THE FEASIBILITY STUDY REPORT
ON
THE SINTERING PROJECT
IN
THE REPUBLIC OF PERU

August 1983

Japan International Cooperation Agency

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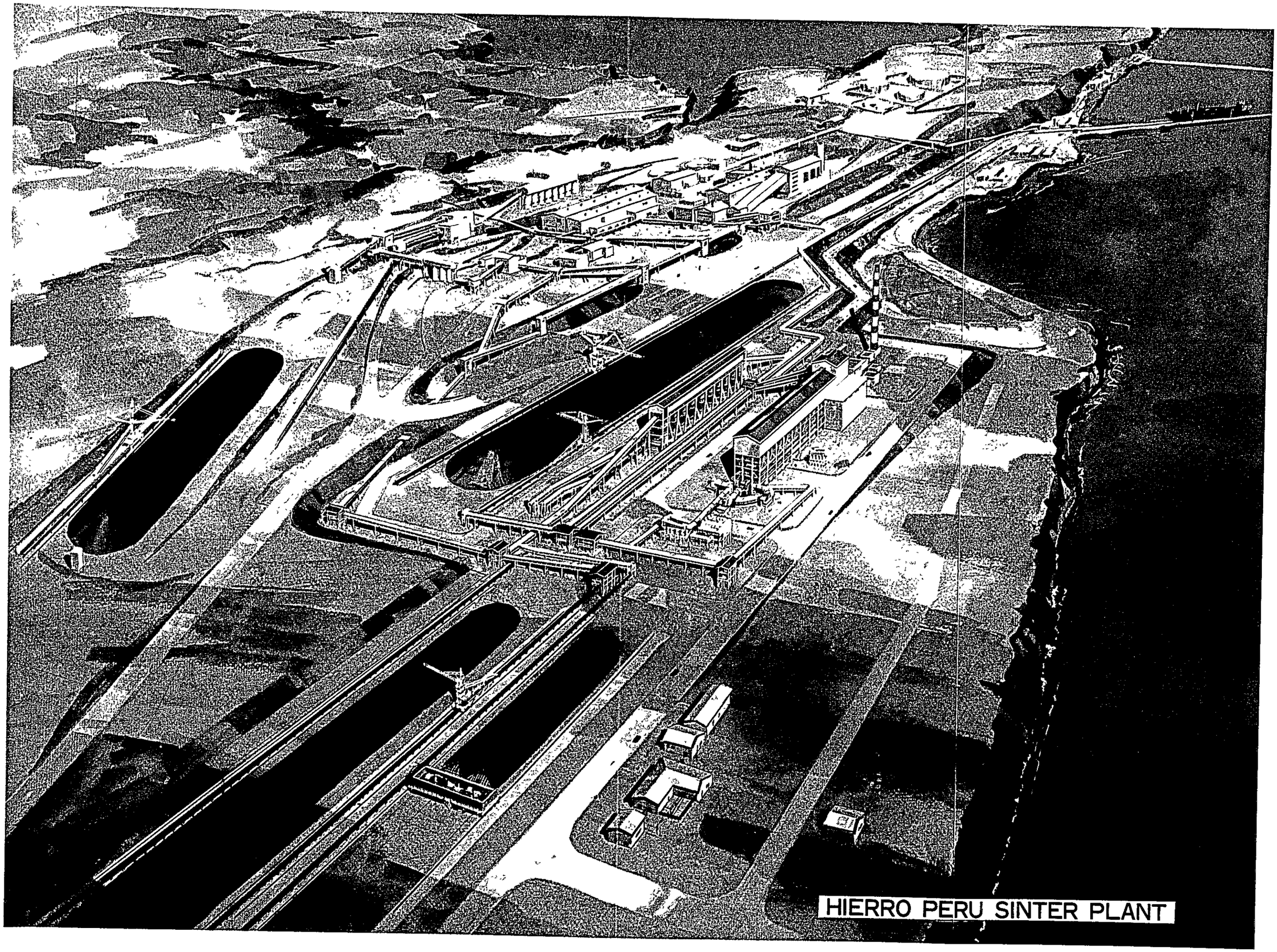
HIERRO PERU SINTER PLANT

PREFACE

It is with great pleasure that I present this feasibility study report on the sintering project of the Marcona Mine to the Government of the Republic of Peru.

This report embodies the result of a field survey which was carried out (in Lima city and San Nicolas area) from 20 November to 10 December, 1979 by the Japanese survey team commissioned by the Japan International Cooperation Agency following the request of the Government of the Republic of Peru made to the Government of Japan.

The survey team, headed by Mr. Hiroshi Iida, had a series of close discussions with the officials concerned of the Government of the Republic of Peru and conducted an extensive field survey and data analyses.

I sincerely hope that this report will be useful as a basic reference for development of the project.

I wish to express my deep appreciation to the officials concerned of the Government of the Republic of Peru for their close cooperation extended to the team

August, 1980

Keisuke Arita

President

Japan International Cooperation Agency

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CHAPTER I

INTRODUCTION

CHAPTER 1 INTRODUCTION

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1.1 History of the Mine and Purpose of the Study

Iron ore production at the Marcona mine in Peru was started in 1953. In July 1975, the mine was nationalized and has been operated by a state-run company, Empresa Minera del Hierro del Peru (hereinafter referred to as Hierro-Peru).

The Marcona mine has been operating its own beneficiation plant and pelletizing plants in a modern way from the time earlier than the nationalization. In 1974, iron ore shipments including pellets reached 10,393,000 tons, most of which was exported.

Iron ore shipments, however, have since been decreasing, partly because of the worldwide decrease in iron and steel production and the resultant decline in demand for iron ore exports, especially pellets, and partly because of the disadvantage of the high sulphr content of Peruvian ore.

This situation led the Peruvian Government and Hierro-Peru to study the possibility of producing sinter by utilizing Hierro-Peru iron ore, and they requested the Japanese Government to carry out a feasibility study on sinter plant construction. The Japanese Government agreed to provide them with technical cooperation and commissioned the Japan International Cooperation Agency (JICA) to carry out the present feasibility study.

The purpose of this study is to determine the commercial feasibility of a sinter plant which would annually produce 2.5 million tons of sintered ore, an iron-making raw material which has a higher added value than iron ore and would also be acceptable in the international market.

1.2 Feasibility Study Team

JICA formed a feasibility study team consisting of nine persons and dispatched them to Peru for a stay of twenty-one days beginning on November 20, 1979. They visited Hierro-Peru and other Peruvian organizations concerned, had discussions with staff members, collected data and carried out site survey.

The members of the Feasibility Study Team were as follows.

Name		Title	Period
Mr. Hiroshi Iida	Kawasaki Steel	Leader of the Team Plant Operation	Nov.20-Dec.10,1979
Mr. Akihiro Mitarai	JICA	Technical Cooperation Advisor	Nov.20-Nov.28,1979
Mr. Norio Fukubayashi	JICA	Coordinator	Nov.29-Dec.10,1979
Mr. Takao Yoneda	Kawasaki Steel	Mining and Beneficiation	Nov.20-Dec. 10,1979
Mr. Takashi Suzuki	Kawasaki Steel	Building and Housing	Nov.22-Dec.10,1979
Mr. Shiro Yamada	Kawasaki Steel	Plant Engineering	Nov.20-Dec.10,1979
Mr. Tateshi Koseki	Kawasaki Steel	Port, Civil Engineering, and Waterworks	Nov.22-Dec.10,1979

Name		Title	Period
Mr. Toshiyuki Osumi	Kawasaki Steel	Finance, General Information, and Marketing	Nov.20-Dec.10,1979
Mr. Kazutoshi Ishii	Kawasaki Steel	Raw Materials and Transportation	Nov.22-Dec.10,1979

1.3 Hierro-Peru People

The following are main interviewees of the Feasibility Study Team members consulted:

Name	Title
Ing. Luis Remy	President
Ing. Miguel Salino Baca	General Manager
Ing. Rodolfo Pareja M.	General Manager of Operation
Ing. Federico Oviedo K.	Technical Manager
Dr. Carlos S. Delta	Director of Public Relations
Ing. Carlos Philipps J.	General Superintendent of Mining
Ing. Rene Rosas C.	General Superintendent of Beneficiation
Ing. Santiago Arenas Z.	Manager of Engineering
Ing. Enrique de Vinatea	Finance Manager
Sr. Daniel de la Cruz	Director of Administrative Operation
Capt. Jose Arce Adrianzen	Director of Marine Operation

1.4 Reporting Mission on Draft Report

JICA formed a reporting mission consisting of four persons and dispatched them to Peru for a stay of ten days beginning on July 18, 1980. They visited Hierro-Peru, explained the draft report and had discussions with staff members of Hierro-Peru.

Name		Title
Mr. Hiroshi Iida	Kawasaki Steel	Leader of the team Plant Operation
Mr. Norio Fukubayashi	JICA	Coordinator
Mr. Shiro Yamada	Kawasaki Steel	Plant Engineering
Mr. Toshiyuki Osumi	Kawasaki Steel	Finance, General Information and Marketing

SAN NICOLAS BAY

PACIFIC OCEAN

MARCONA MINE

SAN NICOLAS

SAN JUAN BAY

SAN JUAN

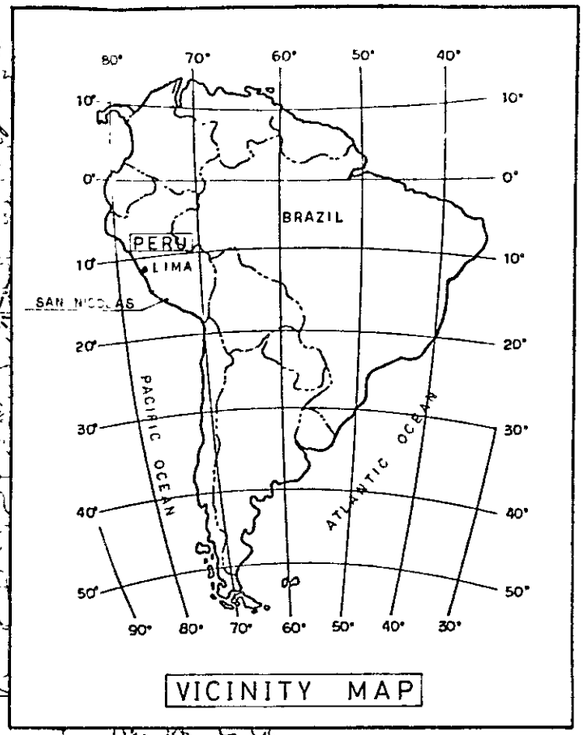
15° 10

15° 20

75° 15'

N

0 1 2 3 4 5 KILOMETERS



VICINITY MAP

CHAPTER 2

SUMMARY AND RECOMMENDATIONS

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2.1 Social and Economic Environment

(1) Political and Economic Features

The political and economical environment in Peru has been greatly changing.The military government, in existence for the past twelve years, is to be replaced by a civilian government by July 1980. The balance of payment which was in the red since the first oil crisis in 1973 has turned to the black in 1979 and the trend of payment surplus is expected to continue for years ahead. This change has been brought about mainly by the export of oil, which Peru previously imported, and also by restoring markets for non-ferrous metals, the major export commodity for Peru. The economical environment in Peru is improving with the balancing of the government's budget and the calming down of labor conditions.

(2) Balance of Payments and Foreign Capital Policy

With the success of the IMF stand-by credit negotiation, Peru has appreciably reduced the amount of repayments for foreign loans and improved its credit standing. Along with this, the Peruvian foreign exchange system has been considerably liberated and the exchange centering systems has been abolished. The foreign exchange market has introduced a mini-devaluation system and the 250

soles per US dollar quoted at the end of 1979 is expected to reach 310 soles per US dollar by the end of 1980. Nevertheless, the foreign capital policy of Peru is based on a common foreign capital policy of the five Andean countries and is susceptible to frequent modifications in accordance with domestic economical development.

(3) Taxes

Corporate taxes are assessed using progressive rates according to a complicated tax system, which is a result of a series of revisions made from time to time, reflecting the fluctuating Peruvian economic situation. The corporate tax for a mining company such as Hierro-Peru is assessed by a tax law for mining companies. Depreciation allowed for Hierro-Peru is a fixed installament. Other taxes assessed on a corporation are capital tax, dividend tax, interest tax, royalty tax, and sales tax. High rates of import duty are placed on raw materials and other commodities depending on the type of commodity and a 17.5% duty is uniformly placed on exports. However, the export duty on sintered ore, produced by this project, will be exempted as a non-traditional commodity.

2.2 Supply & Demand Survey

This study does not deal with concrete sales possibilities of sintered ore in the market The scope of work is to grasp iron ore requirements in Peru and in major iron ore consuming countries and the demand for Peruvian sintered ore due to the international supply gap.

(1) International Supply & Demand Position for Iron Ore

Several forecasts published recently predict an iron ore shortage in 1985 though these predictions take into account the supply capacity of new projects and existing mines which appear most likely to be realized before 1985.

(2) Iron Supply and Demand in Peru

Sider-Peru, the only steel mill in Peru, is planning to utilize 450–500 thousand tons per year of sintered ore in the future.

(3) Iron Ore Supply & Demand Conditions in Major Steel Producing Countries

Major consumers in the international iron ore market which were dealt with are the U.S.A., the seven countries of the EC, U.S.S.R., East European countries, and Japan. With the exception of the U.S.A. and Holland, sinter ratio in blast furnace charge is generally high and therefore a large demand for sintered ore exist. In the U.S.A. and Holland, where sinter ratios for blast furnace are low, there is a possiblity that sintered ore consumption will increase in the future.

In this study, the increase in iron ore demand was estimated by forecating the crude steel demand. However, it is difficult to determine with any degree of accuracy how much the iron ore supply will expand through the development and expansion of iron ore mines.

Therefore, in order to gain a better grasp of the supply and demand picture of world iron ore, further concrete research will be needed, taking into consideration additional supplies from mines throughout the world.

2.3 Raw Materials, Operation and Production Plans

Hierro-Peru produces sinter feed, pellet feed, and pellets from iron ore mined from the mine located at Marcona, Nazca, Ica, Peru. The iron ore is transported on a 15km long belt-conveyor, and beneficiated at a plant at San Nicolas on the coast. The total production capacity for sinter feed and pellet feed is approximately 9 million tons per year, with an adjustable production percentage for sinter feed and pellet feed. At the sinter plant of Hierro-Peru, 2,232,500 tons per year of sinter feed blended with 60% refractory ore (R.O.) and 40% transition ore (T.O.) is scheduled to be utilized as raw material.

Limestone and silicastone to be used as sub-raw materials will be mined from the same mine site as the iron ore. The requirement for limestone is 372,500 tons per year and that for silicastone is 52,500 tons per year. Import coke breeze will be used as carbon material because domestic anthracite resources are unexplored. Coke breeze requirement is 125,000 tons per year.

By conducting pot tests on R.O., T.O., and limestone provided by Hierro-Peru, sinter production conditions were examined

The effects of SiO_2 level, basicity, and coke breeze percentage on sintering property and quality of sintered ore (strength and reducibility) were examined in the pot tests by changing the blending percentage of iron ore and other raw materials.

The result of the pot tests showed that by choosing optimum operational conditions, sintered ore of favourable quality and productivity can be obtained

In the case of Hierro-Peru ore, fluctuations of component especially of SiO_2 is relatively large (σ_{SiO_2}=0.490) and, as a result, requires an appropriate

advance processing. Short-term quality fluctuations may be reduced by ore bedding and long-term fluctuations of SiO_2 may be adjusted to a projected average level by adding silicastone to a fixed level.

Quality control targets for sintered ore for sales overseas are set on a SiO_2 level and basicity from a viewpoint of sintered ore quality requirement.

Quality Control Target for Sintered Ore

Chemical Composition	Quality Control Target
T. Fe	58%
SiO_2	5.5%
CaO/SiO_2	1.5

Physical Property	Quality Control Target
Shatter Index	90% min.
Fine Generation (– 5mm)	3% max.
Reduction Disintegration Index (– 3mm)	38% max.
Reducibility Index	65% min.

An environmental assessment of SO_2 emission including weather conditions at the scheduled plant site was conducted. The plant site is surrounded by an uninhabited desert.

The effects of SO_2 emission on the residential area and the agricultural area 40km away is expected to be within the range permitted by the environmental protection standard of Peru.

Production for the sinter plant is planned at 1.65 million tons per year for the first year, 2 million tons per year for the second, and 2.5 million tons per year for the third year, taking technical and sales aspects into consideration.

2.4 Outline of the Sinter Plant

(1) Design Basis

The site of the projected sinter plant is located in the north of the crude ore yard of the Hierro-Peru San Nicolas Works. The periphery of the Works is an uninhabited desert.

The monthly mean atmospheric temperature and mean relative humidity in this area are 18 ~ 25°C and 64 ~ 79% respectively. The yearly mean rainfall is below 10 mm, which is to be said extremely less. The wind direction is mostly SSE-S and the maximum wind velosity is about 19 m/sec. Further, this area belongs to the circum-pan-Pacific earthquake belt, and therefore earthquake resistance should be considered in the designs of the buildings and structures. In this study, the land grading and foundations are planned according to the existing data, but for the construction of the sinter plant, topographical survey and soil investigation should be implemented prior to the commencement of the detailed engineering. The Peruvian and U.S.A. and Japanese code and regulation are suitably applied to the respective designs.

(2) Basic plan for the production

(a) Production capacity

The nominal annual production capacity of the plant is planned to be 2,500,000 metric tons, and so, when the number of the work days per year is considered to be 90% of a calendar year, the daily and hourly production rates are 7,610 tons and 317 tons respectively.

(b) Prevention of degradation of the sintered ore

Since the sintered ore is characteristically brittle, it is apt to be degraded by fall impact. Therefore, a hard sintering process is applied to the production, and in the transportation and handling, the falling height and frequency are minimized as much as possible to prevent the degradation

(c) Protection of the environment

Taking the site situation into consideration, a stack of 100 m high is installed to exhaust the sinter exhaust gas. Besides, three dust collectors are installed for the dust pollution control and silencers are provided at the main blower and cooler fans to prevent the noise.

(3) Layout of the plant

(a) Simplification of the material flow

The respective facilities are located in such a way that the flow of the raw material as well as the sintered ore is simplified and the number of the belt conveyors and their lengths are reduced.

(b) Effective use of the existing facilities

The existing pier is used for the shipment of the sintered ore and the unloading of the coke breeze. A part of the existing fine ore yard is used as the sinter feed and coke breeze yards, while the existing No 1 crushing plant and silos are commonly used for the crushing of limestone and silicastone.

(c) Environment protection

A space to install an exhaust gas desulfurization plant in the future is kept between the main stack and the tailing pond.

(4) Machinery and equipment

The projected sinter plant is roughly divided into the machinery and equipment for the sintering, blending yard and sinter yard.

(a) Sintering facilities

The sintering facilities are composed of a sintering machine of Dwight-Lloyd type, having an effective grate area of about 250 m^2, blending bins, mixer, cooler, main exhaust blower, screens, etc., to which the sintering machine is central.

(b) Blending yard

Two yards, each 30m x 150m, are provided. The stacking is implemented by a blending stacker of boom slewing type, having a stacking capacity of 500 t/hr, and the reclaiming is performed by a blending reclaimer of double bucket wheel type, of which reclaiming capacity is 700 t/hr.

(c) Sinter yard

The space is 50m x 360m, storing capacity is about 260,000 tons, and stacking is executed by a stacker of 317 t/hr, while the reclaiming is performed by a reclaimer, having a capacity of 3,000 t/hr.

2.5 Utilities

(1) Electric power

Hierro-Peru has a thermal power generation plant of 62.5 MW and for emergency a diesel power generation plant of 5 MW. The electric power required by the existing plant is supplied by these power plants and Electro-Peru.

The electric power of about 15 MW demanded for the sinter plant is supplied from the above system at a tension of 13.8 kv.

(2) Fuel oil

The fuel oil required by the sinter plant is about 600 l/hr. Petro-Peru Industrial No. 6 (equivalent to Bunker-C) is expected to be used, which is supplied from the existing oil storage tank.

(3) Steam

In the sinter plant, saturated steam is used at a rate of about 1,000 kg/hr, which is supplied from the existing facility.

(4) Water

(a) Presently, underground water sources are being searched by Hierro-Peru at Jahuay, Sacaco, etc., and according to the result, the plan for the fresh water supply to the whole plant is expected to be decided. The fresh water needed in the sinter plant is mostly used as the water added to the mixer, of which requirement is about 10 m^3/hr.

(b) Sea water

For the cooling of the water circulated to cool the machinery and equipment of the sinter plant, sea water is used at a rate of 625 m^3/hr. This is supplied from the existing sea water tank.

2.6 Infrastructure

The San Nicolas Works has a pier of 300 m long, and this is mainly used to ship the iron ore and pellet and unload the oil. The maximum size of the vessel which may come alongside the pier is 170,000 DWT. The materials, machinery and equipment for the construction of the sinter plant can be unloaded at this pier.

As for the road, the Pan American Highway which longitudinally runs through Peru and the road linked to the Works are well constructed and maintained. Therefore, no new road is to be constructed particularly for the sinter plant.

In San Juan, such welfare facilities as schools, hospitals, etc. are sufficiently provided for the employees of the existing plant and their families, and the employees of the sinter plant also may use these facilities. The houses for the sinter plant employees are separately planned by Hierro-Peru in relation to the effective use of the personnel of the existing plant, and therefore, these houses are not considered in this study.

2.7 Construction Plan

The works for the construction of the sinter plant are roughly divided in the designing, fabrication, transportation, and erection and construction works on the site, and about three years are required to complete the plant.

(1) Procurement of the materials, machinery, equipment, etc.

The machinery, equipment and steel structures for the sinter plant are imported from a foreign country, while the materials for the construction works, such as cement, gravel, reinforcing steel bars, etc. are procured in Peru.

(2) Transportation of the materials, machinery and equipment

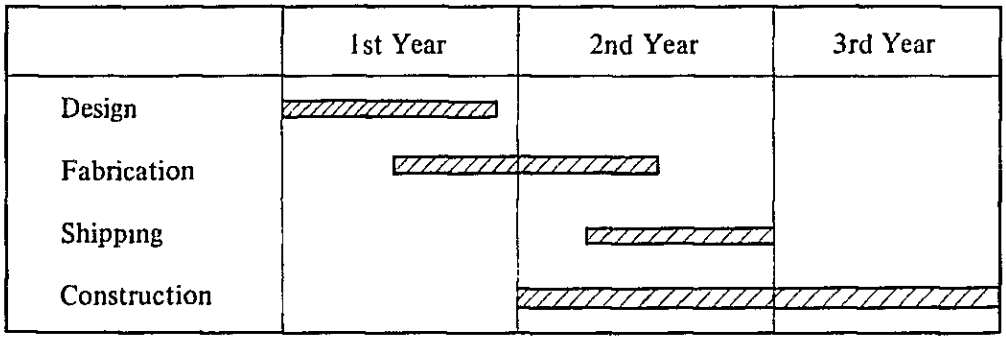
The materials, machinery and equipment delivered by means of marine transportation are unloaded at the San Nicolas Port. They are delivered by several shipments, taking the progress of the works on the site into consideration.

(3) Works on the site

The works on the site are executed by constructors in Peru under the supervision of the engineers delegated from a foreign country.

The existing lodgings are used for the workers, but they are not enough for about 1,500 workers required at the peak of the works. Therefore, the deficient lodgings are newly built. The heavy equipment for the works on the site are procured in Peru, excepting a 100-ton class truck crane which is imported from a foreign country.

Work Schedule



2.8 Organization and Laborer Employment

Hierro-Peru has its head office in Lima and the mines, beneficiation plant and relevant facilities at Nazca county of Ica Province. The numbers of the employees at the respective places of business are as follows.

Head Office	272
Mines	1,027
Beneficiation Plant	1,401
Total	2,700

The personnel required for the sinter plant are in total 139, and they are considered to be part of those under the organization of the beneficiation plant.

As for the education of the employees, in total 12 personnel are trained outside Peru for a period of 2 ~ 3 months, and 9 technical personnel are invited from abroad for the technical supervision of the sinter plant for a period of 3 months.

2.9 Transportation of Raw Materials and Product

(1) Iron Ore and Other Raw Materials

Iron ore, limestone, and silicastone are transported from deposits to the crushing plant at the mine by trucks and from the crushing plant, existing transportation facilities are available for transportation. Imported coke breeze is discharged at the pier at San Nicolas port by derricks or by cranes of vessels

(2) Sintered Ore

The total tonnage of sintered ore, including those for sales in the domestic market is transported by sea. It is, therefore, desirable for sintered ore transportation to utilize ore carriers equipped with slide chutes.

(3) Berth Utilization

The capacity of existing facilities at San Nicolas port is sufficient to handle increased tonnages which are expected to be shipped from the sinter plant.

2.10 Finance

2.10.1 Estimation of Construction Cost

(1) Assumptions for Estimate

- Price Reference : The market prices prevailing in January of 1980
  (no consideration for price fluctuation)
- Currency : U.S. Dollar
- Currency Conversion Rate : US$ 1 = ¥240
  US$ 1 = S 255
  ¥ 1 = S 1.0625
- Procurement
  - Machinery and Equipment ..... Foreign
  - Steel Materials for Building ..... Foreign
  - Other Construction Materials ..... Domestic
  - Construction Work ..... Domestic

(2) Direct Construction Cost

[$ 1,000]

Facilities	Civil Works	Building	Machinery & Equipment	Contingency	Grand Total
Raw Material Handling	279		3,648	167	4,094
Blending Bin	279		10,045	441	10,765
Sintering Machine	560	9,334	10,819	792	21,505
Cooling	279		5,604	250	6,133
Main Blower	279	1,056	7,713	384	9,432
Screening	279		6,479	279	7,037
Sinter Handling	279		7,363	318	7,960
Utilities			1,963	81	2,044
Laboratory		50	1,524	63	1,637
Sinter Yard	1,676		9,977	495	12,148
Ore Blending Yard	1,676		8,206	429	10,311
Electric			15,369	620	15,989
Instrumentation			4,455	178	4,633
Total	5,586	10,440	93,165	4,497	113,688

(3) Total Required Construction Cost

[$1,000]

Items	Procurement Segmentation			Per Sinter Ton
	Domestic	Foreign	Total	($1)
Direct Construction Cost	$52,325	$61,363	$113,688	$45.48
Engineering Fee		3,776	3,776	1.51
Education and Training Cost and Operation Guidance Fee	294	139	433	.17
Preoperating Expenses	505		505	.20
Interest during Construction Period		8,244	8,244	3.30
Total	$53,124	$73,522	$126,646	$50.66
(Component Percentage)	(42%)	(58%)	(100%)	

(4) Asset Classification

[$1,000]

Asset	Acquisition Cost
Tangible Fixed Assets	
Building and Other Structure	$ 18,487
Machinery & Equipment	107,221
Sub-Total	125,708
Deferred assets	938
Total	$126,646

2.10.2 Estimation of Production Cost

(1) Assumption for Estimate

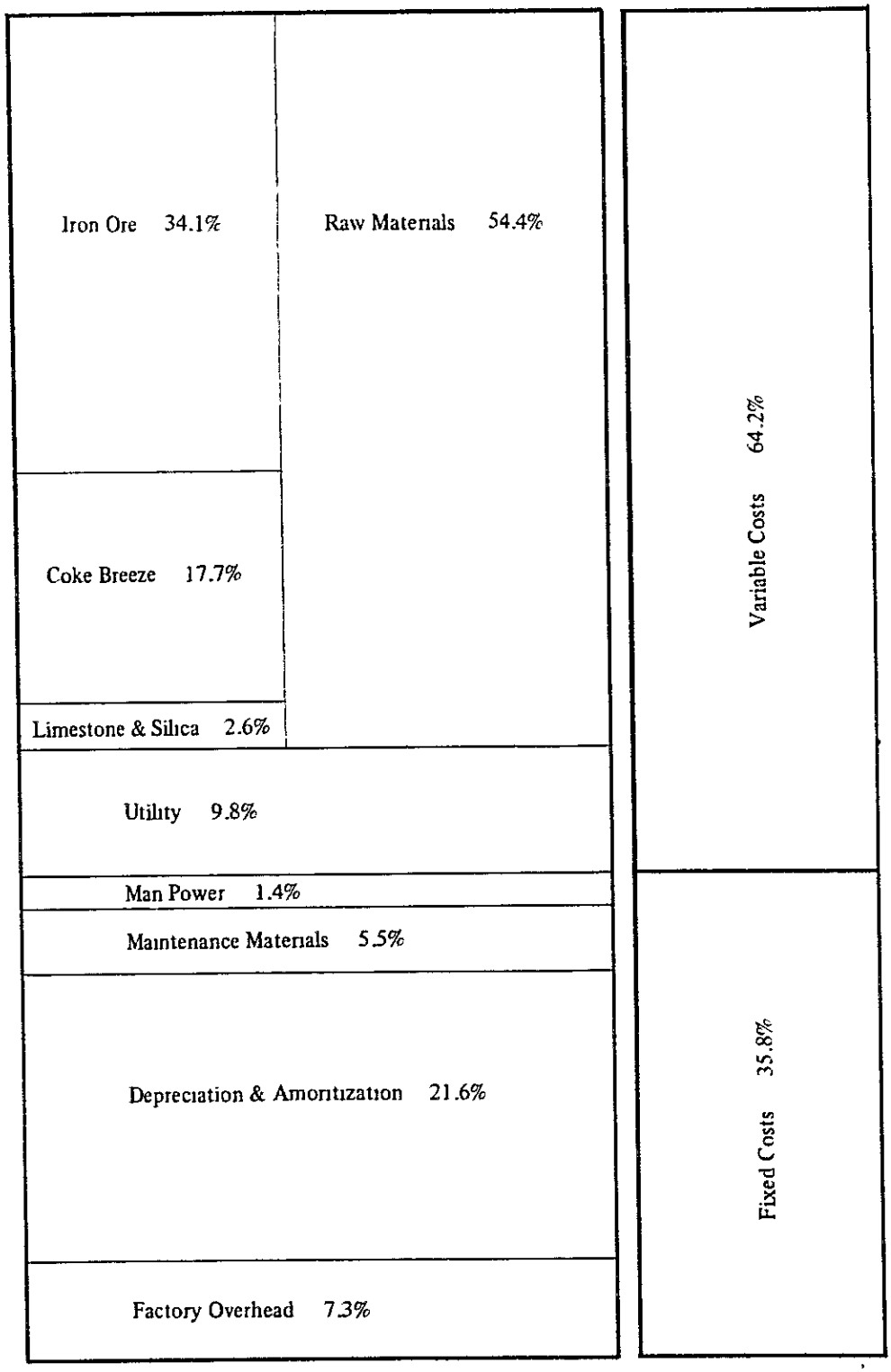
- Price Reference : The market prices prevailing in January of 1980 (no consideration for price fluctuation)
- Currency : U.S. Dollar
- Currency Conversion Rates. US$ 1 = ¥ 240
  US$ 1 = S 255
  ¥ 1 = S 1.0625
- Measure : Dry Metric Ton

(2) Production Cost

Amount, $1,000
Unit Cost, $1

Items	1st Year		2nd Year		3rd Year and After	
	Amount	Unit Cost	Amount	Unit Cost	Amount	Unit Cost
Production Volume	1,650,000 MT		2,000,000 MT		2,500,000 MT	
Raw Material						
Sinter Feed	12,015	7.28	14,467	7.23	18,083	7.23
Coke Breeze	6,962	4.22	7,535	3.77	9,418	3.77
Limestone	805	.49	963	.48	1,203	.48
Silicastone	132	.08	153	.08	191	.08
Sub-total	19,914	12.07	23,118	11.56	28,895	11.56
Operating Cost						
Man Power	767	.46	767	.38	767	.31
Maintenance Materials	2,911	1.76	2,911	1.46	2,911	1.16
Utility	3,846	2.33	4,161	2.08	5,202	2.08
Depreciation	11,338	6.87	11,338	5.67	11,338	4.54
Amortization	94	.06	94	.05	94	.04
Factory Overhead	2,550	1.55	3,091	1.54	3,863	1.54
Sub-total	21,506	13.03	22,362	11.18	24,175	9.67
Total	41,420	25.10	45,480	22.74	53,070	21.23

(3) Production Cost Structure



2.10.3 Financing Plan

(1) Fund Raising Plan

- Equity Contribution — The 25% of the total funds requirement ($32 million)
- Borrowings — . Export Credit;

The 90% of the import prices of machinery and equipment and steel materials for building ($53 million)

Effective Interest Rate–9% p.a.

Repayment–Equal semi-annual installments over 10 years after operation start

U.S. Dollar Loan;

The remaining balance of the total funds requirement which will not be covered by the above Equity Contribution and Export Credit ($44.3 million)

Effective Interest Rate – 9% p.a.

Repayment – Equal semi-annual installments over 7 years with grace period of 3 years after operation start

(2) Cash Balance during Construction

[$1,000]

Item		Amount
Funds Required	Building & Structure	$ 17,173
	Machinery & Equipment	100,291
	Interest during Construction	8,244
	Preoperating Expenses	938
	Raw Material Inventory Buildup	1,845
	Total	$128,491
Funds Raised	Equity Contribution	$ 32,000
	Long-Term Borrowings	
	Export credit	53,042
	U.S. Dollar Loan	44,338
	Sub-total	97,380
	Total	$129,380
Cash Balance		$ 889

(3) After Operation Start

The fund shortage to be caused after operation start will be filled up by the short-term loan in U.S. Dollar with the effective borrowing cost of 12% p.a.

2.10.4 Financial Forecast

(1) Assumptions for Forecasting

- Coverage: 10 years subsequent to the construction period.
- Production · Inventory · Sales Plan

[1,000 ton]

Year	Production Volume	Inventory Increase	Sales Volume
1st Year	1,650	150	1,500
2nd Year	2,000	–	2,000
3rd Year & After	2,500	–	2,500

- Sales price: equivalent to the market price of self-fluxing pellet in 1980 in terms of the price per Fe unit and taking account of the difference in degradation ratio between pellet and sinter. $27.4/DMT
- Taxation.
  - Value-Added Tax; 2% of FOB value of Sinter
  - Income Tax; Straight rate of 40% on Net Income before Tax, simplifying the tax calcualtion formula.
  - Property Tax
  - Royalties
  - Export Tax
  - Withholding Tax on interest payment on foreign Loans

> exempted

(2) Financial Forecast

[$1 million]

Year	Net Income After Tax		Cash Flow Balance	
	Period	Accumulate	Period	Accumulate
1	−8.3	−8.3	−8.8	−8.8
2	−3.8	−12.1	1.6	−7.2
3	2.4	−9.7	7.8	0.6
4	4.1	−5.6	3.9	4.5
5	4.9	−0.7	5.4	9.9
6	4.4	3.7	6.4	16.3
7	5.4	9.1	5.9	22.2
8	6.5	15.6	7.0	29.2
9	7.6	23.2	8.1	37.3
10	8.8	32.0	9.4	46.7
Total	32.0		46.7	

2.10.5 Finacial Analysis

(1) The Basic Case and Three Alternative Simulations

Items	Basic Case	Case I Sales Price allowing for ROI= 10%	Case II Deferred Payment of Import Duty over 5 years	Case III Yields of Surplus Funds; 0%
Sales Price	$27.40	$28.87	$27.40	$27.40
ROE	5.7%	14.0%	12.8%	1.9%
ROI	7.2%	10.0%	9.7%	6.2%
Average Return on Sales (10 years)	5.0%	9.3%	6.1%	3.1%
Years incurring Net Operating Loss	1st & 2nd	1st & 2nd	1st & 2nd	1st & 2nd
Year turning to Net Profit on cumulative base	6th	3rd	4th	6th
Years incurring Funds Shortage	1st	1st	1st & 2nd	1st & 2nd
Short-term borrowings				
Outstanding at peak time	$9.0 million	$6.9 million	$11.7 million	$9.0 million
Year of full repayment	3rd	3rd	5th	4th

(2) Sensitivity Analysis

Items	ROE	ROI	Average Return on Sales
Basic Case	5.7%	7.2%	5.0%
Construction Cost			
10% up	Negative	5.3%	1.8%
10% down	11.2%	9.0%	7.3%
Raw Material			
10% up	Negative	3.9%	Negative
10% down	13.0%	9.6%	9.1%
Interest Rate of Long-term Loans 2% added	Negative	6.4%	1.7%
Sales Price			
10% up	19.4%	12.0%	12.6%
10% down	Negative	Negative	Negative

2.11 Effects on the Economy and Society in Peru and Recommendations

2.11.1 Effects on the Economy and Society

Hierro-peru has been operating iron ore mines, a beneficiation plant, and pelletizing plants since July 1975. It will be useful to export products with a high added value, such as pellets, for the development of industry and the economic standing of the Peruvian people. The sintering project proposed will also affect the Peruvian economy and society directly or indirectly to some extent in the following respects

(1) Increase of Value Added and Acquisition of Foreign Currency

Self-fluxing sintered ore is far superior to fine iron ore as blast furnace burden In this study, we evaluate sintered ore as equal in quality to self-fluxing pellets. If the total output of Hierro-Peru sintered ore is exported, the amount earned over a ten year period will be US$639,790,000, and this will contribute to Peru's balance of payments.

(2) Effective Utilization of Natural Resources

The export of such products as self-fluxing sintered ore is not merely another way of exporting iron ore. Rather, these exports will increase the demand for iron ore and lead to the development of Peruvian limestone and silicastone and thus to the effective utilization of Peruvian natural resources. If Peruvian anthracite is used in the sintering process, its development and effective use can also be expected.

(3) Encrease of Tax Revenue

Once the construction of the sinter plant starts, the Peruvian government can expect to receive US$19,258,000 from duty on the import of machinery,

equipment, etc. and after operations start, the following revenues can aslo be expected for the first ten years:

Income Tax	: $21,627,000
Value Added Tax	: $12,796,000
Import Duty	: $ 8,597,475
Total	. $43,020,475

(4) Effects on the Economy of Plant Construction

The construction work on the plant will be carried out by Peruvian contractors. They will receive approximately US$30,997,000 from the construction, and this sum will further the development of the Peruvian economy. At the same time, the increase in local procurement of construction materials will also affect the Peruvian economy.

(5) Effects of the Creation of Employment Opportunities

In order to operate the sinter plant, 139 workers will be required. The increase of employment together with the economic activities of these workers will positively affect a part of the Peruvian economy. At the peak of construction, 1,500 construction workers will be needed per day, a total of 514,000 man-days.

(6) Effects of Technical Transfer

For the construction of the sinter plant and the maintenance of its operations, technology from various fields, including metallurgy, machinery, electric and instrumentation, chemistry, civil engineering, and construction, will be required, and a broad range of support industries will be necessary from the industrial circles. Therefore, the introduction of the technology for the construction and operation of the plant will result not only in the transfer of sintering technology but also in the improvement of a wide range of industrial technology.

(7) Effects on the Environment

Since Hierro-Peru iron ore has a high sulphur content, when producing sinter from this ore, it will be necessary to pay due attention to the preservation of the environment near the sinter plant. The area around the proposed plant is barren desert, but residential and agricultural areas exist about 40km downwind of the plant. However, based on the assumption of a certain pattern of diffusion, it appears that the pollutants from the plant during operation will not exceed the environmental standards established in Peru, and thus, no air pollution problems will occur. However, since it is preferable to reduce air pollution as much as possible, the measurement and observation of wind direction, velocity and the concentration of SO_2 gas at the ground level should be carried out both in advance and after operation has begun The lay-out of the plant has been designed so that it would be possible to install desulphurization equipment in the future. The sinter plant is designed to use a dry process, and industrial water for the plant is used only for adjusting moisture content and for cooling the equipment (a closed system). Therefore, water contamination is not possible.

2.11.2 Recommendations

Hierro–Peru is planning to export sinter, which has a higher added value than the sinter feed currently being traded, by constructing a sinter plant with a capacity of 2.5 million tons per year and thus contribute to the development of Peru's economy.

Several obstacles are anticipated to the realization of the sinter plant construction and operation, and these are set out hereunder with some recommendations for the Peruvian government and Hierro-Peru to study.

(1) Iron Ore Supply and Demand and Market Exploration

In this study, an increase in iron ore demand is forecasted based on the expected increase in world crude steel production. There are limitations to this study since concrete demand in each country was not surveyed and since it is difficult to get an accurate grasp of how much the iron ore supply will be increased by the expansion of existing mines and the development of new mines. Before deciding on the final requirements for Hierro-Peru sinter, it is necessary to carefully study these conditions once again. In carrying out the project, market research on a consumers of sintered ore, the promotion for technical evaluation of sintered ore as blast furnace burden, and the development of consumers of sintered ore are needed.

(2) Quality Control at Mine and Plant

Strict quality control is required for sintered ore to be used as blast furnace burden. It is also necessary to use a sinter feed of homogeneous quality in the sinter production process and to maintain careful quality control. In this study, ore bedding methods and the adjustment of the SiO_2 content with silicastone are

suggested. In quality control, however, there are also other items which should be controlled the chemical composition and the particle size of the sinter feed and stable and satisfactory chemical and physical properties of the sinter product. For that purpose, the mine, the beneficiation plant, and the sinter plant should cooperate on quality control. It may be helpful to utilize statistical methods for that purpose.

(3) Procurement and Quality of Sub-raw Materials

There is not sufficient limestone in the N-14 deposit to meet the needs of the sinter plant Further investigation of other deposits is necessary in advance of the start-up of the sinter plant in order to secure sufficient supplies. Judging from the data on the N-14 limestone deposit, quality control will be important to obtain a homogeneous quality of limestone since considerable fluctuation in quality can be expected. Silicastone can be secured in quantity, but the grade is expected to be low and uneven. Therefore, research on a further stable supply source of high-grade silicastone is needed. Hierro-Peru should make detailed individual studies of sources of coal materials in order to secure a stable source of long-term supply Anthracite may be available from promising coal fields in Peru, but careful investigation of the availability and economy of extraction will be required before these sources are developed.

(4) Recommendation of an Operational Test

The pot test data are useful for judging the quality of the sintered ore but are in the final analysis merely experimental data obtained in laboratory tests. Therefore, before the project is initiated, it is necessary to run operational tests

on the feed, varying operational conditions, and also to confirm the unit consumptions of the raw materials.

(5) Environmental Protection

The SO_2 concentration in the exhaust gas from the sinter plant will be high due to the high sulphur content in the iron ore feed. In this study, the SO_2 content in the exhaust gas was estimated at levels permitted by Peru's pollution control standards. To minimize air pollution, however, it would be desirable to take the following measures.

(a) Weather conditions such as wind direction and velocity should be recorded accurately over a long period of time. Automatic recorders might be useful.

(b) SO_2 emissions from existing exhaust sources and SO_2 levels on the ground should be measured.

(c) Changes in the environment should be observed and recorded. This work should be started before the plant begins to operate and should be continued once it has come on stream, and every effort should be made to discover problems early enough and to develop measures to deal with problems as rapidly as possible.

(d) The sulphur content of the iron ore should be as low as possible, and as much sulphur as possible should be removed in the beneficiation process.

(6) Survey of the Proposed Site

It is necessary to prepare accurate basic data concerning the proposed site and the surrounding area before planning construction of the plant in order to shorten the construction period and minimize the cost.

The basic data required are:

(a) a highly accurate survey data of the proposed site, and

(b) an analysis of the soil at the proposed site

(7) Selection of Plant Equipment and Measures to Prevent Corrosion and Clogging

Plant equipment is always modified and improved, but the newest equipment is not necessarily the most appropriate since it often requires very experienced engineers and workers for stable operation. Therefore, it is desirable to select equipment which has a reputation for ease of operation and maintenance. It is necessary to study ways of preventing possible clogging and corrosion of the grate bars and corrosion of the wind box, wind leg, and main exhaust duct due to the high sulphur and alkali contents of Hierro-Peru ore.

(8) Measures to Prevent Degradation of Sintered Ore

It is necessary to take measures to prevent the degradation of the brittle sintered ore, especially when the sintered ore is exported, and in this study, measures to minimize degradation are examined Technology for baking the sintered ore hard during the sintering process should be introduced, and plans for handling the sintered ore should be drawn up to minimize the shock which the sintered ore receives during handling by reducing the drop height and handling time. The purchase of ore carrier with a slide chute might be helpful.

(9) Recruitment of Skilled Workers and Training

Hierro-Peru has experience in operating pelletizing plants and has been successful in that field

In a sinter plant, modern automated production facilities still require proper

operation and good judgement on the part of the engineers and workers. Engineers especially must have the ability to direct the workers at the plant. It is necessary, therefore, to recruit capable engineers and workers and give them instruction and training to improve their operational skills.

(10) Utilities

Electric power, industrial water, and fuel oil are indispensable for sinter plant operation. Fresh water availability at the San Nicolas plant is severely limited, and consequently subterranean water sources should be developed as soon as possible in order to decrease sinter production costs.

(11) Preferential Treatment

In this study, the profitability of the project is evaluated by several methods based on costs as of January 1980. Construction of the plant should be planned taking these cost estimates into account. It is desirable that the Peruvian government give Hierro-Peru preferential treatment including various incentives and an extension on the payment of import taxes for five years without interest in order to back up the management of Hierro-Peru.

(12) Finance

In this study, financing methods, interest, and loan periods were set up as a hypothetical model, and on this basis, the financial standing of the project was forecast and analyzed. When Hierro-Peru carries out the project, the financing plan must be carefully made based on actual conditions.

CHAPTER 3

SOCIAL AND ECONOMIC ENVIRONMENT

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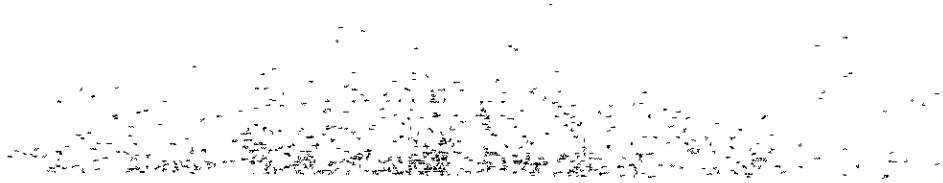


CHAPTER 3 SOCIAL AND ECONOMIC ENVIRONMENT

3.1 General

(1) Land Area

Peru has an area of 1,285,215 km^2 and is the third largest country in South America, after Brazil and Argentina.

(2) Geographical Features and Climate

The land is divided into three contrasting regions: the coastal, the mountainous and the tropical jungle regions.

Lima, the capital, is located in lat. 12° S and belongs to the tropical region but the climate is cool in summer and foggy and cold in winter being affected by the Humboldt current. The coastal region is a 2,000 km long belt which lies south and north between the coast and the Andes comprising almost rainless and largely desert flat land and hills

(3) Population

Peru's population was reported at 14,121,564 in the 1972 census and was estimated to reach 16,900,000 by the middle of 1980 according to the U. N. Demographic Yearbook 1978, which makes it the fifth most populous South American country, after Brazil, Mexico, Colombia, and Argentina.

Population growth rate: 2.9% per annum

Resident Area Distribution

	1949	1978
Cities	40 %	60 %
Rural Areas	60 %	40 %

Age Distribution

Upto 20 years	56 1 %
21 – 39	24.7
40 – 60	13.1
Over 60	6.1

Distribution of Economic Population

	1974	1978
Agriculture, Fishery	43.3 %	46.8 %
Mining	1.9 %	1.4 %
Industry	15.5 %	12.8 %
Construction	4.0 %	3.8 %
Other Services	35.3 %	35.2 %
Total	100 %	100 %
	4,673,000	5,274,000

3.2 Political and Administrative Features

(1) Government

Peru's government is a military dictatorship which came into power following a revolution in 1968 led by General Juan Velasco Alvarado. The second stage of the "revolution" was initiated in August 1975 with the inauguration of Gen. Francisco Morales Bermudez as the President. The constitution was established in July 12, 1979 and it is scheduled that general election will be held on May 18, 1980 and a civilian government will be in office from July 28. 1980. The assembly is comprised of the Upper House and the Lower House.

(2) Administration

The Central Government, headed by the President, has a cabinet comprising 15 ministers designated by the President

(3) Legislation

The constitution stipulates that the assembly consists of the Upper House with 60 representatives and the lower House with 180 representatives.

(4) Political Parties

Presidential and House representative elections are scheduled in May 1980 and the following three political parties are promoting their political campaigns.

APRA (Alianza Popular Revolucionaria)	center-left
PPC (Partido Popular Christiano)	right
AP (Action Popular)	center-right

3.3 Economic Features

3.3.1 General

Peru's economy was weak from 1974 to 1977. Trade deficit, foreign debts, and fiscal deficits had accumulated and inflation was accerelated, while production activities in the country were low for these four years.

This inactiveness of the economy is mainly attributed to

(1) Sluggish demand for copper and other nonferrous mining products in the international market and price hikes of imported goods, together with expansion of commodity imports for development projects in Peru.

(2) Accumulated foreign debts incurred by foreign loans for development projects which aim at increasing oil production.

In May 1978, the Government formed a new economic team which established a new economic stabilization program. They pared down Governmental bedget and carried out tax reforms, raised interest rates, and established export incentive programs, new foreign exchange programs, etc. to reconstruct Peru's economy.

3.3.2 New Moves in the Economy and Exports (1979 - 1980)

(1) Improvements in the Economy

Peru's economic growth rate reached its peak with 3% per annum in 1976

Except for the mining sector, it dropped sharply to minus 1.2% in 1977 and to minus 1.6% in 1978.

There was sign of economical recovery with an annual GNP growth rate of 1% in 1979 and it is expected that the GNP will increase by 3.4% in 1980 (Table 3-1).

In the mining sector, exports of copper, zinc, lead, silver, etc. are steadily growing in the restored international market due to smooth shipments from mines with less frequent strikes than in the previous year. Oil production by the Petro-Peru reached about 210 thousand barrels/day with 60 thousand barrels/day of which is exported abroad. It is expected that Peru's mining sector will increase its exports in the international nonferrous metal market which is experiencing a great advance in prices.

In the fishery sector, they are planning to increase fish meal production by regionally lifting fishing bans for such fishes as anchovy, mackerel, and jack-mackerel.

In the construction sector, a steady growth is expected to continue in 1980, with support by the housing construction loan quota which has been considerably enlarged by the Government.

In the industrial sector, Non-Traditional Export Incentive Act which stipulates CERTEX (export tax drawback system) was passed, and consequently, import tax and duties have been reduced or exempted and other preferential treatment in taxation is applicable to industries. There is a sign of recovery in the industrial sector and an annual growth rate of 4.5% is projected in 1980

(2) Sharp Increase in Exports

In 1979, total export amount is projected to increase by 760,000 thousand dollars from the 1978 level to 2,702,600 thousand dollars (on the FOB

basis). It is projected that total export amount in 1980 will reach 3,164,200 thousand dollars (Table 3-2).

Imports which decreased in 1978 to 1,600,500 thousand dollars by 26% from the previous year is projected to increase again by 14% to 1,875,800 thousand dollars in 1979 (Tabel 3-3).

The trade balance in 1979 tripled to 1,171,800 thousand dollars surplus and 1,160,000 thousand dollars surplus is expected for 1980, because of growth in exports (Table 3-4).

"Exports by Commodities" (Table 3-2) shows that the total export amount in 1979 is projected to exceed the 1978 level by 39.3%. Total export amount for mining products is projected to increase by 29.7% from 912,100 thousand dollars in 1978 to 1,183,000 thousand dollrs in 1979, because of copper and silver price increases in the international markets, improved production facilities at mines, and production increases with less strikes at mines. The most scrutinized oil export was 13,775 thousand barrels and 179,800 thousand dollars in 1978. In 1979, the oil export is projected to expand by 98% in quantity to 27,366 thousand barrels and by 165.1% in amount to 476,700 thousand dollars due to completion of the pipeline which permits transportation of the oil produced in the jungle area in the northern part of the country and also to completion of improved production facilities.

The non-traditional exports (mainly of manufactured goods) are projected to grow 52.6% from 330,100 thousand dollars in 1978 to 503,800 thousand dollars in 1979 due mainly to expanded export benefits stipulated in the Non-Traditional Export Promotion Law (Ley de Promocion de Exportaciones No Tradicionales) passed in October 1978.

(3) Balance of Payments

The balance of payments hit the bottom in 1977, improved to a 191,800 thousand dollar deficit in 1978, and is projected to turn a surplus of 410,800 thousand dollars in 1979. The balance of payment in 1982 is projected to reach 983,600 thousand dollars (Table 3-4).

(4) National Finance

The overall fiscal deficits in 1978 hit the ceiling of 82,145 million soles. In 1979, the government is planning to reduce the budgetary deficit by 20% to 66,300 million soles (Table 3-5). To attain this goal, they implement tax reform which raises tax revenue by 85.6% and cuts spending to reduce everlasting inflation.

(5) Foreign Debts and Foreign Currency Reserves (Table 3-6)

The government concluded the standby credit agreement with the IMF in September 1978 and refinanced the overall foreign debts of 1,710 million dollars from international banks and foreign governments in a series of negotiations. As a result, the aggregated repayments including interest payments to foreign lenders in 1979~80 were sizably reduced from 2,669 million dollars to 1,483 million dollars. The credibility of Peru's foreign currency standing was ensured by the IMF arrangements and therefore repayments and interest payments to foreign lenders in 1981 onwards (1,353 million dollars in 1981 and 1,312 million dollars in 1982) are expected to be carried out smoothly.

(6) Inflation (Table 3-7)

Escalation of consumers' price is continuing. In 1978 consumers' price rose by 73.98% and is expected to rise further in 1979. The government estimate is 60% or less in 1979 but January~August figures already show a 44.93% rise. The Peruvian economy will depend largely on the government's price control.

(7) Foreign Exchange

The floating system of Peru's sol was started in October 1977. Subsequently, import quota were abolished, the government-centered foreign exchange holding restriction system was loosened so that banks and private companies are allowed to hold foreign exchange quota, and interbank business was resumed. In a series of government foreign exchange programs, foreign currency deposits by residents were allowed and the banks' foreign currency certificate system (Certificado Bancario en Moneda y Extrajera) was started so that individual residents could have foreign currency without restrictions. As a result of several minidevaluations, the sol was quoted at 249.50 soles per dollar at the end of 1979. The government projects to control the devaluation of the sol by 24% to 310 soles per dollar by the end of 1980. The past trend of the exchange rate is shown in Table 3-6.

Table 3 - 1 Gross Domestic Product by Productive Sectors

Unit: Million of 1970 Soles, Million of Current U.S. Dollar, 1970 Soles, 1970 U.S. Dollar	1974	% 74/73	1975	% 75/74	1976	% 76/75	1977	% 77/76	1978	% 78/77	* 1979	% 79/78	* 1980	% 80/79
Agriculture and Cattle Raising	39,422	2.3	39,816	1.0	41,130	3.3	41,152	0.1	41,317	0.4	42,102	1.9	43,238	2.7
Fishery	3,093	35.9	2,623	-15.2	3,145	19.9	2,897	-7.9	3,239	12.5	3,026	-6.6	3,328	10.0
Mining (Includes Petroleum)	21,026	3.7	18,734	-11.0	20,401	8.9	26,501	29 9	30,185	13.9	33,408	10.7	34,677	3.8
Manufacturing	76,965	7.5	80,582	4.7	83,966	4.2	78,844	-6.1	76,479	-3.0	75,517	-1.3	78,915	4.5
Construction	15,927	22.0	18,603	16.8	18,082	-2.8	16,690	-7.7	15,021	-10.0	16,787	11.7	17,038	1.5
Government	23,076	2.3	24,114	4.5	24,596	2.0	25,285	2.8	25,285	0.0	24,905	-1.5	24,905	0.0
Other (Electricity, Gas and Water, Housing etc)	124,370	7.1	129,557	4.2	132,239	2.1	128,360	-2.9	123,226	-4.0	121,373	-1.5	125,742	3.6
GROSS DOMESTIC PRODUCT														
(1) Millions of 1970 Soles	303,879	6.9	314,029	3.3	323,559	3.0	319,729	-1.2	314,613	-1.6	317,750	1.0	328,553	3.4
(2) Per Capita (1970 Soles)	20,259		20,260	0.0	20,350	0.4	19,496	-4.2	18,579	-4.7	N.A.		N.A.	
(3) Millions of 1970 US$	7,732	6.9	7,990	3.3	8,230	3.0	7,869	-1.2	7,728	-1.6	N.A		N.A.	
(4) Millions of Current US$	9,595		10,708	11.6	11,650	8.8	12,267	5.3	12,991	5.9	N.A.		N.A.	
(5) Per Capita (1970 US$)	515		515	0.0	518	0.6	480	-7.3	457	-4.8	N.A.		N.A.	

Source: Central Reserve Bank, Banco Continental
Note: The figures for 1979 and 1980 are estimated.

Million of 1970 Soles

Table 3 - 2 Exports by Commodities

(Unit: Million Dollar, FOB)

		1974	%	1975	%	1976	%	1977	%	1978	%	* 1979	%	* 1980	%
Fishery Products	Fish Meal	201.8	13.4	155.7	12.1	177.5	13.1	179.0	10.4	191.8	9.9	198.0	7.3	262.0	8.3
	(1,000 MT)	(629)		(746)		(604)		(430)		(483)		(550)		(676)	
	Fish Oil & Others	59.6	4.0	52.4	4.0	23.2	1.7	36.2	2.1	45.7	2.3	91.5	3.4	101.3	3.2
	(1,000 MT)	(124)		(173)		(53)		(74)		(99)		(185)		(195)	
	Total	261.4	17.4	208.1	16.1	200.7	14.8	215.2	12.5	237.5	12.2	289.5	10.7	363.3	11.5
Agricultural and Cattle Raising Products	Cotton	96.5	6.4	53.6	4.2	70.9	5.2	48.0	2.8	38.1	2.0	54.7	2.0	58.4	1.8
	(1,000 Quintal)	(489)		(375)		(394)		(462)		(394)		(537)		(565)	
	Sugar	193.9	12.9	269.1	20.8	91.2	6.7	74.2	4.3	51.7	2.7	47.6	1.8	67.0	2.1
	(1,000 MT)	(462)		(421)		(346)		(389.5)		(291)		(257)		(280)	
	Coffee	34.8	2.3	53.2	4.1	101.0	7.4	196.3	11.4	168.2	8.6	119.5	4.4	116.1	3.7
	(1,000 MT)	(27)		(43)		(47)		(43)		(54)		(50)		(45)	
	Wool	7.1	0.5	11.4	0.9	18.7	1.4	18.1	1.0	23.2	1.2	27.6	1.0	31.4	1.0
	(1,000 MT)	(2)		(3)		(7)		(3)		(4.4)		(4.8)		(5.2)	
	Total	332.3	22.1	386.7	30.0	281.8	20.7	336.7	19.5	281.2	14.5	249.4	9.2	275.9	8.6
Mining Products	Copper	301.1	20.0	155.7	12.1	227.0	16.7	392.2	22.7	408.6	21.0	562.1	20.8	575.8	18.2
	(1,000 MT)	(183)		(156)		(181)		(331)		(344)		(335)		(344)	
	Iron Ore	75.0	5.0	51.9	4.0	63.5	4.7	90.5	5.3	73.8	3.8	86.7	3.2	101.7	3.2
	(1,000 LT)	(9,731)		(4,975)		(4,470)		(6,122)		(4,778)		(5,500)		(6,300)	
	Silver	140.9	9.4	146.3	11.3	145.1	10.7	172.5	10.0	206.9	10.7	254.9	9.4	279.2	8.8
	(1,000 Troy Onz)	(34,834)		(34,914)		(37,777)		(39,910)		(41,628)		(40,025)		(40,170)	
	Lead	57.5	3.8	41.9	3.3	63.6	4.7	81.7	4.7	89.7	4.6	114.5	4.2	119.6	3.8
	(1,000 MT)	(148)		(120)		(170)		(172)		(176)		(174)		(181)	
	Zinc	150.4	10.0	151.5	11.7	191.5	14.0	163.5	9.5	133.0	6.9	165.1	6.2	163.2	5.2
	(1,000 MT)	(422)		(405)		(425)		(434)		(437)		(431)		(393)	
	Total	724 9	48.2	547.3	42.4	690.3	50.8	900.6	52.2	912.1	47.0	1,183.3	43.8	1,239.5	39.2
Petroleum & By-Products		28.2	1.9	43.6	3.4	53.3	3.9	52.2	3.0	179.8	9.3	476.7	17.7	656.6	20.8
(1,000 BL)		(2,198)		(4,069)		(4,742)		(4,104)		(13,775)		(27,366)		(31,425)	
Other Products		156.5	10.4	105.2	8.1	133.0	9.8	220.9	12.8	330.1	17.0	503.8	18.6	628.9	19.9
Exports Total		1,503.3	100	1,290.9	100	1,359.5	100	1,725.6	100	1,940.7	100	2,702.6	100	3,164.2	100
Imports Total		1,908.9		2,301.1		2,100.0		2,164.0		1,600.5		1,875.8		N.A.	
Trade Balance		-405.6		-1,099.2		-740.5		-438.4		340.2		876.7		N.A.	

Source: Central Reserve Bank
Note: The figures for 1979 and 1980 are estimated.

Table 3 - 3 Imports by General Category

(Unit: Million Dollars)

Item of Goods	1974	74/73 (%)	1975	75/74 (%)	1976	76/75 (%)	1977	77/76 (%)	1978	78/77 (%)	*1979	79/78 (%)
(1) Consumer Goods	154.9	N.A.	198.9	28.4	176.4	-11.3	172.6	-2.1	103.6	-40.0	208.8	101.5
Durable Goods	102.5	N.A.	103.3	0.8	N.A.		77.9		66.6	-14.5	N.A.	
Non-durable Goods	52.4	N.A.	95.6	82.4	N.A.		94.7		37.0	-60.9	N.A.	
(2) Raw Material & Intermediate Goods	919.7	N.A.	1,171.6	27.4	1,031.9	-11.9	1,049.7	1.7	734.3	-30.0	960.9	30.8
Fuel Oil etc.	187.1	N.A.	264.7	41.5	N.A.		319.4		56.6	-82.3	N.A.	
for Agriculture	41.1	N.A.	106.0	157.9	N.A.		54.2		51.0	-5.9	N.A.	
for Industry	691.5	N.A.	800.9	15.8	N.A.		544.1		523.7	-3.7	N.A.	
(3) Capital Goods	610.9	N.A.	780.7	27.8	675.2	-13.5	468.6	-30.6	458.0	-2.3	564.9	23.3
for Construction	72.2	N.A.	113.8	57.6	N.A.		45.7		18.8	-58.9	N.A.	
for Agriculture	14.3	N.A.	25.0	74.8	N.A.		10.5		16.4	56.2	N.A.	
for Industry	434.2	N.A.	486.1	12.0	N.A.		341.2		308.8	-9.5	N.A.	
Transport Machinery	90.2	N.A.	155.8	72.7	N.A.		123.8		86.8	-29.9	N.A.	
(4) Other Various Goods	5.1	N.A.	2.8	-45.1	4.3	53.6	8.7	102.3	5.6	-35.6	141.2	-53.6
(5) Adjustments	218.3	N.A.	236.2	8.2	212.2	-10.2	464.4	118.8	299.0	-35.6		
Total Adjusted	1,908.9	73.9	2,390.2	25.2	2,100.0	-12.1	2,164.0	3.0	1,600.5	-26.0	1,875.8	17.2

Source: Central Reserve Bank
Note: The figure for 1979 is estimated.

Table 3 - 4 Balance of Payments

(Unit: Million Dollars)

	1974	1975	1976	1977	1978	* 1979	* 1980	* 1981	* 1982
(1) Current Balance	-807.2	-1,538.3	-1,192.0	-926.2	-191.8	410.8	415.2	736.2	983.6
Trade Balance	-405.6	-1,099.2	740.5	-438.4	340.2	1,171.8	1,160.0	1,437.3	1,637.1
Export FOB	1,503.3	1,290.9	1,359.5	1,725.6	1,940.7	3,149.3	3,164.2	3,702.6	4,210.8
Import FOB	-1,908.9	-2,301.1	-2,100.0	-2,164.0	-1,600.5	-1,977.5	-2,004.2	-2,265.3	2,573.7
(2) Service & Transfer	-401.6	-439.1	-451.5	-487.8	-532.0	-761.0	-744.9	-701.1	-653.4
(3) Long-Term Capital	894.9	1,138.1	675.5	673.8	421.3	386.8	321.3	188.8	99.6
Public Sector	693.4	792.8	479.7	604.7	382.5	440.5	312.5	204.6	111.9
Private Sector	201.5	342.3	195.8	69.1	38.8	-53.7	8.8	-15.8	-22.3
(4) Net Basic Balance [(1) - (3)]	87.7	-403.3	-516.7	-252.4	229.5	797.6	736.5	925.0	1,083.2
(5) Short-Term Capital Ferrous & Omissions	194.2	-173.4	-351.1	-97.5	-133.6	-111.6	N.A.	N.A.	N.A.
(6) Total Balance of Payments	281.9	-576.7	-867.6	-349.9	95.9	686.0	N.A.	N.A.	N.A.

Source: Central Reserve Bank
Note: The figures for 1979, 1980, 1981 and 1982 are estimated.

Table 3 - 5 Government-To-Public Balance

(Unit: Million of Soles)

(Million of Soles)	1974	74/73	1975	75/74	1976	76/75	1977	77/76	1978	78/77	* 1979	79/78
(1) Current Revenue	68,560	N.A.	87,896	28.2	111,397	26.7	154,052	38.3	264,238	71.5	490,100	85.5
(2) Current Expenditure	62,444	N.A.	90,507	45.0	122,718	35.6	193,092	57.3	288,733	49.5	449,400	55.6
(3) Balance of Current Revenue and Expenditure	6,116	N.A.	-2,611	-29.9	-11,321	-233.6	-39,040	-244.8	-24,495	37.3	40,700	266.2
(4) Treasury Loans and Investments	20,206	N.A.	27,980	38.5	37,111	32.6	40,103	8.1	57,650	43.8	107,100	85.8
(5) Balance of Public Finance	-14,090	N.A.	-30,591	-117.1	-48,432	-58.3	-79,143	-63.4	-82,145	-3.8	-66,300	19.3
(6) Finance in Balance of Public Finance	14,090	N.A.	30,591	117.1	48,432	58.3	79,143	63.4	82,145	3.8	66,300	-19.3
Foreign Finance	10,748	N.A.	16,813	56.4	15,636	-7.0	34,589	121.2	14,907	-56.9	-28,400	-290.5
Domestic Finance	3,342	N.A.	13,778	312.3	32,796	138.0	44,554	35.9	67,238	50.9	94,700	40.8
Remarks:												
Current Deficit Ratio	-		2.9%		9.2%		20.2%		8.5%		-	
Financial Deficit Ratio	-		25.8%		30.3%		33.9%		23.7%		-	

Current peficit Ratio = Balance of Current Revenue and Expenditure (3) ÷ Current Expenditure (2)

Financial Deficit Ratio = Balance of Public Finance (5) ÷ Financial Expenditure
[Current Expenditure (2) + Treasury Loans and Investments (4)]

Source: Central Reserve Bank
Note: The figure for 1979 is estimated.

Table 3 - 6 Other Statistics

Year	International Reserves (Unit: Million Dollars) U.S. Dollars	Gold & SDR	Other Currencies	Total Reserves	Exchange Rate T.T.S. Rate	Annual Rate of Devaluation
1974 (74/73%)	499.9 (91.5)	123.9 (-0.4)	186.7 (24.9)	810.5 (51.5)	43.50	-
1975 (75/74%)	217.5 (-56.5)	124.0 (0.1)	89.1 (-52.3)	430.6 (-46.9)	45.00	3.45%
1976 (76/75%)	176.2 (-19.0)	83.4 (-32.7)	48.1 (-46.0)	307.7 (-28.5)	69.37	54.16%
1977 (77/76%)	285.3 (61.9)	82.7 (-0.8)	49.2 (2.3)	417.2 (35.6)	130.72	88.44%
1978 (78/77%)	430.5 (50.9)	85.9 (3.9)	107.8 (119.1)	624.2 (49.6)	196.18	50.46%

Source: Central Reserve Bank

Table 3 - 7 Consumer's Price Index in Lima and Callao

Year	General Index (%)	Food & Beverage (%)	Housing & Furniture (%)	Clothing (%)	Other (%)	Remarks
1974	19.15	N.A.	N.A.	N.A.	N.A.	Annual Increase in Consumer Price Index (as of Dec.)
1975	24.01	31.19	17.29	19.05	24.17	
1976	44.68	44.49	29.92	33.98	62.79	
1977	32.44	32.96	24.65	29.51	38.26	
1978	73.98	77.73	60.85	72.46	75.63	
1979 (Jan.-Aug. Average)	(44.93)	(51.09)	(34.34)	(31.34)	(38.41)	

Source: Central Reserve Bank

3.4 Foreign Investment Law

Foreign-owned companies are subject to Decision 24 of Cartagena Agreement, a common foreign investment law for the Andean group countries (Venezuela, Colombia, Equador, Bolivia, and Peru) which is incorporated into the Peruvian law D.L. 18900 passed on June 30, 1971 and its detail regulations D.L. 18999, and Peru's Industrial and Fishery Laws.

A foreign investment law (D.L. 21826 passed on April 2, 1977) modified the original Foreign Investment Law as follows:

(1) Transfer of dividends, which was limited to 14% of the foreign-owned portion of a firm's capital, is loosened to 20% per annum.

(2) Inter-Regional Investment (Inversionista Subregional) concept make it possible for a firm which invests in other Andean countries to be eligible for the Domestic Investment Law when the firm meets certain requirements.

(3) When a foreign company seeks a new investment in a national (more than 80% locally owned) firm or in a mixed (more than 51% locally owned) firms, at least 51% of the equity must remain in local hands.

(4) A foreign (less than 51% locally owned) firm can re-invest 7% of their capital instead of the original 5% without application for approval.

(5) A foreign firm is eligible for Peruvian middle-term loans of up to three years as well as short-term loans which were originally approved.

(6) The restrictions applied to a foreign (less than 51% locally owed) firm under the Industrial and Fishery Law that they must fade out to a mixed firm or to a local firm was modified. The "fade out" clause is applicable to (a) foreign firms established on January 1, 1974 and afterwards, and (b) if they wish to take advantage of interregional investment stipulated in the Cartagena Agreement.

(7) A foreign firm can transform to a mixed firm or to a local firm by issuing new stock as well as transferring existing stock.

(8) Bureaucratic procedures are streamlined so that remittance of royalties and dividends which took a long time before gaining approval can now easily be approved by applying to the Foreign Investment Technology Committee (CONITE) in a fixed form.

(9) New Industrial Committee Law (Comunidades Industriales) lowered the worker ownership of a private industrial company (corporation), which aims at capital formation of workers, from 50% to 33.3%. A private firm must submit workers 13.5% of the after-tax profit in the form of stock or bonds per year so that 33.5% of the equity will consequently be held by workers.

3.5 Labor

3.5.1 Unions

More than 700 thousand workers are organized in a union, out of a total labor force of five million.

Both workers and employers are obliged to negotiate a collective bargaining agreement, and the contracts arrived at must last at least one year and must be approved by the Ministry of Labor. If no agreement is reached by direct negotiation within 30 days, a petition is made to the Labor Ministry, and the matter is put before a conciliation board for consideration within 20 days. If conciliation fails, the Labor Ministry is empowered to resolve the dispute within an additional 15 days. At present, disputes are to be limited strictly to wage issues and are not to include other benefits.

In 1977,400 stoppages took place, with 225 affecting industry. In 1978, a strike organized by the Teachers' Union was followed by strikes of hospital workers, bank employees and mines workers, widespread strikes, which were attributable to the government's attempts to implement its economic austerity measures, were seriously interfering with economic growth.

3.5.2 Salaries and Wages

The government raises minimum salaries by a fixed amount reflecting changes in the cost of living. Set out hereunder are trends in the average monthly salary and wages together with the minimum salary (Table 3-8).

Table 3 - 8 Salaries and Wages in Peru

(unit: sol)

	1973	1977	1978	1979*
Blue Collar (daily wage is converted to monthly basis)				
Nominal	10,338	20,458	28,800	38,060**
Real	10,338	6,883	5,579	5,738
Index	100.0	66.6	54.0	55.5
White Collar (monthly salary)				
Nominal	5,510	11,850	17,500	26,760**
Real	5,150	3,987	3,390	4,035
Index	100.0	77.4	65.8	78.3
Minumum Salary				
Nominal	2,400	5,400	6,900	12,000
Real	2,400	1,817	1,337	1,809
Index	100.0	75.7	55.7	75.4
(Government Officials' Salary)				
Grade I				
Nominal	30,000	35,570	41,570	66,000
Real	30,000	11,967	8,053	9,950
Index	100.0	39.9	26.8	33.2
Grade III				
Nominal	21,600	27,170	32,590	45,150
Real	21,600	9,141	6 313	6,807
Index	100.0	42.3	29.2	31.5
Grade VI				
Nominal	9,400	15,408	20,147	24,900
Real	9,400	5,184	3,903	3,754
Index	100.0	54.1	41.5	39.9
Consumers' Index in Peru	100.0	297.23	516.22	825.95

Source: Banco Central de Reserva, Instituto Nacional de Planificacion

Note: * July 1979

** salary in 1978 plus adjustments upto July 1979

The above figures indicate that real salary and wages are devaluated from 1973 by inflation.

3.5.3 Limitation on Employment of Foreign Nationals

The Foreign National Employment Limitation Law was revised in March 1979 so that 90% of a company's workforce must be comprised of Peruvian nationals, and that 90% of salary and wages be paid to Peruvians, instead of 80% each as in the original law.

3.6 Corporate Taxes

3.6.1 Corporate Tax Rates

A corporate tax is levied on a progressive rate. In addition to a corporate tax, companies must pay a 2% tax on after-tax income to support research and development

(a) Under the General Mining Law, the first 50 million soles in profit of a mining company is taxed at 35% and the next 50 million soles at 40%. The rates start at 20% and go up to 55% depending on a scale that relates pre-tax profit to investment. There is also a 30% tax on dividends paid to non-residents In addition, mining companies pay surface taxes on exploration and exploitation concessions in Peru. Tax-free reinvestment allowances of up to 50% of pre-tax profits are available.

(b) Retained earnings that are capitalized (i.e. converted to stock dividends) within six months after the books are closed are subject to an additional but final tax of 15% If retained earnings are capitalized more than six months after the books are closed, they are subject to tax at 25% to 30% (regular withholding tax rates). Companies that have excess earned surplus are obliged to capitalize or distribute these earnings within a year of closing the books.

(c) Branches of foreign corporations pay a 30% complementary tax on the remaining income whether or not the profits are remitted, in addition to a basic profits tax.

3.6.2 Depreciation

Depreciation of all tangible business property except land is tax-deductible and normally determined on a straight-line basis. Accelerated depreciation is availabe in certain circumstances as an incentive for investment in desired areas Exact rates are negotiated with the Superintendency of Taxation, but the normal rate for machinery is 5~10% per year, for installations and equipment 10~15%, and for automobiles and trucks 20~30%. The rate for buildings is set at 3%.

3.6.3 Capital Taxes

A annual capital tax of 1.2% is levied on corporate net assets (partrimonio) of up to 3 million soles; 1.5% for assets from 3 million soles to 10 million soles; and 2% for more than 10 million soles

3.6.4 Taxes on Dividends

The dividend withholding tax rates are 25% for resident persons or companies. Dividends paid to non-resident corporations are normally taxed at 40%.

3.6.5 Taxes on Interest

Interest payments to foreign lenders are subject to a withholding tax of 40% but sometimes reduced to 10% by the Banco Central de Reserva

3.6.6 Taxes on Royalties and Fees

Royalties and fees on patents, trademarks and know-how paied to foreign companies bear the basic 20~55% income tax, plus an additional 30% on the after-tax amount.

3.6.7 Sales Taxes

Taxes are charged on the sale of goods at following rates:

essential goods (e.g. basic food items, fuel oil and pharmaceuticals)	0 %
basic goods	6 %
"normal" products	22 %
luxury items	42 %

A 17.5% tax is levied on imports and on most traditional exports, such as minerals, fish meal, petroleum and certain agricultural products. Export taxes on traditional agricultural, fishing and mining products are considered to be prepayments of the profits tax. The tax is levied on manufacturers' value of exports, including packing, transportation, other services and interest charges; importers pay the applicable rate on C.I.F value. The tax does not apply to retailers, but is mandatory for all manufacturers, wholesalers and retailers that are direct importers and exporters.

3.6.8 Export Incentives

Decree Law 22,432 passed in November 1978 and other measures revamped export incentives.

(1) To qualify for tax and financial incentives, companies must meet progressive rises in export production percentages from 5% by December 1979 and 10% by year-end 1981 to 25% by end-1984; in this case they are allowed to import capital goods duty-free for five years. After that, exporters have two years to increase export earnings to equal the value of

their imports. If they reach this goal, they may continue importing capital goods duty-free. If not, duties and interest must be paid after the second year (seventh year from import commencement).

(2) Exporters of non-traditional goods may deduct their expenses for operating overseas offices, creating export consortiums, or incurred from their working capital. Also, a company can receive a tax deduction of 30~60% of its payroll expenses if its exports create new, permanent jobs. For example, if a company expands its workforce between 20% and 40%, it receives 30% tax reduction. A 40 ~ 60% expansion results in a 45% tax deduction, and an expansion of more than 60% will result in a 60% tax cut.

(3) Exporters of manufactured goods are elegible to receive 15~30% of the F.O.B. value of their exports in the form of Tax Drawback Certificates (CERTEXES). To get the higher percentage, the exporter must prove that export taxes, duties on imported components or import surcharges exceed 15%.

3.6.9 Taxes on an Industrial Corporation

The following example shows the approximate tax burden on a foreign-owned manufacturing company.

Table 3-9 Taxes on an Industrial Corporation in Peru, 1975

Taxable income of the company is of S100 million. It is assumed that the firm reinvests about half of its profits in Lima and has second priority status.

		(S'000)
(1)	Taxable income	100,000
(2)	Tax in industrial and commercial profits	
	20% on first S1 million	200
	30% on S1 million to S50 million	14,700
	40% on S50 million to S100 million	20,000
	total tax	34,900
(3)	After-tax income	65,100
(4)	Profit sharing for comunidad (25%)	16,300
(5)	2% for Itintec	1,300
(6)	Reinvested amount (half of S65.1 million)	32,550
(7)	Tax credits	
	For comunidad: S16.3 million x 34.9% x 0.8	4,551
	For reinvestment: S32.55 million x 34.9% x 0.8	9,088
(8)	Net tax*	21,261
(9)	Total tax, profit-sharing and Itintec contribution	38,861

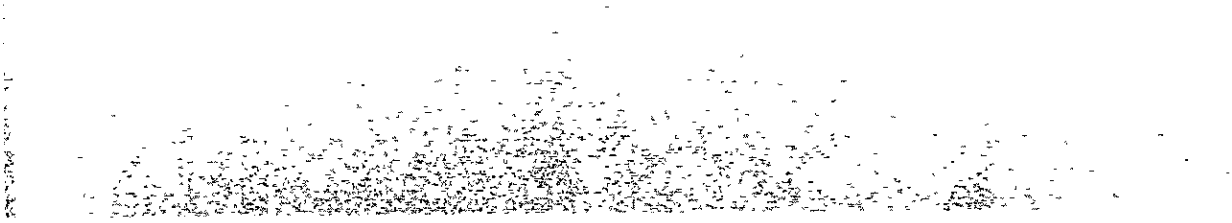
* Tax burden would be higher when capital tax withholding on dividends and tax on obligatory revaluation of assets are taken into account.

(Source: Business International Corp.)

CHAPTER 4

IRON ORE SUPPLY AND DEMAND

CHAPTER 4 IRON ORE SUPPLY AND DEMAND



CHAPTER 4 IRON ORE SUPPLY AND DEMAND

4.1 Iron Ore Supply and Demand in Peru

Iron and steel production is carried out in Peru by a state-run steel company, Empresa Siderurgica del Peru (hereinafter called Sider-Peru), which has steel works located in the coastal city of Chimbote, 450 km north of Lima.

According to Sider-Peru, the iron ore supply and demand situation in Peru is as follows:

4.1.1 Iron Ore Consumption

The Chimbote steel works consume approximately 450,000 ~ 500,000 tons of iron ore per year, 400,000 ~ 440,000 tons of which consists of pellets supplied by Hierro-Peru. The other portion, 50,000 ~ 100,000 tons, consists of undersize pellets, scale, and so on.

The Sider-Peru blast furnace is now operated with a charge blend of pellet, but since this blend is not efficient, Sider-Peru is considering the use of a certain amount of sintered ore and is studying the construction of a small sinter plant which could efficiently consume about 60,000 ~ 100,000 tons per year of undersize pellets, which are now charged directly into the blast furnace.

Sider-Peru will be able to utilize 100% sinter in their blast furnace, and if

Hierro-Peru completes their sinter plant in time, it will be possible to purchase 450,000 ~ 500,000 tons of sinter from Hierro-Peru each year.

Hierro-Peru now delivers to Sider-Peru each year twenty-five shipments of iron ore on 20,000 DWT vessels.

4.1.2 Sider-Peru Production Facilities

(1) Blast Furnace

Sider-Peru has one blast furnace with an interior capacity of 514 m^3 and a production capacity of 950 tons/day. The blast furnace produces 313,500 tons of pig iron per year with 330 operational days per year.

There are no plans to expand the blast furnace, but the construction of additional DR plants and electric furnaces is under consideration in order to meet additional future crude steel demand. (Sider-Peru has two electric furnaces at present.)

The unit consumption of raw materials is as follows:

Pellets : 1,480 kg/ton of pig iron

Coke : 480 kg/ton of pig iron

Fuel oil : 30 kg/ton of pig iron

(2) Direct Reduction (D/R) Plant

Three SL-RN process D/R plants are scheduled for completion in mid-1980. The total capacity of the three plants will be 120,000 tons per year, and the raw material feed will be Hierro-Peru pellets.

There are plans to construct two more D/R plants in 1980 ~ 1984.

Their total production capacity will be 200,000 tons per year.

(3) Unloaders

Sider-Peru has two clamshell bucket unloaders with a capacity of 17 tons each. They can handle 15,000 tons of pellets and 7,500 tons of coke per day.

(4) Belt-conveyor

Transport capacity

Pellets :	1,200 tons/hour
Coke :	250 tons/hour
Width of belt	1,200 mm
Belt speed	1.6 m/sec.
Length of conveyor	1,640 m (Three belts from port to yard, 295 m, 500 m, and 845 m in length)

4.1.3 Crude Steel and Pig Iron Production in Peru

Past trends in crude steel and pig iron production in Peru and planned future output are shown in Table 4-1.

Table 4-1 Crude Steel and Pig Iron Production in Peru

Unit: 1,000 tons

	Crude Steel (Index)	Pig Iron (Index)
1973	356 (100)	253 (100)
1974	450 (126)	303 (120)
1975	431 (121)	286 (113)
1976	346 (97)	232 (92)
1977	379 (106)	241 (95)
1978	379 (106)	246 (97)
(Source: Japan Iron & Steel Federation)		
1979	570	
(Source: Sider-Peru)		
1985	823	
1991	1,099	
1995	1,743	
(Source: Sider-Peru Production Plan)		

4.2 International Iron Ore Supply and Demand Forecast

A projection of international iron ore supply and demand for 1985 is set out below. Since there are virtually no companies or organizations which draw up reliable projections, there is little data which could be used to judge the accuracy of this forecast. Thus, it is submitted here for reference only.

4.2.1 Forecast Method

(1) World Crude Steel and Pig Iron Production

World crude steel and pig iron production in 1985 was calculated based on past and projected production data for each producing country and on analyses of past growth and projections for the future. Projections of crude steel Production are published by several companies and agencies.

(2) World Iron Ore Requirements

The ore ratio (iron ore requirement per ton of pig iron for each country) was determined through the analysis of data an iron ore consumption and blast furnace feed.

The iron ore requirement in each country was calculated as follows:

Iron ore requirement = pig iron production estimate x ore ratio

(3) World Iron Ore Supply

Data were collected on the maximum quantities which existing iron ore mines throughout the world could supply, and from this information, the world iron ore supply was calculated taking into consideration the operating rates of the mines.

(4) New Mine Development and Expansion of Existing Mines

Among the projects now in the planning stage for the development of new iron ore mines and the expansion of existing ones, those which appear likely to be completed by 1985 were determined, and the expected supply from these projects was added to the supply-demand balance calculated from (2) and (3) above.

4.2.2 Forecast

Table 4-2 Iron Ore Supply and Demand Forecast

(Unit: Million tons)

Area	Crude Steel	Pig Iron	Iron Ore Demand	Ore Ratio	Iron Ore Supply	Gap between Supply and Demand	New Projects & New Expansion plans	Balance
North America	156.1	107.2	156.5	1.46	138.0	- 18.5	–	- 18.5
Latin America	49.0	38.2	61.6	1.61	158.0	96.4	48.6	145.0
Western Europe	193.0	138.2	232.6	1.68	88.8	- 143.8	7.0	-136.8
Africa	13.3	9.9	17.8	1.80	59.8	42.0	7 9	49.9
Middle East	8.3	7.0	11.1	1.58	–	- 11.1	–	- 11.1
Asia	159.2	130.9	191.9	1.47	45.9	- 146.0	6.0	- 140.0
Oceania	9.0	8.6	13.1	1.54	107.7	94.6	10.0	104.6
Total for Non-Communist Countries	587.9	440.0	684.1	1.56	598.2	- 86.4	79.5	- 6.9
U.S.S.R	190.0	138.7	244.1	1.76	254.2	10.1	30.2	40.3
Eastern Europe	77.8	53.7	93.9	1.75	5.9	- 88 0	–	- 88.0
China	45.0	43.2	82.1	1.90	60.0	- 22.1	4.1	- 18.0
North Korea	7.0	6.7	12.1	1.80	7.2	– 4.9	4.9	–
Total for Communist Countries	319.8	242.3	432.2	1.78	327.3	- 104.9	39.2	- 65.7
World Total	907.7	682.3	1.116.8	1.64	925.5	- 191.3	118.7	- 72.6

(Source: Mitsui's Projection)

Table 4-2 indicates that the supply capacities of existing mines will fall short of demand by 190 million tons in 1985 on a world scale.

Furthermore, even with the supply from new projects and expansions there will still be a considerable shortfall.

This shortfall in iron ore supply will occur primarily because of demand from Eastern European Countries. To secure sufficient supplies, further development and the expansion of existing mines are required. Otherwise, a shortage of iron ore cannot be avoided.

4.2.3 Other Forecasts Available

A forecast for 1985 issued by the United Nations Industrial Development Organization (UNIDO) on March 26, 1979, is given in Table 4-3 below.

Table 4-3 Other Forecast

Unit: Million tons

	UNIDO	Mitsui	Difference
Crude Steel Production	950	908	42
Pig Iron Production	684	682	2
Iron Ore Demand	1,148	1,117	31
Iron Ore Supply	–	926	–

On May 22, 1979, the International Iron & Steel Institute (IISI) announced its forecast that world crude steel production in 1985 would be 920 million tons.

4.2.4 World Iron Ore Supply

The above forecasts are offered for the reference only. However, the impression has recently become general among Japanese steel producers that a considerable gap between world iron ore supply and demand will develop.

There are two methods of increasing iron ore supply: developing new iron ore mines or expanding existing mines. Some feel that rather than investing the huge amount of funds necessary for the development of a new mine, it is preferable to expand the output of existing mines which have fully developed infrastructure. The Hierro-Peru sintering project is an example of this kind of project.

4.3 Iron Ore Supply and Demand in Major Consuming Countries

Tables 4-4 and 4-5 show iron ore consumption in blast furnaces, unit consumption of iron ore in blast furnaces, agglomerated (sintered ore and pellet) production, crude steel and pig iron production, imports and exports of iron ore and their destinations and supply sources for major iron ore consuming countries from 1973 to 1978. Data for 1979 are not available yet, and many items for communist countries are blank. The data in these tables, however, make possible the inference of past trends of iron ore consumption for blast furnace use in each country. Fig. 4-1 shows the fluctuation in the percentage of sinter in major iron ore consuming countries.

4.3.1 Iron Ore Supply and Demand in the United States of America

(1) Blast Furnace Burden

Steel mills in the United States utilize pellets made of low-grade domestic iron ore (taconite ore : Fe 30 ~ 35%) in order to make the best use of domestic iron ore resources.

Table 4-4-(a) shows that in 1973, the total iron ore consumed in blast furnaces consisted of 47% pellet, 28% sinter, and 25% lump ore and that the percentage of pellet increased by 17% to about 63% in 1978. Between 1973 and 1978, the percentage of sinter remained at roughly the same level each year, about 26%, and the percentage of lump ore decreased by 14% to only 11%.

Fig. 4-1 shows that the percentage of sinter used in the United States remained virtually unchanged from 1973 to 1978.

Thus, the major change in blast furnace burden in the United States during this period was the gradual increase of the percentage of pellet and the decrease of the percentage of lump ore. Domestic pellet production did not increase on any major scale, but pellet imports increased by 150% from 1973 to 1978.

(2) Iron Ore Imports (Table 4-5-(c))

Major sources of U.S. iron ore imports are, in the order of importance, Canada, Venezuela, Brazil, Liberia, and Peru. This order did not change between 1973 and 1978. Imports from Venezuela have been gradually decreasing, and Canada is gaining further importance as a prime supply source. Major American steel mills are involved in the operation of captive mines not only in the United States but also in Canada, which is the reason why Canada is such an important iron ore supply source. Iron ore imports increased in 1974 and 1975 and decreased in 1977 and 1978. (The 1978 figure is 30% lower than the 1973 figure.) Despite the decrease in total iron ore imports, pellet imports continued to grow.

(3) Future Pellet Use

It appears that unlike Japanese steel mills, U.S. steel mills have developed techniques for blast furnace operation using pellets. The percentage of pellets in American blast furnace burden may possibly be affected by an increase in the production costs of pelletizing plants, which consume large amount of fuel oil.

4.3.2 Iron Ore Supply and Demand in Seven EC Countries

Table 4-4-(b) to (e), Table 4-5-(a) to (c), and Fig. 4-1 show iron ore supply and demand in seven EC countries (West Germany, France, Italy, Belgium, Luxemburg, the Netherlands, and the United Kingdom).

(1) Use of Iron Ore in Blast Furnaces

The Netherlands and the United Kingdom do not separate pellets and lump ore in their blast furnace feed statistics. For Italy and the United Kingdom, 1978 figures are not available, but the 1973 ~ 1977 figures show sintered ore and other ore consumption in blast furnaces.

Fig. 4-1 shows that the percentage of sinter utilized for blast furnace burden gradually increased between 1973 and 1977 by about 10%, reaching 79% in 1977. No major expansion of sintering and pelletizing facilities was observed in these seven EC countries during the period, but sinter consumption grew steadily. In 1978, West Germany showed a 7% decrease from 1978 in the percentage of sinter, and as a result, the total percentage of sinter for these seven countries may decline a little.

The percentage of pellet for these seven countries is much lower than the percentage of lump ore, unlike the situation in the United States.

The low percentage of sinter in the Netherlands is attributable to the 3 million ton per year pelletizing plant at the ESTEL Group's Hoogovens plant There are only four pelletizing plants in all seven of these countries. The following Table 4-6 shows the capacities of these four pelletizing plants.

Table 4-6 Pelletizing Plants in EC Countries

Unit: Million tons/year

	Location	Start-up Year	Capacity
Netherlands			
ESTEL/Hoogovens	Ijmuiden	1970	3.0
Italy			
Montecatini S.P.A.	Follonica	1964	0.33
Belgium			
Forges de Clabecq	Clabecq	1969	0.45
United Kingdom			
B S C	Redcar/Teeside	1978	3.0
Total Capacity			6.78

(Source: Metal Bulletin)

(2) Iron Ore Imports

Table 4-5-(a) to (c) shows that Brazil, Sweden, Liberia, Australia, and France are the major sources of iron ore supply for the above seven EC countries. Imports from Brazil are growing steadily, and the percentage of Brazilian iron ore in the import total rose from 15% in 1973 to 23% in 1978, an increase of approximately 8%. Imports from France decreased by 4% between 1973 and 1978. Imports from Australia increased by 4.4% in the same period. Although Swedish ore imports dropped by 7% from 1973 to 1975, Sweden continues to be a stable supply source for EC countries, together with Liberia.

(3) Iron Ore Supply and Demand Outlook for the Seven EC Countries

Low-grade iron mines (Minette ore deposit : Fe 30 ~ 50%) in the Lorraine

district in France have been important iron ore supply sources for France, Belgium, and Luxemburg. These mines are small in scale and are captive mines of major steel companies in the above three countries. EC countries have recently been consuming less EC iron ore and importing more ore from outside the community, partly to extend the lives of their own resources and partly to operate their blast furnaces more efficiently by utilizing high-grade imported ores. The requirements of the EC countries for iron ore from outside the community are thus likely to expand in the future.

4.3.3 Iron Ore Supply and Demand in Eastern Europe

Table 4-4-(f) to (i), Table 4-5-(e) and (f), and Fig. 4-1 show iron ore supply and demand data for Eastern European countries. The data available are very limited, but basically the iron ore supply and demand situation in Eastern European countries is as follows.

(1) Iron Ore Resources in Eastern European Countries and Iron Ore Imports

Eastern European countries, except for Yugoslavia, have few iron ore reasources of their own and depend heavily on iron ore imports from the U.S.S.R. In 1977, the U.S.S.R. exported a total of 41 million tons of iron ore, and 36 million tons of this total were delivered to Eastern European countries. The remaining 5 million tons went to Western Europe and other areas. Of the 36 million tons to Eastern European countries, Poland and Czechoslovakia each received about 11 million tons (60% of the total), and the remainder went, in the order of the size of the iron ore imports, to Rumania, Hungary, East Germany, and Bulgaria.

(2) Iron Ore Supply and Demand Outlook for Eastern Europe

In 1974, an agreement about raw material procurement for iron and steel production was concluded between the U.S.S.R. and other Eastern European countries. This agreement stipulates that the U.S.S.R. is to provide other Eastern European countries with the raw materials for iron and steel production, and in return, Eastern European countries are to provide the U.S.S.R. with iron ore mining equipment. Thus, the U.S.S.R. receives considerable portion of the iron ore it exports in the form of steel. The agreement involves the U.S.S.R., Poland, Czechslovakia, and East Germany, but not Rumania. Consequently, Rumania imports iron ore more from outside of Eastern Europe, especially from Brazil.

Iron ore production in the U.S.S.R. is not growing as scheduled in the five-year plan for 1976 ~ 1980, and it is estimated that production will fall 21.8 million tons short of the 276 million ton target.

One of the main reasons for this is a shortage of the mining equipment necessary for the expansion of production activities. Investments in production equipment and facilities require both time and money, and as a result, it is anticipated that Soviet iron ore exports may fall short of the needs of other Eastern European countries for some years to come. The expected iron ore demand from Eastern European countries may seriously affect iron ore distribution in the world market.

(3) Blast Furnace Burden

Table 4-7, which summarizes the data in Table 4-4-(f) to (i), shows the compositions of the blast furnace burden in Eastern European countries. Blending percentages for the U.S.S.R. are estimates.

A pelletizing plant in Yugoslavia, which has a capacity of 600,000 tons per year, is the only pelletizing plant in the whole of Eastern Europe except for the U.S.S.R. In the U.S.S.R., there are six pelletizing plants, and the total production capacity is 33 million tons per year. The pellets utilized in Poland and Czechoslovakia are all imported.

Table 4 - 7 Blast Furnace Burden in Eastern European Countries

	Sintered Ore	Pellets	Lump Ore	Ore Ratio
Poland	63 7%	12.6%	23.7%	1.80
East Germany	69.5	0	30.5	1.63
Czechoslovakia	80.8	12.1	7.1	1.86
Yugoslavia	82.1	2.1	15.8	1.64
Hungary	99.3	0	0.7	1.98
U.S.S.R.	80 *	15 *	5	1.78

* Estimated

Eastern European steel mills generally use a high percentage of sinter in their blast furnaces, and it appears likely that this trend will continue in the future.

4.3.4 Iron Ore Supply and Demand in Japan

(1) General Features

The Japanese steel industry has developed to the point where it is capable of producing large quantities of high quality iron and steel at low cost, utilizing high grade iron ores imported from many countries. For that purpose, Japanese steel producers have constructed large-scale blast furnaces and also have located steel mills in coastal areas to reduce transportation costs. They continually reinvest in new plants and equipment and have made every effort to rationalize their production facilities.

Fig. 4-1 and Table 4-4-(a) show the sinter percentage in blast furnace burden at Japanese steel mills. Japanese steel mills utilize a high percentage of sintered ore, and this percentage is increasing every year. This heavy reliance on sinter is due to the advantages of sinter in the effective operation of large-scale blast furnaces. Japanese steel mills will probably continue to use hgih levels of sinter, but the energy shortage may somewhat affect the situation.

(2) Iron Ore Import

Japanese steel mills have been involved in mine development in Australia, which is a large and stable supply source of good quality iron ore. Australia is near to Japan and therefore there are cost advantages as far as transportation is concerned. Australian iron ore, as a result, comprises nearly 50% of total iron ore imports into Japan.

It is necessary, on the other hand, to diversify supply sources of iron ore. Frequent strikes at mines have made Japanese steel mills realize the disadvantages of heavy reliance on one specific supply source. Consequently, they are studying

the possibility of increasing imports from distant sources in South America and Africa by developing new transportation methods, and in the future, the diversification of supply sources may characterize the supply of iron ore to the Japanese steel industry.

In the above projection, the increase in iron ore demand was estimated by forecasting world crude steel demand. However, it is difficult to determine with any accuracy how much the iron ore supply will increase through the expansion of existing mines. Therefore, in order to evaluate the gap between iron ore supply and demand, the amount of ore which can be supplied by mines throughout the world should be thoroughly reconsidered.

Before Hierro-Peru actually begins work on the sintering project, further careful concrete research is required to develop consumers of the sintered ore product.

Fig. 4 - 1 World Sinter Ratio for Blast Furnaces

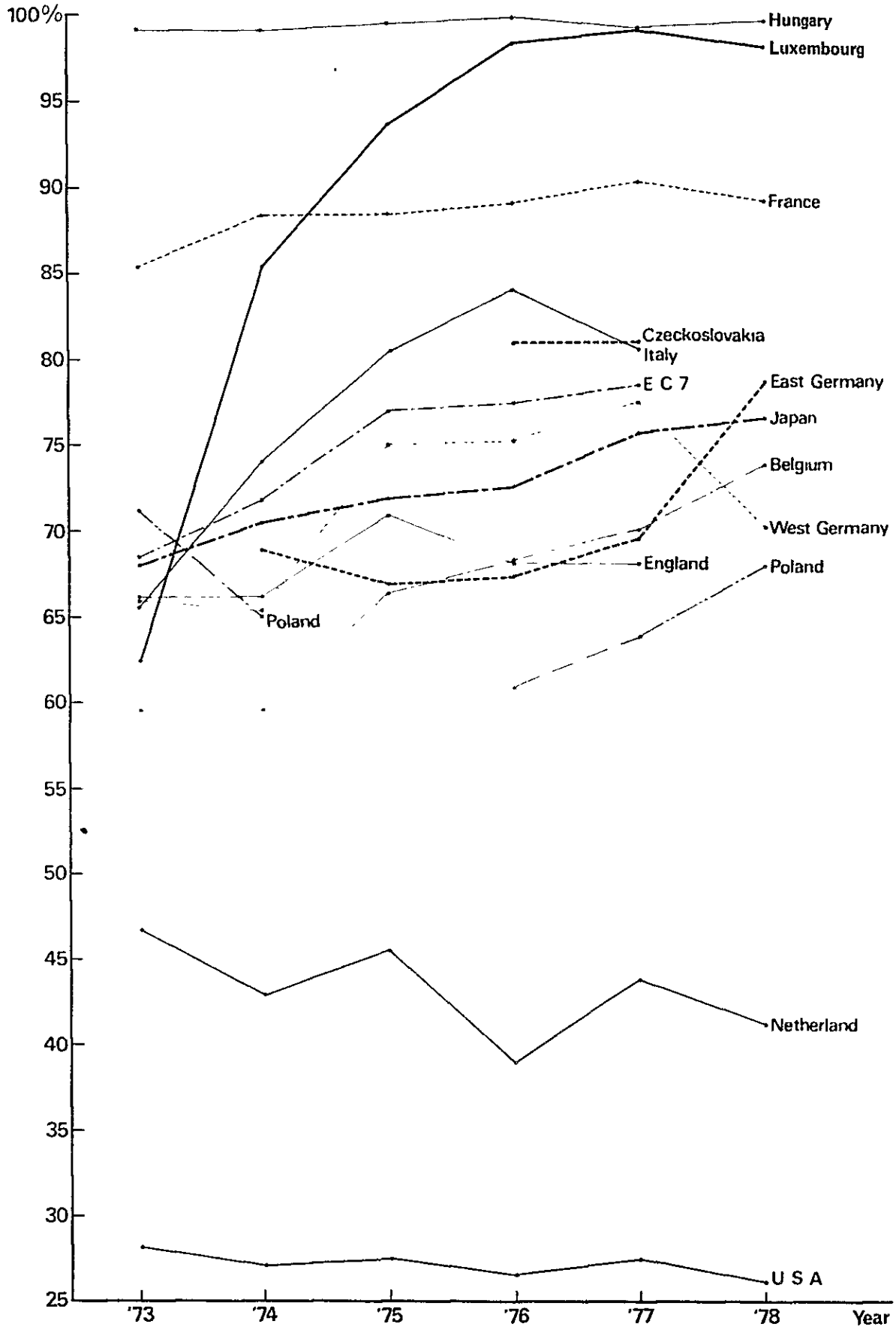


Table 4 - 4 - (a) General Outlook for B/F Raw Materials

Country	Year	Consumption of Iron Ore in Blast Furnaces (1,000 M.T.)				Unit Consumption of Iron Ore in Blast Furnaces (Kg/Pig-ton)				Agglomerate Production for B/F (1,000 M.T.)		Crude Steel Production (1,000 M.T.)	Pig Iron Production (1,000 M.T.)	Domestic Iron Ore Production (1,000 M.T.)	Iron Ore Imports & % Reliance (1,000 M.T.)		Iron Ore Exports (1,000 M.T.)	Apparent Consumption (1,000 M.T.)	Unit Consumption of Iron Ore for Sinter (Kg/M.T.)	Remarks: Imported Pellet (1,000M.T.)
		Sinter	Pellet	Lump	Total	Sinter	Pellet	Lump	Total	Sinter	Pellet									
U.S.A.	1973	42,103	69,688	37,331	149,122	458	759	407	1,624	39,313	62,627	136,803	91,815	88,800	44,027	33.9	2,790	130,037	1,025	11,034
	(%)					(28.2)	(46.7)	(25.1)	(100)		(100)	(100)	(100)	(100)	(100)		(100)	(100)		(100)
	1974	39,107	68,102	36,259	143,468	449	783	417	1,649	36,985	60,848	132,195	87,008	85,917	48,800	36.9	2,360	132,357	1,050	11,101
	(%)					(27.2)	(47.5)	(25.3)	(100)		(97.2)	(96.6)	(94.8)	(96.8)	(110.8)		(84.6)	(101.8)		(100.6)
	1975	31,998	63,025	21,440	116,463	441	869	296	1,606	30,731	62,331	105,816	72,506	80,132	47,490	38.0	2,578	125,044	995	11,505
	(%)					(27.5)	(54.1)	(18.4)	(100)		(99.5)	(77.3)	(79.0)	(90.2)	(107.9)		(92.4)	(96.2)		(104.3)
	1976	33,050	75,142	15,967	124,159	419	953	203	1,575	32,962	62,531	116,120	78,808	80,536	45,101	36.8	2,960	122,677	948	16,079
	(%)					(26.6)	(60.5)	(12.9)	(100)		(99.8)	(84.9)	(85.8)	(90.7)	(102.4)		(106.1)	(94.3)		(145.7)
	1977	31,863	69,489	15,240	116,592	432	942	206	1,580	31,740	42,847	113,168	73,780	55,824	38,513	41.8	2,177	92,160	921	17,232
	(%)					(27.4)	(59.6)	(13.0)	(100)		(68.4)	(82.7)	(80.4)	(62.9)	(87.5)		(78.0)	(70.9)		(156.2)
	1978	32,271	78,589	13,054	123,914	406	988	164	1,558	32,786	64,996	124,002	79,542	82,080	34,156	30.4	3,822	112,414	970	16,565
	(%)					(26.1)	(63.4)	(10.5)	(100)		(103.8)	(90.6)	(86.6)	(92.4)	(77.6)		(137.0)	(86.4)		(150.1)
Japan	1973	97,835	17,565	28,486	143,886	1,091	196	318	1,605	104,999	6,399	119,322	89,676	1,254	128,761	99.0	-	130,015	761	
	(%)					(68.0)	(12.2)	(19.8)	(100)			(100)	(100)		(100)			(100)		
	1974	102,548	16,945	26,074	145,567	1,138	188	289	1,615	110,434	6,605	117,131	90,119	837	130,330	99.4	-	131,167	761	
	(%)					(70.5)	(11.6)	(17.9)	(100)			(98.2)	(100.5)		(101.2)			(100.9)		
	1975	100,387	16,012	23,516	139,915	1,159	185	271	1,615	108,849	7,002	102,313	86,622	1,687	125,478	98.7	-	127,165	758	
	(%)					(71.8)	(11.4)	(16.8)	(100)			(85.7)	(96.6)		(97.5)			(97.8)		
	1976	101,265	15,792	22,582	139,639	1,291	201	288	1,780	111,906	6,646	107,399	78,427	1,667	124,011	98.7	-	125,678	739	
	(%)					(72.5)	(11.3)	(16.2)	(100)			(90.0)	(87.5)		(96.3)			(96.7)		
	1977	104,732	14,793	19,021	138,546	1,222	173	222	1,617	111,829	6,132	102,405	85,699	1,470	123,242	98.8	-	124,712	797	
	(%)					(75.6)	(10.7)	(13.7)	(100)			(85.8)	(95.6)		(95.7)			(95.9)		
	1978	96,893	14,729	15,064	126,686	1,235	188	192	1,615	96,421	4,909	102,105	78,427	1,817	112,073	98.4	-	113,890	788	
	(%)					(76.5)	(11.6)	(11.9)	(100)			(85.6)	(87.6)		(87.0)			(87.6)		

Source:
Annual Bulletin of Steel Statistics for Europe, United Nations

Note:
Apparent Consumption = Domestic Iron Ore Production + Imports - Exports

Table 4 - 4 - (b) General Outlook for B/F Raw Materials

Country	Year	Consumption of Iron Ore in Blast Furnaces (1,000 M.T.)				Unit Consumption of Iron Ore in Blast Furnaces (Kg/Pig-ton)				Agglomerate Production for B/F (1,000 M.T.)		Crude Steel Production (1,000 M.T.)	Pig Iron Production (1,000 M.T.)	Domestic Iron Ore Production (1,000 M.T.)	Iron Ore Imports & % Reliance (1,000 M.T.)		Iron Ore Exports (1,000 M.T.)	Apparent Consumption (1,000 M.T.)	Unit Consumption of Iron Ore for Sinter (Kg/M.T.)	Remarks
		Sinter	Pellet	Lump	Total	Sinter	Pellet	Lump	Total	Sinter	Pellet									
West Germany	1973	38,806	4,425	15,593	58,824	1,054 (66.0)	120 (7.5)	423 (26.5)	1,597 (100)	39,320	-	49,521 (100)	36,828 (100)	5,069 (100)	50,323 (100)	90.9	6	55,386 (100)	892	
	1974	42,224	4,962	17,457	64,643	1,050 (65.3)	123 (7.7)	434 (27.0)	1,607 (100)	42,808	-	53,232 (107.5)	40,221 (109.2)	4,439	57,719 (115)	92.9	5	62,153 (112)	885	
	1975	36,159	3,076	8,981	48,216	1,202 (75.0)	102 (6.4)	298 (18.6)	1,602 (100)	36,761	-	40,415 (81.6)	30,074 (81.7)	3,288	44,322 (88)	93.1	5	47,605 (86)	907	
	1976	38,038	4,295	8,225	50,558	1,194 (75.2)	135 (8.5)	259 (16.3)	1,588 (100)	38,536	-	42,415 (85.7)	31,849 (86.5)	2,256	46,775 (93)	95.4	4	49,027 (88.5)	907	
	1977	35,501	4,207	6,099	45,807	1,226 (77.5)	145 (9.2)	211 (13.3)	1,582 (100)	35,893	-	38,985 (78.7)	28,959 (78.6)	2,470	39,749 (79)	94.2	3	42,216 (76)	901	
	1978	33,435	6,523	7,411	47,369	1,109 (70.6)	216 (13.7)	246 (15.7)	1,571 (100)	33,963	-	41,253	30,148	1,597	42,133 (84)	96.4	7	43,723 (79)	886	
France	1973	34,002	708	5,158	39,868	1,677 (85.3)	35 (1.8)	254 (12.9)	1,966 (100)	35,368	-	25,264 (100)	20,304 (100)	54,754 (100)	11,530 (100)	24.6	19,454 (100)	46,830 (100)	1,154	
	1974	45,231	901	5,084	51,216	2,008 (88.3)	40 (1.8)	226 (9.9)	2,274 (100)	39,836	-	27,023 (107)	22,519 (110.9)	54,730 (100)	15,933 (138)	31.4	19,846 (102)	50,817 (108.5)	1,135	
	1975	30,444	548	3,460	34,452	1,702 (88.4)	31 (1.6)	193 (10.0)	1,926 (100)	32,099	-	21,530 (85)	17,921 (88.3)	50,142 (91.5)	13,169 (114)	27.8	16,016 (82)	47,295 (101)	1,123	
	1976	32,505	568	3,418	36,491	1,711 (89.1)	30 (1.6)	180 (9.4)	1,921 (100)	34,824	-	23,232 (92)	19,024 (93.7)	45,543 (83)	14,057 (122)	32.1	15,862 (81.5)	43,738 (93)	1,102	
	1977	31,082	282	3,069	34,433	1,705 (90.3)	15 (0.8)	168 (8.9)	1,888 (100)	33,365	-	22,097 (87)	18,251 (89.9)	37,011 (67.5)	15,420 (134)	38.3	12,122 (62)	40,309 (86)	1,071	
	1978	30,495	329	3,345	34,169	1,649 (89.2)	18 (1.0)	180 (9.8)	1,847 (100)	35,562	-	22,841 (90)	18,497 (91.1)	33,776 (61.7)	14,697 (127)	56.7	11,371 (58)	37,102 (79)	1,059	

Source:
Annual Bulletin of Steel Statistics for Europe, United Nations

Note:
Apparent Consumption = Domestic Iron Ore Production + Imports - Exports

Table 4 - 4 - (c) General Outlook for B/F Raw Materials

Country	Year	Consumption of Iron Ore in Blast Furnaces (1,000 M.T.)				Unit Consumption of Iron Ore in Blast Furnaces (Kg/Pig-ton)				Agglomerate Production for B/F (1,000 M.T.)		Crude Steel Production (1,000 M.T.)	Pig Iron Production (1,000 M.T.)	Domestic Iron Ore Production (1,000 M.T.)	Iron Ore Imports & % Reliance (1,000 M.T.)		Iron Ore Exports (1,000 M.T.)	Apparent Consumption (1,000 M.T.)	Unit Consumption of Iron Ore for Sinter (Kg/M.T.)	Remarks
		Sinter	Pellet	Lump	Total	Sinter	Pellet	Lump	Total	Sinter	Pellet									
Italy	1973	10,367	3,573	1,863	15,803	1,027 (65.6)	354 (22.6)	184 (11.8)	1,565 (100)	10,368	72	20,995 (100)	10,097 (100)	510 (100)	14,193 (100)	95.5	-	14,864 (100)	905	
	1974	13,500	2,807	1,914	18,221	1,148 (74.1)	238 (15.4)	163 (10.5)	1,549 (100)	13,555	73	23,803 (113)	11,761 (116)	584 (114.5)	18,057 (127)	95.9	-	19,302 (130)	957	
	1975	14,413	2,006	1,497	17,916	1,263 (80.4)	176 (11.2)	131 (8.3)	1,570 (100)	14,348	74	21,836 (104)	11,411 (113)	739 (145)	15,649 (110)	95.6	12	16,376 (110)	938	
	1976	15,268	1,739	1,182	18,189	1,305 (83.9)	149 (9.6)	101 (6.5)	1,555 (100)	15,480	78	23,447 (112)	11,696 (116)	542 (106)	17,053 (120)	96.1	-	17,700 (119)	964	
	1977	14,555	2,197	1,311	18,063	1,269 (80.6)	191 (12.1)	114 (7.3)	1,574 (100)	14,612	70	23,334 (111)	11,473 (114)	461 (90)	15,281 (108)	96.4	5	15,852 (107)	958	
	1978	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	14,843	71	24,283 (116)	11,403 (113)	353 (69)	16,722 (118)	98.6	11	16,722 (112.5)	N.A.	
Belgium	1973	12,886	424	8,298	21,608	1,018 (59.6)	33 (1.9)	656 (38.5)	1,707 (100)	13,485	455	15,522 (100)	12,655 (100)	115 (100)	32,417 (100)	89.3	-	36,314 (100)	932	
	1974	13,262	427	8,551	22,240	1,019 (59.6)	33 (1.9)	657 (38.5)	1,709 (100)	14,029	495	16,224 (104.5)	13,011 (103)	123 (107)	33,431 (103)	92.2	-	36,240 (100)	915	
	1975	10,380	324	4,951	15,655	1,145 (66.3)	36 (2.1)	545 (31.6)	1,726 (100)	10,861	371	11,583 (75)	9,069 (72)	93 (81)	25,519 (79)	91.4	-	27,927 (77)	908	
	1976	11,465	488	4,852	16,805	1,152 (68.2)	49 (2.9)	487 (28.9)	1,688 (100)	12,189	556	12,145 (78)	9,956 (79)	63 (55)	26,979 (83)	92.6	-	29,121 (80)	939	
	1977	10,577	662	3,843	15,082	1,187 (70.1)	74 (4.4)	432 (25.5)	1,693 (100)	11,402	662	11,256 (72.5)	8,910 (70)	47 (41)	21,522 (66)	93.1	-	23,116 (64)	921	
	1978	12,280	673	3,674	16,627	1,212 (73.8)	66 (4.0)	364 (22.2)	1,642 (100)	N.A.	N.A.	12,601 (81)	10,128 (80)	42 (36.5)	24,242 (75)	96.5	-	25,119 (69)	N.A.	

Source:
Annual Bulletin of Steel Statistics for Europe, United Nations

Note:
Apparent Consumption = Domestic Iron Ore Production + Imports - Exports

Table 4 - 4 - (d) General Outlook for B/F Raw Materials

Country	Year	Consumption of Iron Ore in Blast Furnaces (1,000 M.T.)				Unit Consumption of Iron Ore in Blast Furnaces (Kg/Pig-ton)				Agglomerate Production for B/F (1,000 M.T.)		Crude Steel Production (1,000 M.T.)	Pig Iron Production (1,000 M.T.)	Domestic Iron Ore Production (1,000 M.T.)	Iron Ore Imports & % Reliance (1,000 M.T.)		Iron Ore Exports (1,000 M.T.)	Apparent Consumption (1,000 M.T.)	Unit Consumption of Iron Ore for Sinter (Kg/M.T.)	Remarks
		Sinter	Pellet	Lump	Total	Sinter	Pellet	Lump	Total	Sinter	Pellet									
Luxemburg	1973	7,905	-	4,753	12,658	1,553 (62.4)	-	934 (37.6)	2,487 (100)	7,834	-	5,924 (100)	5,089 (100)	3,782 (100)			-		1,261	
	1974	10,683	-	1,850	12,533	1,954 (85.3)	-	338 (14.7)	2,292 (100)	10,316	-	6,448 (109)	5,468 (107)	2,686 (71)			-		1,280	
	1975	8,660	-	578	9,238	2,227 (93.7)	-	149 (6.3)	2,376 (100)	8,418	-	4,625 (78)	3,889 (76)	2,315 (61)			-		1,293	
	1976	8,747	-	152	8,899	2,327 (98.3)	-	40 (1.7)	2,367 (100)	8,627	-	4,566 (77)	3,759 (74)	2,079 (55)			-		1,285	
	1977	8,148	-	82	8,230	2,284 (99.0)	-	23 (1.0)	2,307 (100)	7,947	-	4,329 (73)	3,568 (70)	1,547 (41)			-			
	1978	7,762	-	158	7,920	2,077 (98.0)	-	42 (2.0)	2,119 (100)	7,511	-	4,790 (81)	3,737 (73)	835 (22)			-			
Netherland	1973	3,315	4,009		7,524	747 (46.7)	851		1,598 (100)	3,425		5,624 (100)	4,707 (100)	-	6,973 (100)	100.0	-	6,973 (100)	1,026	
	1974	3,306	4,394		7,700	688 (42.9)	915		1,603 (100)	3,282		5,840 (104)	4,804 (102)	-	7,062 (101)	100.0	-	7,062 (101)	1,007	
	1975	2,811	3,642		6,453	708 (45.6)	917		1,625 (100)	2,842		4,823 (86)	3,970 (84)	-	7,370 (106)	100 0	-	7,370 (106)	989	
	1976	2,610	4,200		6,810	612 (38.3)	984		1,596 (100)	2,667		5,190 (92)	4,266 (91)	-	6,528 (94)	100.0	-	6,528 (94)	979	
	1977	2,725	3,517		6,242	695 (43.7)	897		1,592 (100)	2,709		4,927 (88)	3,922 (83)	-	6,921 (99)	100.0	-	6,921 (99)	1,006	
	1978	3,009	4,294		7,303	652 (41.2)	931		1,583 (100)	3,012		5,590 (99)	4,613 (98)	-	N.A.		-	N.A.	999	

Source:
Annual Bulletin of Steel Statistics for Europe, United Nations

Note:
Apparent Consumption = Domestic Iron Ore Production + Imports - Exports

Table 4 - 4 - (e) General Outlook for B/F Raw Materials

Country	Year	Consumption of Iron Ore in Blast Furnaces (1,000 M.T.)				Unit Consumption of Iron Ore in Blast Furnaces (Kg/Pig-ton)				Agglomerate Production for B/F (1,000 M.T.)		Crude Steel Production (1,000 M.T.)	Pig Iron Production (1,000 M.T.)	Domestic Iron Ore Production (1,000 M.T.)	Iron Ore Imports & % Reliance (1,000 M.T.)		Iron Ore Exports (1,000 M.T.)	Apparent Consumption (1,000 M.T.)	Unit Consumption of Iron Ore for Sinter (Kg/M.T.)	Remarks
		Sinter	Pellet	Lump	Total	Sinter	Pellet	Lump	Total	Sinter	Pellet									
United Kingdom	1973	17,798		9,170	26,968	1,046 (66.0)		538	1,584 (100)	17,953	-	26,649 (100)	17,020 (100)	7,105 (100)	23,920 (100)	88.2	-	31,025 (100)	1,052	
	1974	14,283		7,422	21,705	1,012 (65.8)		526	1,538 (100)	14,295	-	22,426 (84)	14,116 (83)	3,602 (51)	19,674 (82)	84.5	-	23,276 (75)	1,010	
	1975	13,820		5,685	19,505	1,120 (70.8)		461	1,581 (100)	14,175	-	20,198 (76)	12,338 (72.5)	4,490 (63)	15,783 (66)	77.9	-	20,273 (65)	1,024	
	1976	15,243		7,102	22,345	1,088 (68.2)		507	1,595 (100)	15,533	-	22,274 (83.5)	14,014 (82)	4,583 (64.5)	18,589 (78)	80.2	-	23,172 (75)	1,056	
	1977	13,399	3,207	3,083	19,689	1,082 (68.0)	259 (16.3)	249 (15.7)	1,590 (100)	13,672	-	20,410 (76.5)	12,382 (73)	3,745 (53)	15,539 (65)	80.6	-	19,284 (62)	980	
	1978	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	15,799		20,311 (76)	11,601 (68)	4,240	15,680	78.7		19,920	546	
EC 7	1973	125,279		57,974	183,253	1,174 (68.4)		543	1,717 (100)	127,753		149,499 (100)	106,700 (100)	71,335 (100)	139,356 (100)	72.9	19,460 (100)	191,231 (100)		
	1974	142,489		55,769	198,258	1,273 (71.8)		499	1,772 (100)	138,121		154,996 (104)	111,900 (105)	66,164 (93)	151,876 (109)	76.6	19,851 (102)	198,189 (104)		
	1975	116,687		34,748	151,435	1,316 (77.0)		392	1,708 (100)	119,504		125,010 (84)	88,672 (83)	61,067 (86)	121,812 (87)	73.0	16,033 (82)	166,846 (87)		
	1976	123,876		36,221	160,097	1,310 (77.4)		383	1,693 (100)	127,856		133,269 (89)	94,564 (89)	55,066 (77)	129,981 (93)	76.8	15,866 (81.5)	169,181 (88)		
	1977	115,987		31,559	147,546	1,326 (78.6)		361	1,687 (100)	119,600		125,338 (84)	87,465 (82)	45,254 (63)	114,432 (82)	78.9	14,660 (75)	145,026 (76)		
	1978	N.A.		N.A.	N.A.	N.A.		N.A.	N.A.	N.A.		131,669 (88)	90,127 (84)							

Source:
Annual Bulletin of Steel Statistics for Europe, United Nations

Note:
Apparent Consumption = Domestic Iron Ore Production + Imports - Exports

Table 4 - 4 - (f) General Outlook for B/F Raw Materials

Country	Year	Consumption of Iron Ore in Blast Furnaces (1,000 M.T.)				Unit Consumption of Iron Ore in Blast Furnaces (Kg/Pig-ton)				Agglomerate Production for B/F (1,000 M.T.)		Crude Steel Production (1,000 M.T.)	Pig Iron Production (1,000 M.T.)	Domestic Iron Ore Production (1,000 M.T.)	Iron Ore Imports & % Reliance (1,000 M.T.)		Iron Ore Exports (1,000 M.T.)	Apparent Consumption (1,000 M.T.)	Unit Consumption of Iron Ore for Sinter (Kg/M.T.)	Remarks
		Sinter	Pellet	Lump	Total	Sinter	Pellet	Lump	Total	Sinter	Pellet									
Poland	1973	9,472	1,061	2,771	13,304	1,225 (71.2)	137 (8.0)	358 (20.8)	1,720 (100)	11,036	-	14,057 (100)	7,730 (100)	1,413 (100)	13,700 (100)	90.7	-	15,113 (100)		
	1974	9,617	1,190	3,974	14,781	1,235 (65.1)	153 (8.0)	510 (26.9)	1,898 (100)	10,040	-	14,556 (104)	7,787 (101)	1,296 (92)	15,609 (114)	92.3	-	16,905 (112)		
	1975	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	9,929	-	15,007 (107)	7,752 (100)	1,192 (84)	15,423 (113)	92.8	-	16,615 (110)		
	1976	8,563	1,570	3,964	14,097	1,066 (60.8)	195 (11.1)	493 (28.1)	1,754 (100)	10,611	-	15,640 (111)	8,036 (104)	674 (48)	15,829 (116)	95.9	-	16,503 (109)		
	1977	11,103	2,194	4,122	17,419	1,150 (63.7)	227 (12.6)	427 (23.7)	1,804 (100)	14,569	-	17,841 (127)	9,651 (125)	659 (47)	16,943 (124)	96.3	-	17,602 (116)		
	1978	13,906	2,161	4,442	20,509	1,238 (67.8)	192 (10.5)	395 (21.7)	1,825 (100)	18,318	-	19,250 (137)	11,235 (145)	529 (37)	17,179 (125)	97.0	-	17,708 (117)		
East Germany	1973	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	5,890 (100)	2,202 (100)	52 (100)	1,775 (100)	97.2	-	1,827 (100)		
	1974	2,612	-	1,181	3,793	1,146 (68.9)	-	518 (31.1)	1,664 (100)	2,663	-	6,165 (105)	2,280 (104)	25 (48)	1,802 (102)	98.6	-	1,827 (100)		
	1975	2,671	-	1,327	3,998	1,088 (66.8)	-	540 (33.2)	1,628 (100)	2,722	-	6,480 (110)	2,456 (112)	59 (113)	2,118 (119)	97.3	-	2,177 (119)		
	1976	2,763	-	1,341	4,104	1,093 (67.3)	-	530 (32.7)	1,623 (100)	2,874	-	6,740 (114)	2,528 (115)	59 (113)	2,053 (116)	97.2	-	2,112 (116)		
	1977	2,968	-	1,302	4,270	1,130 (69.5)	-	495 (30.5)	1,625 (100)	3,025	-	6,850 (116)	2,628 (119)	72 (138)	2,267 (128)	96.9	-	2,339 (128)		
	1978	3,229	-	891	4,120	1,261 (78.4)	-	348 (21.6)	1,609 (100)	3,287	-	6,976 (118)	2,560 (116)	80 (154)	2,046 (115)	96.2	-	2,126 (116)		

Source:
Annual Bulletin of Steel Statistics for Europe, United Nations

Note.
Apparent Consumption = Domestic Iron Ore Production + Imports - Exports

Table 4 - 4 - (g) General Outlook for B/F Raw Materials

Country	Year	Consumption of Iron Ore in Blast Furnaces (1,000 M T.)				Unit Consumption of Iron Ore in Blast Furnaces (Kg/Pig-ton)				Agglomerate Production for B/F (1,000 M.T.)		Crude Steel Production (1,000 M.T.)	Pig Iron Production (1,000 M.T.)	Domestic Iron Ore Production (1,000 M.T.)	Iron Ore Imports & % Reliance (1,000 M.T.)		Iron Ore Exports (1,000 M.T.)	Apparent Consumption (1,000 M.T.)	Unit Consumption of Iron Ore for Sinter (Kg/M.T.)	Remarks
		Sinter	Pellet	Lump	Total	Sinter	Pellet	Lump	Total	Sinter	Pellet									
Czechoslovakia	1973	12,052		3,082	15,134	1,412		361 (20.4)	1,773 (100)	13,144	-	13,158 (100)	8,534 (100)	1,672 (100)	13,211 (100)	89.1	52	14,831 (100)		
	1974	13,583		3,139	16,722	1,525		352 (18.8)	1,877 (100)	13,886	-	13,640 (104)	8,905 (104)	1,688 (101)	13,985 (106)	89.7	83	15,590 (105)		
	1975	13,981		3,739	17,720	1,505		402 (21.1)	1,907 (100)	14,291	-	14,324 (109)	9,290 (109)	1,773 (106)	14,802 (112)	89.7	66	16,509 (111)		
	1976	14,396	1,789	1,602	17,787	1,519 (80.9)	189 (10.1)	169 (9.0)	1,877 (100)	14,733	-	14,693 (112)	9,475 (111)	1,904 (114)	15,410 (117)	89.1	23	17,291 (117)		
	1977	14,571	2,191	1,281	18,043	1,500 (80.7)	226 (12.2)	132 (7.1)	1,858 (100)	14,956	-	15,054 (114)	9,715 (114)	1,994 (119)	15,970 (121)	89.1	48	17,916 (121)		
	1978	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	15,332	-	15,294 (116)	9,944 (116.5)	2,023 (121)	N.A.		N.A.	N.A.		
Hungary	1973	4,097	-	34	4,131	1,946 (99.2)	-	16 (0.8)	1,962 (100)	4,060	-	3,332 (100)	2,105 (100)	426 (100)	3,712 (100)	89.7	-	4,138 (100)		
	1974	4,506	-	36	4,542	1,968 (99.2)	-	15 (0.8)	1,983 (100)	4,711	-	3,466 (104)	2,290 (109)	331 (78)	4,105 (111)	92.5	-	4,436 (107)		
	1975	4,437	-	17	4,454	2,000 (99.6)	-	8 (0.4)	2,008 (100)	4,429	-	3,671 (110)	2,218 (105)	386 (91)	4,261 (115)	91.7	-	4,647 (112)		
	1976	4,393	-	7	4,400	1,978 (99.8)	-	3 (0.2)	1,981 (100)	4,395	-	3,652 (110)	2,221 (106)	358 (84)	4,234 (114)	92.2	-	4,592 (111)		
	1977	4,492	-	33	4,525	1,965 (99.3)	-	14 (0.7)	1,979 (100)	4,481	-	3,723 (112)	2,286 (109)	262 (62)	4,281 (115)	94.2	-	4,543 (110)		
	1978	4,670	-	20	4,690	2,004 (99.6)	-	8 (0.4)	2,012 (100)	4,677	-	3,877 (116)	2,330 (111)	283 (66)	4,200 (113)	93.7	-	4,483 (108)		

Source:
Annual Bulletin of Steel Statistics for Europe, United Nations

Note:
Apparent Consumption = Domestic Iron Ore Production + Imports - Exports

Table 4 - 4 - (h) General Outlook for B/F Raw Materials

Country	Year	Consumption of Iron Ore in Blast Furnaces (1,000 M.T.)				Unit Consumption of Iron Ore in Blast Furnaces (Kg/Pig-ton)				Agglomerate Production for B/F (1,000 M.T.)		Crude Steel Production (1,000 M.T.)	Pig Iron Production (1,000 M.T.)	Domestic Iron Ore Production (1,000 M.T.)	Iron Ore Imports & % Reliance (1,000 M.T.)		Iron Ore Exports (1,000 M.T.)	Apparent Consumption (1,000 M.T.)	Unit Consumption of Iron Ore for Sinter (Kg/M.T.)	Remarks
		Sinter	Pellet	Lump	Total	Sinter	Pellet	Lump	Total	Sinter	Pellet									
Rumania	1973	9,500		-	9,500	1,662		-	1,662	9,444	-	8,161 (100)	5,713 (100)	3,234 (100)	9,501 (100)	74.6	-	12,735 (100)		
	1974	9,982		-	9,982	1,642		-	1,642	10,032	-	8,840 (108)	6,081 (106)	3,265 (101)	10,002 (105)	75.4	-	13,267 (104)		
	1975									9,922	-	9,549 (117)	6,602 (116)	3,065 (95)	10,879 (105)	78.0	-	13,944 (109)		
	1976									10,344	-	10,734 (131.5)	7,416 (130)	2,835 (88)	11,740 (124)	80.5	-	14,575 (114)		
	1977			N. A.						10,217	-	11,457 (140)	7,784 (136)	2,467 (76)	12,402 (131)	83.4	-	14,869 (117)		
	1978									11,156	-	11,779 (144)	8,155 (143)	2,511 (78)	13,373 (141)	84.2	-	15,884 (125)		
Burgaria	1973											2,246 (100)	1,566 (100)	2,774 (100)	1,672 (100)	37.6	-	4,446 (100)		
	1974											2,188 (97)	1,483 (95)	2,685 (97)	1,638 (98)	37.9	-	4,323 (97)		
	1975			N. A.								2,265 (101)	1,509 (96)	2,337 (84)	1,918 (115)	45.1	-	4,255 (96)		
	1976											2,460 (110)	1,558 (99)	2,316 (83)	2,396 (143)	50.8	-	4,712 (106)		
	1977											2,589 (115)	1,614 (103)	2,270 (82)	1,886 (113)	45.4	-	4,156 (93)		
	1978											2,469 (110)	1,493 (95.5)	2,453 (88)	N.A.			N.A.		

Source:
Annual Bulletin of Steel Statistics for Europe, United Nations

Note:
Apparent Consumption = Domestic Iron Ore Production + Imports - Exports

Table 4 - 4 - (i) General Outlook for B/F Raw Materials

Country	Year	Consumption of Iron Ore in Blast Furnaces (1,000 M.T.)				Unit Consumption of Iron Ore in Blast Furnaces (Kg/Pig-ton)				Agglomerate Production for B/F (1,000 M.T.)		Crude Steel Production (1,000 M.T.)	Pig Iron Production (1,000 M.T.)	Domestic Iron Ore Production (1,000 M.T.)	Iron Ore Imports & % Reliance (1,000 M.T.)		Iron Ore Exports (1,000 M.T.)	Apparent Consumption (1,000 M.T.)	Unit Consumption of Iron Ore for Sinter (Kg/M.T.)	Remarks
		Sinter	Pellet	Lump	Total	Sinter	Pellet	Lump	Total	Sinter	Pellet									
Yugoslavia	1973	2,393	-	526	2,919	1,224	-	269 (18.0)	1,493 (100)	2,537	37	2,676 (100)	1,955 (100)	4,670 (100)	390 (100)	7.7	-	5,060 (100)		
	1974	2,646	-	544	3,190	1,245	-	255 (17.1)	1,500 (100)	2,761	96	2,836 (106)	2,126 (109)	5,034 (108)	430 (110)	7.9	-	5,464 (108)		
	1975	2,496	-	563	3,059	1,248	-	281 (18.4)	1,529 (100)	2,623	97	2,916 (109)	2,001 (102)	5,238 (112)	598 (153)	10.2	-	5,836 (115)		
	1976	2,459	-	511	2,970	1,281	-	267 (17.2)	1,548 (100)	2,585	45	2,750 (103)	1,919 (98)	4,260 (91)	482 (124)	10.2	-	4,742 (94)		
	1977	2,597	67	499	3,163	1,346 (82.1)	35 (2.1)	259 (15.8)	1,640 (100)	2,582	67	3,182 (119)	1,929 (99)	4,451 (95)	516 (132)	10.4	-	4,967 (98)		
	1978	2,829	50	N.A.	N.A.	1,359	34	N.A.	N.A.	2,841	71	3,456 (129)	2,081 (106)	4,563 (98)	547 (140)	10.7	-	5,110 (101)		
U.S.S.R.	1973	161,389		9,630	171,019	1,682		100 (5.6)	1,782 (100)	146,123	21,545	131,481 (100)	95,933 (100)	216,104 (100)	-	-	41,400 (100)	174,704 (100)		
	1974	166,165		11,056	177,221	1,664		111 (6.2)	1,775 (100)	148,796	23,417	136,206 (104)	99,868 (104)	224,883 (104)	-	-	43,300 (105)	181,583 (104)		
	1975	170,216		12,570	182,786	1,653		122 (6.9)	1,775 (100)	151,943	27,209	141,325 (107)	102,968 (107)	232,803 (108)	-	-	43,626 (105)	189,177 (108)		
	1976	N.A.		N.A.	N.A.	N.A.		N.A.	N.A.	153,251	31,398	144,805 (110)	105,384 (110)	239,109 (111)	-	-	43,126 (104)	195,983 (112)		
	1977	N.A.		N.A.	N.A.	N.A.		N.A.	N.A.	158,195	36,170	146,655 (112)	107,368 (112)	239,716 (111)	-	-	40,946 (99)	198,770 (114)		
	1978	N.A.		N.A.	N.A.	N.A.		N.A.	N.A.	159,564	45,005	151,436 (115)	110,702 (115)	244,231 (113)	-	-	N.A.	N.A.		

Source:
Annual Bulletin of Steel Statistics for Europe, United Nations

Note:
Apparent Consumption = Domestic Iron Ore Production + Imports - Exports

Table 4 - 5 - (a) Iron Ore Imports by EC 7 Countries

(Unit: 1,000 wet M.T.)

		1973			1974			1975			1976			1977			1978		
W. Germany	Brazil	11,043	(1)	21.9	11,980		20.8	11,023	(1)	24.9	12,075	(1)	25.8	10,184	(1)	25.6	11,132	(1)	26.4
	Liberia	8,543	(3)	17.0	9,744		16.9	6,196	(3)	14.0	6,600	(3)	14.1	6,805	(2)	17.1	7,045	(2)	16.7
	Sweden	10,885	(2)	21.6	10,586		18.3	5,762	(4)	13.0	5,267	(5)	11.3	4,319	(5)	10.9	5,729	(3)	13.6
	Australia	2,777	(6)	5.5	4,780		8.3	6,412	(2)	14.5	7,005	(2)	15.0	5,226	(3)	13.1	5,581	(4)	13.2
	S. Africa	156	(7)	0.3	475		0.8	297	(7)	0.7	524	(7)	1.1	2,266	(6)	5.7	3,524	(5)	8.4
	Canada	3,886	(4)	7.7	3,976		6.9	4,065	(5)	9.2	6,335	(4)	13.5	4,452	(4)	11.2	3,452	(6)	8.2
	France	3,499	(5)	7.0	3,675		6.4	2,623	(6)	5.9	2,807	(6)	6.0	1,603	(7)	4.0	1,545	(7)	3.7
	Other countries	9,534		19.0	12,503		21.6	7,944		17.8	6,162		13.2	4,894		12.4	4,125		9.8
	Total	50,323		100	57,719		100	44,322		100	46,775		100	39,749		100	42,133		100
France	Brazil	3,246	(1)	28.2	4,211	(1)	26.4	3,491	(1)	26.5	4,206	(1)	29.9	4,271	(1)	27.7	4,301	(1)	29.4
	Australia	831	(5)	7.2	1,613	(5)	10.1	1,676	(4)	12.7	1,687	(5)	12.0	2,173	(3)	14.1	2,197	(2)	15.0
	Mauritania	1,881	(3)	16.3	2,452	(3)	15.4	2,163	(2)	16.4	2,245	(2)	16.0	2,543	(2)	16.5	2,140	(3)	14.7
	Liberia	1,707	(4)	14.8	2,078	(4)	13.0	1,994	(3)	15.1	1,886	(3)	13.4	2,102	(4)	13.6	1,887	(4)	12.9
	Sweden	1,966	(2)	17.1	2,664	(2)	16.7	1,646	(5)	12.5	1,803	(4)	12.8	1,725	(5)	11.2	1,871	(5)	12.8
	Other countries	1,899		16.4	2,915		18.4	2,199			2,230		15.9	2,606		16.9	2,209		15.2
	Total	11,530		100	15,933		100	13,169		100	14,057		100	15,420		100	14,605		100
Italy	Brazil	1,933	(3)	13.6	3,260	(2)	18.1	3,094	(1)	19.8	3,194	(1)	18.7	3,157	(1)	20.7	3,790	(1)	23.3
	Liberia	3,746	(1)	26.5	3,812	(1)	21.1	2,831	(2)	18.1	2,880	(2)	16.9	3,100	(2)	20.3	3,318	(2)	20.4
	Venezuela	1,526	(5)	10.8	1,836	(5)	10.2	2,161	(3)	13.8	1,997	(5)	11.7	1,758	(4)	11.5	1,668	(3)	10.2
	Australia	1,780	(4)	12.5	2,235	(3)	12.4	2,084	(4)	13.3	2,548	(3)	14.9	1,523	(6)	10.0	1,533	(4)	9.4
	Canada	1,943	(2)	13.7	1,998	(4)	11.1	1,992	(5)	12.7	2,098	(4)	12.3	1,807	(3)	11.8	1,497	(5)	9.2
	U.S.S.R.	1,179	(6)	8.3	1,675	(6)	9.3	1,705	(6)	10.9	1,596	(6)	9.4	1,561	(5)	10.2	1,388	(6)	8.5
	Other countries	2,068		14.6	3,241		17.8	1,784		11.4	2,740		16.1	2,375		15.5	3,102		19.0
	Total	14,193		100	18,057		100	15,649		100	17,053		100	15,281		100	16,296		100

Table 4 - 5 - (b) Iron Ore Imports by EC 7 Countries

(Unit: 1,000 wet M.T.)

		1973			1974			1975			1976			1977			1978		
Belgium Luxemburg	France	14,216	(1)	43.9	14,588	(1)	43.6	13,075	(1)	51.2	12,542	(1)	46.5	10,307	(1)	47.9	9,170	(1)	37.8
	Sweden	8,689	(2)	26.8	8,887	(2)	26.6	4,907	(2)	19.2	4,426	(2)	16.4	4,034	(2)	18.7	5,819	(2)	24.0
	Brazil	1,296	(4)	4.0	1,643	(5)	4.9	1,973	(4)	7.7	2,261	(4)	8.4	1,389	(4)	6.4	2,443	(3)	10.1
	Liberia	1,290	(5)	4.0	1,964	(4)	5.9	916	(6)	3.6	1,453	(5)	5.4	797	(6)	3.7	1,287	(4)	5.3
	Venezuela	1,289	(6)	4.0	873	(6)	2.6	285	(8)	1.1	618	(7)	2.3	513	(8)	2.4	1,084	(5)	4.5
	Australia	1,806	(3)	5.6	2,212	(3)	6.6	2,279	(3)	8.9	2,276	(3)	8.4	1,585	(3)	7.4	1,025	(6)	4.2
	Other countries	3,831		11.7	3,264		9.8	2,084		8.3	3,403		12.6	2,897		13.5	3,414		14.1
	Total	32,417		100	33,431		100	25,519		100	26,979		100	21,522		100	24,242		100
Netherland	Brazil	1,219	(3)	17.5	1,613	(2)	22.8	1,769	(1)	24.0	1,672	(2)	25.6	1,100	(3)	15.9	1,767	(1)	31.7
	Liberia	2,465	(1)	35.4	1,595	(3)	22.6	1,082	(3)	14.7	842	(4)	12.9	1,082	(4)	15.6	865	(2)	15.5
	Canada	169	(6)	2.4	600	(4)	8.5	930	(4)	12.6	1,184	(3)	18.1	2,135	(1)	30.8	774	(3)	13.9
	Sweden	1,571	(2)	22.5	1,856	(1)	26.3	1,537	(2)	20.9	1,711	(1)	26.2	1,492	(2)	21.6	722	(4)	12.9
	Australia	220	(5)	3.2	-			688	(5)	9.3	539	(5)	8.3	601	(5)	8.7	540	(5)	9.7
	Spain	226	(4)	3.2	302	(7)	4.3	391	(6)	5.3	199	(6)	3.0	254	(6)	3.7	515	(6)	9.2
	Other countries	1,103		15.8	1,096		15.5	973		13.2	381		5.9	257		3.7	395		7.1
	Total	6,973		100	7,062		100	7,370		100	6,528		100	6,921		100	5,578		100
U. K.	Brazil	2,437	(3)	10.2	3,141	(3)	16.0	2,205	(3)	14.0	3,186	(3)	17.1	2,953	(3)	19.0	3,574	(1)	23.1
	Canada	5,476	(1)	22.9	4,292	(1)	21.8	3,061	(1)	19.4	3,821	(1)	20.6	3,194	(1)	20.6	3,124	(2)	20.2
	Norway	1,076	(8)	4.5	1,074	(7)	5.5	1,639	(5)	10.4	2,473	(4)	13.3	1,241	(5)	8.0	1,879	(3)	12.2
	Australia	1,235	(7)	5.2	807	(8)	4.1	858	(7)	5.4	1,305	(6)	7.0	987	(7)	6.4	1,723	(4)	11.1
	S. Africa	64	(13)	0.3	58	(16)	0.3	68	(14)	0.4	-			1,379	(4)	8.9	1,573	(5)	10.2
	Sweden	4,671	(2)	19.5	3,925	(2)	20.0	2,242	(2)	14.2	3,201	(2)	17.2	3,021	(2)	19.4	843	(6)	5.5
	Mauritania	2,231	(4)	9.3	1,533	(5)	7.8	1,609	(6)	10.2	1,447	(5)	7.8	1,142	(6)	7.3	813	(7)	5.3
	Venezuela	1,716	(5)	7.2	1,728	(4)	8.8	1,803	(4)	11.4	1,006	(7)	5.4	320	(8)	2.1	776	(8)	5.0
	Other countries	5,014		20.9	3,116		15.7	2,298		14.6	2,150		11.6	1,302		8.3	1,148		7.4
	Total	23,920		100	19,674		100	15,783		100	18,589		100	15,539		100	15,453		