the Soederberg type, it would be more advantageous to use the same type rather than employing the Pre-baked type, because the construction cost is higher for the Pre-baked type when the scale of such expansion is small.

It would be easier to control the operation of the plant, and the best way for the smelter to quickly expand production and reduce the cost is to expand the existing plant using the same type.

Again, the size of the electrolytic pot has tended to get larger even in the case of the Soederberg type, and the production capacity of one pot has increased by 20% compared with that of 1961. Moreover, the consumption of electric power has been greatly reduced.

Section 5 Trial Calculation of the Construction Cost of the Plant

The results of the trial calculation showing the advantages of expanding a plant made in consideration of the current situation are calculated in Table 1 attached. Regarding the selection of the size of the electrolytic pot, it was assumed that a 120 kA electrolytic pot would be employed in the case of the Pre-baked type, and a 100 kA pot in case of the Soederberg type, based on available data, literature and information and the experiences obtained from operation in foreign countries.

Consequently, it is necessary to interpret the results of this calculation, bearing in mind the difference of current.

(1) Assumptions for Trial Calculation

The following assumptions were made in this trial calculation.

1) Comarative calculation of both types was made for the production scales of 50,000 tons, 100,000 tons and 150,000 tons.

2) It is assumed that an entirely new plant will be constructed, and all facilities required have been evaluated at current prices.

3) The construction cost does not include the land price.

(2) Examination of the Results of Trial Calculation

The results of the trial calculation of the construction cost of main facilities classified by the scale and type of production is as follows:-

1) As output is in proportion to the number of electrolytic pots, expansion of the production scale can be accomplished by increasing the number of electrolytic pots. For this reason, there is practically no advantage in enlarging the production scale as far as the facilities for smelting are concerned. However, over all cost per unit production of the Pre-baked type is much lower when compared with that of Soederberg type. The construction cost of the facilities for collection of gas and for casting becomes slightly lower when the production scale is made larger, but this advantage diminishes when the production capacity of a plant is over 100,000 tons.

2) Concerning the facilities for the anode, the advantage of expansion is comparatively conspicuous, but the construction cost becomes quite expensive for small-scaled plants employing the Pre-baked type.

The construction cost of the facilities for voltage transformation and rectification, becomes lower for the production capacity of 100,000 tons as compared with that of 50,000 tons, but the reduction rate drops when the production capacity gets larger than 100,000 tons.

3) The merits of expansion are most conspicuous for the control facilities. The cost of controlling the anode is higher for a small scale Pre-baked type, but it is possible to obtain the same advantage from the Soederberg type when the production capacity is over 100,000 tons.

Concerning the construction cost, expansion of the production scale is advantageous for both types. However, the reduction rate of the construction cost becomes gradually smaller in each type when the production capacity becomes larger than 100,000 tons. In case the production capacity becomes larger than 150,000 tons, there is a further decline in the reduction rate.

When the production method is compared, the Soederberg type is more advantageous if the production capacity is around 50,000 tons while the Pre-baked type is more advantageous for the production capacity of over 100,000 tons.

Section 6 Trial Calculation of Production Cost

The results of a trial calculation of the production cost are as shown in Table 2 attached.

(1) Assumptions for Trial Calculation

The following assumptions were made for a trial calculation of the production cost. The trial calculation was made on the basis of literature in this field and the operation experience obtained in foreign countries since no records were available in Japan.

1) The average production cost was calculated as direct manufacturing cost.

2) The 1968 record was used concerning raw material unit consumption. As for electric power, the rate of Japan's best plant for 1968 was used. The unit price of raw materials was based on market prices in 1969.

3) A future wage increase has been included in the labor cost.

4) Expenses include depreciation and interest on the construction cost.

(2) Examination of the Results of Trial Culculation

Production cost is reduced by the expansion of production scale, but the reduction rate is not comparable to that of the construction cost. However, the advantage of the enlargement of the production scale is more marked for the Pre-baked type. Compared with the small scaled 50,000 ton class, its merit is great for a plant with a production capacity of 100,000 tons.

According to the trial calculation made on the assumptions mentioned above to compare both types, the Pre-baked type is considered more advantageous for plants having a production capacity of over 80,000 tons, but in this case, the difference in the current capacity assumed for the said trial calculation should be taken into consideration.

Again, it is said that it is easier to increase the current capacity for the Pre-baked type, and this type would certainly be more advantageous than the Soederberg type if the amount of current is further increased.

Table 1 Trial Calculation of the Construction Cost of Aluminium Smelting Plant

Unit: %

Scale / Type / Equipment	50,000 tons		100,000 tons		150,000 tons	
	Soederberg	Prebake	Soederberg	Prebake	Soederberg	Prebake
Smelting	54.4	45.4	54.4	45.4	54.4	45.4
Collection of gas	4.8	4.8	4.1	4.1	3.84	3.84
Casting	4.8	4.8	4.1	4.1	3.84	3.84
Electrode	4.0	18.4	3.2	12.8	2.8	10.7
Transformer & rectifier	20.0	19.0	18.0	17.0	17.3	16.5
Administration & others	12.0	14.4	10.2	10.2	8.8	8.8
Total	100.0	106.8	94.0	93.6	91.0	89.0

Table 1 Trial Caluclation of Production Cost of Aluminium Smelting Plant

Unit: %

Scale / Type / Equipment	50,000 tons		100,000 tons		150,000 tons	
	Soederberg	Prebake	Soederberg	Prebake	Soederberg	Prebake
Raw materials	63.9	63.4	63.9	62.8	63.9	62.5
Labor	9.1	10.0	7.3	7.3	6.5	6.3
Expenses	27.0	28.8	25.4	25.3	24.5	24.0
Direct manufacturing cost	100.0	102.2	96.6	95.4	94.9	92.8

Fig. 1 Production Scale and Construction Cost

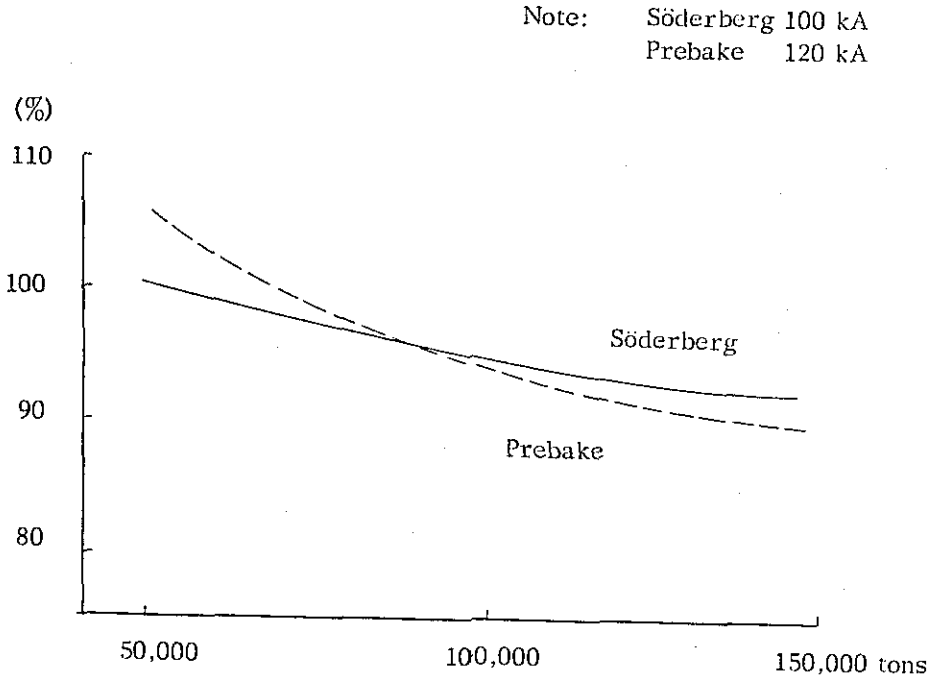
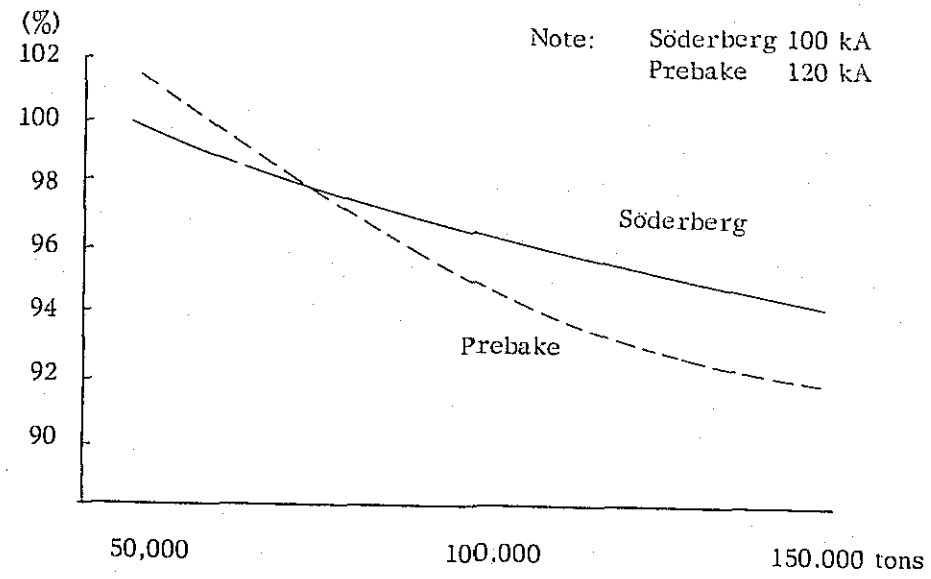


Fig. 2 Production Scale and Production Cost



ANNEXED DATA

LIMITED
E/CN. 11/WRD/MKG/L. 290 (draft)

30 October 1969

ORIGINAL : ENGLISH

UNITED MATIONS

ECONOMIC COMMISSION FOR ASIA AND THE FAR EAST

Committee for coordination of Investigations
of the Lower Mekong Basin
(Khmer Republic, Laons, Thailand and the Republic of Viet-Name)

DRAFT

PLAN OF OPERATION

Pre-Feasibility Survey of the Possibility of establishing Aluminium Industry within the Sambor Project area, Khmer Republic

CONTENTS

I. INTRODUCTION

1. The Mekong Project seeks the development of the water resources and related resources of the Lower Mekong Basin in terms of hydro-electric power, irrigation, navigation improvement, flood control, and other related benefits. The Mekong Project is directed by the Committee for Coordination of Investigations of the Lower Mekong Basin, which the four Lower Mekong Riparian Governments (Cambodia, Laos, Thailand and the Republic of Viet-Nam) established in 1957 as an autonomous inter-governmental agency under the aegis of the United Nations Economic Commission for Asia and the Far East (ECAFE). The Committee consists of a plenipotentiary representative from each of the four countries, and is authorized to promote, coordinate, supervise and control the planning and investigations of water resource projects in the Basin. In 1959, the Committee appointed an Executive Agent for the day-to-day management of the Project. The Office of the Executive Agent is supported in part by the UNDP and in part by E CAFE, to which the office is attached. The work is divided into basic data collection, basin-wide planning, mainstream projects planning, tributary projects planning, navigation improvement, flood control, agricultural development and ancillary projects including experimental and demonstration farms, mineral surveys, power market projections, technical and economic training, and social development and public health. At the end of October 1969, resources of some US$ 175 million equivalent had been pledged by 26 countries, 16 UN Agencies, 4 Foundations, and several private business to projects sponsored by the Committee, with activities and resources steadily growing. The Mekong Project seeks to advance the welfare of the people of the Basin without distinction as to nationality, religion or polities. In 1969, the Committee and its cooperating entities received the Ramon Magsaysay Award for International Understanding.

2. In March 1968, the Executive Agent on behalf of the Mekong Committee, requested the Japanese Government to extend assistance for carrying out a feasibility study for the establishment of an aluminium refining industry at Sihanoukville in Cambodia, based on imported alumina, utilising electric power from the Sambor project, and exporting surplus aluminum ingots.

3. In September 1969, the Japanese Government transmitted the Sambor Project Report (completed in July 1969) to the Twelfth Meeting of the Mekong Committee Advisory Board and to the Forty-second Mekong Committee Session held in Bangkok, 11-13 September 1969 and announced that the Government of Japan was prepared to make available to the Mekong Committee a survey team to study the feasibility of establishing an aluminium industry in Cambodia. The Committee warmly thanked the Representative of Japan and asked the Executive Agent to make arrangements for the implementation of Japan's new pledge. This Plan of Operation is drawn up to cover the implementation of this pledge.

II. PURPOSE AND DESCRIPTION

(i) Purpose of the Project

4. The purpose of the project is to carry out a Pre-feasibility survey of the possibility of establishing aluminium smelters at Sihanoukville in Cambodia based on imported alumina and utilising power from the Sambor project.

(ii) Description of the Project

5. The Sambor project; if constructed as an isolated project, would have an installed

capacity of 875 MW and annual average energy output of 7000 GWH, and if operated in conjunction with Pa Mong project would have an installed capacity of 2,100 MW and an annual average energy output of 14,600 GWH. Implementation of the Sambor project with a large power capacity depends upon an assured demand for power in the area of supply from the project. In view of the fact that the cost of Sambor project power generation will be fairly low, it appears reasonable to expect the establishment of electrometallurgical and electro-chemical industries in the area to be served from the Sambor project.

6. The Sambor project report therefore suggests that it would be desirable to allocate a portion of the firm power potential for the establishment of an aluminium refining industry in the area. It is recognised that the cost of power to be supplied to the aluminium refining industry will have to be such as to make the price of aluminum ingots competitive, taking into consideration both the additional expenditure involved in importing alumina and exporting surplus aluminum ingots. Studies so far made on the Sambor project indicate the possibility of meeting the above requirements.

7. On the basis of international practice, the contemplated aluminium refining plant capacity will be of the order of 125,000 tons per year as being an economical unit and it is estimated that the energy required will be 16,100 kWh per ton of metal. If a larger quantity of power could be allocated to the aluminium industry when the Sambor project is operated in conjunction with the Pa Mong project, the capacity of the aluminium refining industry could be increased.

8. If the Pre-feasibility survey proves that the establishment of an aluminium refining plant in the area to be served from Sambor project is economically feasible it would considerably enhance the Pre-feasibility of the Sambor project.

III. WORK PLAN

(i) Obligation of the Government of Japan

9. The Government of Japan will carry out the Pre-feasibility survey through its Overseas Technical Cooperation Agency (OTCA). The survey team to be organized by OTCA shall carry out the Pre-feasibility study in accordance with the following terms of reference:

a) Study the Pre-feasibility of establishing an aluminium smelting industry in the vicinity of Sihanoukville in Cambodia, based on imported alumina, utilising electric power from the Sambor project, and exporting surplus aluminum ingots;

b) determine the size and exact location of the plant;

c) indicate the capital investment involved in the establishment of the industry including port and other facilities required for importing alumina and exporting surplus aluminum ingots; furnish preliminary layout of plant and raw materials and finished products handling facilities at the plant and the port;

d) indicate the most advantageous source of raw materials; and market for the finished product; and

e) prepare a feasibility report indicating the economical and financial justification for the establishment of the industry.

10. For the purposes of this survey, the team shall:

a) carry out field investigation in Cambodia for a period of one month with particular reference to engineering and economic data collection, interviews with the authorities concerned and reconnaissance of the proposed plant site and related areas;

b) furnish to the Mekong Committee through the Executive Agent 100 copies in English of the Pre-feasibility report;

c) furnish to the Executive Agent 5 copies of all data compiled and the results of investigations used in the final feasibility report unless the said data and results had already been included in the report as appendices, and

d) use the metric system of units in the survey.

11. The Pre-feasibility study shall be carried out by the team without any cost to the other contracting parties of this Plan of Operation than herein provided for in Chapter III, para (ii).

12. The Government of Japan undertakes to bear the cost of translation into French and printing the report in 100 copies.

ii) Obligations of the Mekong Committee

13. The Government of Cambodia shall:

(a) provide a liaison officer and/or an interpreter (Cambodian/English) for the period of the field investigations;

(b) all data and information available in connection with the survey, maps of the area, data on geology, meteorology, hydrology, transport, communications and socio-economic conditions, and

(c) all visa papers, documents required for free movement of the team and its members including employees of the team through all the project areas during the survey.

14. The Mekong Secretariat shall provide:

(a) petroleum products from the contribution made by the Government of Iran for the vehicles used by the team during the field survey in Cambodia, and

(b) any data or information in its possession relevant to the survey such as maps, meteorological, hydrological and geological data.

(iii) Privileges and Immunities

15. Foreign personnel provided for the project by the Government of Japan shall have the right to the following:

(a) immunity from legal process in the respect of all acts performed by them in the execution of the project;

(b) immunity from national service obligations;

(c) immunity from immigration restrictions;

(d) the privilege of bringing into the country reasonable amounts of foreign currency for the purpose of the project or for personal use of such personnel, and of withdrawing any such amounts brought into the country, or, in accordance with the relevant foreign exchange regulations, such amounts as may be earned therein by such personnel in the execution of the project, and

(e) the same repatriation facilities in the event of international crises as diplomatic envoys.

16. Such foreign personnel shall enjoy inviolability for all papers and documents relating to the project.

17. The Government of Cambodia shall either exempt from, or bear the cost of, any taxes, duties, fees or levies which it may impose on the foreign personnel who may be provided for the project by the Government of Japan in respect of:

(a) the salaries or wages earned by such personnel in the execution of the project;

(b) any equipment, materials and supplies brought into the country in connection with execution of this Plan of Operation or which, after having been brought into the country, may be subsequently withdrawn therefrom, and

(c) any property brought, including one privately owned automobile per person, by the project expert team or its foreign personnel for their personal uses or consumption or which, after having been brought into the country, may subsequently be withdrawn therefrom upon departure of such personnel.

18. Privileges and immunities to which such foreign personnel may be entitled, referred to in para 12 - 14 of this Plan of Operation, may be waived by the Government of Japan, where, in its opinion, the immunity would impede the course of justice and can be waived without prejudice to the successful completion of the project or to the interest of the Government of Japan.

19. The Government of Japan shall provide the Government of Cambodia with the list of personnel to whom the privileges and immunities enumerated above shall apply.

(iv) Organization

20. The OTCA will appoint a project manager and advise in writing the Executive Agent of the Mekong Committee about his appointment. The project manager will have overall responsibilities for the organization and the execution of the work stipulated under this Plan of Operation. He shall plan and direct all operations, consult with the Government of Cambodia through the liaison officer appointed under section 13 (a) of this Plan of Operation and report to and allow inspection of the project work progress by the Executive Agent or his authorised representatives.

(v) Schedule of Operation

21. The project shall begin within 30 calendar days after the signature of this Plan of Operation. The project is expected to be completed within six months.

IV. REPORTS

22. The project Pre-feasibility report, data and finding as stipulated in paragraph 10(b) and (c) shall be transmitted to the Mekong Committee, through the Executive Agent not later than 60 days after the completion of the study.

V. CONCLUSION

23. This agreement is established in six original copies in English and in French.

24. In as much as the project herein described is of interest to the Government of Cambodia, Laos, Thailand and the Republic of Viet-Nam, as Members of the Mekong Committee, this Plan of Operation is agreed upon, on behalf of the parties, by the undersigned;

For the Government to Cambodia

For the Government of Laos

For the Government of Thailand

For the Government of
Republic of Viet-Nam

For the Government of Japan

For the Executive Agent,
Committee for Coordination
of Investigations of the Lower
Mekong Basin

KINGDOM OF CAMBODIA

DIRECTION OF THE AUTONOMOUS PORT OF SIHANOUKVILLE

SHORT INFORMATION ABOUT THE PORT OF SIHANOUKVILLE

ROYAUME DU CAMBODGE
DIRECTION DU PORT AUTONOME
DE SIHANOUKVILLE

SHORT INFORMATION ABOUT THE PORT
OF SIHANOUKVILLE

1. GENERALITIES

In the days following independance of Kingdom of Cambodia in 1954, the Port of Phnom-Penh, situated at 180 nautical miles from South China Sea, was onlyavailable to its own disposal.

This coastal-trade harbour can afford restricted traffic with South-East Asiatic countries and is open all around the year, but only for ships with 13 feet and half maximum draught.

A break in transport was unavoidable for all exchanges off these limits and it occurs in Saigon, Hong-Kong and Singapore. The complement result was increases in freight and delays in transport.

Due to its peaceful and neutralist policy, Kingdom of Cambodia extended agricultural resources, constituting its main wealth and, accordingly, export products increased towards foreign countries.

In view to compete international trading, particular care of quality and lowering sales prices of export products are mainly important.

The most efficient way to succed is to use large and modern sea-going freighters loading up to 10.000 tons of farming products, instead of coastal reighters restricted at 2 to 3.000 tons.

For all these peromptory causes, the Royal Gouvernment devised to built up a brand new sea-port.

2. CHOICE OF SITE

After several surveys between Kampot and Thailand boundary a team of technicians, experts in marine works, selected the erea located North-east off Koh-Pos Island, next a slin peninsula to be new harbour site.

The reasons are as follows :

Depths under 33 feet are following from South a natural fairway, between Koh-Pos Island and mainland, broadering in the North up to a 1,300 feet wide natural basin where ships going alongside can easily turn round or cast anchor.

Grounds are very sound for vessels' anchorage.

A long string of islands closes up Kompong Som Bay and shelters the roads against Gulfe of Thailand heavy swells.

3. THE HARBOUR

It was only by a systematic survey of site and its naturel factors as nautical and climatio, that settling harbour arrangments was decided in this soil of Cambodia absoultely virgin up to the year 1954.

The first constructive work was a 933 feet long and 92 feet wide pier, erected on the 33 feet fairway and in parallel direction with.

The Pier Northern end is connected to mainland peninsula by the way of a 605 feet long and 33 feet wide bridge.

Commercial pier provides two berths on each side and is able to admit heavy trucks carrying goods for transhipment and additional load by a single railway track, connected to mainland system.

A 150.000 cubic yards reclamation had been carried out for the arrangment of a 5 acres area, where two 393 x 177 feet warehourses, open storages and access roads have been built up in completion of superstructures and substructures works.

Port Authorities run naval equipment as tugboats, motorlaunches and lighters, moored in a sheltered basin, previously constructed for the works' necessities.

Light buoys are marking out access channels; two lights are shown off shore and a landing light house is erected on the Sothern end of Koh-Rong-Samlem Island with 30 nautical miles range.

All these construction works starded in 1955 in year hard conditions, have been carried out steps by steps according to our resources and completed in 1965, amounting to approximately 400 millions riels

Various and useful improvements have been performed to fulfill an efficient rentability of the scheme.

4. TRAFFICS

Cargo handling statistics beginning 1960, ending 31.12.68 shows.

1960	=	34 694 metric tons
1961	=	95 484
1962	=	166 339
1963	=	369 559
1964	=	714 833
1965	=	754 559
1966	=	548 526
1967	=	545 197
1968	=	747 847

Number of vessels statistics, beginning 1961, ending 31.12.68 shows:

1961	=	89 vessels
1962	=	125
1963	=	155
1964	=	250
1965	=	266
1966	=	258
1967	=	245
1968	=	325

Goods handled in the Port of Sihanoukville are:
for export : farming products
for import : Manufactured products of every day use on machinery for factories..

Main imported or exported goods are as follows:

IMPORT	EXPORT
* food stuffs	* rice
* pharmaceutical products	* logs and timbers
* chemicals	* corn
* cement	* latex
* coal	* rubbler
* textiles	* kapok
* miscellanous equipment	* teel seeds
* motors and machenery	* pepper
* iron and steel products	* kapok seeds
* military material	* vomica nuts
* fuels	* valva nuts
* lubricants	* cotton
* vehicles	* others
* rails	
* others	

From beginning of Port operations, more than 30 differents flags called in Sihanoukville.

The Port of Sihanoukville is open to all vessels, without any consideration of nation, however, Portuguese and South-African vessels are prohibited in agreement with United Nations resolution, which Cambodia is member.

5. DEVELOPMENT PROJECTS

Port trafic statistics show a sustained increasing which exceeds all the expectations; it can be explained by the amazing expansion of our economy, yet our agricultural production have suffered from infortunate incidents due to climatic events.

At a single glance of the cargo handling statistices, list, it appears that the import and export tonnage, which have been estimated 350.000 tons a year, has been overshot by far, during 4 years of operations and maximum recorded tonnage is 755.000 tons for the year 1965.

Due to this stupendous traffic growth, harbour development becomes an imperative necessity from this date.

A general plan for the extension of our national harbour is drawn, up computing each consideration climatic an nautical peculiar to Sihanoukville and the city-planning of Kompong Som area.

This northbound extension includes a second basin, extending actual settings towards North-east and efficient protection of this basin will be worked out by the means of two converging breakwaters (North Jetty and South Jetty).

Breakwaters follow a parallel line with the old pier and measured up 3.300 and 660 yards.

A total quayage of 3.800 yards will provide 20 berths for sea-going vessels inside this basin.

A reclamation, amounting to approximately 18 millions cubic yards will be set beyond quay-lines. This vast yard will be fitted for open storages, warehouses, railways sidings and factory area.

Obviously, the comletion of this second basim and its equipment will be realized steps by steps and needs very important investments.

In the scheme of accomplishment of this basin; Port Authorities began the first section of works, up to the end of 1967 :

1) Two breakwaters (North and South Jetties);

2) 1.150 feet long quay, providing 2 berths for sea-going vessels up to 12.000 tons;

3) A 850 feet radius turing area, with access channel dredged at 33 feet.

In this purpose, Port Authorities has purchased the sea-going hopper suction-dredge KANTHA BOPHA of 1.300 cubic feet capacity.

Annual out put of this dredge, in a common running, can reach 2,600,000 cubic yards, and according to our scheldule, it will be used for reclamations beyond quaylines.

The total amount of this section of works, including equipment supplies is quoted 600 millions riels.

6. OUTLOOKS ON FUTURE

In the scheme of the amazing development of our national economy and the precise schedules projected in our 2nd quinquennial plan (1968-1972) where productivity gets the first place, the Port of Sihanoukville will welcome factory plants and handle exports goods of all kinds.

Exchange flow over foreign countries is made easy by the geographical position of Sihanoukville, turn-table in South-East Asia and by the neutralist policy of our chief of state, promoting exchanged trading with all the nations.

Besiders, the near creation of our merchant marine will attract our people tawards the sea, develop land in coastal islands off Sihanoukville and extend coaster ship traffic all around coastlines. With the help of our merchant marine, Cambodia will find a place in the international competition for marine transport.

Moreover, it is interesting to point out that our territorial waters are abounding with fish and deep-sea fishing is becoming a very important industry National services or private societies entered upon studies on this device and in very near nature, fishing industry must be prosperous.

These numerous and near outlooks set the Port of Sihanoukville as a considerable center of interest for manufacturers and traders; developing harbour plantis essential, so this national port can fulfill with efficiency its mission if the range of Kingdom general economy.

Port Authorities are fully aware of this problem, following development of port activities end our 2nd quinquennial plan scheme, and get a new licence of works proceeding mainly 4 new additional berths with annex settings and supplies of important equipment (ground and marine) to facilitate rational and easy operation, according international standards.

When the 2nd quinquennial plan will be completed, Port Authorities could be proud to provide 10 berths for sea-going vessels and to handle cargo traffic, approximately 1,200,000 tons.

These few informations will permit to have a definite and objective view upon importance of our national port, which plays an essential part in Kingdom economical contexture.

Cambodia is fully aware of this fact, and it is why all attempts have been put forth:

Sihanoukville will be "the Kingdom's lung" as whishes Samdech Sahachivin Chief of State, our worshipped leader./-

SIHANOUKVILLE, JANUARY 5TH 1968
DIRECTOR-GENERAL, PORT OF SIHANOUKVILLE
AUTHORITY

THE SECOND FIVE-YEAR PROGRAM

OF

THE KINGDOM OF CAMBODIA

(EXTRACT)

Volume 2 Program of each technical department concerning the Second Five-Year Program

Section 2 Industry and Mining

Chapter 3 Enterprise Program of the Department of Industry to Promote the Production of Mineral Products

Bauxite

The survey already conducted in 1956 - 1966 with the cooperation of the United Nations, within the scope of the general programs for implementation of the development plan, has confirmed the following:

- that owing to the nature of the ore (it contains little alumina but much silica) the amount of "raw bauxite" found in the Battambang area is not considered sufficinet enough to continue the survey, at least under the present circumstances.

- that on the condition that prior mechnical treatment is to be made, a certain amount of "overlaying" in the Upper Chhlong area may be found among exploitable bauxite. Therefore, among other things, it is essential to make a study of an industrial process at the site, which will allow the enrichment of the alumina soil with the aim of raising the contents of $Al_2 O_3$ to 45% or more, and to reduce the ratio of the silica contents to less than 3%.

- If such a study of the "enrichment" process is carried out successfully, test borings following this study must be systematically conducted to estimate the reserves.

The Second Five - Year Program (1968-1972)

Office in Charge : Mining Bureau

Enterprise	Bauxite
Objective and Capability	A four month investigation on the method of improving the quality of soil containing alumina. If it proves successful, it is essential to systematically carry out test borings at 2 sites of the sector already authorized for a period of 7 months during the dry season.
Place	Upper Chhlong (Mondulkiri and Battambang)
Project Costs :	
Personnel	4.1 M.f.
Equipment	0.9 M.f.
Supplies	1.1 M.f.
Total	6.0 M.f.

Credits required for the
initial year of the program 1.0 M.f.

This project will create 40 temporary jobs.

Record of Import of Aluminium Sheet and Aluminium Plate

(1968)

	Tonnage	Item	FOB Price per Kg.	Country of Origin	Remarks
1)	71,843 Kgs	Aluminium Sheet	382.15 liras	Italy	-20% of custom duties
2)	152,532 Kgs	Aluminium Sheet	3.50 francs	Japan	-
3)	41,351 Kgs	Aluminium Plate	4.02 francs	Hongkong	-14.30% of the value not including TCA.
4)	9,123 Kgs	Aluminium Plate	4.02 francs	Hongkong	-3.30% surplus on CIF price for TCA
5)	39,000 Kgs	Aluminium Plate	425.14 liras	Italy	-5% commission for Sonexim
6)	59,271 Kgs	Aluminium Plate	3.80 francs	Japan	

Phnon Penh November 27, 1969

The Chief of No. 12 Department

USINE : CHUNG - CAM

Bureau de vente : N^{2} 94 Vithei Prey Nokor à Phnom-Penh

15..- Les produits fabriqués par notre usine, les quantités produites, les quantités vendues, les stocks et leurs valeurs correspondantea.

1) Produits fabriqués	1966		1967		1968	
	Quantité	Valeur	Quantité	Valeur	Quantité	Valeur
2) Articles de ménage en aluminium	354.691 piéces	5.500.480 riels	314.208 piéces	6.257.909 riels	466.916 piéces	9.608.945 riels
3) Produits vendns Articles de ménage en aluminium	353.881 piéces	6.895.600 riels	304.456 piéces	5.671.377 riels	414.501 piéces	8.636.183 riels
4) Produits en stock Articles de ménage en aluminium	25.726 piéces	181.185 riels	35.478 piéces	767.717 riels	87.893 piéces	1.740.479 riels

19..- Consommation de matières premières importècs

1) Matières premières	1966			1967		
	Quantité	Valeur		Quantité	Valeur	
		C & F	SONEXIM		C & F	SONEXIM
	K	R	R	K	R	R
2) Aluminium en feuilles et en disques	87.716,700	1.865.000	2.797.857	77.655,000	1.915.000	2.876.521
3) Rivets en aluminium	832,000	34.650-	53.966-	2.013,000	72.000	122.561-
4) Poudre bakelite	5.780,000	62.308-	100.665-	6.570,000	61.840	114.424-
5) Pate a polir	2.392,000	68.483-	109.028-			
6) Fil de fer galvanisé	908,000	Achat lecal	11.120-	3.442,000	Achat lecal	42.158-
7) Fil en aluminium	800,000	19.443-	28.526-	1.860,000	45.205	66.321
Tetaux	K 98.428,700	R 2.049.884	R 3.101.162	K 91.540,000	R 2.094.045	R 3.221.985

8) Matières premières	1968		
	Quantite	Valeur	
		C & F	SONEXIM
	K	R	R
9) Feuilles en aluminium ..... (Importées)	5.313,000	122.499	185.388
10) Feuilles en aluminium ..... (Achats aur plaee)	42.739,000		2.868.382-
11) Disquea en aluminium .. (Impertès).	26.234,000	684.829-	1.213.491-
12) Disquea en aluminium(Achats aur plaee)	31.000,000		2.103.669-
13) Rivets en aluminium	741,000	26.498-	45.116-
14) Poudre bakelite	3.550,000	33.406-	61.827-
15) Pate à polir (Achat aur plaee)	1.150,000		25.300-
16) Fil en aluminium	1.195,000	29.039-	42.610-
Tetaux	K 111.922,000	R 896.271	R 6.545.783

20.- Nos productions et prèvishins de production pour les périodes ci-après:

1) Produits fabriqués			Previsions			
	2e semestre 1968		Ier semestre 1969		2e semestre 1969	
	Quantité	Valeur	Quantité	Valeur	Quantité	Valeur
2) Articles de ménage en aluminium	900.000 piéces	15.000.000 riels	900.000 piéces	15.000.000 riels	900.000 piéces	15.000.000 riels

Valeurs exprimées en milliers de riels

3) Produits fabriqués	REALISATION			
	2éme semestre 1968		Ier semestre 1969	
	Quantité	Valeur	Quantité	Valeur
4) Articles de ménage en aluminium	203.396 piéces	4.470.965 riels	284.275 piéces	5.701.920 riels

Valeurs exprimées en milliers de riels

USINE : EAM-KUANG

Bureau de vente : N° 155 Vithei Preah Bat Ang Duong
à Phnom-Penh

15. - Le tableau des produits fabriqués par notre usine :

NATURE DES MARCHANDISES	1		9		6	
	PRODUITS FABRIQUES		PRODUITS VENDUS		PRODUITS EN STOCKS	
	QUANTITE	VALEUR	QUANTITE	VALEUR	QUANTITE	VALEUR
1)- Casseroles en aluminium	5.985 jeux	4.740.120ƒ00	5.250 jeux	4.158.000ʒ00	735 jeux	582.120ʒ00
2)- Faitouts en aluminium	4.850 jeux	1.920.600,00	4.570 jeux	1.809.720,00	280 jeux	110.880,00
3)- Portes à manger en aluminium	39.300 pcs	1.493.400,00	34.760 pcs	1.320.897,00	4.540 pcs	172.502,05
4)- Plateaux en aluminium	4.540 jeux	681.000,00	3.420 jeux	513.000,00	1.120 jeux	168.000,00
5)- Marmites pour cuission à vapeur	3.720 pcs	1.302.000,00	2.980 pcs	1.043.000,00	740 pcs	259.000,00
6)- Poêles en aluminium	28.500 pcs	997.500,00	25.900 pcs	906.500,00	2.600 pcs	91.000,00
7)- Vases en aluminium	18.900 jeux	1.152.900,00	17.675 jeux	1.078.193,00	1.225 jeux	74.707,00
8)- Gamelles en aluminium	19.500 pcs	1.267.500,00	18.400 pcs	1.196.000,00	1.100 pcs	71.500,00
9)- Crachoirs en aluminium	17.320 pcs	554.298,00	11.450 pcs	366.400,00	5.870 pcs	187.898,00
10)- Lits métalliques	1.040 pcs	1.285.000,00	1.006 pcs	1.253.469,02	34 pcs	31.530,98
11)- Chaises métalliques	11.850 pcs	1.125.750,00	11.785 pcs	1.119.575,00	65 pcs	6.175,00
12)- Chaises pliantes métalliques	3.500 pcs	1.120.000,00	3.500 pcs	1.120.000,00	Néant	Néant
13)- Bureaux métalliques	65 pcs	552.500,00	65 pcs	552.500,00	Néant	Néant
14)-Armoires métalliques	51 pcs	2.135.600,00	51 pcs	637.500,00	Néant	Néant
15)- Tables à manger	1.890 pcs	892.560,00	1.875 pcs	2.119.100,00	15 pcs	16.500,00
16)- Fuateuils	171 cpl	411.600,00	171 cpl	892.560,00	Néant	Néant
17)- Tabourets métalliques	2.940 pcs	1.286.700,98	2.940 pcs	411.600,00	Néant	Néant
18)- Balustrades	108 cpl	637.500,00	108 cpl	1.286.700,98	Néant	Néant
19)- Boulons de toutes dimensions	428.456,50 K	3.470.497,00	365.372,50 K	2.959.517,25	63.084 K	510.980,40
20)- Fil de fer barbelé et chaîne métall.	92.540 K	1.156.750,00	92.540 K.	1.156.750,00	Néant	Néant
21)- Poubelles	.450 pcs	315.000,00	435 pcs	304.500,00	15 pcs	10.500,00
22)- Ampong de tuk thnot	15.600 pcs	546.000,00	15.600 pcs	546.000,00	Néant	Néant
23)- Touques pour l'eau	16.840 pcs	324.506,80	16.840 pcs	324.506,80	Néant	Néant
24)- Jantes pour cycle.	16.560 pres	2.898.000,00	15.320 pres	2.681.000,00	1.240 pres	217.000,00
Total :	29.735 jeux 167.106 pcs 279 cpl 520.996,50 K 16.560 pres	32.267.283ʒ43	30.915 jeux 147.587 pcs 279 cpl 457.912,50K 15.320 pres	29.756.990ʒ00	3.360 jeux 14.979 pcs Néant 63.084 K. 1.240 pres	2.510.293ʒ43

NATURE DES MARCHANDISES	1		9		6	7	
	PRODUITS FABRIQUES		PRODUITS VENDUS			PRODUITS EN STOCKS	
	QUANTITE	VALEUR	QUANTITE	VALEUR		QUANTITE	VALEUR
1)- Casseroles en aluminium	6.080 jeux	4.815.360ƒ00	5.250 jeux	4.158.000ƒ00		830 jeux	657.360ƒ00
2)- Faitouts en aluminium	4 912 jeux	1.821.846,00	4.878 jeux	1.790.996,00		34 jeux	30.850,00
3)- Vases en aluminium	19.450 jeux	1.186.450,00	17.450 jeux	1.064.450,00		2.000 jeux	122.000,00
4)- Gamelles en aluminium	21 240 pcs	1.295.640,00	18.720 pcs	1 216.800,00		2 520 pcs	78.840,00
5)- Portes à manger en aluminium	40 020 pcs	1 520.760,00	37.950 pcs	1.442.100,00		2.070 pcs	78.660,00
6)- Plateaux en aluminium	5.260 jeux	789.000,00	4.850 jeux	727.500,00		410 jeux	61.500,00
7)- Marmites pour cuission à vapeur	3.610 pcs	1.141.000,00	2.910 pcs	1.018.500,00		352 pcs	122.500,00
8)- Poêles en aluminium	26.700 pcs	934.500,00	24.200 pcs	847.000,00		2.500 pcs	87.500,00
9)- Crachoirs en aluminium	12.650 pcs	404.800,00	11.420 pcs	365.440,00		1.230 pcs	39.360,00
10)- Lits métalliques	947 pcs	1.125.100,00	932 pcs	1.045.000,00		15 pcs	80.100,00
11)- Chaises métalliques	8.640 pcs	748.560,00	7.645 pcs	703.340,00		476 pcs	45.220,00
12)- Chaises pliantes métalliques	3.650 pcs	1.168.000,00	3.650 pcs	1.168.000,00		Néant	Néant
13)- Bureaux métalliques	74 pcs	632.500,00	74 pcs	632.500,00		Néant	Néant
14)- Armoires métalliques	84 pcs	1.010.800,00	84 pcs	1.010.800,00		Néant	Néant
15)- Tables à manger	2.004 pcs	2.401.500,00	1.982 pcs	2.374.400,00		22 pcs	27.100,00
16)- Fauteuils	192 cpl	495.600,00	192 cpl	1.089.500,00		Néant	Néant
17)- Tabourets métalliques	3.540 pcs	1.427.600,00	3.480 pcs	454.200,00		60 pcs	41.400,00
18)- Balustrades	132 cpl	2.869.288,50	132 cpl	1.427.600,00		Néant	Néant
19)- Boulons de toutes dimensions	187.489,20 K	2.869.288,50	126.865 K.	2.156.705,00		41.916,60 K	712.583,50
20)- Fil de fer barbelé et chafne métall	72.470 K	920.369,00	72.470 K.	920.369,00		Néant	Néant
21)- Poubelles	150 pcs	105.000,00	135 pcs	94.500,00		15 pcs	10.500,00
22)- Ampong de tuk thnot	14.200 pcs	497.000,00	14.200 pcs	497.000,00		Néant	Néant
23)- Touques pour l'eau	24.520 pcs	673.140,00	34.520 pcs	673.140,00		Néant	Néant
24)- Jantes pour cycles.	21.660 pres	3.656.000,00	19.550 pres	3.323.500,00		1.900 pres	332.500,00
Total :	35.702 jeux 172.029 pcs 324 cpl 259.959,20 K 21.660 pres	32.729.313ƒ50	32.428 jeux 161.902 pcs 324 cpl 199.355 K° 19.550 pres	30.201.340ƒ00		3.274 jeux 9.260 pcs Néant 41.916,60 K 1.900 pres	2.527.973ƒ50

NATURE DES MARCHANDISES	1	9	6	8		
	PRODUITS FABRIQUES		PRODUITS VENDUS		PRODUITS EN STOCKS	
	QUANTITE	VALEUR	QUANTITE	VALEUR	QUANTITE	VALEUR
1)- Casseroles en aluminium	5.988 jeux	4.416.910ȝ00	5.602 jeux	4.260.120ȝ00	1.250 jeux	845.000ȝ00
2)- Plateaux en aluminium	18.038 jeux	2.705.700,00	17.837 jeux	2,675,550,00	611 jeux	91.650,00
3)- Vases en aluminium	34.188 jeux	1.930.719,00	34.338 jeux	1.958.369,00	1.850 jeux	94.350,00
4)- Gamelles en aluminium	16.685 pcs	1.166.940,00	17.190 pcs	1.120.850,00	2.015 pcs	124.930,00
5)- Marmites pour cuission à vapeur	3.685 pcs	1.270.860,00	3.672 pcs	1.285.200,00	338 pcs	108.160,00
6)- Crachoirs en aluminium	29.376 pcs	869.496,00	28.035 pcs	842.010,00	2.571 pcs	66.846,00
7)- Poêles en aluminium	25.185 pcs	876.175,00	25.035 pcs	876.225,00	2,650 pcs	87.450,00
8)- Portes à manger en aluminium	22.792 pcs	788.100,00	24.012 pcs	841.260,00	850 pcs	25.500,00
9)- Assiettes en aluminium	88.376 pcs	794.124,00	87.116 pcs	784.044,00	1.260 pcs	10.080,00
10)- Lits métalliques	762 pcs	541.910,00	767 pcs	614.010,00	10 pcs	8.000,00
11)- Chaises métalliques	3.719 pcs	420.430,00	4.070 pcs	451.900,00	125 pcs	13.750,00
12)- Seaux en tôles galvanisées	15.613 pcs	2.341.950,00	15.613 pcs	2.341.950,00	Néant	Néant
13)- Poubelles avec couvercle en tôles	8.790 pcs	2.190.750,00	8.805 pcs	2.201.250,00	Néant	Néant
14)- Rayons pour cycle	13.328 gros	932.960,00	11.547 gros	808.290,00	1.781 gros	124.670,00
15)-Jantes pour bicyclette	8.210 pres	967.200,00	7.310 pres	877.200,00	900 pres	90.000,00
16)- Jantes pour cyclo-pousse	6.190 pres	995.000,00	6.570 pres	985.500,00	1.520 pres	342.000,00
17)- Boulons de tous genres.	249.754,40 K	4.017.254,50	265.351 K.	4.245.618,00	26.320 K.	552.720,00
Total :		27.253.473ȝ50		27.196.341ȝ00		2.585.106ȝ00

19.- Consommation de matiéres premiéres importées :

Matières premières	1 9 6 6		
	Quantité	Valeurs	
		C & F	SONEXIM
1)- Fer cornière	35.000 Kgs	139.499ƒ26	200.878ƒ93
2)- Ecrous pour boulon.	90.000 "	421.702,63	607.251,79
3)- Zinc	9.000 "	108.190,99	155.795,03
4)- Aluminium en feuille	110.000 "	2.185.911,14	3.147.712,04
5)- Fer plat en barre	186.000 "	766.836,68	1.104.249,14
6)- Anodes de nickelage	1.200 "	142,905,54	228.648,86
7)- Pâte à polir	3.380 "	90.403,57	144.645,71
8)- Profil en feuillard	56.000 "	566.407,67	906.252,27
9)- Zinccen feuille	9.300 "	169.308,23	270.893,17
10)- Fil en aluminium	2.790 "	87.158,67	139.453,87
11)- Tige de soudure	10.230 "	96.457,42	154.331,87
12)- Emeri en grain	11.000 "	69.747,47	111.595,95
13)- Produits pour chromer	8.270 "	372.262,94	595.620,70
14)- Bakelite en poudre	9.800 "	119.432,93	191.092,69
15)- Ecrous pour rayons	43.000 "	673.417,33	1.077.467,73
16) Fil d'acier	81.000 "	463.982,83	742.372,53
Total :	665.970 Kgs.	6.473.628ƒ29	9.778.262ƒ28

Matières premières	1 9 6 7		
	Quantité	Valeurs	
		C & F	SONEXIM
1)- Anodes de nickel	1.299 Kgs	153.661ƒ88	229.609ƒ03
2)- Zinc électrique	16.450 "	116.334,40	305.399,95
3)- Ecrous pour rayon	47.802 gros	723.906,66	1.134.874,16
4)- Profil en feuillard	122.401 m	861.079,09	1.377.726,54
5)- Ecrous pour boulon	2.434.000 pcs	453.443,69	717.662,45
6)- Fil d'acier	111.793 Kgs	134.137,17	1.282.341.97
7)- Emeri en grain	12.765 "	74.996,28	108.656,27
8)- Produits chimiques pour nickelage, chromage, zincage et cuivrage.	7.500 Kgs	300.177,27	444.154,28
9)- Pâte a plir	3.637 "	97.208,15	152.671,24
10)- Zincn en feuille	10.000 "	182,051,87	273.667,05
11)- Fil en aluminium	3.000 "	93.719,01	137.192,50
12)- Tige à soudure	11.000 "	103.717,66	167.807,62
13)- Aluminium en disque	72.374 "	1.808.549,00	2.637.747,62
14)- Aluminium en feuille	5.152 "	124.956,34	181.127,45
15)- Bakelite en poudre	5.550 "	59.990,70	98.605,05
16)- Tôles planes noires	80.900 "	334.148,55	534.637,68
17)- Fer rond à baton	226.500 "	—	2.604.750,00
18)- Produit chimque	5.740 "	—	340.100,00
Total :	573.660 Kgs 47.802 gros 122.401 m 2.434.000 pcs	5.622.077ƒ72	12.728.720ƒ86

Matières premières	1 9 6 8		
	Quantités	Valeurs	
		C & F	SONEXIM
1)- Tôles planes noires	75.200 Kgs	300.800ʃ00	601.600ʃ00
2)- Fer rond	250.000 "	1.000.000,00	1.750.000,00
3)- Aluminium, en feuille	50.600 "	1.315.600,00	2.580.600,00
4)- Aluminium en disque	126.200 "	3.281.200,00	5.048.000,00
5)- Ecrous pour boulon	2.500.000 pcs	300.000,00	925.000,00
6)- Ecrous pour rayon	35.000 gros	265.000,00	714.000,00
7)- Fil en acier	60.000 Kgs	492.000,00	858.600,00
8)- Anode de nickel	120 "	21.666,00	34.161,84
9)- Produits chimique pr. chromer	3.500 "	234.500,00	422.100,00
10)- Fâte à polir	1.350 "	30.340,00	50.693,18
11)- Fer plat	50.000 "	200.000,00	500.000,00
12)- Tôles planes galvanisées	113.340 "	906.720,00	1.700.100,00
13)- Bakelité en poudre	1.500 "	16.500,00	31.500,00
Total :	731.810 Kgs 2.500.000 pcs 35.000 gros	8.364.326ʃ00	15.216.355ʃ02

20.- Nos productions et prèvisions de production pour les pèriodes :

Produits fabriqués	PREVISIONS			
	2ème Semestre 1968		1er Semestre 1969	
	Quantité	Valeur	Quantité	Valeur
1)- Casseroles en aluminium	5.700 jx.	3.853.200ʃ-	6.270 jeux	4.238.520ʃ-
2)- Gamelles en aluminium	14.000 pcs	840.000,-	15.400 pcs	924.000,-
3)- Vases en aluminium'	38.700 jeux.	1.973.700,-	42.570 jeux	2.171.070,-
4)- Marmites pour cuission à vapeur	900 pcs	288.000,-	990 pcs	316.800,-
5)- Crachoirs en aluminium	44.700 pcs	1.296.300,-	49.170 pcs	1.573.440,-
6)- Plateaux en aluminium	11.550 jx.:	1.732.500,-	12.705 jx.	1.968.445,-
7)- Poêles en aluminium	21.750 pcs	761.250,-	23.925 pcs	837.375,-
8)- Portes à manger en aluminium	36.600 pcs	1.351.000,-	42.460 pcs	1.486.100,-
9)- Assiettes en aluminium	60.500 pcs	484.000,-	66.550 pcs	532.400,-
10)- Boulons de toutes dimensions	200.000 kgs	3.2000.00,-	220.000 kgs	3.520.000,-
11)- Jantes pour bicyclette	6.000 prs	720.000,-	6.600 prs	792.000,-
12)- Jantes pour cyclo-pousse	5.000 prs	750.000,-	5.500 prs	825.000,-
13)- Rayon pour cycle	9.500 prs	665.000,-	10.450 grs	731.500,-
14)- Lits métalliques	2.180 pcs	1.744.000,-	2.400 pcs	1.920.000,-
15)- Chaises métalliques	6.700 pcs	737.000,-	7.370 pcs	810.700,-
16)- Seaux en tôles galvanisées	20.750 pcs	3.112.500,-	22.825 pcs	3.423.750,-
17)- Poubelles avec couvercle	10.500 pcs	2.625.000,-	11.550 pcs	2.887.500,-
18)- Portes métalliques	20 cpl	360.000,-	25 cpl	450.000,-

Total :	55.950 jeux 220.580 pcs 200.000 Kgs 11.000 pres 9.500 gros 20 cpl	26.493.450 -	61.545 jeux 242.640 pcs 220.000 Kgs 15.950 pres 10.450 gros 25 cpl	29.408.580ƒ-

Produits fabriqués	P R E V I S I O N S 2ème Semestre 1969	
	Quantité	Valeur
1)- Casseroles en aluminium	5.200 jeux	3.515.200ƒ00
2)- Gamelles en aluminium	14.800 pcs	917.600,00
3)- Vases en aluminium	25.750 jeux	1.313.250,00
4)- Marmites pour cuission à vapeur	1.200 pcs	384.000,00
5)- Crachoirs en aluminium	48.500 pcs	1.261.000,00
6)- Plateaux en aluminium	15.620 jeux	2.343.000,00
7)- Poêles en aluminium	17.500 pcs	577.500,00
8)- Portes à manger en aluminium	38.700 pcs	1.161.000,00
9)- Assiettes en aluminium	50.900 pcs	407.200,00
10)- Lites métalliques	850 pcs	680.000,00
11)- Chaises métalliques	2.500 pcs	275.000,00
12)- Seaux en tôles galvanisées	28.500 pcs	4.275.000,00
13)- Poubelies avec couvercle en tôles galvanisées	12.300 pcs	3.075.000,00
14)- Rayons pour cycle	10.500 gros	735.000,00
15)- Jantes pour bicyclette	7.200 pres	720.000,00
16)- Jantes pour cyclo-pousse	6.500 pres	1.462.500,00
17)- Boulons de tous genres	250.000 Kgs	5.250.000,00
Total :	46.570 jeux 215.750 pcs 10.500 gros 13.700 pres 250.000 Kgs	28.352.250ƒ-00

USINE : KHEMARAK OUSAHAKAM

Bureau de vente : N^2 242 Vithei Preah Bat Norodom

à Phnom-Penh

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Nature des produits	PRODUITS FABRIQUES		PRODUITS VENDUS		PRODUITS EN STOCK	
	Quantité	Valeur	Quantité	Valeur	Quantité	Valeur
1) Marmites à bord coupé	11.014 jeux	2.643.360R00	9.157 jeux	2.196.220R00	1.857 jeux	447.140R00
2) Marmites à bord forgé	8.227 "	1.069.510R00	6.066 "	788.600R00	2.161 "	280.930R00
3) Vase d'eau bord coupé	9.319 "	521.864R00	8.960 "	501.501R00	359 "	20.363R00
4) Vasedd'eau bord forgé	5.060 "	298.540R00	4.836 "	288.856R00	224 "	9.684R00
5) Crachoirs en Aluminium	23.560 pces	306.280R00	21.878 pces	284.416R00	1.682 pces	21.864R00
6) Porte-manger	23.132 "	601.432R00	22.393 "	580.772R00	739 "	20.660R00
7) Plateaux en aluminium	10.493 "	94.437R00	8.600 "	77.400R00	1.893 "	17.037R00
8) Seaux en Al.14/20 cm	6.293 "	239.134R00	4.980 "	189.240R00	1.313 "	49.894R00
9) Couvercles	1.516 "	48.512R00	1.070 "	34.240R00	446 "	14.272R00
10) Lampes d' acetylene	2.380 "	264.180R00	2.274 "	254.430R00	106 "	9.750R00
11) Balance romaine a plateau	1.006 "	422.520R00	930 "	399.130R00	76 "	23.390R00
12) Balance romaine a crochet	1.184 "	417.952R00	815 "	287.762R00	369 "	130.190R00
13) Balance Robervale	1.305 "	874.350R00	1.146 "	769.000R00	159 "	105.350R00
14) Balance a bascule	16 "	52.800R00	-	-	16 "	52.800R00
15) Poids en fonte	2.190 "	78.840R00	1.855 "	66.780R00	335 "	12.060R00
TOTAL	33.620 jeux 73.075 pces	7.933.711R00	29.019 jeux 65.941 pces	6.718.347R00	4.601 jeux 7.134 pces	1.215.364R00

19.- Consommation de matières premières importées en :

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MATIERES PREMIERES	QUANTITE	VALEUR C&F	SONEXIM
1) Tôle plane noire	71.098 Kgs.	231.074R00	568.780R00
2) Fil de fer galvanisée	19.391 "	63.819R00	178.210R00
3) Fer plat en barre	18.276 "	55.970R00	112.767R00
4) C o k e	31.987 "	178.219R00	371.492R00
5) Fer carré en barre	41.123 "	142.567R00	271.798R00
6) Aluminium en feuille	14.478 "	268.110R00	498.792R00
7) Tôle galvanisé	26.039 "	160.400R00	301.279R00
8) Rivet en aluminium	3.181 "	99.190R00	198.316R00
9) Pate à polir	2.570 "	39.598R19	78.419R00
10) Bakelite en poudre	11.070 "	19.901R00	36.984R01
TOTAL.	239.213 Kgs.	1.258.848R19	2.616.846R01

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MATIERES PREMIERES	QUANTITE	VALEUR C&F	SONEXIM
1) Tôle plane noire	34.108 Kgs.	143.253R60	229.205R76
2) Fil de fer galvanisé	8.289 "	51.391R80	82.266R88
3) Tige a soudure	6.495 "	59.104R50	94.567R20
4) C o k e	22.440 "	124.990R80	199.985R28
5) Fer carré en barre	27.165 "	94.262R55	150.820R08
6) Aluminium en feuille	32.901 "	756.723R00	1.210.756R80
7) Tôle galvanisé	16.710 "	102.766R50	164.426R40
8) Rivet en aluminium	1.654 "	51.571R72	82.514R75
9) Pâte a polir	1.495 "	23.023R00	36.836R80
10) Bakelite en poudre	3.092 "	5.565R60	8.904R96
11) Feuille en laiton	1.144 "	54.076R88	86.523R00
TOTAL.	155.493 Kgs.	1.466.729R95	2.346.807R91

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MATIERES PREMIERES	QUANTITE	VALEUR C&F	SONEXIM
1) Tole plane noire	22.378 Kgs.	112.752R28	175.460R59
2) Fer plat en barre	12.912 "	59.110R00	94.576R00
3) Aluminium en feuille	37.731 "	1.346.128R00	2.288.417R75
4) Aluminium en disque	30.052 "	1.118.782R80	1.901.590R89
5) C o k e	24.850 "	138.248R00	221.165R00
6) Rivet en aluminium	1.386 "	51.304R41	96.489R08
7) Laiton en feuille	1.881 "	131.990R00	186.055R11
8) Fil de fer galvanisé	5.004 "	23.084R99	35.132R77
9) Tôle plane galvanisé	346 "	5.190R00	8.304R00
10) Pâte a polir	1.405 "	31.000R00	50.797R82
11) Ferro-Silicium	2.459 "	26.000R00	40.431R60
12) Fer divers	9.100 "	38.220R00	109.200R00
TOTAL.	149.504 Kgs.	3.081.810R48	5.207.620R61

20.- Nos productions et prévisions de production pour les périedes du 2ème semestre 1968, ler semestre 1969 et 2ème semestre 1969 : (prière voir liste jointe)

PREVISONS

Désignation	2è semestre 1968		1er semestre 1969		2è semestre 1969	
	Quantité	Valeur	Quantité	Valeur	Quantité	Valeur
1) Marmutes à bord coupé	4.000 jeux	920.000R00	4.900 jeux	1.127.000R00	5.000 jeux	1.150.000R00
2) Marmites à bord forgé	4.758 "	518.540R00	5.000 "	650.000R00	4.500 "	585.000R00
3) Vase d' eau à bord coupé	5.808 "	326.848R00	6.500 "	364.000R00	6.500 "	364.000R00
4) Vase d' eau à bord forgé	3.500 "	171.500R00	4.200 "	205.800R00	4.000 "	196.000R00
5) Crachoirs en Aluminium	12.789 pces	166.374R00	13.200 pces	171.600R00	14.000 pces	182.000R00
6) Porte-manger	13.217 "	290.774R00	13.800 "	303.600R00	13.500 "	297.000R00
7) Plateaux en aluminium	7.500 "	67.500R00	8.000 "	72.000R00	8.000 "	72.000R00
8) Seaux en Al.	5.600 "	212.800R00	5.800 "	220.400R00	6.000 "	228.000R00
9) Couvercles	1.800 "	57.600R00	2.160 "	69.120R00	3.000 "	81.000R00
10) Lampes d' acétylène	1.309 "	143.990R00	1.571 "	172.810R00	2.000 "	220.000R00
11) Balance à plateaux	619 "	136.180R00	743 "	163.460R00	750 "	165.000R00
12) Balance à crochet	733 "	278.540R00	880 "	334.400R00	340 "	129.200R00
13) Balance robervále	690 "	690.000R00	740 "	740.000R00	800 "	720.000R00
14) Poids en fonte	1.500 "	54.000R00	1.700 "	61.200R00	2.000 "	72.000R00
TOTAL.	18.066 jeux 45.766 pces	4.034.446R00	20.600 jeux 48.594 pces	4.655.390R00	20.000 jeux 58.390 pces	4.461.200R00

REALISATIONS

Désignation	2eme semestre 1968		1er semestre 1969	
	Quantité	Valeur	Quantité	Valeur
1) Marmites à bord coupé	3.716 jeux	831.267R00	4.429 jeux	974.380R00
2) Marmites à bord forgé	8.227 "	1.069.516R00	7.121 "	1.021.380R00
3) Vase d' eau à bord coupé	4.479 "	250.824R00	3.071 "	181.205R00
4) Vase d' eau à bord forgé	5.060 "	298.540R00	3.599 "	201.598R00
5) Crachoirs en Al.	12.895 pces	167.635R00	13.859 pces	180.167R00
6) Porte-manger	12.118 "	259.998R00	9.820 "	216.040R00
7) Plateaux en Al. c	10.493 "	94.437R00	8.775 "	78.975R00
8) Seaux	6.293 "	239.134R00	6.133 "	233.054R00
9) Couvercles	1.516 "	48.512R00	1.277 "	40.864R00
10) Lampes d' acétylène	1.289 "	138.933R00	1.083 "	119.130R00
11) Balance romaine a plateaux	431 "	307.807R00	615 "	135.300R00
12) Balance romaine a crochet	573 "	231.169R00	422 "	160.360R00
13) Balance à robervale	789 "	434.202R00	395 "	359.450R00
14) Poids en fonte	2.190 "	78.840R00	1.457 "	36.425R00
TOTAL. . . .	21.482 jeux 48.587 pces	4.450.808R00	18.220 jeux 43.836 pces	3.938.160R00

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NATURE DES PRODUITS	PRODUITS FABRIQUES		PRODUITS VENDUS		PRODUITS EN STOCK	
	Quantité	Valeur	Quantité	Valeur	Quantité	Valeur
1) Balances de tous modèles	59.718 pces	1.254.925 R00	59.718 pces	1.254.718 R00	Néant	Néant
2) Lampes d' acétylène	1.869 "	786.171 R00	1.869 "	786.171 R00	Néant	Néant
3) Faitout en aluminium	1.998 jeux	682.750 R00	1.998 jeux	682.750 R00	Néant	Néant
4) Marmites en aluminium	5.830 "	519.734 R00	3.100 "	286.850 R00	2.730 jeux	232.876 R00
5) Marmites bord coupe	4.196 "	396.500 R00	4.196 "	396.500 R00	Néant	Néant
6) Vase d' eau bord forgé	22.098 pces	314.750 R00	22.098 pces	314.750 R00	Néant	Néant
7) Vase d' eau bord coupe	9.961 "	176.790 R00	9.961 "	176.790 R00	Néant	Néant
8) Plateaux en Al.	8.032 "	318.760 R00	-	-	8.032 pces	318.760 R00
9) Crachoirs en Al. 14 cm	10.588 "	232.950 R00	-	-	10.588 pces	232.950 R00
10) Crachoirs en Al. 16 cm	3.667 "	234.750 R00	-	-	3.667 "	234.750 R00
11) Porte-manger	1.218 "	196.521 R54	-	-	1.218 "	196.521 R00
TOTAL. . . .	12.024 jeux 117.151 pces	5.114.601 R54 ==========	9.294 jeux 93.646 pces	3.898.836 R00 ==========	2.730 jeux 23.505 pces	1.215.865 R00 ==========

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NATURE DES PRODUITS	PRODUITS FABRIQUES		PRODUITS VENDUS		PRODUITS EN STOCK	
	Quantité	Valeur	Quantité	Valeur	Quantité	Valeur
1) Marmites en aluminium	2.730 jeux	232.876 R00	2.730 jeux	232.876 R00	Néant	Néant
2) Plateau en aluminium	8.032 pces	318.760 R00	8.032 pces	318.760 R00	Néant	Néant
3) Crachoirs en Al. 14 cm	10.588 "	232.950 R00	10.588 "	232.950 R00	Néant	Néant
4) Crachoirs en Al. 16 cm	3.667 "	234.750 R00	3.667 "	234.750 R00	Néant	Néant
5) Crachoirs en Al. 22 cm	3.061 "	94.921 R00	2.620 "	81.250 R00	441 pces	13.671 R00
6) Porte-manger 11 cm	8.587 "	206.090 R00	8.277 "	198.650 R00	310 "	7.440 R00
7) Porte-manger 12 cm	1.218 "	196.521 R00	1.218 "	196.521 R00	Néant	Néant
8) Casseroles en aluminium 16/32 cm	987 jeux	389.840 R00	875 jeux	345.700 R00	112 jeux	44.240 R00
9) Vase d' eau en Al. 13.18 cm	1.769 "	100.860 R00	1.339 "	76.350 R00	430 "	24.510 R00
10) Lampes d' acetyléne	1.541 pces	138.721 R00	1.420 pces	127.831 R00	121 pces	10.980 R00
11) Balance robervâle	1.695 "	525.618 R00	1.473 "	496.798 R00	222 "	68.820 R00
12) Balance romaine	2.194 "	654.880 R00	1.876 "	567.500 R00	318 "	87.380 R00
13) Balance automatique	699 "	874.200 R00	657 "	821.700 R00	42 "	52.500 R00
14) Balance à bascule	72 "	237.924 R00	56 "	185.124 R00	16 "	52.800 R00
TOTAL. . . .	5.486 jeux 41.354 pces	4.438.741 R00 ==========	4.944 jeux 39.884 pces	4.076.490 R00 ==========	542 jeux 1.470 pces	562.251 R00 ==========

OUTLINE OF PLANTS INSPECTED

		Glass Bottle Plant	Brewery	Cement Plant	Oil Refinery	Steel & Aluminium Processing Plant	Vehicle Assembling Plant	Remarks
(I)	Outline of Plant							
(1)	Item & capacity	Glass 300 t/y (Bottles 2,300t Glassware 700t)	Beer Small bottle 360ml x 22,000/h Large bottle 660 ml x 12,000/h	Cement 150,000 t/y	Refining of crude oil 600,000 t/y	Steel goods 500 t/M Alum. goods 30 t/M	2-ton truck 2/day 9-ton truck 1.5/day Tructor 3/day Motor cycle 80/day	
(2)	Management	State-owned	State-owned	State-owned	State-owned	Private (Chinese)	State-owned	
(3)	Name	VIRRERIE DETAT	SOCIETE KUMERE DES DISTILERIES	SOCIETE NATIONALE DE CIMENT	SOCIETE KUMERE DE RAFFINAGE DE PETROLE	EAN-KUANG	SOCIETE NATIONALE DE TRACTEUR	
(4)	Location	Phnom Penh	Sihanoukville		Sihanoukville	Phnom Penh	Sihanoukville	
(5)	Established	1967 (2 years in operation)	Nov. 1968 (About 1 yr. in operation)	1964 (About 5 yr. in operation)	Jan. 1969 (About 1 yr. in operation)	About 20 years ago	Jul. 1967 (2 years in operation)	
(6)	Construction period	1 yr. 3 mon.	1 yr. 6 mon.			Expanded gradually		
(7)	Techniques learned from	Red China. 30 technicians from Red China when operation commenced. At present 3 mechanics are working. Leaving soon.	France. 3 French mech. engineers & 1 French operation engineer gave tech. guidance for 1 year. 3 Cambodians studied in France before operation was commenced.	Red China. (Unconditional grant) Seemed quite a number of Chinese specialists were still remaining behind, but could not confirm.	France. 47 French still remaining.	None (3 Chinese engineers)	France (mainly)	

	Glass Bottle Plant		Brewery	Cement Plant	Oil Refinery	Steel & Aluminium Processing Plant	Vehicle Assembling Plant	Remarks
(8)	Construction	Approximately 100,000,000 Riel	475,000,000 Riel	Over 500,000,000 Riel	765,000,000 Riel	30,000,000 Riel		Most plants have their own repair shop
(II)	Utility, raw material							
(1)	Industrial water	Pumped up from 1,000 m underground	Municipal water supply (Reservoir) 1,000 t/d (min. 300--699 t) Temp. 20°C--30°C Rate: ¥10 -- ¥16/t (Private ¥33/t)	Deep well 100--200 m (4) Requirement: 3,500 t/d Using Nacl & phosphate of soda for cleaning. Cooling tower 1,500 t/d	Fresh water for drinking and boiler feed is supplied from own water source (Temp. 28°C - 30°C) Sea water is used for cooling equipment (Temp. 25°C - 30°C)			Most plants have their own Diesel power generator.
(2)	Electric power	Diesel generator 200 KW x 4 150 KW x 1 75 KW x 1	Diesel generator (320 KW x 2)	Diesel generator 1,500 x KW x 1 Thermal power generator 4,500 KW x 3	Diesel generator (880KW x 3)	Purchasing at 2.2 Riel/kwh (¥14.30/kwh) In Phnom Penh 3.7 R/kwh. Other districts 7 or 8 R/kwh		Most plants have their own Diesel power generator.
(3)	Main raw materials	Lime stone & deromite (self-supply) Soda ash (import) (Price of soda ash ¥30/kg) Other chemicals (import)	Wheat imported from Brazil and France	Lime stone. Owned by co. Carrying & transportation done by the co. Quality $CaCO_3$ 75--80% Plaster (import)	Imported crude oil (Arabian, Syrian & Indonesian)		All imported. Except tires.	

	Glass Bottle Plant	Brewery	Cement Plant	Oil Refinery	Steel & Aluminum Processing Plant	Vehicle Assembling Plant	Remarks
(III) Labor Situation							
(1) Organization & personnel	450 persons General affairs, accounting, business, purchasing 100 Manufacturing, technical, repair 350	220 persons Production 50 Repair 60 Office 20 Others 90	764 persons	180 persons (Jan. '69) 133 Cambodians 47 French	200 persons (including 30 female)	113 persons (Regular 91 Temporary 22) 64 persons in main office & branches	Maintenance and repair section has relatively large number of people.
(2) Working hours	8 hours	8 hours	8 hours	8 hours	8 hours	8 hours (restraint)	Mostly 8 hours (Max. is 48 hrs.)
(3) Shift	(7--15, 15-23, 23--7)	Varies according to job title. Example: Refrigerating 7--13, 13--21, 21--7)	(8-16, 16-24) 0-8 Office 7-11.30, 14-17.30) 8 hours	3 shifts	1 shift (7:00-11:00 1:30-05:30)	1 shift (7:00-15:00 hrs) (11:00-11:30 lunch hour)	3 shifts possible
(4) Wages	1. Worker 1200--1500 Riel/M 2. Temp. worker 30 R/day 3. College grad. 3300 R/M 4. Engineer (Univ. grad.) 900 R/M 5. Dept. chief 13000-15000R/M 6. Plant Mgr. 26000 R/M	Worker 20-30 R/day High sch. grad. 3 times of ord. worker Wages are decided by the president of the co.	Worker 1522--2000R/M Skilled worker Max. 5400 R/M		* Day wage Male min. 50 R (President decides wages) * Double pay for overtime & work on holidays.	* Day worker 40 Riel Average wage for male worker 1593 R/M/person (¥10350/M/person)	* Minimum wage seems to be 30 R/day * Big gap between educated & uneducated * Difference between male & female exists for day workers. No discrimination for salaried workers.
(5) Difference between male & female	No discrimination				About 30 Riel for female		

		Glass Bottle Plant	Brewery	Cement Plant	Oil Refinery	Steel & Aluminium Processing Plant	Vehicle Assembling Plant	Remarks
(6)	Time & method of payment	30th of each month	Every 15 days for daily wkr. Every month for salaried wkr.			Weekly		
(7)	Allowance for sp. operation	100 R/M in kind					36 houses completed	Stated-owned plants usually provide housing
(8)	Company residence	60 houses	69 houses	For over 100 persons				
(9)	Clinic	Yes (Injury resulting from official work is compensated by the co.)	Yes. Doctors available once a week One nurse				Yes. Doctor available 3 days a week. One nurce. Also clinic for family members	A plant having more than 50 employees is required to have a clinic by law. Workers & staffs are easily procured.
(10)	Procurement of laborers	Easy				Easy		Workers & staffs are easily procured.
(11)	Length of employment	Long	Long	Long (due to best long working conditions)				
(12)	Encouragement	Sports (Volley ball, ping-pong)	Sports	Head of State honour 3 workers (2 male & 1 female) every year				Sports popular at the plant
(13)	Others				Bus provided for commuting	Bicycle commutis popular		Safety relations are behind. No helmets or safety eyeglasses used

KINGDOM OF CAMBODIA

MINISTRY OF PLANNING

CODE

OF

INVESTMENTS

NATIONAL INVESTMENT COMMITTEE

1969

CODE

OF

INVESTMENTS

LIST OF CONTENTS

PART 1

LONG TERM ECONOMIC DEVELOPMENT PLAN

1. Agriculture
2. Industry
3. Tourism

I. AGRICULTURE

In the agricultural field, the investment possibilities are immense.

Combodia is one of those rare countries endowed with virgin land and still under-populated lands, whose improvement for agricultural or pastoral purposes is possible.

The Royal Government envisages the economic development of the country in two distinct directions: one tending to satisfy essential needs, therefore reducing or eliminating completely certain imports; the other, on the other hand, permitting an increase of exports of various kinds.

In one or the other case, sales are always possible. One can cite, in the first place, cotton, jute, tea, quinquina, copra, coffee, cocoa and sugar cane and in the second case, rubber, copra, meat, rice, maize, wood and secondary products from the forest.

The possibilities of the principal products are as follows:

Rubber. The present area under rubber is 64,000 hectares of which 40,000 hectares of plantaticns are tapped annually, providing 58,000 tons of dry rubber. The possibilities of developing rubber cultivation are considerable: about 250,000 acres are suitable for rubber (red soils, which are deep, well structured and of basaltic origin in Rattanakiri, Kratie and Kompong Cham provinces) and would be capable of producing 400 to 500,000 tons per year.

The conditions for obtaining very high yields and a largely profitable exploitation are perfectly defined and do not present any risk, if they are respected.

The high yielding plant material (2,000 to 3,000 kg/ha/year), immediately available would allow annual plantation programmes of several thousand hectares so that from 10,000 to 20,000 hectares could be established in less than 2 years.

Coconut. At the present moment, only family planations scattered almost everywhere in the country and a few plantations of medium importance on the cost, between Sihanoukville and Kampot, exist. But the possibilities of development are enormous, particularly in the coastal regions where they line the navigable waterways in all seasons and where the roads are already established. One can estimate at about 300,000 hectares the free land not yet cleared which would be perfectly suitable for coconut cultivation.

Tea, coffee, quinquina and cocoa. These crops can be grown in high regions (Mondulkiri, Kirirom and the Cardamoms) where there is no shortage of good soils. Cocoa can also be grown on the plains.

Cotton, jute and other textile plants. Vast stretches of crystalline red soils and black soils of caleo-permian origin which have not yet been used or have been very little exploited in Rattanakiri, Battambang and Kompong Cham are perfectly suited to cotton. Jute can be planted almost everwhere on humid soils.

Fruit cultivation. Fruit of high yield and quality (bananas, pineapple, citrus fruits, etc.....) could be cultivated on a large scale on soils of various origins (basalt, schist, alluvial, etc.....) for export.

Animal breeding and raising. Vast stretches of land could be used for pastoral purposes.

Cattle raising on a large scale can be carried out everywhere: in the coastal region where the rainfall is excellent permitting good forage crops and in the rest of the country with irrigation during the dry season.

One could, in several cases, combine agriculture with stock rearing: for example, beef and buffalo raising in the large coconut plantations where leguminous plants are recommended as rotation, using the waste products and by-products from the agricultural industries as feed for cattle, pigs and chickens.

II. INDUSTRY

The industrial movement in Cambodia dates from a very recent period, that of Independence, obtained in 1953. Six billion riels have been invested, half by the state. Tens of thousands of new jobs have been created. Nearly 4,000 factories of all kinds are already in operation.

There still remains a huge field of action open to private investors. The IInd Five Year Plan, 1986 - 1972, gives a large role to private investment and reserves great facilities for it.

In this field three principal orientations can be advised to new investors:

1) Industries converting local basic materials for export.

2) Industries working for the internal market for consumption and also for equipment and supply (fertilisers, insecticides, etc.....) for agriculture.

3) Tourism.

Industrial activity, which is already a going concern, is to a large part linked to the rational exploitation of the agricultural, fish and forestry resources of Cambodia. It also tends to help agriculture modernise itself by providing it with the necessary means.

III. TOURISM

After agriculture and industry, the tourist sector features as third priority in the Plan. In this regard Cambodia presents, by its own life, its sites, its landscape and particularly its temples at Angkor, a tourist attraction of the first order which the large air lines are beginning to use in order to increase their clientele.

The number of tourists visiting Cambodia has in fact increased at a rate of 15% per year. This remarkable expansion, which is going to be accentuated in the coming years, has been made possible by the increase of international traffic and by the intensification of group trips by air to Siemreap-Angkor" thanks to the coming into service of the giant intercontinental aircraft.

The Head of State's personal efforts have impressed a new movement on this "essential" industry for our country, which necessitates the building of hotels adapted to a foreign clientele. Therefore at Phnom Penh and Siem Reap in particular, work on new hotel sites of international standard has been begun; this will add to the existing hotels and will be followed by many more to cater for the increasing needs.

Cambodia has thus been called upon to become the country of international tourism in South East Asia.

In addition to the possibilities open to investors in the three sectors which have just been listed, it is worth mentioning that Cambodia is endowed with a developed infrastructure in comparison with other countries in the region: roads, airfields, railways, riverways, and the sea port of Sihanoukville permit easy connection both with the interior and abroad. A230 km railway linking Phnom Penh with Sihanoukville will soon be completed and will allow a substantial reduction in export transport costs.

The creation of the Sihanoukville "free trade zone" is already in progress. Conceived in the most liberal spirit, it is intended to facilitate commercial operations and the establishment of industries. The normal foreign exchange regulations do not apply in this zone and important fiscal privileges will be given to enterprises wanting to set themselves up there.

Finally, the electrical power resources are increasing every year (the Kirirom dam, the future Prek Thnot irrigation and hydro-electric power works) and the necessary labour is abundant and cheap. Professional training of this labour is assured by the modern Institutes created recently.

A young country (half of its population under 20 years), assured of political stability and endowed with a far-looking administration following the directives of the new economic orientation defined by the Head of State, Cambodia has an internal market which is expanding rapidly and great export possibilities.

Th wisdom and experience which it has shown in order to maintain peace under the most difficult circumstances are the surest guarantees of its wich to adapt and to make economic progress under new conditions.

The rythm of investments, assured of their security, can only increase in the future. It is to this end that the Government has promulgated legislation particularly advantageous and welcoming for all foreign capital wanting to invest in our country.

PART II

PRESENT LEGISLATION AND REGULATIONS

1. Analysis of legislation

2. Laws and regulations in force

I. ANALYSIS AND COMMENTS

Three basic legislative texts: the Krams of 13 September 1957, 18 May 1965 and 12 March 1968 as well as the Kret of 5 August 1968 concern the organization and means of private investment in Cambodia.

It is worth analysing the essential dispositions, classing them under four principal headings: A - Previous authorization - B - Authorized sector - C - Advantages given - D - National Investment Committee.

A. Previous authorization

This authorization concerns foreign investments, which to begin with receive the Ministry of Finance's agreement under the terms of article 2 of the Kram of 13 September 1957 as follows:

"Every foreign enterprise which wants to invest its capital in Cambodia either in the form of foreign exchange or in equipment and every foreign enterprise already established in Cambodia and wanting to increase its investments or capital by borrowing from abroad must first obtain the authorization of the Ministry of Finance. This authorization will only be given after favourable recommendation from the Higher Planning Council (article 11).

It is specified in article 4 that "these investments can only be made in foreign currency accepted by the Cambodian National Bank" or, of course, as laid down in article 2, in imported equipment.

The law (article 5) also envisages the possibility of Cambodian capital and work participating in foreign enterprises, which are interested in such participation since it will favourably integrate them into the country in which they are operating.

Because of this, the investment authorization will include:

1° the obligation to reserve a minimum percentage of the registered capital for public or private Cambodian participation.

2° the obligation to use a minimum percentage of Cambodian personnel.

Article 5 of the 1957 Kram makes it clear that, in each case, this percentage will be fixed with regard to the economic necessities or circumstances.

At the same time, on the request of foreign investors, the Ministry of Finance, after consulting the Higher Planning Council, can waive the conditions applying to this article, which is not obligatory in this context.

Although it is not imposed by the texts, it is desirable that the newly established enterprise organizes, either in the country or abroad, professional training for Khmer employees destined to progressively replace a part of the foreign personnel necessary during the first period of its installation.

B. Sector authorized

The field of activity open to private capital, whether national or foreign, is very broad.

The 12 March 1968 Kram in fact only reserves a monopoly to the public powers in the secondary

industrial sector - the production and distribution of electric power (above 500 KVA), of water (above 1,000 cu. metres per day), of alcoholic drinks, of arms and ammunition, of pharmaceutical products, of oil products and chemical products other than fertilisers (for an installed electrical power of more than 5,000 KVA)and also the exploitation of dams and irrigation systems with a discharge of over 1,000,000 cu. metres per year.

The monopoly of this "reserved" sector can, on the other hand, be waived in certain cases, as is set out in Article 5. All other agricultural or industrial production, whatever it may be, is open to the private sector.

If, on the other hand, the public powers deem it necessary in exceptional cases to bring state companies into those activities open to the private sector, these companies cannot avail themselves together with the agents in the private sector of any privileges or advantages of any sort (art. 8)

C. Advantages accorded

In order to encourage private investment, the law has given the following very serious 1° a guarantee against any nationalisation measure for a period of 20 years dating from the guarantees and advantages setting into operation of the enterprise (art. 7 of the 12 March 1968 Kram).

If we consult a previous text on the regulations concerning foreign capital, the length of this guarantee (minimum 20 years) can even be extended to 30 years. In the case of nationalization or of expropriation as a public utility at the end of the period fixed "a just and equitable indemnity" will be accorded (art. 7 of the Kram of 13 September 1957).

2° Very important fiscal exonerations will be accorded to those enterprises approved by the Ministry of Finance prakas, during the first years of exploitation (art. 10 of the 18 May 1965 Kram).

It is therefore up to the Minister to fix the length of time during which the enterprises will benefit from these exonerations.

The same article 10 enumerates the advantages given:

a) Exoneration of registration and stamp duty obligations for the company deeds and increases in capital;

b) Exoneration of import fees for equipment and basic materials necessary for the functioning or exploitation of the enterprise;

c) Exoneration of the land tax on rural property and the tax on cultivated land;

d) Exoneration of profits tax;

e) Exoneration of revenue tax on stocks and shares for dividends distributed;

f) Exoneration of revenue tax on stocks and shares in case of capital increase.

The two most important exonerations concern profits tax, which is normally 25% for companies - and the import fees on equipment and basic materials necessary for the enterprise.

This double privilege accorded to the private investors will be continued for a certain number of years, which will be calculated according to the economic interest which the new enterprise

has for the country.

3° accelerated amortizations can also be expected and practiced on the buildings and equipment used (art. 11 of the 18 May 1965 Kram).

These fiscal advantages (various exonerations and accelerated amortization) will only be given to those enterprises justifying a relatively high initial investment, that is to say:

- 300,000 riels for agricultural enterprises.
- 1,000,000 riels for industrial enterprises.

They will be granted to enterprises or exploitations agreed on by a joint prakas from the Ministry of Finance and, according to the case, the Ministry of Industry or of Agriculture (art. 8 and 9 of the 18 May 1965 Kram).

4° the repatriation of investment capital authorised to be invested in Cambodia can be done each year up to 20% of the net assets regularly established, if it is justified that this remission of investment follows from a liquidation of the company or from a cessation of its activity (art. 10 of the Kram of 13 September 1957).

On the other hand, the law provides for the reimbursement of capital invested in Cambodia in the form of loans abroad, as well as the transfer of interest and credits (art. 9).

5° finally, the transfer of profits made each year can be made in the original foreign currency and to the country from which the capital originated with a limitation of 10 to 15% of the capital invested (art. 8 of the Kram of 13 September 1957).

This percentage can even be raised to 20% according to the economic interest which the enterprise has for the country (same article).

This concerns net profits, of course, after duties and other taxes leviable in Cambodia have been paid.

A last article in the 1957 Kram (art. 13) provides that the means of transfer of funds will be fixed by the Director of the Foreign Exchange Office according to the regulations in force (*), whereas the other aspects of this law are determined by the Minister of Finance.

(*) N.B. Investors are strongly recommended to obtain from the Cambodian National Bank (Direction of Studies) the brochure on "the foreign exchange regulations", which contains all the texts on laws and regulations pertaining to the matter.

D. The National Investment Committee

In order to show his desire to encourage private investment in the economic development of Cambodia, the Head of State has set up, by a Kret dated 15 August 1968, the instrument of this policy: "the National Investment Committee",

1° Its composition.

The committee, the chairman of which is the Minister of Planning and the vice-chairman the Director-General of Planning, is composed of representatives from the principal ministries and organizations interested, that is to say:

a representative from the Ministry of Agriculture

" " Industry
" " Commerce
" " Finance
" " Cambodian National Bank

2° Its functions. The Committee plays a triple role:

a) Documentation: It is responsible for gathering together and placing in order all the legislative texts and regulation concerning investments, in order to make them available to the investors.

b) Aid and instigation: The Committee has the task of facilitating new investments and self-financements, in making administrative approaches to the interested departments and arranging the relative decisions with necessary advantages and guarantees for providing the right climate for the installation of new enterprises (article 4 of the Kret of 15 August 1968).
In order to do this, the Committee has a "Permanent investment office", working in the Ministry of Planning, to which each investor can address any enquiries in case of need.

c) Coordination: Finally the Committee is responsible for the liaison between the various departments, centralises the advice given by each one and reports to the Higher Planning Council, within 40 days of the decisions being taken, and can be used by each department interested at the request of the investor.

The procedure therefore must take place as quickly as possible, so that the authorization of an investment can be given as soon as a case occurs, as is stipulated in the Kram of 13-9-1957, by the Ministry of Finance after favourable recommendation from the Higher Planning Council.

II. Legislative texts and regulations

(*) N.B. This list drawn up jointly by the Ministries of Finance and Industry is not final. All new industries which are of economic interest to the Kingdom may benefit from these fiscal advantages.
This was stressed as recently as 15 August 1968 by the Prime Minister, H.E. PENN NOUTH, in circular no. 50-PCM-2BC, reminding all Members of the Royal Government of the Head of State's High instructions "concerning the favourisation and maximum encouragement of investment of private capital, both national and foreign, within the framework of the national policy for economic expansion.

KRAM N° 221-NS

of 13-9-57

Considering the Constitution of the Kingdom;
Considering Kram No. 171-NS of 15-4-46 fixing the functions of the Prime Minister and those of his Ministers;
Considering Kram No. 102-NS of 31-5-56 concerning investment of foreign capital in Cambodia;
Considering Kram No. 929-NS of 10-2-55 prohibiting the export of capital;
Considering Kram No. 922-NS of 23-12-54 establishing the Cambodian National Bank;
The Council of Ministers being agreed;
Considering the advice of the Council of the Kingdom;

WE PROMULGATE:

The law voted by the National Assembly at the second reading on 13 August 1957, the contents of which are as follows:

LAW FIXING THE REGULATION OF FOREIGN CAPITAL INVESTED IN CAMBODIA AS FROM 31 MAY 1956.

Article 1. Kram No. 102-NS of 31 May, 1956 referred to above is abrogate and replaced by the following arrangements:

CONDITIONS UNDER WHICH FOREIGN CAPITAL CAN BE INBESTED IN CAMBODIA AS FROM 31 MAY 1956.

Article 2. Any foreign enterprise wanting to invest its capital in Cambodia in the from of foreign exchange, or equipment and any foreign enterprise already established in Cambodia and wanting to increase its investments or capital by a loan from abroad must in the first place obtain the authorization of the Minister of Finance.

Article 3. Only investments in operations recognized as beneficial to the economic development of the Kingdom and not implying a monopoly or special privilege will be authorised.

Article 4. Investments can only be made in foreign currencies accepted by the Cambodian National Bank.

OBLIGATIONS TO WHICH ANY ENTERPRISE INVESTING ITS CAPITAL ARE LIABLE

Article 5. The concession of investment authorization will require:

1/ an obligation to reserve a minimum percentage of the registered capital for public or private Cambodian participation;

2/ an obligation to employ a munimum percentage of Cambodian personnel;

The percentage will be fixed in each case by the Minister of Finance, taking account of the economic circumstances or necessities.

TREATMENT RESERVED FOR FOREIGN CAPITAL INVESTED

Article 6. Foreign capital invested under the conditions fixed by the present law will benefit from the same fiscal treatment as that accorded to national capital.

For certain enterprises with exceptional economic interest for the Kingdom, total or partial exoneration from fees and taxes on profits reinvested, on equipment or basic materials imported during the first year of exploitation, may be granted by a Prakas from the Minister of Finance on the proposal of the Minister of the National Economy.

The Minister of Finance will have the final decision on requests of this nature.

Article 7. Foreign capital invested under conditions laid down by the present law will benefit from a just and equitable indemnity in case of nationalization or expropriation as a public utility.

A guarantee of from 10 to 30 years against nationalization or expropriation will be given. It will be included in the Prakas giving investment authorization, as envisaged in articles 2 and 11.

Article 8. Regularly justifiable net profits may be transferred, each year, in the original currency of investment and the country from which the capital originated, up to from 10 to 15% of the amount of capital invested.

This percentage can be increased to 20% of the capital, depending on the degree of economic usefulness the enterprises concerned have for the Kingdom.

Article 9. The transfer of interest and the reimbursement of capital invested in Cambodia in the form of a loan from abroad will be authorized under the conditions laid down in the initial authorization.

Article 10. Withdrawal of foreign investment capital authorized to have been invested in Cambodia following the present law can be made each year up to 20% of the net assets regularly established and justified when the withdrawal results in a liquidation or closing down.

GRANTING OF INITIAL AUTHORITY FOR INVESTMENT OF FOREIGN CAPITAL

Article 11. The initial authorization for the investment of foreign capital will be given by the Minister of Finance following favourable recommendation from the Higher Planning and National Development Council.

The Prakas giving investment authority will lay down the conditions to which the operation is liable, the obligations to which the investor is bound and the treatment for the capital invested.

VARIOUS ARRANGEMENTS

Article 12. Foreign capital invested in Cambodia between 1st January 1955 and the date of the promulgation of the present law will be able to benefit from the present arrangements if they fulfil the above conditions.

Article 13. The means of applying the present law will be determined by the Minister of Finance, apart from those concerning the transfer of funds fixed by the Director of the National foreign Exchange Office according to the legislation and regulations on this matter.

Done in Our Royal Palace at Phnom-Penh, 13 September 1957

His Majesty signed : N. SURAMARIT

Extract from KRAM N° 242-CE of 18 May 1965

(Finance Law current in 1965)

3° Fiscal Advantages

ARITICLE 8. Fiscal and other advantages are accorded to industrial enterprises and agricultural works started after the date of the promulgation of the present law and whose activity contributes to the speeding up of the Kingdom's economy, to the improvement of the employment situation and the improvement of the living standards of the population.

A Prakas issued jointly by the Minister of Finance and the Minister of Industry or Agriculture will give a list of the industrial enterprises and agricultural works which can benefit from these fiscal advantages.

ARTICLE 9. The benefit of these fiscal advantages may be accorded to those industrial enterprises and agricultural works whose investment plan consists of an intial sum of at least:

- 300,000 riels for agricultural works,
- 1,000,000 for industrial enterprises.

ARTICLE 10. The enterprises and works authorised by the Minister of Finance's Prakas will benefit during the first years of exploitation from the following fiscal advantages:

1° Exoneration of registration and stamp duty obligations for the company deeds and increases of capital;
2° Exoneration of import fees for equipment and basic materials necessary for the functioning or exploitation of the enterprise.
3° Exoneration of land tax on rural property and the tax on cultivated land.
4° Exoneration of profits tax.
5° Exoneration of revenue tax on stocks and shares for dividends distributed.
6° Exoneration of revenue tax on stocks and shares in case of capital increase.

ARTICLE 11. Aprt from the fiscal advantages enumerated above, the enterprise or works authorized may be allowed to exercise accelerated amortization on the buildings and equipment used.

ARTICLE 12. The means of applying the arrangements above will be fixed by Prakas from the Ministers concerned.

1st JOINT PRAKAS No 829 of 28-3-67

THE MINISTER OF FINANCE AND THE MINISTER OF INDUSTRY

Considering the Constitution of the Kingdom;

Considering Kret No. 718-CE of 24 October 1966, modified by subsequent texts, with the nomination of the Ministerial Cabinet;

Considering Kram No. 242-CE of 18 May 1965, particularly article 8 and following, granting liscal advantages to the enterprises whose activity contributes to the speeding up of the development of the Kingdom's economy, to the improvement of the employment situation and the living standards of the population:

DECIDE:

Article 1. The following private, public or mixed industrial enterprises may benefit from the fiscal advantages set out in articles 10 and 11 of Kram No. 242-CE of 18 May 1965:

- Manufacture of fruit juice;
- " of fish meal;

- Manufacture of canned vegetables;
- " of vegetable oils using local agricultural products;
- " of chemical fertilisers;
- " of milk;
- " of caustic soda (by electrolosis);
- " of iron rods and pipes;
- " and refining of oil products.

Article 2. The industrial enterprises wanting to benefit from these fiscal advantages must apply to the Ministry of Finance for authorization.

The Prakas giving authorization will detail the fiscal advantages to be given to the enterprise requesting them.

Article 3. The Director of Offices in the Ministry of Finance and the Director of Offices in the Ministry of Industry are charged, accordingly, with the execution of the present Prakas.

Phnom Penh, 28 March 1967

The Minister of Industry,
Signed : LONG BORET

The Minister of Finance,
Signed: HING KUNTHEL

2nd joint Prakas No. 1747 of 22-7-67

.....
.....
.....
.....
.....

Article 1. The international class hotel industry may benefit from the fiscal advantages.

Article 2. .....
.....
.....
.....

Phnom Penh, 22 July 1967

The Secretary of State for the National Economy,
Responsible for Industry:

Signed : KEAT CHHON

The Minister of State
responsible for Finance.

Signed : TOUCH KIM

KRAM No. 357-68 CE of 12-3-68

WE

SAMDECH PREAH NORODOM SIHANOUK UPAYUVAREACH HEAD OF STATE

Considering the Constitution of the Kingdom;

Considering Kram No 149-CE of 16 November 1963 concerning State intervention in Export and Import Trade;

Considering Kram No 154-CE of 16 December 1963 forbidding private banking;

Considering Kram No 173-CE of 24 February 1964 concerning a monopoly in insurance;

Considering Kram No 157-CE of 26 December 1963 granting a State monopoly in alcohol production;

Considering Kram No 249-CE of 14 June 1965 concerning the establishment of the National Enterprise for Pharmaceutical Products;

Considering Kram No 382-NS of 27 February 1960 concerning regulations on Mixed State/Private Companies

Considering the advice of the Council of the Kingdom.

The Council of Ministers being in agreement;

WE PROMULGATE :

The Law voted by the National Assembly at the second reading on 25 December 1967, the contents of which are as follows:

"LAW CONCERNING THE DIVISION OF ECONOMIC ACTIVITY BETWEEN THE PUBLIC AND PRIVATE SECTORS"

Article 1. Producers of goods and services are divided into two sectors; the public and private sector.

Article 2. The following are considered as belonging to the public sector, - the State, secondary public collectives, autonomous public organizations and State enterprises as well as Companies and other people with private rights whose capital is two thirds (2/3) State held, secondary public collectives, autonomous public organizations and State enterprises.

Article 3. The following are considered as belonging to the private sector: - all producers of Khmer nationality who are not listed in article 2 of the present Kram as well as all foreign businesses which have public or private rights.

Article 4. Producers of goods and services named below are the exclusive monopoly of the public sector:

PRIMARY SECTOR:

- Extraction of precious and semi-precious stones, metallic minerals and other mineral products,
- Production of sea salt.

SECONDARY SECTOR:

- Production and distribution to the public of electrical power requiring an installed power of more than 500 Kva,
- Production and distribution to the public of water with a supply capacity of over 1,000 cu. metres per day,
- Production of alcohol and alcoholic drinks,
- Production of arms and ammunition,
- Production and distribution of pharmaceutical products,
- Production, refining and distribution of oil products,
- Production of chemical products other than fertilizers requiring an installed electrical power of more than 5,000 Kva.

SECONDARY AND TERTIARY SECTOR:

- Exploitation of dams and irrigation systems with a discharge of above 1,000,000 cu. metres per year.

TERTIARY SECTOR:

- Banking operations.
- Insurance operations,
- Foreign trade,
- Wholesale business in products imported from abroad,
- Rail transport,
- Internal air transport on Cambodian territory,
- Post and Telecommunications services,
- The notary profession.

Article 5. Notwithstanding the public sector monopoly instituted by article 4, authorization for operators in the private sector to produce certain goods and services may be granted by Kret on a temporary basis. This authorization can in no case be granted for a period longer than twenty years nor less than eight years from the date of the promulgation of the present Kram.

Article 6. All economic production operations for goods and services not mentioned in article 4 of the present Kram can be carried out freely by the private sector within the framework of the legal texts in force.

Article 7. The private sector enterprises for the production of goods and services not mentioned in article 4 above will not be liable to nationalization in any way for twenty

years:
- as from the date of promulgation of the present Kram for already existing enterprises,
- as from the date of commencement of operations for future enterprises.

Article 8. When the general interest requires it (a lack or insufficiency of activity in the private sector, an increase in prices, public order, etc...), the public sector has the right to operate in those fields listed in article 6 on the initiative of the private sector. In this case it will have to operate together with the private sector, without any privileges or advantages of any sort.

Article 9. The present Law is declared to be of extreme urgency.

Done in Phnom Penh, 12 March 1968

Samdech signed : NORODOM SIHANOUK

Presented for signature to the Head of State
by the Minister of State, responsible for Planning,

Signed : TOUCH KIM

To the Head of State
The Prime Minister,

Signed : Samdech PENN NOUTH.

KRET No 463/68-CE

WE

SAMDECH PREAH NORODOM SIHANOUK UPAYUVAREACH HEAD OF STATE

Considering the Constitution of the Kingdom;

.....

WE COMMAND

ARTICLE 1. A National Investment Committee is established, whose composition is as follows:

- The Minister of Planning	Chairman
- The Director General of Planning	Vice-Chairman
- A Representative from the Ministry of Industry	Member
- A Representative from the Ministry of Agriculture	-
- A Representative from the Ministry of Commerce	-
- A Representative from the Ministry of Finance	-
- A Representative from the Cambodian National Bank	-

ARTICLE 2. In case of the prevention or absence of the Ministry of Planning, the chairmanship will pass to the Vice-Chairman.

ARTICLE 3. The members of the National Investment Committee are nominated by prakas from the Prime Minister.

ARTICLE 4. The National Investment Committee has as its functions notably:

- The collecting together of all legal texts and regulations concerning investments, in order to draw up a complete documentation for the use of investors;

- Helping new investments, re-investments and self-financing by facilitating administrative approaches, in particular by making the interested Departments bring into effect the relative decisions regarding advantages accorded to investors, within the Higher Planning Council; allowing this new capital to benefit from the conditions laid down in the existing texts and regulations;

- As suring the existence of an office where each investor can come in case of need;

- Reporting within the following 40 days, in a report addressed to the Higher Planning Council, what each interested Department has done following the decisions of the Higher Planning Council concerning investments.

ARTICLE 5. The National Investment Committee meets at the Chairman's request.

ARTICLE 6. The National Investment Committee has a Permanent office in the Directorate of Plans at the Ministry of Planning. The work and functions of this office will be fixed by Ministerial prakas.

ARTICLE 7. The First Deputy Prime Minister responsible for Planning is responsible for the execution of the present Kret.

Presented for signature of the Head of State
by the First Deputy Prime Minister,
responsible for Planning,
Signed : SON SANN

Done in Phnom Penh, 5 August 1968
Samdech Signed : NORODOM SIHANOUK
by the Head of State

The Prime Minister,
Signed : PENN NOUTH

PART III

PROCEDURE FOR AUTHORISING AND UNDERTAKING

1. General principles

2. Standard record

I. GENERAL PRINCIPLES

Only foreign investments for economic activities useful to the Kingdom and not implying a monopoly or special privilege may be authorised (art. 3 of the Kram of 13-9-57).

In other respects the investor can obtain information from the Ministry of Planning (permanent investment office), which is responsible for liaison between the Higher Planning Council and the interested Departments for all decisions concerning investment requests.

The request for authorization will be deposited or sent to the Ministry of Planning (Investment Office), which will immediately call on the National Investment Committee for study. On the basis of the National Investment Committee's conclusions, the file will be submitted to the Ministry of Planning for the recommendation of the Higher Planning Council.

After the Higher Planning Council's decision, the Investment Office (Minplan) will ask each interested Department to ordain by separate or joint "Prakas" the relevant decisions and functions. It will intervene, if necessary, to facilitate contacts between the investor and the interested Departments.

The request for authorization, dated and signed by the investor, will consist of three kinds of documents:

1° a letter of request putting in a clear manner the form of activity envisaged, as well as the advantages asked for and the engagements which it is intended to honour.

2° a standard record, containing replies to a series of questions to which the investor should endeavour to reply precisely. This schematic document is published on the following pages.

3° annexes, required to complete the standard record and containing each statute, contract or draft contract, proforma invoices, studies and various plans concerning the future enterprise.

II. STANDARD RECORD

The future investor will find below some explanatory indications which will enable him to prepare the standard record.

He is asked to reply with the maximum precision to the questions asked and where he cannot give exact figures, to give at least estimates.

The questions are grouped under two titles:
Title I. Setting up plan.
Title II. Exploitation specification.

They concern, essentially, future industrial enterprises, the relative questionnaire for agricultural investments being founded on equivalent bases and can be requested from the Ministry of Planning (Investment Office).

Title I SETTING UP PLAN

1. Name and description of the project:

2. Site of the enterprise (factory, workshop):

3. Duration of construction:
   a) total duration in months
   b) date on which work site is established
   c) end of first stage
   d) end of second stage
   e) date of completion

4. Capacity:
   a) capacity by hour or shift : in units of weight (quintals or tons), in number of pieces, etc...; capacity is expressed by reference to the volume of the basis material treated or the number of products manufactured (in certain cases by reference to one and the other figure);
   b) global capacity of exploitation : ... quintals-pieces in... days of exploitation (specifying the variants according to the number of shifts per day throughout the whole year);

5. Origin of equipment:

6. Direct investments:
   a) external credits on long term:
   b) Cambodian national resources:
   c) the installer's technical aid during the construction period:
   d) Means of repaying loans:
      - by external credit:
      - by internal credit:

7. Indirect investments:

   a) charged to the State budget:
   b) charged to the regional budget:

8. Cost price: Global value per unit produced

   a) basic materials: 1st year 2nd year 1st year 2nd year
   b) wages:
   c) amortization:
   d) various:
   industrial cost price:

9. Evaluation of results:

   a) on the internal market (quantities per year)
      aa) sales price per unit without profit margin and transport costs
      ab) sales price per unit with profit margin and transport costs
      ac) globla total of price aa
      ad) global total of price ab
   b) on the external market (quantity per year)
      ba) average price realisable without profit margin, transport and insurance costs
      bb) average price realisable with profit margin, transport and insurance costs
      bc) global total of price ba.
      bd) global total of price bb.

10 Annual profit envisaged:

(calculated on the exploitation of the installation 4 b and the commercialization 9 a and 9 b according to the probable proportions).

1st year 2nd year 1st year 2nd year

   a) without amortization of indirect investments:
   b) with amortization of indirect investments:

11. Estimate of labour requirements:

construction:		operations:	
Cambodians	foreigners	Cambodians	foreigners
a) technical cadres			
b) administrative cadres			
c) master cadres			
d) professional labour			

TITLE II. EXPLOITATION SPECIFICATIONS

1. Name and description of operation:

2. Analysis of locality of enterprise (factory, workshop):

a) location of basic materials:
b) communication facilities:
c) power resources:
d) increase in regional living standards:
e) local availability of labour:

3. Financing and payments:

a) orignin of funds:
b) means of unblocking them:
c) detail of payments due by the constructor (*):
d) Cambodian complementary payments: Materials; human, financial (in the case of a project financed by external aid):

4. Conclusion:

a) duration of realization of complete project:
b) beginning of work:
c) completion of construction:
- of workshops:
- of ancillary buildings:
- of dwellings:
d) completion of installation of machines:
e) trial runs from ..... until .....

(1) Equipment, construction of industrial buildings, construction of dwellings, construction material, technicians for construction, assembly, functioning, transport, etc....

5. Production:

a) specification of products and residue:

b) guaranteed capacity: (in volume of basic material treated or in unmber of products)
ab) per hour:
bb) per shift (...hours)
under the following conditions:

c) theoretical capacity per year (365 days):
ca) one shift:
cb) two shifts:
cc) three shifts:

d) exploitation of capacity envisaged:
(e.g. one shift (7 hours) during a whole year, general repairs during a year - 21 days, two repairs per month - 22 dyas. Work days - 365 - 52 Sundays - 15 holidays - 43 stoppages due to repairs - 255 working days).
envisaged exploitation : 255 x capacity per shift

e) stock:
ea) stock capacity:
eb) warehousing of basic materials:
ec) warehousing of semi-finished products:
ed) stock management according to manufacturing needs:

f) *specification of equipment and auxiliary installations (power, water, repair work-shops, etc...):*

g) descriptive analysis of manufacturing techniques:

h) evaluation of technical level of equipment compared to world technical levels:

i) *possiblity of extending production capacity*
   ia) elements constructed capable of being used in an eventual extension of production capacity (e.g. warehouses, buildings, transformers, drainage works, water supply, etc).
   ib) measures to be taken to go over to two shift working:

j) specialization for tropical climate (in the case of material manufactured outside the tropical zone):
   ja) analysis of protection measures taken by supplier:
   jb) special recommendations for working and repairs:

k) provision of spare parts:
   ka) spare parts delivered with equipment:
   kb) delivery delay guarantees on spare parts

l) movement of finished products:
   la) warehouse capacity:
   lb) stocks and precautions taken for conservation:
   lc) study of appropriate packing methods (specifications, quantity and value of packing materials),:
   ld) origin of packing materials
   lda) Cambodian resources:
   ldb) imports:

6. *Investments:*

a) indirect investments (by whom and to whose charge ?):
   aa) construction of access roads:
   ab) electrical installations:
   ac) personnel transport:
   ad) dispensary and sanitation installations:
   ae) other payments on the part of the State or local budget:

b) direct investments:
   ba) projection plans:
   bb) expenses of technical service during construction:
   bc) expenses of technical service during construction charged to the Cambodian budget (in the case of a project financed by external aid):
   bd) drinking water provision:
   be) electric power:
   bf) buildings: - warehouses - production - workshop - Administrative buildings - dwellings -
   bg) equipment and stock of tools:

7. Area occupied by the enterprise:

Total area of ..... sq. metres made up as follows;
a) workshops, warehouses, and auxiliary installations:
b) administrative building:
c) dwellings:

8. Profitability: Provisional Balance Sheet

Assets	Liabilities
Fixed assets	Permanent capital
Cost of establishment	Registered capical
Capital assets	Current accounts of associate companies,
Land	Medium term credit.
Construction	
Material and tools	
Transport materials	
Furniture, fittings and installations	
Incorporeal capital assets	
Outstanding capital assets	
Other fixed assets	
Exploitation assets	
Goods	
Materials or provisions	
Disposable assets	
Cash	

9. Labour:

a) number and qualifications of foreign technicians:
   - for construction
   - for the first years of operation
   - for the foloowing years

b) Cambodian labour for construction:
   ba) professional:
   bb) non-professional:

c) Cambodian labour for normal working

1st year	full capacity

   ca) technicians
   cb) administrative cadres
   cc) professional workers
   cd) semi-professional workers
   de) non-professional workers
   cf) masterworkers

d) professional training necessary for the Cambodian technical and administrative personnel:

e) number of foreign technicians necessary for professional training of Cambodian cadres: number: duration:

f) evaluation of local labour available:

g) evaluation of labour needs from other regions and problems posed by their installation:

TABLEAU II - 1

POPULATION DU CAMBODGE

ANNEE	TOTAL	MASCULIN	FEMININ
1962 (1)	5.728.800	2.863.000	2.865.800 (+)
1963	5.854.800	2.925.900	2·928.900
1964	5.983.600	2.990.300	2.993.300
1965	6.115.300 (+)	3.056.100	3.059.200
1966	6.249.800	3.123.300	3.126.500
1967	6.387.300	3.192.000	3.195.300
1968	6.527.800	3.262.300	3.265.500

NOTA : Pour les années 1963 et suivantes les chiffres donnés sont des estimations se basant sur les résultats du recensement de 1962 et en tenant compte d'un taux d'accroissement net de 2,2%

(1) : Résultats finals du recensement.

SOURCE : Recensement de la population en 1962.

TABLEAU II - 2

RESULTATS FINALS DU RECENSEMENT DE 1962

GROUPE D'AGE	TOTAL	POURCENTAGE	MASCULIN	FEMININ
0 — 4	855.440	14,93	429.658	425.782
5 — 9	893.141	15,59	449.829	443.312
10 — 14	761.034	13,28	388.839	372.195
15 — 19	533.920	9,32	267.892	266.028
20 — 24	468.785	8,18	227.978	240.807
25 — 29	417.976	7,30	203.853	214.123
30 — 34	381.475	6,66	188.058	193.417
35 — 39	318.682	5,56	159.751	158.931
40 — 44	260.752	4,55	129.853	130.899
45 — 49	226.091	3,65	113.554	112.537
50 — 54	187.812	3,28	93.962	93.850
55 — 59	145.392	2,54	72.417	72.975
60 — 64	114.803	2,00	58.070	56.733
65 — 69	72.918	1,27	36.165	36.753
70 — 74	46.314	0,81	22.225	24.089
75 — 79	24.659	0,43	11.598	13.061
80 — 84	11.541	0,20	4.948	6.593
85 et plus	4.814	0,09	2.003	2.811
Non déclaré	3.252	0,06	2.316	936
TOTAL	**5.728.771**	**100,%**	**2.862.939**	**2.865.832**

SOURCE : Recensement de la population en 1962.

TABLEAU II - 3

POPULATION TOTALE SELON LE SEXE PAR UNITES ADMINISTRATIVES

SUPERFICIE ET DENSITE (en 1962)

PROVINCES	Nombre d'habitants	Superficie Km2	Densité
Royaume du Cambodge	5.728.771	181.035,0	31,6
Municipalité de Phnom-Penh	393.995	46,0	8.565,1
Municipalité de Bokor	449	1,1	408,2
Municipalité de Kep	7.724	45,3	170,5
Municipalité de Sihanoukville	7.095	68,2	104,0
Khet de Battambang	551.374	19.184,2	28,7
— Kampot	340.415	5.962,4	57,1
— Kandal	706.206	3.812,1	185,3
— Koh-Kong	39.283	11.160,6	3,5
— Kompong-Cham	821.030	9.798,7	83,8
— Kompong-Chhnang	274.095	5.520,8	49,6
— Kompong-Speu	307.551	7.016,8	43,8
— Kompong-Thom	320.364	27.601,6	11,6
— Kratié	126.340	11.094,1	11,4
— Mondolkiri	14.857	14.287,6	1,0
— Prey-Veng	487.060	4.883,2	99,7
— Pursat	179.973	12.692,1	14,2
— Rattanakiri	49.306	10.782,3	4,6
— Siemreap	312.696	16.456,8	19,0
— Stung-Treng	34.609	11.092,0	3,1
— Svay-Rieng	289.132	2.966,4	97,5
— Takeo	465.317	3.562,7	130,6

SOURCE : Recensement de la population en 1962.

TABLEAU II - 4

POPULATION DE 10 ANS ET PLUS SELON LE TYPE D'ACTIVITE L'AGE ET LE SEXE

(en 1962)

Age	Sexe	Total	Population active	Population inactive	Non déclaré	Age	Sexe	Total	Population active	Population inactive	Non déclaré
Total	T	3.980.190	2.499.735	1.476.199	4.256						
	M	1.983.452	1.449.003	532.323	2.126	45—49	M	113.554	111.680	1.794	80
	F	1.996.738	1.050.732	943.876	2.130		F	112.537	71.550	40.894	93
10—14	M	388.839	69.501	318.894	444	50—54	M	93.962	90.711	3.147	104
	F	372.195	106.019	265.713	463		F	93.850	54.418	39.355	77
15—19	M	267.892	155.581	112.017	294	55—59	M	72.417	65.966	6.396	55
	F	266.028	178.132	87.639	257		F	72.975	36.102	36.783	90
20—24	M	227.978	200.600	27.141	237	60—64	M	58.070	45.359	12.665	46
	F	240.807	153.536	87.041	230		F	56.733	18.394	38.290	49
25—29	M	203.853	198.659	5.031	163	65—69	M	36.165	23.300	12.828	37
	F	214.123	125.038	88.892	193		F	36.753	8.490	28.232	31
30—34	M	188.058	185.811	2.084	163	70—74	M	22.225	9.700	12.495	30
	F	193.417	114.000	79.241	176		F	24.089	3.157	20.901	31
35—39	M	159.751	157.912	1.685	154	75 et plus	M	18.519	5.157	13.335	27
	F	158.931	97.724	61.056	151		F	22.465	1.872	20.563	30
40—44	M	129.853	128.248	1.494	111	Non déclaré	M	2.316	818	1.317	181
	F	130.899	82.083	48.685	131		F	936	217	591	128

SOURCE : Recensement de la population en 1962.

TABLEAU II - 5

POPULATION ACTIVE SELON LA BRANCHE D'ACTIVITE ECONOMIQUE ET LE SEXE

(en 1962)

Branche d'activité économique	Masculin	Féminin	Total
— Agriculture, Sylviculture, Chasse et Pêche	1.094.956	913.107	2.008.063
— Industries extractives	1.698	682	2.380
— Industries manufacturières	47.693	20.827	68.520
— Bâtiment et Travaux Publics	20.459	1.299	21.758
— Electricité, Gaz, Eau et Services sanitaires	1.584	34	1.618
— Commerce, Banque, Assurance, Affaires immobilières	80.110	63.707	143.817
— Transports, Entrepots et Communications	28.094	752	28.846
— Services	152.173	34.995	187.168
— Activités mal désignées	22.236	15.329	37.565
— TOTAL GENERAL	**1.449.003**	**1.050.732**	**2.499.735**

SOURCE : Recensement de la population en 1962.

TABLEAU N° III - 1

REVENU NATIONAL PAR TETE HABITANTS

(en riels)

ANNEE	1962	1963	1964	1965	1966
REVENU PAR TETE	3.307	3.610	3.795	4.041	4.169

TABLEAU N° III - 2

EVOLUTION DU PRODUIT INTERIEUR BRUT PAR SECTEUR

(prix courants)

	1962	1963	1964	1965	1966
Secteur Primaire	9.667,5	10.612,0	11.401,6	12.699,7	13.119,6
Secteur Secondaire	3.835,1	4.492,2	4.645,5	4.864,9	5.411,8
Secteur Tertiaire	6.404,0	7.075,3	7.453,3	8.736,9	9.111,3
Institutions Financières + Administration	3.187,0	3.372,8	4.031,2	4.066,2	4.402,8
Produit Intérieur Brut	23.093,6	25.552,7	27.531,4	30.367,7	32.045,5

SOURCE : Comptes Economiques 1962-1963-1964-1965 et 1966.

TABLEAU N° III - 3

EVOLUTION DU PRODUIT INTERIEUR BRUT DE 1962 A 1966 EN VALEUR ET INDICE

(Prix constants 1966)

DESIGNATION		1962	1963	1964	1965	1966
Secteur Primaire :	V	11.488,5	12.428,6	13.461,6	13.400,8	13.119,6
	I	87,6	94,7	102,6	102,1	100,0
Secteur Secondaire ;	V	4.517,4	4.966,0	4.435,4	4.831,1	5.411,8
	I	83,5	91,8	82,0	89,3	100,0
Secteur Tertiaire :	V	8.112,4	8.668,9	8.071,4	9.031,9	9.111,3
	I	89,0	95,1	88,6	99,1	100,0
Institutions Financières + Administration	V	3.592,7	3.874,5	3.914,1	4.050,6	4.402,8
	I	81,6	88,0	88,9	92,0	100,0
Produit Intérieur Brut :	V	27.711,0	29.938,0	29.882,5	31.314,4	32.045,5
	I	86,5	93,4	93,3	97,7	100,0

SOURCE : Comptes Economiques 1962-1963-1964-1965 et 1966.

TABLEAU VIII – 1

SITUATION DES ENTREPRISES D'ETAT

ANNEE - 1967

NATURE	CAPITAUX INVESTISSEMENTS (Riels)	EFFECTIF DU PERSONNEL	PRODUCTION ANNUELLE	
			UNITE	QUANTITE
— Usine de Textile	156.427.315	950	Tonnes Mètres	700 5.000.000
— Usine de contreplaqué	100.000.000	185	M3	3.000
— Usine de papier	82.756.174	380	T/M	2.762
— Usine d'Egrenage	42.818.099	60	Tonnes	20.000
— Cimenterie d'Etat	500 000.000	738	Tonnes	59.000
— Société Khmère de Distillerie	150.000.000	750	HL.	90.000
— Raffinerie de Sucre	106.904.406	396	Tonnes	8.585
— Usine de Pneumatiques	211.000.000	800	Pièces	45.000
— Brasserie (S.K.D.)	250.000.000	150	HL.	60.000
— Usine Textile de Battambang	1.050.000(1)	900	Tonnes Mètres	500 4.000.000
— Société Nationale d'Assurances	80.000.000	100	...	...
— Scierie d'Etat	7.000.000	300	M3.	10.500
— Usine de Montage des Tracteurs	47.000.000	100	Camions Tracteurs Velomoteurs	400 300 ...
— Usine de Verrerie d'Etat.	120.000.000	370	Bouteilles Verres	2.300 Tonnes 700 Tonnes
— Entreprise de Constructions (SONAC)	22.869.820	115	...	...

(1) — En Livres Sterlings.

SOURCE : Direction du Service des Mines, de l'Industrie et de l'Artisanat.

TABLEAU VIII – 2

SITUATION DES ENTREPRISES D'ETAT

ANNEE – 1968

NATURE	EFFECTIF DU PERSONNEL	PRODUCTION ANNUELLE	
		UNITE	QUANTITE
— Société Nationale de Cimenterie	756	Sacs	1.088.542
— Verrerie d'Etat.	360	Pièces	11.131.948
— Société Nationale de pneumatique.	352	Pneux Chambre à air	16.000 19.000
— Société Khmère de Distillerie	477	Hecto litre	78.986
— Société Nationale de Textille	1.770	Mètres	8.019.870
— Société Nationale de Contre-Plaqué	201	M3	3.389
— Société Nationale de Papiers	511	tonnes	4.582
— Société Nationale de Tracteur	132	...	...
— Société Nationale de Sucre	426	...	...
— Société Nationale d'exportation de pierre et d'or.	33	...	...
— Société Nationale de Conserve de poissons	...	...	...

SOURCE : Direction du Service de Mines, de l'Industrie et de l'Artisanat.

TABLEAU VIII – 3

SITUATION DES ENTREPRISES D'ECONOMIE MIXTE

ANNEE – 1967

NATURE	CAPITAUX INVESTISSEMENTS (Riels)	EFFECTIF DU PERSONNEL	PRODUCTION ANNUELLE	
			UNITE	QUANTITE
1.— Société Khmère de Phosphate	12.000.000	30	Tonnes	12.000
2.— Société Khmère de Jute	115.000.000	700	Sacs Yards toiles	6.000.000 300.000
3.— Raffinerie de Pétrole	700.000.000	150	Tonnes	300.000
4.— Société Khmère d'Oxygène et d'Acétylène	25.305.948	60	— Oxygène — Acétylène — CO2	140.000.000 M3 18.500 M3 282.000 M3
5.— Manufacture de Cigarettes du Cambodge .	45.000.000	340	Paquets	96.000.000

SOURCE : Direction du Service des Mines, de l'Industrie et de l'Artisanat.

TABLEAU VIII-4

SITUATION DES ENTREPRISES D'ECONOMIE MIXTE

ANNEE - 1968

NATURE	EFFECTIF DU PERSONNEL	PRODUCTION ANNUELLE	
		UNITE	QUANTITE
— Société Khmère de Jute.	787	Sacs	4.065.000
— Société Khmère de Raffinerie de Pétrole	...	...	...
— Société Khmère d'oxygène et d'acétylène	...	Oxygène	17.120m3
	...	Acétylène	18.191m3
	...	Gaz-carbonique	315.656m3
	...	Air-comprimé	862m3
— Société Khmère de Phosphate	90	Tonnes	11.419
— Manufacture de cigarette	...	...	...
— TELA KHMER	...	...	...

SOURCE : Direction du Service des Mines, de l'Industrie et de l'Artisanat.

TABLEAU VIII - 5

PRINCIPALES INDUSTRIES PRIVEES

INDUSTRIES DE TRANSFORMATION	1967	1968
— Rizeries et décortiqueries mécaniques	1.467	1.468
— Manufactures de cigarettes	3	3
— Scieries à bras et mécaniques	478	483
— Manufactures d'allumettes	1	1
— Fabriques de boissons gazeuses, sirop, crème glacée, et glace alimentaire	122	125
— Charbonnière	202	204
— Petites Centrales Electriques	65	65
— Briqueries st tuileries	166	166
— Tanneries	10	10
— Savonneries	28	28
— Fabriques de saumure, de sauce chinoise et soja fermenté	62	63
— Imprimeries et fabriques des articles en papier et carton	106	106
— Filatures, tissages, teintures et impressions	88	89
— Fabrique de sorbets	2	2
— Fabrique de divers articles en caoutchouc (sandales, chaussures, souliers enveloppes, chambres à air (etc)	30	33
— Fabriques des filets de pêche	4	4
— Ateliers de réparation mécanique, de construction mécanique et fonderies	82	85
— Fabriques de divers objets et articles métalliques	65	71
— Fadriques de peinture	6	6
— Fabriques de divers articles en matière plastique	46	46
— Raffineries de sucre	35	36
— Fabriques de farine, vermicelle, pâtes	16	17
— Bijouterie	2	5
— Fabrique de disque phonographe	1	1
— Fabrique de Torches de résine de bois, Atelier de broyage de résine de bois et Atelier de séchage de bois	3	3
— Boulangeries — Biscuiteries — Bonbons — Caramels	14	14
— Fabriques de conserves alimentaires	4	4
— Fabriques d'huile alimentaire	16	17
— Fabriques de poudre d'assaisonnement et d'autres	5	5
— Fours de séchoir des feuilles de tabacs	138	162

TABLEAU VIII-5

PRINCIPALES INDUSTRIES PRIVEES

(Suite et Fin)

INDUSTRIES DE TRANSFORMATION	1967	1968
— Menuiseries et saboteries	22	22
— Faienceries, poteries, fours à vaisselle et céramiques	9	10
— Fours à chaux	10	10
— Fabriques de fibrociment et autres matériaux de construction	6	6
— Fabriques de fil à coudre	18	18
— Fabriques de tresse élastique	3	3
— Atelier de confection de vêtements	1	1
— Usines de récharpage des pneus	3	3
— Fabriques de papier hygiènique	5	6
— Fabriques d'engrais, d'insecticides	3	3
— Fabriques d'acide chlorhydrique	1	1
— Fabriques d'essence térébenthine	1	1
— Fabriques de piles sèches	3	3
— Fabriques de produits pharmaceutiques	3	3
— Fabriques de pâte dentifrice	6	6
— Fabriques d'oxygène et d'acétylène et gaz carbonique ainsi que dépôts	3	3
— Autres produits chimiques	2	2
— Clouteries	3	3
— Ateliers de réparation, de fabrication de cadres et divers accessoires et cycles	57	61
— Verreries	3	3
— Garage-réparation automobiles	37	37
— Ateliers de conditionnement des fruits de banane, de farine de banane de fibres en plantes banane et engrais en écorces de banane et de betteraves vertes	2	2
— Ateliers montage de vélomoteurs, poste de radio et télévision, de machine à coudre	16	17
— Fabriques des crayons à bille et autres	2	2
— Fabriques de craie	4	4
— Fabriques de colle forte	2	2
— Fabriques de bougies	1	1
— Fabriques d'encens anti-moustiques	7	7
— Fabriques de cure-dents	1	1
— Fabriques d'appareillage électrique	2	2
— Fours à chaux éteinte destiné au traitement des eaux potables	1	1

SOURCE : Direction du Service des Mines, de l'Industrie et de l'Artisanat.

TABLEAU VIII — 6

PRODUCTION CONTROLEE DES PRINCIPALES INDUSTRIES PRIVEES

PRODUITS	UNITE	1965	1966	1967	1968
Tissus de soie	1.000m	1.153	2.305	970	...
Cuirs	Pièces	38.759	62.816	21.717	60.536
Savons	Tonnes	2.100	2.594	908	2.753
Clous	»	1.591	1.448	935	...
Boissons gazeuses	HL.	74.330	71.650	41.480	175.498
Alcool pur	»	66.759	68.479	37.135	...
Glace	Tonnes	32.596	21.208	...	32.307
Sirop	HL.	237	...	...	...
Allumettes	Millions de Tiges	688	838	966	...
Cigarettes	»	2.624	2.825	3.511	2.886
Sandales	Milliers de Paires	4.170	4.578	2.289	...
Pneumatiques et chambres à air (bicyclettes)	Pièces	320.761	334.314	392.279	700.231
Oxygène	m3	127.450	140.870	151.786	...
Acétylène	»	15.366	18.900	16.136	...
Gaz	Tonnes	237	285	315	...

SOURCE : Direction du Service des Mines, de l'Industrie et de l'Artisanat.

TABLEAU VIII — 7

PRODUCTION D'ELECTRICITE

MILLIERS DE KWH

PROVINCES ET CIRCONSCRIPTIONS	1964	1965	1966	1967	1968 (1)
Battambang	2.217	2.033	2.175	2.415	2.104
Kampot et Kg. Trach.	1.840	1.682	1.729	1.740	1.643
Kompong-Cham	1.832	1.506	1.691	1.789	1.661
Kompong-Chhnang	223	225	330	337	322
Kompong-Speu	105	153	185	204	177
Kompong-Thom	445	356	377	392	376
Kratié	627	487	513	528	466
Phnom-Penh, Kandal et Kirirom	71.227	70.478	78.075	83.460	80.962
Prey Vèng et Banam	240	217	238	251	238
Pursat	183	185	230	226	196
Siemreap	1.971	1.670	1.937	2.120	2.142
Sihanoukville	626	472	710	720	1.051
Stung-Trèng	185	144	146	120	108
Svay-Rieng	644	525	567	597	524
Takèo	471	390	395	417	363
TOTAL	**82.836**	**80.622**	**89.307**	**95.316**	**92.333**

(1) Total des 10 premiers mois seulement.

SOURCE : Direction de l'Energie.

TABLEAU VIII - 8

PRODUCTION D'EAU

MILLIERS DE M3

CENTRES URBAINS	1964	1965	1966	1967	1968
Banam	70	40	34	31	37
Battambang	616	682	837	1.124	1.249
Kampot	258	375	434	522	540
Kompong-Cham	1.141	1.093	1.128	1.148	1.150
Kompong-Chhnang	165	170	168	151	174
Kompong-Speu	45	37	63	53	55
Kompong-Thom	74	100	92	113	147
Kompong-Trach	32	28	27	36	28
Kratié	94	112	89	103	100
Kandal	...	...	119	146	119
Phnom-Penh	15.240	18.570	21.962	22.683	24.672
Prey-Vèng	44	37	36	37	45
Pursat	70	81	80	82	83
Siemreap	155	143	132	228	310
Sihanoukville	86	246	180	212	604
Stung-Trèng	52	42	36	33	32
Svay-Rieng	113	147	121	118	113
Takéo	101	100	84	86	85
Kep	—	—	365	...	...
Bokor	—	—	219	...	...
TOTAL	**18.346**	**22.006**	**26.196**	**26.906**	**28.543**

SOURCE : Direction de l'Energie.

TABLEAU VIII — 9

VENTE DE PRODUITS PETROLIERS AU CAMBODGE

PRODUITS	UNITE	1964	1965	1966	1967	1968
Essence avion	1.000 Litres	3.536	4.439	4.445	4.874	5.769
Turbo Fuel aviation	»	6.862	10.152	9.125	11.845	12.216
Essence auto	»	57.136	47.614	48.202	17.578	53.773
Pétrole	»	25.295	37.696	25.231	26.099	28.474
Gas Oil	»	57.744	65.253	69.999	74.412	64.980
Huile de graissage	»	7.171	7.493	8.980	9.901	11.095
Solvant	»	346	678	632	908	863
Diesel Oil	»	52.832	62.311	74.303	92.605	101.008
Graisse et pétrolata	»	12.064	17.109	18.374	27.639	48.843
Asphalte	Tonnes	245	409	560	462	349
Paraffine Wax	»	1.393	1.102	809	542	145
	»	652	1.116	1.046	1.327	1.054

SOURCE — Esso Standard Eastern

— Caltex Asia

— Société Shell du Cambodge

TABLEAU XIV — 1

EVOLUTION DU COMMERCE EXTERIEUR

ANNEE	IMPORTATIONS		EXPORTATIONS		INDICE D'EXPORTATIONS		
	QUANTITE	VALEUR	QANTITE	VALEUR	VALEUR	VOLUME	VALEUR MOYENNE
1962	533.715	3.582.846	566.575	1.902.594	105,1	99,3	88,9
1963	609.831	3.751.189	799.608	3.116.101	172,1	152,9	99,2
1964	454.891	2.863·071	839.401	3.063.209	169,2	144,8	90,4
1965	557.742	3.602.859	812.194	3.690,014	203,8	182,0	104,6
1966	559,809	3.887.852	495.094	2.356.232	156,2	122,1	104,0
1967	663.494 (+)	3.365.316	503.856	2 906.574	160,5	110,8	119,9
1968 (1)	364.085	2.238.528	274.156	1.439.082	158,9	96,1	94,9

(1) 1er semestre 1968

Unité { Quantité : Tonnes
Valeur : Milliers de Riels

SOURCE : Direction des Douanes et Régies.

TABLEAU XIV — 2

PRINCIPAUX PRODUITS IMPORTES

DESIGNATION	1966		1967		1968 (1)	
	QUANTITE	VALEUR	QUANTITE	VALEUR	QUANTITE	VALEUR
I — PRODUITS ALIMENTAIRES ET AUTRES	**30.651**	**209.082**	**28.508**	**242.353**	**23.507**	**144.487**
— Produits laitiers	4.891	73.945	6.388	105.824	3.000	49.934
— Légumes et fruits	1.238	6.957	701	4.406	98	878
— Café	10	525	—	85	—	1
— Thé	51	1.660	137	462	69	2.544
— Farine de froment	12.307	41.979	12.529	69.083	8.943	45.595
— Canserves de viande et de poissons	62	3.192	58	2.869	32	1.495
— Sucre	9.307	27.428	7.005	17.649	10.466	24.239
— Conserves de légumes et de fruits	53	2.283	79	2.826	32	921
— Bière	1.247	11.913	304	3.195	309	2.763
— Vins et apéritifs	251	6.935	318	8.104	135	3.391
— Eaux de vie et liqueurs	305	19.678	324	15.702	236	10.657
— Autres boissons	868	9.281	651	7.567	168	1.018
— Tabac	66	3.306	64	4.581	17	1.051

(1) 1er semestre 1968

Unité { Quantité : Tonnes
Valeur : Milliers de riels

TABLEAU XIV-2

PRINCIPAUX PRODUITS IMPORTES

(Suite)

DESIGNATION	1966		1967		1968 (1)	
	QUANTITE	VALEUR	QUANTITE	VALEUR	QUANTITE	VALEUR
II.— PRODUITS MINERAUX	**369.731**	**425.152**	**403.051**	**451.849**	**203.708**	**250.671**
— Essence	39.080	51.133	34.664	47.076	16.024	23.603
— Produits pétroliers	179.877	247.095	198.568	267.092	96.254	106.640
— Autres produits minéraux	49.402	45.981	27.021	32.209	29.727	29.665
— Ciment	101.362	80.943	142.798	105.472	61.703	67.305
III. — TEXTILES	**13.551**	**496.923**	**10.394**	**265.323(+)**	**6.913**	**173.241**
— Soie grège	49	20.805	2	999	4	2.177
— Files de coton	870	41.910	381	17.775	348	13.317
— Autres fils	271	3.702	397	5.897	3	195
— Filets de pêche	21	2.656	47	5.436	41	5.148
— Tissus de coton	3.793	270.805	1.901	130.472	677	50.894
— Tissus de Rayonne	344	26.922	211	16.308	312	40.708
— Autres Tissus	52	6.750	105	12.128	148	15.238
— Sacs et Toile de jute	8.151	123.313	7.350	76.508	5.380	45.564

(1) 1er semestre 1968

Unité { *Quantité : Tonnes* ; Valeur : Milliers de Riels

TABLEAU XIV – 2

PRINCIPAUX PRODUITS IMPORTES

(Suite et Fin)

DESIGNATION	1966		1967		1968 (1)	
	QUANTITE	VALEUR	QUANTITE	VALEUR	QUANTITE	VALEUR
IV— METAUX ET PRODUITS DE LEUR TRANSFORMATION	**92.343**	**1.695.546**	**72.433**	**1.394.386**	**48.331**	**842.614**
— Fer et Acier	65.039	346.096	51.966	277.257	35.947	186.985
— Antres métaux	1.651	36.788	1.095	35.098	1.395	30.434
— Ouvrages en métaux	3.725	229.926	6.208	144.735	4.186	101.110
— Machines et appareils	6.985	498.884	5.481	390.146	2.342	176.315
— Contructions électriques	6.591	251.533	3.364	246.041	1.924	140.297
— Autos et pièces détachées	3.484	204.255	2.130	164.727	1.444	126.718
— Cycles et pièces détachées	1.117	71.848	835	59.551	1.025	74 054
— Autres matériels de transport	729	52.675	1.304	72.013	46	3.207
— Horlogeries	22	3.541	50	5.848	22	3.502
V — AUTRES PRODUITS	**53.533**	**1.061.149**	**149.108**	**1.010.405**	**81.628**	**827.515**
— Produits pharmaceutiques	1.031	300.660	856	246.418	628	144·048
— Produits chimiques	11.933	90.561	11.262	91.468	6.841	55.690
— Pneumatiques	1.456	80.449	793	47.679	611	30.132
— Ouvrages en caoutchouc	350	16.194	233	13·540	157	10,245
— *Papiers et cartons*	4.124	44.569	1.636	20.532	1.783	21.392
— Ouvrages en papier et Carton	—	—	—	10	—	—
— Divers	34.639	528.716	134.328	590.758	71.608	566.018
TOTAL GENERAL	559.809	3.887.852	663.494	3.365.316	364.085	2.238.528

(1) 1er semestre 1968

Unité { Quantité : Tonnes ; Valeur : Milliers de Riels

SOURCE : Direction des Douanes et Régies.

TABLEAU XIV-4

PRINCIPAUX PRODUITS EXPORTES

PAYS	1966		1967		1968 (2)	
	QUANTITE	VALEUR	QUANTITE	VALEUR	QUANTITE	VALEUR
Riz	190,1	846	219,1	1.284	111,8	667
Maïs	133,4	285	64,8	147	28,2	52
Caoutchouc	51,1	873	49,7	716	19,3	248
Poivre	1,5	59	1,7	58	1,4	40
Kapok égrené	11,7	99	3,9	45	1,8	21
Tabac	0,1	2	0,6	17	—	—
Produits forestiers (1)	81,3	59	100,9	80	70,7	54
Produit de la pêche	1,6	6	3,0	23	1,0	3
Animaux vivants	6,4	89	11,0	90	10,0	87
Haricots secs	0,4	2	6,3	48	8,3	57
Sucre de palme	—	—	0,1	1	0,5	3
Soja	0,7	3	—	—	2,0	9
Sésame	4,8	32	6,6	63	2,0	13
Arachide	—	—	1,7	14	0,2	1
TOTAL	**483,1**	**2.305**	**469,4**	**2.576**	**257,2**	**1.255**

(1) Bois d'œuvre, Charbon de bois, huile et résine de bois
(2) 1er semestre 1968

Unité { Quantité : Milliers de Tonnes
Valeur : Millions de Riels

SOURCE : Direction des Douanes et Régies.

TABLEAU XIV – 5

EXPORTATIONS PAR PAYS DE DESTINATION

PAYS	1966		1967		1968 (1)	
	QUANTITE	VALEUR	QUANTITE	VALEUR	QUANTITE	VALEUR
ZONE DOLLAR						
Etats-Unis	3,3	49,5	6,1	75,6	2,1	24,4
Philippines	—	—	14,9	82,6	—	—
Haïti	—	—	—	—	—	—
Panama	—	—	—	—	—	—
Argentine	—	—	—	—	—	—
Canada	—	—	—	—	—	—
Autres Pays	—	—	1,2	14,6	—	—
TOTAL	**3,3**	**49,5**	**22,2**	**172,8**	**2,1**	**24,4**

(1) semestre 1968

Unité { Quantité : Millier de Tonnes
Valeur : Millions de Riels