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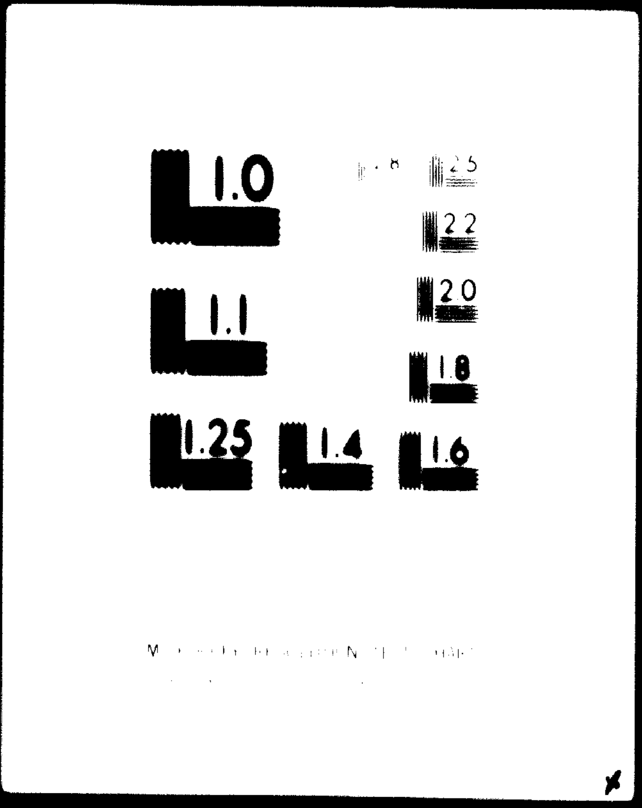

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UNIDO

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

STUDY FOR THE INTEGRATION OF THE SHIPBUILDING AND REPAIR INDUSTRY IN THE ANDEAN GROUP OF COUNTRIES

FINAL REPORT

VOLUME I

UNIDO - CONTRACT No. 73/13 (1)
PROJECT No. IS/RLA/72/E43

TECNIBERIA
MADRID-SPAIN

STUDY FOR THE INTEGRATION OF THE SHIPBUILDING AND REPAIR INDUSTRY IN THE ANDEAN GROUP OF COUNTRIES.

- FINAL REPORT -

CONTRACT: UNIDO nº 73/13(1)

Project nº IS/RLA/72/843

AUTHORS: TECNIBERIA - Madrid (Spain).

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S Y N O P S I S

An analysis is made of the present situation of the ship-building and shipping sector in the Andean Subregion in - order to study the possibilities for an integrated development.

A forecast is made of the shipping demand in the Subregion which after being analysed, is estimated sufficient to - stablish new shipyards and on this ground are defined the production facilities and resources. in the shipbuilding - sector for two alternatives of development from the present situation up to 1.985.

In the alternative of greater development, the production capacity of the shipyards in the Subregion would be increased up to more than 1.600.000 D.W.T. of annual output in 1.985, - being at present of only 75.000 D.W.T./year.
With the tonnage eventually built in the Subregion and with supplementary acquisition of ships in foreign countries, it is estimated that the subregional fleet could be increased - up to a tonnage of 12.000.000 D.W.T. in 1.985, being at present of only 1.600.000 D.W.T.

The various resources needed for the development of this sector are analised, in special the financial resources, which - are considered to be decisive factor determining the development rate.

I N D E X VOLUME I

- - - - - - - -

VOLUME II.

INDEX OF APPENDIX.

[illegible]

The present Study is based on the UNIDO agreement to provide assis- [illegible] governments of the Andean Group of Countries, which include [illegible], Chile, Colombia, Ecuador, [illegible], Venezuela, [illegible] to executive Organ denominated "[illegible] DEL [illegible] DE CARTAGENA" (Board of the agreement of Cartagena) to prepare a Study which serve [illegible] for the decision-making regarding to the inte- [illegible] of the shipbuilding [illegible] industries in the above mentioned countries of the Andean Group. The purpose of this Study is to provide the Board with adequate information and [illegible] possibilities presented by these countries for pro- [illegible] the development of the shipbuilding sector [illegible] of [illegible] to each country specific industrial or mercantile activities, within the general process of economic integration under way in the Andean countries. This will be done by means of plans for the libe- ralization of trade, specialization in production, and the co-ordina- tion of the regulations and policies relating to this sector in par- ticular.

It is considered *a priori* that the development that can be effected in the shipbuilding sector of the sub-region is very great and that the implementation of this development is very important because of shipbuilding being an industry of synthesis, so that it produces a very significant multiplier effect on other complementaries and servi[illegible].

In the shipbuilding sector, by reason of its particular characteris- tics, [illegible] is highly indicated and recommendable, with po- ssibility [illegible] assignation [illegible] country of the Andean Group [illegible] factories, [illegible], etc.

..

The above mentioned characteristics of the shipbuilding sector make it possible for there to be outstanding benefits of an economic, social and political order for the Sub-region, in the programme of development of this sector, that can be put into effect through the Junta del Acuerdo de Cartagena.

The scope of the Study was defined after first contacts with the Resident Representative of the UNIDO in Lima and with the UNIDO Coordinator of the Board, in the sense that the Study would cover the whole of the shipbuilding industry in relation to merchant ships of more than 1,000 gross registered tons., including coastal ships and excluding fishing vessels and those engaged in ports works. This distinction is due to the fact that the ships of less than 1,000 G.R.T. are included in the list of products with automatic liberation of the ALALC, and their possible exports cannot be submitted to any economic restriction which could be derived from this study.

With respect to the auxiliary or complementary industries, it was defined that those which were not included in programmes concerning other sectors, specially the metal-mechanical sector, would be studied.

The present Study has been divided into three parts:

In the first part the existing situation in the shipbuilding sector in the Sub-region is described and analysed. For this purpose, a team composed of 3 Doctors of Marine Engineering and 1 Doctor of Engineering who is a specialist in Market Research, has travelled through the six Andean countries, collecting information by means of questionnaires submitted to the various firms and organisations in the sector, in addition, members of the team made personal visits to the principal shipyards and shipbuilding industries. Likewise, they reviewed the previously existing reports, documents and publications, which are enumerated in Appendix nº 1 (Bibliography).

In the second part a study is made of the demand for Maritime Transport in the Subregion, specifying the Fleet by the various types and sizes of ships that it will be necessary to construct up to 1985. A study is also made of the market for Ship Repairing, forecasting the merchant ships to be repaired in the shipyards of the Subregion.

In the third part the possible development of the shipbuilding sector of the Subregion is studied, taking as a basis the demand for ship construction and repair defined in the second part. The development of the production of existing shipyards is estimated, and two alternatives are defined for the increase of ship production by means of additional shipyards. A study is made of the Ship Repair Centres which will be required, and an analysis is made of the development of the auxiliary industry, defining in particular the implantation of factories for various types of marine engines. Recommendations are also made for the development of Shipping Companies and, in conclusion, an evaluation is made of the human, technological and financial resources that will be required for the alternatives of development defined, together with the recommendable evolution in regard to legislation concerning the shipbuilding sector in its general aspects.

1. ANALYSIS OF THE PRESENT SITUATION OF THE SHIPBUILDING SECTOR IN THE SUB-REGION

1.1. SHIPYARDS FOR CONSTRUCTION AND REPAIRING

1.1.0. GENERAL CONSIDERATIONS

The activities of ship construction and repair in the Andean sub-region have developed up to the present time covering the following fields which we indicate below in order of importance.

(a) - Repairing of ships of the respective national Naval fleets

Each of the countries of the sub-region has arsenals and dockyards to take care of the maintenance of the ships of their respective navies. Generally these shipyards are organically and technically structured on North American models, the supervisory staff having been trained in North America.

(b) - Construction of fishing boats and small units, such as barges, tugs, etc.

In almost all of the countries of the sub-region there are some of these shipyards and it is appropriate to emphasise the large numbers of fishing vessels constructed in Peru during the decade of the sixties for the anchovy fishing fleet. It is interesting to point out that many of these shipyards are situated at a distance from the coast and that it is necessary to transport the ships distances of, in some cases, several kilometres in order to launch them in the sea.

(c) - Repair of merchant and fishing vessels

In all the countries there is a certain amount of activity in regard to the repair of merchant ships that is normally carried out in the naval shipyards but, on the other hand, there are small shipyards that maintain the respective fishing fleets of each country.

(d) - Construction of merchant ships

Only the SIMA shipyards at Callao, Peru, has experience in the construction of merchant ships larger than 1,000 gross registered tonnage.

(e) - Construction of small or auxiliary naval units

In the majority of the countries and in the above-mentioned Naval shipyards the construction or assembly of small naval units, or auxiliary vessels for the Navy has been carried out following the design and technical assistance of other countries.

As we have indicated in this short outline, the most important enterprises engaged in ship construction or repairing are, or have been, arsenals of the respective national navies, which continue, in the majority of cases, to be under the direction of Naval officers, and their legal and constitutional system is subject to the inflexibility characteristic of the public administration.

However, in all countries the tendency is noted to endow these firms with an autonomy appropriate to an independent administration that permits them to act with greater flexibility in the national market and in circumstances suitable to the development of an industrial firm. It was observed that these firms do not have their own technology and that they depend almost entirely on foreign technology.

The facilities of the existing shipyards are rather antiquated and are the result of a chaotic and discontinuous growth that has evolved with a scarcity of financial means which leads to some plants being disordered and lacking a rational structure.

The quality of work is irregular and in certain cases, even excessive. The productivity, in general, is low, which results in some excessively high production costs.

The policy with regard to stocks and supplies is also subject to the typical term and financial inflexibility that makes good progress of the work difficult.

[illegible] the principal shipyards in the Andean sub-region [illegible] chronological order of the visits made to their facilities, [illegible] indication of some projects for new shipyards that are at present being studied in the sub-region, and that are in an advanced degree of maturity.

1.1.1. S.I.M.A. (SERVICIO INDUSTRIAL DE LA MARINA), PERU

(a) - GENERAL CONSIDERATIONS

S.I.M.A. (Servicio Industrial de la Marina) is a Firm engaged in the construction and repair of ships and in mechanical metal work in general.

It has two factories: SIMAC at El Callao, the principal port of the Republic of Peru, and SIMAI at Iquitos, a Peruvian river port on the Amazon.

SIMAC has been recently converted (October 1973) into a mercantile firm under the denomination SIMA - PERU. Until that date it has been directly subordinate to the Peruvian Navy since its foundation on 14 February 1950. A description is given hereunder of the SIMA factory at El Callao, whose general data and address are the following:

S.I.M.A. - PERU
Avda. Contralmirante Mora s/n
Base Naval del Callao
Telex PX 5528
Apartado de Correos (P.O. Box) No. 112
Cables: SIMAC / Telephone: 293698

A map is annexed of the general layout of the shipyard in its present condition, as well as in its envisaged phase of extension.

The total area of the Factory is 300,000 m^2, approximately, of which about 31,200 m^2 is roofed.

(b) - PLANT

The S.I.M.A. Factory at El Callao at present counts with a plant equipped for the construction of ships of up to approximately 27,000 D.W.T. and various repair docks.

The facilities of the plant are described below:

- Storage parks for plates and profiles with a shotpeening and steel priming machine and a 15-ton mechanical gantry crane as well as stores for the various materials and equipment for shipbuilding and repair. These stores count with facilities for handling cargoes with "Kangeroo" cranes and fork-lift trucks.

There is access by road to the shipyard for delivery of materials.

- Machinery. Among the principal elements of machinery are the following:

. Grooving machines (2) of 165 mm. to 500 mm.
. Reaming machines (2) of up to 25 mm. in diameter.
. Beveler (1) of up to 14 m. in length
. Planing machines (10) of up to 1,000 mm.
. Cutting machines (27) of up to 25 mm. cutting capacity.
. Boilers (5) of 2,300 Kg. steam/hour.
. Compressers (18)
. Bending machines (22) of 0.8 to 32 mm.
. Dresser (1) of 6 mm. to 25 mm.
. Grinding machines (48)
. Sets of painting equipment (20)
. Metallizing equipment (1)
. Milling machines (13) of 25 to 500 mm.
. Welding machines (57), 220-440 volts and 230-460 amps.
. Cranes (56): bridge cranes up to 50 tons and automotive type up to 70 tons.
. Turbine rotor balancers (1) of 3.5 mm. in diameter
. Kilns (30) of 200 Kg. to 1,600 Kg.
. Straightener (1) of up to 3 m. in length and up to 25 mm. gage.
. Gear generators
. Presses (17) from 5 to 400 tons capacity.
. Punching machines (1) punching capacity up to 41. mm. diameter.
. Polishers (8)
. Saws (34)
. Drills (43)
. Lathes (75). One vertical of 3 m. diameter and two horisontal of 8 m. between points.

. Oxyacetylene cutting equipment (11)

. Automatic "Hancock" pantographic cutting equipment for a scale of 1:10.

- Berth

The present construction berth is 210 m. long and 30 m. wide. It has a capacity for ships of up to 27,000 tons dead weight approximately. At the present time bulk carriers of 25,000 D.W.T. are being constructed.

The berth is equipped with 15-ton cranes (bridge cranes) and 60-ton cranes.

- Dry docks

S.I.M.A. has a dry dock which has the following characteristics: 200 m. in length, 33m. wide (higher part) and 7.30 m. maximum available draught, which makes it suitable for ships of up to 25,000 D.W.T.

In addition, S.I.M.A. has two floating docks with lifting capacities of 2,000 tons and 3,500 tons.

(c) - PERSONNEL

The S.I.M.A. Factory at El Callao counts with a staff of about 2,600 (including sailors engaged in handling the dock).

The distribution of the staff at present is as follows:

- 1480 people in the Ship Repairing Division
- 820 people in the Shipbuilding Division
- 200 people in the Administration Division
- 100 sailors for operating the docks.

The personnel continues to increase, it being planned to reach about 4,000 people in 1975 and perhaps to reach a staff of 6,000 by 1980. These figures, given by the persons interviewed in S.I.M.A. appear excessive and in any case, should be adjusted to the expansion plans of the Shipyard and to the modern methods of production that will have to be implanted.

The composition of the Production Department personnel in the Construction Division is the following:

. Engineers	6	
. Technicians (medium grade) . .	5	
. Templates	8	operatives
. Boilermakers	143	operatives (plus 12 assistants, crane workers, etc).
. Welders	140	operatives
. Oxyacetylene cutters and calkers	85	in workshops and 14 in slipways
. Slipway personnel (erection)	100	operatives
. Painters	35	operatives
. Pipe fitters	90	operatives (including oxyacetylene cutters)
. Machinery fitters	75	operatives
. Electricians	18	operatives
. Carpenters and joiners	85	operatives

In the Plans Department the following persons are working principally on the adaptation of plans and specifications of materials to the standards of the Shipyard:

. Engineers	4
. Technicians (medium grade) . .	16
. Hull section draughtsmen . . .	8
. Machinery section draughtsmen	9

In the Ship Repair Division, the composition of the personnel is the following:

. Engineers	30
. Administrative personnel . . .	60
. Operatives	1390

The average wage level is about 200 soles per day, received by the operatives, not including overtime.

Social security charges are of the order of 84 per cent of the wages received by the personnel.

Productivity incentive systems are not applied, because they are prohibited by Peruvian Law.

S.I.M.A. has a School for Apprentices, where an average of 40 apprentices are trained on a continuous basis.

The Safety and Work Hygiene systems are well taken care of.

S.I.M.A. - Callao subcontracts some work to firms in the shipbuilding and metal mechanical sectors.

(d) - PRODUCTION

The S.I.M.A. factory - Callao, was principally engaged in ship repairing until a few years ago, when it commenced its shipbuilding activities.

- Ships constructed to date are the following:

. 2 oil tankers of 6,000 tons dead weight
. 2 oil tankers of 10,000 tons dead weight
. 2 general cargo ships of 13,000 tons dead weight

At present the order book of S.I.M.A. - Callao counts with the following ships for Peruvian shipowners:

. 3 bulk carriers of 25,000 tons dead weight
. 2 oil tankers of 25,000 tons dead weight
. 1 bulk carrier of 25,000 tons dead weight (under negotiation)

The programme of deliveries envisaged is the following:

The first 25,000 DWT bulk carrier	.....	Delivery January 1974
The second " " " "	.....	Delivery June 1974
The third " " " "	.....	Delivery November 1974
The first 25,000 DWT oil tanker	.....	Delivery May 1975
The second " " " "	.....	Delivery September 1975

- Ship Repair Division : This Division is largely devoted to ships of the Peruvian Navy. In addition about 15 merchant ships and fishing vessels are repaired per month.

It may be estimated that the distribution of the repairing capacity of S.I.M.A. - Callao is as follows:

. 40 per cent for the Peruvian Navy
. 60 per cent for merchant ships and fishing vessels.

- Productivity

A monthly production of 800 tons of steel is estimated in the existing workshops.

Present productivity is of the order of 84.8 hours per ton of steel installed in the ship, of which the hourly rates are comprised as follows: 60 hours per ton in processing and prefabrication workshops, 24.8 hours per ton in erection on the slipway.

The figure indicated of 84.8 hours per ton of steel is estimated to be very high in comparison with that of Spanish shipyards and with that of Japanese shipyards, for the type of ships constructed by S.I.M.A.

The cost of an hour's work is approximately U.S. $2, a very low figure compared with the standard rate in Spanish shipyards, which is about U.S. $5.

- Supplies

The percentage of supplies of materials and equipment that is imported from abroad is of the order of 80 to 85 per cent, the following being among the principal supplying countries: U.S.A., Japan, Great Britain, Norway, West Germany, etc.

Supplies coming from countries in the Andean sub-region can be considered to be nil.

Cited because of their importance among the imported materials and equipment are: steel, propulsion motors, electrical generating units, propeller shafts and propellers, navigation and steering equipment, etc.

(e) - TECHNOLOGICAL LEVEL

S.I.M.A. has its own Technical Office, although it is not engaged in preparing original ship designs, since these are obtained abroad. The work of the Technical Office is reduced to the adaptation of plans, translation of the said plans and development of constructional details, etc.

The system of steel tracing is effected with plans to a scale of 1:10.

S.I.M.A. has organized a quality control department and has experience in complying with the Rules of Ship Classification Societies, principally Lloyd's Register of Shipping.

- Laboratories

S.I.M.A. has well equipped laboratories for carrying out various tests of materials:

- Mechanical tests (traction, impact, hardness, etc.)
- Metallographical tests (macrographies, micrographies, etc., with metallographic microscopes of up to 500 magnifications).
- Non-destructive tests (Magnaflux, X-rays, ultrasonic, tests with dyes, etc.)
- Paint tests (exposure to salt spray, immersion, adherence, weldability, etc.)
- Chemical tests (analyses, determination of carbon and sulphur in steel), spectrophotometry of atomic absorption, polarography, chromatography, analysis of oxygen content, etc.)

- Organization of production: The organization of production is capable of being improved significantly with regard to the production programmes for mass-produced ships that S.I.M.A. is contemplating. Modern methods of programming, follow-up, time and cost control, methods and standardization, should be developed in the coming years.

- Technical Assistance Contracts

Independently of the specific contracts for purchasing ship designs, S.I.M.A. has signed contracts for the manufacture of equipment under licence with McGregor (metal hatchway closures) and Norwinch (hydraulic deck machinery).

- Computers

S.I.M.A. has a BURROUGHS 3500 computer which was acquired recently, and an IBM 1440 used exclusively for administrative operations.

(f) - ECONOMIC AND FINANCIAL DATA

In the last three years the billing of S.I.M.A. has been as follows:

	Gross production value (in millions of soles)		
	1971	1972	1973
. Ship construction . . .	158.4	294.7	633.4
. Repairs	213.4	234.43	255.6

The financing of ships is generally effected through the Banco Industrial del Peru or through COFIDE, for 80 per cent of the national value of the ship, with loans extending over 6 years and with an interest rate of approximately 8 per cent.

For imported supplies, 100 per cent financing over 8 years with interest of the order of 10 per cent is generally obtained.

The cost of the ships constructed by S.I.M.A., for example, the 25,000 DWT bulk carriers, is estimated to be 30 - 40 per cent higher than the average international cost.

S.I.M.A. overheads amount to 85 per cent of the total cost of labour and social security charges.

(g) - EXPANSION PLANS

S.I.M.A. has approved and put into operation a Development Plan that includes the immediate initiation of the building of a construction dry dock of 360 m. in length, 56 m. wide (beam) and 10 m. in depth (depth of hold). In the first stage the dry dock will be 300 m in length.

This dry dock will be destined for the construction of tanker vessels of up to [illegible],000 tons dead weight.

For the expansion of the S.I.M.A. factory at El Callao, the financing has already been agreed at 25 years for the work to be carried out by an English construction firm.

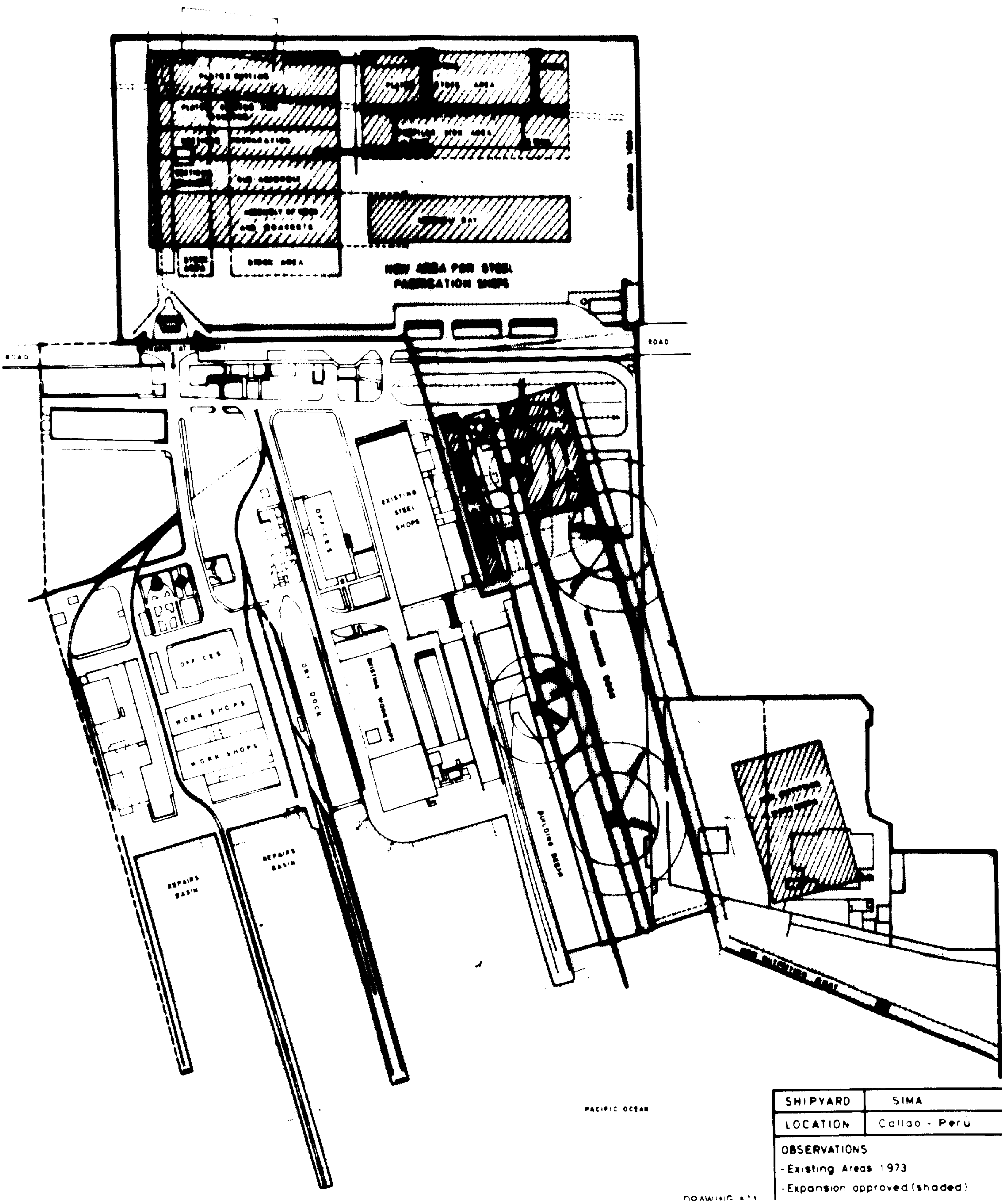
The expropriation of land has already been effected and at the time of the visit by the Techniberia team to S.I.M.A., the details of the contract with the construction firm were almost finalised.

The time envisaged for the construction of the dry dock is 30 months.'

The construction dry dock will be complemented with the expansion of workshops and storage facilities, a new steel processing and assembly zone and new 120-ton cranes running on both sides of the dry dock.

A new assembly wharf will also be constructed with a 20-ton crane.

A map of the S.I.M.A. facilities is attached, on which the new expansion zones can be seen, as well as the present layout of the Factory at El Callao. (Map N° 1).



SHIPYARD	SIMA
LOCATION	Callao - Perú

OBSERVATIONS

- Existing Areas 1973
- Expansion approved (shaded)

DRAWING N°1

1.1.2. METAL EMPRESA, S.A. - PERU

(a) - GENERAL CONSIDERATIONS

METAL EMPRESA, S.A. is a joint-stock company founded in 1967 in Lima, Peru.

The Factory and offices are situated in Callao, Peru, at a short distance from the sea, to where the vessels built are towed.

The firm's address is as follows:

Victor A. Belaunde, 852 (Av. Argentina Cdra. 57)
Telephone number: 325064. P.O. Box numbers: 10069 Lima and 117 Callao
Cables: METEMSA / Telex METEMSA PX 5554

Forty-five per cent of the company's capital is owned by Ishikawakima Harima Heavy Industries Co. Ltd. (I.H.I.) of Japan, and the rest by the ADELA Group.

The total area of the factory is about 57,000 m^2 of which 23,664 m^2 has concrete floors and 14,986 m^2 is roofed.

(b) - PLANT

The METAL EMPRESA factory at Callo counts with a well-equipped plant for the construction of ships. Among the facilities available are the following:

- Storage facilities for sheet and profiles, as well as warehouses for various materials and equipment.

- Elevation and transport equipment

  . Bridge cranes : 4 of 10 tons, 1 of 5 tons and 2 of 2 tons.
  . Truck cranes: 6 units of 32, 7, 5 (2), 3 and 2 tons.

. Additional transport material:

. 1 2-ton fork lift truck
. 1 1-ton fork lift truck
. 1 [illegible]-ton tractor truck
. 1 20-ton trailer

- <u>Machinery for the mechanical workshops</u>

. 5 Horizontal lathes of between 2,4 and 15 HP
. 3 bevel planing machines of 5 - 7 and 10 HP
. 1 bench planer of 10 HP
. 2 vertical lathes of 7.5 and 10 HP
. 4 boring machines of 5 and 10 (3) HP
. 1 vertical planer of 5 HP
. 3 milling machines of 2.4 - 5 and 10 HP
. 2 gear generators of 7.5 and 10 HP
. 4 threading machines of 2 - 5 (2) and 10 HP

- <u>Machinery for the steel workshops</u>

. 1 hydraulic press of 250 tons capacity, 300 mm. gap for sheets of 10 mm. thickness and 3,600 mm. width.
. 5 hydraulic presses of:
  - 40 tons (2) manual
  - 60 tons manual
  - 100 tons
  - 150 tons (4 columns)
. 2 manual mechanical presses of 2 and 6 tons
. 5 radical drills 2.2 and 5 HP with radii between 350 and 1,500 mm.
. 2 rollers for sheets of 15 mm. gauge x 3 mm. length.
. 1 roller of profiles with a capacity for angles of 100 x 100 x 12, angles of 50 x 50 x 10, with minimum diameter of bending of 1,500 mm.
. 2 punches for plates of 15 mm. gauge x 3 m. length
. 2 cutting machines for plates of 7.5 mm. gauge.
. 2 punch cutting machines (combined)
. Oxyacetylene cutting equipment

- Motor-driven pantograph
- 10 motor-driven cutters
- 50 manually operated portable cutters

- <u>Welding equipment</u>

. [illegible] sets a.c. [illegible] with transformer
. [illegible] sets " 500 A " "
. 10 sets " [illegible] A " "
. [illegible] sets d.c. [illegible] with electric motor
. 12 sets " [illegible] A " " "
. [illegible] sets " [illegible] A with petrol motor
. 2 sets " 1,500 A for multiple operation (24 operatives each)
. 3 sets " 750 A for automatic welding (submerged arc)
. 5 LINCOLN brand automatic welding sets

- <u>Tracing room</u> (templates)

Pattern system to a scale of 1:1

- <u>Prefabrication and assembly zone</u>

Extensive unroofed area.

- <u>Carpentry workshops</u>

Equipped with sufficient means for the work of fitting-out of quarters in the ships.

They are not equipped to do their own <u>forging or casting</u>, and sub-contract this work.

(c) - <u>PERSONNEL</u>

The factory counts with a production staff of about 470 people, of whom some 20 are medium grade technicians and 5 are engineers. They plan to engage more personnel shortly.

They do not have schools for apprentices [illegible] such, although they do provide vocational training for the personnel employed in the factory, for which I.N.I. provides the necessary technical assistance.

The average wage of the workers is calculated at about [illegible] per day (U.S. [illegible]). Social subsidies and charges amount to [illegible] per cent. It is estimated that there will be an increase in wages of nearly [illegible]0 per cent next year.

Productivity incentive systems are not applied.

(d) - PRODUCTION

In addition to the construction of ships, the factory is engaged in the production of various elements and equipment for industry, such as:

- Steam boilers (fire tubes)
- Water treatment plants
- Tanks for petroleum, acids, water, etc.
- Pressure pipelines
- Metal structures
- Transport equipment, dump carts, etc.
- Marine equipment
- Bridge cranes
- Pressure containers (up to 1[illegible] Kg./cm^2) for propane gas.

METAL EMPRESA acquired in 19[illegible] the assets of the firm [illegible] that had been in operation for 7 years, during which time it constructed [illegible]00 fishing boats with a capacity for [illegible]0 tons of fish (anchovy fishing boats).

- Metal Empresa has constructed about [illegible]0 ships having the following capacities:

- 11 fishing boats of [illegible]00 tons for [illegible]
- [illegible] " " " [illegible]00 tons for [illegible]
- 1 " " " 150 tons " " "
- 2 " " " 200 tons " Industrial [illegible] S.A.
- 2 " " " 150 tons " " " "
- 1 " " " [illegible]00 tons " Industrial [illegible], S.A.

- 1 Fishing boat of 200 tons for Envasadora Santa Rosa, S.A.
- 5 " " " 200 tons " Consorcio Ballenero, S.A.
- 4 " " " 350 tons " " " "
- 1 " " " 370 tons " " " "
- 3 " " " 200 tons " Pesquera Industrial, Sta. Marta, S.A.
- 3 " " " 350 tons " " " " " "
- 1 " " " 200 tons " Cía. Pesquera El Sol, S.A.
- 2 " " " 200 tons " Industrial Marítima Supe, S.A.
- 1 " " " 200 tons " Pesquera Litoral, S.A.
- 2 " " " 350 tons " Fibaco, S.A.
- 2 " " " 350 tons " Pesquera La Gaviota, S.A.
- 1 " " " 370 tons " " " " "
- 1 " " " 350 tons " J. Manuel Coto Arguelles
- 1 " " " 350 tons " Anchoveta Peruana, S.A.
- 3 " " " 350 tons " Inversiones Rocamar, S.A.

The following vessels are at present under construction (for delivery in April 1974):

- 1 350-ton fishing vessel (owner in negotiations)
- 1 Shrimp trawler (trawl and line) with refrigerated hold of [illegible]0 m^3 for Fish of Jamaica Co. Ltd.
- 2 Tuna freezer ships for ABIP - BRAZIL, purse [illegible], with [illegible] m^3 holds (125 tons fish), 180 tons dead weight.
- 6 Fresh fish trawlers for ABIP BRAZIL with holds of 230 m^3 (165 tons fish), 190 tons dead weight.
- 3 Freezer trawlers for ABIP - BRAZIL with holds of 230 m^3 (165 tons fish) 190 tons dead weight.
- 4 Freezer trawlers for CUBAPESCA, purse seiner type, with holds of 765 m^3 (600 tons fish), 900 tons dead weight.
- 3 Refrigerated shrimp boats with holds of [illegible]0 m^3 for Amber Sea Foods Ltd., Trinidad.
- 6 River launches
- 3 Tugs of 850 HP
- 1 Tug of 4,350 HP for Remolques Fluviales del Brasil
- 4 Oil barges of 25,000 barrel capacity
- 2 " " " 4,000 " "
- 3 " " " 2,000 " "
- 12 Cargo barges of 500 tons capacity.

- Productivity

It is estimated that 80 per cent of the materials are imported from: Japan, the U.S.A., West Germany, Denmark, Norway, etc.

Among the imported materials and equipment are the following:

- Steel
- Propulsion motors
- Propellers
- Propeller shafts
- Refrigeration equipment
- Hydraulic steering systems
- Fish handling equipment (occasionally the firm itself has made winches under a MARCO licence).

(e) - TECHNOLOGICAL LEVEL

The firm has a contract for technical aid for a limited time with Ishikawajima Harima Heavy Industries Ltd. (I.H.I.) Japan, and has worked and is now working with designs from other countries.

The firm counts with its own Technical Office for certain designs and for the development of detailed plans.

The system of layout for ships is the traditional system with templates to a scale of 1:1.

Quality control is carried out basically in the welding of the steel structure, being done by radiography.

There is a furnace for heat treatments for welded structures and containers.

The qualifications of welders and the means of production makes them capable of manufacturing Class 1 welded pressure containers, approved by the Classification Societies.

In regard to ships, these are generally classified by the ABS (American Bureau of Shipping) and the G.Ll. (Germanischer Lloyd).

(f) - ECONOMIC AND FINANCIAL DATA

The present annual level of billing is about 500 million soles (approximately U.S. $11.6 million).

The Firm estimates that the level of billing for [illegible] may be of the order of 1,200 million soles (approximately U.S. [illegible] million).

The approximate sales prices of fishing vessels under construction are the following:

- Shrimper of 72' length, 80 m^3 hold, refrigerated and with a [illegible] HP engine .... U.S. $171,000

- Anchovy fishing vessel of 119' length, [illegible] m^3 hold, (350 tons fish) and 850 HP engine .... U.S. $475,000

(Including electronic equipment and excluding nets)

The cost of the imported steel situated in the shipyard is about 20 soles/Kg. (approximately U.S. $0.46/Kg.)

The average wage is 150 soles (approximately U.S. [illegible]), to which there are applied social subsidies and charges of 70 per cent.

(g) - PLANS FOR EXPANSION

The maximum construction capacity of the present factory of METAL EMPRESA is calculated for vessels of up to [illegible] tons dead weight. For this reason it will be necessary to construct the vessels in two halves and join them in the dry dock of S.I.M.A., which has not been done up to now.

The firm states that it has finished the plans and engineering for tuna fishing vessels of 600, 800 and 1,000 tons dead weight.

The firm's objective is also to be able to construct cargo vessels of up to 5,000 dead weight tons for the Lima-Panama-Iquitos trade, for which a new factory would be necessary.

METAL EMPRESA plans to establish a new Shipyard on the coast, and has several alternative sites under study.

- A zone conceded to METAL EMPRESA in the fishing port of Oquendo (shipyard being planned)
- a zone on Zamano Bay, between Chimbote and Lima, which is more than 200 kilometres distant from Lima, for which reason it would recieve the legal benefits granted for decentralization of industry.
- A zone on the Bay of Naplo, 50 kilometres to the south of Callao.

Also in progress is the constitution of the firm METAL ORIENTE, with participation in its capital by Morbesco, Suito, Sima and Metal Empresa, for ship construction in the Iquitos zone on the banks of the Nanai River.

1.1.3. FABRICACIONES METALICAS, S.A. "FABRIMET" - PERU

(a) - GENERAL CONSIDERATIONS

This Firm was founded in 1948. The capital is 100,000,000 soles (approximately U.S. $2,300,000). It is a totally private Peruvian Company. The plant is situated at approximately 1 kilometre from the coast, to where the totally finished vessels are transported.

The firm has an affiliate in Pucallpa for river boats, which are constructed in sections at Callao and assembled and launched at Pucallpa.

Address:

Contralmirante Mora, 590
P.O. Box Nº 307
CALLAO, PERU
TELEX PX 5324, FABRIMET.

(b) - PLANT

This Firm does not have a construction slipway, because of its distance from the sea. The ships are constructed in an open space served by a gantry crane of 65 m. x 18 m. with a capacity of 20 tons and by mobile cranes of 10 tons and 5 tons. The sheet and profiles storage area is served by a gantry crane of 29.30 m. x 8.40 m. with a capacity of 10 tons, without magnetic means.

The workshop for processing plates counts with a roller of 3,050 mm. wide by 45 mm. gage, a hydraulic press of 630 tons x 6 mm. width, an oxyacetylene cutting and automatic copying machine to a scale of 1:1, apart from smaller presses, shears, punches, sealers, semi-manual oxy-acetylene cutting machines, etc., and a machine for manufacturing corrugated pipes for boiler furnaces of 1.60 m. maximum diameter by 8 m. in length.

Portable equipment is available for shotblasting and spray-coating of hulls, an operation which is carried out on land annexed to the shipyard.

The machine shop is equipped with a boring machine with a 160 mm. shaft 2 milling machines, 4 drills, 8 lathes, 2 filing machines and other minor auxiliary machines.

It has automatic and semi-automatic welding equipment.

There are no foundry or casting shops.

There is an annealing furnace of 3 m. x 3 m. x 10 m.

A compressed air facility is available, supplied by 6 compressers of capacities of between 823 cubic feet per minute and 125 cubic feet per minute.

The access for materials is by road, but acces is also possible by the railway which runs next to the factory.

(c) - PERSONNEL

The personnel, including the management, is composed of 415 persons: 15 engineers, 77 technical or administrative employees and 323 workers. The average wage is 250 soles (U.S. $5.80).

Social security charges represent 69.5 per cent. There is no school for apprentices. They have difficulty in recruiting qualified personnel.

(d) - PRODUCTION

Up to the present time they have constructed or have under construction a total of 550 vessels, the majority of which are fishing vessels. They have also built a tug for the Peruvian Navy and 4 tugs for ENAPU. Within the Andean Group, they have constructed a fishing vessel of 31 m. length for Ecuador and 20 for Chile.

At present they have a contract with CUBAPESCA for 30 shrimp boats of 18 metres length.

Its production capacity is 3 vessels of 31 metres length a month, or 8 vessels of the 18-metre CUBAPESCA type per month. They do not carry out ship repairs.

At the present time 60 per cent of their activity is devoted to shipbuilding and 40 per cent to non-marine structures or elements such as boilers, bridge cranes, industrial structures, hoppers for dump carts, equipment for handling grain, etc.

The Peruvian materials employed amount to approximately 25 per cent of the total. The principal items of domestic supplies are: electrodes, paint, pumps, welded pipes larger than 50 mmm in diameter, wood, centrifuged and phosphor bronze and the mechanical part of the deck or fishing machinery.

Imported materials amount to approximately 75 per cent of the total and come from Europe, the United States or Japan. They do not import any material whatsoever from other countries of the Andean Group.

Steel is purchased at a price of 15.50 soles/Kg., C.I.F. Callao, which increased by 28 per cent for tariffs, customs, clearance expenses, reaches a cost of 20 soles/Kg. delivered to the factory, that is to say about $460 per ton.

The principal engines are imported and they are normally selected by the ship owner previous to the contract.

The propeller shafting is machined in the Shipyard using imported material. The propellers are imported, as well as the valves and seamless piping and all classes of piping smaller than 50 mm. in diameter.

The hydraulic equipment is imported, although the mechanical part of the deck machinery is manufactured in the country, normally in the Shipyard itself.

(e) - <u>TECHNOLOGY</u>

The firm counts with a Technical Office staffed by an engineer and 10 draughtsmen. They use either their own designs or those of other technical offices. The plans are drawn up in minute detail because of the lack of skill of the operatives. They utilize a tracing system on a full-sized scale. They work with several Classification Societies, especially Lloyd's Register of Shipping and the American Bureau of Shipping.

They have a laboratory with X-ray equipment, ultrasonic and other mechanical testing apparatus.

They have signed licence or technical aid contracts with the following firms:

. MARCO - USA, Fishing vessels
. ESCHERWYSS A.G. Switzerland. Sluices for hydraulic plants
. HONOLULU IRON WORKS. Hawaii. Equipment for sugar mills
. STAG, Switzerland. Silos for bulk products
. KOERTING A.G. Germany. Evaporators for fish meal.
. ALUSUISSE, Switzerland. Aluminium transport units
. WALTHER & CIE, S.A. Germany, Fire-tube boilers up to [illegible] tons/hour
. MARINETECHNIK, Germany. Warships
. COMBUSTION ENGINEERING, U.S.A. Stationary boilers
. UNIT RIG & EQUIPMENT, U.S.A. Hoppers for trucks of up to 120 tons

(f) - <u>ECONOMIC AND FINANCIAL DATA</u>

The capital is 100,000,000 soles (approximately U.S. $2,300,000).

The sources of financing are the firm's own resources and the Banco Industrial del Perú, which finances up to 75 per cent of the national value of the vessel over 8 years at 8 per cent. The foreign material and equipments are financed by the suppliers up to [illegible] of the value covering at least 80%.

The CUBAPESCA type shrimp boats of 18 m. length and with a 245 BHP engine, are offered at 4,000,000 soles (U.S. $ [illegible]) to Peruvian ship owners and at 8,200,000 soles (U.S. $188,[illegible]) for export.

Steel is purchased at a price of about $460 per ton delivered to the Shipyard.

The average level of wages is 250 soles per day. (i.e. $ 5,80).

The coefficient of social security contributions is 29.5 per cent.

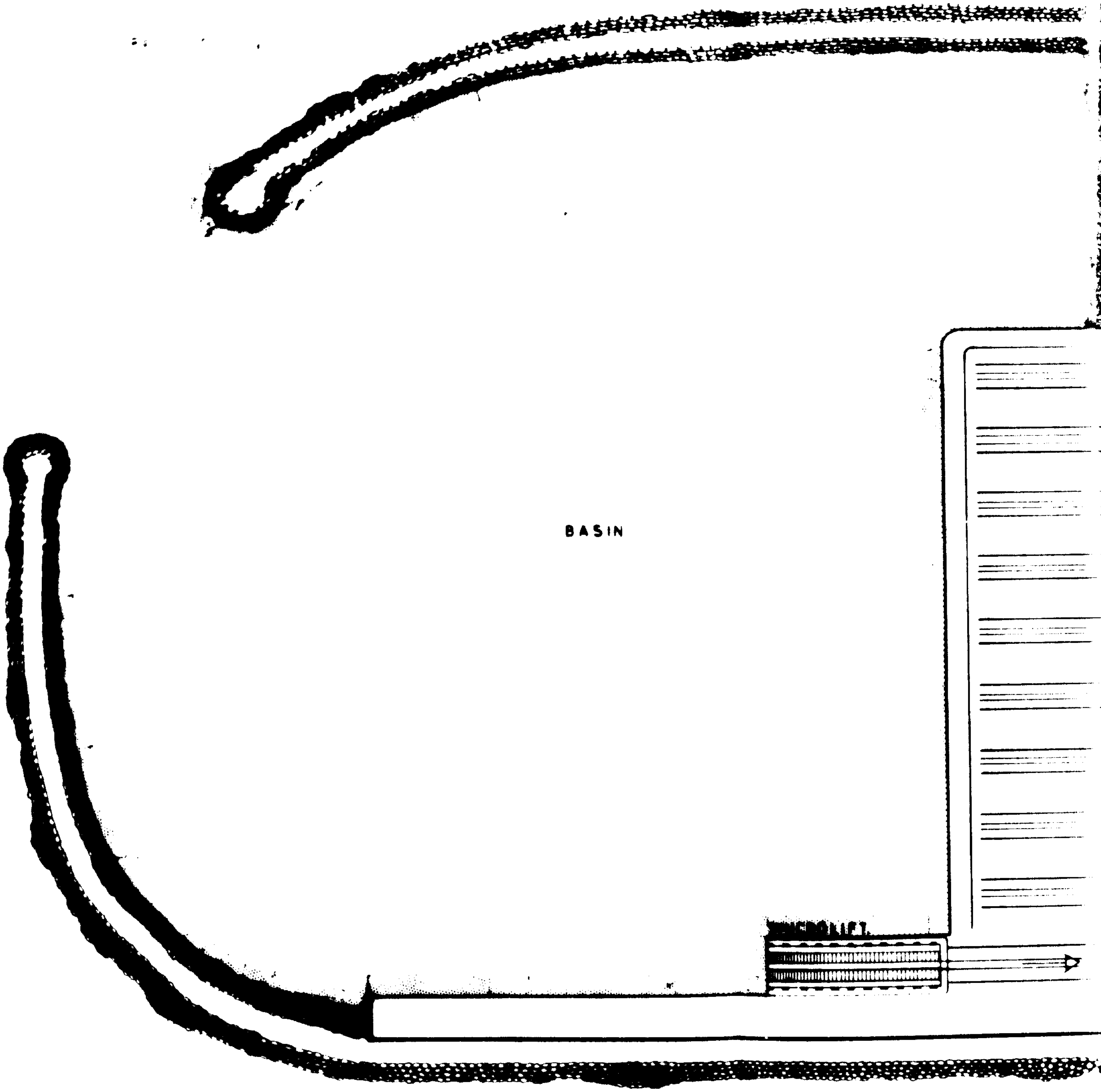
The coefficient of overheads is 40 per cent. This coefficient includes the tax on ships, which is 8.5 per cent. In the case of exports, this tax is not levied and in addition there is a tax rebate that varies between 15 and 25 per cent, and in some special cases amounts to 30 per cent.

Billing amounted to 192,000,000 soles in 1969, [illegible]0,000,000 in 1970 and 237,000,000 in 1971.

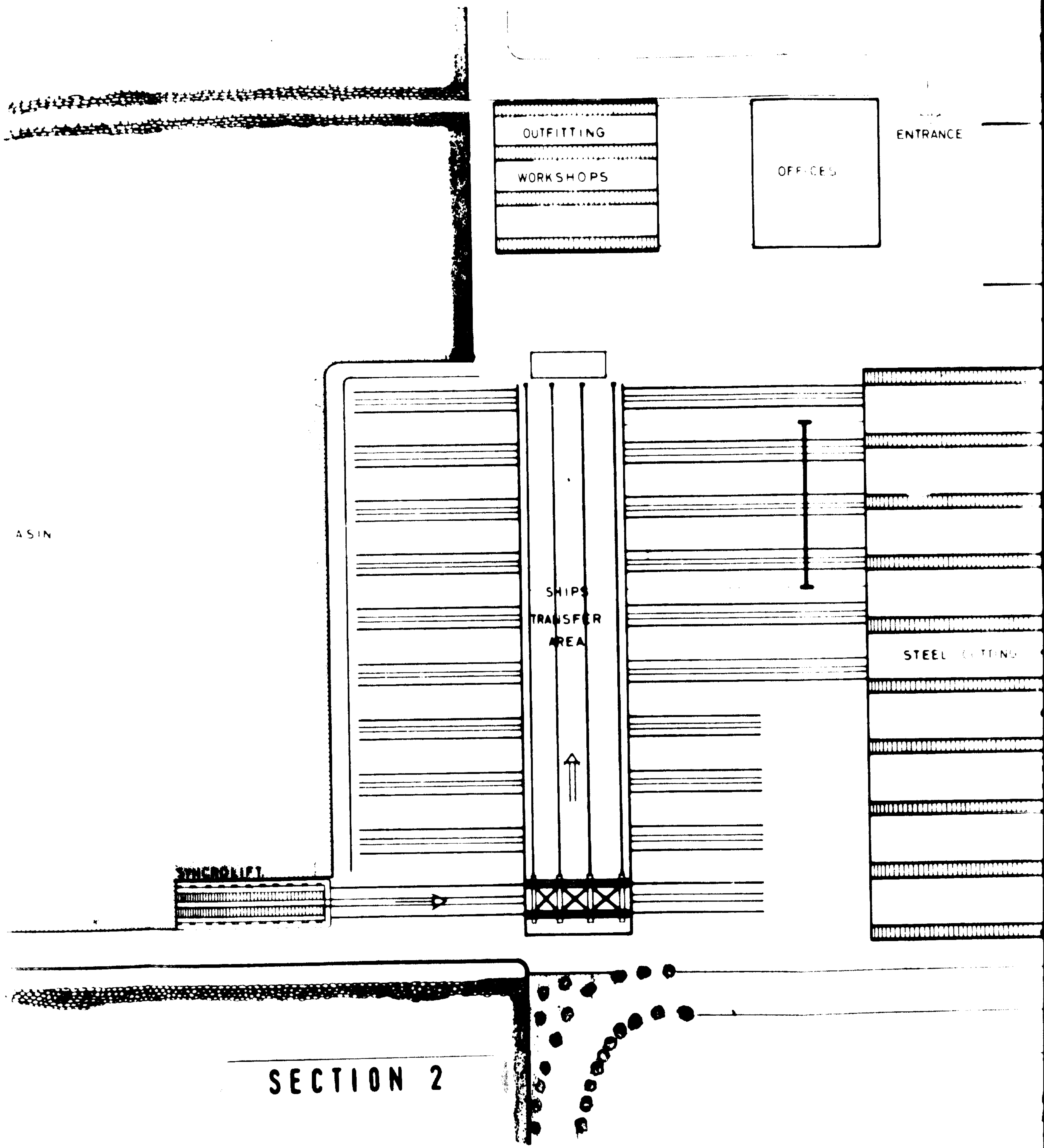
(g)- PLANS FOR EXPANSION

The present factory is limited in regard to the size of ships it can construct, since it is situated at a distance from the sea. On the other hand, the land on which it stands is bounded by the railway and by the facilities of PETROPERU.

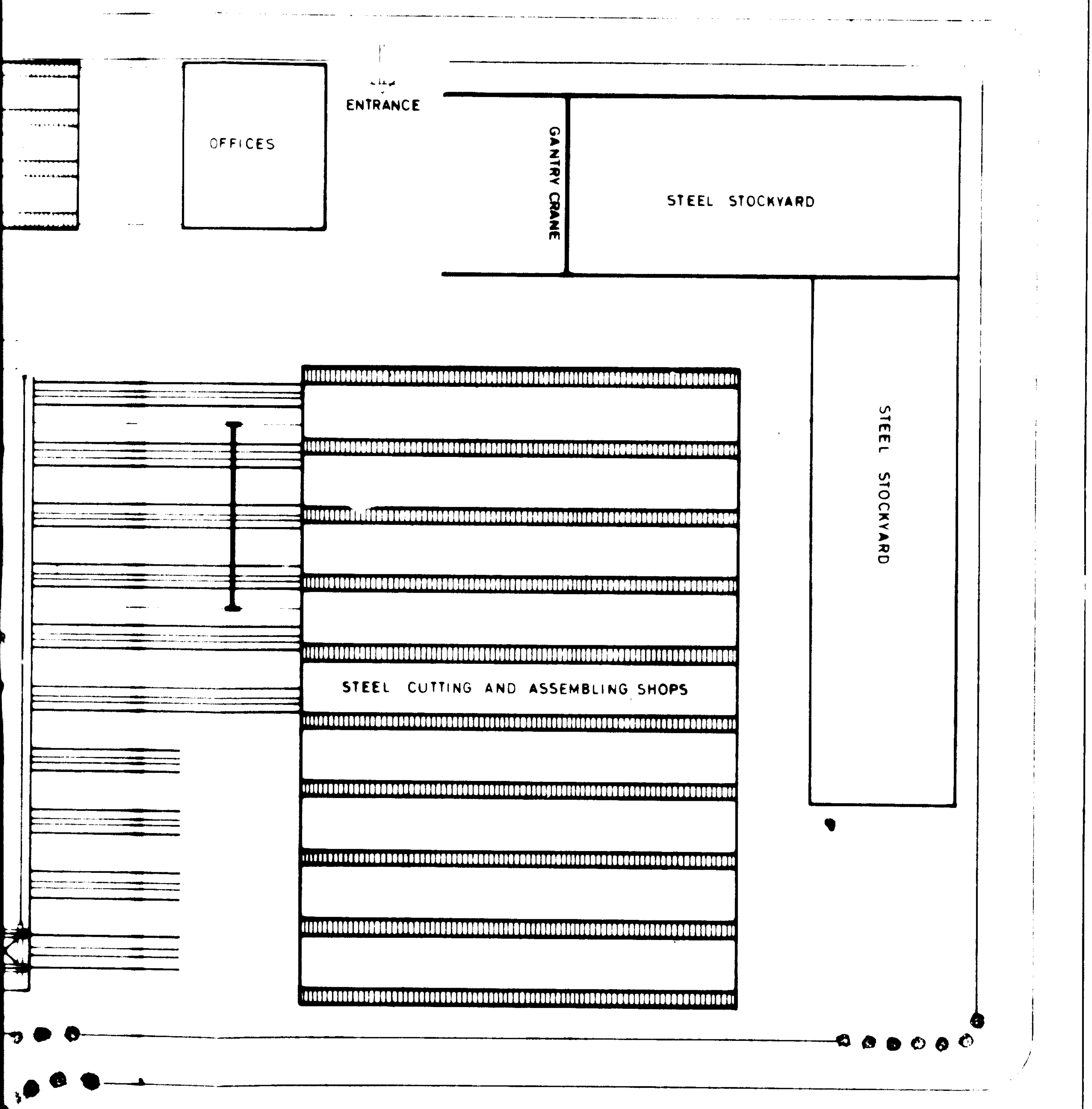
Fabrimet has studied a project for the construction of a new shipyard at Oquendo where it has taken an option on a bankside site of 90,000 m^2 that would permit the construction of ships of up to 45 m. in length. This project is at present delayed pending the approval and execution by the public sector of the infrastructure works at the fishing port, principally breakwaters and piers. Plan No. 2, annexed, shows the general layout envisaged for this project.



SECTION 1


OUTFITTING
WORKSHOPS
OFFICES
ENTRANCE
ASIN
SHIPS
TRANSFER
AREA
STEEL
SYNCROLIFT

SECTION 2



SECTION 3

SHIPYARD	FABRIMET
LOCATION	Oquendo - Peru
OBSERVATIONS -Future project (pending approval)	

DRAWING N° 2

1.1.4. PICSA - PERU

(a) - GENERAL CONSIDERATIONS

This is a totally private firm, belonging to the Banchero Group, with activities in the fish and fishmeal sector.

The factory at Callao was founded in 19[illegible]. In 19[illegible] the factory at Chimbote was created, replacing the old factory at Callao which was situated at a distance from the sea. The data indicated hereunder refer to the factory at Chimbote. The total area is [illegible],[illegible]00 m².

The principal offices are at Callao : Avenida Argentina, 1650.

(b) - PLANT

The PICSA factory at Chimbote is of recent creation.

The construction of hulls is carried out on a large horizontal concrete slab. The vessels are transferred in a lengthwise and transverse direction until they are placed on the platform of the synchro elevator that lowers the ship until it floats. This platform is also utilized to ground repair ships. The present capacity of the platform was initially [illegible]00 tons but the extension work that is being finished will increase its elevation capacity to 1,000 tons with dimensions of 45.7[illegible] m. in length and [illegible].50 m. beam.

The construction zone is served by 6 travelling cranes, each of [illegible]0 tons.

The sheet metal storage area is served by one travelling crane. The blasting and priming of the plates is carried out manually in the storage area. A protected platform on a roller table is being prepared for manual sanding.

The steel workshop has a roller for 19 mm. gage and 4 m. length and one for 12 mm. and 3 m. respectively together with a 400-ton hydraulic cutting machine and a 300-ton hydraulic press.

Oxygen cutting is done with semi automatic trucks to a scale of 1:1. The degree of prefabrication is relatively low, and sub-assemblies are formed that are installed "in situ". Semi automatic welding is employed on a large scale. The fitting-out dock will be 79 metres in length once the extension of the platform is finished. It is intended to float the ship when it is completely finished.

The machine-shop has 2 8-metre lathes for machining of propeller shafting and a 6-metre lathe, apart from smaller machines. There is a pipe-fitters' shop. At the time of the visit they were sending galvanizing work to be done at LIMA, but a galvanising shop is being finished at Chimbote with which it is intended to subcontract.

There is an electrical workshop and a carpenters' shop but no forging or casting shops.

The transformation capacity is [illegible] KVA, taking [illegible],[illegible]00 KVA from the grid, 1,000 KVA from a stationary generator unit and 300 KVA from mobile emergency units. It appears that certain problems of distribution of power from the grid exist and that they are in the course of being solved.

Oxygen and acetylene are supplied locally.

There are fire-prevention facilities and a compressed air system.

There is access for materials by road, or by sea as far as the port of Chimbote

(c) - PERSONNEL

At present the staff comprises 700 with an increase to 1,200 envisaged for the coming months.

There are [illegible] engineers in addition to another 10 in the Callao Offices. There are [illegible] medium grade technicians.

There is no school for apprentices. They have difficulty in recruiting qualified personnel and they are studying the possibility of establishing courses in agreement with SENATI (the organization for vocational training in Peru).

They use sub-contractors for 100 per cent of the refrigerated installations and partially for carpentry, furnishing and fitting and welding work.

The average level of wages is 240 soles per day (U.S. $5.75) with social charges of 54 per cent. Overtime and work by the day are paid on these wages.

(d) - PRODUCTION

Up to the present time 385 ships have been constructed at Callao and the first ship has been finished at Chimbote.

The order book at present comprises:

- 16 fishing vessels for Cuba of 600 D.W.T.
- 6 " " " France of 600 D.W.T.
- 3 " " " Pepesca - Peru of 600 D.W.T.
- 2 " " " Pepesca of 1,000 D.W.T.

Contracts are being negotiated for 10 to 15 fishing vessels for Mexico and a further 10 vessels for Costa Rica of 600 D.W.T. , two 1,000 D.W.T. trawlers for Peru and various flat barges and tugs for PETROPERU.

Repair work is usually carried out by grounding the ships with the synchroelevator platform.

Twenty-one ships can be worked on simultaneously and the capacity envisaged is 24 tuna fishing boats of 600 D.W.T. per year, In accordance with the contracts at present in force, 12 tuna fishing boats will be delivered in 1974. It is envisaged that a capacity for processing 12,000 tons steel per annum will be attained.

Supplies of the following equipment are purchased from Peruvian suppliers: pumps, electric engines, electric cables, paints, electrodes, bronze propellers, fitting-out and decorating materials, electric junction boxes and switchboards, the majority with imported switchgear, steel casting including anchors, zinc anodes, part of the insulation material and the mechanical part of the deck machinery.

Imports amount to 40 to 45 per cent of the value of the vessel. No products whatsoever have been purchased from other countries of the Andean sub-region They have had contracts to buy LISTER engines made in Colombia, which are pending fulfillment.

The purchasing system is by independent products, selecting the most suitable, and with self-financing.

(e) <u>TECHNOLOGY</u>

They count with a Technical Office in Lima, and with 3 engineers and 6 draughtsmen in addition to an engineer and a draughtsman for the plant section.

They have bought the designs for tuna fishing vessels, since it is a type of ship with which they had no experience, but normally, they work with their own designs.

The tracing system is to a scale of 1:1.

They normally work with Lloyd's Register, Germanischer Lloyd and Bureau Veritas.

They do not have a laboratory. They are expecting to receive ultrasonic equipment next year. They sub-contract radiographic control service with an auxiliary firm.

(f) - <u>ECONOMIC AND FINANCIAL DATA</u>

The capital is 57,800,000 soles. (U.S. $ 1.330.000).

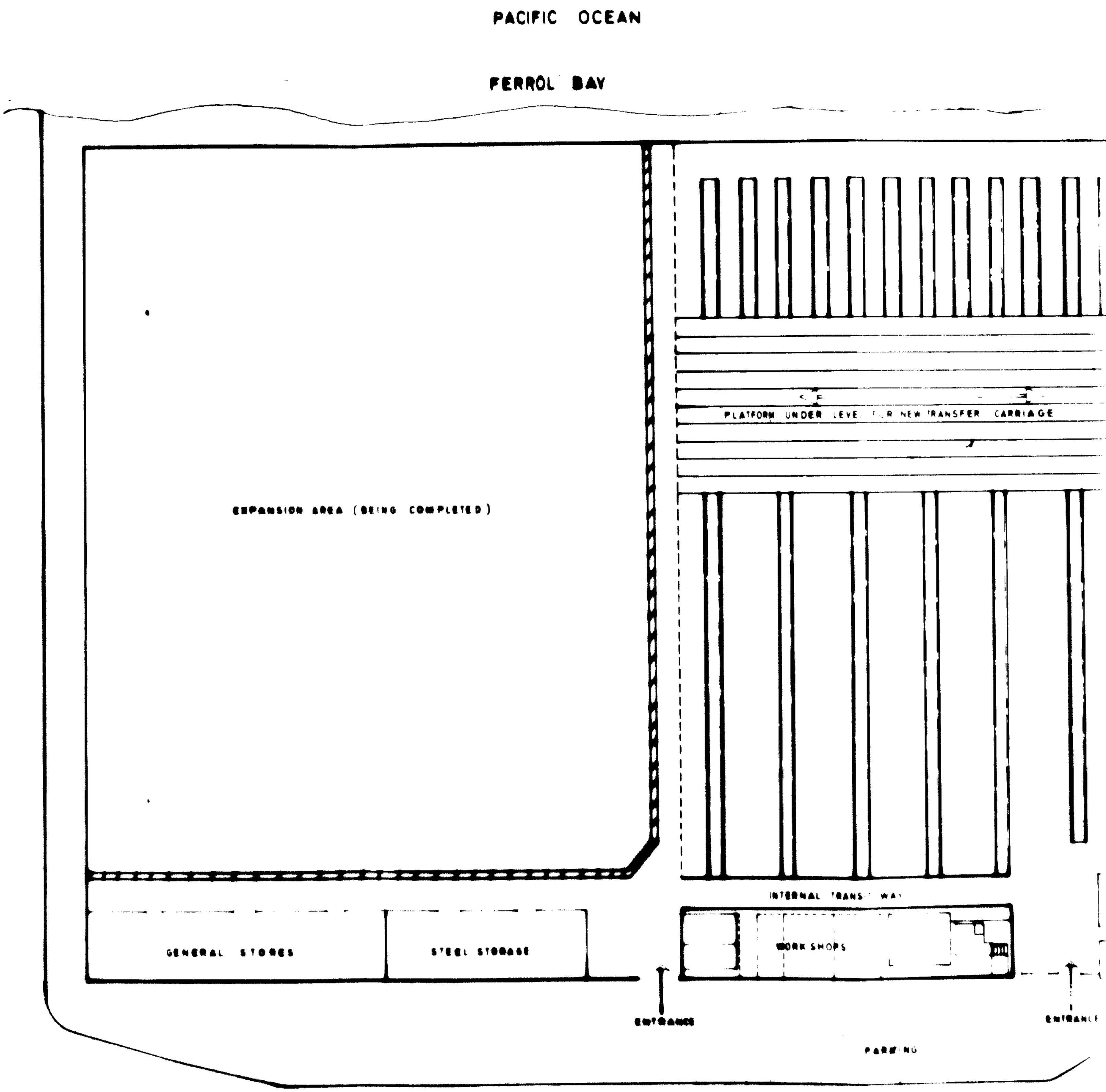
Financing has been effected through the Banco Industrial del Perú for 85 per cent of the national value of the vessel, financing the remaining 15 per cent with initial payments from the shipowner or through private banks. The foreign equipments are financed by the suppliers up to 80% or 100% of its value.

They have taken advantage of the CERTEX benefits for exports that normally amount to a tax rebate of 15 per cent and that can be increased by a further 5 or 10 per cent in accordance with special cases or conditions.

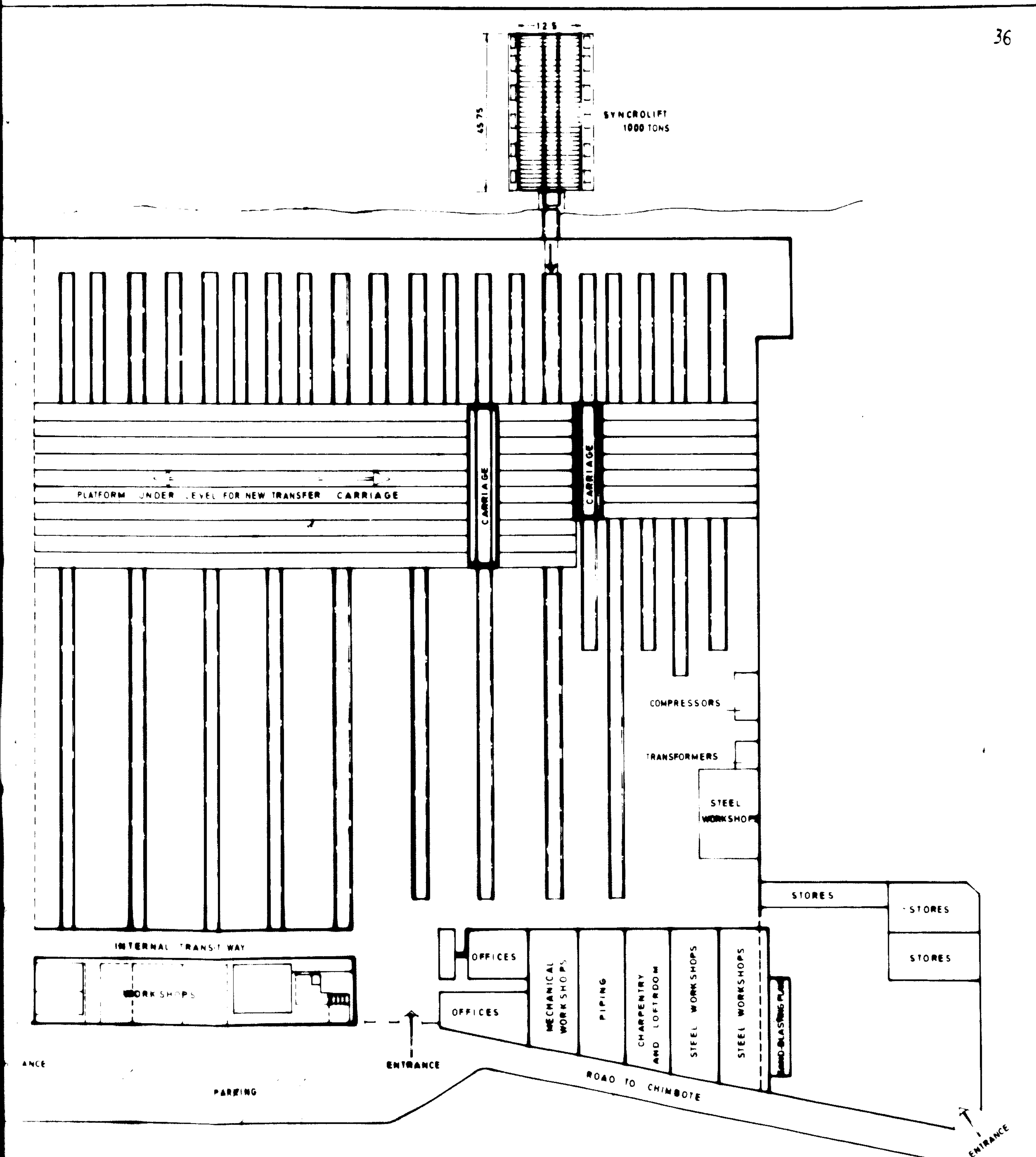
(g) - PLANS FOR EXPANSION

There are no new plans for expansion in the immediate future, once the present extension works, to which reference has been made previously, have been finished.

The attached map shows the general layout of the PICSA Shipyards at Chimbote. (Map Nº 3).


PACIFIC OCEAN
FERROL BAY
EXPANSION AREA (BEING COMPLETED)
GENERAL STORES
STEEL STORAGE
WORK SHOPS
ENTRANCE

SECTION 1



SECTION 2

SHIPYARD	PICSA
LOCATION	Chimbote - Peru

OBSERVATIONS

-Facilities being completed

DRAWING N'3

1.1.5. CONASTIL - COLOMBIA

(a) - GENERAL CONSIDERATIONS

The address of the COMPAÑIA COLOMBIANA DE ASTILLEROS LTD. (CONASTIL) is the following:

Base Naval
Telephone No. 10242 - 18225
CARTAGENA - Colombia

The Firm was founded in 1969, as a Limited Liability Company, with a capital subscribed in equal parts by the Instituto de Fomento Industrial (IFI) and the Empresa de Astilleros y Servicios Navales de Colombia (EDANESCO), a State industrial and commercial enterprise, connected with the Ministry of Defence, which owns the facilities, equipment and machinery.

The present facilities situated within the precinct of the Naval Base, will be moved to the industrial zone of Mamonal on the Bay of Cartagena at the beginning of 1975.

The firm is principally engaged in ship repair and mechanical metal work.

(b) - PLANT

At the present time the plant counts with a floating dock of 140 m. length x 18.30 m. beam, that will be scrapped when the synchroelevator, now in the planning stage, enters into service.

There is a transverse slipway with a capacity for ships of up to 60 m. in length

The boiler shops, machine shops, and engine and electrical shops are equipped to carry out ship repair work. Part of the machinery will be moved to the new workshops and a study is being made of the new machinery which it will be necessary to acquire.

For blasting and painting hulls there are 4 compressers of 3,000 cubic feet, each with 14 recently acquired modern portable blasting machines.

There is a carpenters' shop and a casting shop. There is no forge.

(c) - PERSONNEL

The Shipyard counts with a staff of 300 men (250 workers and 50 administrative staff) of which 4 are engineers, in addition to the general manager and the administrative manager. It is intended to increase the staff to 800 men in 1975. This will be effected gradually, in step with the entering into operation of the new facilities. For this reason there are at present 150 apprentices undergoing training at the school run by SENA in Cartagena.

They utilize sub-contracts in accordance with the workload, with an average of 35 men.

The average wage is 57 Colombian pesos per day (U.S. $2.40), with social security charges of 35 per cent.

There is no incentive system for the volume of work carried out, but only a merit system.

(d) PRODUCTION

The following units have been constructed:

- A submarine dock with a total weight of 700 tons of steel with Japanese designs.
- A shrimp boat for Venezuela of 22 m. length, with thecompany's own design.
- Four coastguard vessels for the Colombian Navy.
- Five river barges and 5 river tugs.

The order book includes 5 fishing vessels for The Argentine, which are pending authorization, a dredger for Panama for delivery in 1974 and the firm is negotiating the construction of 44 shrimp boats of 20 m. in length for Panama.

Ship repairing constitutes the most important activity. About [illegible]0 units are repaired annually, including small repairs done with the vessels afloat. Initially, repairs for the Colombian Navy constituted the principal work of CONASTIL, but at the present time these repairs are only of the order of 10 per cent of total billing. Among the most important repair work carried out is the total remodelling of 4 tugs of 600 HP for Panama.

They purchase the following nationally produced supplies: electrodes, gases, pumps, screws etc., low pressure valves, electrical switches, batteries, transformers, sanitary apparatus, fitting-out and decorating materials, furniture and wood, paint. They import sheet and forged steel, diesel engines, steel and copper pipes, propellers, anchors and chains, zinc anodes, electric motors , air conditioning plant, life-saving material and high pressure valves. They have not imported any materials from other countries of the Andean Group.

It is estimated that 70 per cent of the value of the materials is represented by imports. Because it is a State enterprise, imports are exempt from customs duties. An "in-bond" system is utilized for orders to foreign countries which makes the import procedures extraordinarily flexible.

(e) - TECHNOLOGICAL LEVEL

The firm counts with a small technical office of its own, although the majority of the designs utilized have been of foreign design. Its engineers have followed study courses in Europe and the United States. The Production Manager is a North American engineer, assigned by an American Shipyard.

They utilize a tracing system of a scale of 1:1.

They normally work under the rules and control of the principal Classification Societies.

They have X-ray apparatus to control welding. For metallographic tests they utilize the laboratory of the University of Cartagena.

They have sign[illegible] to work under lic[illegible] with ELLICOTT DREDGES, of the United States, for the construction of dredgers for the countries of the Andean Group.

(f) - ECONOMIC AND FINANCIAL DATA

The capital is 3[illegible],000,000 pesos (U.S. $[illegible],[illegible]50,000). The ships constructed for private owners have been built with a financing of 80 per cent of the value of the ship over 5 years and 7 per cent interest.

On a number of occasions they have obtained financing for repairs in national currency, over one or two years at [illegible] per cent per month.

Repairs are normally carried out on a cost-plus basis, and the number of private customers who accept this system is increasing.

Overheads represent 150 per cent of the cost of labour plus social security contributions.

Annual billing was 35,000,000 pesos (U.S. $1,4[illegible]0,000) in 1972 and it is calculated that it will reach 40,000,000 pesos (U.S. $ 1,5[illegible],000) in 1973.

(g) - PLANS FOR EXPANSION

COMASTIL has acquired a site of 326,000 m² in the industrial zone of Mamonal on the Bay of Cartagena. It is planned to relocate the present shipyard on the said land in accordance with a plan based on a study of the expansion of the present facilities, carried out by a Japanese firm.

This plan comprises three phases: It is envisaged that the first phase will be carried out in 1974 and the beginning of 1975, for which the preliminary steps are being taken, such as studies, designs, administrative authorisations, selection of equipment, etc.

This first phase includes the installation of a synchroelevator of 3,000 tons elevation and two berthing wharves for ships of up to 120 m. in length.

The synchroelevator permits the simultaneous grounding of two ships of 60 m. in length x 10 m. beam and two of 100 m. x 17 m. respectively, one of the two major positions being an obligatory procedure for the boats that are going to be docked.

During this phase workshops will be constructed, for which advantage will be taken of part of the presently existing machinery. The steel workshops will be served by bridge cranes of 15 and 30 tons.

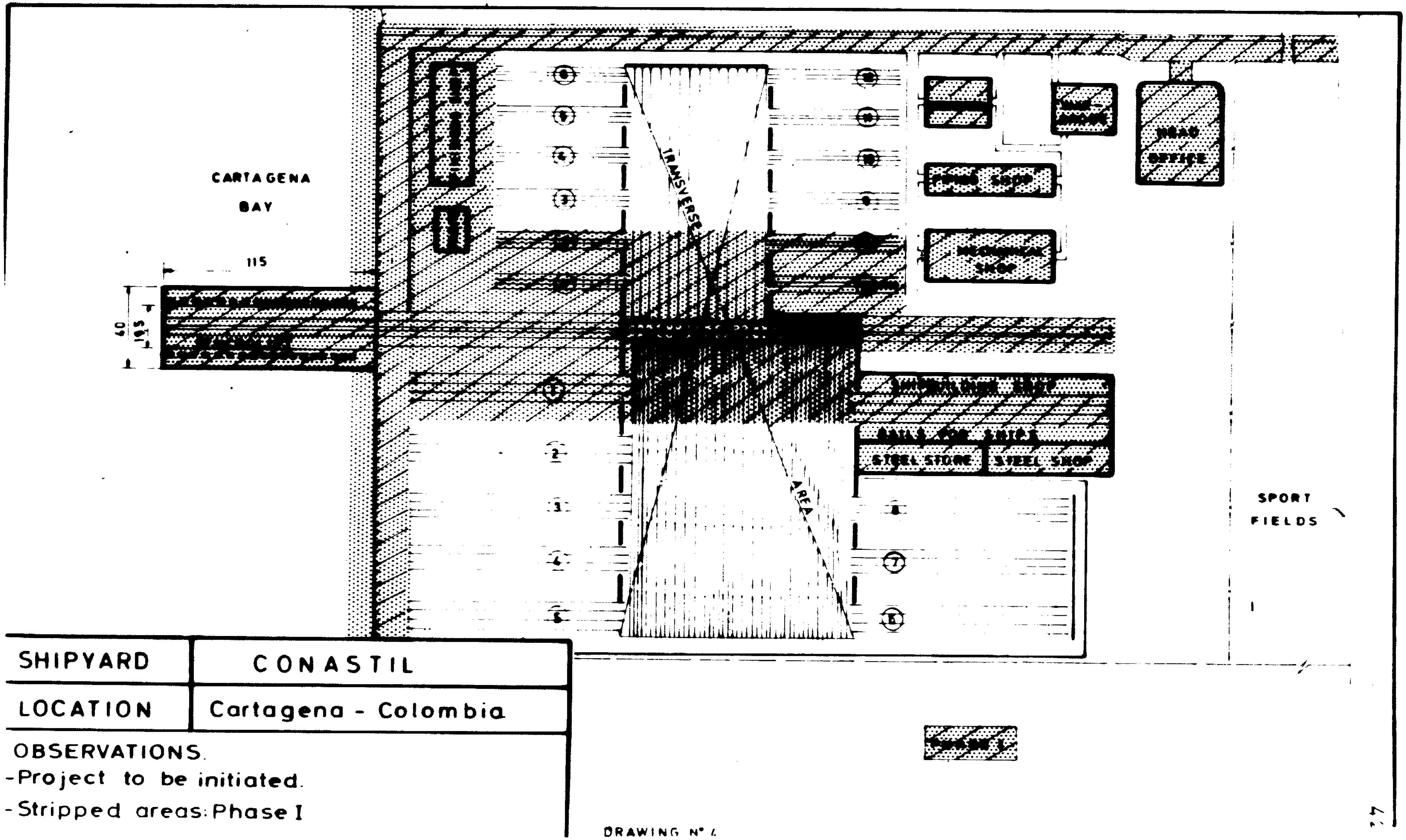
There will be an area of 600 m^2 for storage of steel with a 5-ton bridge crane.

It is envisaged that the workshops will have a capacity for processing 4,000 tons of steel per annum

In the second and third phases it is intended to equip the fitting-out berths with cranes and services and to instal the mooring posts up to a total of 12 posts of 60 x 10 m. and 8 posts of 100 x 17 m.

The execution of these phases is forecast for between 1978 and 1983, but subject to the development and results of the first phase.

Map Nº 4, annexed, shows the layout envisaged for the shipyard.



SHIPYARD	CONASTIL
LOCATION	Cartagena - Colombia

OBSERVATIONS.

-Project to be initiated.

-Stripped areas: Phase I

1.1.6. UNIAL - COLOMBIA

(a) - GENERAL CONSIDERATIONS

UNION INDUSTRIAL Y ASTILLEROS BARRANQUILLA (UNIAL, S.A.) is situated at Barranquilla, Colombia, on the left bank of the River Magdalena, at 15 kilometres from the Atlantic coast, with access to maritime and river traffic.

Address:

Vía 40 Nº 74 - 240
Telephone Nº commutator 44850
Cables: UNIAL
Telex 033321

Founded in 1929. Private capital, linked with important Colombian financial groups in the brewery and aluminium sectors.

Total areaof the factory: 173,800 m^2.

Roofed area: 14,162 m^2.

Its activities are distributed between the mechanical-metal sector (machinery for the brewing industry, boilers, heat interchangers, high and low pressure tanks, etc.) and ship construction and repairing.

(b) - PLANT

The shipyardhas a slipway with 6 trolleys each of 100 tons capacity with a maximum permitted length of 65 m. This slipway is limited by the draught of 2.15 m. in the basin. It is served by [illegible] 10-ton cranes, one of 6 tons and another of 1.5 tons.

The boilershop that carried out maritime and non-maritime work counts with a guillotine cutting machine of 250 tons, oxyacetylene tracer machines that work to a scale of 1:1, crimping presses of 150 tons and 90 tons respectively, a 500-ton hydraulic press, rollers of [illegible],[illegible]00 mm. in length and 12 mm. gage, and of 4,000 mm. in length and [illegible] mm. gage, a flange turner for tank bottoms of 3,050 mm. maximum radius and [illegible] mm. gage and 1,220 mm. maximum radius and [illegible] mm. gage respectively, apart from other minor and auxiliary machines. The two bays are served by two bridge cranes of 10 tons and 2 of 7.50 tons.

There is no zone especially prepared for prefabricating [illegible] units for ships. Submerged automatic arc welding equipment is available with positioners for pieces and movement of the welding head in horizontal and vertical directions. Semi-automatic welding equipment is also available.

There is no fitting-out dock, but ships can come alongside at the mouth of the basin where they are carried on rafts without the use of cranes.

The machine shop carries out the metal-mechanical and ship repairing work. It counts with a lathe of 8 m. between points, a vertical lathe of 5.[illegible]0 m. plate, a boring machine with a 75 m. spindle, [illegible] minor and auxiliary machines and it is served by a [illegible]0-ton bridge crane and another of 7.5 tons.

There is an electrical workshop and a carpenters' shop.

There is no forge or foundry shop, although the creation of a foundry for casting iron, steel and bronze is being considered, in conjunction with other metal-mechanical firms in the zone.

Supplies of oxygen and acetylene are obtained from a factory situated in the area. There is a compressed air facility and a fire-prevention system.

Access for materials is normally by road, although occasionally certain equipment can be unloaded directly from a ship or barge in the firm's own basin.

(c) - PERSONNEL

The total personnel is approximately 400, and is composed by 130 boilermakers, sheetmetal workers and platers, [illegible]0 welders, [illegible]0 machine-tool operators and 30 electricians and other tradesmen.

There are about 50 administrative office employees, and technical and auxiliary employees. There are 6 engineers.

In accordance with the necessities of the workload, painting, boilermaking, insulation and carpentry work is sub-contracted. The average number of personnel sub-contracted is about 60 men.

The average wage level is 64 pesos per day (U.S. $2.65) and social security charges represent 70 per cent of that amount.

There is no school for apprentices, but the firm permanently maintains 20 pupils at the school run by SENA at Barranquilla.

A system of tasks incentives is applied in some areas of work, principally welding, which amounts to 30 to 40 per cent of the wages in these cases.

There is a work safety and hygiene committee.

(d) - PRODUCTION

Apart from a series of barges constructed in previous years for river transport, the principal units of shipping constructed in recent years are the following:

- 25 shrimp boats of 22 m. and 3 of 20 m. length, constructed to a Spanish design, and 2 shrimp boats of 16 m. constructed to the firm's own design.

At the present time a "long-liner" of 82' in length is being constructed for Venezuela and a catamaran for 221 passengers for Martinique.

The order book comprises 6 shrimp boats of 21 m. length for Trinidad and a self-propelled barge for Panama.

A large part of the activities is devoted to the repair of river boats that operate on the River Magdalena and a certain number of repairs to small maritime units are carried out.

The processing capacity of the steel shop is estimated at about 40 tons per month per shift for metal-mechanical work, plus about 300 tons per month per shift for maritime work, whenever there is a certain continuity of work.

The present level of occupation is high, calculating that the present contracts in the metal-mechanical and maritime sector amount to about 350,000 man hours.

For ship construction the firm uses national products amounting to approximately 25 per cent of the value of the materials used for the vessel.

Supplies of plate for ships is normally obtained from Japan, although in the present circumstances of scarcity they have turned to other markets, European or American.

The iron and steel works of Paz del Río supplies non-maritime plate of up to 3 mm. gage, and is planning a new rolling plant which will produce gages of up to 25 mm.

Propulsion motors, electro-generating units, pumps, servomotors, deck machinery and piping normally come from the United States, and it is estimated that 40 per cent of the value of the materials for a ship is of North American origin, generally because of the brand requirements of the shipowners.

They utilize electric cable of Venezuelan manufacture for installations where it has to be exposed to the weather, and are considering for the future the importation of ship plate from Venezuela. From the domestic market they obtain supplies of electrodes, marine paint, bolts and nuts and fitting-out and decorating elements.

(e) - TECHNOLOGICAL LEVEL

The firm counts with a technical office comprising an engineer, two technicians for budgeting and programming, 3 draughtsmen and one tracer. The tracing system is to a scale of 1:1.

There is a quality control department that tests tolerances and qualities. Both for the construction of new ships and for ship repairing, they work under the inspection of the following Classification Societies: Lloyd's Register, The American Bureau of Shipping, etc.

X-ray apparatus for welding control is available as well as ultrasonic equipment.

For destructive testing they have recourse to the laboratory of the University of Barranquilla or to the National University of Colombia at Bogotá.

For the manufacture of machinery for the brewery industry, they utilize various licences and their own designs.

(f) - ECONOMIC AND FINANCIAL DATA

Capital plus reserves amounts to 36,000,000 Col. pesos (U.S. $1,500,000).

For purposes of exporting, they utilize the official financing of PROEXPO which grants 80 per cent of the value over 5 years at 7 per cent. In some cases the financing may be extended to 7 years.

There is an incentive for exporting which amounts to 15 per cent of the value of the vessel. In order to have access to this bonus it is necessary that 40 per cent of the value as a minimum should be contributed by Colombian sources.

If the value of the national contribution exceeds 51 per cent of the F.O.B. value, there is an exemption from Customs Duties for the imported materials.

The firm has utilized financing from the World Bank for the acquisition of production machinery to the value of U.S. $800,000.

The ships at present under construction were contracted by means of open competitive bidding.

They have constructed small units for the Colombian Navy in accordance with officially awarded contracts.

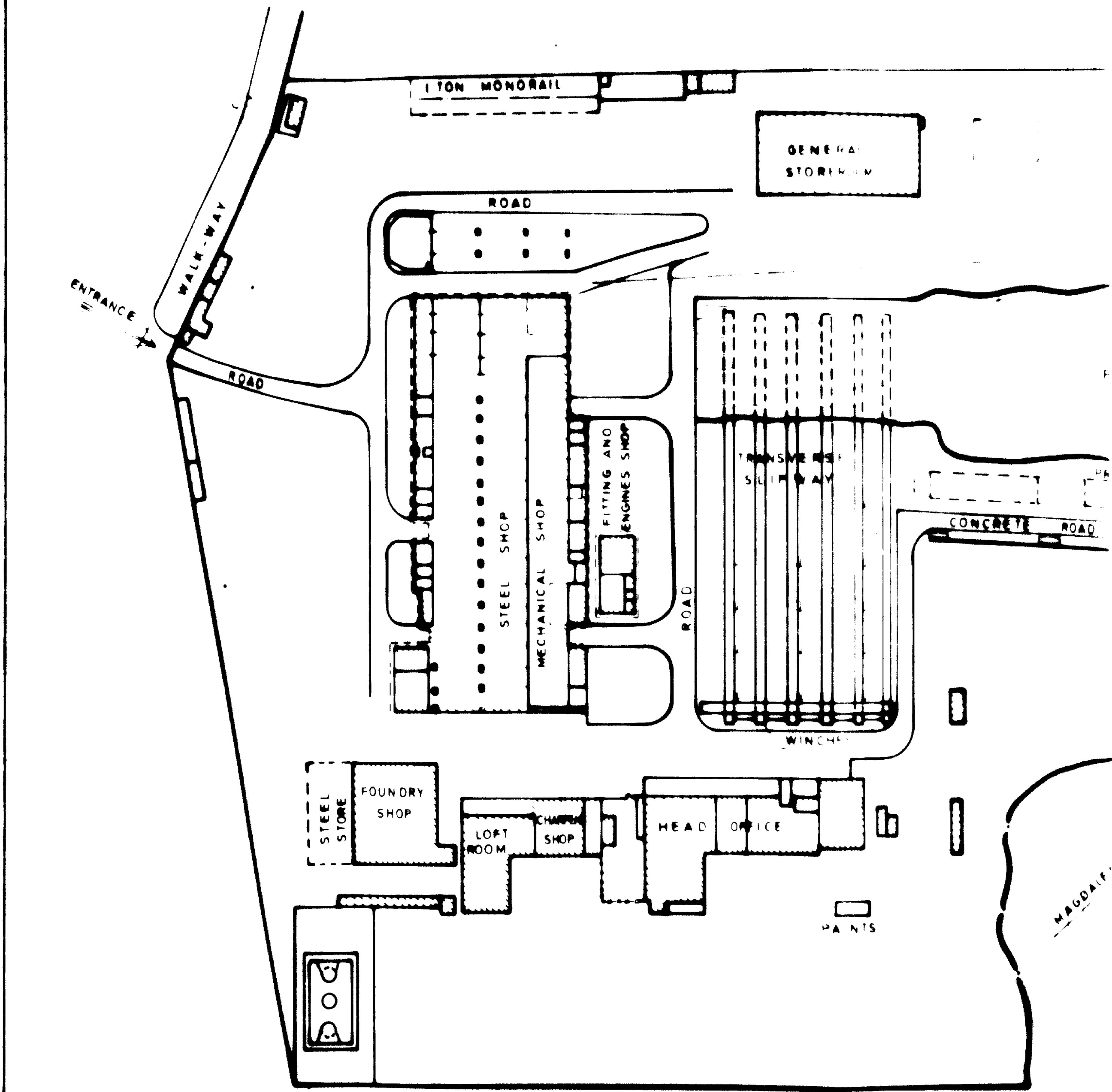
Repair work is normally carried out on a cost-plus basis.

Annual billing is of the order of 54,000,000 Col. pesos (U.S. $2,250,000).

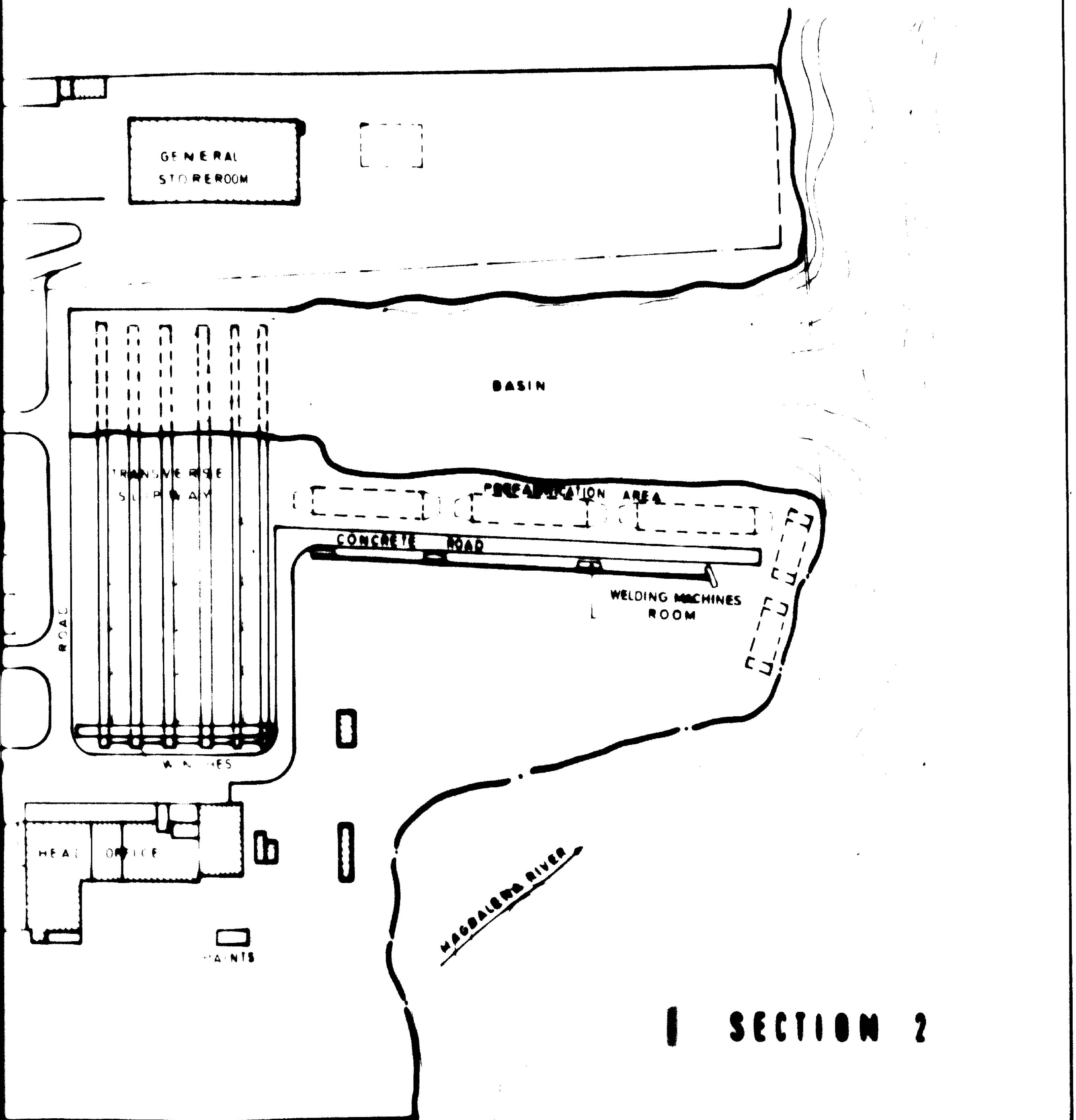
(g) - PLANS FOR EXPANSION

On a short-term basis the extension of the metal-mechanical plant is envisaged, as well as the construction of a new building for pre-processing of steel and prefabrication for shipbuilding. There is no plan to extend the launching and slipway facilities, neither is the construction foreseen of boats larger than those they construct at present.

Map Nº 5, annexed, shows the layout of the shipyard.


1 TON MONORAIL
GENERAL STOREROOM
ROAD
WALK-WAY
ENTRANCE
ROAD
STEEL SHOP
MECHANICAL SHOP
FITTING AND ENGINES SHOP
ROAD
SLIPWAY
CONCRETE ROAD
STEEL STORE
FOUNDRY SHOP
LOFT ROOM
SHOP
HEAD OFFICE
PAINTS

SECTION 1



SECTION 2

SHIPYARD	UNIAL S.A
LOCATION	Barranquilla - Colombia

OBSERVATIONS

- Present lay out without future expansion

1.1.7. INSTITUTO AUTONOMO DE DIQUES Y ASTILLEROS NACIONALES - VENEZUELA

(a) - GENERAL CONSIDERATIONS

This is a State enterprise subordinate to the Ministry of Defence. It was founded in 1905.

Address:

Valle de Santa Lucía, Pto. Cabello
Telephone Nº 3414 - 3211
Telex 42461
Telegraphic address: DIASTINAL

(b) - PLANT

At the present time there is a dry dock utilized for ship repairing it is 220.5 m. in length, 32 m. beam and 9.20 m. draught over blocks, with a capacity to dry dock ships of about 45,000 D.W.T.

At a distance of 8 kilometres from the dry dock there are slipways for ships of 1,500 and 500 D.W.T. respectively.

A synchroelevator of 5,000 tons elevation with a capacity for grounding ships of 125 metres in length is under construction.

The equipment has been ordered from the supplier and it is expected that it will enter into service at the end of 1974.

In November 1973 a general workshop was inaugurated, it is 330 m. long by 50 m. wide, with 6 interchangeable bridge cranes with capacities for 5, 10 and 30 tons.

This workshop replaces the old boilershops and machine shops which were situated 8 kilometres from the dock and presented difficulties as a consequence of the distance.

The workshop is equipped with oxyacetylene cutting machines for straight cutting, an oxyacetylene copying machine with a scale of 1:1 fitted to utilize numerical control in the future, an oxyacetylene pantograph, scale 1:1, a turning roller of 9.5 m. in length for plates of up to 10 mm. gage, a swansneck press of 750 tons, a bending press, a profile bender and other auxiliary machinery.

For the prefabrication zone, at present being equipped, two gantry cranes with a capacity of 60 tons, at 18 metres; 40 tons at 27 metres add 20 tons at 42 metres are envisaged. It is expected that they will be delivered in 1974.

The entrance channel to the basin has a draught of 12.20 m.

The machine shop has a lathe of 17 m. in length, a three-head boring machine with a 200 mm. rod, balancers, and a series of conventional machinery transferred from the old workshop.

There is an electrical shop, but at the moment the factory has no pipework shop, carpenters' shop or foundry and forging shops.

The workshop is supplied by oxygen, propane and compressed air systems that permit connection of these services in any part of the workshop.

Installed electric power is 7,500 KVA complemented by 440 V diesel units.

A 900 hP tug is available for manoeuvring in the basin.

(c) - PERSONNEL

The shipyard staff consists of about 1,000 men. There are 7 engineers in the technical office and workshops, and three engineers in the Management section.

The wage level is 28 Bolivars per day (U.S. $6.15) and social security charges are of the order of 75 per cent of the wage.

The firm does not have its own school for apprentices, but there is a school for apprentices run by the I.N.C.E. at Puerto Cabello, which is very near the Shipyard, and supplies qualified personnel for the factory.

(d) - PRODUCTION

No ships have been built at this factory, and at the present time they are constructing the first of a series of 11 patrol launches for the Naval Forces, using Italian designs to which a further 10 will be added; the hulls and equipment will be sent from Italy to be assembled in Venezuela.

There is also an order for three tugs.

In view of the fact that this shipyard is at present in the phase of initiation, its productivity cannot be estimated at the present time, since they are engaged in training personnel and putting the facilities into operation.

At the present time the shipyard devotes the greater part of its activities to the repairing of Naval vessels, as well as some merchant ships.

However, the degree of utilisation of the docks is of the order of 50 per cent.

(e) - TECHNOLOGICAL LEVEL

The technical departments of the Shipyard are principally devoted at the present time to completing and developing the plant.

They count with a small technical office which attends to repairs, there being no technical office which can undertake designs for new ships.

Systems of quality control and organisation of production are in the study stage in view of the fact that the shipyard is initiating its first activities.

(f - ECONOMIC AND FINANCIAL DATA

Total investment in the Shipyard, including the present facilities is calculated to be 140 million Bolivars (U.S. $30,500,000).

There is no experience whatsoever with respect to estimates for new shipbuilding, although there are rates for certain repairs.

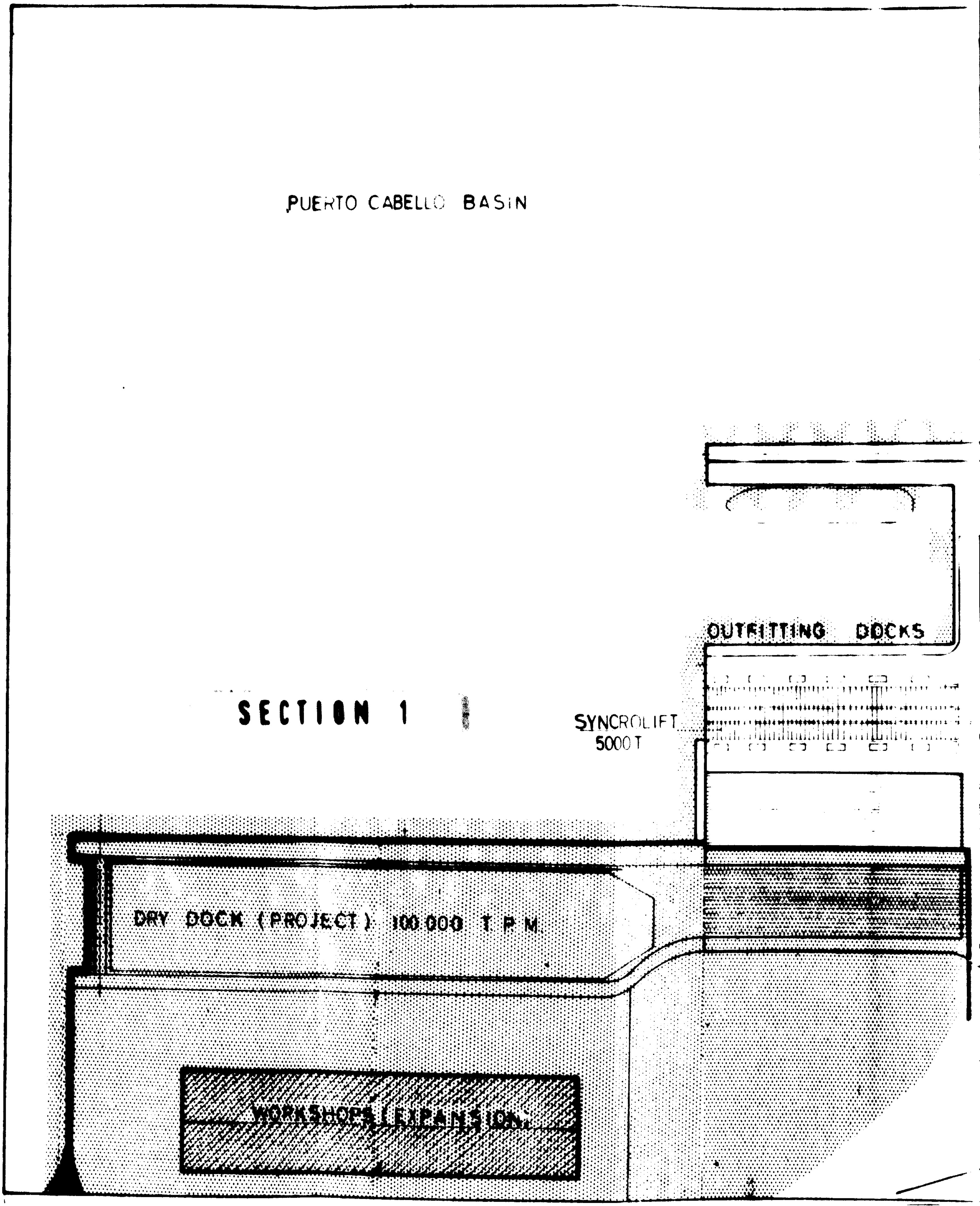
No studies exist on prices of materials, etc.

(g) - PLANS FOR EXPANSION

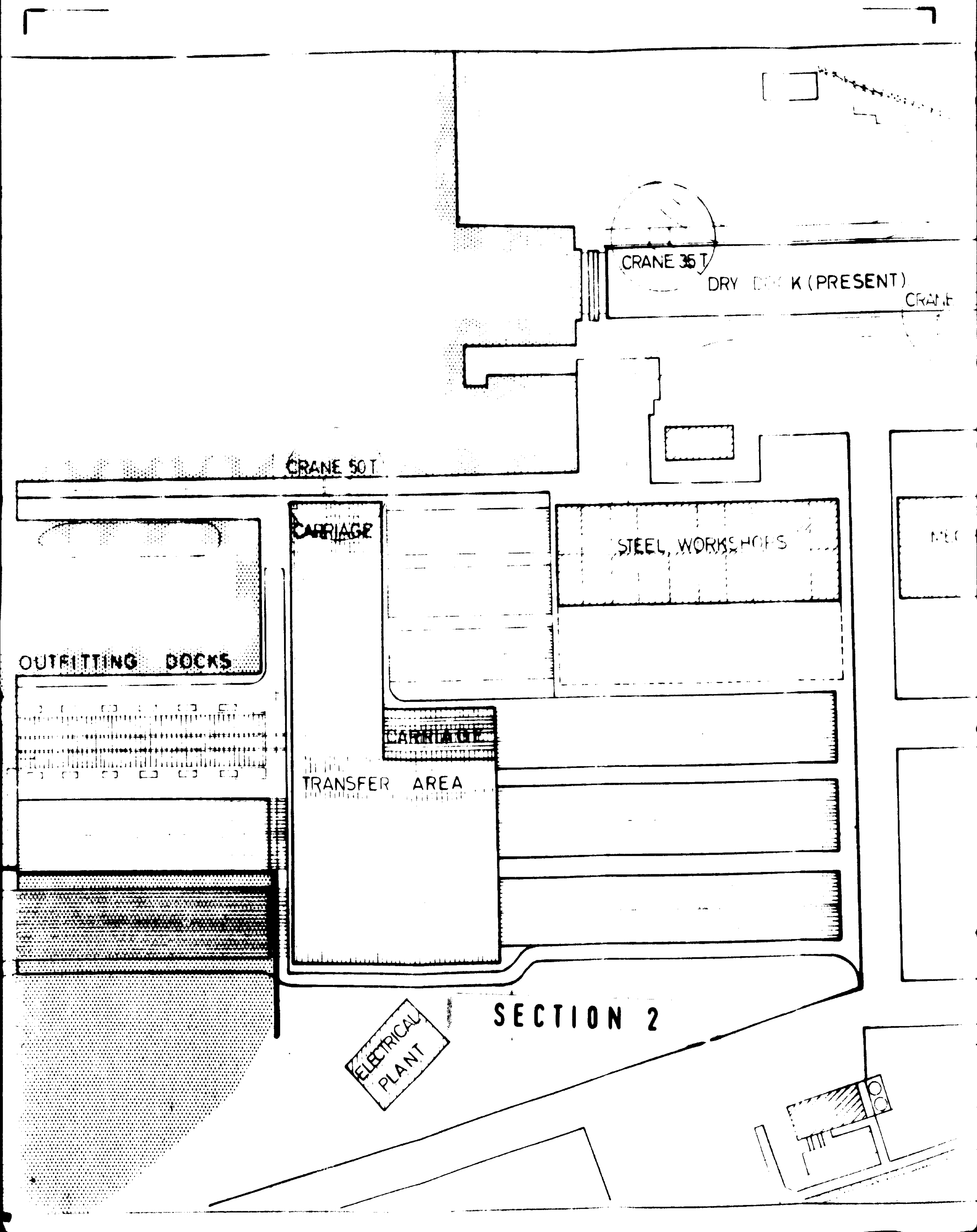
Once the present phase is terminated, which includes the completion of the workshop, the synchroelevator and the prefabrication zones with their corresponding cranes and related services, there are plans for the construction, in a new phase, of a dock for 100,000 D.W.T., and in an advanced stage the exclusive employment of the present shipyard with its two docks for repairs and the construction of a new shipyard on the land at the other side of the basin.

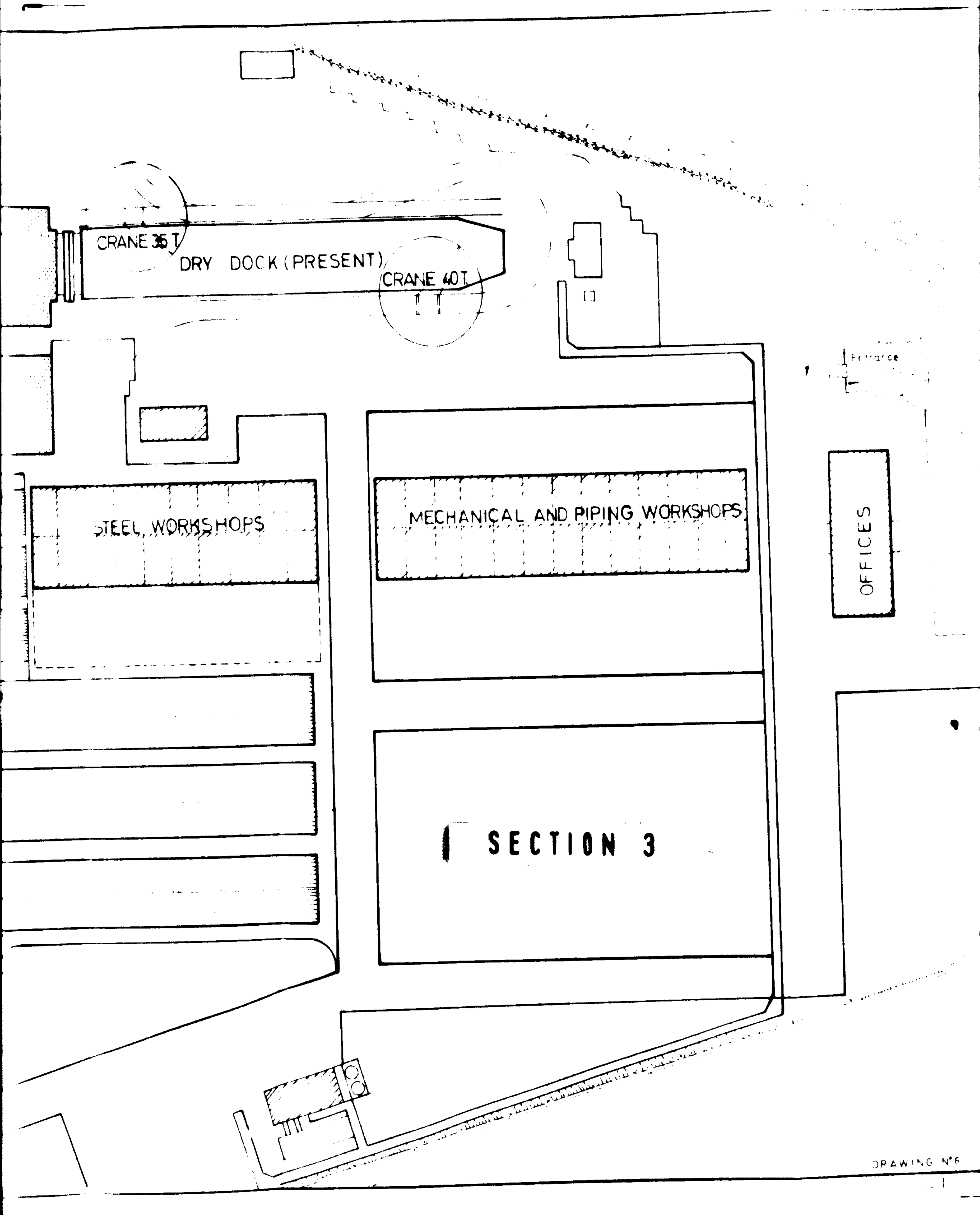
Neither of the two projects has been assigned a date for execution.

Map Nº 6, annexed, shows the layout of the shipyard with the extensions envisaged.

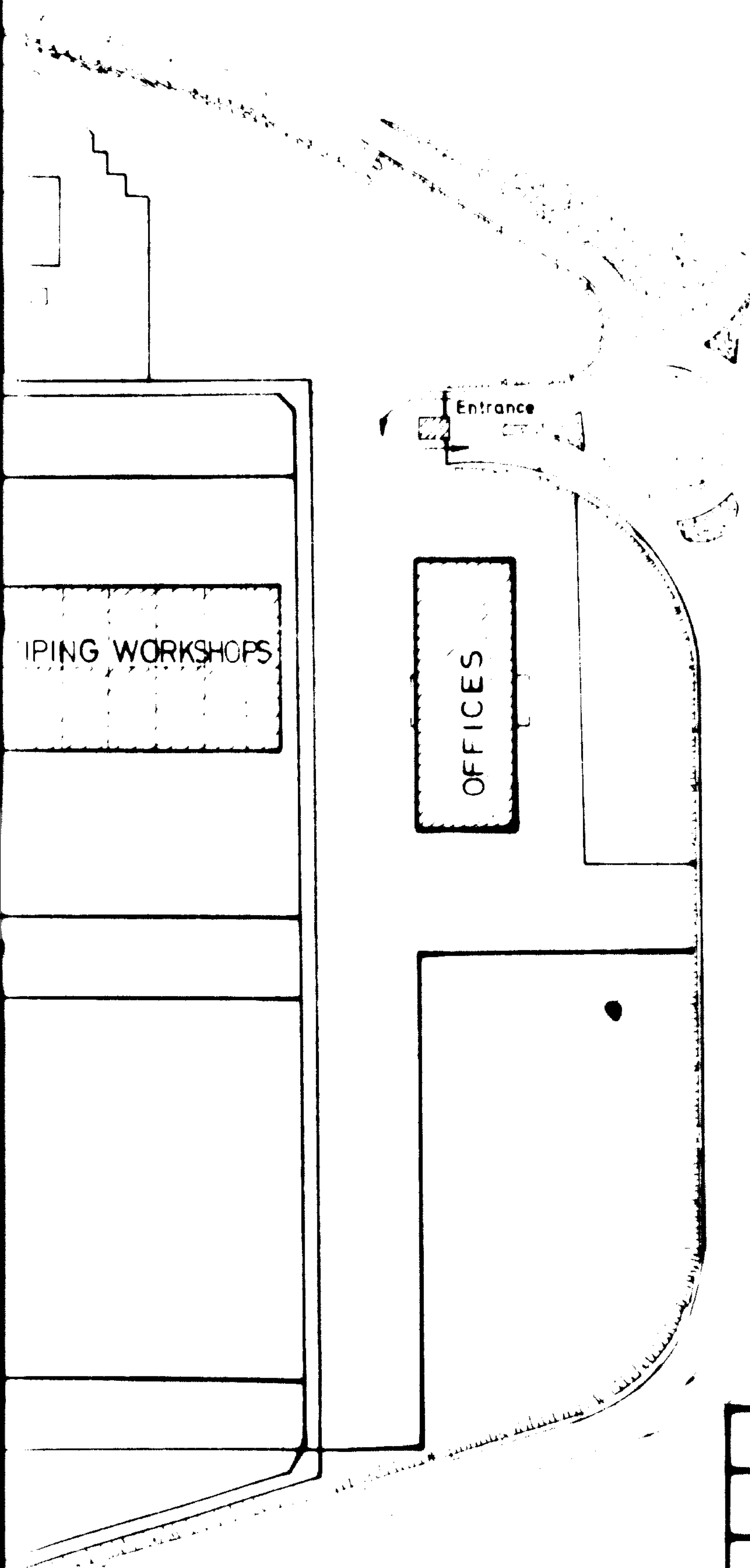


PUERTO CABELLO BASIN
OUTFITTING DOCKS
SECTION 1
SYNCROLIFT
5000 T
DRY DOCK (PROJECT) 100.000 T.P.M.
WORKSHOPS EXPANSION


CRANE 35 T
DRY K (PRESENT)
CRANE 50 T
CARRIAGE
STEEL, WORKSHOPS
OUTFITTING DOCKS
CARRIAGE
TRANSFER AREA
SECTION 2
ELECTRICAL PLANT


CRANE 35 T
DRY DOCK (PRESENT)
CRANE 40 T
Entrance
STEEL WORKSHOPS
MECHANICAL AND PIPING WORKSHOPS
OFFICES
SECTION 3

DRAWING N°6



SECTION 4

SHIPYARD	I A DIQUES Y ASTILLEROS NACIONALES
LOCATION	Puerto Cabello - Venezuela

OBSERVATIONS

- Existing areas in 1973
- Expansion areas (New drydock and workshops) (shaded)

DRAWING N°6

1.1.8 GUAYAQUIL NAVAL ARSENAL . ECUADOR

(a) - GENERAL CONSIDERATIONS

This Naval Dockyard was founded in [illegible]. The address is:

Arsenal Naval
P.O. Box 71075 - Guayaquil - Ecuador
Telephone Nº 3 - 42361

It is a one hundred per cent state-owned enterprise, constituted as a private law entity.

The Directorate is composed of Naval Officers and the Commander of the Dockyard and the Production Directors are also Naval Officers.

The Dockyard occupies a total area of 11,000 m [illegible] which approximately one-third comprises roofed workshops and buildings. They have at present acquired two additonal contiguous plots with an area of 10,600 m^2.

(b) - PLANT

There are three slipways, the first capable of grounding ships of about 1,000 D.W.T. The other two, which are in very poor condition, have capacities of 150 D.W.T. and 100 D.W.T. respectively.

There is a floating dock of the ARD type which [illegible] from the United States Navy. It has a lifting force of 4,000 tons, and is situated at about 8 kilometres from the workshop, moored to a pier belonging to the Navy.

The dock is served by two mobile 15-ton cranes, and there are workshops on the dock itself.

The boilershop, of about 600 m^2 in area, has a roller for bending sheets of 12 mm. gage, a shears for cutting 9 mm. sheet and a bending machine also for 9 mm. sheet, in addition to other auxiliary machinery.

It has a small storage zone for sheet and profiles without special means of movement and it does not have blasting or painting facilities.

There is no space available for prefabrication, and there are means for only manual welding.

The Dockyard counts with a fitting-out wharf of about 100 metres on the recently acquired plot, in addition to a mooring berth capable of handling ships of about 100 metres in length, which has difficulties of access, although both zones have a draught sufficient in proportion to the dimensions of the ships than can be moored.

There are no cranes available on the fitting-out wharf and it would be necessary to carry out extensive civil engineering works in order to provide the corresponding travelling path for the cranes.

The machine shop has a lathe capable of machining propeller shafts, a vertical lathe and various smaller and auxiliary machinery.

Pipework is carried out in a small tube-bending device in the boilershop.

There is a small electrical shop capable of undertaking minor repairs to electric motors.

A small, poorly-equipped electrical-mechanical workshop is available. The carpenters' shop and pattern shop manufacture furniture and small models.

There is an iron foundry shop next to the floating dock and another small foundry shop for metals with a capacity for casting pieces of 20 Kg. maximum weight.

There is only a hammer and a small forge available for forging work.

The general warehouse has an area of 150 m^2 and has no special facilities for handling.

Installed power is 60,000 KVA.

There is no oxygen and acetylene plant, which are acquired commercially.

There is a water supply system and a compressed air system.

There is a direct current unit for supplying the ships undergoing repair.

The supply of materials is effected by truck, and, exceptionally, by ship.

Plan No. 7, annexed, shows thepresent layout of the Shipyard Plant and the expansion zones.

(c) - PERSONNEL

The shipyard counts with a staff of about 200 men, of which 80 per cent are civilians and 20 per cent are naval personnel.

There are 10 engineers (4 civilians and 6 naval).

There are no qualified technicians of an intermediate grade, although there are four students from the Polytechnic carrying out these functions. There is a school for apprentices from which 30 qualified workers are graduated each year and training courses are given with the cooperation of SECAP.

Sub-contracts are utilised for blasting sheets, painting, calking and certain boiler and welding work.

The wage level is 80.- sucres per day. (U.S. $ 3,14).

Social security charges amount to 40 per cent of the salary.

A rudimentary system of incentives is utilized, under which time is estimated by foremen.

There is a work safety and hygiene service.

(d) - PRODUCTION

The ships constructed to date have been few and of small size, such as oceanographic launches and patrol boats, yachts, tenders, glass fibre and ferrocement boats and a 200-ton fishing vessel.

There are no new constructions at the present moment, although it is intended to contribute to the Plan Pesquero (Fishing Boat Plan), by constructing vessels of 180 tons on one of the newly acquired sites.

The Shipyard devotes most of its activities to the repair of ships, repairing about 20 merchant vessels per annum of between 1,000 and 1,400 tons, in addition to warships.

There are no time and cost control systems.

Electrodes , oxygen and acetylene are supplied by AGA in Guayaquil.

In addition, the national market can supply small pieces of cast iron and bronze, wood, marine paint and electrical cables without shielding and without certificates from Classification Societies.

They do not use any materials coming from other countries in the Andean sub-region.

The remainder of the materials and equipment is bought principally in Japan, the United States and Europe.

(e) - TECHNOLOGICAL LEVEL

The Technical Office is directed by an engineer and counts with eight draughtsmen, some of whom are students at the Polytechnic.

The Dockyard has no experience in ship design.

Tracing is carried out in a workshop with templates to a scale of 1:1.

Repairs are carried out under supervision of the principal Classification Socieites.

The Dockyard counts with a laboratory of 150 m^2 in area, with machines for traction tests, checking hardness, etc., a chemical laboratory and machinery for checking injectors and calibrators.

This laboratory also carries out work for outside clients.

There is no equipment for radiographic control, but there is Magnaflux equipment.

Organisation, programmation and control services are practically non-existent.

Purchases are made through the Directorate of Materials of the Navy.

The Dockyard does not have any contracts for licences or for technical aid.

(f) - ECONOMIC AND FINANCIAL DATA

The capital is 100.000.000 sucres [illegible])

The type of work carried out to date has not required the utilisation of state or private credit facilities, since both repair work and the small constructions have been paid for in cash.

The construction of fishing units for the plan pesquero has not provided for any system of financing up to the present time.

The coefficient of overheads is 40 per cent of the wages.

The accounting systems are conventional.

The annual billing is estimated at about [illegible]5,000,000 sucres.

(g) - PLANS FOR EXPANSION

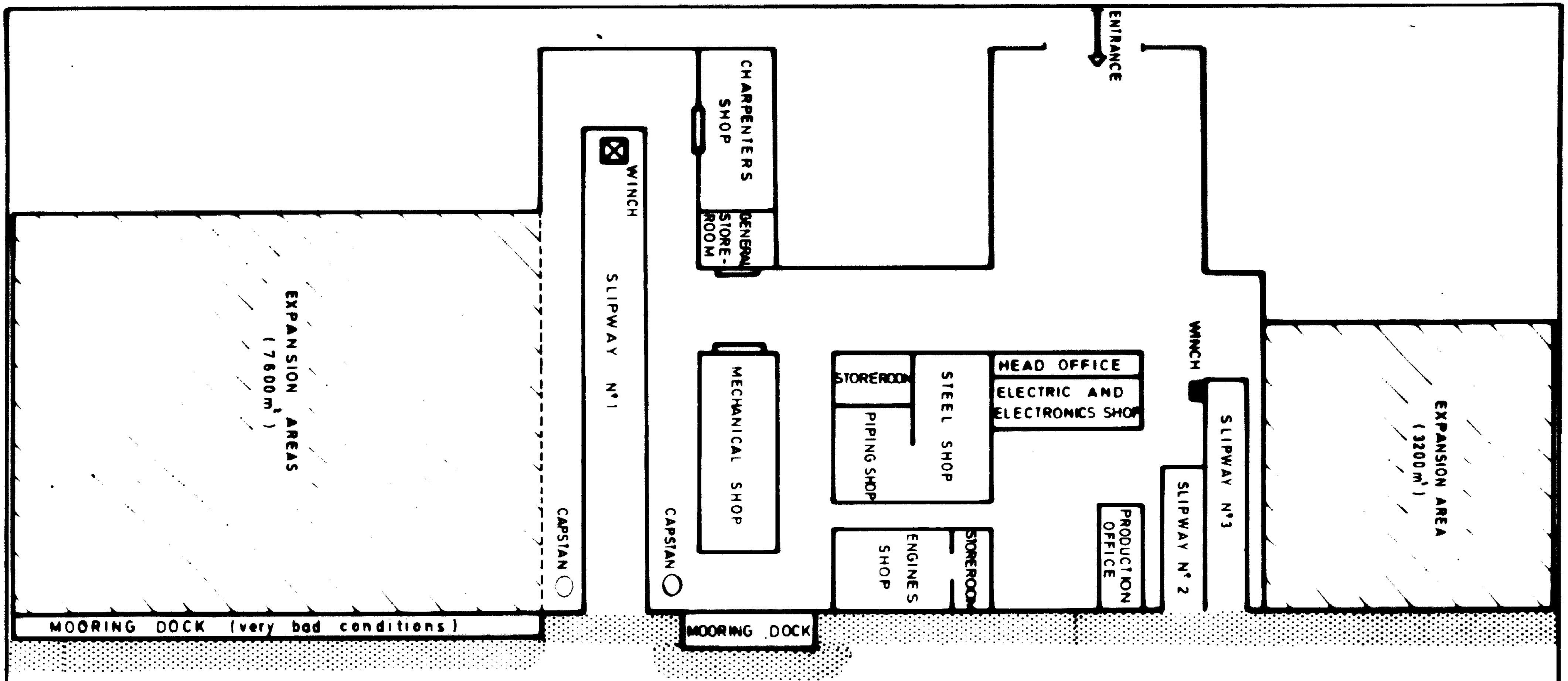
On the recently acquired land next to Slipway No. 1, the construction of small vessels, principally fishing boats, is envisaged, utilizing the slipway for launching them.

The zone where the shipyard is at present situated has a draught of 3 m. at low tide. The bottom is muddy and can be dredged, although this service is very much neglected.

It appears that there will be no difficulties in the supply of electric power. Access by land is easy, although it is necessary to cross the military zone of the Dockyard.

There is a project for the construction of a new shipyard, the feasibility study for which was carried out in December 197[illegible]. Seven qualified technical firms have responded to a call for bids which will be closed in September 1973. The study of these offers has not yet been finished.

The initial idea is to construct vessels of 15,000 D.W.T. but it is not known precisely the guidelines that will be followed in the definition of the shipyard and the date for the initiation of the work. A possible site is a plot of land owned by the Navy on the Island of Esperansa, although at present there are no bridges or possibilities of access by land.



SHIPYARD	ASTINAVE
LOCATION	Arsenal de Guayaquil-Ecuador.

OBSERVATIONS.

- Areas existing in 1.973
- Stripped areas Expansion.

DRAWING N°7

1.1.9. ASTILLEROS DE LAS HABAS, S.A. - CHILE

(a) - GENERAL CONSIDERATIONS

Astilleros de las Habas, S.A. is a firm controlled by the State through CORFO, which holds the majority of the capital.

The address of the shipyards is as follows:

Avenida Altamirano, 1015, VALPARAISO
Post Office Box No. 53[illegible]
Telephone No. 59421
Telex 30305
Telegraphic address : HABAS

(b) - PLANT

The factory is situated on the Bay of Valparaiso next to the road that borders the sea outside the port. The road passes between the workshops and the sea

Opposite the workshop there is a mooring wharf which is in a poor state of maintenance and cannot be used when the sea is rough.

There is a floating dock of 4,500 tons lifting power, very old and poorly situated with respect to communication with the workshop. There is also a construction slipway near to the shipyard, where fishing vessels were built some years ago, and which is at present abandoned.

Workshops. The factory has a good machine workshop for ship repair and other non-maritime works. There are also boiler shops, casting shops, forging shops, pipe-work shops, engine shops, etc. with good machinery and gantry cranes of up to 15 tons.

Within the shipyard itself there is an important workshop devoted to spare parts for the automobile industry. The distribution of the workshops is somewhat disordered.

(c) - PERSONNEL

The shipyard has a staff of about 450 people in all, of whom about 15 work in the Technical Office under the direction of an engineer.

(d) - PRODUCTION

Apart from the limited amount of fishing boat construction mentioned above, and now abandoned, the present activities centre on the repairing of ships of up to 10,000 D.W.T. and the manufacture of non-maritime equipment, principally for the automobile industry.

(e) - TECHNOLOGICAL LEVEL

The quality of the ship repairs appear to be good within the range of work normally undertaken by the shipyard.

(f) - ECONOMIC AND FINANCIAL DATA

The capital of Astilleros de Las Habas, S.A. is held by CORFO, so that the firm is State owned.

This shipyard, with the firm Marine Construction of Seattle, U.S.A., participates in the MARCO shipyard at IQUIQUE.

(g) - PLANS FOR EXPANSION

The factory has sufficient space for expansion. It has a plan to divert the road that runs between the workshops and the sea.

Likewise there are immediate plans to purchase a floating dock of approximately 10,000 tons lifting capacity.

1.1.10. ASMAR - CHILE

(a) GENERAL CONSIDERATIONS

ASTILLEROS Y MAESTRANZA DE LA ARMADA (ASMAR) is a State enterprise created in 1960.

The address of the central offices is:

c/. Varas, 343
VALAPRAISO
P.O. Box No. 150-V
Telephone No. 59-411 - Valparaiso

It has factories in Valparaiso, Talcahuano and Punta Arenas, the most important being that at Talcahuano. Data concerning the latter factory are given below:

(b) - PLANT

The factory at Talcahuano is situated in the Naval Base of the same name, with access by road, railway and sea.

There are two dry docks and two floating docks which have the following characteristics:

Dry dock Nº 1. For a length of 190,55 m., an effective beam of 15.30 m. and for a length of 168 m. and an effective beam of 2[illegible] m., with an average draught up to the line of blocks of 7.9[illegible] m. It can receive vessels of up to approximately 12,000 D.W.T.

Dry dock Nº 2. 245.74 m. in length x 41.12 m. beam, with an average draught up to the line of blocks of 11 m. It has a capacity for ships of up to approximately 60,000 D.W.T.

Floating dock Nº 1. Length 66.12 m. x 9.75 m. effective beam. Lifting power 1,000 tons.

<u>Floating dock Nº 2.</u> 130.76 m. in length x 18.59 m. effective beam. Lifting power 3,500 tons.

Dry dock Nº 1 counts with cranes of 15 and 4 tons, and dry dock Nº 2 with cranes of 30, 25, 15 and 10 tons.

Floating dock Nº 2 is equipped with cranes of 10 tons.

On the quays there are mobile cranes of various powers up to 22 tons.

The steel workshop counts with machinery suitable for a repair shipyard, although it is, in general, antiquated.

The tracing system is conventional, and is carried out in the template bay to a scale of 1:1.

A prefabrication zone, where units of up to 120 tons can be constructed is utilized for shipbuilding. These units are assembled in the dry dock after being transported by a floating crane.

There is a machine shop with modern machinery appropriate for a repair shipyard.

There are also workshops for fitting and mechanics, for internal combustion engines, and shops for pipe fitting, galvanizing, electricity, electronics and carpentry.

The shipyard counts with a forging shop with a 500-ton press and various lift hammers.

The foundry shop is equipped with oil and electric furnaces for casting iron and bronze pieces of up to 2,000 Kg. There is a centrifuger for non-ferrous metals, plants for preparing sand, moulding machines and a well-equipped pattern shop.

In addition there are artillery shops, torpedo shops, optical shops, etc., and a series of auxiliary workshops and services such as maintenance, tools, etc.

Installed electrical power is 6.000 kva.

Map No. 8, annexed, shows the present layout of the plant of the shipyard at Talcahuano.

(c) - PERSONNEL

The Directorate, or supervisory Board is composed, for the greater part, by Naval Officers. The Director General, with headquarters in Valparaiso, is an Admiral, and the Factory Managers are also Naval Officers.

The staff of the Talcahuano factory consists of 4,100 persons, of whom 40 are engineers, some of them civilians and others Naval Officers.

There is a school for apprentices and a partial system of incentives by estimation of time is applied.

(d) - PRODUCTION

The principal activity of ASMAR, is the repair of Naval vessels, which occupies more than 50 per cent of the personnel. Next in importance is the repair of merchant ships which is carried out principally in dry dock Nº 2.

A certain amount of shipbuilding has been carried out, among which are represented fishing boats of less than 200 gross registered tonnage and small units for the Navy such as ferry-boats, barges, and a submarine-chaser that was constructed with a North American design and with materials from the U.S.A. They also carry out various non-marine works such as the construction of large tanks and equipment for heavy industry and mining, as well as the repair of heavy machinery.

The foundry shop also works for non-maritime customers. Part of the materials used are obtained on the national market, the principal supplier of steel being the Compañía de Aceros del Pacífico, which supplies plate and profiles for construction work. Special equipment for ships is imported and the Navy supplies its own equipment which is installed at the Shipyard. They do not buy materials and equipment from other countries in the sub-region.

The level of materials in store is lower than is customary in a repair shipyard. This causes delays in the work and incides on the productivity of the repair work.

(e) - TECHNOLOGICAL LEVEL

The quality of ship repairing is good although the rate of work is markedly slow, as is usual in shipyards principally engaged in the repair of warships.

There is a quality control system, both with regard to the steel structure and in the checking of services and machinery for the vessels. The shipyard works with the principal Classification Societies.

There is a well-equipped laboratory available that has radiographic welding control and ultrasonic control facilities. There is also a well equipped metallographic laboratory and a chemical laboratory.

ASMAR has a contract with BURMEISTER & WAIN for the construction of a number of ranges of marine engines, but which up to the present time has not been put into effect.

The technical office counts with a Marine Engineering department that is sub-divided into the following sections: ship repairing, industrial and ship construction and a Civil Engineering department that is sub-divided into two sections: planning and design and construction and maintenance.

The services of the shipyard are well maintained in spite of the budgetary stringency within which they operate.

(f) - ECONOMIC AND FINANCIAL DATA

The firm's capital is 58 million escudos, all of which is held by the State.

The shipyard's finances are supported from the Navy budget, which even pays the wages of the employees serving in the shipyard. Each year the State sets aside an amount for the shipyard and its whole economic and financial system operates within the legal and juridical framework of a governmental department.

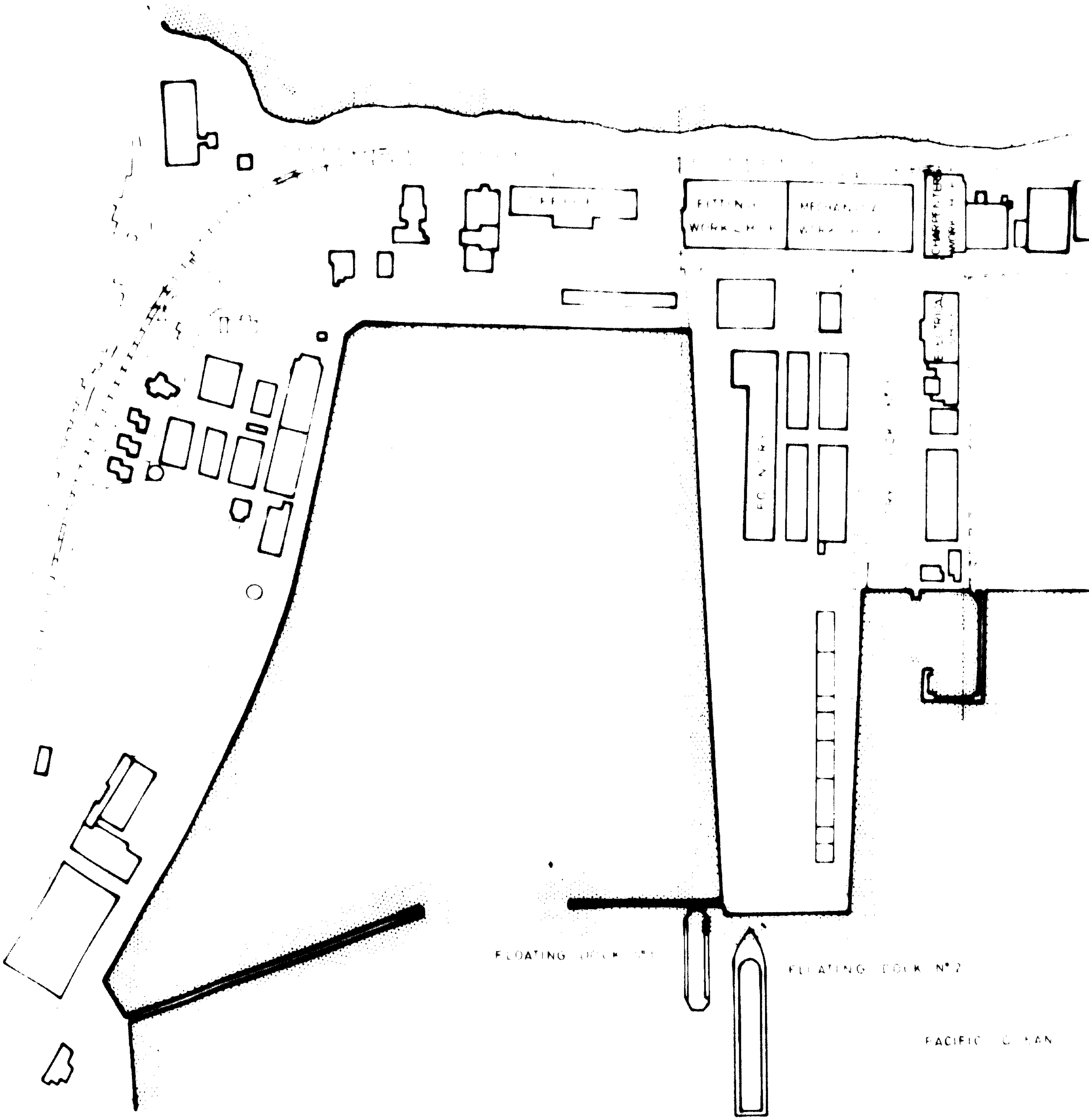
Another source of income is the billing of private customers. With the Navy, the shipyard works on a cost-plus basis.

(g) - PLANS FOR EXPANSION

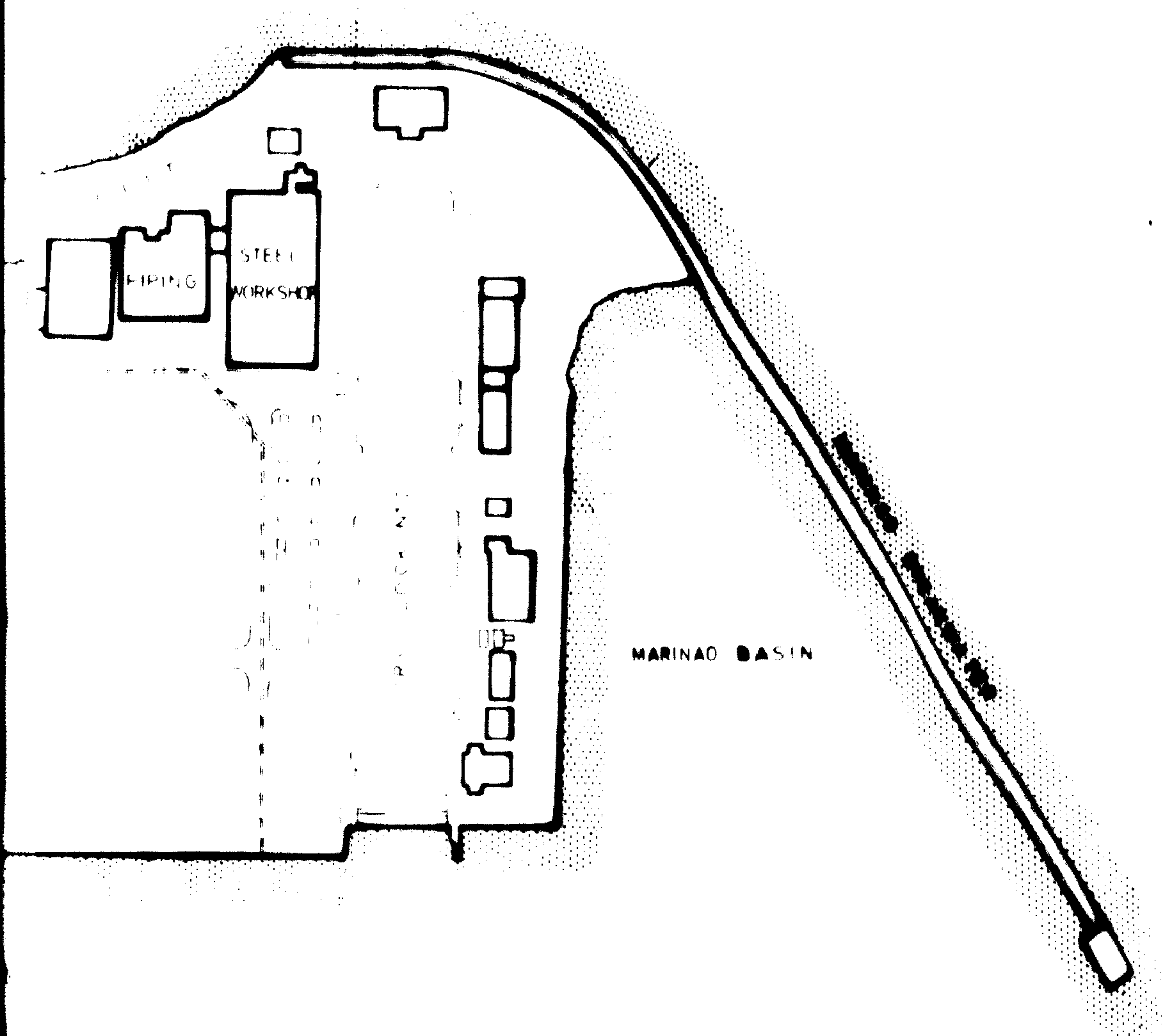
There is no intention to devote the activities of the shipyard to the repairing of merchant ships and there is only a possibility of partially using dock Nº 2 for this purpose.

The possible extensions that could be made in order to better serve the needs of the Navy do not fall within the scope of the present study.

Various studies and plans carried out in the past for the eventual expansion of the shipyard for purposes of new construction appear to have been anandoned.



SECTION 1



SECTION 2

AN

METERS

SHIPYARD	ASMAR
LOCATION	BASE NAVAL DE TALCAHUANO-CHILE

OBSERVATIONS

-Existing areas in 1973

DRAWING Nº 8

1.1.11. NEW SHIPYARDS IN PROJECT.

Almost every country in the Andean Subregion have projects of new shipyards to be created by public or private firms. The possibilities of short term execution have been studied as well as the degree of the development of the discussions for the creation of such shipyards.

In Peru, the possibilities of creating shipyards in Chimbote and Oquendo are being studied, the capacity and main particulars of the yards being not yet defined and having preliminary discussions.

In Colombia, the discussions for the creation of a mixed company - with Colombian and Spanish capital to build a new shipyard in Cartagena Bay are advanced. The envisaged percentages of participation are 51% Colombian capital to be subscribed by Instituto de Fomento de la Industria (IFI) and 49% Spanish capital to be subscribed by Instituto Nacional de Industria (INI) and Astilleros Españoles, S.A. The possibility of reducing both proportions in order to allow investments from other Andean countries is considered.

The envisaged investments are about 15 to [illegible] millions $ U.S. and 60 millions $ U.S. Should be added for ships financing.

The shipyard would build 15.000 to 2[illegible].000 T.D.W. ships. Shiprepairing is considered for the future according the Caribean market.

The technical commitees from both countries sent to their own governments positive reports recomending to go ahead with the stablishment of this mixed company.

The changes in the Spanish administration in January 197[illegible] delayed the constitution of the company which was finally created by the middle of the present year 1974.

A project for building a shipyard in Pertigalete area exists in Venezuela, being considered the Chaure way or [illegible] way as possible locations.

It looks that the promotion of these shipyards is still in an early stage and it would not start their activities in a short term.

A feasibility study for the development of "Astilleros Navales Ecuatorianos" has been made in Ecuador. The following steps not being defined, nothing final about the possible starting of the company may be said.

Several projects for the creation of new shipyard have been made in Chile.

One in Talcahuano for shipbuilding between 20.000 and 70.000 D.W.T. and another in Valdivia for ships under 4.000 D.W.T. looking both to be in suspension. A new project in Quintero (Valparaíso) or Guayacain (Coquimbo - La Serena) for shipbuilding till [illegible] D.W.T. and shiprepairing is being considered. Quick decissions on the execution of this project are not expected.

There exist in Venezuela some projects for the building of different shipyards, their localization dimensioning and specialization being in study.

1.2. AUXILIARY INDUSTRY. THE PRESENT SITUATION

1.2.0. GENERAL OBSERVATIONS

The general situation of the auxiliary industry and services connected with the ship-building sector has been analysed. By means of questionnaires (the content of which appears in Appendix N° 2 , together with a list of firms contacted, Appendix N° 3) information was gathered regarding the activities of the different firms. Although the replies to the questionnaires were not exhaustive, it was possible to obtain a real impression, corroborated by the visit and interviews held with firms and official Organisations in the different countries of the Sub-region.

In general, the capacity and development of the auxiliary industry and services in this sector is quite limited, and it is estimated that the national contributions in the supplies of materials, equipment and auxiliary services for the construction and repair of ships in the Sub-region is limited to a percentage that varies from [illegible] to 45 per cent of the total value of the supplies. As a comparative data it may be mentioned that in the countries of Western Europe which have a certain development in the ship-building sector, this value is generally greater than [illegible]5 per cent.

It is necessary to provide the remainder of the supplies by means of imports, generally from the U.S.A., Europe and Japan, and it should be noted that, in the first place, purchases are not made from other non-Andean Ibero-American countries and, in the second place, that ship-building supplies are not exchanged among countries of the Andean Sub-region

From the review made of the recommendations and conclusions relating to the Metal-mechanical Programme of the Board of the Agreement of Cartagena, it was deduced that a large part of ship-building auxiliary industries have already been the subject of allotment, within the scope of the said Programme (See list included in point [illegible].4.1.)

For this reason, the comments which follow have been fundamentally centred on the industries corresponding to non-associated units.

1.2.1. IRON AND STEEL INDUSTRY

The supply of iron and steel products (plates and profiles) to shipyards in the Sub-region at present exists in only a very small proportion, and is effected by iron and steel firms in the Sub-region itself.

In Ecuador and Bolivia there do not exist iron and steel industries that can produce plates and profiles for ship-building.

In Chile, Compañía de Acero del Pacífico produces thick grade "A" ship building plate, which is used by the repair shipyards in the country. There exist plans for the expansion of this Company up to a capacity of 1,000,000 metric tons of steel in 197[illegible]. It would be desirable for part of this production to be orientated towards the ship-building market.

In Peru, the Siderperu firm at Chimbote has not yet produced ship-building plate, which expects to begin to produce on a commercial scale in 1974. The plant has already been classified by Lloyd's Register, together with the laboratories and measurement and control apparatuses. Likewise, the samples of materials produced have been approved. It is intended to begin production with grade "A" plate. The thicknesses can reach up to 32 mm. and the widths up to 2400 mm. At a later stage, it is envisaged that other qualities will be manufactured. For the moment, profiles are not rolled. The firm has a rolling mill for profiles which can produce them up to 6", but its utilization will depend on the demand of the market.

In Venezuela, the Planta Siderúrgica del Orinoco has not produced, up to the present, ship-building iron and steel products, although it has plans to manufacture them in the near future.

In Colombia, the Siderúrgica de Paz del Río is in a period of expansion, and at present has a production of 500,000 tons per year, although, for the moment, it does not manufacture ship-building products.

In addition, there exist in the Sub-region a certain number of firms manufacturing Forges and Foundries of small and medium size, but which provide only limited supplies to the shipyards.

There does not exist in the Sub-region any large Forge capable of manufacturing crankshafts or propeller shafts for ships of a tonnage exceeding 1,000 gross registered tons.

1.2.2. DIESEL ENGINES

The manufacture of Diesel engines for ships, both for propulsion purposes and auxiliary engines for electricity generating groups is practically non-existent.

In Colombia there are plans in an advanced stage for the manufacture of small engines under "LISTER-BLACKSTONE" licence of up to 40 HP.

In Peru, a company has recently been constituted with a participation of the Peruvian Government to manufacture engines with VOLVO and PERKINS licences of up to 350 HP, and SIMA has plans, not yet concretely established, which would lead to the manufacture of propulsion engines beside its Shipyard at Callao. In Chile, ASMAR has negotiated a licence with BURMEISTER & WAIN which will permit it to manufacture marine engines, but up to the present no concrete study has been begun for any manufacturing plant of this type.

1.2.3. MISCELLANEOUS EQUIPMENT AND MATERIALS

It has already been mentioned that the Shipyards of the Sub-region acquire the major percentage of equipment and material for the construction of ships outside the Andean zone.

In the Sub-region, there is practically no auxiliary ship-building industry, although a certain type of industries devote some proportion of their activities to supplies for shipyards. Other industries could orientate themselves towards the ship-building market in the event of development of this sector.

In Appendix nº 3 there are included the principal auxiliary industry firms which have been contacted for the present Study.

In this respect, emphasis is laid on the following manufactures which, although they are being the subject of allotment within the Metal-mechanical Programme give an idea of the type of auxiliary industries that are most developed in the Sub-region.

Electrodes for welding. These are manufactured in the majority of the countries of the Sub-region, under foreign licences (Armco, Oerlikon, Westinghouse, etc.) and they are supplied to Shipyards.

Steam boilers. There are various manufacturers, which make only small sizes and not specifically of the type intended for ships. In Peru: Abecaa, Metal-Empresa and Fabrimet. In Chile: Indu-Vapor, Socometal and H. Briones y Cía. In Colombia: Distral, Ceballos y Cía., Tissot. In Venezuela: Industrias Van Dam, Combustion Eng. Inc. and Metalúrgica Calderera, S.A.

It should be mentioned that the industry that manufactures equipment intended for fish-meal plants has undergone important development in Peru, and that it counts with a "Know-how" which could be directed towards the manufacture of marine boilers.

Piping. The industries of the Sub-region are in a position to be able to supply welded piping for ship-building. The principal firms in Venezuela are: Tupaca, Sideroca and Metaltécnica Industrial. In Colombia: Siderurgical de Medellin, Colmena and Corpacero. In Chile: Aceroperfil Ltda., Cintac, S.A. and Compac, S.A. In Peru: Industrial Lima y Ferrum Peru, S.A. Siderurgica del Orinoco, in Venezuela is the only firm in the Sub-region that produces drawn piping.

Valves. Various manufacturers exist, of which the principal are the following: In Venezuela: Inaf, S.A. In Peru: Matusita and Fundición Lima. In Chile: Nancoar and Fundición Talmet. In Colombia: Grival and Simetal.

Pumps. Outstanding in Peru is the firm of Hidrostal, which manufactures pumps of its own design. In Colombia: Industrias Hidromecánicas, Hidro... and Worthington. In Venezuela there are some 6 manufacturers, with foreign licences. In Bolivia, the firm Volcan, S.A. counts with a Sulser licence for centrifugal pumps. In Chile small-capacity pumps are manufactured.

Air compressors. There are various manufacturers in the sub-region of small compressors, under Atlas Copco, Worthington, etc. licences.

Deck machinery for ships. Some types are manufactured under licence, the principal firm being SIMA in Peru which manufactures winches and capstans for anchors, under Norwinch licence, and hatchway covers under Mac Gregor licence.

Electric machinery. There are various manufacturers of electric motors under licence. For example, Marelli in Peru, and General Electric in Venezuela.

Cables and electric switchgear. This is quite a developed sector, and in Peru almost 100 per cent of the electric cables for ships are of national manufacture (under Pirelli and other licences). Likewise, Venezuela, Chile and Colombia manufacture electric cables and switchgear in important proportions.

Marine paints. There exist various manufacturers of marine paints, some under foreign licences, in Peru, Venezuela, Chile, Ecuador and Colombia, which supply the present consumption of shipyards and slipways.

1.3. SHIPPING COMPANIES. THE PRESENT SITUATION

1.3.1. EXISTING FLEETS AND TRAFFIC

By means of the surveys carried out, an analysis has been made of the present situation concerning the fleets of the countries in the sub-region. In Appendix ..A.... the characteristics of the vessels that comprise the fleets in question are given in detail.

The traditionally operated transoceanic general cargo lines are those which serve the trade with the north and south of Europe and with the Gulf of Mexico, the U.S.A. and to a lesser extent, with Canada. Recently regular lines have also been operated with Japan, in the case of Peru and Venezuela.

The principal trade in bulk cargo is carried out with Japan and the U.S.A. and on a minor scale with Europe. There also exists an exchange of petroleum derivatives products among the countries of the sub-region.

For the purpose of presenting a report on the most representative shipowners in the sub-region, an analysis has been made, taking into account all the shipowners whose fleets amount to at least fifty thousand tons dead weight. In the analysis all the countries of the sub-region are represented, except Bolivia, which does not possess a significant fleet, and Ecuador which is represented by its participation in the Gran Colombian fleet of Colombia. Table 1.3.1-1, below, summarizes this analysis, for merchant ships of more than 1,000 gross registered tonnage (approximately [illegible],500 D.W.T.

Table 1.3.1-1

SITUATION WITH RESPECT TO THE PRINCIPAL SHIPPING LINES IN THE COUNTRIES OF THE SUB-REGION (OCTOBER 1973).

COUNTRY.	COLOMBIA.	CHILE.	PERU.	VENEZUELA(*)	TOTAL.
N°OF SHIPS.	27	17	19	15	78
TOTAL D.W.T	241,993	365,238	239,506	154,238	1,000,975
% OF TOTAL D.W.T. OF THE COUNTRY.	86.1	97.6	57	28,8	62.1
AVERAGE AGE.	12.2	11.8	4.4	12.6	10.4
AVERAGE SPEED (KNOTS).	17.4	16.5	16.4	16.5	16.8

(*) Creole Petroleum and Shell Venezuela are not included because their only foreign trade is to the refineries of Aruba and Curacao.

It was noted that of the total number of ships of the leading shipping lines of the sub-region, 34.2 per cent were between 0 - 6 years old, 21 per cent between 7 and 12 years old, and 44.[illegible] per cent were over 12 years old.

With respect to age of tonnage, 37 per cent is between 0 - 6 years, 17 per cent between 7 and 12 years and 46 per cent is more than 12 years old, for which reason a high rate of renovation is foreseen during the coming years.

The number of ships with speeds of more than 1[illegible] knots is 5[illegible].4 per cent; 31.5 per cent reach more than 16 knots, but less than 20 knots and the remaining 17.1 per cent have speeds of 20 knots or more. Speed is a very important factor in this fleet, owing to the fact that the ships have to cover a number of very long distance routes, as in the case of the lines that sail to Japan and Europe.

With respect to size, 18.6 per cent of the ships are of less than 6,000 D.W.T., 22.3 per cent are between 6,000 and 11,000 D.W.T. and 59.[illegible] per cent exceed 11,000 D.W.T.

Table 1.3.1-2 NUMBER OF SHIPS COMPRISING THE PRINCIPAL FLEETS OF THE SUB-REGION BY TYPE AND SIZE

TYPE	SIZE IN THOUSAND D.W.T.	COLOMBIA	[illegible]	[illegible]	VENEZUELA	[illegible]
CARGO SHIPS	0 - 2.5	--	--	--	--	-
	2.6 - 6.0	6	--	--	[illegible]	14
	6.1 - 11.0	9		--	[illegible]	[illegible]
	11.1 - 21.0	12	[illegible]	[illegible]	4	[illegible]
OIL TANKERS AND OBOS	0 - 9.5	--	--	[illegible]	--	[illegible]
	9.6 - 16.0	--	--		[illegible]	[illegible]
	16.1 - 51.0	--	[illegible]	[illegible]	--	[illegible]
	More than 51.0	--	2	--	1	[illegible]
BULK CARGO SHIPS	0 - 2.5	--	--	--	[illegible]	--
	2.6 - 6.0	--	--	--	--	--
	6.1 - 11.0	--	--	--	--	--
	More than 11.0	--	[illegible]	[illegible]	--	[illegible]

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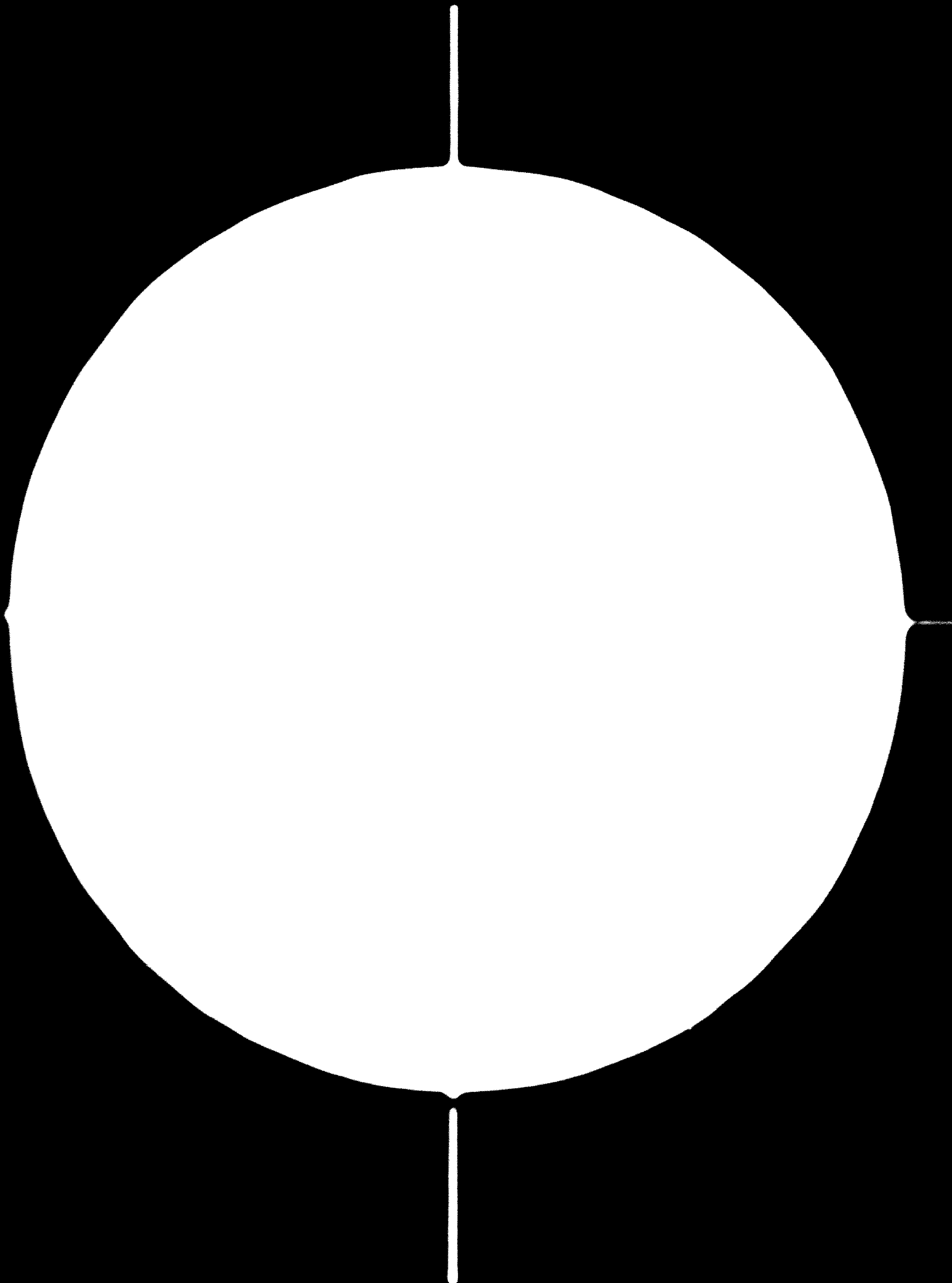

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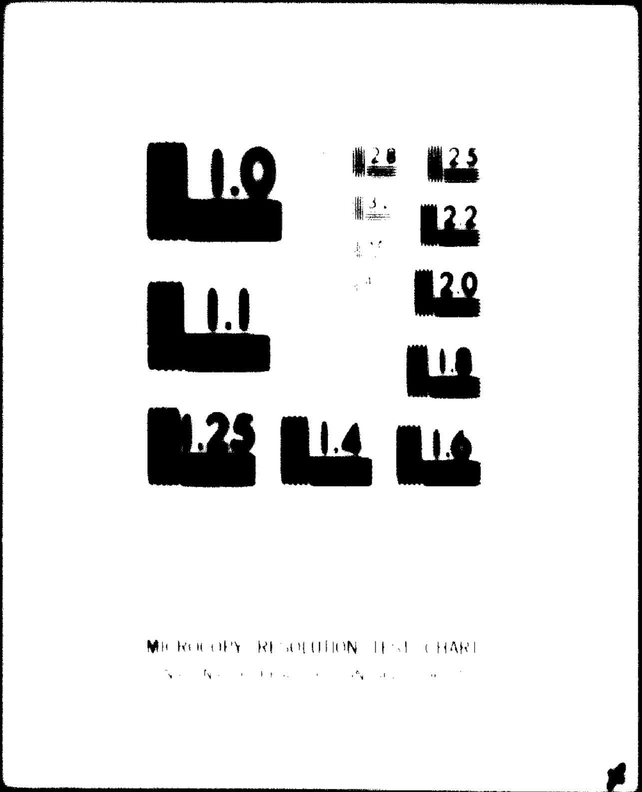

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On the other hand, Table 1.3.1-2 shows the [illegible] specialized ships suitable for the transport of bulk cargoes and petroleum and its derivatives. At the present time, part of the bulk cargo is transported in general cargo vessels owing to the low level of the existing trade, but it is expected that this situation will not be maintained for long, since there will be an enormous increase in the transport of these raw materials in the coming years up to levels at which it will be much more economical to transport them in specialized ships.

Finally, Table 1.3.1-3 includes the summary of the analysis of the average sizes of the vessels in the sub-region, according to types.

Table 1.3.1-3 AVERAGE SIZE OF THE PRESENT FLEET, IN THOUSANDS OF D.W.T.

TYPE	COLOMBIA	CHILE	PERU	VENEZUELA	AVERAGE FOR SUB-REGION
CARGO SHIPS	8,963	12,148	12,370	7,[illegible]	9,729
OIL TANKERS AND OBOS	--	41,846	10,350	55,[illegible]	28,801
BULK CARRIERS	--	17,264	13,700	--	16,076

1.3.2. CARGOES TRANSPORTED AND FREIGHT RATES

In all the countries of the sub-region there is, at the present time, legislation that reserves for the ships registered in each country a substantial participation in foreign trade by sea either in respect to tonnage or to freight rates received.

Tables 1.3.2-1 and -2 show the participation in freight rates and tonnages of the Andean merchant fleets in the foreign trade of the sub-region.

With respect to imports, it is observed that percentage participation of the fleet comprises between 10 per cent for Ecuador and 27.9 per cent for Peru in tons carried, with an average of 18.4 per cent. If we consider the freight rates received, the participation varies between 13.3 per cent in Venezuela and 25.3 per cent in Chile, with an average of 20.9 per cent.

The participation of nationally registered vessels in exports represents 7.9 per cent and 13.5 in tons carried and freight rates obtained, if we discount the exceptional case of Venezuela, whose oil tanker fleet is very inferior to that required for existing transportation needs. The freight rates obtained per ton carried in national ships are higher then the average, due to the concentration of the Andean fleet in general cargo merchandise, with a unit freight rate which is considerably higher than average.

	EXPORTS			IMPORTS			TOTAL FOREIGN TRADE		
COUNTRIES	TOTAL FREIGHT	FREIGHT OF NATIONAL SHIPS	%	TOTAL FREIGHT	FREIGHT OF NATIONAL SHIPS	%	TOTAL FREIGHT	FREIGHT OF NATIONAL SHIPS	%
COLOMBIA	57.0	5.0	8.8	93.5	21.3	22.8	150.5	26.3	17.4
CHILE	97.8	12.4	12.7	90.0	22.8	25.3	187.8	35.2	18.7
ECUADOR	48.0	6.4	13.3	42.0	6.2	14.8	90.0	12.6	14.0
PERU	160.0	25.5	16.0	55.0	[illegible]	25.0	215.0	34.0	15.8
VENEZUELA	900.0	1.2 (1)	0.1	90.0	12.0(1)	13.3	990.0	13.2 (1)	1.3
TOTAL FOR THE SUB-REGION WITHOUT VENEZUELA	362.8	49.3	13.1	280.5	[illegible]	[illegible]	[illegible]	[illegible]	16.8
TOTAL FOR THE SUB-REGION	1262.[illegible]	50.5	4.0	370.5	[illegible]	19.1	[illegible]	[illegible]	[illegible]

Table 1.3.6-1. SHARE OF NATIONAL SHIPS IN FOREIGN TRADE FREIGHTS IN THE COUNTRIES OF THE SUB-REGION IN 1970 (IN MILLIONS OF DOLLARS AND IN PERCENTAGES)

(1) Transportation of liquid bulk cargoes effected by CREOLE and SHELL to Aruba and Curacao is not included.

COUNTRIES	EXPORTS: TOTAL VOLUME	EXPORTS: IN NATIONAL SHIPS	EXPORTS: %	IMPORTS: TOTAL VOLUME	IMPORTS: IN NATIONAL SHIPS	IMPORTS: %	TOTAL FOREIGN TRADE: TOTAL VOLUME	TOTAL FOREIGN TRADE: IN NATIONAL SHIPS	TOTAL FOREIGN TRADE: %
COLOMBIA	5,884	142	2.4	1,913	241	17.[illegible]	7,797	[illegible]83	[illegible]
CHILE	12,003	897	7.5	4,481	1,103	24.6	16,[illegible]	2,000	12.1
ECUADOR	1,646	150	9.1	1,501	150	10.0	3,147	300	9.5
PERU	14,314	1,500	10.5	2,081	580	27.9	16,395	2,080	12.7
VENEZUELA	204,750	28 (1)	0.1	4,225	440	10.4	208,975	468 (1)	0.2
TOTAL FOR THE SUB-REGION WITHOUT VENEZUELA	33,847	2,6[illegible]	7.9	9,87[illegible]	2,174	21.7	[illegible]	4,[illegible]	[illegible]
TOTAL FOR THE SUB-REGION	[illegible],597	2,717	1.1	14,014	2,614	[illegible]	25[illegible],[illegible]	5,[illegible]	[illegible].1

Table 1.3.2-2. SHARE OF NATIONAL SHIPS IN THE FOREIGN TRADE OF THE COUNTRIES OF THE SUBREGION, 1970 (IN THOUSANDS OF TONS AND IN PERCENTAGES)

(1) Transportation of liquid bulk cargoes effected by CREOLE and SHELL to Aruba and Curacao is not included.

1.3.3. MAINTENANCE OF THE FLEET

A large number of the ships of the fleet of the sub-region that trade with foreign countries effect their repairs in the large ports at which they call on their respective routes, in the foreign countries.

The principal shipyards and repair centres in the sub-region are described in Section 1.1. of the present Study.

There are legal incentives for carrying out maintenance of the ships principally in Chile and Peru. However, and for reasons of operational efficiency, many repairs tend to be carried out in the shipyards of other countries because of their being better equipped with means and spare parts necessary to carry out repairs.

1.3.4. CREWS AND PERSONNEL

The present situation with respect to the personnel of the Shipping Companies in the sub-region is dealt with in Section 1.4 of the present Study, together with the other human resources of the Shipping Sector.

It should be emphasised that the executives of the existing Shipping Companies show, in general, an excellent level of qualification and experience.

With respect to qualified merchant seamen, there is a notable scarcity in the sub-region, for which reason a high percentage of foreign captains, engineers and officers are recruited.

1.4. HUMAN, TECHNOLOGICAL AND FINANCIAL RESOURCES

1.4.0. GENERAL CONSIDERATIONS

In each country and in the principal firms of the sector a study has been made of the present evolution and the possibilities for future training of the personnel that constitutes or may constitute the marine sector. This study was made at the different levels of management, engineers and senior and medium grade technicians and other workers, and on the various aspects of ship building or repair, operating of ships, auxiliary industries and services.

It also indicates the present development of technology in the sub-region related to construction, repair and operation of ships and the dependency of the technology on foreign countries.

On the other hand, the study shows the channels being used at the present time for the financing of ships, as well as figures illustrating the economic dimension of each country.

1.4.1 HUMAN RESOURCES

In view of the limited development of shipbuilding in the sub-region, it may be said that the number of persons having direct experience of shipyard work is small, at all levels. The same may be said of the auxiliary industries and services. Nevertheless, there is an interesting experience in the operation of ships, since the sub-region counts with a number of shipping companies that enjoy a high level of international prestige.

The different levels are described hereinafter:

(a) - Entrepreneurs

The major shipyards in the sub-region are connected with the respective Navies and the highest management posts are occupied by Naval Officers.

These officers habitually alternate their duties at the shipyards with other duties on active service and with the command of warships. This produces a lack of continuity in their managerial work and therefore in the experience necessary to direct a firm with the efficiency and flexibility necessary today, in spite of the personal qualities of these officers who are usually highly qualified. In turn, this work is usually made difficult because of the excessively legalistic structure connected with the State Administration, which prevents the shipyards from acting with the autonomy necessary in order to progress in the industrial and commercial world. The trend in all the countries concerned is to give the shipyards a greater degree of autonomy in order to correct these shortcomings.

If we except the shipping and fishing companies, private firms in this sector are few, although there are firms which could direct their activities towards the shipping sector. The private shipyards work on vessels of less than 1,000 D.W.T. and, only in isolated cases, do they consider engaging in the construction of larger vessels. In the sub-region there are various shipping companies, both private and State-owned, with considerable experience and undoubted international prestige. Their management staff are experts in the shipping business, and the structure of these shipping companies is adequate. In almost all the countries a concern has been observed in certain entrepreneurial sectors with respect to initiating activities related to marine transport.

(b) - Marine Engineers.

Specific centres for the training of marine engineers do not exist in the sub-region, although the Polytechnic School at Guayaquil graduates about five marine engineers each year. The Ecuadorian Navy sends its officers to the above-mentioned school for specialized training, instead of sending them abroad as was done formerly. Due to the lack of contact with the shipyards, and the absence of technological support, such as laboratories, experimental canals, etc., their training is excessively theoretical.

They can also follow a two-year course of marine engineering at the Universidad de Concepción, Chile, but it is necessary to complete their studies of the speciality abroad.

The shipyards are staffed by engineers from the respective Navies, who have taken courses in marine engineering in foreign countries, or with engineers trained in other specialities who have acquired professional experience abroad.

It was noted that various small Peruvian shipyards counted with engineers trained at S.I.M.A. Other shipyards employ European or North American engineers.

There are several engineers working in the shipyard at Puerto Cabello who come from other countries in the Andean sub-region.

The engineers have considerable experience in ship repairing work. Ships of the respective national navies are repaired and maintained in accordance with required standards of quality.

Only in Peru is there found a real experience in shipbuilding, and to a lesser degree in Colombia.

Experience in ship design is practically nil, although some small shipyards have adapted foreign designs or have drawn up designs for small vessels, modifying the designs of others constructed perviously by the same shipyard.

(c) - Merchant Navy Officers.

There are nautical schools in Venezuela, Colombia and Chile.

The school at Callao, Peru, has recently resumed its activities and as yet no courses in this new stage have been completed.

Foreign captains and officers, many of them Spanish, sail in the merchant fleets of Peru, Colombia and Ecuador, in addition to nationals of these countries.

In order to achieve a rapid expansion of the merchant fleets of the sub-region, the collaboration of foreign captains and engineers would be required until new nautical schools supply the captains and other officers needed.

(d) - Medium-grade Technicians

The scarcity of intermediate personnel with experience in the various techniques of shipbuilding and repair is obvious.

S.I.M.A. at Callao and ASMAR at Talcahuano have trained their own intermediate technical personnel. The shipyard at Puerto Cabello is also training its own intermediate personnel.

In those techniques that are common to other branches of industry there exists a greater possibility of training intermediate personnel as well as in the auxiliary industries, especially in those zones where there is a certain degree of development of the metal-mechanical industry.

On the other hand, there are training centres for intermediate personnel in all the countries concerned, although they do not offer specific courses in ship building.

(e) - Workers

In each country there are organizations encharged with vocational training.

In Chile, vocational training is offered in the industrial schools of INACAP or in the vocational schools connected with the State Universidad Técnica. The firms themselves train the majority of the personnel.

For the training of personnel in Colombia, there is a national apprenticeship service (S.E.N.A.) which offers courses in the following trades related to shipbuilding.

Trade	Duration of course in years
Machine-tool operator	2
Maintenance mechanic	3
Sheet metal worker	3
Torch and arc welder	2
Refrigeration and air-conditioning mechanic	2

Trade	Duration of course in years
Foundry moulder	3
Foundry patternmaker	3
Diesel engine repair mechanic	2
Marine engine repair mechanic	3
Installation and maintenance electrician	3
Assistant repair mechanic for electronic equipment	3
Ship's carpenter	3

There are training centres at Cartagena and Barranquilla. At the present time CONASTIL has 150 apprentices in a centre run by S.E.N.A. in view of the need for personnel caused by the extension of the Shipyard.

UNIAL, for its part, permanently maintains 20 students at the centre run by S.E.N.A. at Barranquilla.

At the same time training courses are given in both shipyards in cooperation with S.E.N.A.

Funds for S.E.N.A. come from a deduction of 2 per cent from wages, destined for this purpose.

In Peru there is a National Industrial Apprenticeship Service (S.E.N.A.T.I.) which initially was financed by firms that set aside 1 per cent of their billing for the support of the Centre. At the present time it is dependent on the Ministry of Industry and Commerce. Its purpose is to train workers who are already working in the firms, that is to say, after the age for apprenticeship. S.E.N.A.T.I. organises courses in the Centre and in firms and counts with schools of metal-mechanical work, die-making, boilerwork and welding.

The shipyards utilise the services of S.E.N.A.T.I.

S.I.M.A. counts with a school for apprentices. Courses for welders have been organised in various shipyards in cooperation with the manufacturers of electrodes.

In Venezuela the Instituto Autónomo de Diques y Astilleros (Autonomous Institute of Docks and Shipyards) is training apprentices in the I.N.C.A. Centre at Puerto Cabello, near the factory. I.N.C.A. trains mechanics, light metalworkers, boilermakers and welders. It comprises more than a hundred schools for different specialities throughout the country.

All the shipyards in the sub-region experience difficulties in finding specialised workers.

The quality of the work is high in the shipyards with a longer tradition, which have been able to train personnel, instruct them and give them sufficient experience.

If productivity is, in general, low, it is due rather to lack of organization and of the means for maintaining continuity in the work than to the lack of activity on the part of the workers. The incentives systems, especially in the State enterprises, are insufficient and even non-existent in some cases, which contributes to the low productivity.

1.A.2. TECHNOLOGICAL RESOURCES

A notable lack of technological resources is observed in the sub-region, principally in ship building, in which, as has already been mentioned, foreign designs are utilised almost exclusively. The systems of production organisation and methods of work, are basically conventional and are capable of being improved with the incorporation of more advanced techniques.

The technical offices of the existing shipyards are limited almost exclusively to the translation and adaptation of foreign designs as well as to the drawing up of very detailed drawings in order that they may be easily understood by the operatives.

There is a greater degree of technification in the field of repairing, principally due to the maintenance needs of the respective national Navies.

S.I.M.A. counts with a laboratory which has an outstanding capacity including the following facilities:

- Mechanical tests (traction, impact up to -40° C, hardness, etc.)

- Metallographic tests (micrography, macrography, etc.) with 2 metallographic microscopes of up to 500 magnifications.

- Non-destructive tests, with 2 X-ray apparatuses for gages of up to 2", Magnaflux, Ultrasonic equipment and tests with dyes.

- Tests of paint, entailing experiments on exposure to salt spray, immersion, chalking, adhesion, weldability, etc.

- Complete chemical tests with apparatus comprising:

  . Atomic absorption spectrophotometer
  . Infra-red spectrophotometer
  . Polarograph
  . Potentiometer
  . Gas chromatograph
  . D'Oreat oxygen analyser

The remaining Peruvian shipyards are well equipped with Ultrasonic and/or X-ray apparatus, or they utilise the services of independent firms for these non-destructive tests. Also, in some cases they utilise the facilities of the laboratory of the Universidad de Ingeniería (Engineering University) for mechanical tests.

The Colombian shipyards do not have their own laboratories and only have apparatus for radiographic control.

For metallographic tests they utilise the services of the Universities of Cartagena, Barranquilla or Bogotá.

The laboratories at ASMAR in Talcahuano are of a standard similar to those of S.I.M.A.

At Puerto Cabello the laboratories are in the planning stage.

The shipyard at Guayaquil counts with small premises with a dynamic balancer, chemical laboratory, machine for measuring hardness, and a machine for controlling injectors. It does not have X-ray apparatus.

The shipyards in the sub-region utilise computers for administrative work when the volume of work makes it justifiable. Computers are not used for technical services.

The Compañía Sudamericana de Vapores has utilised computer services for operational research work.

The sub-region has no research centre in the ship-building sector.

Neither does it count with an experimental canal for hydrodynamic tests with models of ships, nor for tests with propellers.

1.4.3. FINANCIAL RESOURCES

The limited activity developed up to the present time in ship-building in the sub-region has made it unnecessary to create specific organisations or machinery for channelling the financing of ships or shipyards.

Ships of more than 1,000 gross tonnage registered in the sub-region have generally been constructed abroad, taking advantage of the credit facilities granted by the constructor countries.

The ships constructed by S.I.M.A. have received credit facilities that cover the imported equipment supplied in a package deal by a Scandinavian firm. The rest of the financing was covered by Peruvian State funds.

The shipyards that export small units from Peru or Colombia receive the credits and export premiums granted by their respective countries.

Foreign loans have occasionally been obtained for the construction or extension of shipyards. British financing was obtained for the new dock at S.I.M.A. and for the annexed workshops. Spanish financing is envisaged for the new shipyard at Cartagena. UNIAL has utilised World Bank financing for certain machinery purchases.

Among the entities that can channel financing for ships, shipyards and the auxiliary industry in the sub-region, it is necessary to emphasise the Corporación Andina de Fomento and the various promoting entities that exist in each country.

The Corporación Andina de Fomento (C.A.F.) initiated its activities in 1970 and has its headquarters in Caracas. It constitutes the principal financial organism destined to promote the process of integration within the same framework in which are established the legal or institutional instruments of the process. It is an Institution formed with the constributions of its member countries. It operates with a small technical and professional team, utilising to the maximum the installed capacity in the member countries themselves by means of the national development organizations that are members and that also act as liaison offices.

In its work it maintains close co-ordination with the organism of the Cartagena Agreement.

Its principal activities are : identification, promotion and execution of specific projects and the obtention and mobilization of resources within and beyond the sub-region.

The C.A.F. can intervene as an agent for the financing of shipyards with soft lines of foreign currency. However, its financing capacity in national currency is very limited. It can intervene in the financing of ships with international acceptances of government notes under conditions of the order of 9.5 per cent interest for a term of about 10 years.

The C.A.F. may not grant bonuses or premiums for ship construction.

In Chile the Corporación de Fomento (C.O.R.F.O.) has intervened directly in the sector, in the shipyard of Las Habas. CORFO may also intervene in order to guarantee operations for financing ships or equipment for ships being constructed in the country.

ASMAR has been financed through the State budgets.

In Colombia, the Instituto de Fomento Industrial (I.F.I.) has a participation in CONASTIL as it also had in the old Magdalena shipyard that has now ceased its activities.

In the same way, participation by I.F.I. is envisaged in the new shipyard which it is planned to construct on the Bay of Cartagena. On the other hand, it may contribute to the financing of private shipyards in accordance with its corporate purpose.

The I.F.I. participates in various industries which supply auxiliary equipment for the ship-building industry, among which industries Forjas de Colombia at Bucaramanga is outstanding. The Institute should participate in Firms of a certain size which are beyond the possibilities of private capital.

Participation in firms engaged in maritime transport does not fall within the purposes of the I.F.I., since it is only authorized to participate in manufacturing firms. However, in some cases it may contribute to the financing of ships. In fact, it has experience of financing 120 fishing vessels.

In Ecuador the Naval Arsenal at Guayaquil has been financed by means of annual budgets from the Navy, and the few vessels constructed in the said shipyard were sold without financing.

In Peru the CORPORACION FINANCIERA DE DESARROLLO (COFIDE) may intervene in the financing of shipyards, either by loans negotiated by COFIDE in national or foreign currency or by private foreign loans negotiated directly by the shipyard. Funds for public enterprises have to be negotiated through COFIDE. The financing of imported equipment cannot be effected in national currency and it is necessary to obtain credit in foreign currency. In the case of foreign loans, COFIDE is prepared to endorse the credit instruments.

COFIDE may finance investments in shipyards or auxiliary industries on a medium or long-term basis, to the amount of more than 20,000,000 soles (U.S. $450,000). Smaller investments have to be financed through the Banco de Fomento Industrial. The conditions of the financing depend on the degree of priority accorded to the industries. The shipping industry is considered as an industry of first priority, but this is not so in the case of all the auxiliary industries.

The CORPORACION VENEZOLANA DE FOMENTO has intervened in the financing of fishing vessels, and ships in general fall within the scope of its possibilities for financing. The financing capacity of the private sector in Venezuela is outstanding, and its relative importance compared with the public sector is the greatest of all the countries in the sub-region.

Table nº 1.4.3-1 includes data concerning per capita income, gross national product and reserves of foreign currency in 1971 for each country and for the sub-region in general, as different indices of economical development.

YEAR 1.971.	INCOME PER CAPITA IN $ U.S.	GROSS NATIONAL PRODUCT IN MILL. $ U.S.	RESERVES OF FOREIGN CURRENCY IN MILL. $ U.S.
- BOLIVIA.	190	935	54,3
- ECUADOR.	256	1.610	65
- CHILE.	566	5.100	221
- COLOMBIA.	366	7.734	203
- PERU.	363	4.933	240
- VENEZUELA.	923	9.943	1522
- GENERAL IN SUB-REGION	460	30.259	2305,3

Table 1.4.3-1

1.5. LEGISLATION - THE PRESENT SITUATION

1.5.0. ORGANIZATIONS HAVING JURISDICTION OVER THE SHIPBUILDING SECTOR

In the countries of the Andean Sub-region there have not been developed by the competent Organs specific plans for the promotion and development of ship-building and the merchant marine. However, there are organs which control the activities of this sector and which have promulgated various Decrees and Laws of a general characters in this respect. These bodies are the following:

In Bolivia:	FUERZA NAVAL BOLIVIANA
In Chile:	DIRECCION DEL LITORAL Y DE MARINA MERCANTE (Under-Secretariat of the Navy, Ministry of National Defence) and DEPARTMENTO DE TRANSPORTE MARITIMO, FLUVIAL Y LACUSTRE (Ministry of Public Works and Transport)
In Colombia:	DIRECCION DE MARINA MERCANTE (Ministry of National Defence)
In Ecuador:	DIRECCTION DE LA MARINE MERCANTE Y DEL LITORAL (Subordinate to the Navy)
In Peru:	DIRECCION GENERAL DE CAPITANIAS (Ministry of National Defence) and DIRECCION GENERAL DE TRANSPORTE ACUATICO (Ministry of Transport and Communications)
In Venezuela:	DIRECCION GENERAL DE CAPITANIAS DE PUERTOS (Ministry of National Defence) and CONSEJO NACIONAL DE LA MARINA MERCANTE (Ministry of Communications)

The present situation regarding Legislation as far as the different aspects of the shipbuilding sector are concerned, is outlined in the following points.

1.5.1. RESERVATION OF FREIGHT

In the majority of the countries of the Sub-region there are Decrees that ensure a priority in maritime transport to national ships. In this sense the maritime coastal transport, and river or lake transport is 100 per cent reserved to national vessels.

With regard to foreign maritime transport, 50 per cent of this traffic is also generally reserved to national vessels, both for imports and exports.

This percentage is reduced in Ecuador to 30 per cent for general cargo and bulk (except petroleum) and to 20 per cent for refrigerated cargo.

In the different Andean countries there are regulations specifying the conditions required for a ship to be considered "national", which require a certain minimum percentage of national ownership of the capital of the firm (from 75 per cent to 80 per cent) and that at least 3/5 of the managers and Directors of the firm concerned be nationals. Likewise, in general, it is required, for this consideration, that the crews be national, except for authorized exceptions.

In some cases foreign ships chartered by national shipping companies have access to these reservations of freight with certain limitations and commitments.

1.5.2. CONSTRUCTION AND REPAIR OF SHIPS

There is very little legislation concerning the implantation and development of shipyards.

In general, the approval of the Governmental Authorities is required for investment in shipyards.

In Venezuela, in order to promote ship construction, exclusive rights with respect to determined domestic navigational activities are granted to ships built in the country.

Generally, national ships have to be repaired in the shipyards of their own country.

In regard to the importation of equipment and materials for shipbuilding, some countries have reduced customs duties, because they consider the shipbuilding industry to be of public utility.

No premiums or benefits for ship-building have been established, as is done in the majority of the ship-building countries of Europe, Japan and the U.S.A.

1.5.3. ACQUISITION OF SHIPS

Financial and credit machinery in the countries of the Sub-region is directed towards promoting the growth of the merchant fleet is not as extensive and constant as could be desired, although on some occasions contributions have been made to finance specific purchases of ships.

The importation of ships newly built or second hand is permitted in most of the countries. In the latter case certain limitations are imposed, as, for example, that the ship should not be more than 10 years old (Colombia). Naturally, in addition the importation of ships is subject to the approval of the competent Agencies and to the appropriate concession of foreign currency facilities.

In various Andean countries the system of customs duties facilities the importation of ships, since the liberalization of the customs duties on imports is generalized, pursuant to the justification of the impossibility of constructing the ships in national shipyards.

2. STUDY OF THE MARKET FOR SHIP CONSTRUCTION AND REPAIR IN THE SUB-REGION

2.1. METHODOLOGY

The purpose of this chapter is the determination of the market available for ship construction and repair for the Shipyards of the Andean Sub-region. To this end the fleets needed for the maritime trade of the Sub-region in 1980 and 1985 have been determined.

Throughout the Study it has been envisaged that the volume of cargo transported in fleets registered in the Sub-region should reach 50 per cent of the total trade with countries beyond the PACTO ANDINO area, and 80 per cent for the trade between the countries of the Sub-region and the totality of the coastal trade of these latter countries. The tonnages to be built taking into account the foregoing percentages, constitute the captive market of the possible shipyards in the Sub-region, without discarding, for that reason, openings to the rest of the fleet needed in the Sub-region and to foreign markets.

In the forecast of the needs for ships in the Sub-region, there has been taken into account the tonnages to be transported, the origins and destinations of the said tonnages, the limitations of the ports, the maximum dimensions permitted by the Panama Canal, the speed of the fleet and its operating efficiency, rate of loading and unloading and time required for maintenance of the vessels.

The availabe market for the most important types of vessels have been studied separately: Oil tahkers, Bulk carriers, Gas tankers, Cargo ships, Refrigerated vessels, Container-carriers and Barge carriers. The needs for each type are specified by number and size of the ships.

2.2. STUDY OF THE DEMAND FOR MARITIME TRANSPORT IN THE SUB-REGION UP TO 1980 AND 1985

The forecasts of cargo transported by sea for the countries that comprise the Andean Sub-region are given in detail below, having been obtained from the information compiled by the TECNAVAL work team in the different countries, as well as from available statistical information.

For the purpose of arriving at a forecast of the different types of ships, the analysis was made by grouping the trade according to classified products in accordance with their means of transport.

The classification of products was made in accordance with the following groups of merchandise:

Bulk liquids

- Petroleum and its products
- Liquified petroleum gas
- Natural gas

Bulk solids

Iron ore, coal, phosphates, fertilisers, cereals, non-ferrous ores, sugar, saltpetre, salt and lime.

General cargo

- Refrigerated general cargo, not capable of being divided into units
- General cargo capable of being divided into units (in containers)
- Non-refrigerated general cargo, not capable of being divided into units

2.2.1. TRAFFIC IN BULK LIQUIDS

The study of bulk liquids has been divided into three parts, according to the type of vessel in which they are transported: Petroleum and petroleum derivatives, liquified petroleum gas (L.P.G.) and liquified natural gas (L.N.G.)

In order to establish the evolution of the trade in these products in the Andean Sub-region up to 1985, the existing information concerning each product and each country has been compiled. The principal figures studied are given in Tables 2.1, 2.2 and 2.3 of this Report. These Tables are divided by countries, and they include the direction of the traffic for each product (exports, imports or coastal trade), the trade figures estimated for 1980 and 1985 and, finally, the percentage distribution of destinations for exports and origins in the case of imports.

Table 2.2.1-1 shows in detail the trade in Petroleum and its derivatives.

The great importance of Venezuela in the trade in this product, compared with the other countries of the Sub-region, with 77.7 per cent of the total trade in 1980 and 67.6 per cent in 1985, may be observed. This percentage decrease is due to two reasons: firstly, it has been considered that Venezuela's production will remain constant during all the years, in order to avoid the exhaustion of the reserves on a short-term basis and, secondly, the increase that will be experienced by the trade with other countries of the Sub-region owing to the increased exports of the producing countries, Ecuador and Peru and to the increase in domestic consumption in the importing countries, Colombia and Chile.

In Venezuela a tendency is observed to reduce exports of crudes and to increase the exports of refined products, which will imply an increase of the fleet required owing to the fact that a large part of the crude goes to be refined at Aruba, Curacao and Trinidad - Tobago, because they are very close to Venezuela and the time taken for the round voyage is very little. On the other hand, refined products go directly to their destination, principally to the U.S.A., for which reason a greater number of ships is needed because of the longer voyage.

Table 2.2.1-2 shows the trade in L.P.G. The only country that will trade with foreign countries will be Venezuela, which will export ammonia and L.P.G., principally to the U.S.A., Brazil and The Argentine. Chile also will need a fleet of this type for its coastal traffic.

Table 2.2.1-3 gives the figures for the L.N G. trade in detail. In the case of Venezuela there was suitable information for the estimate, but in the case of Ecuador the estimations were made on the basis of the

COUNTRY.	TRAFFIC (1)	PRODUCT	IN THOUSAND TONS. 1.980	1.985	PERCENTAGE OF DISTRIBUTION FOR EACH COUNTRY. PERSIAN GULF.	USA CANADA.	JAPAN.	ANDEAN GROUP.	OTHERS AMERICA.	OTHER COUNTRIES.
VENEZUELA.	E	CRUDE OIL.	118755	107755	--	50	--	--	35	15
	E	OIL PRODUCTS.	91250	103720	--	80	--	--	9	11
	C	OIL PRODUCTS.	2900	3300	--	--	--	--	--	--
COLOMBIA.	I	CRUDE OIL.	3970	9930	70	--	--	30	--	--
	E	OIL PRODUCTS.	2700	1700	--	85	--	10	5	--
ECUADOR.	E	CRUDE OIL.	30000	36000	--	60	--	10	30	--
PERU.	E	CRUDE OIL.	18675	28000	--	50	30	10	--	10
	E	OIL PRODUCTS.	8715	12000	--	70	--	--	30	--
	C	SULPHURIC AC.	180	220	--	--	--	--	--	--
CHILE.	I	CRUDE OIL.	8000	10200	70	--	--	30	--	--
	C	CRUDE OIL.	2598	3316	--	--	--	--	--	--
	C	OIL PRODUCTS.	1030	1315	--	--	--	--	--	--
TOTAL.	I	CRUDE OIL.	11970	20130	--	--	--	--	--	--
	E	CRUDE OIL.	167430	171755	--	--	--	--	--	--
	E	OIL PRODUCTS.	120665	117420	--	--	--	--	--	--
	C	CRUDE OIL.	2598	3316	--	--	--	--	--	--
	C	OIL PRODUCTS.	3930	3615	--	--	--	--	--	--
	C	SULPHURIC AC.	180	220	--	--	--	--	--	--
	TOTAL.	TOTAL	288773	317456	--	--	--	--	--	--

(1) I: IMPORTS. E: EXPORTS. C: COASTAL TRADE.

Table 2.2.1-1. FORECAST OF MARITIME TRADE IN PETROLEUM AND ITS DERIVATES IN THE ANDEAN SUBREGION.

COUNTRY.	TRAFFIC. (1)	PRODUCT	IN THOUSAND TONS.		PERCANTAGE OF DISTRIBUTION FOR EACH COUNTRY			
			1.980.	1.985.	U.S.A CANADA.	EUROP	OTHER COUNTRIES	BRASIL and ARGENTINA.
VENEZUELA.	E	AMMONIA,	930	1300	65	--	--	35
	E	L.P.G.	1900	2150	35	15	40	--
CHILE.	C	L.P.G.	80,5	102,7	--	--	--	--
TOTAL.	TOTAL	TOTAL	2910,5	3552,7	--	--	--	--

(1) E: EXPORTS.
C: COASTAL TRADE.

Table 2.2.1-2 FORECAST OF MARITIME TRADE IN L.P.G. IN THE ANDEAN SUBREGION.

COUNTRY	TRAFFIC (1)	PRODUCT.	IN THOUSAND TONS.		PERCENTAGE OF DISTRIBUTION FOR EACH COUNTRY.			
			1980.	1985.	U.S.A CANADA.	EUROPE	OTHER COUNTRIES.	BRASIL AND ARGENTINA.
VENEZUELA.	E	L.N.G.	4700	5888,9	90	--	10	--
ECUADOR.	E	L.N.G.	391	1564	100	--	--	--
TOTAL.	TOTAL.	TOTAL	5090	7452,9	--	--	--	--

(1) E: EXPORTS.

Table 2.2.1-3 FORECAST MARITIME TRADE IN L.N.G. IN THE ANDEAN SUBREGION.

different needs that exist for [illegible] and west coasts of the U.S.A.

2.2.2. **TRAFFIC IN BULK SOLIDS**

For the study of the bulk solids to [illegible] 1980 and 1985, all the existing information in each country has been compiled and the trade evolution of the principal products during recent years has been considered. Based on the reports and statistics [illegible] the ALALC. This estimate has also taken into account the [illegible] at the end of 1.975, for the increase of production.

Table [illegible] shows the principal bulk [illegible] transported by sea for each country of the Sub-region in the years [illegible] and 1985. The table also show the origins or destinations, according to whether imports or exports are concerned.

The most important product to be transported [illegible], which represents [illegible] per cent of the total in 19[illegible] and [illegible] per cent [illegible]. This is owing, principally, to the important export expansion projects in Venezuela and Chile, an increase is also observed in the [illegible] Peru, which will export [illegible] million tons in 1980. The [illegible] of iron ore will [illegible] U.S.A., Europe and Japan.

The products following in order of importance [illegible] copper, with [illegible].2 per cent and [illegible] per cent respectively.

2.2.3. **TRAFFIC IN [illegible]**
[illegible]

For the analysis of each of these types of cargo [illegible] division has been made according to:

a) - **[illegible] traffic** for the tr[illegible] region and the rest of the world
b) - **Intra-regional traffic** for trade among the countries of the Sub-region
c) - **Coastal trade**, for each country

COUNTRY.	TRAFFIC. (1)	PRODUCT	IN THOUSAND TONS.		PERCENTAGE OF DISTRIBUTION FOR EACH COUNTRY.					
			1.980	1.985	U.S.A. CANADA.	EUROPE.	JAPAN.	ANDEAN GROUP.	OTHERS AMERICA.	OTHER COUNTRIES
VENEZUELA	I	GRAINS.	700	700	100	--	--	--	--	--
	E	IRON ORE.	35500	44500	60	40	--	--	--	--
	E	Ni-Zn-Cu-Pb	140	140	--	100	--	--	--	--
	E	ALUMINIUM.	200	225	--	--	--	100	--	--
	E	STEEL PRODUCTS.	200	250	--	--	--	50	50	--
COLOMBIA	I	GRAINS.	450	450	90	--	--	--	10	--
	E	COAL.	5000	7000	100	--	--	--	--	--
	E	SUGAR.	180	180	65	--	--	35	--	--
ECUADOR.	I	IRON ORE.	750	1000	--	--	--	100	--	--
	I	GRAINS.	150	150	100	--	--	--	--	--
	E	BANANA MEAL.	400	600	50	25	25	--	--	--
	E	SUGAR.	200	250	100	--	--	--	--	--
PERU.	I	GRAINS.	300	300	100	--	--	--	--	--
	I	COAL (COKE).	1000	1250	50	25	--	--	--	25
	E	IRON ORE.	10000	10000	10	5	80	5	--	--
	E	Cu-Zn-Pb Scrap.	1529	2241,5	25	30	45	--	--	--
	E	FERTILIZERS.	5900	7375	--	--	--	100	--	--
	E	SUGAR.	400	400	[illegible]	--	--	--	--	--
	[illegible]	IRON ORE.	3200	4000	--	--	--	--	--	--

Table 2.2.2-1 FORECAST OF MARITIME TRADE OF BULK SOLID IN THE ANDEAN SUBREGION.

COUNTRY	TRAFFIC (1)	PRODUCT.	IN THOUSAND TONS.		PERCENTAGE OF DISTRIBUTION FOR EACH COUNTRY.					
			1.980	1.985.	U.S.A CANADA.	EUROPE.	JAPAN.	ANDEAN GROUP.	OTHERS AMERICA.	OTHER COUNTRIES.
CHILE.	I	GRAINS.	750	750	--	--	--	--	60	40
	I	SUGAR.	145	145	20	--	--	60	20	--
	I	FERTILIZERS AND PHOSPHORITE	695	870	33	--	--	41	--	26.
	I	COAL AND COKE	470	600	57	--	43	--	--	--
	E	COAL AND SALT	1500	1500	38	29	33	--	--	--
	E	IRON ORE.	19000	25000	--	20	70	2	--	8
	E	COPPER.	178	178	--	--	100	--	--	--
	C	SALTPETRE.	334,6	427,1	--	--	--	--	--	--
	C	SALT.	185,9	237,2	--	--	--	--	--	--
	C	LIMESTONE.	800	1000	--	--	--	--	--	--
	C	COALSTONE.	262	335	--	--	--	--	--	--
TOTAL.	I	--	5410	6215	--	--	--	--	--	--
	E	--	71327	90839,5	--	--	--	--	--	--
	C	--	4782,5	5999,3	--	--	--	--	--	--
	TOTAL	TOTAL.	81519,5	103053,8	--	--	--	--	--	--

(1) I: IMPORTS.
E: EXPORTS.
C: COASTAL TRADE.

Table 2.2.2-1 FORECAST OF MARITIME TRADE OF SOLID BULK CARGOES IN THE ANDEAN SUBREGION (CONT).

The study of the extra-zonal General Cargo has been made in a global form for the whole of the countries that comprise the Andean Sub-region. The decision to do so was taken for various reasons, among others, the variety of cargoes, the annual fluctutations presented by this type of cargo for each country, and, finally, the insufficiency of data in a number of cases.

In order to make the projection up to 1985, it was necessary to study the imports and exports effected during recent years, since the requirements for ships will be determined in accordance with the direction of the majority of the traffic; it was noted that exports were greater than imports, so that, for future projections, the former were taken as a basis. The documents utilised for this analysis were the reports of the ALALC Plan of Action: "Transport by Water in the ALALC" and "Evolution of Maritime Transport in the ALALC", June 1973.

The rate of increase for the extra-zonal General Cargo has been estimated at 8 per cent per annum up to 1985. This percentage corresponds to the average increase in international maritime transport of General Cargo during the last ten years. It is considered that this percentage is representative because of the very great influence of the U.S.A., Japan and Europe on the total world transport of General Cargo and because these countries are the destinations of the entire exports of the Sub-region.

The total General Cargo has been distributed by destinations according to the percentages obtained from a study carried out by the O.E.C.D. on destinations of General Cargo.

Table 2.2.3-1

DESTINATIONS OF GENERAL CARGO

DESTINATIONS	PERCENTAGE
U.S.A.-CANADA	45
EUROPE	42
JAPAN	[illegible]
OTHERS	3

The forecast of intra-zonal General Cargo has been estimated by taking as a base the intra-zonal trade in 1970, and the growth rates considered were 12 per cent in 1970-1973, 6 per cent in 1974-1977 and 20 per cent in 1978-1985. These rates were taken as higher than the extra-zonal General Cargo because of the marked growth which will be experienced in trade, owing, for one thing, to the reduction in customs duties in the countries of the Sub-region and also to the growing industrial specialisation which will be produced within the framework of the Cartagena Agreement.

It has also been observed that many of the existing lines carrying extra-zonal General Cargo call at various ports in different countries of the Sub-region, so that it has been estimated that 20 per cent of the intra-zonal General Cargo will be carried in ships that will also be engaged in extra-zonal trade.

The final quantities estimated for extra-zonal and intra-zonal General Cargo are shown in Table 2.2.3-2.

Table 2.2.3-2

EXTRA-ZONAL AND INTRA-ZONAL GENERAL CARGO

GENERAL CARGO.	1980 In thousands of tons	1985 In thousands of tons
EXTRAZONAL (EXPORTS).	12,272	15,286
INTRA-ZONAL .	506	1,016

In order to study the Cargo in Containers, that part of the General Cargo that would be capable of being divided into units has been taken separately, thus obtaining the fact that 64.7 per cent of the extra-zonal General Cargo would be capable of being divided into units, and for the intra-zonal General Cargo a figure of 80 per cent was obtained. A number of coefficients of divisibility into units have been applied to these amounts, in accordance with the criterion that the division into units of General Cargo in the Sub-region will follow the same general lines as those observed previously in the division into units of cargoes exchanged among developed countries.

Table 2.2.3-3 shows the percentages corresponding to the extra-zonal General Cargo.

Table 2.2.3-3

COEFFICIENTS OF EXTRA-ZONAL DIVISION OF CARGO INTO UNITS

	1980	1985
U.S.A. - CANADA	29 per cent	49 per cent
EUROPE	29 per cent	49 per cent
JAPAN	17 per cent	37 per cent

In the case of intra-zonal General Cargo it is estimated that the amount of cargo capable of being divided into units will be 20 per cent in 1980 and will amount to 40 per cent in 1985.

It is also estimated that 20 per cent of the intra-zonal container traffic will be carried in container-carrier vessels that cover extra-zonal traffic.

The final amounts obtained for the transport of containers is shown in Table 2.2.3-4

Table 2.2.3-4

TOTAL CARGO IN CONTAINERS

	1980 In thousands of tons	1985 In thousands of tons
EXPORT TRAFFIC IN CONTAINERS	2,676	6,830
INTRA-ZONAL CONTAINER TRAFFIC	97	485

For the study of refrigerated cargo only exports of bananas from Ecuador have been considered since the rest of the products, in view of their small global volume, will not require a special fleet, but will be carried in refrigerated holds in general cargo ships.

Exports of bananas will be maintained at about 1,400,000 tons and it is estimated that 80 per cent of them will be carried in refrigerated ships, the rest will also be carried in general cargo ships. The principal destinations of the bananas will be Europe, with 40 per cent, the U.S.A. with 25 per cent and Japan with 35 per cent.

In the case of coastal trade, forecasts were made of the trade for each country in particular. In some cases statistical information suitable for making the forecast of trade was not available, in which cases an extrapolation of the fleet was made according to different types of ships.

The deviations that may be produced in the coastal trade fleet have practically no influence on the total required for the Sub-region, because of the low percentages of the total represented by the different types of vessels, as may be observed from Table 2.2.3-5.

Table 2.2.3-5

PERCENTAGE IN TONS OF COASTAL TRADE SHIPS WITH RESPECT TO THE TOTAL TONNAGE OF SHIPS REQUIRED IN THE SUB-REGION

	1980 Percentage in Tons.	1985 Percentage in Tons.
PETROL TANKERS AND OBOS	4.12	4.71
L.P.G.	4.93	5.79
L.N.G.	-	-
BULK CARRIERS	1.16	1.45
CARGO SHIPS	3.33	3.41
CONTAINERS	3.87	2.81
REFRIGERATED SHIPS	-	-

2.3. FLEETS REQUIRED AND AVAILABLE MARKET FOR SHIP BUILDING IN THE SUBREGION.

The fleet required has been determined by taking as a base the previously envisaged data relating to trade. The shipbuilding market available for shipyards refers exclusively to the fleet required to be registered in the Sub-region, the data being obtained by assuming a movement of cargo of the order of 50 per cent for extra-zonal trade, 80 per cent for intra-zonal trade and the whole of the coastal trade.

The requirements, as well as the market available for shipbuilding in the Sub-region are detailed in point 2.3.2.
In the last point, a short comment is given on the fleets to be contracted, relating to the years 1980 and 1985.

2.3.1. HYPOTHESIS OF DISTRIBUTION OF THE FLEETS.

The number and size of the ships required has been determined for each type of traffic in particular, obtaining the total fleet required of each type of vessel by adding the above mentioned types of traffic.

The calculation of the dead weight tonnage required in a specific type of traffic requires previous hypotheses relating to days in port, size, (correlated with the previous variable) and the speed of the carriers of bulk cargoes, both solid and liquid, has been assumed to be 15.5 knots in newly constructed ships. This average speed has been increased to 18.5 knots for vessels carrying natural gas (L.N.G.)

The efficiency of the work carried out in port determines, together with possible congestion, the length of time spent in port. From these variable factors there has been taken for each product average values corresponding to the ports at present existing in Europe, North America and Japan, assuming that the evolution of the ports in the Sub-region will reach these levels in 1980.

With respect to size, the following has been taken into account:

- The quantity to be transported.
- The security and stability of the trade.
- The physical limitations of the ports of origin or destination and possibilities of expansion,
- It they pass through the Panama Canal, in which case they cannot exceed 70.000 D.W.T.
- Experience in similar traffic in other regions.

The election of ships' size which building would be advisable for every type, has been based on the analysis of the world shipbuilding tendency during the last years, bearing in mind at the same time - the prevailing advice of well known authorities in these matters - in connection with the tendencies noted.

To get an exact determination of number and size of every type of ship required in the future, it has been necessary to define, as previously stated, the origin and destination of imports and exports and coastal traffics of the market in the sub-region, what has been carried out backing the studies on the marine transportation statistics as published by the O.E.C.D. and United Nations, as well as by analysis of other publications included in Appendix nº 1.

- Evolucion del transporte marítimo en la ALALC.
- Memoria del Seminario de transporte marítimo andino.
- Statistical tables 1.973 (Lloyds Register of Shipping).

In the following paragraphs are pointed out some hypothesisdealing with the size of every type of ships to built got from the quoted sources.

For bulk liquids maximum sizes of up to 60.000 D.W.T. have been - assumed for trade among Latin American countries. For trade with the U.S.A. and Canada the maximum size assumed is 150.000 D.W.T. but the most usual size of ship is estimated to be 60.000/70.000 D.W.T. For traffic with Europe and Japan that does not pass -

through the Panama Canal, the ships have no physical limitations, but the maximum sizes of ships considered is 250.000 D.W.T. be - cause of financing problems, the lack of experience of the ship-owners in the Sub-region and because of the greater flexibility in case some of the traffic envisaged does not materialise.

With respect to traffic in bulk solids among Latin American coun-tries a maximum size of 30.000 D.W.T. has been estimated, the most typical ships being of 20 - 25.000 D.W.T.

For the remaining traffic in bulk solids, ships of between 20.000 and 40.000 D.W.T. have been assumed depending, principally, on - the quantities to be transported.

The required tonnage of general cargo ships, whether the cargo is divided into units or not, presents greater difficulties than in - the case of bulk-carriers.

The utilisation of general cargo ships is less than in the case - of bulkcarriers, by weight, in view of the lower average density of that type of cargo. As the value of this utilisation the value corresponding to the world general cargo fleet has been taken, - from "FEARNLEY & EGGERS" and "LES TRANSPORTS MARITIMES".

The rapid evolution of the average speed of cargo and container - ships as well as the development of the means of loading and un - loading, make necessary the introduction of a coefficient of in - crease in efficiency in the average operation of the ships. The - said coefficient has been determined on a basis of the changes ex-perienced in the maritime trade for general cargo and containers in the last ten years.

In the distribution by size of the general cargo fleets, sizes larger than the world average have been assumed - because of the fact that a large number of vessels engaged in extra-zonal traffic carry raw materials, which do not amount to a volume great enough to be transported in specialised ships.

Within the requirements for container-carriers vessel there are included barge-carriers of the LASH, SEABEE, or similar types, of which it is estimated that 4 and 8 vessels will be required in 1980 and 1985 respectively of about - 20 - 25.000 D.W.T. each, subject to the technological de - velopment that may take place in the case of this type of vessel.

The fleets to be contracted have been obtained by difference between those required and those remaining in 1.980 and 1.985 of the present fleets and ships on order. As the average age for breaking up 16 years has been estimated for - bulk carriers and 20 years for general cargo, refrigerated - and container vessels.

2.3.2. TABLES OF RESULTS OF THE FLEET REQUIRED AND THE FLEET TO BE CONTRACTED.

The tables of results show the fleet required of vessels registered in the sub-region and the fleet to be contracted by countries of the sub-region in 1980 and 1985. The results corresponding to 1980 are included in Tables 2.3.2-1 to 2.3.2-7 and for the year 1985 in tables 2.3.2-8 to 2.3.2-14.

SIZE RANGE	INITIAL AND-ORDERS 1.1.73.		TO BE BROKEN-UP 1.974-1.980.		REMAINING IN 1.980		FLEET TO BE CONTRACTED 1.974-1.980.			TOTAL NECESSARY 1.980.
DWT x 10^3	N°	DWT x 10^3	N°	DWT x 10^3	N°	DWT x 10^3	N°	DWT x 10^3	N°	DWT x 10^3
0 - 5,0	7	18,1	7	18,1	--	--	5	18,0	5	18,0
5 - 15	10	81,3	7	45,2	3	261	3,5	32,4	6,5	58,5
15 - 30	13	262,8	6	120,9	5	1218	10,5	215,7	15,5	337,5
30 - 45	10	352,1	10	352,1	--	--	49,5	1770,0	49,5	1770
45 - 60	1	55,8	1	55,8	--	--	7	385,0	7	385,0
60 - 80	2	130,1	1	61,2	1	68,9	22,5	1501,1	23,5	1570,0
80 - 120	--	--	--	--	--	--	--	--	--	--
120 - 180	--	--	--	--	--	--	7,5	1160,0	7,5	1160,0
180 - 300	1	265,2	--	--	1	265,2	7,5	1784,8	8,5	2050,0
TOTAL.	44	1305,4	32	653,3	10	622,0	113	6867,0	123	7349,0

Table 2.3.2-1 FLEET OF OIL TANKERS AND OBOS REQUIRED FOR 1980.

SIZE RANGE.	INITIAL AND ORDERS 1.1.73.		TO BE BROKEN-UP 1974-1980.		REMAINING IN 1.980		FLEET TO BE CONTRACTED 1974-1980.		TOTAL NECESSARY. 1.980	
DWT x 10^3	N°	DWT x 10^3	N°	DWT x 10^3	N°	DWT x 10^3	N°	DWT x 10^3	N°	DWT x 10^3
0 - 5	1	2,1	--	--	1	2,1	2	4,0	3	6,1
15 - 30	--	--	--	--	--	--	3.0	75,0	3,0	75,0
TOTAL.	1	2,1	--	--	1	2,1	5	79	6	81,1

Table 2.3.2.2 FLEET OF L.P.G. VESSELS REQUIRED FOR 1.980.

SIZE RANGE	INITIAL AND ORDERS 1.1.73		TO BE BROKEN-UP 1974 - 1980.		REMAINING IN 1980.		FLEET TO BE CONTRACTED 1974 - 1980.		TOTAL NECESSARY. 1980	
DWT x 10^3	N°	DWT x 10^3	N°	DWT x 10^3	N°	DWT x 10^3	N°	DWT x 10^3	N°	DWT x 10^3
15 - 30	--	--	--	--	--	--	1	23,5	1	23,5
60 - 80	--	--	--	--	--	--	1,5	99,0	1,5	99,0
TOTAL	--	--	--	--	--	--	2,5	122,5	2,5	122,5

Table 2.3.2-3 FLEET OF L.N.G. VESSELS REQUIRED FOR 1.980.

SIZE RANGE.	INITIAL AND ORDERS 31.9.73.		TO BE BROKEN-UP 1974 - 1980.		REMAINING IN 1980.		FLEET TO BE CONTRACTED. 1.974-1.980.		TOTAL NECESSARY. 1.980	
DWT x 10^3	Nº	DWT x 10^3	Nº	DWT x 10^3	Nº	DWT x 10^3	Nº	DWT x 10^3	Nº	DWT x 10^3
5 - 15	6	48,5	5	34,8	1	13,7	7,5	67,1	8,5	80,8
15 - 30	9	181,7	5	78,5	4	103,2	17	463,9	21	567,1
30 - 45	1	30,0	--	--	1	30,0	1,5	70,0	2,5	100,0
45 - 60	--	--	--	--	--	--	3	150,0	3	150,0
60 - 80	--	--	--	--	--	--	9	695,0	9	695,0
80 - 120	--	--	--	--	--	--	7	675,0	7	675,0
120 - 180	--	--	--		--	--	13	2025,0	13	2025,0
TOTAL	23	440.8	10	113.3	13	327.5	58	4146.0	64	4292.9

Table 2.3.2-4 FLEET OF BULKCARRIERS REQUIRED FOR 1.980.

SIZE RANGE.	INITIAL AND ORDERS 1.1.73.		TO BE BROKEN-UP. 1974-1980.		REMAINING IN 1.980		FLEET TO BE CONTRACTED. 1974-1980.		TOTAL NECESSARY. 1980.	
DWT x 10^3	N°	DWT x 10^3	N°	DWT x 10^3	N°	DWT x 10^3	N°	DWT x 10^3	N°	DWT x 10^3
2,5 - 6,0	6	23,1	1	3,1	5	20,0	10	30,0	15	50,0
TOTAL.	6	23,1	1	3,1	5	20,0	10	30,0	15	50,0

Tabl 2.3.2-5 FLEET OF REFRIGERATED SHIPS REQUIRED FOR 1.980.

SIZE RANGE	INITIAL AND ORDERS 1.1.73.		TO BE BROKEN-UP. 1974-1980.		REMAINING IN 1980.		FLEET TO BE CONTRACTED 1.974 - 1.980		TOTAL NECESSARY. 1.980.	
DWT x 10^3	N°	DWT x 10^3	N°	DWT x 10^3	N°	DWT x 10^3	N°	DWT x 10^3	N°	DWT. x 10^3
2,5 - 6,0	--	--	--	--	--	--	13	50,4	13	50,4
6,0 - 11,0	--	--	--	--	--	--	5	38,3	5	38,3
11,0 - 21,0	--	--	--	--	--	--	7	107,1	7	107,1
21,0 - 31,0	--	--	--	--	--	--	3	75,0	3	75,0
TOTAL	--	--	--	--	--	--	23	270,8	31	345,8

Table 2.3.2-6 FLEET OF BULKCARRIERS REQUIRED FOR 1.980.

SIZE RANGE.	INITIAL AND ORDERS 31.9.73.		TO BE BROKEN UP 1.974-1980.		REMAINING 1.980.		FLEET TO BE CONTRACTED 1.974-1.980.		TOTAL NECESSARY. 1.980	
DWT x 10^3	N	DWT x 10^3	N	DWT x 10^3	N	DWT x 10^3	N	DWT x 10^3	N	DWT x 10^3
2,5 - 6,0	43	174,0	33	141,1	10	32,9	68	279,7	78	312,6
6,0 - 11,0	25	195,2	21	157,2	4	38,0	69	582,6	73	620,6
11,0 - 21,0	50	665,3	2	24,8	48	640,5	50	922,9	98	1563,4
TOTAL	118	1034,5	56	323,1	62	711,4	187	1785,2	249	2496,6

Table 2.3.2-7 FLEET OF GENERAL CARGO SHIPS REQUIRED FOR 1.980.

SIZE RANGE	INITIAL FLEET. 1.1.81.		TO BE BROKEN UP 1981 - 1985.		REMAINING. 1.985.		FLEET TO BE CONTRACTED. 1981-1985.		TOTAL NECESSARY. 1985.	
DWT x 10^3	N°	DWT x 10^3	N°	DWT x 10^3	N°	DWT x 10^3	N°	DWT x 10^3	N°	DWT x 10^3
0 - 5,0	5	18,0	--	--	5	18,0	1	4,0	6	22
5 - 15	6,5	58,5	1	12,0	5,5	46,5	3	29,0	8,5	75,5
15 - 30	15,5	337,5	3	55,2	12,5	282,3	16	327,2	28,5	609,5
30 - 45	49,5	1770,0	--	--	49,5	1770,0	8,5	317,0	58	2087,0
45 - 60	7	385,0	--	--	7	385,0	0,5	27,5	7,5	412,5
60 - 80	23,5	1570,0	--	--	23,5	1570,0	6,5	445,0	30	2015,0
80 - 120	--	--	--	--	--	--	--	--	--	--
120 - 180	7,5	1160,0	--	--	7,5	1160,0	3,5	450,0	11	1610,0
180 - 300	8,5	2050,0	--	--	8	2050,0	2,5	687,5	10,5	2737,5
TOTAL	123	7349,0	4	67,2	119	7281,8	42	2287,2	160	9569,0

Table 2.3.2-8 FLEET OF OIL TANKERS AND OBOS REQUIRED FOR 1.985.

SIZE RANGE.	INITIAL FLEET. 1.1.81.		TO BE BROKEN UP 1981 - 1985.		REMAINING. 1985		FLEET TO BE CONTRAC TED 1981-1985		TOTAL NECESSARY. 1985.	
DWT x 10^3	Nº	DWT x 10^3	Nº	DWT x 10^3	Nº	DWT x 10^3	N	DWT x 10^3	N	DWT x 10^3
0 - 5	3	6.1	1	2.1	2	4,0	1	2.0	3	6,0
15 - 30	3.0	75,0	--	--	3,0	75.0	1	22,5	4	97,5
TOTAL.	6	81.1	1	2,1	5	79	2	24.5	7	103.5

Table 2.3.2-9 FLEET OF L.P.G. VESSELS REQUIRED FOR 1.985.

SIZE RANGE.	INITIAL FLEET. 1.981.		TO BE BROKEN UP 1981-1985.		REMAINING 1.985		FLEET TO BE CONTRACTED. 1981 - 1985.		TOTAL NECESSARY. 1985.	
DWT x 10^3	N°	DWT x 10^3	N°	DWT x 10^3	N°	DWT x 10^3	N°	DWT x 10^3	N°	DWT x 10^3
15 - 30	1	23.5	--	--	1	23.5	1	27,8	2	51,3
60 - 80	1.5	99,0	--	--	1,5	99.0	1.5	103,0	3	202,0
TOTAL	2,5	122,5	--	--	2,5	122.5	2,5	130,8	5	253,3

Table: 2.3.2-10 FLEET OF L.N.G. VESSELS REQUIRED FOR 1.985.

SIZE RANGE.	INITIAL FLEET. 1981.		TO BE BROKEN-UP 1981 - 1985.		REMAINING. 1985		FLEET TO BE CONTRACTED. 1981 - 1985.		TOTAL NECESSARY. 1985.	
DWT x 10^3	N°	DWT x 10^3	N°	DWT x 10^3	N°	DWT x 10^3	N°	DWT x 10^3	N°	DWT x 10^3
5 - 15	8.5	80,8	--	--	8,5	80,5	2	17,2	10,5	98.0
15 - 30	21	567,1	--	--	21	567,1	4	83,0	25	650.1
30 - 45	2,5	100,0	--	--	2,5	100,0	0,5	20.0	3	120.0
45 - 60	3	150,0	--	--	3	150,0	0,5	25.0	3.5	175.0
60 - 80	9	695,0	--	--	9	695,0	3,5	257.5	12,5	952.5
80 - 120	7	675,0	--	--	7	675,0	3	270,0	10	945.0
120 - 180	13	2025,0	--	--	13	2025,0	3,5	525,0	16,5	2550,0
TOTAL	64	4292,9	--	--	64	4292,9	17	1197,7	81	5490,6

Table [illegible].3.2-11 FLEET OF BULKCARRIERS REQUIRED FOR 1.985.

SIZE RANGE	INITIAL FLEET 1.1.81.		TO BE BROKEN UP 1981 - 1985.		REMAINING. 1985.		FLEET TO BE CONTRACTED. 1981 - 1985.		TOTAL NECESSARY. 1985.	
DWT x 10^3	N°	DWT x 10^3	N°	DWT x 10^3	N°	DWT x 10^3	N°	DWT x 10^3	N°	DWT x 10^3
2.5 - 6,0	15	50,0	--	--	15	50,0	--	--	15	50,0
TOTAL	15	50,0	--	--	15	50,0	--	--	15	50,0

Table 2.3.2-12 FLEET OF REFRIGERATED SHIPS REQUIRED FOR 1.985.

SIZE RANGE.	INITIAL FLEET 1.1.81.		TO BE BROKEN UP. 1981 - 1985.		REMAINING. 1985.		FLEET TO BE CONTRACTED. 1981 - 1985.		TOTAL NECESSARY. 1985.	
DWT x 10^3	N°	DWT x10^3	N°	DWT x 10^3	N°	DWT x 10^3	N°	DWT x 10^3	N°	DWT x 10^3
2,5 - 6,0	13	50,4	--	--	13	50,4	11	48,8	24	99,2
6,0 - 11,0	5	38,3	--	--	5	38,3	5	46,4	10	84,7
11,0 - 21,0	7	107,1	--	--	7	107,1	11	180,0	18	287,1
21,0 - 31,0	3	75,0	--	--	3	75,0	5	125,0	8	200.0
TOTAL	31	345,8	--	--	31	345,8	32	400,2	67	846,0

Tabl 2.3.2-13 FLEET OF CONTAINERSHIPS REQUIRED FOR 1.985.

SIZE RANGE	INITIAL FLEET. 1.1.81.		TO BE BROKEN UP. 1981 - 1985.		REMAINING. 1985.		FLEET TO BE CONTRACTED. 1981 - 1985.		TOTAL NECESSARY. 1.985	
DWT x 10^3	N°	DWT x 10^3	N°	DWT x 10^3	N°	DWT x 10^3	N°	DWT x 10^3	N°	DWT x 103
2,5 - 6.0	78	312,6	9	31,7	69	280.9	31	121,8	100	402.7
6,0 - 11,0	73	620,6	--	--	73	620,6	16	141,9	89	762.5
11,0 - 21,0	98	1563,4	13	169,6	85	1393,8	35	527,7	120	1921.5
TOTAL	249	2496,6	22	201.3	227	2295.3	82	791,4	309	3086,7

Table 2.3.2-14 FLEET OF GENERAL CARGO SHIPS REQUIRED FOR 1.985.

For the calculation of the fleet to be contracted in 1981 - 1985, the initial fleet required in 1980 and assumed to be in service, has been considered.

It has been assumed that in the year 1980 there will have entered into service ships of 250,000 D.W.T. for transporting crude from Venezuela to Europe and Japan, in view of the fact that there already exist superports in the countries of destination and at that date suitable facilities will be available in the Maracaibo zone of Venezuela.

The presently existing cargo fleet is large in comparison with the remaining types of vessels, which will lead, especially in the years 1980 to 1985 to the breaking-up of a large number of these units, making it necessary to contract for the entry into service of new units at that time.

This explains why, in spite of the fact that the cargo fleet required in 1985 is less important in percentage in comparison with 1980, the tonnage to be contracted for that date is greater than in 1980.

2.3.3. COMMENTS ON THE FLEETS TO BE CONTRACTED UP TO 1980 AND 1985

In point 2.3.2. tables are presented, according to different types of vessels, which show the tonnage that it will be necessary to contract in order that the vessels may enter into service in 1980 and 1985, effecting together with the fleet remaining, 50 per cent of extra-zonal transport, 80 per cent of intra-zonal transport and 100 per cent of coastal traffic.

The types of vessel of greater percentage importance compared with the total of vessels contracted prior to 1980 for entry into service at that date are Oil Tankers and OBOS (51.6 per cent) and Bulk Carriers (30.[illegible] %) decreasing to a proportion of 0.2 per cent in the case of Refrigerated ships.

In addition to the tables showing the percentage importance of the fleet to be contracted and required for 1980 and 1985 (Tables 2.3.3-1 and 2.3.3-2), tables are included which show percentages in D.W.T. by types of ships and intervals of size in 1980 and 1985 (Tables 2.3.3-3 and 2.3.3-4 as well as tables showing average sizes of the fleet to be contracted and required (tables 2.3.3.5 and 2.3.3.6).

Year / Type of vessel	1980	1985
OIL TANKERS AND OBOS	51.6	46.4
L.P.G.	0.6	0.5
L.N.G.	0.9	2.7
BULK CARRIERS	30.4	24.3
REFRIGERATED	0.2	0.0
CONTAINERS	2.6	10.1
CARGO SHIPS	13.7	16.0

Table 2.3.3-1 RELATIVE PERCENTAGES OF IMPORTANCE FLEET TO BE CONTRACTED

Year / Type of vessel	1980	1985
OIL TANKERS AND OBOS	49.9	49.3
L.P.G.	0.6	0.5
L.N.G.	0.8	1.3
BULK CARRIERS	29.1	28.3
REFRIGERATED	0.3	0.3
CONTAINERS	2.3	4.4
CARGO SHIPS	17.0	15.9

Table 2.3.3-2 RELATIVE PERCENTAGES OF IMPORTANCE FLEET REQUIRED

In the latter table it is to be observed that the average size of the oil tankers is less than that of solid bulk carriers, this is due, on the one hand, to the great relative importance of the total tonnage for transport of refined products whose unit tonnage is small, and on the other hand, to the limitations of existing ports along the whole of the American coast that precludes the entrance of large vessels for the transport of crude.

SIZE RANGE (IN THOUS. TONS.) / TYPE OF SHIP.	0 - 30		30 - 80		80 - 180		180	
	1.980	1.985	1.980.	1.985.	1.980.	1.985.	1.980.	1.985.
Oil Tankers and obos	4,7	15,7	53,8	34,5	15,0	19,7	16,5	30,1
L.P.G.	100,0	100,0	--	--	--	--	--	--
L.N.G.	19,2	21,3	80,8	78,7	--	--	--	--
Bulkcarriers.	8,8	8,4	23,1	25,2	68,1	66,4	--	--
Refrigerated ships.	100,0	100,0	--	--	--	--	--	--
Container ships.	100,0	100,0	--	--	--	--	--	--
Cargo ships.	100,0	100,0	--	--	--	--	--	--

Table 2.3.3-3 PERCENTAGES OF D.W.T. for EACH SIZE RANGE.
FLEET TO BE CONTRACTED.

SIZE RANGE (IN THOUS. TONS) / TYPE OF SHIP.	0 - 30		30 - 80		80 - 100		100	
	1.980	1.985.	1.980.	1.985.	1.980.	1.985.	1.980.	1.985.
Oil Tankers and obos.	5,6	7,4	50,7	47,2	15,8	16,8	27,9	28,6
L.P.G.	100,0	100,0	--	--	--	--	--	--
L.N.G.	19,2	20,3	80,8	79,7	--	--	--	--
Bulkcarriers.	15,2	13,6	22,0	22,7	62,8	63,7	--	--
Refrigerated ships.	100,0	100,0	--	--	--	--	--	--
Container ships.	100,0	100,0	--	--	--	--	--	--
Cargo ships.	100,0	100,0	--	--	--	--	--	--

Table 2.3.3-4 PORCENTAGES OF D.W.T. FOR EACH SIZE RANGE. FLEET REQUIRED.

Year / Type of vessel	1980	1985
OIL TANKERS AND OBOS	59.5	54.4
L.P.G.	15.8	12.2
L.N.G.	40.8	43.6
BULK CARRIERS	77.7	70.4
REFRIGERATED	3.0	--
CONTAINERS	11.0	13.8
CARGO SHIPS	9.5	9.6

Table 2.3.3-5 AVERAGE SIZE, FLEET TO BE CONTRACTED (IN THOUSANDS OF TONS DEAD WEIGHT)

Year / Type of vessel	1980	1985
OIL TANKERS AND OBOS	59.7	59.8
L.P.G.	13.5	14.7
L.N.G.	40.8	50.6
BULK CARRIERS	67.0	70.3
REFRIGERATED	3.3	3.3
CONTAINERS	11.1	12.6
CARGO SHIPS	10.0	9.9

Table 2.3.3-6 AVERAGE SIZE, FLEET REQUIRED (IN THOUSAND OF TONS DEAD WEIGHT)

On the other hand, the transport of large solids will represent in the future, a greater proportion of traffic to countries with port facilities that permit the operation of large vessels, both in import and export transactions, which justifies the larger average size in comparison with that of oil tankers even counting with the fact that large ships of this type of more than 180,000 D.W.T. do not exist.

The comparison of the fleets to be contracted for entry into service in 1980 and 1985 shows a decrease in relative importance of the tonnage of OIL TANKERS and OBOS (-5.2 per cent) and BULK CARRIERS (-6.1 per cent) and an increase in relative importance in the type of cargo vessels (+ 2.3 per cent) and containers (+ 7.5 per cent), which corresponds to the process of industrialisation in the countries of the Sub-region.

On the other hand, and with respect to the oil fleet contracted for entry into service in 1985, a greater percentage in the unit tonnages of more than 80,000 D.W.T. is observed, even in the case of large tankers, (VLCC) in relation to those of 1980, owing to the forecast made of the entry into service in these years of terminals suitable for these large vessels.

2.4. STUDY OF THE MARKET FOR SHIP REPAIRS

2.4.1. FORECASTS CONCERNING SHIPS TO BE REPAIRED IN SHIPYARDS IN THE SUB-REGION

The market for ship repair will be constituted by ships comprising the following groups:

a) - Ships registered in Andean countries

b) - Ships registered in other foreign countries

For each of these groups, maximum and minimum hypotheses have been considered, and in accordance with each of these hypotheses the number of ships and their tonnages that it is envisaged will constitute the market in 1980 and 1985 have been specified.

a) In the case of ships registered in the Sub-region, the maximum hypothesis assumes that in 1980 there will be registered the number of ships required to cover 50 per cent of the extra-zonal traffic, 80 per cent of the intra-zonal traffic and 100 per cent of the national coastal traffic in accordance with the figures given in Tables 2.3.2-1 to 2.3.2-7.

The minimum hypothesis assumes that in 1980 there will be registered in the Sub-region the number of vessels in each range of tonnage that represent the arithmetic mean between the amount of the fleet remaining in 1980 and the amount of the fleet required as indicated in the above-mentioned Tables 2.3.2-1 to 2.3.2-7.

It should be remembered that the number of ships in the total fleet required corresponds precisely to the criterion of assigning to the ships registered in the Sub-region 50 per cent of the extra-zonal traffic, 80 per cent of the intra-zonal traffic of the Sub-region and 100 per cent of the national coastal traffic of each country.

In the case of the year 1985, the two corresponding hypotheses have been considered in a similar way: The first of these hypotheses envisages the maximum number of ships registered in the Andean Sub-region that will be required to carry out the transport of merchandise in the precentages previously indicated for each type of traffic, in accordance with the fore-casts made in point 2.3.2 (Tables 2.3.2-8 to 2.3.2-14).

The second hypothesis takes into account a number of ships registered in the Sub-region which is intermediate between the number of ships remaining and the number required in order to cover the previous hypothesis. In order to determine this number in each range of tonnage the same factors have been taken into consideration as in the case of 1980.

On the basis of these data, Tables 2.4.1-1 and 2.4.1-2 have been drawn up, corresponding to the ships of Andean registration that it was envisaged could be repaired in the shipyards of the Sub-region in 1980 and 1985 respectively. These tables show the ships classified by tonnage independently of type of cargo. For this forecast it was considered that all the ships registered in Andean countries would be required in the Sub-region, for which purpose it will be necessary to take the appropriate legal measures.

b) <u>In the case of ships of foreign registration</u> that can be repaired in the Sub-region in 1980 and 1985, two forecasts have also been made: a maximum and a minimum forecast. In both cases the total number of ships of foreign registration that would be required to complement the total merchant traffic in all items has been taken into consideration.

Tables 2.4.1-3 and 2.4.1-4 show the data classified in the same ranges of dead weight tonnages as in the case of Andean ships, of number of ships and total dead weight tonnage. In this case an estimate has been made for each range of tonnage, of percentages of foreign ships that will be repaired in the Sub-region. It is considered that in view of the newness of the Andean repair shipyards, these percentages will be small and even nil for the largest sizes.

Table 2.4.1-5 shows the total numbers of merchant vessels that it is envisaged will constitute the market for ship repair in the Andean Sub-region in 1980 and 1985 respectively, in accordance with the maximum and minimum hypotheses previously defined.

Table 2.4.1-1

ESTIMATION OF ANDEAN FLEET TO BE REPAIRED IN THE SUBREGION IN 1980 .

MINIMUM FLEET ESTIMATION.			MAXIMUM FLEET ESTIMATION.		
D.W.T. range.	N° ships.	DWT total.	DWT range.	N° ships	DWT total.
2000-6000	44	528.000	2000-6000	114	910.500
6000-15000	56	672.000	6000-15000	146	1.166.500
15000-45000	75	1.500.000	15000-45000	150	3.851.800
45000-80000	17	1.100.000	45000-80000	44	2.899.000
80000-180000	10	1.400.000	80000-180000	27	3.860.000
> 180000	4	1.000.000	> 180000	8	2.050.000

Tabl 2.4.1-2

ESTIMATION OF ANDEAN FLEET TO BE REPAIRED IN THE SUBREGION IN 1.985.

MINIMUM FLEET ESTIMATION.			MAXIMUM FLEET ESTIMATION.		
D.W.T Range.	N° ships.	D.W.T total	D.W.T Range	N ships.	D.W.T total.
2000-6000	66	660.000	2000-6000	148	1.153.600
6000-15000	84	840.000	6000-15000	199	1.551.00
15000-45000	100	2.250.000	15000-45000	186	5.094.700
45000-80000	25	1.625.000	45000-80000	56	3.757.0
80000-180000	15	2.100.000	80000-180000	38	5.105.000
>180.000	6	1.500.000	>180.000	10	2.737.500

Table 2.4.1-3

ESTIMATION OF PERCENTAGES AND NUMBER OF FOREIGN SHIPS THAT WILL BE DRYDOCKED IN THE SUBREGION IN 1.980

MAXIMUM ESTIMATION.				
Range of D.W.T.	Number of operating ships.	D.W.T total	Percentage of ships that will be drydocked in the Subregion.	N° of ships estimated for drydocking.
2000-6000	78	556.000	20%	15,6
6000-15000	236	1.675.000	8%	18,8
15-45000	168	4.740.484	5%	8
45-80000	67	4.109.100	2%	1,34
80-180000	46	6.170.000	-	-
>180000	12	2.834.800	-	-
MINIMUM ESTIMATION.				
Range of D.W.T.	Number of operating ships.	D.W.T total	Percentage of ships that will be drydocked in the Subregion.	N° of ships estimated for drydocking.
2000-6000	38	336.400	20%	7,6
6000-15000	115	1.017.700	8%	9,2
15-45000	93	2.388.684	5%	4,6
45-80000	40	2.310.100	2%	1
80-180000	29	3.710.000	-	-
>180000	8	1.784.800	-	-

Table 2.4.1-4

ESTIMATION OF PERCENTAGES AND NUMBER OF FOREIGN SHIPS THAT WILL BE DRYDOCKED IN THE SUBREGION IN 1.980.

MAXIMUM ESTIMATION.				
Range of D.W.T.	Number of operating ships.	D.W.T. total.	Percentage of ships that will be drydocked in the Subregion.	Number of ships estimated for drydocking.
2000-6000	111	927.600	20%	22
6000-150000	332	2.775.000	8%	27
15-45000	250	6.119.174	5%	12,5
45-80000	80	5.317.000	2%	1,6
80-180000	60	7.960.000	-	-
> 180000	15	3.625.000	-	-
MINIMUM ESTIMATION.				
Range of D.W.T.	Number of operating ships.	D.W.T. total.	Percentage of ships that will be drydocked in the Subregion.	Number of ships estimated for drydocking.
2000-6000	65	629.258	20%	13
6000-15000	193	1.868.540	8%	15,4
15-45000	146	3.274.474	5%	7,3
45-80000	49	3.185.000	2%	1
80-180000	38	4.955.000	-	-
> 180000	11	2.387.500	-	-

Tabl 2.4.1-5

ESTIMATION (MAX. AND MIN.) OF TOTAL NUMBER OF MERCHANT SHIPS DRYDOCKING IN THE SUBREGION IN 1.980 AND 1.985.

	MAXIMUM.		MINIMUM.	
Range of D.W.T	Number of ships estimated drydocking in 1.980.	Number of ships estimated drydocking in 1.985.	Number of ships estimated drydocking in 1.980.	Number of ships estimated drydocking in 1.985.
2.000-6000	129,6	170	51,6	79
6000-15000	164,8	226	65,2	99,4
15000-46000	158	198,5	79,6	107,3
46000-80000	45,3	57,6	18	26
80000-180000	27	38	10	15
> 180000	8	10	4	6

2.4.2. DISTRIBUTION OF THE REPAIR FACILITIES IN RANGES OF SIZE

The sizes of the repair facilities have been classified in relation to the dead weight tonnage of the ships to be repaired. This classification is orientative, since the possibility of grounding a ship depends on the geometrical characteristics of the means with which the grounding is to be effected, and in the case of floating docks or synchroelevators, the lifting power has also to be considered. That is to say, that a ship of a specified dead weight may be grounded or not, according to whether its length, beam and draught are less than those of the dock that is to accommodate it, and for a fixed dead weight, these three characteristics may have values that differ substantially. It is the mission of the dock designer to select the most suitable dimensions for a specified dead weight, but it was considered that the sub-division by dead weight is the most appropriate and, furthermore, the most in accordance with the rest of the Study.

The sizes of docks selected are:

- For ships of between 2,000 and 6,000 D.W.T.
- For ships of between 6,000 and 15,000 D.W.T.
- For ships of between 15,000 and 45,000 D.W.T.
- For ships of between 45,000 and 80,000 D.W.T.
- For ships of between 80,000 and 180,000 D.W.T.
- For ships of more than 180,000 D.W.T.

The limits of the ranges has been fixed in such a way that the investment will be minimal, since the range of tonnages admitted in each of the docks is wide, at the same time a suitable flexibility in the small and medium sizes is achieved by reason of the number of them provided.

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(2 of 3)

UNIDO

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

STUDY FOR THE INTEGRATION OF THE SHIPBUILDING AND REPAIR INDUSTRY IN THE ANDEAN GROUP OF COUNTRIES

FINAL REPORT

VOLUME II

UNIDO - CONTRACT No. 73/13 (1)
PROJECT No. IS/RLA/72/843

TECNIBERIA
MADRID-SPAIN

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INDEX OF APPENDIX.

3. STUDY OF THE DEVELOPMENT OF THE SHIPBUILDING SECTOR IN THE SUB-REGION

3.0. GENERAL ASPECTS

The shipbuilding sector presents a series of aspects of such complexity that in order to direct its development, it is advisable to establish a number of general ideas which, it is considered, should be taken into account at the time of taking decisions and while continuing the course of development of the shipbuilding sector in the sub-region until adequate levels are attained.

The development of the shipbuilding sector should be based on integral planning, beginning with the co-ordinated analysis of the diverse factors that concur in the sector.

The sub-sectors integrating the shipbuilding sector are studied in sections 3.1 to 3.5 of this part of the Study, beginning with the forecasts for the market in ship construction and repairing deduced in Part 2 of the Study. Also in sections 3.6 and 3.7 an analysis is made of the resources necessary for the various alternatives of development and the desirable evolution of the legislation in the sub-region, coherent with the policy adopted for the development of the shipbuilding sector.

The general policy concerning the shipbuilding sector includes variable approaches, in accordance with the emphasis which it is decided to place on the preferred development of some of the components of the sector: Fleet of the sub-region, Shipbuilding, Ship Repairing or development of Auxiliary Industries.

In this sense, it should be noted that a Shipping Company is, fundamentally, a firm that utilises capital goods, that has to make very large investments in ships and whose operation is carried out by a small number of persons.

Shipbuilding requires high investments, although normally a long period of amortisation is available. However, a large number of personnel is necessary to carry out the construction of a ship and a working capital that permits the purchase of materials and sufficient elasticity to be able to give shipowners acceptable conditions of financing. Ship Repairing requires similar, and in some cases smaller investments, and also a smaller working capital, since there is a lesser volume of materials to be purchased and, on the other hand, repairs do not require such long deferred payments as is customary in ship construction. The contribution of labour in this case is, proportionately, the most important in the sector. The Auxiliary Industry covers such a wide range of possibilities that it would be difficult to define the proportions of labour and capital, although we may consider that it would be similar to those for ship building for the whole of the auxiliary industry considered globally.

As an illustrative example of the various possible approaches, it is appropriate to indicate the policies followed by some countries, or groups of countries, of a certain importance within the shipping sector.

JAPAN

This country, with 14,750,831 gross registered tons delivered in 1973 and more than 50 per cent of world production, occupies the first place in the world ship construction. Moreover, its merchant fleet, with 36,785,000 gross registered tons occupies the second place in the world after Liberia.

The guidelines followed by Japan in this sector have been those of favouring initially, and by every means, the ship-building industry, being supported by low labour costs and an advanced conventional technology in ship construction.

As a consequence of the enormous potential acquired by Japanese ship-building a large merchant fleet has been developed in accordance with the needs of an archipelago such as Japan, whose foreign trade is effected entirely by sea. Also, as a consequence of the development of the basis ship-building industry, an auxiliary industry was subsequently created that today supplies practically all the Japanese shipyards, and successfully exports to other countries. It is appropriate to point out that 20 years ago Japanese imports of equipment for the ship-building industry amounted to large quantities and came principally from Europe and the U.S.A.

GREECE

The importance of Greece in the shipping world is due to the activity of its Shipowners who, by initially building almost all the ships outside the country, or even buying them second hand, have registered in Greece an important tonnage that amounts to 19,295,000 gross registered tonnage to which must be added the tonnage that, under flags of convenience, is controlled by Greek shipowners. It is noteworthy that, in both cases, the crews of the ships are generally Greek. Much later, after the development of its merchant fleet, the construction of shipyards devoted principally to repairing was initiated, and only subsequently, and even at the present time, on a small scale (114,311 gross registered tonnage in 1973), these shipyards are engaging in construction. The Greek auxiliary ship-building industry is still only incipient.

SCANDINAVIA

The Scandinavian countries present a very interesting panorama in the shipping sector.

Sweden has been for many years now the leading country in Europe in ship construction and the second in the world, after Japan, with 2,290,466 gross registerdd tonnage in 1973.

Norway, with much more modest figures in ship-building (983,693 gross registered tonnage) has a merchant fleet that occupies third place in the world, excepting flags of convenience, and amounts of 23,621,000 gross registered tonnage, that is to say, much higher than that of Sweden which only counts with 5,669,080 gross registered tonnage.

Denmark is below the other countries mentioned in regard to its merchant fleet (4,107,000 gross registered tonnage). However, its production in ship-building is similar to that of Norway (1,003,960 gross registered tonnage in 1973).

A commercial firm engaged in the construction of slow diesel engines is established in Denmark, which, either with its own manufactures, or through the licences, occupies second place in the world, amounting to 2,157,390 BHP in 1973, which represents 24 per cent of the propulsive power of the ships driven by diesel engines that have entered into service during the year.

We may consider that a specialisation exists within the sector in each of the countries concerned and that Scandinavia, as a whole, places this group of countries in an important position in the ship-building and operating industry, as well as in the complex technology of the auxiliary industry in its various aspects.

It is noteworthy that Norway, which constructs a high percentage of its tonnage outside the country, has developed an important auxiliary industry and that the greater part of the Norwegian ships constructed abroad carry auxiliary equipment manufactured in Norway. The case of Sweden is also curious, since with the highest wage levels in the world, it occupies the second place in ship construction thanks to a very advanced technology and in spite of the great importance of the labour factor in the price of constructing a ship.

SPAIN

The policy with regard to the development of the ship-building sector in Spain has been to maintain a balance between the different sectors that compose it, developing simultaneously ship construction and the merchant marine at the same time that the utilisation of ship equipment manufactured by the Spanish auxiliary industry has been promoted, although in the majority of cases using manufacturing licences from other countries.

The Spanish merchant fleet amounts to 4,833,000 gross registered tonnage and its shipyards delivered a total of 1,318,506 gross registered tonnage in 1973.

The foregoing examples may serve to identify the different approaches that are suitable for the development of the shipping sector.

On the other hand, and in regard to the aspect of location of the Firms in the shipping sector within the countries of the sub-region, the factors determining the strategy of distribution of firms to be implemented are shown hereunder.

These factors may be grouped in the following sections:

(a) - Geographical

- Distance from the shipyards to the railheads and loading and unloading of merchandises.
- Distance from the shipyards to the most frequented international sea routes.
- Facilities for access of materials by sea, railway, or road to the shipyards of Auxiliary Industries.
- Natural characteristics of the coast.

(b) - Meteorological

- Pluviometric indices that may affect working in the open air, principally with respect to welding operations
- Force of winds that may make manoeuvres difficult with blocks or elements of large volume as well as affecting protected arc welding with gases
- Extreme temperatures that might affect the output of the personnel due to excessive heat or cold.

(c) - Sociological

- Wage levels in each zone
- Unemployment levels
- Polarisation of socio-economic development in certain areas
- Need for development of the most depressed zones

(d) - Technological

- Experience in ship-building and repair work, shipping operations or auxiliary industries for a period of time sufficient to develop the technology of the sector
- Experience in manufacturing or similar work
- Possibilities of contracting auxiliary work
- Advisability of integrating in a single shipyard ship-building and repair activities.

(c) - Financial

The financial possibilities of each country for investments in shipyards and industries and especially for investments in ships. It should be remembered that within the sector there exists different proportions between the financial needs and the labour requirements, according to whether it is a question of maritime transport, ship-building, ship - repairing, manufacture of equipment, etc., as it has been stated previously.

3.1. DEVELOPMENT OF SHIPBUILDING YARDS

3.1.1. DEVELOPMENT OF PRODUCTION OF EXISTING SHIPYARDS OR THOSE IN AN ADVANCED STAGE OF PLANNING

The capacity of the shipyards existing at the present time in the sub-region has been projected for the future, taking into account for this purpose the degree of development foreseeable during the period under study and the increases in capacity envisaged up to 1985, as well as the plans for new shipyards that are now in such an advanced stage that they may be considered as realisable within the above-mentioned period.

Both with respect to the increases in capacity and the new shipyards already in an advanced planning stage, a realistic criterion has been applied in order to estimate their development, which, in many cases, is below the forecasts made by the directors of the respective shipyards.

In the case of SIMA it was considered that the present building berth will continue in service for the construction of ships of the order of 25,000 D. W.T. and that the new building berth, at present under construction, will initiate its activities with the construction of ships of 150,000 tons, subsequently proceeding to the construction of ships of 250,000 tons.

It has been envisaged that PICSA will engage fundamentally in the construction of fishing vessels, as it has done up to the present time, and only a part of its capacity will be devoted to cargo ships of 2,500 D.W.T., taking into account the fact that the launching facilities of this shipyard do not permit the construction of larger ships.

In the case of CONASTIL, it is envisaged that in 1976 the new shipyard projected in the zone of Mamonal on the Bay of Cartagena will commence its activities. It was also envisaged that the new project for the new shipyard at CARTAGENA is sufficiently advanced to be included within this group and that the initiation of its activities in 1977 may be expected.

The entry into service of the synchroelevator for the docks and slipways at Puerto Cabello has also been taken into account, with a progressive increase in the capacity of the shipyard, which will permit it to construct 6 ships of 10.000 D.W.T. each year about 1984.

Following these criteria, Table 3.1.1-1 has been prepared, showing the following data for each shipyard.

- Year to which the forecast refers.
- Number of ships and dead weight tonnage per unit of the ships to be produced in the year.
- Total dead weight tonnage to be produced in the year (DWT).
- Tons. of steel needed for the construction of the hulls of the ships to be produced (St.)
- Total power of the propulsion engines of the ships to be produced, expressed in brake horse power (BHP).
- Total power of the auxiliary engines of the generating units of the ships to be produced, expressed in brake horse power (bhp).

Table 3.1.1-2 shows the forecast for total production of the existing shipyards expressed in dead weight tonnage, tons of steel required for construction of hulls, and horsepower of the propulsion engines and auxiliary engines.

Successively, the data indicated in this Table have been graphically represented in figures 3.1.1-A, 3.1.1-B, 3.1.1-C, 3.1.1-D, 3.1.1-E for - each of the shipyards.

In a similar way the figures contained in Table 3.1.1-2 have been represented graphically in Figure 3.1.1-F.

Table 3.1.1-1

SHIPBUILDING PLAN IN EXISTING SHIPYARDS (OR IN ADVANCED DESIGN STAGE) BETWEEN 1.974 and 1.985.

SIMA - Perú.

1.974.	1.975.	1.976.
3 x 25.000 D.W.T.	3 x 25.000 D.W.T.	3 x 25.000 D.W.T.
DWT = 75.000 St. = 24.000 Tons. BHP = 33.000 bhp = 5.850	DWT = 75.000 St. = 24.000 Tons. BHP = 33.000 bhp = 5.850	DWT = 75.000 St. = 24.000 Tons. BHP = 33.000 bhp = 5.850
1.977.	1.978.	1.979.
4 x 25.000 D.W.T.	2 x 25.000 D.W.T. 1 x 150000 D.W.T.	3 x 25.000 D.W.T. 1 x 150.000 D.W.T.
DWT = 100.000 St. = 32.000 Tons. BHP = 44.000 bhp = 7.800	DWT = 200.000 St. = 38.000 Tons. BHP = 50.000 bhp = 6.750	DWT = 225.000 St. = 46.000 Tons. BHP = 61.000 bhp = 8.7000
1.980.	1.981.	1.982.
3 x 25.000 D.W.T. 2 x 150.000 D.W.T.	4 x 25.000 D.W.T. 2 x 150.000 D.W.T.	4 x 25.000 D.W.T. 2 x 150.000 D.W.T.
DWT = 375.000 St. = 68.000 Tons. BHP = 89.000. bhp = 11.550.	DWT = 400.000. St. = 76.000. BHP = 100.000. bhp = 13.500.	DWT = 400.000 St. = 76.000 BHP = 100.000 bhp = 13.500
1.983.	1.984.	1.985.
4 x 25.000 D.W.T. 2 x 150.000 D.W.T.	4 x 25.000 D.W.T. 2 x 250.000 D.W.T.	4 25.000 D.W.T. 2 x 250.000 D.W.T.
DWT = 400.000 St. = 76.000 Tons. BHP = 100.000. bhp = 13.500.	DWT = 600.000. St. = 96.000 Tons. BHP = 116.000 bhp = 14.400	DWT = 600.000 St. = 96.000 Tons. BHP = 116.000 bhp = 14.400

Table 3.1.1-1 (Continuation)

SHIPBUILDING PLAN IN EXISTING SHIPYARDS (OR IN ADVANCED DESIGN STAGE) BETWEEN 1.974 AND 1.985

PICSA - PERU.

1.974.	1.975.	1.976 .
-	-	-
1,977.	1,978.	1.979.
1 x 2.500 D.W.T.	1 x 2.500 D.W.T.	1 x 2.500 D.W.T.
DWT = 2.500 St. = 800 Tons. BHP = 2,000 bhp = 500	DWT = 2.500 St. = 800 Tons. BHP = 2.000 bhp = 500	DWT = 2.500 St. = 800 Tons. BHP = 2.000 bhp = 500
1,980,	1,981,	1.982,
2 x 2500 D.W.T.	2 x 2.500 D.W.T.	2 x 2.500 D.W.T.
DWT = 5.000 St. = 1600 Tons. BHP = 4.000 bhp = 1.000	DWT = 5.000 St. = 1600 Tons. BHP = 4.000 bhp = 1.000	DWT = 5.000 St. = 1.600 Tons. BHP = 4.000 bhp = 1.000
1,983.	1,984.	1.985
4 x 2.500 D.W.T.	4 x 2.500 D.W.T.	4 x 2.500 D.W.T.
DWT = 10.000 St. = 3.200 Tons. BHP = 8.000 bhp = 2.000	DWT = 10.000 St. = 3.200 Tons. BHP = 8.000 bhp = 2.000	DWT = 10.000 St. = 3.200 T. BHP = 8.000 bhp = 2.000

3.1.1-1 (CONTINUATION)

SHIPBUILDING PLAN IN EXISTING SHIPYARDS (OR IN ADVANCED DESIGN STAGE) BETWEEN 1.974 and 1.985.

CONASTIL enlarged (Moved away)
COLOMBIA.

1.974.	1.975.	1.976.
--	--	1 x 3.000 D.W.T.
		DWT = 3.000 St. = 1.000 BHP = 3.500 bhp = 600.
1.977	1.978	1.979.
2 x 3.000 D.W.T.	3 x 3.000 D.W.T.	4 x 3.000 D.W.T.
DWT = 6.000 St. = 2.000 BHP = 7.000 bhp = 1.200	DWT = 9.000 St. = 3.000 BHP = 10.500 bhp = 1.800	DWT = 12.000 St. = 4.000 BHP = 14.000 bhp = 2.400.
1.980	1.981.	1.982.
4 x 3.000 D.W.T.	4 x 3.000 D.W.T.	4 x 3.000 D.W.T.
DWT= 12.000 St.= 4.000 BHP = 14.000 bhp = 2.400	DWT = 12.000 St. = 4.000 BHP = 14.000 bhp = 2.400	DWT = 12.000 St. = 4.000 BHP = 14.000 bhp = 2.400
1.983.	1.984.	1.985.
4 x 3.000 D.W.T.	4 x 3.000 D.W.T.	4 x 3.000 D.W.T.
DWT= 12.000 St.= 4.000 BHP = 14.000 bhp = 2.400	DWT= 12.000 St.= 4.000 BHP = 14.000 bhp = 2.400	DWT 12.000 St. = 4.000 BHP = 14.000 bhp = 2.400

Table 3.1.1-1 (Continuation)

SHIPBUILDING PLAN IN EXISTING SHIPYARDS (OR IN ADVANCED DESIGN STAGE) BETWEEN 1.974 and 1.985.

New Shipyard at Cartagena (Colombia).

1.974.	1.975.	1.976.
-	-	
1.977	1.978.	1.979.
1 x 15.000 D.W.T.	2 x 15.000 D.W.T.	2 x 20.000 D.W.T.
DWT = 15.000 St. = 5.000 BHP = 8.000 bhp = 1.650	DWT = 30.000 St = 10.000 BHP = 16.000 bhp = 3.300	DWT = 40.000 St. = 14.000 BHP = 20.000 bhp = 3.600
1.980.	1.981.	1.982.
3 x 20.000 D.W.T.	4 x 20.000 D.W.T.	4 x 25.000 D.W.T.
DWT = 60.000 St. = 21.000 BHP = 30.000 bhp = 5.400	DWT = 80.000 St. = 28.000 BHP = 40.000 bhp = 7.200	DWT = 100.000 St. = 32.000 BHP = 44.000 BHP = 7.800
1.983.	1.984.	1.985.
4 x 25.000 D.W.T.	4 x 25.000 D.W.T.	4 x 25.000 D.W.T.
DWT = 100.000 St. = 32.000 BHP = 44.000 bhp = 7.800	DWT = 100.000 St. = 32.000 BHP = 44.000 bhp = 7.800	DWT = 100.000 St. = 32.000 BHP = 44.000 bhp = 7.800

Table 3.1.1-1 (Continuation)

SHIPBUILDING PLAN IN EXISTING SHIPYARDS (OR IN ADVANCED DESIGN STAGE) BETWEEN 1.974 and 1.985.

DIQUES Y VARADEROS - P'o. Cabello. (Venezuela).

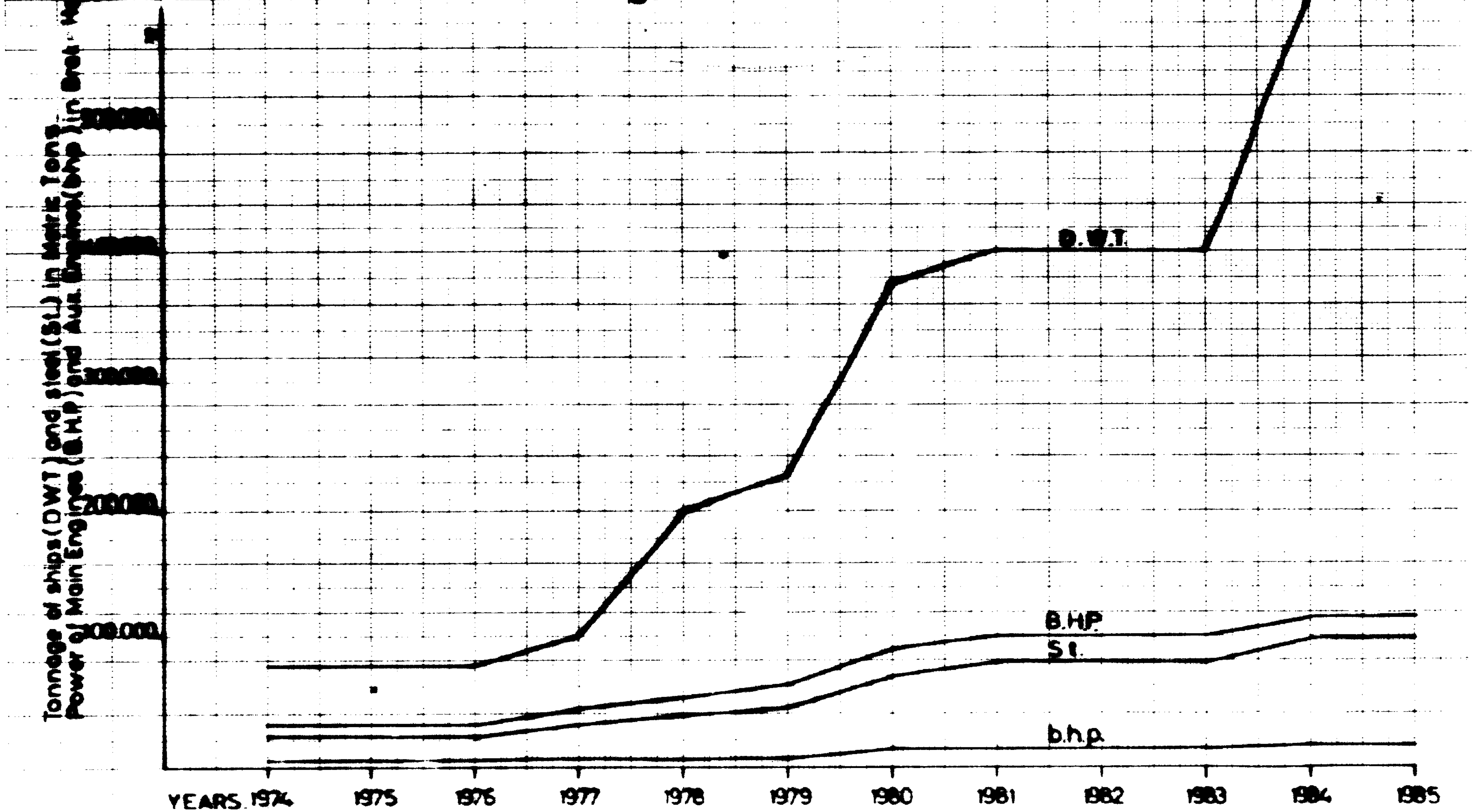
1.974.	**1.975.**	1.9[illegible].
--	1 x 6.000 D.W.T.	2 x 6.000 D.W.T.
	DWT= 6.000 St.= 2.000 BHP = 5.000 bhp = 900.	DWT - 12.000 St. - 4.000 BHP = 10.000 bhp = 1.800
1.977.	**1.978.**	1.979
1 x 6.000 D.W.T. 1 x 10.000 D.W.T.	2 x 10.000 D.W.T.	3 x 10.000 D.W.T.
DWT = 16.000 St. - 5.250 BHP = 12.000 bhp = 2.200	DWT = 20.000 St. = 6.500 BHP = 14.000 bhp = 2.600	DWT - 30.000 St. 9.750 BHP 21.000 bhp = 3.900
1.980.	**1.981.**	1.982.
4 x 10.000 D.W.T.	4 x 10.000 D.W.T.	5 x 10.000 D.W.T.
DWT 40.000 St. = 13.000 BHP = 28.000 bhp = 5.200	DWT 40.000 St. 13.000 BHP = 28.000 bhp = 5.200	DWT - 50.000 St. 16.250 BHP = 35.000 bhp 6.500
1.983	**1.984.**	1.985.
5 x 10.000 D.W.T.	6 x 10.000 D.W.T	6 x 10.000 D.W.T.
DWT 50.000 St. = 16.250 BHP = 35.000 bhp = 6.500	DWT - 60.000 St. = 19.500 BHP = 42.000 bhp = 7.800.	DWT - 60.000 St. - 19.500 BHP - 42.000 bhp - 7.800

Table 3,1,1-2

TOTAL ANNUAL PRODUCTION OF EXISTING SHIPYARDS
(OR IN ADVANCED DESIGN STAGE).

FORECAST BETWEEN 1.974 and 1.985.

Year	D.W.T.	Tons. St.	B.H.P	b.h.p
1.974	75.000	24.000	33.000	5.850
1.975.	81.000	26.000	38.000	6.750.
1.976.	90.000	29.000	46.500	8.250
1.977.	139.500	45.050	73.000	13.350
1.978.	261.500	58.300	92.500	14.950
1.979.	309.500	74.550	118.000	19.100
1.980.	492,000	107,600	165.000	25.550
1.981.	537.000	122.600	168,000	29.300
1.982.	567.000	129.850	194.600	31.200
1.983	572,000	131.450	201,000	32.200
1.984	782.000	154.700	224.000	34.400
1.985.	782.000	154.700	224.000	34.400

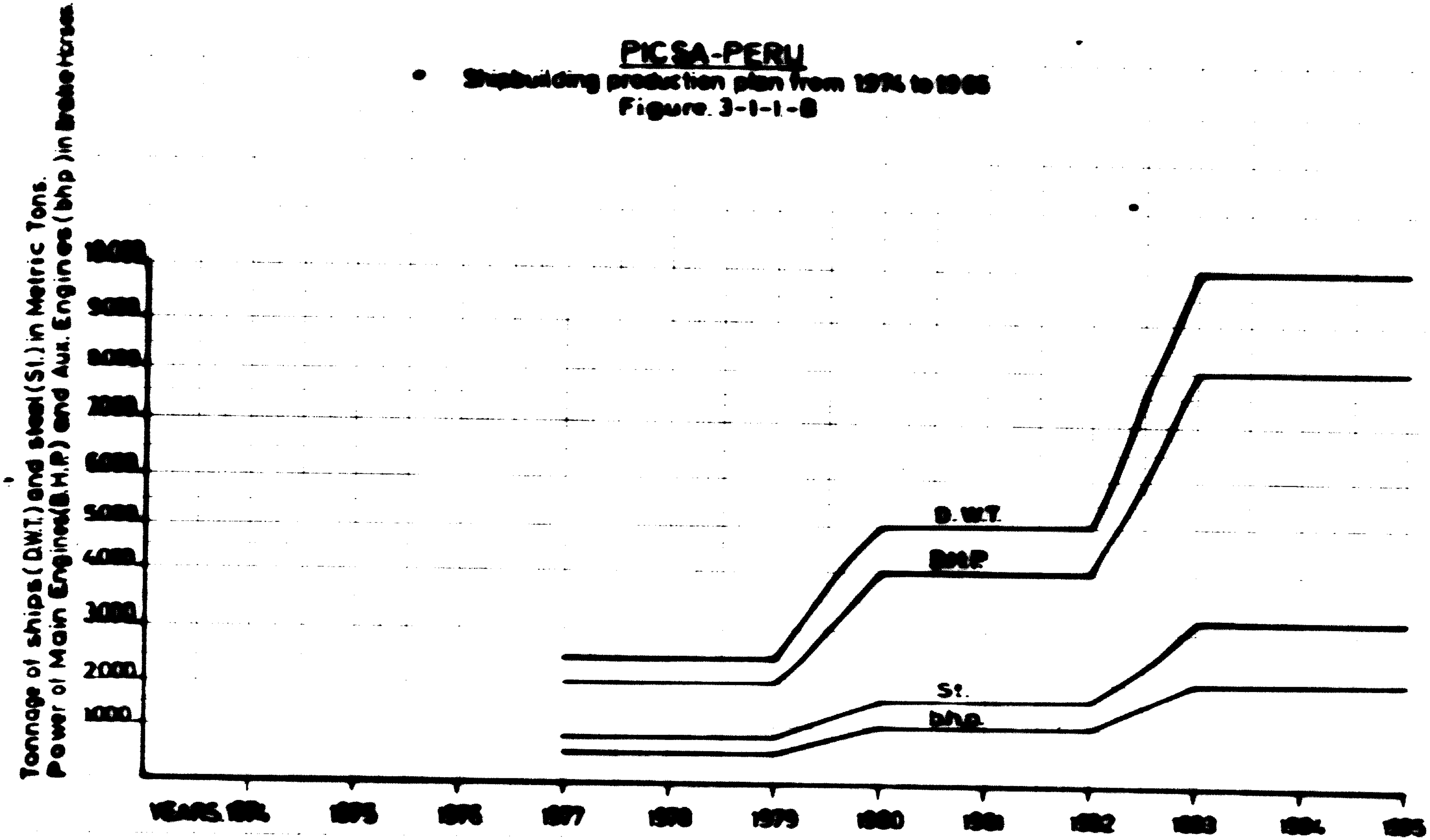


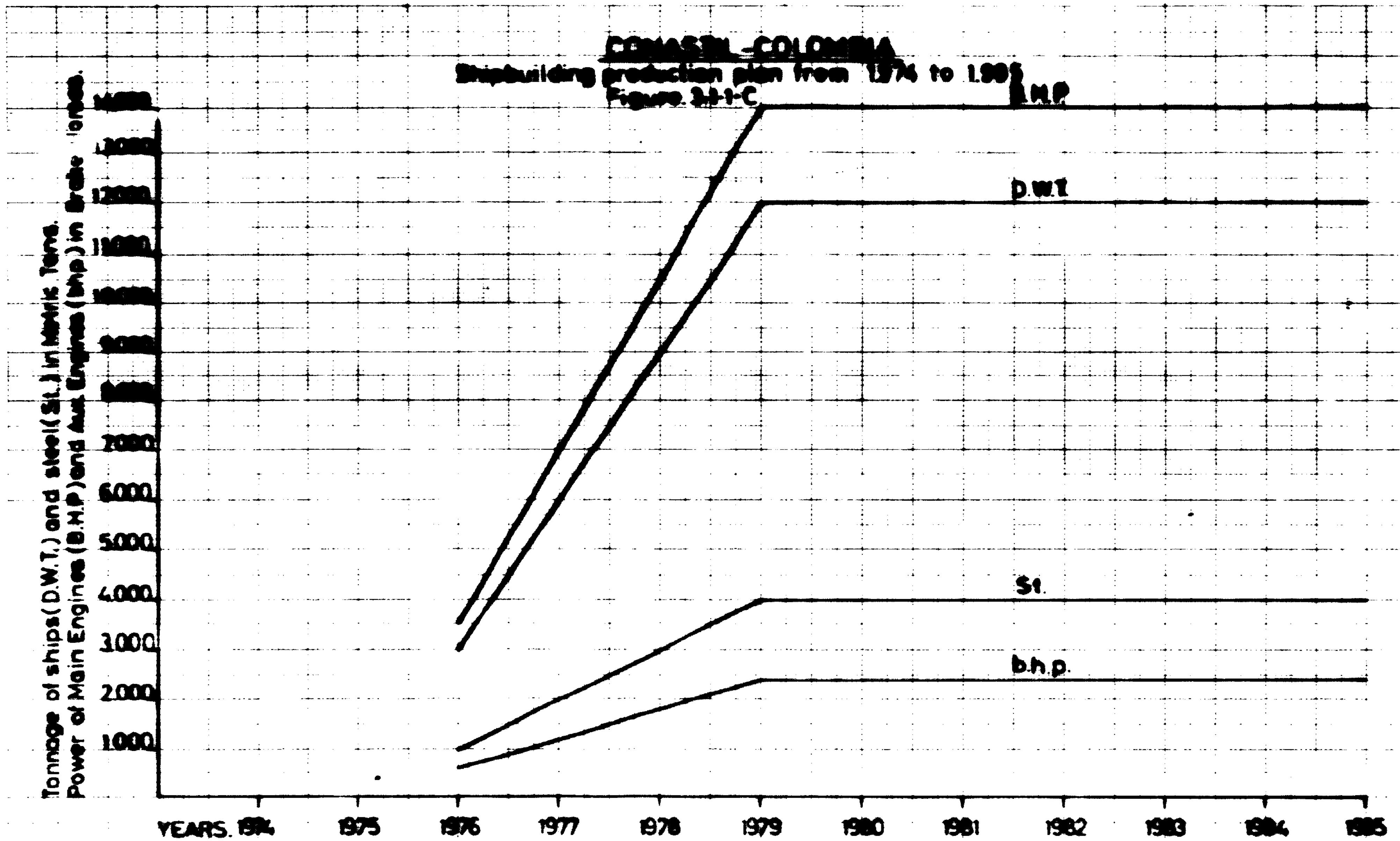
SIMA-PERU
Shipbuilding production plan from [illegible] to [illegible]
Figure 3-1-1-A

PICSA-PERU

Shipbuilding production plan from 1974 to 1985

Figure. 3-1-1-8

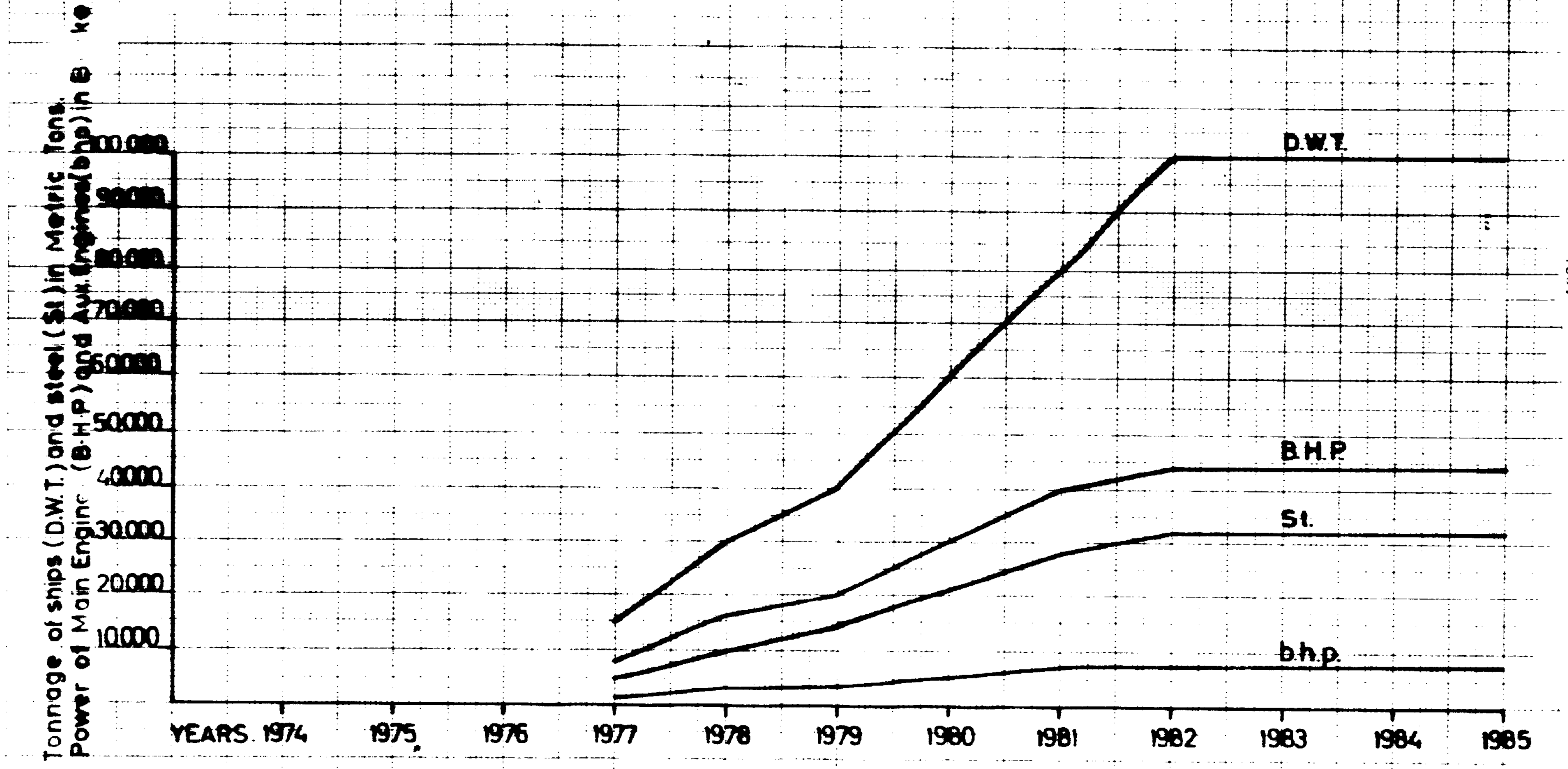


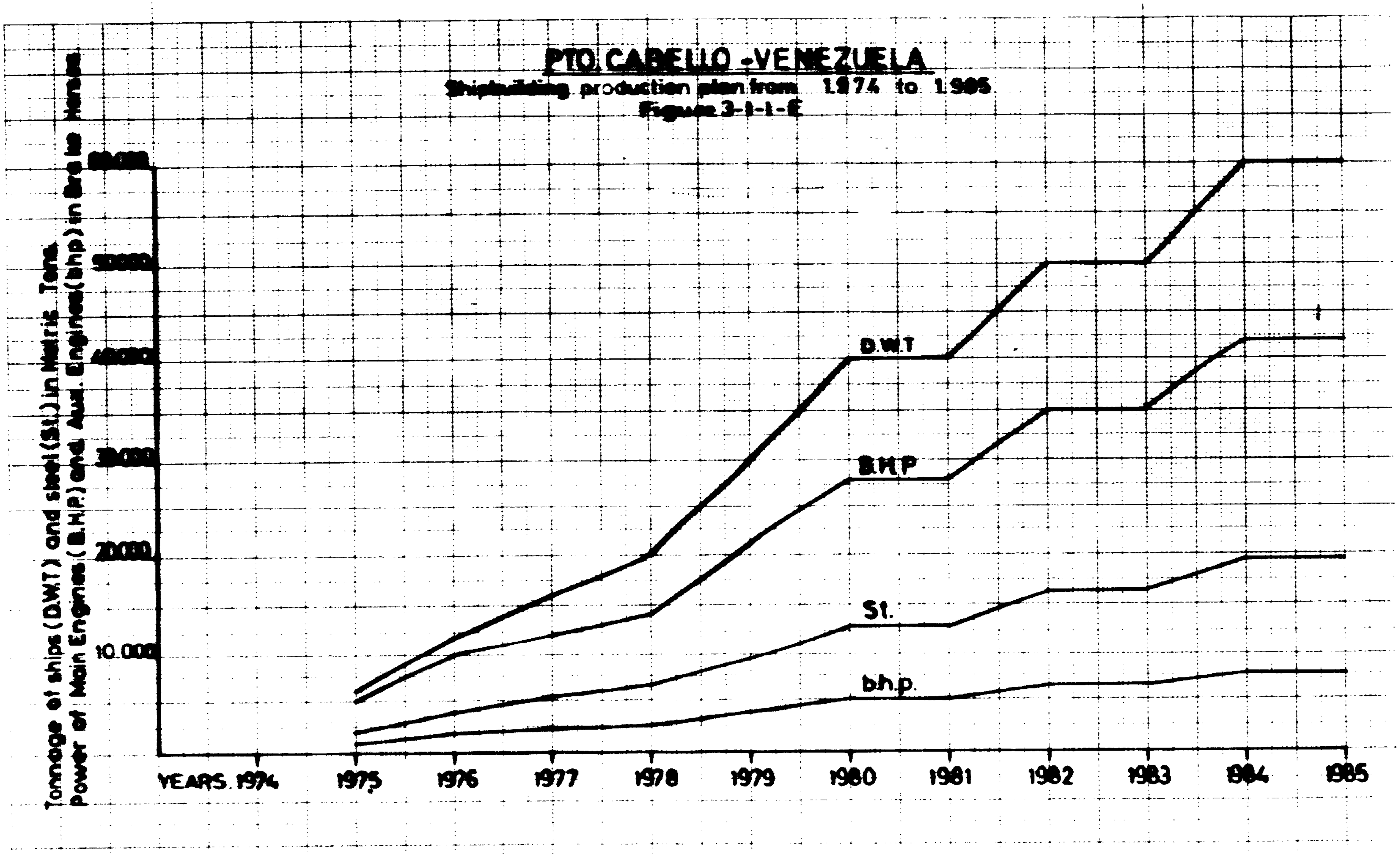

Shipbuilding production plan
Tonnage of ships (D.W.T.) and steel (St.) in Metric Tons.
Power of Main Engines (B.H.P) and Aux. Engines (bhp) in Brake Tonnes.
1000
2000
3000
4000
5000
6000
7000
YEARS. 1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
B.H.P
D.W.T
St.
b.h.p.

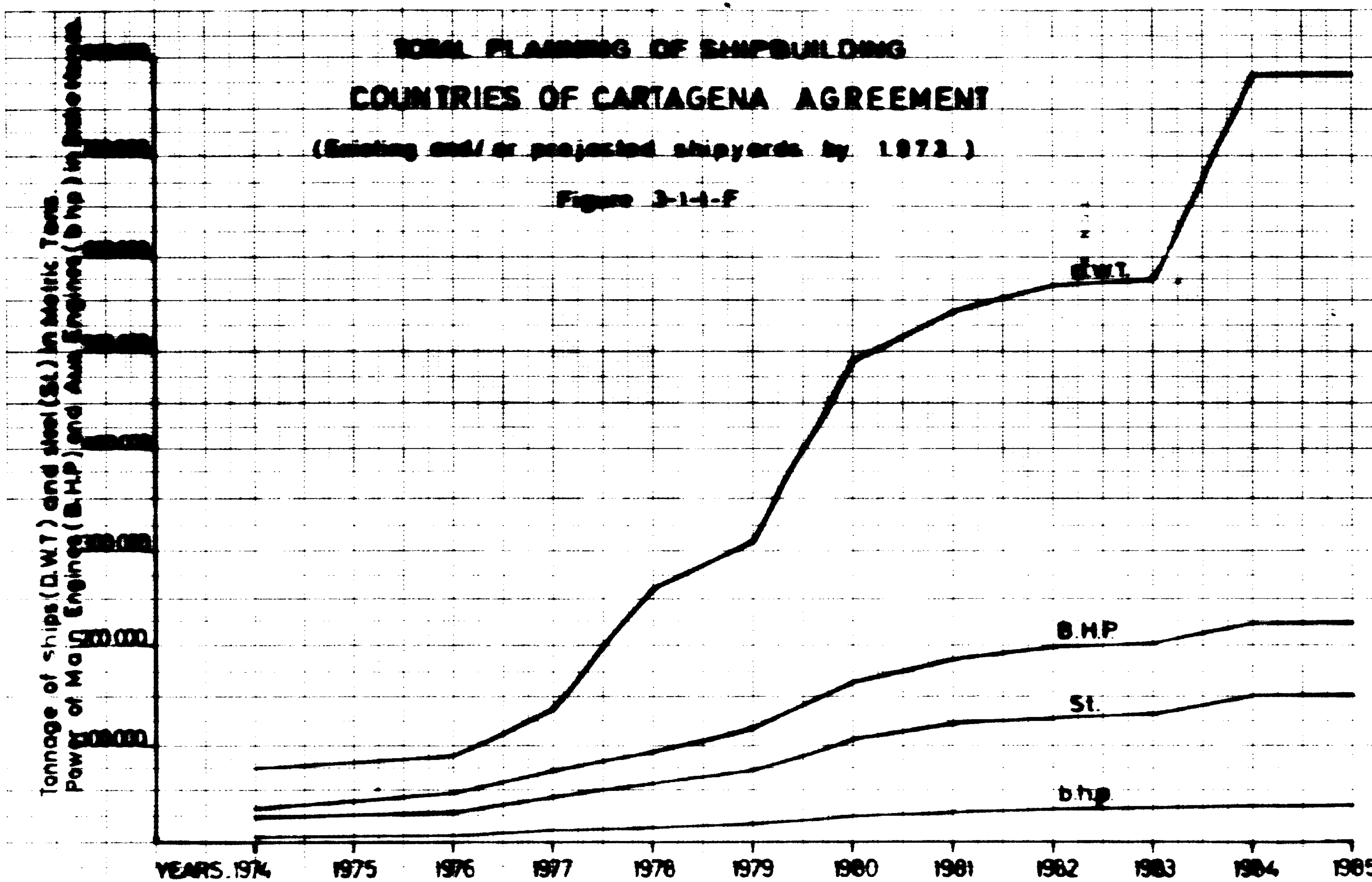
CARTAGENA-COLOMBIA

Shipbuilding production plan from 1976 to 1985

Figure. 3-1-1-D




PTO. CABELLO -VENEZUELA
Shipbuilding production plan from 1974 to 1985
Figure 3-1-1-E
Tonnage of ships (D.W.T) and steel (St.) in Metric Tons.
Power of Main Engines (B.H.P.) and Aux. Engines (bhp) in Brake Horses
60.000
50.000
40.000
30.000
20.000
10.000
YEARS. 1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
D.W.T
B.H.P
St.
b.h.p.


COUNTRIES OF CARTAGENA AGREEMENT
d.w.t.
B.H.P
St.
b.hp
300.000
200.000
100.000
YEARS. 1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985

3.1.2. STUDY OF FEASABLE NEW SHIPYARDS

a) - BASIC ASSUMPTIONS

The basic assumption made is that the subregional Shipyards shall be dedicated to the construction of those ships for - andean fleets which demand should show to be sufficient, and provided the necessary legal protection be stablished in such a way as to give preference to the subregional - shipbuilding over the acquisition of ships from outside.

For this study of the feasability of implementin new shipyards in the andean subregion, the following comparison - has been stablished between:

i) Accumulated production forecast of existing shipyards (including those projects in advanced stage) from 1974 to 1.985 as defined in point 3.1.1. and represented in Figures 3.1.1.-A to F (pág. 160 to 165)

ii) Accumulated demand forecast, that is the tonnage that may be incorporated to the andean fleet in the periods 1.974-1.980 and 1.981-1.985, as defined in point 2.3.2. and represented in Tables 2.3.2.-1 to 2.3.2-14 (pág. 118 to 131).

As stated previously, this forecast of additional tonnage for registration has been based on the assumption that - the designed goal of participation of the andean fleet in the future maritime traffic be the following:

- 50% of cargoes in extrazonal trades.
- 80% of cargoes in intrazonal trades.
- 100% of cargoes in coastal trades.

and the new tonnage needed for these participations has been determined taking into account the existing fleet and after computing the tonnage to be scrapped in this period of time.

The resulting difference between i) and ii) shall show the feasability of stablishing new shipyards, but their production capacity should be fixed below a certain safety limit.

b)- SELECTION OF TYPES AND SIZES OF SHIPS

Those ships which type and size show a greater demand in the contemplated period, have been selected for their eventual construction by shipyards in the sub-region. For this purpose, the Tables 2.3.3.-1 to 2.3.3.-6 (pág. 133 to 136) have been analised as for relative percentages of ships demand. As a result the following types have been selected as more interesting, in principle, for their construction in andean shipyards.

Type 1

- Cargo ships. Refrigerated and Containerships from 2.500 to 6.000 D.W.T.

Type 2

- Cargo ships from 6.000 to 11.000 D.W.T.

Type 3

- Cargo ships, Refrigerated and Containerships from 11.000 to 21.000 D.W.T.
- Oil tankers, OBOS and Bulk-carriers from 15.000 to 30.000 D.W.T.

Type 4

- Oil tankers, OBOS and Bulk-carriers from 30.000 to 45.000 DWT

Type 5

- Oil Tankers, OBOS and Bulk-carriers from 60.000 to 80.000 D.W.T.

Type 6

- Oil tankers, OBOS and Bulk-carriers from 120.000 to 180.000 DWT.

Type 7

- Oil tankers, OBOS and Bulk-carriers from 180.000 to 300.000 D.W.T.

For this classification, there has been taken into account the ranges of vessels that can be constructed in the same slipway or building berth, that is to say it is considered that it would be uneconomical to construct in a shipyard classified within one of the types cited, a vessel of a size different from that indicated within the limits for each type. On the other hand, it is evident that the optimum size to be constructed from the point of view of the profitability of the shipyard is a size of ship close to the maximum for which the facilities of the shipyard plant have been planned.

It has been considered that the low figure of demand for liquified gas carriers (natural or petroleum) and specific sizes of other types of ships does not justify their construction in the sub-region, as may be seen in the Tables showing the ships demand, in Part 2 of this Study.

e) - STUDY OF PRODUCTION OF NEW SHIPYARDS

For each of the ship types defined in b), the possibilities have been studied for the stablishing of new shipyards in the subregion according to the following methodology:

(see figures 3.1.2-A, B, C, D, E, F and G for each ship type, pages 178 to 184)

It has been graphically represented (CURVE 1) the accumulated demand up to 1.985, showing the tonnage that would be needed for

for andean registration in order to reach the percentages of partici-pation assumed in the maritime traffic

In tracing this curve the starting points have been the tonnage figures for the accumulated demand up to 1.980 and up to 1.985 as per Tables 2.3.2-1 to 14. This curve 1 has been traced assuming a linear variation within the intervals 1.974 to 1.980 and 1.981 to 1.985, which - is considered to be a sufficient approximation for the purpose of the - present study.

It has been graphically represented (CURVE 2) the accumulated production up to 1.985 of existing shipyards (or projects in advanced stage) dedicated to the construction of the corresponding ship types, considering their estimated production plans.

To trace these curves 2, the tonnages defined in point 3.1.1 have been accumulated up to every year.

It has been traced a curve (CURVE 3) which represents a proposed safety production limit (ACCUMULATED TOTAL) for the subregional shipyards, which limit is recommended not to exceed on any of the possible development alternatives that may be under consideration.

This curve 3 has been traced with an increasing slope up to 1.985, and with a value in that year such as to be sensibly lower than the accumulated demand. To define this curve 3 for each ship type it has been taken into account the characteristics of curve 1 and curve 2, and their tendency over the year 1.985.

A conservative criterion has been followed in order to assure an ample safety margin of demand for the shipyards in the subregion.

It is to be considered moreover that some years after 1.980 the subregional shipyards shall have reached sufficient experience as to be able to enter into the international market with the possibility of getting some orders from foreign countries, if by any unforesable circumstances the own demand in the subregion should be depressed.

C-798

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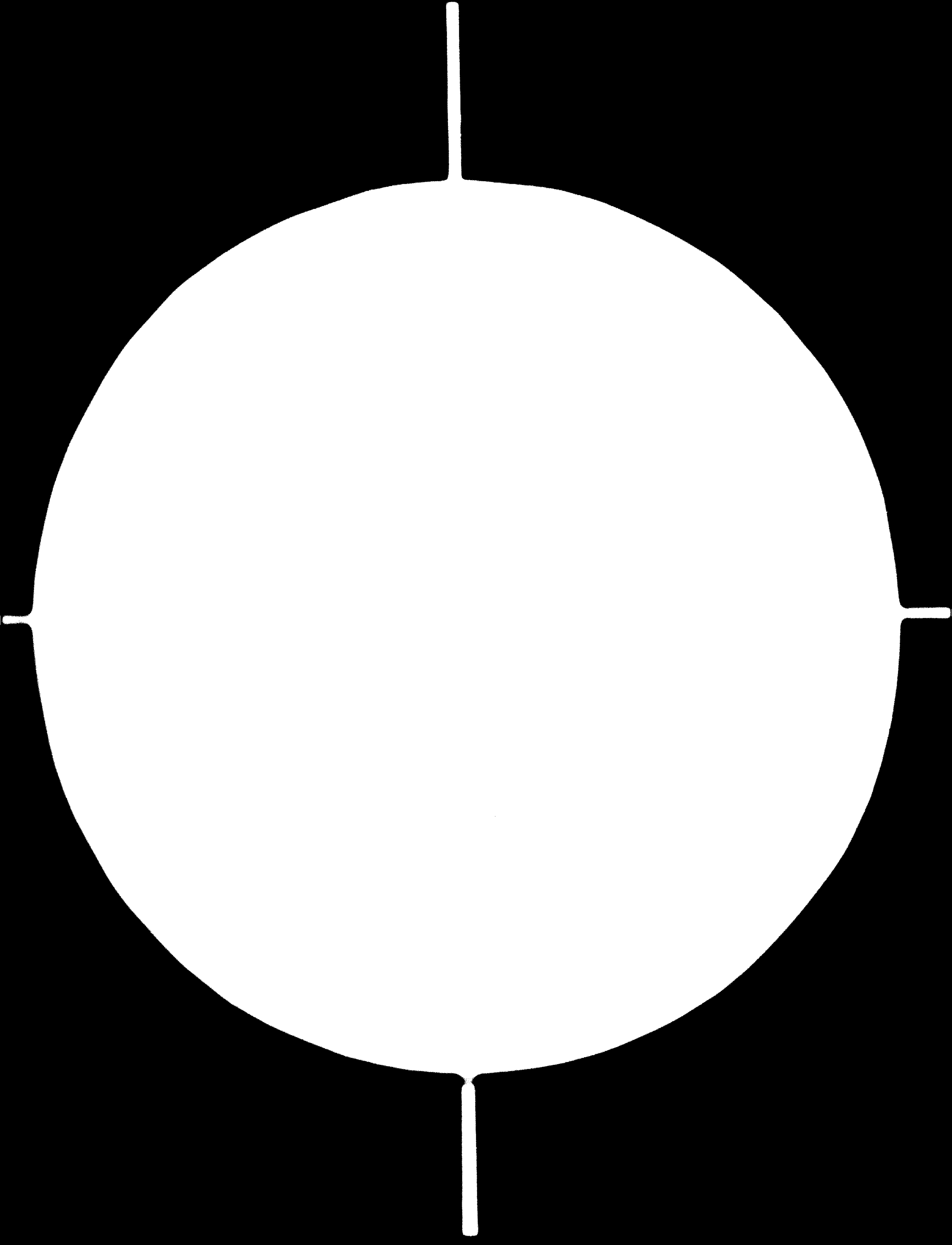
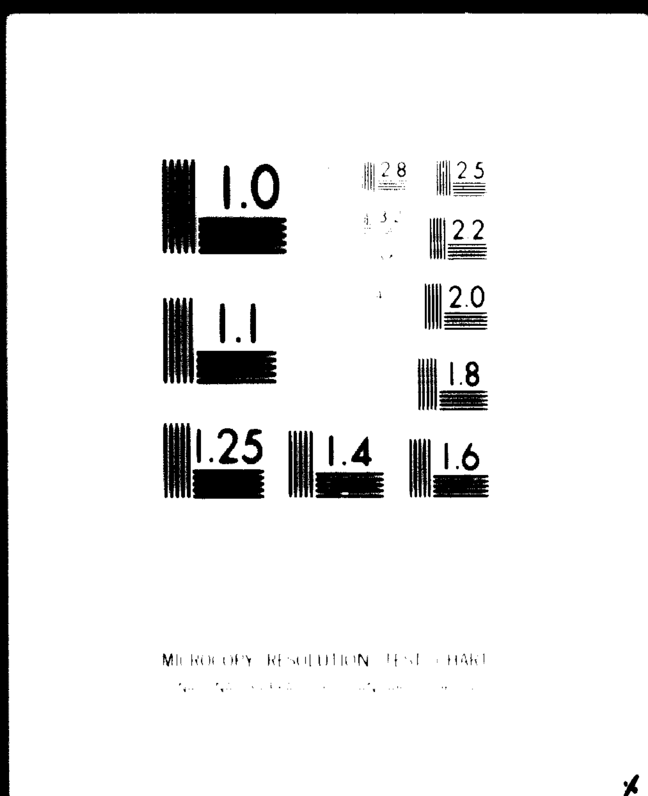


3 OF 5



24 x

E

It should also be pointed out that there will be another demand reserve in the ship types not selected in principle for the new shipyards production.

Once the curves 1, 2 and 3 so defined have been traced (figures 3.1.2-A to G, pag. 178 to 184) for each one of the selected ship types, an analysis has been carried out, after preparing the Table 3.1.2-1 (deducted from tables 2.3.2-1 to 14) and the following conclusion drawn out:

For ship types 2 and 7, the curve of accumulated production of existing shipyards (curve 2) reaches up to 1.985 a very high percentage of the accumulated demand and, most important, it has an approximative tendency towards the curve 1 of demand and this is considered risky for any new shipyards specializing in this ship type. Therefore it is advisable not to stablish new shipyards for these types 2 and 7, Thus, the efforts should be concentrated in developping new shipyards for the other types: 1, 3, 4, 5 and 6.

d) CRITERIA OF MINIMUM ANNUAL SHIPYARD PRODUCTION

The following estimations have been made regarding the minimum economical annual production per each construction berth of shipyards. That is to stablish certain production capacities which should be reached in order to be in an adequate level of productivity regarding the investments.

Below these production capacities, which should be achieved after a period of adjustment which would vary from one shipyard to another, it is not considered that the utilization of these facili -

TYPE OF SHIPS.	Demand up to 1.985.		Production up to 1.985.		
	n	Tonnage D.W.T.	SHIPYARDS.	n	Tonnage D.W.T.
Type 1. (2.5/6000 DWT)	133	530.700	-Picsa. (-Conastil. (	55	154.500
Type 2. (6/11000 DWT)	85	724.500	-Diques y (Varaderos.(	40	384.000
Type 3. (11/30000 DWT)	150,5	2.827.500	-Sima (-Cartagena.(	69	1.650.000
Type 4. (30/45000 DWT)	60	2.177.000	-	-	-
Type 5. (60/80000 DWT)	41,5	2.898.600	-	-	-
Type 6. (120/180000 DWT)	27,5	4.160.000	-Sima (up to 1983(	10	1.500.000
Type 7. (180/300000 DWT	10	2.472.300	-Sima (from 1984 (	4	1.000.000

Note: n = number of ships.

Table 3.1.2-1

ties would be economical.

These annual production capacities, by types of berths are the following:

Type 1 - Cargo vessels, Refrigerated ships and Container-carriers from 2.500 to 6.000 D.W.T.

Minimum annual production per berth.

5 ships of 5.000 D.W.T. = 25.000 D.W.T. per year aprox.

Type 3 - Cargo vessels, Refrigerated ships and Container-carriers, from 11.000 to 21.000 D.W.T., and oil tankers, OBOS and - Bulk-carriers from 15.000 to 30.000 D.W.T.

Minimum annual production per berth:

2 ships of 20.000 D.W.T.)
2 ships of 30.000 D.W.T.) 100.000 D.W.T. per year aprox.

Type 4 - Oil tankers, OBOS, and Bulk-carriers from 30.000 to 45.000 D.W.T.

Minimum annual production per berth:

4 ships of 40.000 D.W.T. = 160.000 D.W.T. per year aprox.

Type 5 - Oil tankers, OBOS and Bulk-carriers, from 60.000 to 90.000 D.W.T.

Minimum annual production per berth:

3 ships of 75.000 D.W.T. = 225.000 D.W.T. per year aprox.

Type 6 - Oil tankers, OBOS and Bulk-carriers, from 120.000 to - 180.000 D.W.T.

Minimum annual production per berth:

3 ships of 170.000 D.W.T. = 510.000 D.W.T. per year aprox.

e) NEW CONSTRUCTION BERTHS FEASABLE

The maximum annual production increase advisable for each one of the ship types would be that covering the difference between - the annual production of existing shipyards (see curve 2) and - the annual increase shown in the safety production limit curve (3).

It may be seen in these curves that this difference is increasing up to 1.985, when it is maximum.

On the other hand, the minimum annual production per berth - already defined has to be taken into account.

From the above considerations, the maximum advisable numbers of new berths to enter in production before 1.985 have been stablished as follows:

For Type 1 - Max. annual production increase = 25.000 D.W.T/year.

Min, annual production per berth = 25.000 D.W.T/year.

Therefore, one new berth may be stablished

For Type 3 - Máx. annual production increase = 100.000 D.W.T/year.

Min. annual production per berth= 100.000 D.W.T/year.

Therefore, one new berth may be stablished.

For Type 4 - Max. annual production increase = 200.000 D.W.T/year

Min. annual production per berth= 160.000 D.W.T/year

Therefore, one new berth may be stablished, but with two berths - the max. limit would be exceeded.

For Type 5 - Max. annual production increase = 360.000 D.W.T/year.

- Min. annaul production per berth= 225.000 D.W.T/year

Therefore, one new berth may be stablished, but with two berths, the max. limit would be exceeded.

For Type 6 - Max. annual production increase = 450.000 D.W.T.

- Min. anual production per berth = 510.000 D.W.T.

According to these figures for this type 6 of ships, the max. annual production increase is below the minimum annual production per berth, although very close to it.

Nevertheless having a closer look to this case (Fig. 3.1.2-F) it may be observed that curve 2 (production) becomes horizontal from 1.983 and, consequently, if no further berths are stablished, the deficit production demand would be greater in future years, as the demand curve shows in 1.985 a very high growing rate.

Therefore, it is recommended the stablishing of one new berth for construction of this type of ships from 120.000 to 1[illegible].000 D.W.T., which could start its activities in 1.983, and reach full production after 1.985.

Logically, the new building berths shall be increasing their annual production from their starting year until they reach full production. In table 3.1.2-2 (pag. 185 to 1[illegible]) for each berth type is indicated the production increase that would be achieved with one new berth, with higher productivity every year, and also the estimated number of ships that would be delivered every year, the steel tons. needed for their construction (ST), and the installed power of propulsion engines (BHP) and auxiliary engines (bhp) for the production plans considered for each berth.

In Table 3.1.2-3 (pág. 190) it is summarized the maximum number -

of new berths of each type estimated up to 1.985, indicating those entering into production before 1.980 and in the period 1.980 - 1.985. They would not reach their full production capacity until some years after 1.980 and 1.985 respectively.

In effect, it has been considered that it is not feasable that - the activity in the new berths could be started before 1.978, - for types 1, 3, 4 and 5, and that for type 6, as indicated above, the starting of production of the new proposed berth should be in 1.984 and not before.

In fig. 3.1.2-A, C, D, E and F, are included the curves (4) representing the accumulated total production that would be reached with the implementation of one new berth of each type, over the existing ones.

f) ALTERNATIVE PROPOSALS FOR DEVELOPMENT OF NEW BERTHS

In view of the feasability of stablishing new construction berths, two alternative development plans are proposed:

Alternative 1

Intermediate development between the present capacity and the maximum capacity that will consist in adding the following construction berths:

- 1 for type 3 ships of between 11,000/30,000 D.W.T.
- 1 for type 4 ships of between 30,000/45,000 D.W.T.
- 1 for type 5 ships of between 60,000/80,000 D.W.T.

Alternative 2

Maximum development, constructing the maximum number of berths feasable in accordance with the previously indicated criteria. The following construction berths should have entered into service by 1.985, as per this alternative plan:

- 1 for construction of type 1 ships (2,500/6,000 D.W.T)
- 1 for type 3 ships (11,000/30,000 D.W.T).
- 1 for type 4 ships (30,000/45,000 D.W.T)
- 1 for type 5 ships (60,000/80,000 D.W.T)
- 1 for type 6 ships (120,000/180,000 D.W.T)

This last berth would not be in full production before 1.985. In Tables 3.1.2-4 and 3.1.2-5 (pag 191 and 192) there are indicated the estimated total annual production figures as per alternatives 1 and 2, that are the productions attainable by adding the output of the new shipyards over the existing ones.

In these tables the following data are included for each year:

. Total tonnage in deadweight tons. (DWT)
. Total steel tons as necessary for the ships construction. (ST)
. Total brake horse power of propulsion engines (BHP).
. Total brake horse power of auxiliary engines. (bhp).

In another Table, 3.1.2-6 (pag. 193) there are indicated the DWT that would be added annually with the new proposed berths as per alternatives 1 and 2.

As may be seen, with the alternative 1 plan the production capacity would be increased in 1.985 by 485.000 DWT/year, and with the alternative 2 plan by 850.000 DWT/year.

Finally, as a summary of the analysis of the feasability of new shipyards in the subregion the Fig. 3.1.2-H (pag. 194) has been prepared showing the following curves, including - all the ship types selected (1, 2, 3, 4, 5, 6 and 7):

CURVE 1. Accumulated Total Demand for all the ship types selected.

CURVE 2. Accumulated Total Production of the existing shipyards (or projects in advanced stage) for all the ship types selected.

CURVE 3. Accumulated Total Safety Production Limit for all the ship types selected.

CURVE A_1
CURVE A_2 Accumulated Total Production that would be reached by stablishing the new construction berths proposed as per alternatives 1 and 2 respectively, over the existing ones.

GENERAL CARGO, REFRIG. AND CONTAINER SHIPS

FROM 2500 TO 6000 D.W.T.

TYPE 1

1. Curve of Accumulated Demand
2. Curve of Accumulated Production of existing shipyards: CONASTIL and PICSA.
3. Curve of Safety limit for Accumulated Total Production.
4. Curve of Accumulated Total Production with addition of one new berth.

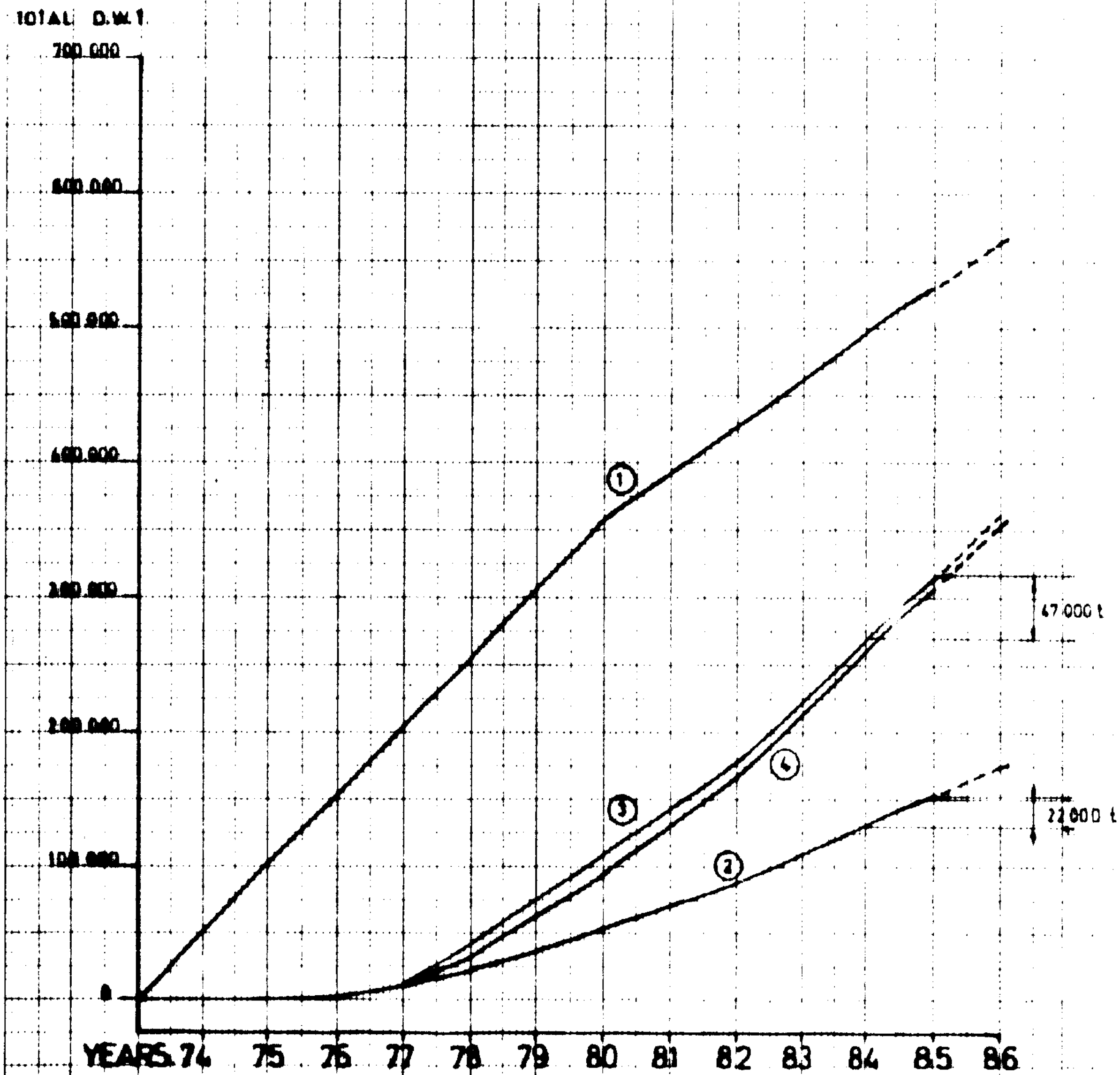
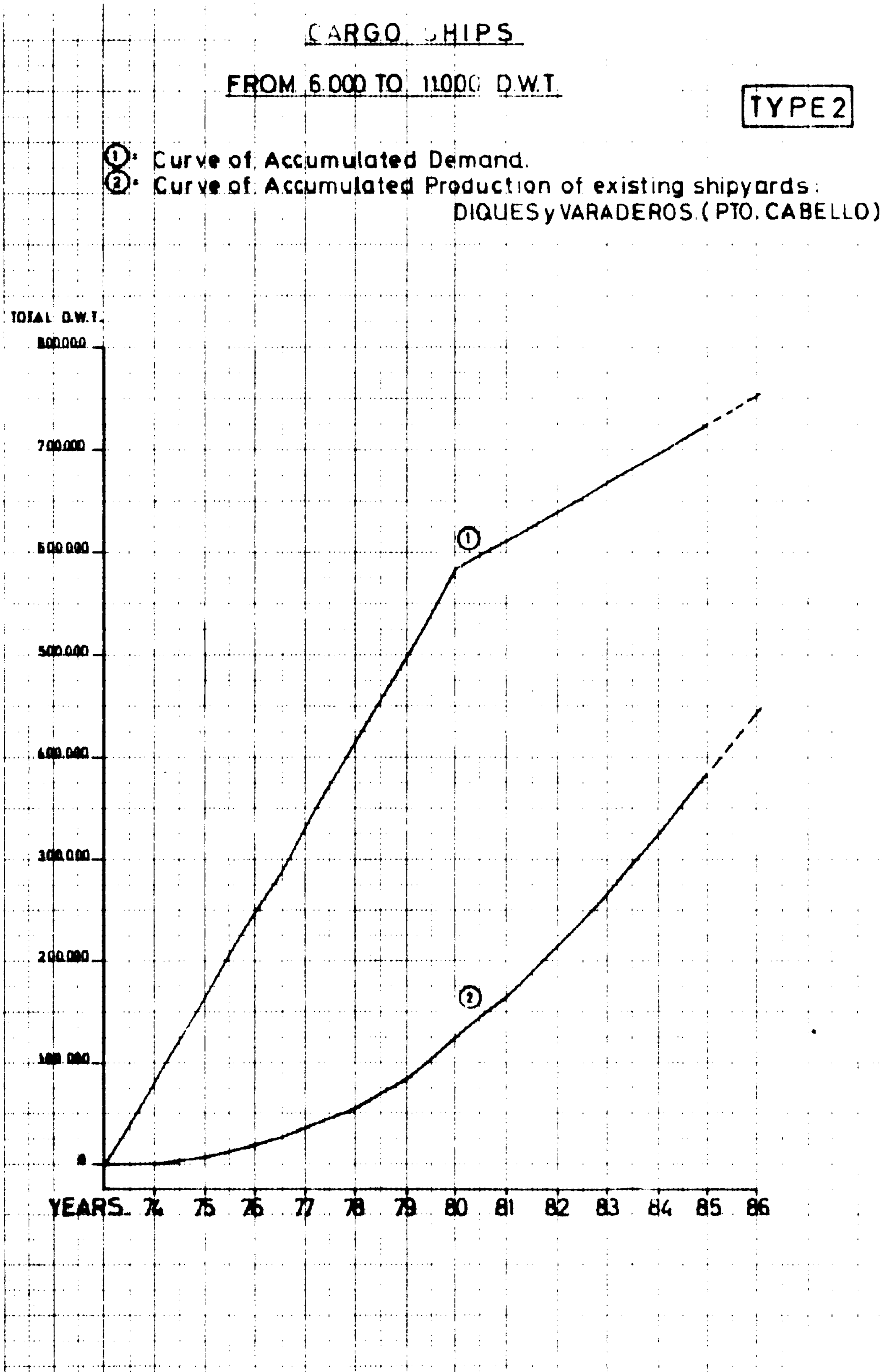


Figure 3-1-2-A



CARGO SHIPS
FROM 6.000 TO 11.000 D.W.T.
TYPE 2
①: Curve of Accumulated Demand.
②: Curve of Accumulated Production of existing shipyards:
DIQUES y VARADEROS (PTO. CABELLO)
TOTAL D.W.T.
800.000
700.000
600.000
500.000
400.000
300.000
200.000
100.000
0
YEARS 74 75 76 77 78 79 80 81 82 83 84 85 86
①
②

Figure. 3-1-2-B

CARGO AND CONTAINER SHIPS.
From 11000 to 21000 D.W.T.
TANKERS, OBO'S AND BULKCARRIERS
From 15.000 to 30,000 D.W.T.

TYPE 3

(1) : Curve of Accumulated Demand.
(2) : Curve of Accumulated Production of existing shipyards : SIMA (present berth) and CARTAGENA
(3) : Curve of Safety limit for Accumulated Total Production.
(4) : Curve of Accumulated Total Production with addition of one new berth

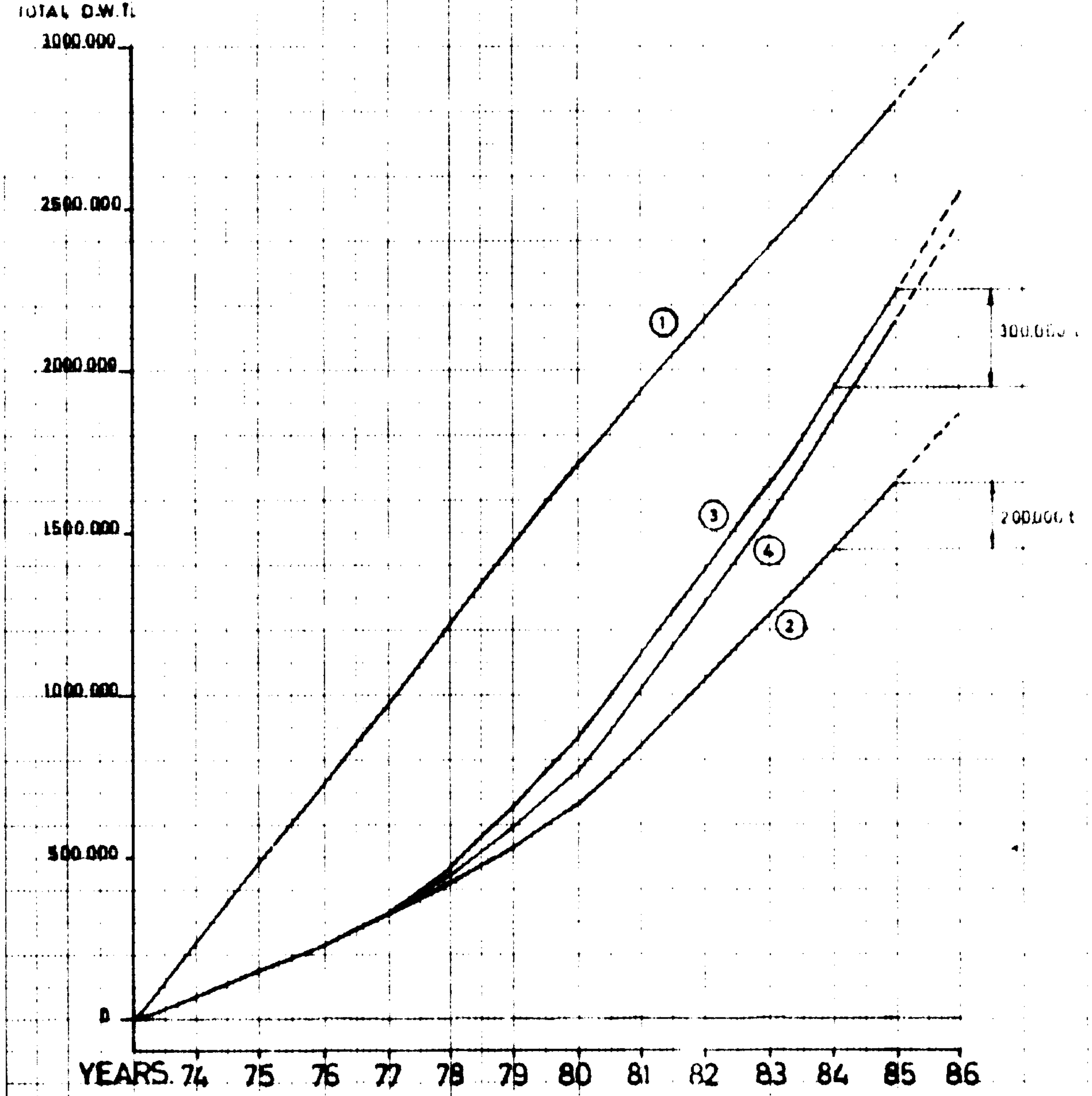


Figure. 3-1-2-C

TANKERS, OBO'S AND BULKCARRIERS
From 30.000 to 45.000 D.W.T.

TYPE 4

1. Curve of Accumulated Demand.
2. Curve of Accumulated Production of existing shipyards: NIHIL
3. Curve of Safety limit for Accumulated Total Production
4. Curve of Accumulated Total Production with addition of one new berth.

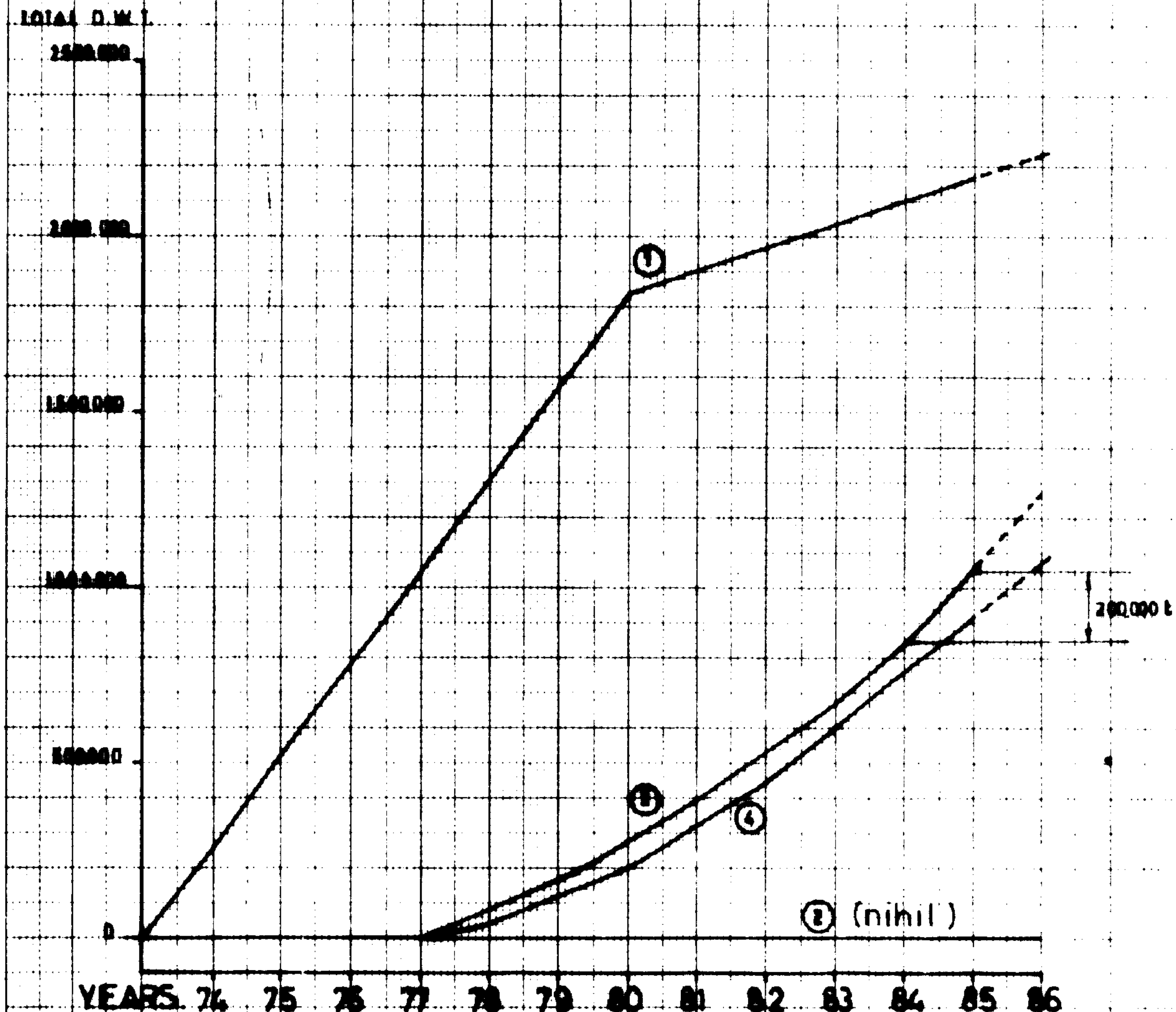


Figure. 3-1-2-D

TANKERS, OBO'S AND BULKCARRIERS
From 60.000 to 80.000 D.W.T.

TYPE 5

1. Curve of Accumulated Demad.
2. Curve of Accumulated Production of existing shipyards : NIHIL
3. Curve of Safety limit for Accumulated Total Production.
4. Curve of Accumulated Total Production with addition of one new berth.

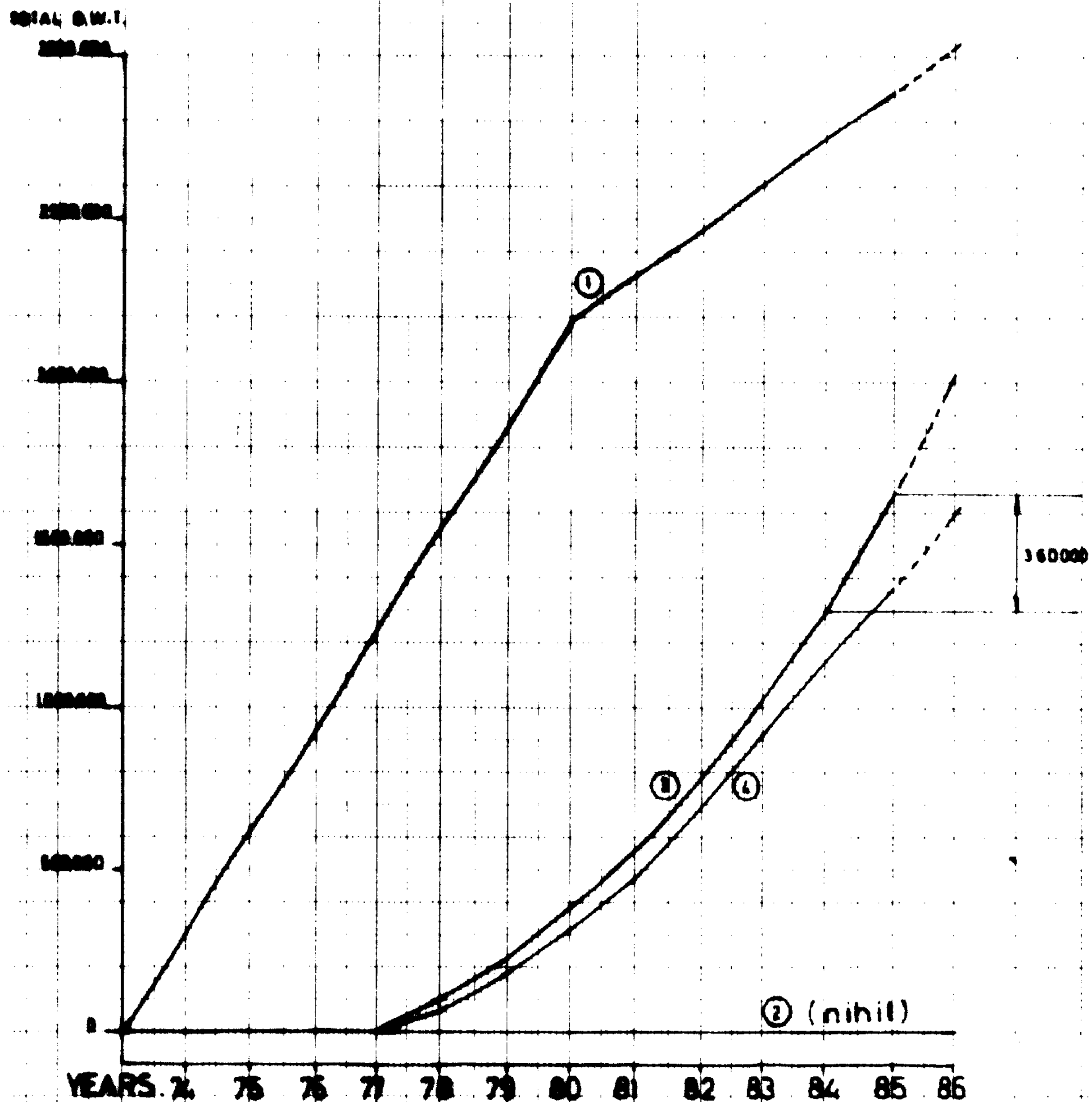


Figure 3-1-2-E

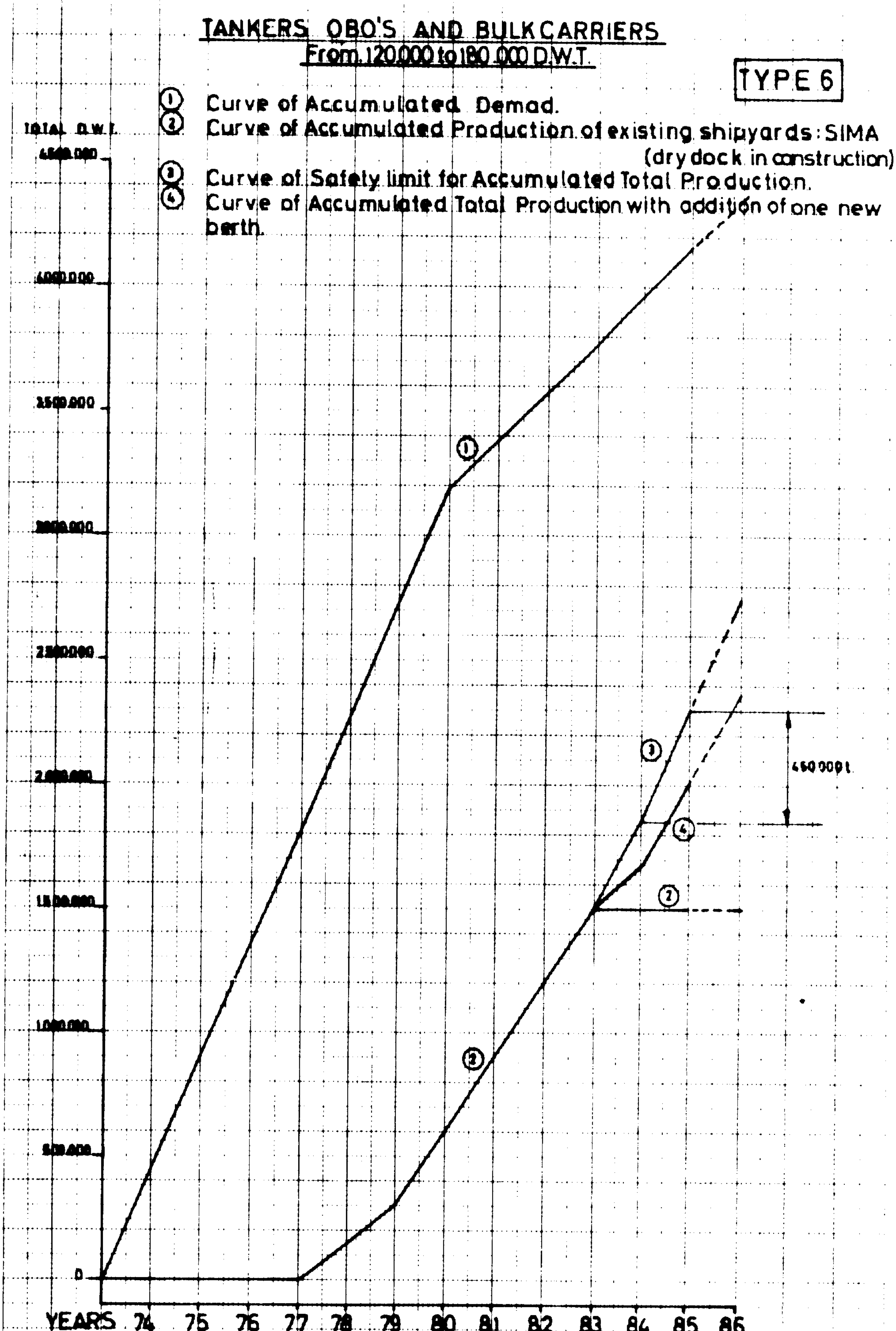

TANKERS OBO'S AND BULKCARRIERS
From 120.000 to 180.000 D.W.T.
TYPE 6
① Curve of Accumulated Demad.
② Curve of Accumulated Production of existing shipyards: SIMA (dry dock in construction)
③ Curve of Safety limit for Accumulated Total Production.
④ Curve of Accumulated Total Production with addition of one new berth.
TOTAL D.W.T.
4.500.000
4.000.000
3.500.000
3.000.000
2.500.000
2.000.000
1.500.000
1.000.000
500.000
0
YEARS 74 75 76 77 78 79 80 81 82 83 84 85 86
460.000 t.

Figure. 3-1-2-F

TANKERS OBO'S AND BULKCARRIERS
From 180.000 to 300.000 D.W.T.

TYPE 7

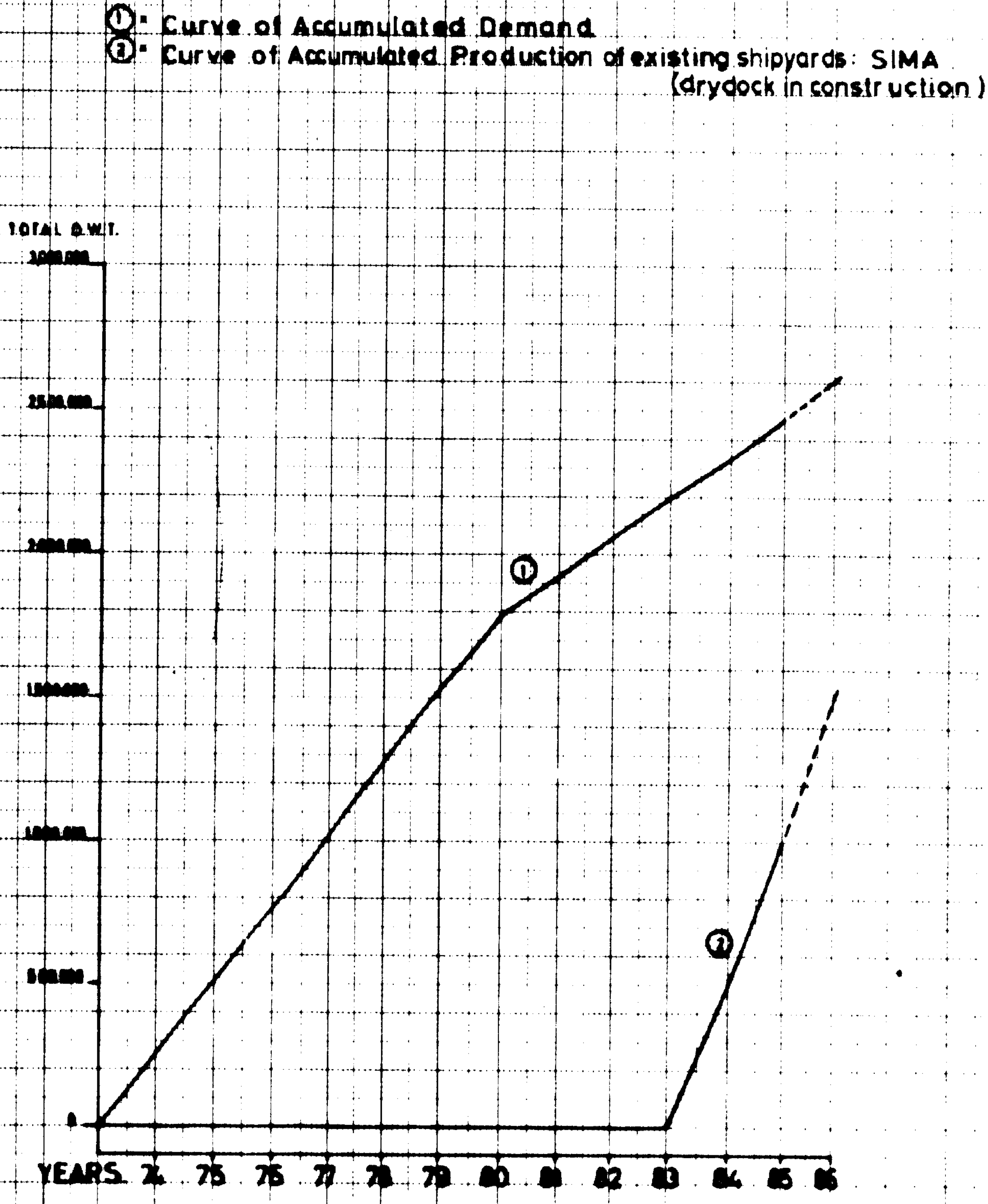


Figure. 3-1-2-G

Table 3.1.2-2

PRODUCTION INCREASES THAT WOULD ASSUME THE ENTRANCE INTO SERVICE OF BUILDING BERTHS OF EACH OF THE TYPES INDICATED.

BUILDING BERTH TYPE 1.

1974.	1975	1976
-	-	-
1977	**1978**	**1979**
	2 x 5.000 DWT.	3 x 5.000 DWT.
-	DWT = 10.000 Tons.St. = 3.600 BHP = 9.000 bhp = 1.800	DWT = 15.000 Tons.St. = 5.400 BHP = 13.500 bhp = 2.700
1980	**1981**	**1982**
3 x 5.000 DWT	4 x 5000 DWT	4 x 5000 DWT
DWT = 15.000. Tons.St. = 5.400 BHP = 13.500 bhp = 2.700	DWT - 20.000 Tons.St. = 7.200 BHP 18.000 bhp = 3.600	DWT = 20.000 Tons. St. = 7.200 BHP = 18.000 bhp = 3.600
1983	**1984**	**1985**
5 x 5.000 DWT	5 x 5000 DWT	5 x 5000 DWT
DWT = 25.000 Tons.St. = 9.000 BHP = 22.500 bhp = 4.500	DWT = 25.000 Tons.St. = 9.000 BHP = 22.500 bhp - 4.500	DWT. = 25.000 Tons.St. = 9.000 BHP = 22.500 bhp = 4.500

Table 3.1,2-2 (Continuation)

PRODUCTION INCREASES THAT WOULD ASSUME THE ENTRANCE-INTO SERVICE AT BUILDING BERTHS OF EACH OF THE TYPES INDICATED.

BUILDING BERTH TYPE 3.

1974	1975	1976
-	-	-
1977	**1978**	**1979**
-	1 x 20.000 DWT	2 x 20.000 DWT
-	DWT - 20.000 Tons.St. = 7.000 BHP = 10.000 bhp = 1.800	DWT = 40.000 Tons.St.= 14.000 BHP = 20.000 bhp = 3.600
1980	**1981**	**1982**
2 x 20.000 DWT	3 x 20.000 DWT	2 x 20.000 DWT 1 x 30.000 DWT
DWT = 40.000 Tons. St. = 14.000 BHP = 20.000 bhp = 3.600	DWT = 60.000 Tons.St. = 21.000 BHP = 30.000 bhp = 5.400	DWT = 70.000 Tons. ST.= 23.000 BHP = 32.000 bhp = 5.700
1983	**1984**	**1985**
2 x 20.000 DWT 1 x 30.000 DWT	2 x 20.000 DWT 2 x 30.000 DWT	2 x 20.000 DWT 2 x 30.000 DWT
DWT = 70.000 Tons. St. = 23.000 BHP = 32.000 bhp = 5.700	DWT = 100.000 Tons. St.= 32.000 BHP = 44.000 bhp = 7.800	DWT = 100.000 Tons.St.32.000 BHP = 44.000 bhp = 7.800

Table 3.1.2-2 (Continuation)

PRODUCTION INCREASES THAT WOULD ASSUME THE ENTRANCE INTO - SERVICE OF BUILDING BERTHS OF EACH OF THE TYPES INDICATED.

BUILDING BERTH TYPE 4.

1.974.	1.975	1.976
-	-	-
1.977	1.978	1.979
-	1 x 40.000 DWT	2 x 40.000 DWT
	DWT = 40.000 Tons.St.12.000 BHP = 15.000 bhp = 2.250	DWT = 80.000 Tons.St. = 24.000 BHP = 30.000 bhp = 4.500
1.980	1.981.	1.982
2 x 40.000 DWT	3 x 40.000 DWT	3 x 40.000 DWT
DWT = 80.000 Tons.St. = 24.000 BHP = 30.000 bhp = 4.500	DWT = 120.000 Tons.St. = 36.000 BHP = 45.000 bhp = 6.750	DWT. = 120.000 Tons.St. - 36.000 BHP = 45.000 bhp = 6.750
1.983	1.984	1.985
4 x 40.000 DWT	4 x 40.000 DWT	4 x 40.000 DWT
DWT 160.000 Tons.St. = 48.000 BHP = 60.000 bhp = 9.000	DWT = 160.000 Tons.St. = 48.000 BHP = 60.000 bhp = 9.000	DWT 160.000 Tons.St. - 48.000 BHP = 60.000 bhp = 9.000

Table 3.1.2-2 (Continuation)

PRODUCTION INCREASES THAT WOULD ASSUME THE ENTRANCE - INTO SERVICE OF BUILDING BERTHS OF EACH OF THE TYPES INDICATED.

BUILDING BERTH TYPE 5.

1.974.	1.975.	1.976.
-	-	-
1.977	1.978	1.979
	1 x [illegible].000 DWT	2 x 60.000 DWT
-	DWT = 60.000 Tons. St. = 13.500 BHP = 19.000 bhp = 2.350.	DWT = 120.000 Tons. St = 27.000 B.H.P = 38.000 bhp = 4.700
1.980	1.981	1.982
1 x 60.000 DWT 1 x 75.000 DWT	2 x 75000 DWT	3 x 75.000 DWT
DWT 135.000 Tons. St. = 28.500 BHP = 41.000 bhp = 4.750	DWT = 150.000 Tons. St. 30.000 BHP = 44.000 bhp = 4.800	DWT = 225.000 Tons. St = 45.000 BHP = 66.000 bhp = 7.200
1.983	1.984	1.985
3 x 75.000 DWT	3 x 75.000 DWT	3 x 75.000 DWT
DWT = 225.000 Tons. St. 45.000 BHP = 66.000 bhp = 7.200	DWT 225.000 Tons. St. 45.000 BHP = 66.000 bhp 7.200	DWT = 225.000 Tons. St. 45.000 BHP = 66.000 bhp = 7.200

Table 3.1.2-2 (Continuation)

PRODUCTION INCREASES THAT WOULD ASSUME THE ENTRANCE-INTO SERVICE OF BUILDING BERTHS OF EACH OF THE TYPES INDICATED.

BUILDING BERTH TYPE 6.

1.974.	1.975.	1.976
-	-	-
1.977	1.978	1.979
-	-	-
1.980	1.981.	1.982
-	-	-
1.983	1.984	1.985
-	1 x 170.000 D.W.T.	2 x 170.000 DWT
-	DWT 170.000 Tons.St. = 25.000 BHP = 32.000 bhp = 3.000	DWT = 34.000 Tons.St. = 50.000 BHP = 64.000 bhp = 6.000

MAXIMUM NUMBER OF BUILDING BERTHS TO ADD.

Type of building berths.	Range of ships to build (DWT min. and max.)	New building berths between 1974 - 1980.	New building berths between 1980 - 1985.	Total new building berths 1985.
1	2.500 - 6.000	1	-	1
2	6.000 - 11.000	-	-	-
3	11.000 - 30.000	1	-	1
4	30.000 - 45.000	1	-	1
5	60.000 - 80.000	1	-	1
6	120.000 - 180.000	-	1	1
7	180.000 and more	-	-	-

Table 3.1.2-3

TOTAL ANNUAL PRODUCTION ACCORDING TO ALTERNATIVE 1

(EXISTING SHIPYARDS PLUS ADDITIONAL BERTHS).

1.974	1.975	1.976.
DWT = 75.000 Tons.St. = 24.000 BHP = 33.000 bhp = 5.850.	DWT - 81.000 Tons.St. = 26.000 BHP = 38.000 bhp = 6.750	DWT = 90.000 Tons.St. = 29.000 BHP = 46.500 bhp = 8.250.
1.977	**1.978**	**1.979**
DWT = 139.500 Tons.St. = 45.050 BHP = 73.000 bhp = 13.350.	DWT - 381.500 Tons.St. = 90.800 BHP = 136.500 bhp = 21.350.	DWT = 549.500 Tons.St. = 139.550 BHP = 206.000 bhp = 31.900
1.980	**1.981**	**1.982.**
DWT = 747.000 Tons.St. = 174.100 BHP = 256.000 bhp = 38.400	DWT - 867.000 Tons.St. = 209.600 BHP = 287.000 bhp = 46.250.	DWT = 982.000 Tons.St. = 233.850 BHP = 337.000 bhp = 50.850
1.983	**1.984**	**1.985.**
DWT = 1.027.000 Tons.St = 247.450 BHP = 359.000 bhp = 54.100	DWT = 1.267.000 Tons.St. = 279.700 BHP = 394.000 bhp = 58.400	DWT = 1.267.000 Tons.St. = 279.700 BHP = 394.000 bhp = 58.400

NEW BERTHS PROPOSED IN ALTERNATIVE 1:

1 of the type 3 for ships from 11.000 to 30.000 D.W.T.

1 of the type 4 for ships from 30.000 to 45.000 D.W.T.

1 of the type 5 for ships from 60.000 tp 80.000 D.W.T.

Table 3.1.2-4

TOTAL ANNUAL PRODUCTION ACCORDING TO ALTERNATIVE 2

(EXISTING SHIPYARDS PLUS ADDITIONAL BERTHS).

T.974.	T.975.	T.976.
DWT = 75.000 Tons.St.24.000 BHP = 33.000 bhp = 5.850.	DWT = 81.000 Tons.St. = 26.000 BHP = 38.000 bhp = 6.750	DWT = 90.000 Tons.St. = 29.000 BHP = 46.500 bhp = 8.250.
T.977	**T.978**	**T.979**
DWT = 139.500 Tons.St.= 45.050 BHP = 73.000 bhp = 13.350.	DWT = 391.500 Tons.St. = 94.400 BHP = 145.500 bhp = 23.150	DWT = 564.500 Tons.St.= 144.950 BHP = 219.500 bhp = 34.600
T.980	**T.981**	**T.982**
DWT = 762.000 TONS.St.= 179.500 B.H.P. 269.500 bhp = 41.100	DWT = 887.000 Tons.St. = 216.800 BHP = 305.000 bhp = 49.850	DWT = 1.002.000. Tons.St.= 241.050. BHP = 355.600. bhp = 54.450.
T.983	**T.984**	**T.985**
DWT = 1.052.000 Tons.St.=256.450 BHP = 381.500 bhp = 58.600	DWT = 1.462.000 Tons.St. = 313.700 BHP = 448.500 bhp = 65.900	DWT = 1.632.000 Tons.St. = 338.700 BHP = 480.500 bhp = 68.900.

NEW BERTHS PROPOSED IN ALTERNATIVE 2:

1 of the type 1 for ships from 2500 to 6000 D.W.T.
1 " " " 3 " " " 11000 to 30000 D.W.T.
1 " " " 4 " " " 30000 to 45000 D.W.T.
1 " " " 5 " " " 60000 to 80000 D.W.T.
1 " " " 6 " " " 120000 to 180000 D.W.T.

Table 3.1.2-5

TOTAL D.W.T. THAT WOULD BE ADDED ANNUALLY TO THE FLEET OF THE SUB-REGION WITH ADDITIONAL SHIPYARDS TO THE EXISTING (OR IN ADVANCED DESIGN STAGE).

	Year. 1978.	Year. 1979.	Year. 1980.	Year. 1981.	Year. 1982.	Year. 1983.	Year. 1984.	Year. 1985.
ALTERNATIVE 1. ..	120.000	240.000	255.000	330.000	415.000	455.000	485.000	485.000
ALTERNATIVE 2. ..	130.000	255.000	270.000	350.000	435.000	480.000	680.000	850.000

Table 3.1.2-6

SUMMARY CURVES INCLUDING ALL SELECTED SHIP TYPES

(TYPES 1, 2, 3, 4, 5, 6 and 7)

1. Accumulated Demand Curve for all selected types of ships.
2. Accumulated Production Curve for existins shipyards.
3. Safety Production Limit Curve (Accumulated Total)

A1. Accumulated Total Production Curve, with implementation of new building berths, according alternative 1

A2. Accumulated Total Production Curve, with implementation of new building berths, according alternative 2

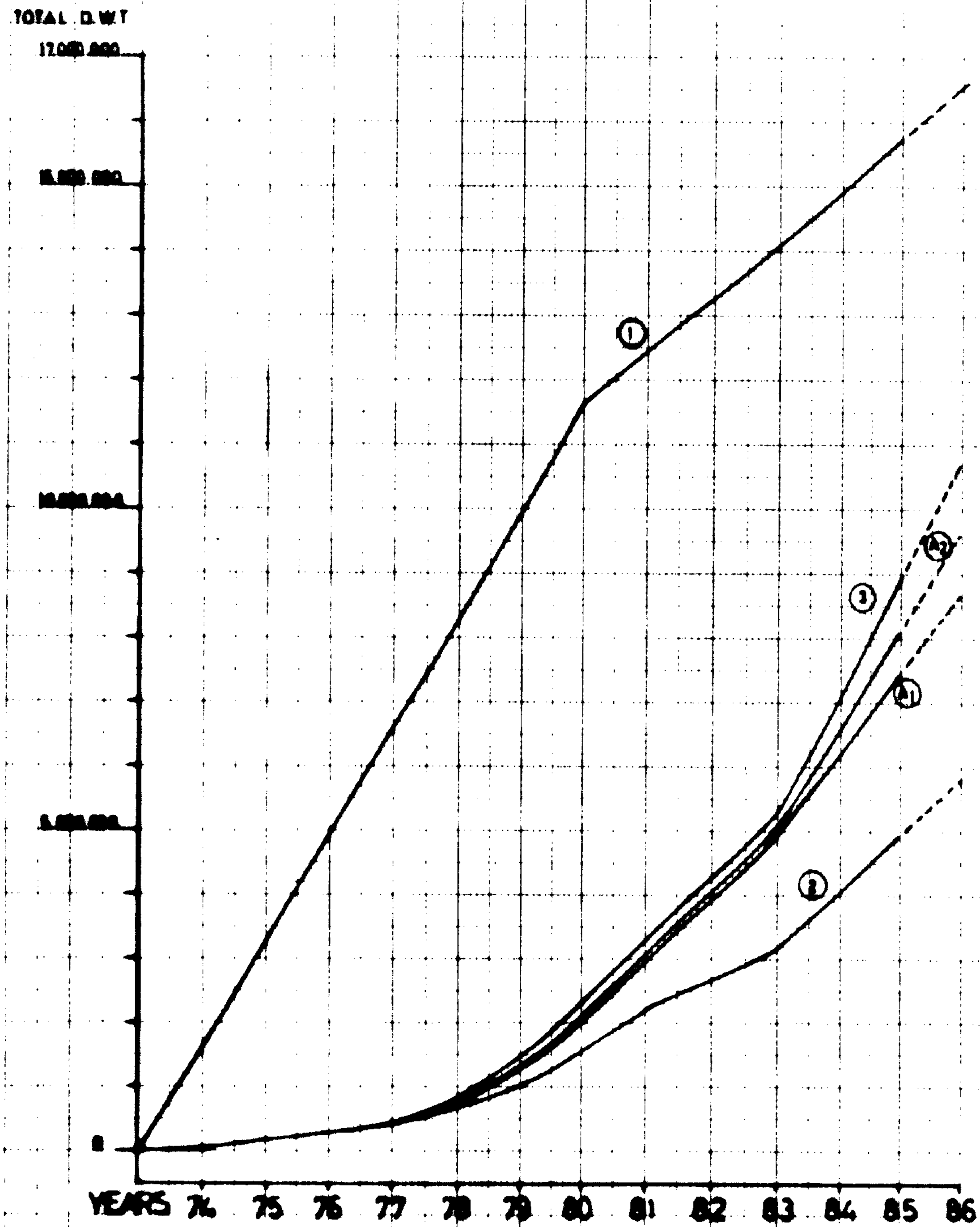


Figure. 3-1-2-H

3.2. DEVELOPMENT OF SHIP REPAIRING

3.2.1. NUMBER OF REPAIR FACILITIES NECESSARY

An attempt has been made to define the most suitable number and size of the repair docks or repair facilities that it would be advisable to establish in the countries of the Andean sub-region. For this purpose, the analysis of the foreseeable potential market for ship repairing in the years 1980 and 1985, included in Section 2.4. of the present Study has been taken as a basis.

The requirements for docks for ship repairing have been determined by estimating the average annual length of stay in dock in relation to the sizes of the ships, and that for each ship, in its corresponding tonnage range, **are the following:**

From 2,000 to 6,000 D.W.T.	 5	days	in	dock	per	year
From 6,000 to 15,000 D.W.T.	 5	"	"	"	"	"
From 15,000 to 45,000 D.W.T.	 7	"	"	"	"	"
From 45,000 to 80,000 D.W.T.	 8	"	"	"	"	"
From 80,000 to 180,000 D.W.T.	 9	"	"	"	"	"
Larger than 180,000 D.W.T.	 10	"	"	"	"	"

Multiplying for each range of tonnage the number of ships that it is envisaged to repair in the sub-region, in accordance with the figures shown in Tables 2.4.1-5, by the number of days in dock, the number of days required in dock for repair in each year is obtained.

Tables 3.2.1-1 and 3.2.1-2 show, for each range of tonnages selected, the total number of days required for repair that will be necessary both for vessels of the fleet registered in the Andean sub-region and for complementary ships of foreign flags, in the two hypotheses established in point 2.4.1 in the years 1980 and 1985 respectively.

The total number of **docking-days, representing** the **occupancy of the repair docks has been increased by introducing a safety coefficient of 0,90 for the operation of the said docks. By means of this coefficient** the possible inactive days between the departure of one ship and the arrival of the next one are taken into account, together with excessive time employed in difficult operations, in connection - with the manoeuvrings of ships, etc.

In this way it has been possible to define the number of docks of each size required, in each hypothesis and each year (1980 or 1985) and with respect to these units so defined it should be noted that their number is determined in such a way that in any case their - operation throughout the year may be effected easily. For this - reason 300 working days a year has been considered and the total - number of days required has been divided by 300.

REPAIR DOCKS NEEDS, YEAR 1.980.

MAXIMUM FORESEEN.

CAPACITY OF DOCK (INTERVAL OF DWT)	Total days necessary for repairing per year.	Total days necessary applying the safety coefficient of 0.90	Number of necessary docks.
2.000 - 6.000	648	720	2,4
6.000 - 15.000	824	916	3
15.000 - 45.000	1.106	1.229	4
45.000 - 80.000	362,4	402	1,3
80.000 - 180.000	243	270	0,9
180.000 and more.	80	89	0,3
MINIMUM FORESEEN			
2.000 - 6.000	258	286	0,95
6.000 - 15.000	326	362	1,2
15.000 - 45.000	557,2	619	2
45.000 - 80.000	144	160	0,5
80.000 - 180.000	90	100	0,3
180.000 and more.	40	44	0,1

Table 3.[illegible].1-1

REPAIR DOCKS NEEDS, YEAR 1.985.

MAXIMUM FORESEEN.

Capacity of dock (Interval of DWT)	Total days necessary for repairing per year.	Total days necessary applying the safety coefficient of 0.90	Number of necessary docks.
2.000 - 6.000	850	944	3,1
6.000 - 15.000	1130	1255	4,1
15.000 - 45.000	1389	1543	5,1
45.000 - 80.000	460	511	1,7
80.000 - 180.000	342	380	1,2
180.000 and more.	100	111	0,3
MINIMUM FORESEEN			
2.000 - 6.000	395	439	1,4
6.000-15.000	497	552	1,8
15.000-45.0000	751	834	2,8
45.000-80.0000	208	231	0,8
80.000-180.000	135	150	0,5
180.000 and more.	60	66	0,2

Table 3.2.1-2

3.2.2. NUMBER OF REPAIR FACILITIES TO BE CONSTRUCTED

In order to determine the number of repair facilities to be constructed the following data have been taken as a basis:

(a) - The number of docks required to take care of the ship repair market in the Andean Sub-region in 1980 and [illegible], in accordance with what has been specified in point [illegible].

(b) - The capacity of the existing facilities or those in an advanced stage of planning, whose entry into service is envisaged prior to 1980.

It has been taken as a basis for this study the totality of the Ship Repair Yards existing in the Sub-region, whose principal characteristics are included in Appendix No 6..

From these shipyards there have been selected those that count with facilities for repairing vessels of more than 1,000 gross registered tons or that have in the course of execution, or in a very advanced stage of planning, the construction of the said facilities in such a way that their entry into operation is envisaged prior to [illegible].

Table 3.2.2-1 shows these shipyards, indicating the type of repair facility, the maximum capacity of the ships that they can handle expressed in D.W.T., as well as the number of repair facilities that they can operate simultaneously. This Table does not include docks destined exclusively to the repair of Naval units although docks that alternate the repairing of warships and merchant ships are included.

As complementary information Appendix No 6 includes a list of the ship repair facilities at present existing in adjacent countries or countries near to the Andean Sub-region, and which can constitute competition for the ship repair yards in the Sub-region.

Table 3.2.2-2 shows for each range of tonnage under study, the number of docks existing at present in the adjacent zones and the number of vessels registered or not registered in the Andean Sub-region which it is envisaged will constitute the maritime traffic in the Sub-region in 1980 and 1985 respectively.

Table 3.2.2-1 PRESENT CAPACITY, OR THAT IN AN ADVANCED STAGE OF PLANNING, OF REPAIR FACILITIES IN THE SUB-REGION FOR REPAIR OF MERCHANT MARINE VESSELS OF MORE THAN [illegible],000 GROSS REGISTERED TONNAGE.

NAME OF SHIPYARD	TYPE OF FACILITY	MAXIMUM CAPACITY IN D.W.T.	NUMBER OF REPAIR FACILITIES
CONASTIL (Cartagena)	Synchroelevator	[illegible],000	
ASMAR (Talcahuano)	Dry dock	[illegible]0,000	1
ARSENAL NAVAL (Guayaquil)	Floating dock	[illegible],000	[illegible]
SIMA (Callao)	Dry dock	25,000	
PICSA (Chimbote)	Synchroelevator	[illegible],500	[illegible]
DIQUES Y VARADEROS (Puertocabello)	Dry dock	45,000	[illegible]
DIQUES Y VARADEROS	Synchroelevator	10,000	2

DWT Ranges of ships for docking.	Number of docks at present in adjacent areas.	Number of ships on traffic in the sub-region in 1.9[illegible] per each range of D.W.T.			Number of ships on traffic in the sub-region in 1.985 per each range of D.W.T.		
		Foreign	Andin	Total.	Foreign	Andin	Total.
2.000 to 6.000	18	78	114	192	111	148	259
6.000 to 15.000	12	235	146	381	332	199	531
15.000 to 45.000	19	[illegible]	148	316	250	186	436
45.000 to 80.000	13	67	44	111	80	56	136
80.000 to 180000	[illegible]	[illegible]	27	[illegible]	[illegible]	[illegible]	[illegible]
180.000 and more	[illegible]	12	8	20	15	10	25

Table 3.2.2-2

Table 3.[illegible] shows the maximum and minimum number of docks necessary in 1980 and 1985 in accordance with what was deduced in Tables [illegible] and 3.2.1.3. Also shown are figures which are defined as the number of docks in existence prior to 1980, and which were selected taking into account the following factors:

- Repair facilities indicated in Table 3.[illegible]
- Utilization for the repair of merchant vessels of more than [illegible] gross registered tons, that is to say, discounting repairs to naval vessels, the fishing fleet and ships up to 1000 gross registered tons.
- Utilization for the repair of ships included precisely in the range indicated.

The difference between the docks needed and the existing docks will give the number [illegible] to be constructed prior to 1980 and [illegible] respectively in their maximum and minimum hypotheses.

On obtaining decimal figures, the lower whole figure has always been taken for the minimum number of docks, and for the maximum number of docks the lower whole figure has been taken if the decimal figure is lower than 5, or the higher figure if the decimal figure is higher than 5.

In this way there has been determined the number of repair facilities to be constructed, which will be the following:

NUMBER OF REPAIR FACILITIES TO BE CONSTRUCTED

From [illegible] to [illegible] D.W.T.

- Prior to 1980 . . . . From 0 to [illegible]
- From 1980 to 1985 . . . . From 0 to [illegible] more

From [illegible] up to 15,000 D.W.T.

- Prior to 1980 . . . . From 0 to [illegible]
- From 1980 to 1985 . . . . From 0 to 1 more

From 15.000 to 45.000 D.W.T

- Prior to 1.980 .... From 1 to 3
- From 1.980 to 1.985 .... From 0 to 1 more

From 45.000 to 80.000 D.W.T

- Prior to 1.980 .... From 0 to 1
- From 1.980 to 1.985 0

From 80 to 130.000 D.W.T

- Prior to 1.980 .... From 0 to 1
- From 1.980 to 1.985 0

Of more than 130.000 D.W.T 0

Table 3.2.2-4 shows the same results as those given in Table 3.2.2-3 but expressed in the number of docking-days per year. That is to say, for a specific range of tonnages there is indicated the number of docking days that will be needed to repair the fleet [illegible] in the maximum and minimum hypotheses in 1.980 and 1.985. The table shows the number of docking-days which are available and the number days which it will be necessary to add for which the facilities will have to be increased taking into account a utilisation of docks of 300 days a year. This statement of the data expressed in terms of docking-days is possibly more understandable than that of the number of docks which is presented in a somewhat abstract form.

It is emphasised that the word dock is used frequently in this Study as a repair facility and that these facilities can refer both to dry docks and to floating docks, synchro-elevators or any other means that permits the grounding of a vessel.

D. W.T. Range.	1.980.					1.985.			
	Necessary docks		Existing docks up to 1.980	New docks		Necessary docks.		New docks.	
	Min.	Max.		Min.	Max.	Min.	Max.	Min.	Max.
2.000-6.000	0,95	2,4	1,6	-0,65	0,8	1,4	3,1	-0,2	1,5
6.000-15.000	**1,2**	**3**	**1**	**0,2**	**2**	**1,8**	**4,1**	**0,8**	**3,1**
15.000-45.000	2	**4**	**1**	1	3	2,8	5,1	1,8	**4,1**
45.000-80.000	**0,5**	**1,3**	**0,4**	**0,1**	**0,9**	**0,8**	**1,7**	**0,4**	**1,3**
80.000-180.000	0,3	0,9	0	0,3	0,9	0,5	1,2	0,5	1,2
Over 180.000	0,1	0,3	0	0,1	0,3	0,2	0,3	0,2	0,3

Table 3.2.2-3

D.W.T. Range	1.980. Docking-days requirements Min.	Max.	Available docking-days in 1980	Docking-days to add Min.	Max.	1.985 Docking-days requirements Min.	Max.	Docking-days to add Min.	Max.
2.000-6.000	286	720	480	-194	240	439	944	-41	464
6.000-15.000	362	916	300	62	616	552	1255	252	955
15.000-45.000	619	1229	300	319	929	834	1543	534	1243
45.000-80.000	160	402	120	40	282	231	511	111	391
80.000-180.000	100	270	0	100	270	150	380	150	380
Over 180.000	44	89	0	44	89	66	11	66	11

Table 3.2.2-4

3.3. DEFINITION OF CENTRES OF CONSTRUCTION AND REPAIR OF SHIPS

3.3.1. CHARACTERISTICS OF THE CENTRES OF CONSTRUCTION AND REPAIR

In view of the needs for construction berths, defined in point 3.1.2., and of repair facilities for ships, defined in point - 3.2.[illegible], there has been defined a certain number of centres of ship construction and repair that can be [illegible] in the - sub-region before 1.985.

It will be recalled that for shipbuilding there [illegible] two alternatives, that assumed two different degrees of development.

The two alternatives for shipbuilding [illegible] needs of a market that aims to register in the Andean Sub-region 50 per cent of the ships that carry out the traffic with third countries, 80 per cent of those that cover the traffic between Andean countries and 100 per cent of those that effect the coastal trade of each country.

The allocation of financial resources in a greater or lesser degree, and the greater or lesser speed of technological development [illegible] be decisive for one or the other alternative.

In the case of Ship Repair, two hypotheses were established: a minimum and a maximum. The minimum hypothesis is below the - needs of the market, but the maximum hypothesis may, in some - cases, be above this level. This criterion has been followed considering the necessity of attending to the repairs and [illegible] of the sub-region's own fleet, and taking into - account the fact that the financing of ship repairs requires amounts considerably inferior to those that are needed to undertake the financing of newly-built ships.

Some of [illegible] yards that are listed [illegible], developed [illegible], would cover the requirements of Alternative 1 of Cons[illegible] of [illegible] basis of Sh[illegible]

[illegible] of these centres, developed [illegible] the form [illegible] would cover the requirements of Alternative [illegible] Construct[illegible] and [illegible] of repair.

The [illegible] industries related [illegible] the devel[illegible] shipbuilding sector, will be decided [illegible] the mem[illegible] of the "[illegible] age a" hav[illegible] [illegible] of [illegible] involved.

In point [illegible] of the present study [illegible] were [illegible] consideration may facilitate this decision-making.

<u>The [illegible] of these centres of [illegible] building</u> [illegible] to [illegible] in relation to the [illegible] dead weight [illegible] of the ships to be built or repaired in these centres [illegible] following:

<u>Centre "A"</u>

Devoted [illegible] building and repair of ships between [illegible] dead weight tons, which would consist of a combined system of launching and docking of the synchroelevator or similar type, and with a system of [illegible] which will permit the construction [illegible] of the maximum size indicated and [illegible] of [illegible] vessels [illegible] [illegible]

A [illegible] capacity of 5 ships of 5.[illegible] dead weight tons. [illegible] year has been envisaged, together with the [illegible] ships of [illegible] between [illegible] and 6.000 dead weight tons.

<u>Centre "B"</u>

For repair of ships from 6.000 to 15.000 dead weight tons, which would consist of [illegible] repair docks capable of [illegible] vessels of up to 15.000 dead weight tons.

[illegible] ships [illegible] year [illegible] dead weight [illegible] is envisaged.

Centre "C"

For ship-building and repair. For the construction of ships between 11.000 and 30.000 dead weight tons, and the repair of ships of 15.000 to 45.000 dead weight tons. It would consist of one construction berth prepared for the construction of ships of 30.[illegible] dead weight tons, and a repair dock capable of handling ships of 45.000 dead weight tons.
A construction capacity of 4 ships per year of more than 2[illegible] 000 dead weight tons each is envisaged, together with the repair of [illegible]3 ships per year, of sizes of between 15.000 and 45.000 deadweight tons.

Centre "D"

For ship-building and repair. For the construction of ships of between 30.000 and 45.000 dead weight tons, and the repair of ships between 15.000 and 45.000 dead weight tons; it would consist of a construction slipway capable of building vessels of 45.000 dead weight tons, and three repair docks capable of handling vessels of 45.000 dead weight tons.
Its construction capacity is estimated at 4 ships per year of 45.000 dead weight tons, and there is envisaged the repair of 30 ships per year of sizes between 15.000 and 45.000 dead weight tons.

Centre "E"

For ship-building and repair. For the construction of ships of 60.000/[illegible].000 dead weight tons, and repair of ships of between 45.000 and [illegible].000 dead weight tons. It would consist of a construction slipway capable of handling vessels of up to [illegible].000 dead weight tons, and a repair dock capable of handling vessels of up to [illegible].000 d.w.t.

year is envisaged, together with the repair of 37 vessels per year of 45.000 to 80.000 dead weight tons.

Centre "F"

For ship-building and repair. For the construction of ships from 120.000 to 180.000 dead weight tons, and repair of ships from 80.000 to 180.000 dead weight tons: it would consist of two equal dock, one of which would be dedicated toconstruction and the other to repair, each of them being capable of handling a vessel of 180.000 dead weight tons.

Its production capacity is estimated at 3 ships of 170.000 dead weight tons. per year, and it could repair annually 33 ships of sizes between 80.000 and 180.000 dead weight tons.
With these six centres, two alternative plans are proposed.

ALTERNATIVE 1, which corresponds to Alternative 1 of Shipbuilding and to the minimum hypothesis of Ship Repairing.

There are indicated below the centres to be developed to cover this Alternative, and the facilities that would be necessary for the purpose.

Centre "C"

A construction slipway for vessels between 11.000 and 30.000 dead weight tons, which would enter into service before 1.980, with its corresponding workshops.

Centre "D"

A construction slipway for ships between 30.000 and 40.000 d.w.t.

and a dock for repair of ships up to 45.000 dead weight tons, with the workshops necessary for the operation of both, which would function before 1.980.

Centre "E"

A construction slipway with its corresponding workshops, for the building of ships from 60.000 to 80.000 dead weight tons, which would be developed before 1.980.

ALTERNATIVE 2 , includes the totality of the centres in their maximum development, and covers Alternative 2 for Shipbuilding and the maximum hypothesis for Shiprepairing.
Its development is envisaged as follows:

Centre "A"

A synchroelevator with a construction facility and another repair facility for ships of up to 6.000 dead weight tons, with their corresponding workshops, before 1.980.
The extension to a new repair facility with the consequent extension of workshops and services for the period 1.980 - 1.985.

Centre "B"

Two docks for Repair of ships of up to 15.000 dead weight tons, with their corresponding workshops for entry into service in the period 1.975 - 1.980.
A new dock, with the consequent extensions of workshops and services 1.9 5.

Centre "C"

One construction slipway for vessels of between 11.000 and 30.000 dead weight tons and a dock for the repair of ships of up to 45.000 dead weight tons, to enter into service before 1.980 with their corresponding workshops.

Centre "D"

A construction slipway for ships from 30,000 to 45,000 dead weight tons, and two docks for repair of ships up to 45,000 dead weight tons, which would function before 1980, with the workshops necessary.

Extension of a new dock of 45,000 dead weight tons, equal to the previous docks, with the consequent extension of workshops, to enter into service in the period 1980 - 1985.

Centre "E"

A construction slipway for ships of 60,000 to 80,000 dead weight tons, and a dock for the repair of ships of up to 80,000 dead weight tons, with their corresponding workshops, functioning before 1980.

Centre "F"

A dock for the repair of ships of up to 180,000 dead weight tons, with its corresponding auxiliary workshops, to function before 1980.

A construction dock for ships between 120,000 and 180,000 dead weight tons, with its corresponding workshops, to initiate its activities before 1985, although it may not have reached its full development in that year.

As may be seen, Alternative 1 is only an intermediate development of Alternative 2, and it is possible to pass from Alternative 1 to Alternative 2 with great flexibility if the circumstances so advise.

3.4. DEVELOPMENT OF AUXILIARY INDUSTRY

3.4.1. ALLOTMENT OF UNITS IN PROGRAMMES OF THE AGREEMENT OF CARTAGENA

Many of the ship-building complementary and auxiliary industries also produce equipment and materials for other non-marine uses.

Within the programmes of industrial development studied by the Board of the Agreement of Cartagena, and concretely in the Metal-mechanical Programme, proposals of allotment of industrial units among the countries of the Sub-region have already been made.

In order to summarize the situation in this respect insofar as the development of the ship-building auxiliary industries is concerned, a review has been made of the allotments contained in the Metal-mechanical Programme for units with possible application to the ship-building industry.

The summary of this analysis is the following :

LIST OF UNITS ALLOCATED BY THE METAL MECHANICAL PROGRAMME WITH POSSIBLE APPLICATION TO THE SHIP BUILDING INDUSTRY

NABANDINA	PRODUCT	COUNTRY OF ALLOTMENT	PRESENT PRODUCTION
84.11.02.00	Compressors, motor-compressors and turbo-compressors except for refrigeration of 40 HP or more	Bolivia	No
84.11.90.00	Parts and pieces for the above	"	No
84.22.01.00	Hoisting blocks, winches and capstans	Peru	Yes
84.22.91.00	Parts and pieces for the above	Peru	Yes
85.01.01.00	Dynamos	Chile-Peru	Yes
85.01.02.00	Alternators	" "	"
85.01.03.00	Electric generating sets	" "	"
85.01.04.00	D.C. motors of more than 10 HP	" "	"
85.01.05.99	Monophase motors of more than 10 HP	" "	"

NABANDINA	PRODUCT	COUNTRY OF ALLOTMENT	PRESENT PRODUCTION
85.01.06.11.	Polyphase motors of more than 10 up to 20 HP	Chile-Peru	Yes
85.01.06.15.	Polyphase motors from 20 to 100 HP	" "	"
85.01.06.99.	Other polyphase motors	" "	"
85.01.07.00.	Rotary converters	" "	"
85.01.08.00.	Static converters	" "	No.
90.28.01.00.	Electric or electronic instruments and apparatus to measure electrical magnitudes, except oscilloscopes and oscillographs	Ecuador	No
90.29.05.00.	Parts and pieces for the above	"	"
84.10.03.00.	Pumps, motor-pumps and volumetric rotary turbo-pumps	Colombia Chile Peru	Yes
84.10.04.00.	Pumps, motor pumps and turbo-pumps with the exception of those of one single stage and output diameter inferior to 100 mm.	"	"
84.10.05.00.	Pumps, motor-pumps and injection turbo-pumps, except for motors	"	"
84.10.90.00.	Parts and pieces for pumps, motor-pumps and volumetric rotary turbo-pumps	"	"
84.18.01.99.	Other centrifuges and centrifuge dryers	Ecuador	No
84.18.90.01.	Parts and pieces for centrifuges	"	"
84.61.02.00.	Pressure reduction valves	Chile-Colombia	Yes
84.61.11.00.	Spherical valves	" "	"
86.61.12.00.	Gate valves of diameter superior to 100 mm.	" "	"
84.61.89.00.	Other articles of cocks and fittings, with the exception of globe valves of diameter up to 100 mm., and the automatic valves of this position included in the first section of the common list	" "	"
85.19.01.00.	Circuit-breakers for service voltages of between 260 and 1,000 V., and for nominal currents of between 30 and 400 amps.	Bolivia-Ecuador	Yes
85.19.06.00.	Isolating switches for the same voltages and currents	"	"
85.19.11.00.	Commutators for the same voltages and currents	"	"

NABANDINA	PRODUCT	COUNTRY OF ALLOTMENT	PRESENT PRODUCTION
85.19.16.00.	Relays for service voltages superior to 260 V., and nominal currents superior to 30 amps.	Bolivia-Ecuador	Yes
85.19.21.00.	Circuit breakers for service voltages of between 260 and 1,000 V., and for nominal currents of between 30 and 400 amps.	•	•
85.19.31.00.	Wave dampers	•	•
85.19.36.00.	Splicing and connecting apparatus for service voltages of between 260 and 1,000 V., and for nominal currents of between 30 and 400 amps	•	•
85.19.51.00.	Rheostats for service voltages superior to 260 V., and nominal currents superior to 30 amps.	•	•
91.03.89.30.	Panel clocks and similar for use on board for aircraft, ships and other vehicles except for automobiles	Ecuador	Yes
91.04.89.01.	Marine chronometers and similar devices	•	•
84.63.04.30	Speed reducers, multiplicators and changers	Peru.	Yes
85.01.	Motor-reducers, motor-changers and motor-multiplicators for speed, except with mono-phase or three-phase motors from 1 to 10 HP, inclusive.	•	•
84.59.89.99.	Hydraulic apparatus for the driving of machines and apparatuses such as hydraulic presses, etc.	Ecuador	Yes
73.24.01.00.	Iron or steel containers for compressed or liquified gases, without welding	Peru	No
73.24.02.00.	Iron or steel containers for compressed or liquified gases, with welding, for normal working pressures superior to 20 Kgs/cm2	•	•
84.11.03.00.	Open compressers for refrigeration	Colombia	Yes
84.40.01.03.	Machines and apparatuses for dry-cleaning	•	•
84.40.91.04.	Machines and presses for ironing	•	•
90.24.01.00.	Manometers	Ecuador	Yes
90.24.02.00.) 90.28.02.09.)	Thermostats	Peru	Yes

Note: "YES" means that there has been located in the Sub-region some manufacture of some type of product included in the group. Not necessarily in the country allocated.

Again, a revision has been made of the units whose products continue on the Reserve Scale, always within those of possible application to the ship-building industry.

The result of this analysis is given in the following list:

LIST OF UNITS THAT CONTINUE IN THE RESERVE SCALE AND WHOSE PRODUCTS APPLICABLE TO THE SHIPBUILDING INDUSTRY

NABANDINA	PRODUCT
39.01.04.00.	Polyester resins other than alkyd resins
39.01.08.	Polyurethane and superpolyurethanes
39.01.09.	Epoxy or ethoxylene resins
73.07.03.00.	Forging scrap
73.10.02.00.	Hot-rolled or spun bars
73.10.03.00.	Forged bars
73.10.04.00.	Cold-produced or finished bars
73.11.02.00.	Profiles of 80 mm. or more hot-rolled or spun or forged.
73.11.05.00.	Profiles of less than 80 mm. hot-rolled or spun or forged
73.12.01.00.	Hot-rolled elements, not coated or worked
73.13.01.00.	Magnetic sheets
73.13.02.00.	Hot-rolled sheet of more than 4.75 mm. in thickness
73.13.02.01.	Ditto of 3 mm. and 4.75 mm. thick
73.13.02.02.	Ditto of less than 3 mm. in thickness
73.13.05.00.	Galvanized sheets
73.13.07.00.	Surface-worked sheets
73.15.01.00.	Fine carbon steel ingots
73.15.02.00.	Alloyed steel ingots
73.15.03.00.	Fine carbon steel square or rectangular waste pieces
73.15.09.00.	Solid fine carbon-steel bars
73.15.10.00.	Solid alloyed steel bars

NABANDINA	PRODUCT
73.15.13.00.	Fine carbon-steel profiles of 80 mm. or more
73.15.04.00.	Alloyed steel square or rectangular scrap pieces
73.15.14.00.	Profiles of 80 mm. or more, of alloyed steel
73.15.15.00.	Fine carbon-steel profiles of less than 80 mm.
73.15.16.00.	Alloyed steel profiles of less than 80 mm.
73.15.17.00.	Fine carbon-steel sheets of more than 4.75 mm.
73.15.18.00.	Alloyed steel sheets of more than 4.75 mm.
73.15.19.00.	Fine carbon-steel sheets of 3 to 4.75 mm.
73.15.20.00.	Alloyed steel sheets of 3 to 4.75 mm.
73.15.21.00.	Non-coated sheets of less than 3 mm. thick, of fine carbon-steel
73.15.22.00.	Non-coated sheets of less than 3 mm. thick, of alloyed steel
73.15.23.00.	Coated sheets of less than 3 mm. thick, of fine carbon-steel
73.15.24.00.	Coated sheets of less than 3 mm. thick, of alloyed steel
73.15.25.00.	Fine carbon-steel strips
73.15.26.00.	Alloyed steel strips
73.18.02.00.	Iron or steel pipes with seam
73.18.03.00.	Iron or steel pipes without seam
73.18.04.00.	Alloyed steel pipes or fine carbon-steel pipes with seam
73.18.05.00.	Alloyed steel pipes or fine carbon-steel pipes without seam
76.03.00.00	Sheets, plates, leaves and strips of aluminium of thickness superior to 0,20 mm.
84.06.	Internal combustion engines

From the above list it is deduced that, with the exception of the 3 products that appear in the first places, the remainder of the products are included within the Iron and Steel Industry and that of Internal Combustion Engines. These last two groups of industries are those treated in the following points of the present Study.

3.4.2. DIESEL ENGINES

Diesel engines have been considered as propulsion machinery for the ships to be constructed in the sub-region, excluding steam turbines, gas turbines and other systems. The recommendation to adopt this criterion is based on the fact that the technology for motor vessels is more straightforward than that for turbine ships and it seems logical to adopt systems that are simpler and present fewer problems for shipyards in the course of development. On the other hand, for the types and sizes of vessels that it is envisaged will be constructed in the sub-region, the diesel engine system of propulsion represents the perfect solution.

(a) - Classification of types of diesel engines

The different types of diesel engines utilised in the propulsion and electric power generating installations in the ships have been analysed according to the following classifications:

- Type "A" engines

Diesel propulsion engines, directly coupled to the propeller shafting, that is to say, without reduction gears.

. Power: between 5,000 BHP and 35,000 BHP.
. Speed rating: less than 300 r.p.m.

- Type "B" engines

Diesel propulsion engines to drive the propeller shafting by means of reduction gears.

. Power: between 2,500 BHP and 20,000 BHP
. Speed rating: between 300 r.p.m. and 1,000 r.p.m.

- Type "C" engines

Diesel propulsion engines or auxiliary engines (for electric generating units), operating by means of reduction gears in both cases.

. Power: between 1,000 BHP and 7,500 BHP.
. Speed rating: more than 1,000 r.p.m.

- Type "D" engines

Diesel propulsion engines for driving the propeller shafting by means of reduction gears.

Auxiliary engines to operate electricity generator units by direct coupling.

. Power : between 500 BHP and 2,500 BHP

. Speed rating : less than 800 r.p.m.

With reference to this last group of type "D" engines, it is pointed out that although the engines of less than 1.000 BHP are included in the Automotion Programme, it is considered - that speeds of less than 800 r.p.m. are of special applica - tion to marine engines and are suitable for inclusion in the present study .

From the point of view of the potential market for this type "D" diesel engines, it should be noted that, in addition to - the analysed demand for this type of engines shown in para - graph (b) below, there is an additional demand for vessels of less than 1,000 gross registered tonnage (fishing vessels, tugs, etc) not included in the scope of the present study, as well as possible applications, in the case of the less powerful engines to uses on land such as locomotive use, sationary electricity generating units, etc.

Figure nº 3.4.2-A on page 219 shows the ranges of power and - speed for each of the types of engines indicated.

TYPES OF ENGINES. CLASSIFICATION BY POWER AND R.P.M.

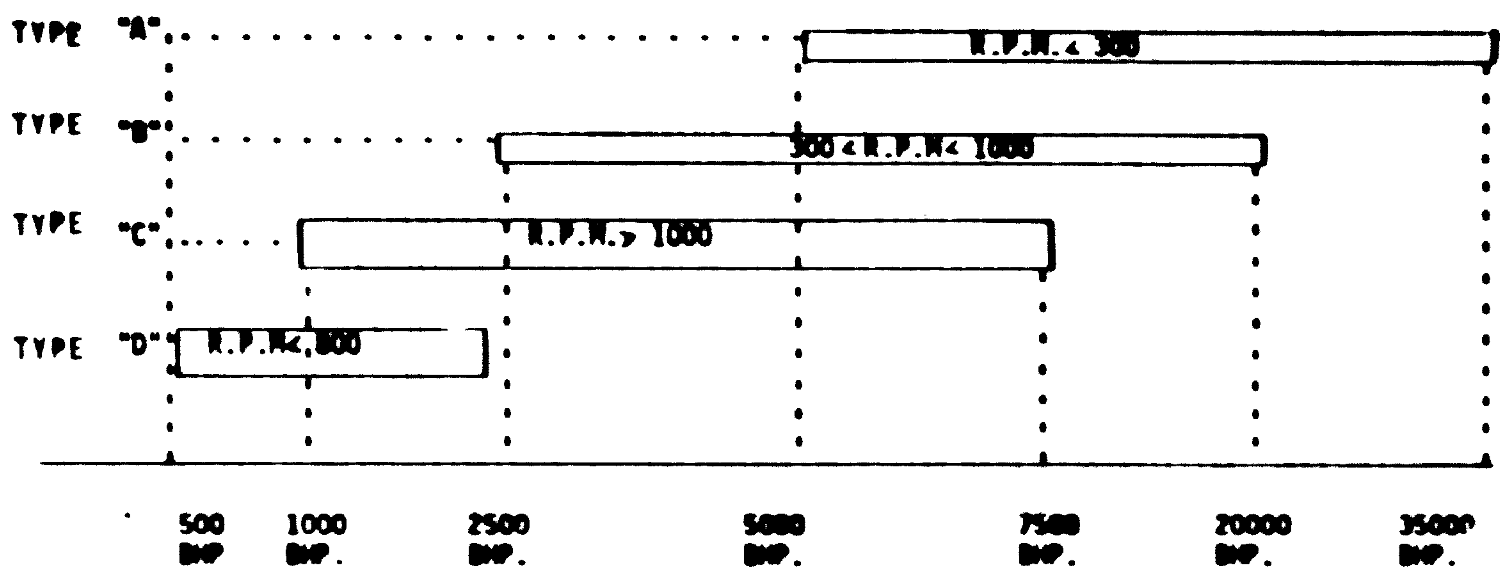


Figure 3.4.2-A

In the following paragraph (b), the foreseeable demand for diesel marine engines in the sub-region is analysed.

(b) Total annual demand in BHP of propulsion engines and auxiliary engines for electricity generating units.

An analysis has been made of the power of propulsion engines and auxiliary engines for electricity generating groups for the ships considered in the construction programmes of the shipyards in the subregion. The development of production of the existing shipyards and the forecast of production of the new shipyards have been taken into account in their two alternative hypotheses.

The resulting figures of the total annual demand in BHP for engines of the various types, evaluated for the year 1980 and for 1985 are indicated in Table n° 3.4.2-1 included hereinafter.

TOTAL ANNUAL DEMAND FOR MARINE ENGINES IN BHP.

	ALTERNATIVE 1. Lesser development. (See page 190).		ALTERNATIVE 2. Greater development. (See page 191).	
	Year 1980	Year 1985.	Year 1980	Year 1985.
Type "A" ENGINES.	185.000 BHP	282.000 BHP	185.000 BHP	330.000 BHP
Type "B" ENGINES.	67.000 "	104.000 "	76.000 "	140.000 "
Type "C" ENGINES.	8.000 "	15.000 "	10.000 "	17.000 "
Type "D" ENGINES.	34.400 "	51.400 "	39.600 "	62.400 "

Table 3.4.2-1

(e) - Recommendations on the implantation of factories for the manufacture of diesel engines

In view of Table 3.4.2-1 showing the annual demand for engines, the implantation of a number of factories for the manufacture of diesel engines is justified, since the figures of demand for specific types exceed the minimum levels of production which are considered to be the thresholds of profitability which are, in general terms, about 150,000 BHP per annum for high powered, low r.p.m. engines (Type "A" defined in this study) about 100000 BHP/annum for medium speed engines (Type "B") and about 40.000 BHP per annum for lower powered, high r.p.m -engines, (types "C" and "D") so long as the ranges of engines to be manufactured are not too wide.

In accordance with the demand foreseen, the manufacture of type "C" engines in the sub-region is not justified.

On the other hand, it is evident that benefits will accrue to the sub-region through having available its own marine engine manufacture, with the consequent savings in foreign exchange and the creation of employ - ment opportunities.

In addition it should be pointed out that the supply of propulsion engines constitutes a problem of delivery dates for the majority of shipyards in all parts of the world, for which reason the availability of an assured supply would contribute to the autonomy and flexibility of the production of the shipyards of the sub-region.

In accordance with the foregoing, the possible implantation of the following marine engine factories is recommended:

ALTERNATIVE 1 (Lesser development of the sector).

- A factory for type "A" engines, with a production capacity of 150,000 BHP per annum in 1980, which could increase its production to 200,000 BHP per annum in 1985.

- A factory for type "B" engines, for implantation after 1980, and with a production capacity of 100,000 BHP per annum in 1985.

- A factory for type "D" engines, with a production capacity of 30,000 BHP per annum in 1980 and subsequent extension to attain 50,000 BHP per annum in 1985.

ALTERNATIVE 2 (Greater development of the sector)

- A factory for type "A" engines, with a production capacity of 150,000 BHP per annum in 1980, increasing its production to 200,000 BHP per annum in 1985.

- A second factory for type "A" engines, for implantation after 1980 to reach a production capacity of 150,000 BHP per annum in 1985.

- A factory for type "B" engines, with a production capacity of 75,000 BHP per annum in 1980, increasing its production to 150,000 BHP per annum in 1985.

- A factory for type "D" engines, with a production capacity of 30,000 BHP per annum in 1980, and subsequent expansion to attain 60,000 BHP per annum in 1985.

(d) - Characteristics of the engine factories recommended

The marine engine factories defined in paragraph (c) above, will present the estimated characteristics that are set forth in tabular form hereinafter:

CHARACTERISTICS OF RECOMMENDED ENGINE FACTORIES.

ALTERNATIVE 1 (Lesser development)	YEAR 1980		YEAR 1985	
	Staff of personnel	Investment in U.S. $	Staff of personnel	Investment in U.S. $
Factory for Type A engines 150,000 BHP/year	760	18,460,000		
Extension of the above factory to 200,000 BHP/year			190	5,000,000.-
Factory for type B engines, 100,000 BHP/year	-	-	650	12,540,000.-
Factory for type D engines, 30,000 BHP/year	210	4,300,000		
Extension of the above factory to 50,000 BHP/year			120	2,520,000
TOTAL ALTERNATIVE 1	970	22.760.000	960	20.060.000

ALTERNATIVE 2 (Greater development)	YEAR 1980		YEAR 1985	
	Staff of personnel	Investment in U.S. $	Staff of personnel	Investment in U.S. $
Factory for type A engines 150,000 BHP/year	760	18,460,000		
Extension of the above factory to 200,000 BHP/year			190	5,000,000.-
Second factory for type A engines 150,000 BHP/year	-	-	760	18,460,000.-
Factory for type B engines, 75,000 BHP/year	530	10,200,000		
Extension of the above factory to 150,000 BHP/year			370	6,300,000.-
Factory for type D engines, 30,000 BHP/year	210	4,300,000		
Extension of the above factory to 60,000 BHP/year			160	2,800,000.-
TOTAL ALTERNATIVE 2	1,500	32,960,000	1,480	32,560,000

Table 3.4.2-2

The factories under consideration have been assumed, in certain aspects, to have a higher degree of autonomy than other similar factories in more highly developed countries, since in these factories a greater amount of sub-contracting of specific supplies is feasible.

On the other hand, the level of sub-contracting within the sub-region cannot be very high because of the scarcity of auxiliary manufactures, this being higher in factories making small-sized engines, since there are greater possibilities of finding suppliers in the market.
In the case of types A and B engines, the installation of foundries in the factories has not been considered. On the other hand, it has been considered for the manufacture of type D engines.

In general, it is estimated that the factories for manufacturing engines that may be implanted in the sub-region would have to import a high percentage of their production value (between 30 and 50 per cent, depending on the development of the zone where the factory is situated and on the type of engine being manufactured).

Among the elements to be imported are the following:

- Supercharging turbo- blowers.
- Crankshafts
- Measuring apparatus
- Regulators
- Lubricating mechanisms
- High pressure piping
- Pumps and injection nozzles
- Large castings and forgings
- etc.

(e) - Siting of the factories

With regard to the possible siting of the factories recommended within the Andean sub-region, it is to be recalled the general criteria on siting expressed in section 3,0 of this study.

3.4.3. IRON AND STEEL SHIPBUILDING PRODUCTS

Iron and steel products constitute a very important part of the materials employed in the construction of ships. The value of the steel in the hull of a ship represents from 10 to 20 per cent of the total value of construction, the lower value being applicable to ships of small tonnage, and the higher to large super oil-tankers.

An analysis has been made of the demand for rolled steel in shipbuilding qualities for the programmes of construction that can be undertaken in accordance with the alternatives considered in the present Study. This demand in its three variants is reflected in the following Table Nº 3.4.3-1 for the successive years between 1974 and 1985.

Table Nº 3.4.3-1

TOTAL ANNUAL DEMAND FOR SHIPBUILDING ROLLED STEEL IN THE SUB-REGION ACCORDING TO THE CONSTRUCTION PROGRAMMES CONSIDERED

YEAR	With existing shipyards or those in an advanced stage of planning	Alternative I (lesser development)	Alternative II (greater development).
1974.	24,000 Tons	24,000 Tons	24,000 Tons
1975.	26,000 "	26,000 "	26,000 "
1976.	29,000 "	29,000 "	29,000 "
1977.	45,050 "	45,050 "	45,050 "
1978.	58,300 "	90,800 "	94.400 "
1979.	74,550 "	139,550 "	144,950 "
1980.	107,600 "	174,100 "	179,500 "
1981.	122,600 "	209,600 "	216.800 "
1982.	129,850 "	233,450 "	241.050 "
1983.	131,450 "	247,450 "	256.450 "
1984.	154,700 "	279,700 "	313.700 "
1985.	154,700 "	279,700 "	338.700 "

As has already been remarked in point 1.2.1. of this Study, the existing iron and steel plants of the Sub-region have practically no production of rolled steel for shipbuilding. However, it is considered that, in view of their development plans in progress or projected, it is feasible that they will be able to include in their productions of future years lines of shipbuilding products, with sufficient capacity to supply the market of the shipyards of the Sub-region, covering the annual demand which in Alternative 2 of greater development proposed for shipbuilding, would reach the figure of 338.700 tons per annum of ship-building steel for 1985, of which 80/90 per cent should be considered to be plates, and the remaining 20/10 per cent to be rolled profiles.

It is considered that the basic prices of the iron and steel ship-building products rolled in the Sub-region will be comparable to international prices, since the iron and steel plants involved will be of modern design, with a high degree of automation and with processes similar to those of foreign plants, so that comparable coefficients of productivity will be achieved.

Among the rolled iron and steel ship-building products it is estimated that in the Sub-region it will be possible to supply the shipyards with practically the whole range of ship-building plate of grades A, B, D and E (except, perhaps, the largest widths and thicknesses), together with shipbuilding profiles in their normal sections.

However, there will continue for a certain time the necessity of effecting imports of certain products, such as high tension steel (grades AH, DH and EH, of yield point higher than 27 Kg/mm2), alloyed steels and certain profiles of special sections.

These imports of ship-building steel can be estimated at 10/15 per cent of the total demand mentioned above, which can be the equivalent of approximately 2 per cent of the value of the ships built.

Again, it is considered that it will be necessary to stimulate the development of forging and foundry plants for the auxiliary industry in its production of ship-building equipment, and fundamentally for the propeller shafting.

lines and for the factories of marine Diesel engines although for the large sizes of shafts, both propelling and crankshafts, it is estimated that imports may continue over the period of time con - sidered in the present Study.

2.5. DEVELOPMENT OF SHIPPING COMPANIES

2.5.1. CLASSIFICATION OF SHIPPING COMPANIES

In order that the merchant fleets of the Andean Sub-region can effect 50 per cent of the traffic with other countries, 80 per cent of the traffic between the countries of the Sub-region and 100 per cent of the national coastal traffic, as has been envisaged, the expansion required on the basis of the existing situation described in Section 1.3 is of such a magnitude that it would necessitate the reorganisation of the Shipping Companies of the respective countries and a structuring in accordance with the tonnage of the fleet required.

In the first place, a classification of the Shipping Companies seems to be indicated, with respect to the traffic to be carried, the cargoes to be transported and, consequently, the ships that have to be operated.

In accordance with this criterion, the Shipping Companies have been classified in the following groups:

(a) - Shipping Companies engaged in the exporting and, where applicable, the importing of crudes.

Type of ships to be operated: Oil tankers of more than 60,000 tons dead weight.

(b) - Shipping Companies engaged in the importation and exportation of petroleum products.

Type of ships to be operated: Oil tankers of 5,000 to 45,000 tons dead weight and Liquified Petroleum Gas (L.P.G.) Tankers

(c) - Shipping Companies engaged in coastal trade for distribution of petroleum products.

Type of ships to be operated: Oil tankers of less than 30,000 tons dead weight.

(d) - Shipping Companies engaged in combined import and export trade of crude oil and bulk cargoes.

Type of vessels to be operated: Bulk carriers of more than 30,000 dead weight tons, Oil tankers and OBOs of more than 60,000 dead weight tons.

(e) - Shipping Companies engaged in the importation and exportation of bulk solid cargoes.

Type of vessel to be operated: Bulk carriers of more than 30,000 tons dead weight.

(f) - Shipping Companies engaged in general cargo or refrigerated cargo traffic between the Andean Sub-region and third countries.

Type of vessel to be operated : Refrigerated vessels of more than 2,500 dead weight tons and cargo liners, including partially refrigerated vessels, of more than 11,000 dead weight tons.

(g) - Shipping Companies engaged in traffic among the countries of the Andean Sub-region.

Type of vessels to be operated: Conventional cargo ships, Container-carriers, Roll-on Roll-off, etc., of less than 20,000 dead weight tons.

(h) - Shipping Companies engaged in national coastal traffic and traffic with the countries of the Caribbean Area.

Type of vessel to be operated: Cargo vessels of less than 6,000 dead weight tons and lake or river vessels.

At the present time there are shipping companies in the Andean Sub-region which we could classify in groups (c), (f) and (h), although there are some vessels that could be included in some of the other groups even though the Company to which they belong cannot be so classified.

Special traffics, such as L.N.G., have not been included because of the need of very sophisticated ships requiring specialised design, operation and maintenance techniques. It is considered convenient to leave these traffics in hands of foreign shipping companies with a greater experience.

STRUCTURE OF SHIPPING COMPANIES.

A successful operation of a merchant fleet requires, in addition to a specialization in certain traffics, adequate company and fleet dimensions allowing optimum conditions of profitability to the investments. In this way the following benefits are obtained:

- Reduction on of percentage rates of overhead expenses over operating expenses.
- Greater flexibility in the use and assignement of ships.
- Better crewing procedures, as crewmembers may be changed from ship to ship, cover vacation periods, etc.
- Reduction in capital costs as regards spare parts, general supplies, etc.
- Increased management power on occassion of contracting newbuildings of fixing chartering conditions.

Although there are some Andean Shipping Companies with adequate dimensions, it is considered of importance to stress the recommendation that the future development of the shipping sector in the Subregion should be made on the basis of appropiate dimensions and structure of the shipping companies to be stablished.

It is estimated that a minimum recommendable number of ships is five, to allow a rational operating structure of a Shipping Company.

In view of the number of ships required to cover the traffic, it seems feasable that, in the period under study, various companies can succeed in acquiring a number of vessels that will allow good conditions of operation.

In order to develop the merchant fleets, the following courses of action may be followed:

(a) Expansion of the existing Shipping Companies
(b) Merging of existing Shipping Companies in order to form larger-sized firms
(c) The creation of new Shipping Companies

As stated in point 3.5.1., the existing Andean Shipping Companies may be classified in groups (c), (f) and (h). It does not seem that Shipping Companies in any of the other groups can be developed, taking as a basis the Companies existing at the present time.

It will be recalled that the coastal traffic in petroleum products at the present time is effected in ships owned or chartered by the national petroleum companies.

Group (c) includes the most important maritime transport companies in the Andean Sub-region, whose experience and knowledge of the shipping business are outstanding.

Therefore, these already existing firms should be strengthened, and should be provided with the necessary legal and economic aid to effect the expansion of the maritime traffic between the Andean Sub-region and the rest of the world. It should be recalled that, in order to cover the requirements of the traffic in 1980 with 50 per cent of this traffic being carried in ships registered in Andean countries, it would be necessary to contract 50 new cargo vessels of more than 11,000 dead weight tons, in accordance with what is indicated in Table 2.3.2-7, the existing fleet of this type of vessels being also 50 units. The requirements for the period 1981-1985 would be a further 35 new ships, as indicated in Table 2.3.2-14.

The Companies that at the present time carry out the traffic included in group (h) for coastal traffic are, in general, small in size and it is advisable that they should be expanded or, at all events, that several of them should merge in order to attain more profitable dimensions.

The merging of already existing small companies can be effected in two ways:

- By merging Shipping Companies of the same country.
- By merging Shipping Companies of different Andean countries in order to form a multi-national company of larger and more rational dimensions.

With these mergers, firms could be constituted whose operations could be classified in group (h) as indicated previously. In the case of the constitution of multi-national companies it would be possible to undertake the creation of companies which would be classified in group (g).

This group merits special attention in view of its importance for the development of trade among the Andean countries and its relation with the Physical Integration of the Sub-region. It will be recalled that in Point 2.2.2. the growth rates for the intra-zonal traffic were estimated at 16 per cent for the period 1974-1977 and 20 per cent for the period 1978-1985, having been only 12 per cent between 1970 and 1973. In order to reach these rates, action on the part of the respective governments will be necessary in order to break the existing vicious circle caused by having little intra-zonal commerce due to the lack of means of transport and inadequate means of transport due to the lack of cargo to be transported.

Apart from other measures to promote trade among the Andean countries, it is necessary to establish means of transport that would be able to meet the possible demand. These means would be excessive at the outset, so that they should be partially subsidized by the countries concerned. It should not be forgotten that five of the six Andean countries are physically joined by means of the sea and that the seaborne traffic the most economical transport for the greater part of the merchandises carried. It should be kept in mind also, that the greater part of the important towns and cities and the industrial centres are near to the coasts. It is necessary, however, to create the infrastructure and the conditions required for the transport by land between the ports and the centres of production and consumption. In this sense, combined systems of transport should be considered, utilizing containers or roll-on roll-off ships.

Taking the maximum advantage of the possibilities of extending the existing Shipping Companies and merging others in order to achieve a more rational dimension would only cover a part of the traffic requirements envisaged in order to attain the objectives stated.

It will be necessary to create new shipping companies in order to cover principally groups (a), (b), (d), (e) and also part of group (g). These new shipping companies should cover the most important traffic in tonnage in respect of solid and liquid bulk cargoes.

These new firms could be national, multi-national or a combination of the two.

The constitution of national or multi-national firms will require a great economic effort on the part of the Sub-region, but it will bring about a high degree of independence and a stronger position by being able to offer products C.I.F. instead of F.O.B. by companies completely controlled by the respective countries.

Taking into account that both the crude and the solid bulk cargoes are destined for large international companies which often have important interests in the extractive industries of the Sub-region, the creation of joint maritime transport firms could be negotiated with these companies.

The negotiation of the constitution of such companies should be effected according to a co-ordinated plan in order to obtain favourable conditions for the financing of the vessels.

3.6. EVALUATION OF NECESSARY RESOURCES (HUMAN, TECHNOLOGICAL AND FINANCIAL)

3.6.1. HUMAN RESOURCES

For the evaluation of the human resources necessary for the development of the ship-building sector in the Andean Sub-region, the following have been studied:

a) employment opportunities in new shipyards
b) Employment opportunities on board the ships

An estimation has been made of the number of employment opportunities in new shipyards, divided into various professional levels or categories. For this purpose, it has been considered that the shipyard is not a self-sufficient unit that produces all or the mayor part of the elements that constitute the ship, but an industry of synthesis. That is to say, that it is basically a factory that constructs the structural hull of the vessel starting with rolled plates and profiles, and an assembly line that installs in ship a series of items of equipment and elements that have been manufactured outside the shipyard. This requires a flow of materials that can come from the Sub-region or from third countries. It has also been assumed that the Shipyard can effect certain works with personnel sub-contracted to cover work demands at the moments when the sequence of construction or repair of the ship so requires. It has also been assumed that certain works, such as painting, decoration, preparation of living quarters, etc., will be done in part with outside personnel who can attend to various shipyards geographically near to one another, or to other non-shipbuilding industries. These hypotheses are within the line of work of modern shipyards in the most highly developed countries, and it has been demonstrated, on the other hand, that the industrial and labour level at the points of possible location of the shipyards permits this.

An estimate has not been made of personnel needed for the development of the existing shipyards, since these have already defined programmes for the recruitment and training of personnel.

In Tables 3.6.1-1 to 3.6.1-9 and indication is given of the employment opportunities envisaged for the different types of shipyards which are defined in point ..., in accordance with Alternatives 1 and 2.

EVALUATION OF EMPLOYMENT REQUIREMENTS IN SHIPYARDS

TYPE "C" SHIPYARD.

ALTERNATIVE A.

QUALIFICATION	Period 1974-1980.	Period 1980-1985.	TOTAL.
Upper grade engineers	8	-	8
Other upper graduates	2	-	2
Lower-grade engineers	10	-	10
Administrative personnel	20	-	20
Draughtsmen	35	-	35
Foremen	100	-	100
Qualified workers	1000	-	1000
Non-qualified workers	200	-	200
Apprentices	75	-	75
TOTAL.	1450	-	1450

Table: 3.6.1-1

EVALUATION OF EMPLOYMENT REQUIREMENTS IN SHIPYARDS

TYPE "D" SHIPYARD.

ALTERNATIVE 1.

QUALIFICATION	Period 1974-1980	Period 1980-1985.	TOTAL.
Upper grade engineers	15	-	15
Other upper graduates	3	-	3
Lower-grade engineers	20	-	20
Administrative personnel.....	50	-	50
Draughtsmen	30	-	30
Foremen	180	-	180
Qualified workers	1800	-	1800
Non-qualified workers.........	550	-	550
Apprentices...................	100	-	100
TOTAL	2748	-	2748

Table 3.6.1-2

EVALUATION OF EMPLOYMENT REQUIREMENTS IN SHIPYARDS

TYPE "E" SHIPYARD.

ALTERNATIVE 1.

QUALIFICATION	Period 1974-1980	Period 1980-1985.	TOTAL.
Upper grade engineers	12	-	12
Other upper graduates	3	-	3
Lower-grade engineers	18	-	18
Administrative personnel.......	50	-	50
Draughtsmen	30	-	30
Foremen	140	-	140
Qualified workers	1400	-	1400
Non-qualified workers	400	-	400
Apprentices	100	-	100
TOTAL	2153	-	2153

Table 3.6.1-3

EVALUATION OF EMPLOYMENT REQUIREMENTS IN SHIPYARDS.

SHIPYARD TYPE "A"

ALTERNATIVE 2.

QUALIFICATION	Period 1974-1980.	Period 1980-1985.	TOTAL.
Highly qualified engineer	5	1	6
Other highly qualified per.	2	-	2
Medium-grade engineers	20	3	23
Administrative employees	30	5	35
Draughtsmen	10	2	12
Foremen	60	8	68
Skilled workers	600	80	680
Non-skilled workers.......	200	20	220
Apprentices	50	20	70
TOTAL	977	139	1116

Table 3.6.1-4

EVALUATION OF EMPLOYMENT REQUIREMENTS IN SHIPYARDS.

SHIPYARD TYPE "B"

ALTERNATIVE 2

QUALIFICATION	Period 1974-1980.	Period 1980-1985.	TOTAL
Highly qualified engineers	5	2	7
Other highly qualified per.	2	-	2
Medium-grade engineers.....	15	5	20
Administrative employees...	25	5	30
Draughtsmen	6	2	8
Foremen	34	16	50
Skilled workers	340	160	500
Non-skilled workers........	100	50	150
Apprentices	35	15	50
TOTAL	562	255	817

Table 3.6.1-5

EVALUATION OF EMPLOYMENT REQUIREMENTS IN SHIPYARDS.

TYPE "C" SHIPYARD
ALTERNATIV E2.

QUALIFICATION	Period 1974-1980.	Period 1980-1985.	TOTAL.
Highly qualified engineers.	8	-	8
Other highly qualified pers.	2	-	2
Medium-grade engineers	14	-	14
Administrative employees.....	25	-	25
Draughtsmen	25	-	25
Foremen	125	-	125
Skilled workers	1250	-	1250
Non-skilled workers........	250	-	250
Apprentices	75	-	75
TOTAL	1774	-	1774

Table: 3.6.1-6

EVALUATION OF EMPLOYMENT REQUIREMENTS IN SHIPYARDS.

SHIPYARD TYPE "D"

ALTERNATIVE 2.

QUALIFICATION	Period 1974-1980	Period 1980-1985.	TOTAL
Highly qualified engineers..	18	2	20
Other highly qualified pers.	4	1	5
Medium-grade engineers......	25	5	30
Administrative employees....	60	10	70
Draughtsmen	33	2	35
Foremen	220	40	260
Skilled workers............	2200	400	2600
Non-skilled workers........	675	125	800
Apprentices................	125	25	150
TOTAL	3360	610	3970

Table 3.6.1-7

EVALUATION OF EMPLOYMENT REQUIREMENTS IN SHIPYARDS.

SHIPYARD TYPE "E"

ALTERNATIVE 2.

QUALIFICATION	Period 1974-1980.	Period 1980-1985.	TOTAL
Highly qualified engineers......	15	-	15
Other highly qualified personnel	4	-	4
Medium-grade engineers	23	-	23
Administrative employes	60	-	60
Draughtsmen	33	-	33
Foremen	185	-	185
Skilled workers	1850	-	1850
Non-skilled workers	540	-	540
Apprentices	125	-	125
TOTAL	2.835	-	2.835

Table : 3.6.1-8

EVALUATION OF EMPLOYMENT REQUIREMENTS IN SHIPYARDS.

SHIPYARD TYPE "F"

ALTERNATIVE 2.

QUALIFICATION	Period 1974-1980	Period 1980-1985.	TOTAL.
Highly qualified engineers	7	8	15
Other highly qualified per.	2	2	4
Medium-grade engineers.....	13	12	25
Administrative employees...	30	35	65
Draughtsmen	10	25	35
Foremen	80	140	220
Skilled workers............	800	1400	2200
Non-skilled workers........	250	300	550
Apprentices	40	60	100
TOTAL	1232	1982	3214

Table: 3.6.1-9

SUMMARY OF EVALUATION OF EMPLOYMENT REQUIREMENTS IN SHIPYARDS

	ALTERNATIVE 1.		ALTERNATIVE 2.	
	1.974-1.980.	1.981-1.985.	1.974-1.980.	1.981-1.985.
Highly qualified eng.	35	-	58	13
Other highly qualified personnel	8	-	16	3
Medium-grade engin...	48	-	110	25
Administrative empl..	120	-	230	55
Draughtsmen	95	-	117	31
Foremen	420	-	703	204
Skilled workers......	4200	-	7030	2040
Non-skilled workers..	1150	-	2015	495
Apprentices..........	275	-	450	120
TOTAL	6351	-	10729	2986

Tabla 3.6.1-10

In Table 3.6.1-10 a summary is given of the employment opportunities in new shipyards in accordance with Alternatives 1 and 2 in the periods indicated.

An approximate estimation has been made of the new employment opportunities on board ships, taking into account the estimated ships to be built in Subregional shipyards as per Alternative 2, plus the additional ships that are estimated will be acquired from outside the Subregion.

In this way, the data given in Table 3.6.1-11 have been obtained, where a break-down has been given of the different professional categories to cover the employment opportunities on board the ships in the periods 1974-1,980 and 1.981-1.985.

EVALUATION OF EMPLOYMENT OPPORTUNITIES ON BOARD SHIP

Qualification	Period 1.974 - 1.980	Period 1.981 - 1.985
Captains	179	227
Deck Officers	537	681
Engineer Officers	537	681
Radio Officers	179	227
Petty Officers	537	681
Crew members	3.580	4.540
TOTAL	5.549	7.037

Table 3.6.1-11

No evaluation has been made of the land personnel of the Shipping Companies because their number will depend on the structure of such Companies and on their distribution in the different countries of the Subregion. In any event, the number of employment opportunities on land will be small and only about 10 per cent of the onboard personnel.

The development of the ship-building sector will imply the creation - of a series of employment opportunities in the technical services of the respective Administrations in the inspection services of the Classification Societies, in the Technical Consultant Offices for shipyards and ship-owners, in the Research Centres and in the Technical Schools and Professional Training Centres. Their evaluation is very complex because of being related to other technical fields, and to other sectors of the Education and of the Administration.

The same can be said about commercial services that have to be created to attend to the needs of shipyards and shipowners, and, above all of the - Auxiliary Industry. The latter is very diverse, and attends to other economic sectors distinct from the shipbuilding sector. It is important to point out that a development of the Shipbuilding Industry will influence the development of the Metal-mechanical and Iron and Steel Industries, and will indirectly increase the employment opportunities in these sectors.

Because of their importance and their almost exclusive dedication to the shipbuilding sector, mention is made of the employment opportunities that it is envisaged will have to be created in the manufacture of Diesel engines larger than 500 BHP, in accordance with Alternatives 1 and 2 which are indicated in point 3.4.2. for the periods 1974 - 1980 and 1981 - 1985.

	Period 1974 - 1980	Periodo 1981 - 1985
ALTERNATIVE 1	990 employment req.	940 employment req.
ALTERNATIVE 2	1500 " "	1480 " "

3.6.2. TECHNOLOGICAL RESOURCES NECESSARY FOR THE DEVELOPMENT OF THE SECTOR

In order to be able to develop the maritime sector in the sub-region in accordance with any of the alternatives indicated, it is necessary to raise the technological level that prevails at the present time in regard to ship construction and repairing and to take the necessary measures for the expansion of the sub-regional merchant marine, permitting the fleet to be operated under international conditions of profitability and competition.

In order to attain these objectives it is necessary to take various steps at different levels : sub-regional, national and managerial.

(a) - SUB-REGIONAL LEVEL

At the sub-regional level it is considered necessary to create an atmosphere and a professional consciousness that will serve as a support and an impelling force for all that is related to marine technique and will be capable of continuing the evolution of the said technique in the future.

For this reason, it is recommended that the following institutions of a sub-regional character be created:

- High Technical School for Naval Architects and Marine Engineers.
- Institute for Ship Research and Study

The School would form senior graduates to cover the management posts in the shipyards, in the functions of production and design, although it is envisaged that in the period considered in the present study the shipyards would work fundamentally with foreign designs.

In addition to covering the technical posts in the shipyards, the marine engineers should engage in the technical management of the shipping companies, supervision of ship construction and repair and maintenance of ships.

There are also a series of related technical and commercial services in the Public Administration and in the public and private auxiliary industries that require extensive knowledge of marine technique and which should be developed by senior graduates in Marine Engineering.'

In view of the number of engineers necessary in the shipyards, it is considered advisable that one single School for this speciality at advanced level should exist in the sub-region in the period studied. Unified training of engineers at the highest level is considered, moreover, as a positive factor for the integration of the sector in the area of the sub-region.

In respect to the Institute for Ship Research and Study, this, naturally, requires the presence of the most highly qualified engineers in the shipping industry.

The Institue for Ship Research and Study should comprise the following fields:

- Hydrodynamics Experimental Canal. For trials with models of ships and propellers and other hydrodynamic tests.

- Metallotechnical laboratories, for destructive and non-destructive tests, extensively equipped to solve special problems that cannot be solved at the local level.

- Computer service, with specific programmes for the marine sector.

- Standardisation service, that will define a number of standards, either its own, or those based on other existing standards, and that will be applied throughout the sub-region. A number of standards accepted by all the shipyards could contribute very significantly to the reduction of costs, both in the principal and auxiliary industries.

- Library, Information and Documentation Services.

One or various centralised services would be advisable.

It is considered appropriate that the School and the Institute should be established in the same city. The city chosen should be near to a ship building and repairing centre, so that both students and professors as well as research workers may maintain a close contact with the reality of the profession.

(b) - NATIONAL LEVEL

Each country should undertake a series of measures complementary to those taken at the sub-regional level, which will relieve the firms of part of the technological effort that they are forced to maintain. We may classify these measures in four sections:

- Creation of Nautical Schools
- Creation of training centres for technical personnel at intermediate and lower levels.
- Development of organisations for inspection and control subordinate to the respective public administrations.
- Creation of testing laboratories in the ship-building or repairing zones.

The countries should develop or create professional training centres at different levels and for different specialities.

Nautical Schools. It will be necessary to increase the number of nautical training centres in the sub-region, both for navigating officers and for engineering officers, in accordance with the needs created by the increase in the size of the fleet.

Training of medium-grade technicians. The creation of a centre in each country seems to be excessive. Two schools could be established in the two countries which have the most highly developed shipping sector, and in the rest of the countries complementary training courses could be established for technicians trained in other schools in the metal-mechanical branch.

Training schools for apprentices in the trades that require a higher level of technical training, such as tracers, fitters, electricians, etc.

Schools for accelerated training for the more simple trades that require a lower level of technical training, such as welders, cutters, painters, etc.

Each country should create or develop inspection and control organizations of a quality sufficient to guarantee that the ships registered or constructed in the country comply with the rules of the Convention on the Safety of Human Life at Sea and with the rest of the international regulations, the fulfillment of which is customarily the responsibility of the Public Administration of the country that constructs or registers the ship. For this reason it is necessary to have a body of experienced inspectors to carry out the tests required by the respective regulations.

In those zones in which there are several shipyards it may be advisable to create laboratories which will provide service to all the shipyards in the zone. These laboratories should work in close contact and co-operation with the central laboratory of the Institute for Ship Research and Study. In this way the technical support of the shipyard itself can be increased.

(c) . MANAGERIAL LEVEL.-

It is envisaged that the shipyards will have to work with foreign designs during the period under consideration. However, a massive technological contribution will be necessary in order to achieve the proposed objectives with competitive prices and qualities. Foreign technology should cover the following facets until the sub-region has a technology of its own :

- Design of shipyards
- Specification of shipyard equipment and machinery
- Planning and control of production in ship building and repairing.
- Quality control in shipyards
- Stock control
- Selection and purchasing of equipment for ships
- Budgets and budgetary control
- Contracting of ships
- Marketing of ship repairing
- Recruitment and selection of personnel.

Contracts should be concluded with specialized foreign firms for the implantation of these techniques and their progressive absorption by the shipyard personnel.

The auxiliary industry shall also work with foreign licences in many cases. This is absolutely essential for the manufacture of diesel engines. The successive substitution of imported equipment by equipment produced in the sub-region should also be effected with the support of foreign licences.

The co-operation and support of the shipyards is very important for the adequacy of the auxiliary industries. In many cases metal-mechanical industries exist in the sub-region which could contribute elements and equipment for ships. However, they lack the experience to adjust their manufactures to the requirements of the Classification Societies and other regulations proper to the shipping industry. In order to resolve this problem it would be advisable for the shipyards, individually or as a group, to create a department devoted to investigating the possibilities of the auxiliary industry and to giving technical support to such industries in order that they may comply with the specific requirements of the marine sector.

3.6.3. FINANCIAL RESOURCES. CREDITS AND SUBSIDIES FOR THE SHIPBUILDING AND SHIPPING SECTOR

The financial resources available to develop the shipbuilding sector may constitute the bottleneck which will limit the development of the Sector.

It will be necessary for the countries of the Andean Sub-region to define the part of their Gross National Product that they desire to devote to developing the Shipbuilding Sector, since the dedication of resources to this sector will have to be coordinated with the necessities of other economic sectors.

The possibilities of external financing, whether public, private or through international organizations should be studied.

We can group the financial requirements into:

- Investment in Shipyards
- Investments in Ships,
- Investments in Auxiliary Industry.
- Investments in Training of Personnel.
- Investments in Technological Development.

In the estimate of the investments in shipyards it is necessary to point out that they may be subject to considerable variations on their location not being fixed. The geological conditions of the site have a very marked effect on the cost of the civil engineering work and, as may be seen, the cost of the infra-structure is high in relation to the total cost. It has been considered of interest to make these estimates, even at the risk of presenting important deviations with respect to the real cost.

The investments in shipyards have been divided into four large groups:

(1) - Infrastucture: This includes land, docks, slipways or synchroelevators, assembly and mooring quays, protection breakwaters, buildings for

workshops, offices and services, preparation of surfaces for prefabrication or storage, roads, ways of access and other civil engineering works of infra-structure.

(2) - Services: These include networks of compressed air, water and gases, electricity installation, cranes in docks, slipways, quays and storage facilities and cranes in workshops.

(3) - Machinery: This includes all the machinery of the different workshops, and the machines for automatic, semi-automatic and manual welding.

(4) - Miscellaneous materials and equipment: These include control and laboratory material, protection and safety material, scaffolding, hand tools, furniture and fittings for offices and services, vehicles for the transport of personnel and materials, ships and boats, office material, calculating equipment and any other element not included in the previous sections.

In Tables 3.6.3-1 to 3.6.3-3 there are indicated the investments in shipyards for ALTERNATIVE 1 which would have to be made in the period 1975-1980. In ALTERNATIVE 1, investments have not been envisaged in the period 1981-1985.

In Tables 3.6.3-4 to 3.6.3-9 there are indicated the investments in shipyards for ALTERNATIVE 2 corresponding to the period 1975-1980, and in Tables 3.6.3-10 to 3.6.3-13, those corresponding to the period 1981-1985, also for ALTERNATIVE 2.

These investments have been broken down into what it is estimated can be national and foreign contributions.

In Table 3.6.3-14 there is presented a summary of the investments in new shipyards, in accordance with Alternatives 1 and 2, indicating for each type of shipyard the investments corresponding to each period, and the total investments.

In Tables 3.6.3.-15 and 16 the total investments in national and foreign currencies are indicated.

INVESTMENTS IN SHIPYARDS

TYPE "C" SHIPYARD.

ALTERNATIVE 1

INVESTMENTS IN THE PERIOD 1.975-1.980.

FACILITIES TO BE CARRIED OUT: One building berth for ships between 11.000 and 30.000 D.W.T. together with corresponding workshops and services.

	Envisaged invest. in 1000 $ USA		
	National Currency	Foreign Currency	TOTAL.
1. Infraestructure	13.236	2.400	15.636
2 Services	660	3.480	4.140
3 Machinery	420	4.500	4.920
4 Miscellaneous, materials and equipment.	315	2.010	2.325
TOTAL	14.631	12.390	27.021

Table 3.6.3-1

INVESTMENTS IN SHIPYARDS

TYPE "C[illegible]PYARD.

ALTERNATIVE I

INVESTMENTS IN THE [illegible]RIOD 1.975-1.980.

FACILITIES TO BE CARRI[illegible]UT: One building berth for ships b[illegible]en 11.000 and 30.000 D.W.T. together with correspondin[illegible]kshops and services.

	Envis[illegible] invest. in 1000 $ USA		
	N[illegible]nal [illegible]rency	Foreign Currency	TOTAL.
1. Infraestructure	[illegible]36	2.400	15.636
2 Services	660	3.480	4.140
3 Machinery	420	4.[illegible]	4.920
4 Miscellaneous [illegible]terials and equipment	315	2.010	[illegible]2.325
TOTAL	14.631	12.390	27.0[illegible]

Table 3.6.3-1

INVESTMENTS IN SHIPYARD

TYPE "D" SHIPYARD.

ALTERNATIVE 1.

INVESTMENTS IN THE PERIOD 1.975-1.980

FACILITIES TO BE BUILT: One building berth for ships between 30.000 and 45.000 D.W.T., one drydock for repairing ships up to 45.000 D.W.T, with corresponding workshops and services.

	Envisaged invest. in 1000 U.S. $		
	National currency	Foreign currency	TOTAL
1. Infraestructure	40.550	5.720	46.270
2. Services	500	4.530	5.030
3. Machinery	486	4.574	5.060
4. Miscellaneous, materials and equipment	540	2.600	3.140
TOTAL	42.076	17.424	59.500

Table 3.6.3-2

INVESTMENTS IN SHIPYARDS

TYPE "E" SHIPYARD

ALTERNATIVE 1.

INVESTMENTS IN THE PERIOD 1.975-1.980.

FACILITIES TO BE CARRIED OUT: One building berth for ships between 60.000 and 80.000 D.W.T. with the corresponding workshops and services.

	Envisaged invest. in 1000 U.S. $		
	National currency	Foreign currency	TOTAL.
1. Infraestructure	24.630	2.748	27.378
2. Services	750	6.660	7.410
3. Machinery	750	6.240	6.990
4. Miscellaneous, materials and equipment	630	2.985	3.615
TOTAL	26.760	18.633	45.393

Table: 3.6.3-3

INVESTMENTS IN SHIPYARDS

TYPE "A" SHIPYARD.

ALTERNATIVE 2.

INVESTMENTS IN THE PERIOD 1.975-1.980.

FACILITIES TO BE CARRIED OUT: One synchrolift for ships up to 6.000 D.W.T. with one shipbuilding place, one shiprepairing place - and the necessary workshops.

	Envisaged invest. in 1000 U.S $		
	National Currency	Foreign Currency	TOTAL.
1. Infraestructure................	9.330	3.180	12.510
2. Services	540	3.000	3.540
3. Machinery	315	2.511	2.826
4. Miscellaneous, materials and equipment.	225	1.665	1.890
TOTAL	10.410	10.356	20.766

Table : 3.6.3-4

INVESTMENTS IN SHIPYARDS

TYPE "B" SHIPYARD

ALTERNATIVE 2.

INVESTMENTS IN THE PERIOD 1.975-1.980.

FACILITIES TO BE CARRIED OUT: Two drydocks for repairing ships up to 15.000 D.W.T. with the necessary workshops.

	Envisaged invest. in 1000 U.S. $		
	National Currency	Foreign Currency	TOTAL.
1. Infraestructure	25.340	3.224	28.564
2. Services	300	1.800	2.100
3 Machinery	180	1.920	2.100
4. Miscellaneous, materials and equipment	166	1.100	1.266
TOTAL	25.986	8.044	34.030

Table 3.6.3-5

INVESTMENTS IN SHIPYARDS

SHIPYARD TYPE "C"

ALTERNATIVE 2

INVESTMENTS IN THE PERIOD 1.975-1.980

FACILITIES TO BE CARRIED OUT: One building berth for ships between 11.000 and 30.000 D.W.T. and one drydock for repairing ships up to 45.000 D.W.T. with the necessary workshops and services.

	Envisaged invest. in 1000 U.S. $		
	National currency	Foreign Currency	TOTAL.
1. Infraestructure	38.100	4.150	42.250
2. Services	595	5.175	5.770
3. Machinery	460	4.675	5.135
4. Miscellaneous materials and equipment.	365	2.720	3.085
TOTAL	39.520	16.720	56.240

Table 3.6.3-6

INVESTMENTS IN SHIPYARDS

TYPE "D" SHIPYARD.

ALTERNATIVE 2.

INVESTMENTS IN THE PERIOD 1.975-1.980

FACILITIES TO BE CARRIED OUT: One building berth for ships between 30.000 and 45.000 D.W.T. and two drydocks for repairing ships up to 45.000 D.W.T. with workshops and services.

	Envisaged invest. in National Currency	Foreign Currency	'000 U.S. $ TOTAL.
1. Infraestructure	68.044	8.700	76.744
2. Services	630	5.720	6.350
3. Machinery	610	5.440	6.050
4. Miscellaneous materials and equipment	650	3.360	4.010
TOTAL	69.934	23.220	93.154

Table 3.6.3-7

INVESTMENTS IN SHIPYARD

TYPE "E" SHIPYARD

ALTERNATIVE 2.

INVESTMENTS IN THE PERIOD 1.975-1.980.

FACILITIES TO BE CARRIED OUT: One building berth for ships between 60.000 and 80.000 D.W.T. and one drydock for repairing ships up to 80.000 D.W.T., with the corresponding workshops and services.

	Envisaged invest. in 1000 U.S. $		
	National Currency	Foreign Currency	TOTAL.
1. Infraestructure...........	38.560	4.995	43.555
2. Services	425	4.370	4.795
3. Machinery	405	4.145	4.550
4. Miscellaneous materials and equipment	360	2.150	2.510
TOTAL	39.750	15.660	55.410

Table. 3.6.3-8

INVESTMENTS IN SHIPYARDS

TYPE "F" SHIPYARD.

ALTERNATIVE 2

INVESTMENTS IN THE PERIOD 1.975-1.980.

FACILITIES TO BE CARRIED OUT. **One drydock for repairing ships up to 180.000 D.W.T. with the corresponding workshops and services.**

	Envisaged invest. in 1000 U.S. $		
	National Currency	Foreign Currency	TOTAL.
1. Infraestructure	74.700	8.550	83.250
Services	560	2.460	3.020
3. Machinery	250	2.300	2.550
4. Miscellaneous, materials and equipment	180	1.430	1.610
TOTAL	75.690	14.740	90.430

Table. 3.6.3-9

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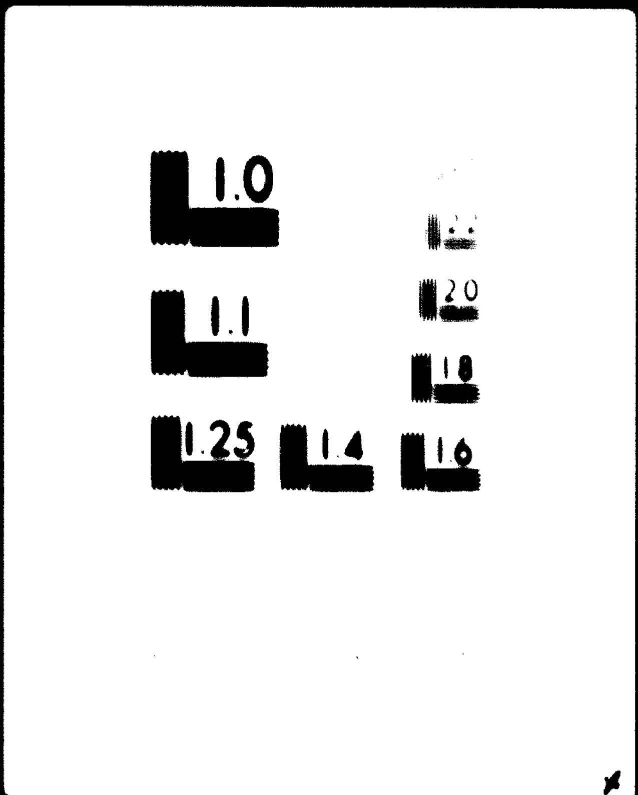

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INVESTMENTS IN SHIPYARDS

TYPE "A" SHIPYARD.

ALTERNATIVE 2.

INVESTMENTS IN THE PERIOD 1.980-1.985

FACILITIES TO BE CARRIED OUT: One slipway for repairing ships up to 6.000 D.W.T., with the corresponding enlargement of the workshops and services.

	Envisaged invest. in 1000 U.S. $		
	National Currency	Foreign Currency	TOTAL
1 Infraestructure	1.410	132	1.542
2. Services	75	555	630
3. Machinery	45	744	789
4. Miscellaneous, materials and .. equipment	54	258	312
TOTAL	1.584	1.689	3.273

Table 3.6.3-10

INVESTMENTS IN SHIPYARD

TYPE "B" SHIPYARD

ALTERNATIVE 2.

INVESTMENTS IN THE PERIOD 1.980-1.985

FACILITIES TO BE CARRIED OUT: **One dock for repairingships up to 15.000 D.W.T., with the correspon-ding enlargement of the workshops and services.**

	Envisaged invest' in National Currency	Foreign Currency	1000 U.S.$ TOTAL
1. Infraestructure	12.142	1.620	13.762
2 Services	130	710	840
3. Machinery	40	590	630
4 Miscellaneous, materials and equipment.	50	452	502
TOTAL	12.362	3.372	15.734

Table [illegible]

INVESTMENTS IN SHIPYARDS

TYPE "D" SHIPYARD
ALTERNATIVE 2

INVESTMENTS IN THE PERIOD 1.980-1.985

FACILITIES TO BE CARRIED OUT: ONE DOCK FOR REPAIRING SHIPS UP TO 45.000 D.W.T. WITH THE CORRESPONDING ENLARGEMENT OF THE WORKSHOPS.

	Thousand invest. in 1000 U.S.$ National Currency	Foreign Currency	TOTAL
1 Infraestructure	27.414	3.060	30.474
2 Services	140	1.180	1.320
3 Machinery	100	890	990
4 Miscellaneous, materials and equipment.	90	780	870
TOTAL	27.744	5.910	33.654

Table 3.6.3-12

INVESTMENTS IN SHIPYARDS

TYPE "F" SHIPYARD

ALTERNATIVE 2

INVESTMENTS IN THE PERIOD 1.980-1.985.

FACILITIES TO BE CARRIED OUT: One drydock for building ships between 80.000 and 180.000 D.W.T. with workshops and services.

	Envisaged invest. in [illegible]		
	National Currency	Foreign Currency	TOTAL
1 Infraestructure	73.215	8.400	81.615
2 Services	840	5.100	5.900
3 Machinery-	300	2.896	3.196
4 Miscellaneous, materials and equipment	270	190	460
TOTAL	74.625	18.586	93.210

Table [illegible]

TOTAL INVESTMENTS IN NEW SHIPYARDS (IN 1000 $ USA)

SHIPYARDS	ALTERNATIVE 1.			ALTERNATIVE 2.		
	1975-1980.	1980-1985.	TOTAL.	1975-1980.	1980-1985.	TOTAL.
"A"	-	-	-	20.766	3.273	24.039
"B"	-	-	-	34.030	15.734	49.764
"C"	27.021	-	27.021	56.240	-	56.240
"D"	59.500	-	59.500	93.154	33.654	126.808
"E"	45.393	-	45.393	55.410	-	55.410
"F"	-	-	-	90.430	93.210	183.640
TOTAL.	131.914	-	131.914	350.030	145.871	495.901

Table 3.6.3-14

INVESTMENTS FOR NEW SHIPYARDS IN NATIONAL CURRENCY (IN 1000 $ U.S)

	ALTERNATIVE 1			ALTERNATIVE 2		
SHIPYARDS	1975-1980	1980-1985	TOTAL	1975-1980	1980-1985	TOTAL.
"A"	-	-	-	10.410	1.584	11.994
"B"	-	-	-	25.986	12.362	38.348
"C"	14.631	-	14.631	39.520	-	39.520
"D"	42.076	-	42.076	69.934	27.744	97.678
"E"	26.760	-	26.760	39.750	-	39.750
"F"	-	-	-	75.690	74.625	150.315
TOTAL.	83.467	-	83.467	261.290	116.315	377.605

Table 3.6.3-15

INVESTMENTS FOR NEW SHIPYARDS IN FOREIGN CURRENCY (IN 1000 $ U.S)

	ALTERNATIVE 1.			ALTERNATIVE 2.		
SHIPYARDS	1.975-1980	1.980-1985	TOTAL	1975-1.980	1.980-1.985	TOTAL.
"A"	-	-	-	10.356	1.689	12.045
"B"	-	-	-	8.044	3.372	11.416
"C"	12.390	-	12.390	16.720	-	16.720
"D"	17.424	-	17.424	23.220	5.910	29.130
"E"	18.633	-	18.633	15.660	-	15.660
"F"	-	-	-	14.740	18.585	33.325
TOTAL	48.447	-	48.447	88.740	29.556	118.296

Table 3.6.3-16

Regarding investments in ships, these would include the ships incorporated to the andean fleet through:

a) - Construction in the Subregional Shipyards, as per Alternative 1 or 2 defined before, including the existing shipyards.

b) - Acquisition from outside countries.

The forecast of new ships resulting from a) is in accordance with the production plans of the shipyards (existing plus those proposed as new) and the ships value is indicated in Tables 3.[illegible]-17-a-b-c (Pag. [illegible]) For the estimation of the ships cost, they have been considered at international market prices in the year 1.974.
In the Table, the values are indicated for the annual production and for the accumulated production along the years.

In connection with the evaluation of the required resources for the acquisition of ships from outside the Subregion, the following considerations are made:

i) - Obviously the intent of increasing as soon as possible the andean fleet tonnage by means of importing ships from outside the Subregion is conflicting with the objective of the development of the Subregional shipbuilidng industry. Therefore both objectives should be harmonized and their achievement adequately regulated, bearing always in mind that the end objective is that the future development of the andean merchant fleet be based fundamentally on ships built by the Subregional Shipyards.

ii) -The forecast fleet demand in the Subregion up to 1.980 is so large that show in itself undeniable difficulties to be fulfilled.

Certainly, to reach in 1.980 the desired percentages of participation in extrazonal traffic (50%), intrazonal (80%) and coastal (100%) it would be necessary to carry out an outstanding investment, in the order of 5.496 millions USA dollars, as indicated in Table 3.6.3-18 (pág. 281) (Details of investments in ships for each type are included in Tables 3.6.3-19 to 25, pág. 282 to 287.

Putting aside the financial difficulties involded, there are other types of obstacles: to attain the acquisition of more than 400 ships up to 1.980 may be considered unfeasable due to various reasons, amongst which there are the own inertia of the actions to be taken, and of the development of the shipping companies and, above all, the almost physical impossibility of getting such a number of ships delivered from the world ship yards, even taking into account the possible purchase of some second hand tonnage.

iii) After the above considerations it is recommended to regulate the acquisitions of ships from outside the subregion on realistic basis within the feasable limits in such a way as to have a higher rate of ship imports in the period 1.974-1.980 and a lower rate in the period 1.981-1.985 when the subregional shipyards may already be reaching their full production.

On these grounds an estimation has been made of the feasable ship imports up to 1.980 and 1.985, as part of the total tonnage demand:

<u>Period 1.974-1.980</u>

90 ships, with 3.000.000 D.W.T., and cost of 1.[illegible]37 mill. USA $.

<u>Period 1.981-1.985</u>

40 ships, with 1.600.000 D.W.T., and cost of 54[illegible] mill. USA $.

As a summary of the required financial resources for the estimated development of the merchant shipping, the Table 3.6.3-26 (Pág. [illegible]) has been prepared showing the investments in ships in the periods - 1.974-80 and 1.981-85 including those ships foreseen to be built in Subregional shipyards, as well as those to be acquired from outside the Subregion.

It is to be pointed out that in the event of acquiring new ships - from abroad, the conditions of financing that could be obtained on - the international market are of the order of 80 per cent of the value of the ships, with payments deferred over 8 years, with interest of the order of 7 per cent.

If second-hand ships would be acquired, the purchase values would be lower, but with harder conditions of financing.

The financing of ships constructed in the Sub-region would have to be supported by the andean countries, although aid could be requested from international organizations through the C.A.F. or the national development corporations. Private financing could be obtained for the equipment acquired abroad, with deferred payments of the order of 5 years. The greater the percentage of materials and equipment produced in the sub-region, the lesser will be the external fi -

nancing for this concept. This factor will have to be studied at the time of deciding on the degree of development of the auxiliary industry. It should be pointed out that financing does not generally exist for the rolled steel of the structural hull, which represents a high percentage of the value of the ship.

A factor to be taken into account at the moment of deciding on the greater or lesser participation of the countries' own shipbuilding industry in the development of the merchant fleets of the Andean Subregion is the price of the ships constructed in the Subregion.

Although the percentages of the factors that constitute the cost of a ship vary according to the types and sizes of the vessels, it can be stated that the materials represent between 50 and 60 per cent of the cost in question, and the value added by the shipyard represents from 40 to 50 per cent, there being included in the said added value the labour cost, the costs of transformation, and the overheads.

The materials that are produced at the present time in the Sub-region are at a level of prices which, in general, is in line with the international market. On increasing the percentage of national materials, it is necessary for the materials produced in the Sub-region to maintain their costs within the levels of the international market.

A certain freedom of importation for this type of products is necessary in order to maintain these levels of prices. In view of its importance in the cost of a ship, it is necessary for the rolled steel of shipbuilding quality produced in the Sub-region to be maintained within the limits of the international price, which seems perfectly possible.

The items of equipment not produced in the Sub-region will be acquired on the international market, and consequently at international prices, increased only by the cost of transport from the producer countries (Europe, Japan or the U.S.A.), evidently [illegible] from the Subregion. If these equipments are subject to Customs duties, the cost of the ship will be affected by these amounts.

The most important cost factor of the value added in the shipyard is labour. The costs of labour in the Sub-region vary from one country to another, the highest being those of Venezuela and the lowest those of Colombia, although it can be said that they are maintained inferior to those of other more developed countries, which at the present time appear in a leading position with regard to ship-building, such as Japan, or the European countries. However, the productivity of a shipyard that commences its activities is [illegible] lower than that of those that count with a long experience, above all taking into account that the industrial infrastructure that [illegible] new shipyards is considerable inferior to that available in [illegible] of the highly developed countries.

All these factors that we have indicated make it very difficult to forecast costs of shipbuilding in the Subregion, but it can be said that such costs shall depend on two fundamental factors:

(a) - The policy followed with regard to protection for the auxiliary industry, and the resultant Customs duties for the imports of shipbuilding equipment.

(b) - The productivity of the shipyards, which will depend upon the design of the shipyard, on its facilities and on the management of production.

Independently of the cost of the ship, the price that the ship-owner shall have to pay for it will depend on the subsidies or premiums for acquiring a ship constructed in the Andean Subregion.

At the present time shipbuilding countries provide a bonus for shipbuilding with premiums that are of the order of [illegible] per cent, and which will have to decrease in the future, and even disappear. These premiums vary from one country to another and depend on various factors, such as the percentage of national materials employed in the ship, the annual rate of inflation, etc

In order to encourage shipbuilding in the Andean Subregion it will be necessary, in the initial years, to stimulate it with premiums superior to those that are granted in the countries with greater development in this sector, since it is inevitable that until all the cost factors have been duly adjusted, the first ships constructed will prove to have a cost superior to that of the international market.

These premiums will have to be supported by the countries of the Subregion.

It will also be necessary to provide a system of loans to the ship-owners which will permit them to acquire their ships in conditions similar to those that other countries offer which, as has been said above, are of the order of 80 per cent of the value of the ship, with repayments over 8 years and with interest rates that vary between 6 and 8 per cent, the normal interest rates being between 7 and 7,5 per cent

With regard to the investments necessary for the development of the shipbuilding industry, their estimate proves to be very complex because of the relationships existing between the shipbuilding auxiliary [illegible] nufactures and other non-maritime manufactures. This is specially so in the case of iron and steel industries and of other manufactures corresponding to the metal-mechanical sector. Only in the case of the manufactures of marine engines, whose implantation - has been analyses in point 3.4.2. of this Study have the finan - cial resources necessary been evaluated, resulting in investments in manufacturing plants which can reach, in the case of greatest - development, up to U.S. $65.520.000 accumulated up to 1.985.

To summarise the total figures of financial resources necessary, in the case of the Alternative of greatest feasable development of the shipbuilding sector, the following total investments accumulated up to 1.985 would be reached:

INVESTMENTS IN SHIPYARDS .... (Alternative 2).	495.901.000 USA $
INVESTMENTS IN SHIPS .... (Built in subregional shipyards as per alternative 2, plus those acquired outside).	5.164.000.000 USA $
INVESTMENTS IN AUX. IND. .... (Evaluated only the diesel engines fac - tories).	65.520.000 USA $

To these investments there should be added those related with Professional Training and Technological Development, not evaluated in the present study.

It may be pointed out from the above figures that the investments required for ships are the most outstanding within the scope of - development of the shipbuilidng and shipping sector, being about 10 times higher than the investments required for stablishing the shipyards.

VALUE OF NEW SHIPS TO BE BUILT BY THE SUBREGION SHIPYARDS, IN MILLIONS OF U.S. $ (ACCORDING TO THE SELECTED TYPES)

YEAR	EXISTING SHIPYARDS ONLY	
	YEARLY PRODUCTION	ACCUMULATED PRODUCTION
1.974	31	31
1.975	36	67
1.976	48	115
1.977	83	198
1.978	116	314
1.979	145	459
1.980	187	646
1.981	231	877
1.982	235	1.112
1.983	241	1.353
1.984	272	1.625
1.985	272	1.897

Table 3.6.3-17 - a

VALUE OF NEW SHIPS TO BE BUILT BY THE SUBREGION SHIPYARDS

IN MILLIONS OF U.S. $ (ACCORDING TO THE SELECTED TYPES)

YEAR	ALTERNATIVE 1	
	YEARLY PRODUCTION	ACCUMULATED PRODUCTION
1.974	31	31
1.975	36	67
1.976	48	115
1.977	83	198
1.978	168	366
1.979	250	616
1.980	295	911
1.981	369	1280
1.982	406	1.686
1.983	440	2.126
1.984	475	2.601
1.985	475	3.076

Table 3.6.3-17-b

VALUE OF NEW SHIPS TO BE BUILT BY THE SUBREGION SHIPYARDS,
IN MILLIONS OF U.S. $ (ACCORDING TO THE SELECTED TYPES)

YEAR	ALTERNATIVE 2	
	YEARLY PRODUCTION	ACCUMULATED PRODUCTION
1.974	31	31
1.975	36	67
1.976	48	115
1.977	83	198
1.978	180	378
1.979	268	646
1.980	313	959
1.981	393	1352
1.982	430	1782
1.983	470	2252
1.984	545	2797
1.985	585	3382

Table 3.6.3-17-c)

VALUE, IN MILLIONS OF U.S. $ OF THE SHIPS THAT MUST BE ADDED TO THE ANDEAN FLEET FOR REACHING THE DESIRED PERCENTAGES OF PARTICIPATION IN TRAFFICS.

(For all ship types, including those no selected to be built in Subregion Shipyards).

SHIP TYPES.	PERIOD 1.974 - 1.980			PERIOD 1.981 - 1.985		
	N°	TONNAGE D.W.T.	VALUE MILL. U.S. $	N°	TONNAGE D.W.T.	VALUE MILL. U.S. $
OIL TANKERS AND OBOS	113	6.867.000	2.293	42	2.287.200	749
L.P.G CARRIERS	5	79.000	59	2	24.500	19
L.N.G CARRIERS	2,5	122.500	154	2,5	130.800	164
BULKCARRIERS...	58	4.146.000	1.184	17	1.197.700	371
REFRIGERATED - CARGO	10	30.000	55	-	-	-
CONTAINERSHIPS.	28	270.800	275	32	400.200	389
GENERAL CARGO..	187	1.785.200	1.476	82	791.400	731
T O T A l ..	403,5	13.300.500	5.496	177,5	4.831.800	2423

Table 3.6.3-18.

INVESTMENTS IN SHIPS THAT MUST BE ADDED TO THE ANDEAN FLEET FOR REACHING THE DESIRED PERCENTAGES OF PARTICIPATION IN TRAFFICS.

SHIP TYPE : OIL TANKERS AND OBO'S.

SIZE RANGE	PERIOD 1.974 - 1.980.			PERIOD 1.981 - 1.985.		
DWT x 10^3	Nº.	DWT x 10^3	Cost $ U.S Millions.	Nº	DWT x 10^3	Cost $ U.S. Millions.
0,5	5	18	17,5	1	4,0	4,2
5-15	3,5	32,4	21,0	3	29,0	18,8
15-30	10,5	215,7	107,8	16	327,2	163,6
30-45	49,5	1770	841,5	8,5	317,0	144,5
45-60	7	385	144.4	0,5	27.5	10.3
60 - 80	22.5	1501.1	607,5	6,5	445.0	175,5
80 - 120	-	-	-	-	-	-
120-130	7.5	1160	232,0	3.5	450,0	108,5
180-300	7,5	1784,8	321.2	2.5	687.5	123,8
TOTAL	113	6867.0	2292,9	42	2287.2	749,2

19.

INVESTMENTS IN SHIPS THAT MUST BE ADDED TO THE ANDEAN FLEET FOR REACHING THE DESIRED PERCENTAGES OF PARTICIPATION IN TRAFFICS

SHIP TYPE : LPG CARRIER

SIZE RANGE	PERIOD 1.974 - 1.980			PERIOD 1.981 - 1.985		
DWT x 10^3	n°	DWT x 10^3	Cost $ US millions	n°	DWT x 10^3	Cost $ US millions
0 - 5	2	4	7	1	2,0	3,5
15 - 30	3	75	50,1	1	22,5	15
TOTAL	5	79	57,1	2	24.5	18,5

Table 3.6.3-20

SIZE RANGE	PERIOD 1.974 - 1.980			PERIOD 1.981 - 1.985		
DWT x 10^3	n°	DWT x 10^3	Cost $ US millions	n°	DWT x 10^3	Cost $ US millions
15 - 30	1	23,5	33,8	1	27,8	40
60 - 80	1,5	99,5	120	1,5	103,0	123,5
TOTAL	2,5	122,5	153,8	2,5	130,8	163,5

Table 3.6.3.-21

INVESTMENTS IN SHIPS THAT MUST BE ADDED TO THE ANDEAN FLEET FOR REACHING THE DESIRED PERCENTAGES OF PARTICIPATION IN TRAFFICS.

SHIP TYPE: BULKCARRIER.

SIZE RANGE	PERIOD 1.974 - 1.980			PERIOD 1.981 - 1.985		
DWT x 10^3	Nº	DWT 10^3	Cost $ U.S Millions.	Nº	DWT x 10^3	Cost $ U.S. Millions.
5-15	7,5	67,1	43,6	2	17,2	11,2
15-30	17	463,9	231,9	4	83,0	55,2
30 - 45	1,5	70,0	26,2	0,5	20,0	8,7
45 - 60	3	150,0	56,2	0,5	25,0	9,4
60 - 80	9	695,0	225	3,5	257,5	87,5
80 - 120	7	675,0	196	3	270	84
120 - 180	13	2025,0	405	3,5	525,0	115
TOTAL.	58	4146	1183,9	17	1197,7	371

Table 3.6.3.-22

INVESTMENTS IN SHIPS THAT MUST BE ADDED TO THE ANDEAN FLEET FOR REACHING THE DESIRED PERCENTAGES OF PARTICIPATION IN TRAFFICS.

SHIP TYPE: <u>CONTAINERSHIP</u>.

SIZE RANGE.	PERIOD 1974 - 1980.			PERIOD 1981 - 1985.		
DWT x 10^3	N°	DWT x 10^3	Cost $ U.S. Millions.	N°	DWT x 10^3	Cost $ U.S. Millions.
2,5 - 6	13	50,4	54,6	11	48,8	46,2
6 - 11	5	38,3	38	5	46,4	38
11 - 21	7	107,1	107,8	11	180,0	180
21 - 23	3	75,0	75	5	125,0	125
TOTAL	28	270,8	275,4	32	400,2	389,2

Table 3.6.3-23

INVESTMENTS IN SHIPS THAT MUST BE ADDED TO THE ANDEAN FLEET FOR REACHING THE DESIRED PERCENTAGES OF PARTICIPATION IN TRAFFICS.

SHIP TYPE: REFRIGERATED CARGO.

SIZE RANGE.	PERIOD 1974 - 1980			PERIOD 1981 - 1985		
DWT x 10^3	N°	DWT x 10^3	Cost $ U.S. Millions.	N°	DWT x 10^3	Cost $ U.S. Millions.
2,5 - 6	10	30	55	-	-	-
TOTAL	10	30	55	-	-	-

Table 3.6.3-24

INVESTMENTS IN SHIPS THAT MUST BE ADDED TO THE ANDEAN FLEET FOR REACHING THE DESIRED PERCENTAGES OF PARTICIPATION IN TRAFFICS.

SHIP TYPE: GENERAL CARGO.

SIZE RANGE.	PERIOD 1974 - 1980.			PERIOD 1981 - 1985.		
DWT x 10^3	N°	DWT x 10^3	Cost $ U.S. Millions.	N°	DWT x 10^3	Cost $ U.S. Millions.
2,5 - 6	68	279,7	272	31	121,8	124
6 - 11	69	582,6	503,7	16	141,9	116,8
11 - 21	50	922,9	700	35	527,7	490
TOTAL.	187	1785,2	1475,7	82	791,4	730,8

Table 3.5.3-25

FORESEEN INVESTMENTS IN SHIPS.

	PERIOD 1974 - 1980.			PERIOD 1981 - 1985.		
	N°	Tonnage D.W.T.	Value U.S. $ Millions.	N°	Tonnage D.W.T.	Value U.S. $ Millions.
A. SHIPS BUILT IN SUBREGION SHIPYARDS.						
0) Production of existing shipyards	66	1.448.500	646	112	3.240.000	1.251.
1) Total production of shipyards according Alternative 1	81	2.063.500	911	161	5.410.000	2.165
2) Total production of shipyards according Alternative 2	89	2.103.500	959	187	6.035.000	2.423
B. SHIPS ACQUIRED FROM OUTSIDE THE SUBREGION						
3) Maximum foreseen (including ship types no selected to be - built in the Subregion shipyards)	90	3.000.000	1237	40	1.600.000	545
TOTAL						
0 + 3	156	4.448.500	1883	152	4.840.000	1796
1 + 3	171	5.063.500	2148	201	7.010.000	2710
2 + 3	.179	5.103.500	2196	227	7.635.000	2968.

Table 3.6.3-26

3.7. LEGISLATION. RECOMMENDABLE EVOLUTION.

3.7.0. GENERAL.

In order to promote and regulate the development of the shipbuilding sector in the Andean Sub-region, it is considered recommendable that there should be established a co-ordinated legislation with respect to the objectives of development contemplated.

The legislations existing in the different Andean countries should be unified and developed on the basis of common criteria. Likewise, within each country, and on a Sub-regional level, there should be simplified and co-ordinated the regulations and guidelines of the various governmental Agencies that intervene in the different aspects of the shipbuilding sector (Commerce, Ind stry, Finance, Transport, Labour, the Navy, etc.) through a specific Agency of the shipbuilding sector that will apply the various economic and technical provisions.

3.7.1. FIRMS

Within the objectives of the Agreement of Cartagena it is considered very appropriate that there should be formed multinational Andean firms in the shipbuilding sector, and in this regard the legislation that is to be created should regulate the special circumstances of multinational firms for the construction and repair of ships, shipping companies, auxiliary industries, service undertakings, etc.

Again, it will be advisable to establish the conditions that regulate foreign investments in undertakings of the shipbuilding sector, thus attracting foreign capital which will contribute to the development of sector, although always maintaining the majority holding of Andean capital in the firms to be created.

It will be necessary to deal, from the legal point of view, with the conditions in which there can be grouped or concentrated, in a temporary or permanent manner, various firms of the sector in order to form units of larger dimensions.

These new firms could be national or multi-national, if the firms grouped belong to different Andean countries. This grouping or merger can prove to be of particular interest in the case of the Maritime Transport Companies.

1.9.2. TRANSPORT

With regard to the reservations of freight for ships of the Sub-region, the criteria should be unified and compliance with them should be regulated. In this aspect, in the present Study there has been considered as a logical and desirable goal the fact that vessels registered in Andean countries should effect 100 per cent of the national coastal traffic, 40 per cent of the traffic between Andean countries and 50 per cent of the traffic with abroad.

The regular shipping lines should be the subject of study and special legislative regulation, in order to establish an optimum structuring from the point of view of operating costs, and likewise to offer a common front in the negotiations of Maritime Conferences with foreign fleets.

The coastal traffic between the Andean countries should be specially favoured in order to stimulate its development, even with the aid of subsidies in necessary cases.

In view of the importance of this inter-zonal maritime transport for the physical integration of the Andean Sub-region, there is considered necessary the legal co-ordination of all the Andean countries in order to favour this traffic.

It is also advisable to define the legal structure which will make flexible the co-ordination of maritime with land transport in the ports that are affected by this intra-zonal coastal trade.

[illegible] ACQUISITION OF SHIPS

As may be deduced from the present Study, in order to develop the merchant marine of the Sub-region it will be necessary not only to establish shipyards of their own in the Andean countries, but also simultaneously to acquire ships from abroad, either of new construction or second-hand.

It will thus be necessary to define a policy that will establish in a flexible and progressive manner the percentages assignable to each type of acquisition, and the conditions in which there can be approved the contracts for constructions in foreign shipyards or the purchase of second-hand tonnage, giving, in any event, preference to the contracting in shipyards of the Sub-region in order to assure them high coefficients of activity in the constructions of their speciality.

Naturally, it will be necessary for the prices of the ships constructed in the Sub-region to be equivalent to the international prices for the Shipping Companies, for which purpose it will be necessary, especially in the initial stages of development of the sector, to subsidize the Sub-regional construction to an adequate degree.

In order to promote the increase of the merchant marine by means of constructions in shipyards of the Sub-region, it will be advisable to regulate the availability of loans for the financing of approximately [illegible] per cent of the total value of the constructions. In this regard, it will be possible to favour the contracting of given types or sizes of ships which have major interest for the Sub-regional economy, by offering the shipowners a larger percentage of official credit or a longer period of amortization. Use should also be made of the requirement of certain minimum limits with respect to the dimensions of the Shipping Companies, the number and tonnage of the fleet, the requirement of breaking-up ships of an age greater than 25 years, etc., such measures being usual in other shipbuilding countries. Likewise, with regard to the acquisition of foreign second-hand ships, their importation should be regulated by means of the study of the systems of customs duties applicable, and the conditions necessary for the imports to be approved in each case, depending on the age of the ships in question, their type and size, and the programming of the Shipping Companies.

3.7.4. SHIPYARDS

It is recommended that adequate legislation be established to promote the implantation of new shipyards for the construction and repair of ships, whose location, specialities and capacities of production will be those decided upon as most appropriate to the interests of the Subregion. A coordinated policy should be established which will regulate the development of shipyards with regard to the evolution of the market.

For this purpose there can serve as an instrument the establishment of Plans of Concerted Action with the State in the countries concerned, between the Shipyards and the Government, through which there will be channelled the credit aids, subsidies, etc., to stimulate and support the investments necessary for the shipyard plants and their future development. These Plans of Concerted Action would include the requirement for the Shipyards to follow determined lines of actuation, and to attain objectives dictated by the Government.

In order to ensure that the prices of the ships constructed will be interesting for the Shipping Companies, it will be necessary to structure a system of premiums for shipbuilding together with tax rebates, of a form similar to systems existing in other foreign countries.

With regard to Repairs, the requirement should be regulated, to the extent necessary, that the ships of the Subregion carry out their repair in Subregional shipyards, excepting in a flexible manner the appropriate cases due to emergencies, grave damages to the interests of the Shipping Companies, etc., these repairs being controlled and supervised in all cases by a Subregional Technical Inspection Organization.

An important chapter in the shipbuilding of the Subregion will be constituted by the imports of equipment and materials, for which reason the formalities concerning such imports should be regulated and made flexible with a clearly defined policy.

With regard to the objectives of providing supplies to the shipyards under favourable conditions, and on the other hand to protect the auxiliary industry of the Sub-region, Customs barriers should be established with respect to countries outside the Andean region.

In the case of ship repairs, it is necessary to make the Customs formalities more flexible, by authorizing temporary imports and by taking the legal measures necessary so that the ships may be repaired within appropriate time limits, and with adequate materials, especially with respect to spare parts for machinery and equipment.

3.7.5. SHIPBUILDING AUXILIARY INDUSTRY

The legislation regarding the shipbuilding auxiliary industry will have to take into account that the promotion of its development is vital in order to proceed to achieve sufficient levels of autonomy in shipbuilding, and above all, it should take into account that this sector has a close connection with complementary industries and services of great magnitude, so that around it there should be produced an industrial development which will create a large number of employment opportunities.

It has already been indicated in another part of the present Study that the majority of the shipbuilding auxiliary industries are included in the programmes of the metal-mechanical sector, so that when legislating for these industries there should be taken into account their complementary role in multiple sectors.

As has been stated in the previous point, 3.7.4., the Sub-regional auxiliary industry should, in all cases, be favoured at the time of regulating the imports of equipment and materials from abroad, by establishing the appropriate Customs tariffs, or refusing authorizations for the importation of goods produced in sufficient quantity in the Sub-region.

3.7.6. TECHNOLOGICAL DEVELOPMENT

The full industrial development of the shipbuilding sector will not be assured until its technology is gradually developed.

In order to promote this technological development of the shipbuilding sector in the Sub-region, the legislators should study efficacious measures of support for research, both in shipyards and in auxiliary industries, and in maritime transport in order to proceed to reduce in this manner, with the passage of time, the necessity of having recourse to foreign technologies, designs, etc.

In this connection, it will be necessary to subsidize the creation of Centres of Technical Education, Experimental Centres, Laboratories, etc., and to develop the dedication of sufficient human and financial resources to these activities.

4. CONCLUSIONS

From the analysis effected in Parts 1, 2 and 3 of this Study, the following conclusions stand out:

1. Having inspected the ten most important shipyards of the Zone, it is deduced that there exists in the Andean Sub-region a certain amount of experience in the repair of [illegible] vessels and warships, which extends to all the coastal countries. With regard to construction, only one Shipyard, SIMA, in Callao, Perú has proven experience in the construction of ships larger than 1.000 gross registered tons.

2. The development of the Shipbuilding Auxiliary Industry in the Andean Subregion is scanty, since it supplies to the Shipyards only between 15 and 25 per cent of the materials that are required for the construction of a ship. These supplies are effected by local industries, and interchanges among countries of the Sub-region for these products [illegible].

3. The Sub-region counts with a certain number of Shipping Companies with international experience and prestige. The sum-total of the merchant fleets of the Andean countries is slightly superior to 1.600.000 dead weight tons. The average size of its ships is smaller than the world figure, and their age is superior to the average of the world fleet. These fleets transport 18.4 per cent of the tonnage corresponding to imports, and 7.9 per cent of the export tonnage of merchandise from the Sub-region. The majority of the ships are devoted to the transport of general cargo, the number of oil tankers being very small, and that of bulk carriers even smaller.

4. The number of people at present engaged in the shipbuilding sector is low in the Andean Sub-region, and their professional expe-

rience, in general, is limited. The quality of the work is high in the shipyards of greatest experience. Great dependence on foreign technology is noted, and this is practically total with respect to the design of ships.

5. At the present time there do not exist specific Agencies or mechanisms to channel the financing of ships or shipyards in the countries of the Andean Subregion, nor are there adequate legal provisions to cope with this problem.

6. From the market study of ship construction in the Sub-region, there have been deduced the number of ships that would be necessary, their tonnage and their classification by types of cargo in order to transport, in 1.980 and 1.985 respectively, 50 per cent of the cargo with countries outside the Andean Group, 80 per cent of the cargo between Andean countries, and 100 per cent of the national coastal trade of each country.
This additional fleet would be of 403 ships, representing 13.300.500 dead weight in the period 1.974-1.980, and 177 ships, representing 4.831.800 dead weight tons in the period 1.981-1.985, in order to attain the above-mentioned percentages of participation in cargo traffic.
To reach these tonnages is estimated unfeasable in the contemplated periods.
From the market study it is concluded to be sufficient demand to justify the stablishing of new shipyards in the Andean Subregion.

7. From the market study of Ship Repairs, there has been deduced the maximum and minimum number of ships that can be repaired in the Sub-region in 1.980 and 1.985, which gives the figures of 533 and 228 respectively, for 1.980, and of 700 and 333 for 1.985.

8. From the study of the production capacity of the shipyards existing in the Andean Sub-region, once the expansion plans envisaged have been executed, and including in these the new Shipyard planeed for the Bay of Cartagena, Colombia, the following results have been obtained:

Capacity envisaged for the total production in the period 1.974-1.980:

1.448.500 dead weight tons

Capacity envisaged for the total production in the period 1.981-1.985:

3.240.000 dead weight tons

9. Two alternatives have been proposed which assume two different degrees of development of the Shipbuilding in the Subregion.

Alternative 1, that of lesser development, assumes the addition to the existing shipyards, once they have been extended, and to those that are in an advanced phase of planning a total of 3 new berths dedicated to the construction of ships of 11.000 to 30.000 DWT (1 berth) of 30.000 to 45.000 DWT (1 berth) and of 60.000 to 80.000 DWT (1 berth).

The inclusion of these three new berths represents the following forecasts of total production for the whole of the subregional shipyards:

- 2.063.500 dead weight tons in the period 1.974-1.980 and
- 5.410.000 dead weight tons in the period 1.981-1.985.

Alternative 2, that of greater development, assumes the addition to the existing shipyards, once they have been extended, and to those that are in an advanced phase of planning, a total of 5 new berths dedicated to the construction of ships of between 2.500 to

6.000 dead weight tons. (1 berth) of between 11.000 and 30.000 dead weight tons (1 berth) of between 30.000 and 45.000 dead - weight tons (1 berth) of between 60.000 and 80.000 dead weight tons (1 berth) and of between 120.000 and 180.000 dead weight - tons. (1 berth).

The inclusion of these five new building berths allows an estimated total production for the whole of the subregional shipyards of:

- 2.103.500 DWT in the period 1.974-1.980 and
- 6.035.000 DWT in the period 1.981-1.985.

10. From the maximum and minimum number of ships that can be repaired in the Andean Sub-region, from the capacity of the existing facilities and from the forecasts of extension of these facilities, - there has been deduced the number of repair facilities that it is necessary to add, and which is one dock in the period 1.974-1.980 for the minimum hypothesis, and 8 docks in the period 1.974-1.980 plus three other docks in the period 1.981-1.985 for the maximum hypothesis.

11. As a consequence of the number of construction berths and of - repair facilities necessary to cover the different alternatives - and hypotheses which have been drawn up for Ship Construction and Repairs, there have been defined some Ship Construction and Repair Centres, which can be constructed in the Sub-region before 1.985, which are summarized here:

According to Alternative 1, which covers the case of lesser development of Shipbuilding, and minimum hypothesis of Repair, it would be necessary to construct three centres devoted to the following:

- The construction of ships of between 11.000 and 30.000 dead weight Tons.

- The construction of ships of between 30.000 and 45.000 dead weight tons and the repair of ships up to 45.000 dead weight tons.

- The construction of ships of between 60.000 and 80.000 dead weight tons.

In accordance with Alternative 2, which covers the case of greater development of Shipbuilding and the maximum hypothesis of Repair, it would be necessary to construct six centres dedicated to the following:

- The construction and repair of ships of less than 6.000 dead weight tons.
- The repair of ships less than 15.000 dead weight tons.
- The construction of ships of between 11.000 and 30.000 dead weight tons. and the repair of ships up to 45.000 dead weight tons.
- The construction of ships of between 30.000 and 45.000 dead weight tons. and the repair of ships of up to 45.000 dead weight tons.
- The construction of ships of between 60.000 and 80.000 dead weight tons. and the repair of ships of up to 80.000 dead weight tons.
- The construction of ships of between 120.000 and 180.000 dead weight tons. and the repair of ships of up to 180.000 dead weight tons.

12. The greater part of the materials and equipment that the auxiliary industry will be able to produce intended to be employed in ships

included either in the Iron and Steel Programme or in the Metal-mechanical Programme studied by the Board of the Agreement of Cartagena, and their production has been defined and assigned to the countries concerned.

There also exists a large quantity of products that can be freely manufactured in any of the Andean countries in accordance with ALALC.

13. A study has been made of the development of the Diesel engine industry intended for ships, and two alternatives have been defined in accordance with the alternatives of lesser and greater development of shipbuilding. In accordance with Alternative 1, that of lesser development, the following factories could be stablished in the Subregion:

- A factory for high-power slow-speed engines.
- A factory for high-power semi-rapid engines.
- A factory for low-power slow-speed engines.

According to Alternative 2, that of greater development, the following factories could be stablished in the Subregion:

- Two factories for high-power slow-speed engines.
- A factory for high-power semi-rapid engines.
- A factory for low-power slow-speed engines.

14. A study has been made of the requirement of rolled steel for the construction of ships' hulls in the shipyards as per alternative 2, including the existing shipyards.

These requirements have been calculated at a total of 542.900 tons. in the period 1.974-1.980 and 1.366.700 tons. in the period 1.981-1.985.

15. An evaluation has been made of the employment opportunities necessary in the new shipyards that are considered in Alternatives 1 and 2 of Ship Construction and Repair, with the result that, to cover the requirements of Alternative 1, the new shipyards would require 6,351 new employment posts in the period 1.974-1.980, and in the case of Alternative 2, the number of new employment posts would be 10.729 in the period 1.974-1980 and 2.986 for the period 1.981-1.985.

An evaluation has also been made of the employment posts that would be created on board ships in the alternative of greater development, including the ships built in the Subregion and the ships that it is estimated could be acquired from outside, resulting the figures of 5.549 new posts in ships in the period 1.974-1.980, and 7.037 in the period 1.981-1.985.

16. In order to develop the shipbuilding sector in the Andean sub-region, it is necessary to take measures on a Subregional, national and managerial level aimed at increasing the technological level of the sector.
These measures affect the spheres of Education, Research and the regulation of foreign technical contribution.

17. An evaluation has been made of the investments in new shipyards in accordance with the two Alternatives studied, resulting in investment forecasts of U.S. $ 131.914.000 for the construction of shipyards in the period 1.975-1.980 in the case of Alternative 1, and investment forecasts of U.S. $ 350.030.000 in the period 1.975-1980 and of U.S. $ 145.871.000 in the period 1.981-1.985 in the case of Alternative 2.

18. The evaluation of feasable investments in ships gives the following

figures in the case of greater development envisaged:

In the period 1.974-80 = 2.196 mill. USA $

In the period 1.981-85 = 2.968 mill. USA $

That is, an accumulated total of 5.164 mill. USA $.

19. By means of an adequate organization of the Shipping Companies which contemplate their extension, or, where applicable, the mergers of various Companies, the traffic of import and export of general cargo and the coastal traffic can be developed on the basis of the Shipping Companies existing at the present time.

It will be necessary to study in an over all form, and coordinated with land transport facilities, the development of the Companies that will carry out the intra-zonal traffic, and to consider the possibility of multi-national companies being created for this purpose.

The export traffic of solid or liquid bulk cargoes should be effected with newly created Companies, whether these be national, multi-national or mixed.

20. The Andean countries should review and make adequate their respective legislations, and cover, where necessary, the legal gaps that exist at the present time. It will be necessary to take the opportune legal measures with respect to the firms that constitute the shipbuilding sector, and with respect to the regulations of maritime transport, especially with regard to the traffic between the countries that form the Andean Sub-region, and to define the financial aids for Shipbuilding, both with regard to subsidies or premiums and to credits for the acquisition of ships.

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UNIDO

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

STUDY FOR THE INTEGRATION OF THE SHIPBUILDING AND REPAIR INDUSTRY IN THE ANDEAN GROUP OF COUNTRIES

FINAL REPORT

APPENDIX

UNIDO - CONTRACT No. 73/13 (1)
PROJECT No. IS/RLA/72/043

TECNIBERIA
MADRID-SPAIN

STUDY FOR THE INTEGRATION OF THE SHIPBUILDING AND REPAIR
INDUSTRY IN THE ANDEAN GROUP OF COUNTRIES

FINAL REPORT

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APPENDIX n° 1.

B I B L I O G R A P H Y.

GENERAL INFORMATION.

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APPENDIX n° 2.

QUESTIONNAIRES.

I - SHIPPING COMPANIES QUESTIONNAIRE

A. PRESENT SITUATION

A1. Existing fleet owned and under charter

Number of ships

Dead weight tonnage

Age

Speed

Type of propulsion

A2. Lines operated

Countries and ports of call

Matrix of transports indicating the upward and downward flows in tons per annum in the last three years. The following should be indicated separately: liquid bulk cargoes, liquified gases, solid bulk cargoes, general cargo and containers.

A3. Operating factors

Times of round voyages in each one of the lines operated

Average stowage factor for general cargo

Annual percentage of utilization of the capacity of the fleet

Annual percentage of the time that the fleet is in active service

A4. Personnel

Indicate office and fleet personnel

With regard to fleet personnel, indicate Deck Officers, Engine-room officers, Petty Officers and subordinates.

Origin of qualified personnel, indicating institution and country.

Indicate if there exist Company's own centres of professional training, and for the training of Petty Officers and subordinates, together with the capacity of such Centres.

A5. <u>Technical Department</u>

Number of persons and their qualifications devoted to the modification of ships in service. In the event of not having a Technical Department, what organizations are encharged with exercising this function.

Do systems of preventive maintenance exist, or are they in preparation

Place where the fleet is repaired, indicating for major and minor repairs the shipyard and the country.

A6. <u>Finance</u>

Annual operating costs, indicating separately administration overheads; payrolls of crews; costs of maintenance and repairs; consumption of fuels, oils and water; supplies, and stores; port costs.

Criteria of amortization

Balance sheets of the last two [illegible] years

Sources of financing of the new fleet.

A7. <u>Legal</u>

Restrictions or stimuli to effect repairs in the country itself or abroad.

Conference agreements existing.

Laws that establish minimum percentages for the transport of the cargo leaving or entering the country.

B. <u>FORECASTS UP TO THE YEAR 1985</u>

B1. Fleet that will enter into service, indicating for each ship the approximate date, dead weight tonnage and traffic to which it is intended to be destined.

B2. Lines that will be operated, and date of opening of new lines, if known.

Forecast of annual tonnages that will be transported, indicating the countries of origin and destination in accordance with the classification of products indicated in section A2.

B3. Times of round voyages of the new lines considered, and future percentages of utilisation of the capacity and of the time that the fleet is in active service, if these data differ from the present data.

B4. Future requirements for personnel, in accordance with the classification indicated in Section A4.

II SHIPYARDS QUESTIONNAIRE

A. GENERAL CHARACTERISTICS OF THE SHIPYARD

A.1 Factories and offices

Location

Address

Telephone - Telex

Year of foundation

State or private concern

Legal regime

Layout

Total surface are of the factory

Roofed

Unroofed

3. PLANT

3.1 Slipways

Dimensions

Maximum dead wieght tonnage of ships to be constructed

Cranes and gantries

3.2. Construction and/or repair docks

Dimensions

Maximum capacity of drydocking

Cranes and gantries

3.3. Plate and profiles storage area

Surface area

Means of loading and handling

3.4. Workshops for elaboration of plates and profiles

Surface area

Total capacity in tons per month

Machinery installed

3.5. Means of blasting and painting

3.6. Zone of prefabrication

Roofed surface

Unroofed surface

Average and maximum weight of blocks

Cranes

Welding elements - degree of automation

3.7. Fitting-out berths

Length - draught

Service of cranes

3.8 Mechanical and fitting workshops

Surface area

Machinery

B.9 Piping workshops

B.10 Electrical workshop

B.11 Electronic workshop

B.12 Carpentry workshop

B.13 Casting workshop

Surface area
Iron, steel and bronze
Type of furnaces

Maximum size of pieces to be cast
Production capacity in tons per year
Types of pieces cast (anchors, propellers, sternframes, etc.)
Works other than those connected with shipbuilding

B.14 Forging workshop

Surface area
Machinery
Maximum size of pieces
Types of pieces forged
Works other than those connected with shipbuilding

B.15. Warehouses

Surface area
Handling facilities

B.16 Miscellaneous facilities

Electric power installed
Capacity of transformation
Oxygen plant
Acetylene plant
Water supply
Fire fighting equipment
Compressed air system

B.17 Means of access for materials

C. PERSONNEL

C.1 Organization chart

C.2. Distribution of personnel by workshops and trades

Classification by professional categories

Graduate engineers or technicians

Medium-grade technicians

Foremen

Skilled workers

Unskilled workers

Apprentices

C.3. Subcontracts

C.4. Wage level

C.5 Social security charges

C.6 School for apprentices

C.7 System of incentives

C.8 Labour safety and hygiene

D. PRODUCTION

D.1 Ships constructed up to the present

Characteristics - year of construction

Order book - Programme of deliveries

D.2 Repairs

Number and type of ships repaired per year

Fixed personnel engaged in repairs

Hours devoted to repairs

Percentage of repair work destined to merchant ships

D.3 Productivity

Tons produced per month

Hours per ton of hull

Total hours by trades for ships of new contruction

Slipway times

Fitting-out times

D.4 Supplies

Suppliers located in the country concerned

Suppliers located in the Andean Sub-region

Suppliers located in other countries.

B. TECHNOLOGICAL LEVEL

B.1. Technical office

Number and qualifications of personnel

Projects - delineation

B.2. Systems of tracing

B.3 Quality control

Classification Societies

Other standards of quality and control

B.4 Laboratories

Radiographic control

B.5 Organization of production

Planning

Programming

Methods

Follow-up

Times

Cost control

Stock control

Standardisation

B.6 Technical aid contracts

Licence contracts

F. ECONOMIC AND FINANCIAL ASPECTS

F.1 Corporate capital

F.2 Lines of credit

State

Private

International

F.3 Financing of ships constructed and on order

F.4 Sales prices of the ships

System of contracting

Free from competitive bidding

Official award

Administration

F.5 Costs

Materials

Prices of steel

Prices of diesel engines

Customs tariffs - other measures of protection

Systems of purchasing

Cost of energy

Overheads - Coefficient

Industrial accounting

Analytical accounting

F.6 Annual billing

F.7 Balance sheets

G. PLANS FOR EXPANSION

G.1 Plans under execution

G.2 Plans in project stage

G.3. Limitations of infrastructure

Draught

Surface area

Availabilities of energy

Means of access

III - QUESTIONNAIRES FOR AUXILIARY INDUSTRIES

A - IRON AND STEEL FIRMS

A-1. Annual production capacity

A-2. Annual sales made to shipyards in the Andean countries (Chile, Bolivia, Peru, Ecuador, Colombia and Venezuela).

A-3. Unit prices of your products

A-4. Homologation or approval of your manufactures by Ship Classification Societies. State which.

A-5. Licences of foreign firms used in your manufactures. State which.

A-6. In your opinion, are there adequate possibilities of obtaining credit for the financing of investments?

A-7. In your opinion, are there adequate measures for Customs protection for the sector with respect to imported products coming from non-Andean countries?

A-8. Types of plate being produced:

. Mild steel (Grades A - B - D - E)

. High stress steel

. Special steels

A-9. Thicknesses of plates being produced

A-10. Types of rolled profiles being produced.

B- STEEL, IRON AND BRONZE FOUNDRIES

B-1. Annual production capacity in different materials

B-2. Annual sales made to shipyards in Andean countries (Chile, Bolivia, Peru, Ecuador, Colombia and Venezuela)

B-3. Unit prices of your products (price per Kg.)

B-4. Homologation or approval of your manufactures by Ship Classification Societies. State which.

B-5. Licences of foreign firms used in your manufactures. State which.

B-6. In your opinion, are there adequate possibilities of obtaining credit for financing investments?

B-7. In your opinion, are there adequate measures for Customs protection of the sector with respect to imported products coming from non-Andean countries?

B-8. Casting processes employed, including type of furnaces (electric, induction, etc.)

B-9. Maximum weight of a cast iron piece

B-10. Maximum weight of a carbon steel cast piece

B-11. Maximum weight of a special steel cast piece

B-12. Maximum weight of a piece cast in non-ferrous metals

B-13. Do you cast ships' anchors?

B-14. Do you cast stern frames for ships?

B-15. Do you cast steading bearings for ship shafting?

B-16. Do you cast stern tubes?

B-17. Do you cast propeller screws for ships? State maximum diameter.

C - INDUSTRIAL FORGES

C-1. Annual production capacity

C-2. Annual sales made to shipyards in Andean countries (Chile, Bolivia, Peru, Ecuador, Colombia and Venezuela)

C-3. Unit price of your products (price per kg.

C-4. Homologation or approval of your manufactures by Ship Classification Societies. State which.

C-5. Licenses of foreign firms used in your manufactures. State which.

C-6. In your opinion, are there adequate possibilities of obtaining credit for financing investments?

C-7. In your opinion, are there adequate measures for Customs protection of the sector with respect to imported products coming from non-Andean countries?

C-8. Maximum weight of forged pieces

C-9. Maximum size of forged pieces.

C-10. Do you manufacture propeller shafting of ships?

C-11. Do you manufacture rudder stock for ships?

C-12. Do you supply rough forged, or machined pieces?

D - FACTORIES MAKING ELECTRODES

D-1. Annual production capacity

D-2. Annual sales made to shipyards in the Andean countries (Chile, Bolivia, Peru, Ecuador, Colombia and Venezuela)

D-3. Unit price of your products

D-4. Homologation or approval of your manufactures by Ship Classification Societies. State which.

D-5. Licences of foreign firms used in your manufactures. State which.

D-6. In your opinion, are there adequate possibilities of obtaining credit for the financing of investments?

D-7. In your opinion, are there adequate measures for Customs protection for the sector with respect to imported products coming from non-Andean countries?

D-8. Types of Electrodes being produced:

- Electrodes for manual arc welding units (rutile, basic, high yield etc
- Rods of fluxing wire for submerged arc welding (automatic or semi-automatic)

B - PIPING MANUFACTURERS

B-1. Annual production capacity

B-2. Annual sales made to shipyards in the Andean countries (Chile, Bolivia, Peru, Ecuador, Colombia and Venezuela)

B-3. Unit prices of your products

B-4. Homologation or approval of your manufactures by Ship Classification Societies. State which.

B-5. Licences of foreign firms used in your manufactures. State which.

B-6. In your opinion, are there adequate possibilities of obtaining credit for the financing of investments?

B-7. In your opinion are there adequate measures for Customs protection for the sector with respect to imported products coming from non-Andean countries?

B-8. Materials used in the piping you manufacture:

Steel - Copper - Cupronickel - Aluminium brass - Light alloy yellow brass - Cast iron (gray, spheroidal, ductile)

B-9. Method of manufacture: drawn. Welding (longitudinal, helicoidal).

B-10. Diameters and thicknesses of your manufactures.

B-11. Do you manufacture special high pressure piping?

B-12. Do you manufacture piping accessories? State which (flanges, elbows, connections, couplings, bulkhead girders, etc.)

B-13. Standards used in your manufactures, (ASA, DIN, API, etc.).

D - VALVE FACTORIES

D- 1. Annual production capacity.

D- 2. Annual sales made to shipyards in the Andean countries (Chile, Bolivia, Peru, Ecuador, Colombia and Venezuela).

D- 3. Unit prices of your products.

D- 4. Homologation or approval of your manufactures by Ship Classification Societies. State which.

D- 5. Licences of foreign firms used in your manufactures. State which.

D- 6. In your opinion, are there adequate possibilities of obtaining credit for the financing of investments?

D- 7. In your opinion, are there adequate measures for Customs protection for the sector with respect to imported products coming from non-Andean countries?

D- 8. Materials used in the valves of your manufacture (forged steel, cast stee stainless steel, cast iron, non-ferrous metals, etc.)

D- 9. Types of valves manufactured (gate, ball-check, butterfly, safety, reducing, etc.)

D-10. Maximum diameters and pressures of your manufactures.

D-11. Standard utilized in your manufactures (ASA, DIN, API, etc.)

G - DIESEL ENGINE FACTORIES -

G-1. Annual production capacity

G-2. Annual sales made to shipyards in Andean countries (Chile, Bolivia Peru, Colombia, Ecuador and Venezuela).

G-3. Unit prices of your products (prices/BHP).

G-4. Homologation or approval of your manufactures by Ship Classification Societies. State which.

G-5. Licences of foreign firms used in your manufactures. State which.

G-6. In your opinion, are there adequate possibilities of obtaining credit for the financing of investments ?

G-7. In your opinion, are there adequate measures for Customs protection for the sector with respect ot imported products coming from non-Andean countries?

G-8. Brief description of the types of engines in production.

G-9. Power and r.p.m. ranges of the engines of your manufacture.

G-10. The engine of maximum power supplied up to the present.

G-11. Can you supply complete propulsion lines, (engine, shafting, propeller)?

H - BOILER FACTORIES -

H-1. Annual production capacity.

H-2. Annual sales made to shipyards in the Andean countries (Chile, Bolivia, Peru, Ecuador, Colombia and Venezuela).

H-3. Unit prices of your products.

H-4. Homologation or approval of yuur manufacture by Ship Classification Societies. State which.

H-5. Licences of foreign firms used in your manufactures. State which.

H-6. In your opinion, are there adequate possibilities of obtaining credit for the financing of investments?

H-7. In your opinion, are there adequate measures for Customs protection for the sector with respect to imported products coming from non-Andean countries?

H-8. Brief description of the types of marine boilers in production.

H-9. Ranges of pressures and capacities (tons/h.) of the boilers included in your manufacturing programme.

H-10. The boiler of maximum capacity and pressure supplied up to the present.

I. FACTORIES OF PUMPS FOR SHIPS

I - 1. Annual production capacity.

I - 2. Annual sales made to shipyards in the Andean countries (Chile, Bolivia, Peru, Ecuador, Colombia and Venezuela)

I - 3. Unit prices of your products.

I - 4. Homologation or approval of your manufactures by Ship Classification Societies. State which.

I - 5. Licences of foreign firms used in your manufactures. State which.

I - 6. In your opinion, are there adequate possibilities of obtaining credit for the financing of investments?

I - 7. In your opinion, are there adequate measures for Customs protection for the sector with respect to imported products coming from non-Andean countries?

I - 8. Types of pumps included in your manufacturing programme (alternating, centrifugal, screw, , etc.)

I - 9. Materials employed in the pumps of your manufacture (cast iron, steel, bronze, etc.)

I-10. Ranges of capacities of your pumps in m^3/h.

I-11. Maximum capacity of pump manufactured.

J - AIR COMPRESSOR FACTORIES -

J-1. Annual production capacity

J-2. Annual sales made to shipyards in the Andean countries (Chile, Bolivia, Peru, Ecuador, Colombia, Venezuela)

J-3. Unit prices of your products.

J-4. Homologation or approval of your manufactures by Ship Classification Societies. State which.

J-5. Licences of foreign firms used in your manufactures. State which.

J-6. In your opinion, are there adequate possibilities of obtaining credit for the financing of investments?

J-7. In your opinion, are there adequate measures for Customs protection for the sector with respect to imported products coming from non-Andean countries?

J-8. Types of compressors of your manufacture (piston, rotary, etc.)

J-9. Ranges of capacities (m^3/h) and pressures of your compressors.

J-10. Maximum capacity and pressure of compressor manufactures.

K - FACTORIES OF DECK MACHINERY FOR SHIPS -

K- 1. Annual production capacity.

K- 2. Annual sales made to shipyards in the Andean countries (Chile, Bolivia, Ecuador, Peru, Colombia and Venezuela).

K- 3. Unit prices of your products.

K- 4. Homologation or approval of your manufactures by Ship Classification Societies. State which.

K- 5. Licences of foreign firms used in your manufactures. State which.

K- 6. In your opinion, are there adequate possibilities of obtaining credit for the financing of investments?

K- 7. In your opinion, are there adequate measures for Customs protection for the sector with respect to imported products coming from non-Andean countries?

K- 8. Type of deck machinery of your manufacture (anchor windlasses, capstans, cargo winches, cargo cranes, fishing winches, etc.)

K- 9. Ranges of power and characteristics of your manufactures.

K- 10. Type of drive of your machinery (electric, steam, hydraulic, etc.)

K- 11. Maximum capacity of machine manufactures.

L - ELECTRIC MACHINERY FACTORIES -

L-1. Annual production capacity.

L-2. Annual sales made to shipyards in the Andean countries (Chile, Bolivia, Peru, Ecuador, Colombia, Venezuela).

L-3. Unit prices of your products.

L-4. Homologation or approval of your manufactures by Ship Classification Societies. State which.

L-5. Licences of foreign firms used in your manufactures. State which.

L-6. In your opinion, are there adequate possibilities of obtaining credit for the financing of investments?

L-7. In your opinion, are there adequate measures for Customs protection for the sector with respect to imported products coming from non-Andean countries.?

L-8. Type of electric machinery of your manufacture: (alternators, dynamos, converters, "Ward-Leonard" Groups, A.C. motors, D.C. motors, rectifiers, transformers, etc.)

L-9. Power ranges of your manufactures.

L-10. Maximum powers manufactured.

[redacted] - ELECTRIC CABLE FACTORIES

[redacted]-1. Annual production capacity

[redacted]-2. Annual sales made to the shipyards in Andean countries (Chile, Bolivia, Peru, Ecuador, Colombia and Venezeula)

[redacted]-3. Unit prices of your products.

[redacted]-4. Homologation or approval of your manufactures by Ship Classification Societies. State which.

[redacted]-5. Licences of foreign firms used in your manufactures. State which.

[redacted]-6. In your opinion are there adequate possibilities of obtaining credit for the financing of investments?

[redacted]-7. In your opinion, are there adequate measures for Customs protection for the sector with respect to imported products coming from non-Andeand countries?

[redacted]-8. Type of conductor cables of your manufacture. (Define insulating and covering materials utilized).

[redacted] - ELECTRIC SWITCHGEAR FACTORIES -

[redacted]-1. Annual production capacity.

[redacted]-2. Annual sales made to shipyards in the Andean countries (Chile, Bolivia, Peru, Ecuador, Colombia, and Venezuela).

[redacted]-3. Unit prices of your products

[redacted]-4. Homologation or approval of your manufactures by Ship Classification Societies. State which.

[redacted]-5. Licences of foreign firms used in your manufactures. State which.

[redacted]-6. In your opinion, are there adequate possibilities of obtaining credit for the financing of investments?

[redacted]-7. In your opinion, are there adequate measures for Customs protection for the sector with respect to imported products coming from non-Andean countries.

[redacted]-8. Types of electric switchgear of your manufacture : (Switchboard, distribution boxes, contactors, self-starters, automatic/manual switches circuit breaking devices, regulators, relays, cutouts, measuring appartuses, etc.)

[redacted]-9. Ranges of powers and characteristics of your manufactures.

[redacted]-10. Switchgear of maximum capacity manufactured.

O - AIR CONDITIONING, VENTILATION AND REFRIGERATION APPARATUS FACTORIES

O-1. Annual production capacity

O-2. Annual sales made to shipyards in the Andean countries (Chile, Bolivia, Peru, Ecuador, Colombia and Venezuela)

O-3. Unit prices of your products

O-4. Homologation or approval of your manufactures by Ship Classification Societies. State which.

O-5. Licences of foreign firms used in your manufactures. State which.

O-6. In your opinion, are there adequate possibilities of obtaining credit for the financing of investments?

O-7. In your opinion, are there adequate measures for Customs protection for the sector with respect to imported products coming from non-Andean countries?

O-8. Speciality of your manufactures:
(Air conditioning apparatus, ventilation apparatus for living quarters, ventilation for holds, ventilation apparatus for engine rooms, refrigeration apparatus for holds, refrigeration apparatus for transport of liquified gases, ventilation apparatus for storerooms, refrigeration apparatus for fishing vessels, etc.)

O-9. In addition to manufactures, do you carry out complete plant installations on board ship?

O-10. Maximum capacity of refrigeration compressors manufactured.

O-11. Maximum capacity of ventilators manufactured

O-12. Maximum volume of air-conditioned and refrigerated spaces.

O-13. Minimum temperatures of refrigeration installations carried out.

P - THERMAL AND ACOUSTIC INSULATING MATERIALS FACTORIES -

P - 1. Annual production capacity.

P - 2. Annual sales made to shipyards in the Andean countries (Chile, Bolivia, Peru, Ecuador, Colombia and Venezuela).

P - 3. Unit prices of your products.

P - 4. Homologation or approval of your manufactures by Ship Classification Societies. State which.

P - 5. Licences of foreign firms used in your manufactures. State which.

P - 6. In your opinion, are there adequate possibilities of obtaining credit for the financing of investments

P - 7. In your opinion, are there adequate measures for Customs protection for the sector with respect to imported products coming from non-Andean countries?

P - 8. Types of materials of your manufacture (Rock wool, polyurethane, cork agglomerates, etc.)

P - 9. In addition to the manufacture of material, do you carry out insulation installations or only manufactures of material?

Q - MARINE PAINT FACTORIES -

Q-1. Annual production capacity

Q-2. Annual sales made to shipyards in the Andean countries (Chile, Bolivia, Peru, Ecuador, Colombia and Venezuela).

Q-3. Unit prices of your products.

Q-4. Licences of foreign firms used in your manufactures. State which.

Q-5. In your opinion are there adequate possibilities of obtaining credit for the financing of investments?

Q-6. In your opinion are there adequate measures for Customs protection for the sector in respect to imported products coming from non-Andean countries?

Q-7. Types of paint of your manufacture :
(priming coats for steel, anti-rust paint, anti-scale and anti-fouling compounds, Epoxy, rubber hydrochloride, Vinyl, etc.)

R . FACTORIES OF SHIPBUILDING ACCESSORIES IN GENERAL

R- 1. Annual production capacity.

R- 2. Annual sales made to shipyards in the Andean countries (Chile, Bolivia, Peru, Ecuador, Colombia and Venezuela).

R- 3. Unit prices of your products

R- 4. Homologation or approval of your manufactures by Ship Classification Societies. State which.

R- 5. Licences of foreign firms used in your manufactures. State which.

R- 6. In your opinion, are there adequate possibilities of obtaining credit for the financing of investments:

R- 7. In your opinion, are there adequate measures for Customs protection for the sector with respect to imported products coming from non-Andean countries?

R- 8. Types of shipbuilding accessories of your manufacture; indicate important characteristics.

APPENDIX n° 3.

LIST OF FIRMS AND OFFICIAL BODIES CONTACTED.

B O L I V I A .

- SECRETARIA TECNICA DE INTEGRACION (Ministerio Relaciones Exteriores) - La Paz.

- VOLCAN, S.A. - La Paz.

- COFADENA (CORPORACION FUERZAS ARMADAS PARA DESARROLLO NACIONAL) - La Paz.

- FUERZA NAVAL BOLIVIANA - La Paz.

C O L O M B I A .

- UNITED NATIONS - Bogotá.
- INCOMEX (Instituto Colombiano Comercio Exterior) - Bogotá.
- FLOTA MERCANTE GRANCOLOMBIANA - Bogotá.
- I.F.I (INSTITUTO FOMENTO INDUSTRIAL) - Bogotá.
- FEDEMETAL - Bogotá.
- ACERIAS PAZ DEL RIO - Bogotá.
- ECOPETROL - Bogotá.
- PUERTOS DE COLOMBIA - Bogotá.
- CUTMA - Bogotá.
- NAVENAL - Bogotá.
- CONASTIL - Cartagena.
- UNIAL - Barranquilla.
- MINISTERIO DE DESARROLLO - Bogotá.

C H I L E .

- SECRETARIA DE INTEGRACION - Ministerio de Asuntos Exteriores - Santiago de Chile.
- MINISTERIO DE OBRAS PUBLICAS - Santiago.
- EMPRESA NACIONAL DEL PETROLEO - Santiago.
- CIA. DE ACEROS DEL PACIFICO - Santiago.
- SUBSECRETARIA DE TRANSPORTES - Santiago.
- CORFO - Santiago.
- ELECMETAL - Santiago.
- S.G.M. - Santiago.
- C.I.C. - Santiago.
- ELECTROMECANICA FAMELA - SOMELA, S.A.
- ASMAR - Valparaiso.
- ASTILLEROS LAS HABAS - Valparaiso.
- CIA. SUDAMERICANA DE VAPORES - Valparaiso.
- EMPREMAR - Valpariso.
- SONAP - Valparaiso.
- CIA. DE ACEROS DEL PACIFICO - Huachipato.

E C U A D O R.

- MINISTERIO DE INDUSTRIAS, COMERCIO E INTEGRACION - Quito.
- MINISTERIO DE AGRICULTURA - Quito.
- CONELSA - Quito.
- DIRECCION GENERAL DE GEOLOGIA Y MINAS - Quito.
- CORPORACION ESTATAL PETROLERA ECUATORIANA - Quito.
- MINISTERIO DE DEFENSA (COMANDANCIA DE LA MARINA) - Quito.
- JUNTA NACIONAL DE PLANIFICACION - Quito.
- CABLEC - Quito.
- METALURGICA ECUATORIANA - Quito.
- SECAP (SERVICIO ECUATORIANO DE CAPACITACION PROFESIONAL) - Quito.
- FLOTA PETROLERA (FLOPEC).
- DIRECCION DE LA MARINA MERCANTE - Guayaquil.
- DELEGACION MINISTERIO INDUSTRIAS, COMERCIO E INTEGRACION - Guayaquil.
- PROGRAMA NACIONAL DEL BANANO Y FRUTOS TROPICALES - Guayaquil.
- ARSENAL NAVAL - Guayaquil.
- PROGRAMA NACIONAL DEL ARROZ Y MAIZ - Guayaquil.
- CEUDES CENTRO DE DESARROLLO - Guayaquil.

P E R U .

- ONIT (Oficina Nacional de Integración) - Lima.
- SIMA - Callao.
- C.P.V. COMPAÑIA PERUANA DE VAPORES - Lima.
- FABRIMET (FABRICACIONES METALICAS, S.A.) - Callao.
- INDUPERU - Lima.
- MINISTERIO DE TRANSPORTES - Lima.
- ARMCO PERUANA, S.A. - Lima.
- METAL EMPRESA, S.A. - Callao.
- MINISTERIO INDUSTRIA Y COMERCIO - Lima.
- MINISTERIO ENERGIA Y MINAS - Lima.
- MARCONA MINING Co. - Lima.
- I.N.P. (INSTITUTO NACIONAL PLANIFICACION) - Lima.
- COFIDE (CORPORACION FINANCIERA DESARROLLO).
- SIDERPERU - Lima.
- PETROPERU - Lima.
- PICSA ASTILLEROS - Chimbote.
- SIDERPERU - Chimbote.
- ASOCIACION ARMADORES PERU - Callao.
- HIDROSTAL - Lima.

V E N E Z U E L A .

- INSTITUTO DE COMERCIO EXTERIOR - Caracas.
- CORDIPLAN - Caracas.
- CORPORACION ANDINA DE FOMENTO (C.A.F) - Caracas.
- INSTITUTO AUTONOMO DE DIQUES Y ASTILLEROS - Pto. Cabello.
- INSTITUTO DE COMERCIO EXTERIOR - Caracas.
- CORDIPLAN - Caracas.
- MINISTERIO DE MINAS E HIDROCARBUROS - Caracas.
- MINISTERIO OBRAS PUBLICAS - Caracas.
- ASOCIACION NAVIERA DE VENEZUELA - Caracas.
- C.A. VENEZOLANA DE NAVEGACION - Caracas.
- ASOCIACION DE INDUSTRIALES METALURGICOS Y DE MINERIA - Caracas.
- CAMARA VENEZOLANA DE FABRICANTES DE ARTEFACTOS DOMESTICOS Y DE LA INDUSTRIA ELECTRICA (CAFADAE).
- TALLERES Y FUNDICION MECANICA DE CATIA, C.A. (FUNMECA).
- SIDERURGICA DEL ORINOCO - Ciudad Guayana.

A R G E N T I N A .

- INSTITUTO IBEROAMERICANO DE LA MARINA MERCANTE.
  Buenos Aires.

URUGUAY.

- ALALC - Montevideo.

S P A I N .

- ASTILLEROS ESPAÑOLES, S.A. - Madrid

- I.N.I (INSTITUTO NACIONAL DE INDUSTRIA) - Madrid.

APPENDIX n° 4.

PRESENT SHIPS OF THE SUBREGION COUNTRIES.

SHIPOWNER	[illegible]	[illegible]			[illegible]	[illegible]
ARMADA DE CHILE	ALM. JORGE MONT	TANKER	17	17.853	2 TURBINES	14
	ARAUCANO	TANKER.	6	18.030	1 DIESEL	17
(CHILE)	BEAGLE	TANKER.	29	2.485	2 DIESEL ELECT.	14
	AGUILA	CARGO.	30	3.490	2 DIESEL	10
	PILOTO PARDO.	FERRY.	14	1.200	3 DIESEL ELECT.	14
	AQUILES	FERRY.	20	1.390	1 DIESEL	16
SONAP	CABO HORNO	TANKER	16	29.400	1 DIESEL	15
(CHILE)	CABO PILAR	TANKER.	2	67.842	1 DIESEL	15
	CABO TAMAR	TANKER.	9	61.260	1 DIESEL	17
	MAGALLANES	TANKER	16	29.400	1 DIESEL	15
MARTINEZ PEREIRA	CARMEN	CARGO.	16	2.500	1 DIESEL	13
	GLORIA L.	CARGO.	16	2.502	1 DIESEL	13
(CHILE)	ISABELLA	CARGO	21	1.750	1 DIESEL	10
INTEROCEANICA.	ALLIPEN	CARGO	18	7.470	2 DIESEL	12
(CHILE)	ANTARTICO	CARGO.	19	8.700	1 DIESEL	15
NAV. CORONEL	ROCA MAULE	BULKCARRIER	25	9.340	1 RECIPR.	11
(CHILE)	FEDERICO SCHWAGER		25	9.340	1 RECIPR.	11
	PUCHOCO		57	-	1	8
TRANSMARES (CHILE)	CORDILLERA	CARGO.	20	4.576	1 DIESEL	14
INTEROCEAN GAS (CHILE)	COPERNICO	L.P.G.	10	2.140	1 DIESEL	13
EMPREMAR	ALBACORA	CARGO	1	7.920	-	-
(CHILE)	ANGUILA	CARGO	1	[illegible].920	-	-
	ANTOFAGASTA	CARGO	18	1.745	1 DIESEL	1[illegible]

SHIPOWNER.	SHIP	TYPE.	[illegible]	[illegible]	PROPULSION.	[illegible]
EMPREMAR (CHILE)	ATUN	CARGO	1	7.970		
	CONCEPCION	"	13	3.563	2 DIESEL	12
	COQUIMBO	"	14	3.130	2 DIESEL	12
	LAGO GRAL. CARRERA	"	13	2.250	2 DIESEL	13
	LAGO HUALA-IHLIE	"	2	15.800	1 DIESEL	16
	LAGO LANAL-HUE	"	3	15.838	1 DIESEL	16
	LAGO ILLAN-QUIHUE	"	3	15.798	1 DIESEL	16
	LAGO MAIHUE	"	3	15.807	1 DIESEL	16
	LAGO PUYE-HUE	"	3	15.806	1 DIESEL	16
	LAGO RIÑI-HUE	"	3	15.838	1 DIESEL	16
	LAGO TOCO-PILLA	"	13	3.130	2 DIESEL	12
	VALDIVIA	"	12	3.563	2 DIESEL	12
EMPREMAR (CHILE)	DÑA. ISADO-RA	BULKCARRIER	24	5.080	1 RECIPR	10
	MATIAS COU-SIÑO	"	19	5.180	1 "	10
	NAVARINO	FERRY	22	1.815	2 DIESEL	15
	PINGUINO	REFRIGERATED	3	1.995	1 DIESEL	14
SUDAMERICANA DE VAPORES. (CHILE)	ACONCAGUA	CARGO.	8	11.730	2 TURBIN	20
	ANDALIEN	"	18	10.672	2 TURBIN	16
	COPIAPO	"	7	11.746	2 TURBIN	20
	IMPERIAL	"	8	11.730	2 TURBIN	20
	LAJA	"	12	12.800	1 DIESEL	15
	LEBU	"	18	10.622	2 TURBI.	16
	LIMARI	"	12	13.903	1 DIESEL	14
	LOA	"	16	13.430	1 DIESEL	15
	LONGAVI	"	13	13.081	1 DIESEL	15

SHIPOWNER.	SHIP	TYPE	AGE	D.W.T.	PROPULSION	SPEED KNOTS.
(CHILE)	MAIPO	CARGO.	7	11.730	2 TURBIN	20
	ELQUI	BULKCARRIER.	13	17.260	2 TURBIN	15
	ILLAPEL	"	13	17.260	2 TURBIN	15
F.M. GRAN-COLOMBIANA (COLOMBIA)	CARTAGENA DE INDIAS	CARGO.	15	[illegible]	1 DIESEL	17
	CIUDAD DE ARMENIA	"	13	8.093	1 DIESEL	17
	CIUDAD DE BARRANQUIL.	"	15	7.880	1 DIESEL	16
	CDAD. DE BOGOTA	"	9	12.[illegible]3	1 DIESEL	19
	CDAD. DE BUCARAMANGA	"	8	12.157	1 DIESEL	19
	CDAD. DE BUENAVENT	"	7	12.167	1 DIESEL	19
	CDAD. CALI	"	1	12.000	1 DIESEL	22
	CDAD. DE CUCUTA	"	7	12.167	1 DIESEL	19
	CDAD. DE IBAGUE	"	1	12.000	1 DIESEL	21
	CDAD. DE MANIZALES	"	3	12.221	1 DIESEL	21
	CDAD. DE MEDELLIN	"	3	11.673	1 DIESEL	21
	CDAD. DE NEIVA	"	18	4.808	2 DIESEL	13
	CDAD. DE PASTO	"	15	7.815	1 DIESEL	17
	CDAD. DE PEREIRA	"	14	8.[illegible]	1 DIESEL	17
	CDAD. DE POPAYAN	"	1[illegible]	4.808	2 DIESEL	13
	CDAD. STA. MARTA	"	1[illegible]	4.808	2 DIESEL	13
	CDAD. DE TUNJA	"	1[illegible]	[illegible]	1 DIESEL	1[illegible]

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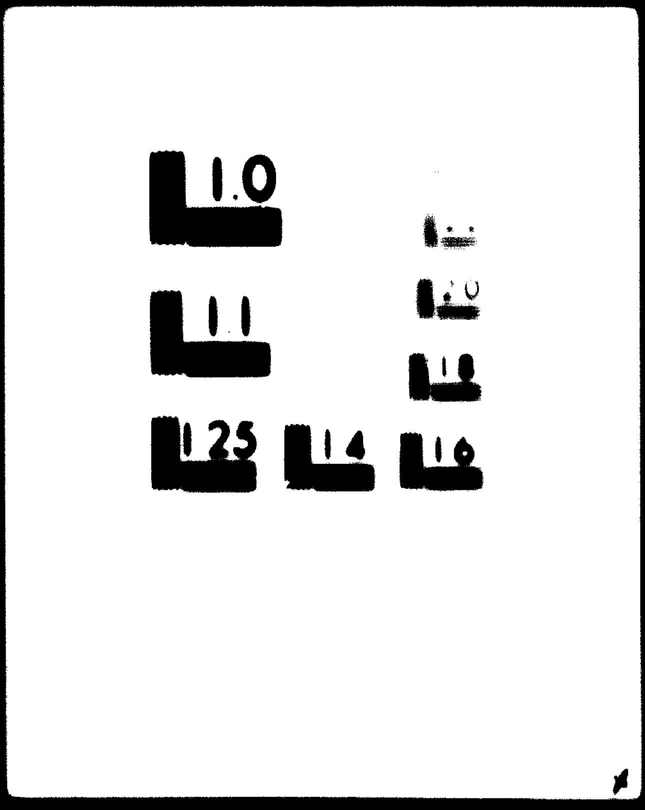

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[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
(COLOMBIA)	MANUEL ME-JIA	[illegible]	[illegible]	[illegible]	1 DIESEL	[illegible]
	REPUBLICA COLOMBIA		[illegible]	[illegible]	1 DIESEL	10
	RIO MAGDALENA		[illegible]	[illegible]	1 DIESEL	10
	RIO [illegible]			[illegible]	1 DIESEL	15
CONCESION DE SALINAS (COLOMBIA)	[illegible]	[illegible]	[illegible]	[illegible]	2 DIESEL	[illegible]
	[illegible] ABANGO		[illegible]	[illegible]	2 DIESEL	[illegible]
	PLANTA DE BETANIA		[illegible]	[illegible]	2 DIESEL	[illegible]
	PLANTA DE MAMONAL		2	[illegible]	2 DIESEL	[illegible]
	SALINA DE MANAURE		[illegible]	2 [illegible]	2 DIESEL	12
COLOMBIANA INTERNACIONAL DE VAPORES. (COLOMBIA)	ADRIANA	CARGO	5	3 [illegible]	1 DIESEL	15
	ANAMILENA		5	3 [illegible]	1 DIESEL	15
	[illegible]		7	3 [illegible]	1 DIESEL	15
	[illegible] MIGUEL		8	3 [illegible]	1 DIESEL	15
CIA NACIONAL DE NAVEGACION (COLOMBIA)	CATAIMA	CARGO	15	2 350	1 DIESEL	10
	MAITAMA		24	5 940	1 DIESEL	14
	TAIROMA		17	2 230	1 DIESEL	11
CIA A. y M. SANTA ROSA (COLOMBIA)	[illegible]	CARGO	26	6 [illegible]	1 DIESEL	11
	COVADONGA	[illegible]	[illegible]	6 382	1 DIESEL	14
	RIO [illegible]	[illegible]	30	4 [illegible]	1 RECIPR	9
M. DEFENSA NACIONAL (COLOMBIA)	[illegible]	TANKER	[illegible]	16 100	1 DIESEL	14
	MAMONAL	"	[illegible]8	4 150	1 DIESEL	11
	[illegible] JIMENO	"	28	4 [illegible]	1 DIESEL	11

[illegible]						
F. M. GRAN COLOMBIANA (ECUADOR)	CIUDAD DE CUENCA	CARGA	[illegible]	[illegible]	2 DIESEL	[illegible]
	CIUDAD DE GUAYAQUIL		[illegible]	[illegible]	1 DIESEL	[illegible]
	CIUDAD DE MANTA		[illegible]	[illegible]	1 DIESEL	[illegible]
	CIUDAD DE QUITO		4	[illegible]44	1 DIESEL	[illegible]
	REPUBLICA DE ECUADOR		[illegible]	[illegible]	1 DIESEL	[illegible]
C. A. TRANS PETROLEO (ECUADOR)	[illegible]	TANKER	[illegible]	[illegible]44	2 DIESEL	[illegible]
	[illegible]		[illegible]	[illegible]	4 DIESEL	[illegible]
FLOTA BANANERA ECUATORIANA	[illegible]	REFRIGER	[illegible]	[illegible]	1 DIESEL	[illegible]
	RIO AMAZONA		5	[illegible]	1 DIESEL	[illegible]
TRANSNAVE (ECUADOR)	ECUADOR	TANKER	14	[illegible]	1 DIESEL	15
CARIBEAN INVESTMENT (ECUADOR)	[illegible]	TANKER	46	[illegible]	2 DIESEL	10
ANGLO ECUATORIANA	ANGLO	TANQUER	[illegible]	4 500	2 DIES	9
	[illegible]	TANQUER	[illegible]	2 307	2 DIES	9
C. P. VAPORES (PERU)	[illegible]	CARGO	[illegible]	[illegible]	1 DIESEL	17
	[illegible]	[illegible]	4	[illegible]	1 DIESEL	17
	[illegible]	[illegible]	[illegible]	[illegible]	1 DIESEL	17
	[illegible]		[illegible]	[illegible]	1 DIESEL	17
	[illegible]	[illegible]	[illegible]	[illegible]	1 DIESEL	17

[illegible]	[illegible]	[illegible]			[illegible]	[illegible]
(PERU)	INCA [illegible]	[illegible]		4	1 DIESEL	
	INCA [illegible]		4	4	1 DIESEL	
	CALMA				DIESEL	
	[illegible]		4		DIESEL	
	TE[illegible]				DIESEL	
	PA[illegible]		4		DIESEL	
	GARCILA[illegible]		4		DIESEL	
	RIMAC				DIESEL	4
OFIC. NAV. COMERCIAL (PERU)	[illegible]	TANKER		[illegible]	1 DIESEL	
	[illegible]		1[illegible]	[illegible]	1 DIESEL	
	CAN[illegible]			[illegible]	1 DIESEL	[illegible]4
	[illegible]		4	[illegible]	1 DIESEL	[illegible]4
	ZORRI[illegible]		14	[illegible]	1 DIESEL	
	[illegible]	CARGO	[illegible]	1[illegible]	1 DIESEL	1[illegible]
CONS. NAV. PERU	LIMA	CARGO	[illegible]	[illegible]	2 DIESEL	15
	[illegible]		[illegible]	[illegible]	2 DIESEL	16
	TACNA		14	12 [illegible]	1 DIESEL	16
	CUZCO	REFRIGERAT	1[illegible]	[illegible]	1 DIESEL	16
PERUANA DE NAVEGACION	[illegible]	CARGO	6	[illegible]	1 DIESEL	1[illegible]
	[illegible]		4	4 [illegible]	1 RECIPR	1[illegible]
ENAFER (PERU)	MAN[illegible]	FERRY		1 [illegible]	1 DIESEL	1[illegible]
	[illegible]		4[illegible]	[illegible]	[illegible] RECIPR	11
NAV. AMAZONICA (PERU)	[illegible]	CARGO		[illegible]	1 RECIPR	11
	[illegible]		[illegible]	4 4[illegible]	1 DIESEL	14

[illegible]						
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
	[illegible]		[illegible]		[illegible]	4
LINEA [illegible] [illegible]		BULKCARRIER		[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]			[illegible]	
LINEA AMA[illegible] [illegible] (PERU)	[illegible]	[illegible]	[illegible]	[illegible]	1 DIESEL	
NAVIERA HUMBOLDT S.A (PERU)	[illegible]	BULKCARRIER	[illegible]	[illegible] 4	1 DIESEL	14
NAVIERA [illegible] DEL PACIFICO	[illegible]	TANKER	[illegible]	[illegible]	1 TURBINE	14
OPERACIONES Y SERVICIOS	[illegible]	FACTORY	8	5.[illegible]	1 DIESEL	10
[illegible]PANA S.A (PERU)	[illegible]	BULKCARRIER	18	5.[illegible]	1 DIESEL	9
[illegible] NAV [illegible]ANTA (PERU)	[illegible]	TANKER	[illegible]	9.[illegible]	1 RECIPR	11
NAV. NEPTUNO (PERU)	[illegible]	CARGO	1	6.604	1 DIESEL	15
[illegible]AVN (VENEZUELA)	AN[illegible]	CARGO	[illegible]	5.[illegible]	2 DIESEL	15
	CA[illegible]A			11.[illegible]	1 DIESEL	20
	[illegible]			[illegible]	1 DIESEL	16
	[illegible]	"	[illegible]	[illegible].885	1 DIESEL	16
	[illegible]	"	[illegible]4	[illegible].995	1 DIESEL	15
	[illegible]	"	[illegible]	[illegible].885	1 DIESEL	16
	GUA[illegible]	"	[illegible]	[illegible].514	1 DIESEL	16
	GUA[illegible]	"	[illegible]	[illegible]	1 DIESEL	12
	MARA[illegible]	"		14.050	1 DIESEL	20

SHIPOWNERS	[illegible]	TYPE	[illegible]	[illegible]	[illegible]	KNOT
(VENEZUELA)	MERIDA	CARGO	18	[illegible]	2 DIESEL	15
	NUEVA ESPARTA		14	7.100	1 DIESEL	15
	SANTO TOME		9	[illegible].281	1 DIESEL	13
	SUCRE		18	[illegible].019	[illegible] DIESEL	14
	VENEZUELA			11.95[illegible]	1 DIESEL	20
	YARACUY	"	18	[illegible].100	2 DIESEL	15
CIA SHELL VENEZUELA	SHELL ARAMARE	TANKER	13	34.124	2 TURBIN.	15
	SHELL CARICUAO	"	19	15.25[illegible]	2 RECIPR	12
	SHELL CHARAIMA	"	19	15.681	2 "	12
	SHELL MARA	"	15	33.4[illegible]	2 TURBIN.	16
	SHELL MURACHI	"	23	[illegible].002	1 RECIPR	12
	SHELL NAIGUATA	"	13	33.958	2 TURBIN.	15
CREOLE PETROLEUM (VENEZUELA)	ESSO AMUAY	TANKER.	13	35.328	2 TURBIN.	15
	ESSO CARACAS	"	14	40.790	2 TURBIN.	15
	ESSO CARIPITO	"	13	35.411	2 TURBIN.	15
	ESSO MARACAIBO	"	14	40.925	2 TURBIN.	15
CIA. PETROLEO LAGO. (CREOLE PETROLEUM) (VENEZUELA)	ESSO LA GUAIRA	TANKER.	19	10.905	2 COMPOUND	12
	ESSO MARGARITA	"	20	10.905	2 COMPOUND	12
CONSOLIDADA DE FERRYS (VENEZUELA)	LUISA CACERES	FERRY	4	536	2 DIESEL	22
	Ma. GUEVARA	"	3	340	2 DIESEL	18
	STA. MARGARITA.	"	3	436	2 DIESEL	18

SHIPOWNER	[illegible]	TYPE			[illegible]	*NOT[illegible]
TRANSYTUR (VENEZUELA)	ANDRES BE-LLO	CARGO	16	[illegible]	2 DIESEL	13
	ARTURO MI-CHELENA	CARGO	14	4.81[illegible]	1 DIESEL	16
	FCO MIRAN-DA	"	14	74[illegible]	1 DIESEL	16
CIA. NAV. ORINOCO (CANO) (VENEZUELA)	PARIMA	CARGO.	26	5.44[illegible]	1 DIESEL	15
	RORAIMA	"	24	5.[illegible]00	1 DIESEL	15
TRANS. FLUV CACIQUE	CARAFOGO	FERRY	20	200	1 DIESEL	14
LA TRANSLA-CUSTRE	CARACAS	FERRY	23	200	1 DIESEL	10
SELMADURO (LA GUAIRA)	MANAURE	CARGO.	12	2.104	1 DIESEL	13
NAVEMAR C,A (VENEZUELA)	NAVEMAR	TANKER.	12	54.300	2 TURBIN	16
TRANSP. IND (VENEZUELA)	VENCEMOS I	CEMENT.	18	3.238	2 DIESEL	16
VENEZ. CE-MENTOS (VENEZUELA)	VENCEMOS III	CEMENT	4	3.826	4 DIESEL ELECT.	14
MARITIMA ARAGUA (VENEZUELA)	VOLINA	TANKER.	28	5.202	1 DIESEL	13
INST. NAL. CANALIZA-CIONES. ORINOCO MI-NING CO.	D. ZULIA	DREDGE	12	16.010	Nul cargo	cap.
	D. [illegible]A	"	1[illegible]	18.796	" "	"
CORPORACION VENEZOLANA PETROLEO	INDEPENDEN-CIA.	TANKER.	1	[illegible]9.[illegible]00	1 DIESEL	15,5

APPENDIX N° 5

DETAILS OF INFORMATION USED FOR THE DEMAND FORECAST IN THE ANDEAN MARITIME TRANSPORT

1. INFORMATION USED IN THE FORECAST OF MARITIME TRAFFIC OF BULK CARGOES IN THE ANDEAN SUBREGION

The tonnage figures of bulk cargoes to be transported in 1.980 and 1.985 as summarized in table 2.2.1 have been obtained - mainly from information collected from the Official Bodies contacted in the Subregion by the TECNIBERIA team members.

Those bodies which have more directly contributed with data to the stablishing of these forecasts have been the following:

BOLIVIA

- Secretaría Técnica de Integración (Ministerio de Relaciones Exteriores). La Paz.
- Cotadena (Corporación Fuerzas Armadas para Desarrollo Nacional). La Paz.

ECUADOR

- Dirección General de Geología y Minas Quito.
- Junta Nacional de Planificación. Quito.
- Delegación Ministerio de Industrias, Comercio e Integración. Guayaquil.
- Programa Nacional del Banano y Frutos Tropicales. Guayaquil.
- Programa Nacional del Arroz y Maiz. Guayaquil.

COLOMBIA

- Incomex. (Instituto Colombiano de Comercio Exterior). Bogotá.
- Flota Mercante Grancolombiana Bogotá.
- Ecopetrol. Bogotá.
- Ministerio de Desarrollo. Bogotá.

CHILE

- Secretaría de Integración. Ministerio de Asuntos Exteriores. Santiago de Chile.
- Empresa Nacional del Petróleo. Santiago.
- Cía. de Aceros del Pacífico. Santiago.
- Corfo. Santiago.

VENEZUELA

- Cordiplan. Caracas.
- Ministerio de Minas e Hidrocarburos. Caracas.
- Asociación de Industriales Metalúrgicos y de Minería. Caracas.
- Siderúrgica del Orinoco. Ciudad Guayana.
- Oficina de Economía Minera.

PERU

- Ministerio de Energía y Minas. Lima.
- Marcona Mining Co. Lima.
- Siderperú. Lima.

Some historical series available in some countries have been also taken into account as indicated in the following paragraphs:

VENEZUELA

- Imports of cereals. (Historical serie in Table I).

COLOMBIA

- Exports of sugar. (Historical serie in Table I).

PERU

- Imports of cereals. (Historical serie in Table I, together with information obtained about a decrease foreseen in the imports - in the future).

- Exports of sugar. (Historical serie in Table I).

COUNTRY	TRADE	PRODUCT	ANNUAL TONNAGE (IN THOUS.TONS) 66	67	68	69	70	71
Venezuela	Imp.	Cereals	578	726	895	811	987	588
Colombia	Exp.	Sugar	158	241	189	194	180	187
Perú	Imp.	Cereals	268	564	535	756	529	558
Perú	Exp.	Sugar	462	457	471	318	449	453

TABLE I. TRADE HISTORICAL SERIES

INFORMATION USED IN THE FORECAST OF GENERAL CARGO MARITIME TRANSPORT

The figures for the forecast of General Cargo Maritime Transport have been worked out from data contained in the Report "Evolución del Transporte Marítimo en la ALALC" (June 1.973).

Based on these data, it has been taken the figure of 7.211.000 t corresponding to the total general cargo exports of the Andean Countries in 1.970 (From table n. 24, ALALC). From this tonnage an amount of 404.000 t. has been deducted, corresponding to intrazonal trade that it is supposed to be included in the mentioned figure (5,6 of 7.211.000 t. with percentage similar to that indicated in the ALALC report for the dry cargo).
On the other hand, an amount of 47.000 t has been added, corresponding to refrigerated cargo which is supposed to be transported in refrig. spaces of general cargo ships (exports from Chile, Table n. 2).

In this way, it has been obtained the tonnage figure of exports in extrazonal trade in general cargo ships, in the year 1.970, which results to be 6.854.000 t.

The increase of this figure at the annual growth rate of 8% (as indicated in pag. 110 of the present study) leads to the figures given for the years 1.980 and 1.985.

	1.980	1.985
GENERAL CARGO EXPORT IN EXTRAZONAL TRADE	14.797.000 t.	21.741.000 t.

To these figures, the 20% of the general cargo trade foreseen in the intrazonal trade has been added being this the percentage which is anticipated will be transported in ships employed in extrazonal trades. On the other hand a deduction has been computed corresponding to unitized cargo (see pags. 111 and 112 of the study), obtaining after this the resulting fitures of forecast trade in general cargo ships in extrazonal trade:

	1 980	1 985
General Cargo Export extrazonal trade	14 797 000 t	21 741 000 t
20 % of intrazonal trade	+ 151 000 t	+ 375 000 t
Deduction unitized cargo	− 2 626 000 t	6 830 000 t
TOTAL General Cargo Export in Extrazonal Trade	12 322 000 t	15 286 000 t

3. UNITIZATION CRITERIA

The percentages of unitization for commondities in the general cargo trade, have been obtained from data contained in the ALALC Report "Bases para el estudio sobre transporte en contenedores".

These percentages have been applied to the commodities transported in extrazonal and intrazonal trades, so obtaining the proportions of 64,7 % nad 80 % respectively, which will determine the amount of general cargo susceptible of unitization.

The coefficients of cargo unitization have been obtained from the reports "Maritime Transport" (OCDE), "Developments and problems of seaborne container transport" (OCEDE), and report about unitization from "Lambert Brothers Ltd."

In accordance with the development indexes for the containerized maritime transport, and the development plans for ports in these traffics, it has been anticipated an unitization growth of a 4 % annual average. In consequence the 29 % in the year 1980 in the USA-CANADA traffic, should reach to a 49 % in 1985. The same growth rate has been applied to the traffics of Europe and Japan.

APPENDIX N° 6-A.

PRESENT INSTALLATION FOR SHIP REPAIRING IN THE ANDEAN SUBREGION.

Country	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
CHILE	[illegible]	Floating dock	[illegible] m	[illegible]	
		Slipway	[illegible] m	[illegible]	[illegible] for small vessels
CHILE	TALCAHUANO	Dry dock (?)	[illegible] m	[illegible]	Navy (?)
			[illegible] m	[illegible]	Navy use
		Floating dock	[illegible] m	[illegible]	
			[illegible] m	[illegible]	Restricted Navy use (?)
		Slipway			Small vessels
		Two slipways			Small vessels
CHILE	VALPARAISO	Floating dock	111.25 m	[illegible]	Navy use Built in [illegible]
		Slipway			Small vessels
CHILE	ARICA (?)	Slipway			Small vessels

COUNTRY.	PORT.	TYPE.	MAX. LENGTH	MAX. SIZE SHIP IN D.W.T	OBSERVATIONS
CHILE. (Cont.)	ANTOFAGASTA.	3 Slipways.			For samall vessels.
CHILE.	ARICA.	Slipway.			For samall vessels
CHILE.	CHANARAL.	Slipway.			For small vessels
CHILE.	CORONEL.	Two slipways.			For small vessels.
CHILE.	HUASCO.	Two slipways.			For small vessels.
CHILE.	LEBU.	Two slipways.			
CHILE.	LOTA.	Two slipways.			
CHILE.	MAGALLANES.	Slipway.		2.000	ASMAR (Navy)
"	"	"		1.000	

COUNTRY.	PORT.	TYPE.	MAX. LENGTH	MAX. SIZE SHIP IN D.W.T	OBSERVATIONS.
CHILE (Cont.)	MEJILLONES DEL SUR	Two Slipways.			Harbour units, etc.
CHILE	SAN ANTONIO.	Slipway.		700	
CHILE.	TALTAI.	3 Slipways.			Small vessels.
CHILE.	TOCOPILLA.	4 Slipways.			For harbour units.
CHILE.	VALDIVIA.	Slipway.		200	
"	"	"		500	

COUNTRY.	PORT.	TYPE.	MAX. LENGTH	MAX. SIZE SHIP IN D.W.T	OBSERVATIONS.
COLOMBIA.	BARRANQUILLA.	Slipway.	60,97 m.	1.500	
"	"	"	33 m.	300	
"	"	"	100,81 m.	1.000	
COLOMBIA	GALAN.	Dique flotante "RIO MAGDALENA"	63.09 m.	1.200	Built in 1927. Four sections.

COUNTRY.	PORT.	TYPE.	MAX. LENGTH	MAX. SIZE SHIP IN D.W.T	OBSERVATIONS.
ECUADOR.	GUAYAQUIL.	Floating dock "AMAZONAS"	150,59 m.	8.000	30% Navy.
"	"	Slipway.	141,76 m.	2.500	
"	"	Slipway.	83,84 m.	2.500	

COUNTRY.	PORT.	TYPE.	MAX. LENGTH	MAX. SIZE SHIP IN D.W.T.	OBSERVATIONS.
PERU.	CALLAO.	Dry dock.	182,92 m.	25.000	1 Floating crane of 120 T.
"	"	Floating dock 106	87,80 m.	5.000	1 Gantry crane of 50 T.
"	"	" " 107	124,39 m.	8.000	3 Cranes of 25 T.
"	"	" "	36,58 m.	700	
"	"	" "	33,53 m.	500	
"	"	Slipway.	-	700	
"	"	"	-	300	
"	"	Mechanical floating dock.	-	800	
PERU	CHIMBOTE.	Syncrolift.	-	2.500	

COUNTRY.	PORT.	TYPE.	MAX. LENGTH	MAX. SIZE SHIP IN D.W.T	OBSERVATIONS.
VENEZUELA.	MARACAIBO.	Slipway.	152,44 m.	800	Built in 1940.
VENEZUELA.	Pto. CABELLO.	Slipway.	43,29	1000	Built in 1941.
"	"	"	75,99	3000	" "
"	"	Dry dock "SANTA LUCIA".	220,57	45000	80% for Navy.

APPENDIX n° 6-B.

EXISTING INSTALLATIONS FOR SHIP-RAPAIRING IN COUNTRIES IN THE NEIGHBOURHOOD OF THE ANDEAN SUB-REGION.

COUNTRY.	PORT.	TYPE.	MAX. LENGTH	MAX. SIZE SHIP IN D.W.T	OBSERVATIONS.
ANTILLAS.	CURACAO.	Floating dock.	122 m.	10.000	Built in 1926.
"	"	Dry dock.	193 m.	30.000	3 Cranes of 25 T and 1 of 10 T.
"	"	" "	280 m.	100.000	1 Crane of 75 T. and 1 of 25 T.
ANTILLAS.	BAHAMAS.	Slipway.	183 m.	350	Re-built in 1938.
"	"	Slipway n° 2	91,5 m.	200	
ANTILLAS.	CUBA	Dry dock	140,2 m.	12,000	TIDE VARIATIONS 0,46 m.
"	"	Slipway.	272 m.	7.500	
"	"	"	195 m.	1.500	
"	"	Floating dock.	83,5 m.		
ANTILLAS.	REP. DOMINICANA	Floating dock n°1	109,7 m.	9.000	
"	"	" " 2	91,5 m.	3.000	
"	"	" " 3	152,5 m.	60.000	

COUNTRY.	PORT.	TYPE.	MAX. LENGTH	MAX. SIZE SHIP IN D.W.T	OBSERVATIONS.
ANTILLAS (Cont.)	**JAMAICA.**	**Slipway.**		**2.500**	**Built in 1943.**
ANTILLAS.	**MARTINICA.**	**Dry dock.**	**200 m.**	**40.000**	
ANTILLAS.	**PUERTO RICO.**	**Dry dock.**	**210,6 m.**	**40.000**	
ANTILLAS	**TRINIDAD.**	**Slipway.**	**245 m.**	**1.700**	
"	"	**Slipway.**	**137 m.**	**1.200**	
"	"	**Floating dock.**	**198 m.**	**40.000**	

COUNTRY.	PORT.	TYPE.	MAX. LENGTH	MAX. SIZE SHIP IN D.W.T.	OBSERVATIONS.
BRASIL.	BAHIA	Dry dock.	230 m.	75.000	2 Cranes of 18 T. 7 Capstans.
BRASIL.	BELEM.	Slipway n° 1.	182,8 m.	2.500	
"	"	" 2	182,8 m.	2.500	
"	"	" 3	158,5 m.	2.500	
"	"	Dry dock.	186 m.	30.000	
BRASIL.	CHARQUEADAS.	Slipway n° 1	137,7 m.	1.300	
"	"	" 2	150 m.	1.300	
"	"	" 3	101,5 m.	500	
BRASIL	FLORIANAPOLIS.	Slipway ARATACA.	109,7 m.	4.000	
BRASIL	MANAOS (Rio Amazonas)	Slipway n° 1	243,8 m.	750	Not in use between October and January.

COUNTRY.	PORT.	TYPE.	MAX. LENGTH	MAX. SIZE SHIP IN D.W.T	OBSERVATIONS.
BRASIL (Cont.).	MANAOS	Slipway nº 2.	213,3 m.	200	
	"	" 3.	243,8 m.	1.200	
BRASIL.	**PORTO ALEGRE.**	Slipway nº 1	149,3 m.	1.800	
"	"	" 2	137 m.	1.500	
"	"	" 3	137 m.	1.500	
BRASIL.	RIO DE JANEIRO.	Dry dock "GUANA-**BARA"**	174,8 m.	30.000	
"	"	Dry dock.	254,13 m.	100.000	
"	"	Floating dock CEARA.	150 m.	12.000	
"	"	Slipway nº 1	230 m.	2.500	
"	"	Slipway nº 2	116 m.	2.500	
"	"	Drydock nº 1			
		ESTALEIRO INHAUMA	160 m.	30.000	

COUNTRY.	PORT.	TYPE.	MAX. LENGTH	MAX. SIZE SHIP IN D.W.T	OBSERVATIONS.
BRASIL (Cont.)	RIO DE JANEIRO.	Dry dock n° 1	135,3 m.	15.000	
"	" "	" " 2	115,5 m.	10.000	
"	" "	Floating dock ALMIRANTE LADARIO	171,9 m.	20.000	Built in 1956.
"	" "	Dry dock ILHA DE VIANNA	137,1	15.000	Maximum load for safety docking of ships 5,2 m.
"	" "	Dry dock HENRIQUE LAGE	192 m.	50.000	Two electrical cranes of 20 Tons.
BRASIL.	LAHMEYER.	Dry dock	165,8 m	40.000	
"	"	Slipway	196 m	200	
BRASIL	RIO GRANDE	Slipway.	182,9 m.	4.000	
"	" "	"	170,7 m.	4.000	

COUNTRY.	PORT.	TYPE	MAX. LENGTH.	MAX. SIZE SHIP IN D.W.T	OBSERVATIONS.
BRASIL.	SANTOS	Slipway.	125,8 m.	1.700	
"	"	"	82,31 m.	250	

COUNTRY	PORT	TYPE	MAX. LENGTH	MAX. SIZE SHIP [illegible]	OBSERVATIONS
ESTADOS UNIDOS	BEAUMONT	Floating dock	180 m	100 000	[illegible] sections
ESTADOS UNIDOS	GALVESTON	Floating dock n° 1	190,5 m	[illegible] 000	Built in [illegible] One gantry crane [illegible]
" "			190,5 m	[illegible] 000	Built in [illegible], and [illegible] gantry crane [illegible]
" "	"	" "	187 m.	75 000	Built in [illegible] 2 gantry cranes of [illegible] on side walls and one of [illegible]
ESTADOS UNIDOS	HOUSTON Texas	Floating dock	170	20 000	Gantry crane of 40 T
ESTADOS UNIDOS	JACKSONVILLE	Floating dock n° 1	189,5	60 000	Built in 1983.
" "	"	4	180	100 000	

COUNTRY	PORT	TYPE	MAX. LENGTH	MAX. SIZE [illegible]	[illegible]
Cont					
ESTADOS UNIDOS	JACKSONVILLE	Floating dock n 5	[illegible] m.	[illegible]	
		6	[illegible]	[illegible]	
		7	129,2 m	[illegible]	
ESTADOS UNIDOS.	KEY WEST. (Florida).	Slipway.	122	1.500	
" "	"	"		9.000	
ESTADOS UNIDOS.	MOBILE (Alabama).	Floating dock n 4	115,6 m.	12.000	Rebuilt in 1964. 1 Gantry crane of 50 T. 1 WHIRLEY crane de [illegible] Tons and sever [illegible] Tons
"	"	Floating dock n 2	232,2 m	120.000	Rebuilt in 1961 1 Gantry crane of 50 T.
" "	"	Floating dock AFDM7	189,6 m.	100.000	9 WHIRLEY cranes of 50 Tons. and 1 floating crane of 62.1/2 T.

COUNTRY.	PORT.	TYPE.	MAX. LENGTH	MAX. SIZE SHIP IN D.W.T	OBSERVATIONS.
(Cont.) ESTADOS UNIDOS.	MOBILE.	Floating dock YFD-17	187,8 m.	100.000	Built in 1942. 1 Gantry crane of 50 T.
ESTADOS UNIDOS	NUEVA ORLEANS.	Floating dock n°5	187,2 m.	75.000	Built in 1942.
" "	" "	" 7	189,6 m.	120.000	2 Moving cranes. Built in 1944. 2 Moving cranes of 20 T.
" "	" "	"	84,14 m.	8.000	Built in 1950.
ESTADOS UNIDOS.	ORANGE.	Floating dock.	118,3 m.	50.000	
"	"	"	109,7 m.	10.000	
ESTADOS UNIDOS.	PANAMA CITY.	Slipway.		600	
ESTADOS UNIDOS	PASCAGOULA.	Slipway.		3.000	

COUNTRY.	PORT.	TYPE.	MAX. LENGTH	MAX. SIZE SHIP IN D.W.T.	OBSERVATIONS.
ESTADOS UNIDOS (Cont.)	PORTEVERGLADES. (Florida).	Mechanical elevation dock.			
ESTADOS UNIDOS	TAMPA (Florida).	Floating dock n°2	31,15 m.	7.500	
" "	"	Dry dock.	160,3 m.	12.000	2 chain type cranes 15 Tons.
ESTADOS UNIDOS.	RICHMOND (California)	Dry dock n°1	183 m.	26.000	
" "	"	" " 2	228 m.	50.000	
" "	"	" " 3	183 m.	26.000	
" "	"	" " 4	183 m.	26.000	
" "	"	" " 5	183 m.	26.000	
ESTADOS UNIDOS	SAN DIEGO (California)	Dry dock n° 2	61 m.	1.000	

COUNTRY.	PORT.	TYPE.	MAX. LENGTH	MAX. SIZE SHIP IN D.W.T	OBSERVATIONS.
(Cont.)					
ESTADOS UNIDOS.	SAN DIEGO	Dry dock n° 3	61 m.	1.000	
" "	"	" " 4	122 m.	6.000	
" "	"	Floating dock.	115,8 m.	5.000	
" "	"	"	73 m.	1.300	

COUNTRY.	PORT.	TYPE.	MAX. LENGTH	MAX. SIZE SHIP IN D.W.T	OBSERVATIONS.
MEXICO.	SALINA CRUZ.	Dry dock.	202,4 m.	35,000	Channel width: 39 m. Depth: 4,6 m. Can be used for merchant ships. Priority for Government vessels.
MEXICO.	TAMPICO.	Floating dock.	74,7 m.	6.500	
MEXICO.	VERACRUZ.	Dry dock n° 2	154,8 m.	20.000	
"	"	Floating dock	178 m.	40,000	
"	"	Floating dock n°3	126 m.	10.000	

COUNTRY.	PORT.	TYPE.	MAX. LENGTH	MAX. SIZE SHIP IN D.W.T	OBSERVATIONS.
REP. ARGENTINA.	BAHIA BLANCA	Dry dock n° 1.	211 m.	60.000	Dividable in two compartments of 69 and 127 m. or 110 and 85 m. One crane of 10 Tons. and one of 20 Tons.
" "	"	Dry dock n° 2.	222 m.	75.000	One crane of 35 T. Priority for Government vessels.
REP. ARGENTINA	BUENOS AIRES.	Dry dock.	180 m.	50.000	
" "	"	Dry dock.	150 m.	20.000	
" "	"	Floating dock.	172,5 m.	60.000	
" "	"	" "	126,1 m.	250.000	
" "	"	" "	110 m.	10.000	
" "	"	" "	91,5 m.	5.000	
REP. ARGENTINA.	CAMPANA	Slipway.	119,7 m.	3.200	

COUNTRY.	PORT.	TYPE.	MAX. LENGTH	MAX. SIZE SHIP IN D.W.T	OBSERVATIONS.
REP, ARGENTINA,	ROSARIO.	Slipway.	140 m.	3.200	
REP. ARGENTINA.	SAN FERNANDO.	Slipway.	114 m.	3.200	

COUNTRY.	PORT.	TYPE.	MAX. LENGTH	MAX. SIZE SHIP IN D.W.T.	OBSERVATIONS.
URUGUAY	CARMELO.	Slipway.	103 m.	3.200	
URUGUAY.	MONTEVIDEO.	Floating dock AFD n° 1	166,15	60.000	Built in 1902. Two electrical cranes of 5 Tons.
"	"	Dry dock.	143,44	15.000	Priority for Government vessels.
"	"	Slipway.	228,65	2.000	Electrically operated. Ten 600 Tons. ships can be accommodated at the same time.

COUNTRY.	PORT.	TYPE.	MAX. LENGTH	MAX. SIZE SHIP IN D.W.T.	OBSERVATIONS.
CANAL PANAMA	BALBOA.	Dry dock.	338,4 m.	250.000	Moving crane of 50 T. with external radius of 4,6 m.
CANAL PANAMA	CRISTOBAL.	Dry dock.	118 m.	10.000	Two cranes of 35 T.
" "	."	Slipway.		3.200	

APPENDIX n° 6-C.

HYPOTHESIS REGARDING PERCENTAGES OF FOREIGN FLAG SHIPS
TO BE REPAIRED IN SUBREGIONAL REPAIR CENTRES.

HYPOTHESIS REGARDING PERCENTAGES OF FOREIGN FLAG SHIPS TO BE REPAIRED IN SUBREGIONAL REPAIR CENTRES.

The following factors have been taken into account in the estimation of these percentages:

1. Tendency to carry out inspections and dry dockings in shipyards of the shipowners countries, or otherwise in repair centres with long experience.

2. Higher costs of moving to other repair centres outside the Subregion, for the smaller ships.

3. Only those foreign flag ships operating intrazonal traffics show high probability of repairing in the Subregion.

4. For extrazonal traffics, the repairs most probably shall be carried - out in centres outside the Subregion.

5. Only in case of heavy damages, or impossibility of moving to other - centres, these ships in extrazonal traffics, shall effected drydockings in the Subregion.

Based upon the experience of TECNIBERIA team in similar traffics to the - present, and after taking into account the influence of the factors outli-ned above in the shipowners decisions to select a drydrocking centre, the following percentages have been defined in respect of the total number of foreign flag ships operating in the Subregion.

D.W.T. RANGE.	Percentage.
2.000 - 6.000	20%.
6.000 - 15.000	8%.
15.000 - 45.000	5%.
45.000 - 80.000	2%.
80.000 - 180.000	-
More than 180.000	-

APPENDIX n° 7.

TERMINOLOGY AND ABREVIATIONS USED.

G.R.T. - Gross Register Ton. Unit of volume indicative of the closed space a ship contains.

D.W.T. - Dead Weight ton. Unit of weight that indicates the metric tons of load, combustible and stores a ship can transport.

B.H.P. - Horsepower at the brake. Unit of power of an engine. In this study B.H.P. in capital letters is used for indicating the power of the propulsion engine of a ship.

b.h.p. - Horsepower at the brake. In this study b.h.p. in small letters is used to indicate the power of the auxiliary generating sets.

Shipbuilding Berth. Place where is built the ship hull until it can be put afloat.

Repair facility. Place where a ship is grounded to be able to carry out the inspection or repair of those parts of the ship that are normally underwater.

Slipway. Shipbuilding berth in inclined plane from where, once built the ship hull, it is launched into the water by sliding on it.

Dry Dock. Pit where the ship is introduced and once closed the water contained is drained in order the ship be grounded. It can be used for ships construction or reparation.

Floating Dock. Box shaped floating artefact that can lift and ground a ship draining the water contained in the tanks forming the box.

Repair Slipway. Ramp that allows to ground small ships pulling them upwards.

Synchroelevator. Platform used to ground ships by means of traction cables that lift said platform when the ship has been positioned.

Tanker — Ship destined to the bulk transport of crude oil or liquid products.

O.B.O. — Ore-Bulk Oil. Ship destined to the combined transport of mineral ores (grains, [illegible], etc.) and oil.

Bulk carrier — Ship destined to transport dry bulk (ore, grain, etc.)

L.P.G. — Liquefied Petroleum Gas. Ship destined to the transport of liquefied petroleum gases.

L.N.G. — Liquefied Natural Gas. Ship destined to the transport of liquefied natural gases.

Refrigerated Ship — Ship exclusively destined to the transport of refrigerated food with holds able to maintain low temperatures.

Container Carrier — Ship destined to the transport of [illegible] stored in containers of standard sizes.

Cargo ship — Ships destined to the transport of general cargo not included in any of the above items.

Andean Subregion — group of countries that have subscribed the "Acuerdo de Cartagena": Bolivia, Colombia, Chile, Ecuador, Peru and Venezuela.

National Companies — Those created in one of the countries of the Andean Subregion which capital belongs in more than 80% to national investors, provided that in the opinion of the national competent organism that proportion be reflected in the technical, financial, administrative or commercial management of the company, as defined in the Decision 24 of the Commission of the Cartagena Agreement.

Mixed companies. Those created in one of the countries of the Andean Subregion which capital belongs in a proportion between 51 and 80% to national investors, provided that in the opinion of the competent national organism - that proportion be reflected in the technical, financial, administrative and commercial managements of - the company as defined in the Decision 24 of the Commission of the Cartagena Agreement.

Multinacional Companies Those created in one of the countries of the Andean Subregion with capital apports of investors of two - or more countries of the Subregion, over the 60% of the capital and provided that most of the national - sugregional capital be reflected in the technical, financial, administrative and commercial management of the company, as defined in the decision n°46 of the Commission of the Cartagena Agreement.

We regret that some of the pages in the microfiche copy of this report may not be up to the proper legibility standards, even though the best possible copy was used for preparing the master fiche

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