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Metals Industry in Latin America and
Possibilities for Complementarity*

Córdoba, Argentina
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THE DEVELOPMENT OF NON-FERROUS METALS IN SOUTH AMERICA AND THE POSSIBILITIES FOR COMPLEMENTARITY**

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* This meeting was organized by UNIDO together with the Government of Argentina.

** Primarily analyses concentrates and refined metals. The views and opinions expressed in this document are those of the author and do not necessarily reflect the views of the UNIDO Secretariat. Mention of firm names and commercial products does not imply the endorsement of the United Nations Industrial Development Organization. This document has been translated from an unedited original.

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CONTENTS

1. INTRODUCTION

The present study was carried out in fulfilment of one of the recommendations made to UNIDO during the First Consultation on the Non-Ferrous Metals Industry which was held in Budapest, Hungary, from 30 November to 4 December 1987.

The immediate objective of the present study is to attempt to identify specific possibilities of complementarity between the aluminium, copper and tin industries of Argentina, Bolivia, Brazil, Chile, Peru and Venezuela.

It is understood that the results of this study will serve as an information base for a meeting which will be held subsequently in Argentina in order to analyse the inherent possibilities for complementarity and to make recommendations to governments, national and international institutions and public and private companies concerning policy and action guidelines for achieving complementarity as a route towards industrial development in the South American region.

2. CONCLUSIONS AND RECOMMENDATIONS

There are clear possibilities for complementarity between the Countries covered by the study both at the level of concentrates, processed and refined products and also at the level of finished and semi-finished goods.

In this report the conclusions and recommendations are limited to complementarity in respect of the metals covered by the study up to the level of smelting and refining.

Complementarity between the Aluminium, Copper and Tin Industries in the six countries studied is of special relevance because the Aluminium Industries in Venezuela and Brazil produce 6,500,000 tonnes of Bauxite, 2,600,000 tonnes of Alumina and 1,275,000 tonnes of Aluminium, these figures being equivalent to 7.2%, 7.6% and 7.6% respectively of world production.

The Copper Industries of Peru and Chile produce 1,750,000 tonnes of Copper contained in concentrates and 1,400,000 tonnes of Refined Copper, representing 21.3% and 16.2% respectively of world production.

The Tin Industries of Bolivia and Brazil produce 34,000 tonnes of Tin contained in concentrates and 31,500 tonnes of Refined Tin, representing 19.8% and 16.3% respectively of world production.

The possibilities for complementarity in the Aluminium Industry are for Brazilian Bauxite to be processed in Venezuela, Venezuelan Alumina in Argentina and, finally, both the converting of Venezuelan and Brazilian Refined Aluminium in the industrial plants in Bolivia, Peru, Argentina and Chile. The specific possibilities for complementarity in the Aluminium Industry are described in Chapter 13.

Possibilities for complementarity in the Copper Industry include smelting Peruvian and Chilean concentrates in the Fundición de Caraiba de Metales (Caraiba Metal Smelting Works) in Brazil, refining Peruvian and Chilean Blister Copper in the Refinería de Caraiba (Caraiba Refinery) in Brazil and of Peruvian and Chilean Copper Cathodes in the Planta de Colada Continua (Continuous Casting Plant) which is also in Caraiba in Brazil. Finally the converting of Peruvian and Chilean Refined Copper to semi-finished and finished products could be carried out in converting installations in Argentina, Brazil, Chile and Venezuela. Chapter 13 of the present report also sets out in detail the specific possibilities for complementarity which have been identified in this study.

In the Tin Industry there are smelting and refining installations in Bolivia with unused capacities, but the surplus Tin concentrates produced in Brazil cannot be processed in them for two main reasons; firstly there is the cost of transport between the mining areas in Brazil and the Bolivian refineries which is much higher than the cost of constructing new smelting and refining capacities in Brazil itself. Secondly there are the production limits which the World Tin Association imposes on each one of its member Countries: Brazil is already operating at the maximum permitted limit.

On the other hand the possiblity of complementarity with other countries in respect of Tin produced in Bolivia and Brazil is practically nil, due to the fact that the consumption in these other countries is very small and also to

the fact that they have practically no semi-finished or finished tin products which could then be converted in these other countries for re-exporting.

However, possibilities for complementarity were identified during the study in regard to other metals, specifically Lead and Zinc concentrates, and these are described in Chapter 13 of the present report.

Although falling outside the scope of the present study it was found that the Refined Metal Converting Industries producing semi-finished and finished products in practically all the countries in the study were operating far below their installed capacity, so ensuring that there are many possibilities for complementarity between these countries in regard to the metals involved.

A major limitation on complementarity at the level of semi-finished and finished products is the matter of supplying these products to the final markets, especially in the developed countries with which they have to compete, since industry in these countries is orientated towards buying raw materials for converting into semi-finished and finished products for domestic consumption and/or export and with a high value added.

In order to overcome this limitation countries such as Chile and Venezuela are buying or installing processing plants outside their territories for converting their products, especially in countries which are consumers of the finished products. This is the case with the Copper Wire factories which CODELCO has in West Germany and the Copper Tube Plant which has been installed in Mainland China. Similarly Venezuela has purchased, through the CVG, Aluminium processing plants in Costa Rica and Belgium.

Another limitation on complementarity which was identified in respect of semi-finished and finished products is the lack of marketing mechanisms with the knowledge and capability which our countries have in selling raw materials.

Organisations exist for marketing raw materials, whether these are concentrates, alumina or refined metals, such as CODELCO in Chile, CVG International in Venezuela or Minero Perú Comercial in Peru; these have not only their expert knowledge but also great capability in negotiation for the volumes which they market, thus achieving a high level of efficiency in carrying out their tasks.

This is not the case with marketing semi-finished and finished products since practically every smelter, factory or workshop for the processing and production of semi-finished and finished products markets its own products individually, on both the domestic and export markets. To overcome this limitation it would be necessary to form national or inter-regional Trading organisations to integrate the production of these goods for their competitive marketing at world level.

Another limitation on any complementarity or integration project is the almost universal feeling of frustration arising from the failure of former efforts of this type. This is clearest in the case of Bolivia, a country which was granted preferences as a country of relatively lower development and which constructed factories to produce a variety of products which could then be allowed entry into other countries in the region: however because of the inefficient allocation of projects and the vested interests of other countries practically all these industries, which had been established in the expectation of integration with the other countries in the region, were finally closed down.

A similar limitation arises from the feelings of the majority of the industrialists interviewed in regard to the role and efficacy of the projects promoted by international bodies.

On the other hand it has been observed that countries with liberal economic policies, such as Venezuela, Brazil and Chile, have very little interest in complementarity and Integration with countries in the region unless the benefits will be very clear, tangible and short-term. For this reason schemes for complementarity need to be very pragmatic and easily applied, and must represent very clear benefits for all parties involved.

The complementarity which could exist between the countries studied needs to be supported by schemes which permit financing of the transactions involved, the formation of mixed companies and the elimination of the tariff barriers that still exist in the region.

Integration is still further limited by the restrictions imposed by certain countries on the free entry of nationals from other countries. One industrialist who was interviewed said that since it was sometimes practically impossible for individuals to enter certain countries it was obviously even more difficult for companies and their products. For this reason industrial integration schemes must envisage, as a basic condition, the free movement of individuals between the countries of the region.

3. THE SCOPE OF THE STUDY

The process for producing the metals Aluminium, Copper and Tin starts with the extraction from the earth's crust of those ores which contain them, and ends with the integration of these metals, in their pure or alloyed states or as chemical products, in semi-finished or finished products.

The present study is concerned with finding and identifying the possibilities for complementarity in the aluminium, copper and tin industries, from the production of the ore and its processing to give concentrates in the case of copper and tin or alumina in the case of aluminium, up to the stages of smelting and refining to give the pure metal.

Finding and identifyng complementarity in the processing of the refined metals to give semi-finished and finished products will be the subject of a further study to follow the present one.

From the geographical standpoint the present study will be limited to six South American countries, Argentina, Bolivia, Brazil, Chile, Peru and Venezuela.

The extension of the possibilities for complementarity to other South and Central American countries, such as the Caribbean and other regions with developing countries will be the subject of parallel studies to be carried out by UNIDO in fulfilment of the mandate received at the First Consultation on the Non-Ferrous Metals Industry.

4. METHODOLOGY AND PRESENTATION

In order to carry out the present study, and in addition to desk research and the collection and analysis of information on production, processing capacity, etc., brief visits were made to the six countries covered by the study in order to interview persons involved in the aluminium, copper and tin industries including government officials, trade associations and mining and metallurgical companies.

The object of these visits was to supplement the collection of information, to verify the coherence of the various sources of information and to obtain the opinions of the persons responsible for the industry on the possibilities for complementarity from both the technical and policy standpoints.

The study is presented on the basis that its results can serve to establish a common communication and information basis for all those who will take part in a meeting to be held in Argentina within the UNIDO programme of consultations.

It presents, first of all, the definition which is given in this study to the concept of Complementarity, establishing the limits of this in respect of processing in each of the industries dealing with these metals.

Then a brief description is given of the process for producing each of the metals, with the volumes of production and usage and the principal uses.

After this an anlysis is provided of the principal trading flows, at global and regional level, of the metals covered by the study.

After a very brief survey is given of some economic indicators for the countries covered by the study the structure of production and consumption of the metals in the countries of the region is set out.

This is followed by a listing of the various companies producing each metal, at the various processing levels, in each country.

An analysis has been made of the principal limitations and facilities which exist for the products in each country with a list of international agreements, which have been drawn up to facilitate trading, as they have been identified in each country.

Details are also given of the customs classification in use in the countries covered by the study on the products and sub-products or aluminium, copper and tin.

Finally a suggestion is made as to the form in which complementarity could be achieved in the countries covered by the study at the levels of ores, concentrates, alumina and refined aluminium, copper and tin.

In the case of the statistical information the fact that more than one source has been utilised had led to discrepancies in some cases: the figures are presented without correction, citing the source used.

5. COMPLEMENTARITY

5.1. Conceptual definition

For the purposes of this study complementarity is understood as being Ver'ical Integration, making it possible to make the greatest use of the productive resources, to obtain the benefits from scale economies and to increase bilateral trade between those countries between which there exists complementarity.

Complementarity exists between a pair of countries when a resource is produced in one of them up to a certain level of processing and installations exist in the other country which are able to take the said resource on to more advanced levels in the overall process of transformation.

Complementarity has existed since the beginning of transactions between human beings who have used bartering to satisfy their needs. Throughout the passage of time the application of complementarity, without any idea of development and progress for both parties, has generated the division between developed and under-developed countries. That is to say those countries which had the capacity for processing inputs, from those countries which had the resources, progressed rapidly, retaining for themselves the technology, markets and value added, whilst limiting those countries endowed with the resources to the status of producers of raw materials without any great degree of subsequent processing.

In respect of the countries covered by this study two groups of countries can be identified in which, whilst the pattern of trade described in the previous paragraph is not basically modified, the process of development continues in a divergent form so as to create within the South American region a division between developed and under-developed countries. Amongst the former are Argentina and Brazil, whilst Peru and Bolivia are amongst the latter: Chile and Venezuela find themselves in an intermediate position.

Once complementarity has been identified it can serve to create the parallel development of both parties. What is needed to achieve this is the political will and decision of both countries and the establishment by them of mechanisms for trading, financing, the interchange of technology, etc., so that they can make use of this condition of complementarity.

5.2. Complementarity at the level of Ores, Concentrates and Refined Products

Ores, with their low value at primary mining level and the large volumes handled, cannot profit from the advantages offered by complementarity because of the distances between the countries covered by the present study, unless they undergo significant modifications to increase their value or to reduce their volume.

In the case of Aluminium the first process to which the raw materials is subjected is the drying of the bauxite. In certain cases this process can reduce its weight by up to fifty percent, and for this reason drying operations must be carried out in the country of origin. Thus complementarity in the case of aluminium can start with the production of alumina from bauxite in installations in the receiving country. Then it is clear that there is the possibility of processing the alumina produced in the country of origin in smelting works or refineries in a complementary country.

Finally if there are aluminium refining plants in the country of origin then complementarity can exist in the manufacture of semi-finished or finished products in the complementary country.

In the case of copper complementarity can involve converting a concentrate to copper matte (in smelters), the matte to blister copper (in converters), from blister to cathodes (in electrolytic refineries) and, finally, from refined copper to semi-finished and finished products (in continuous casting plants and converting factories).

Finally in the case of Tin complementarity can start with converting concentrates or ores of high metal content to primary Tin (in smelters and refineries) and then to semi-finished and finished products, although in the case of tin the production of semi-finished and finished tin products is minimal, this metal being almost exclusively used as a component in solders, alloys and coatings. For this reason the possiblities for complementarity at this level in the tin industry are also minimal.

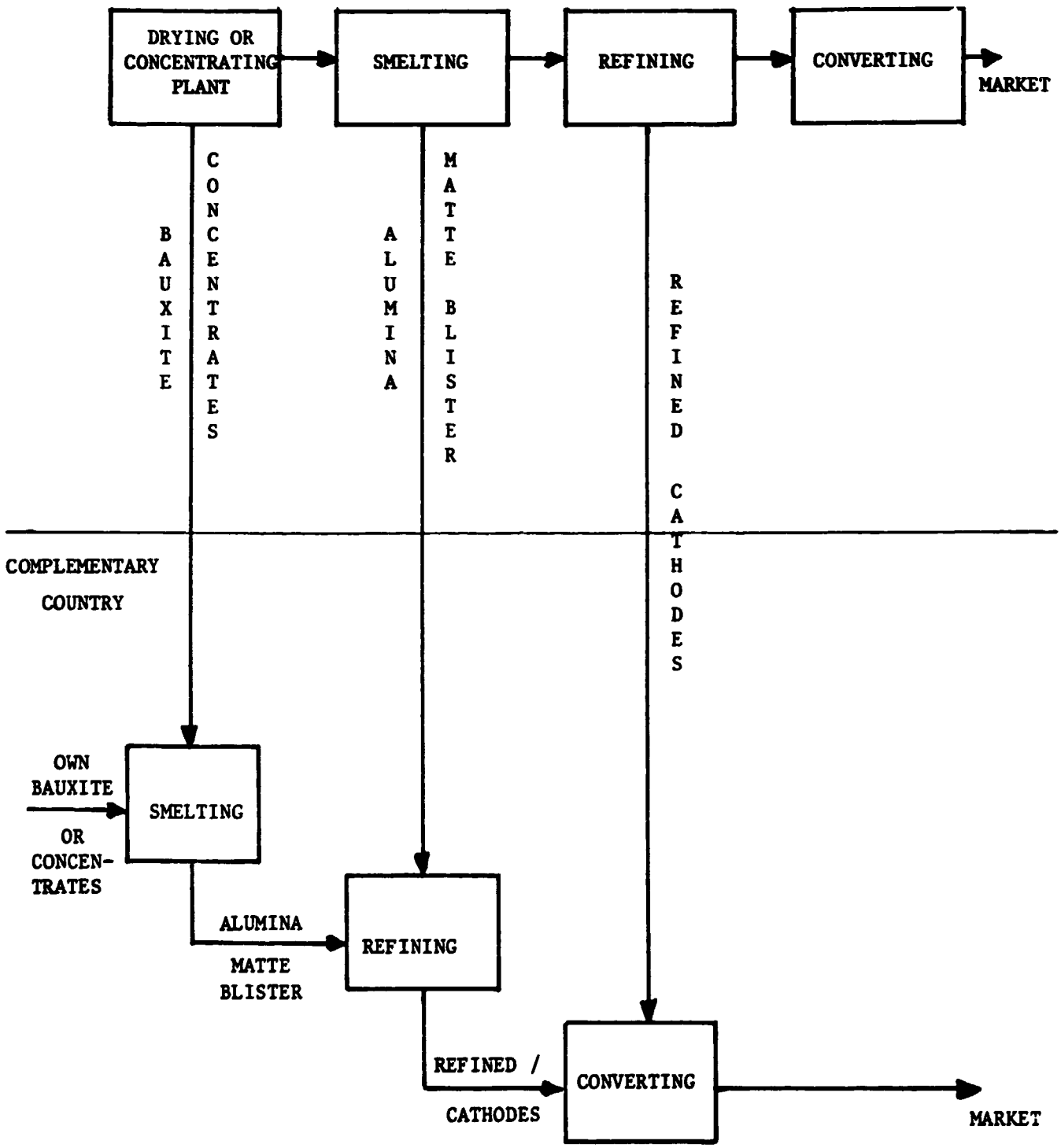

Diagram No.1 - COMPLEMENTARITY IN ORES

6. THE ALUMINIUM, COPPER AND TIN INDUSTRIES

6.1. The Aluminium Industry

6.1.1. Introduction

Aluminium is a light metal with a density one third of that of copper or steel; it is malleable, ductile and easy to machine or cast. It has high corrosion resistance and a long working life.

Consumption is very high, being second only to iron; this makes it very important in all segments of the world economy.

The world aluminium industry is concentrated in six major companies and about fifty smaller state companies.

6.1.2. Reserves

Bauxite is the principal source of alumina; chemically it is a hydrated oxide of aluminium, formed by a natural process of modification of certain types of rocks (with a low silica content), giving rise to the so-called lateritic soils which can reach considerable thicknesses.

The total global reserves of bauxite are 21,000m tonnes, and at the present annual rate of production this represents supplies for 230 years. The principal deposits are located in Guinea (27%), Australia (21%), Jamaica (10%) and Brazil (10%).

6.1.3. Mining

Bauxite mining operations are almost exclusively of the opencast type, using highly mechanised equipment of a high level of production and productivity, involving very heavy capital investments but low operating costs.

In certain European countries mining is carried out underground because of the geological conditions and the depth of the deposits, resulting in low production levels and higher costs.

World bauxite production is 91m tonnes, the principal producers being Australia (35%), Guinea (16%) and Jamaica (8%).

6.1.4. Processing

In order to obtain metallic aluminium it is necessary to convert the bauxite into alumina, and this is done using a solution of sodium hydroxide in an autoclave (Bayer process). Finally the alumina is refined in electrolytic cells to produce aluminium in ingots. It is important to point out that the refining of alumina requires a very large quantity of electrical energy, 16 MWh for every tonne produced, which is eight times more than is needed in the case of copper.

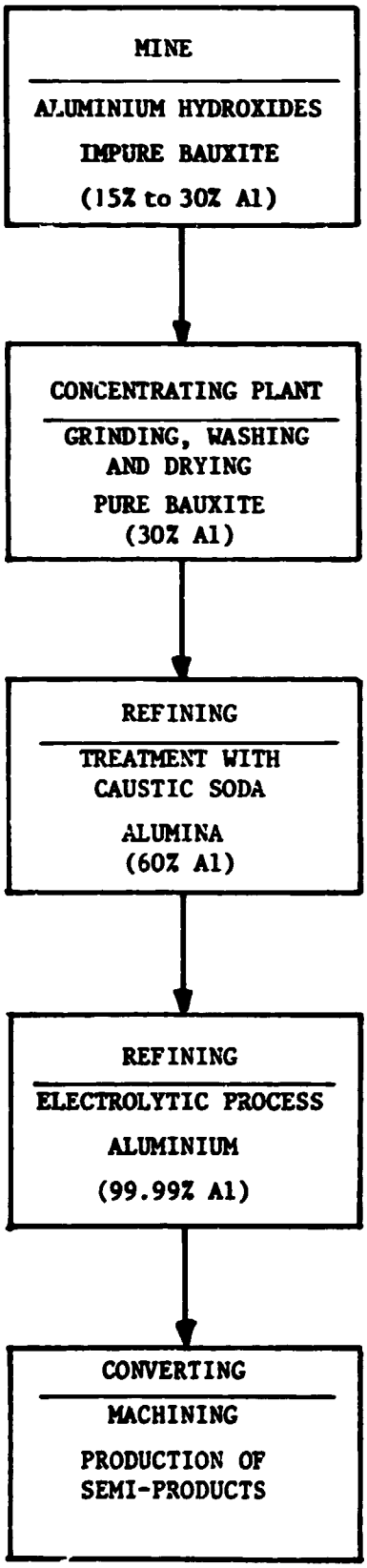

Diagram No.2 - PROCESS OF OBTAINING ALUMINIUM

The total quantity of aluminium metal produced in the world is 15.5m tonnes, the principal producers being the United States (20%), the Soviet Union (15%) and Canada (9%).

6.1.5. Consumption and uses

In 1986 world consumption of aluminium reached 16.4m tonnes, the mean annual increase in recent years being 2.1%. The countries with the largest consumptions were the United States (26.4%), the Soviet Union (11.5%), Japan (9.9%) and Federal Germany (7.3%).

Aluminium metal, alumina and bauxite are used for a wide variety of purposes.

Aluminium metal is used in :

- Domestic utensils
- The building industry
- The aeronautic industry
- The packaging industry
- Machinery and equipment generally
- Military applications.

Alumina and bauxite are used in :

- Refractories
- Chemical products
- Abrasives.

6.2. The Copper Industry

6.2.1. Introduction

Man has made great use of copper over the last 6000 years, and it has contributed to the growth of civilisation.

Its first use was probably in the manufacture of tools, weapons and adornments. The well known alloy bronze is produced from copper and tin, whilst brass, another widely used alloy, is produced by mixing copper and zinc. However the growth of the copper industry is today closely linked with electrical applications.

6.2.2. Reserves

Chalcopyrite and other copper sulphides are the principal sources of copper.

The total global resources are 340m tonnes of copper content, and at the present rate of production this represents 35 years supply. The principal deposits are found in Chile (23%), the United States (17%), Zambia (9%) and Zaire (8%).

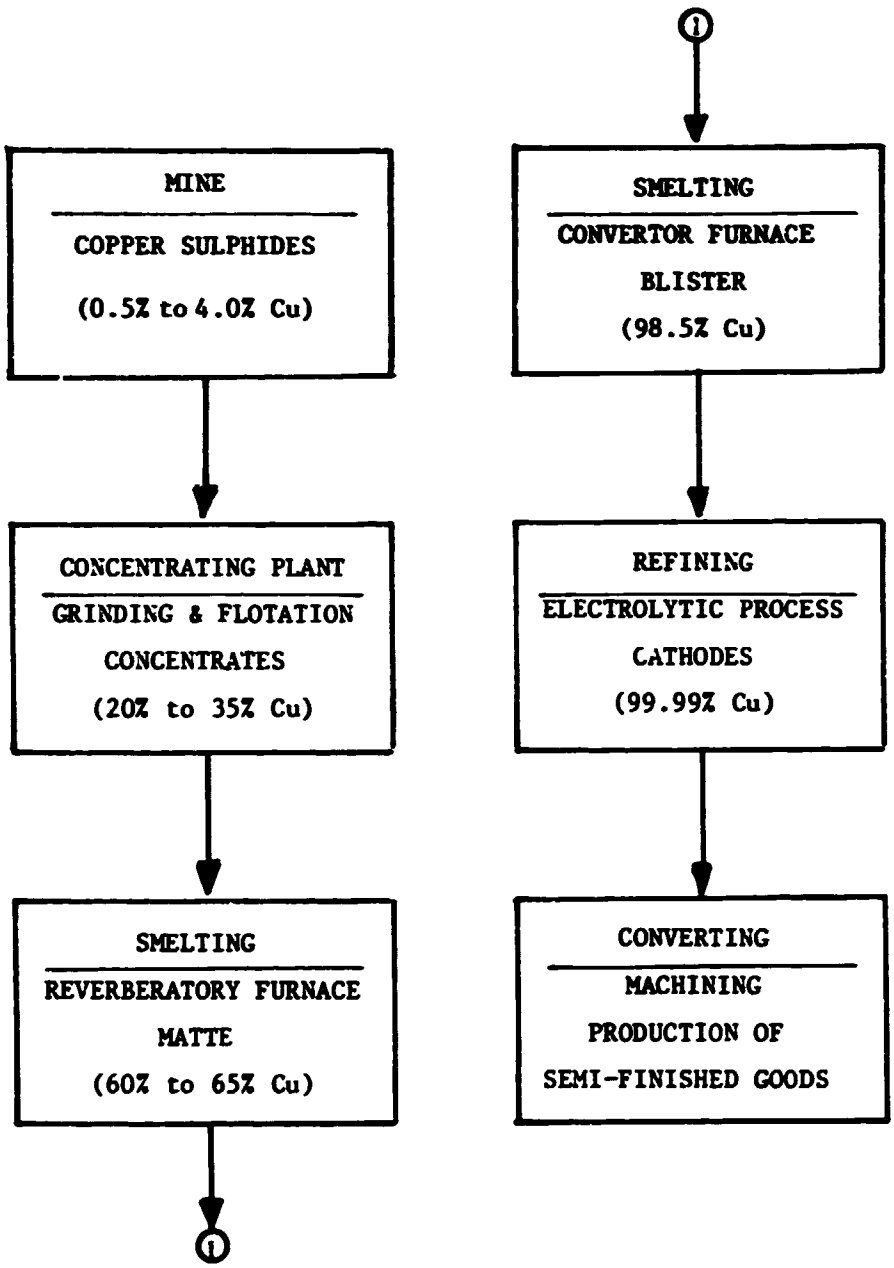

Diagram No.3 - PROCESS OF OBTAINING COPPER

6.2.3. Mining

The largest mines in the world use opencast mining and are intensely mechanised involving high capital investments. The deeper deposits use underground methods, but generally the ores extracted from these mines contain not only copper but also silver, lead, zinc, nickel and gold.

The world production of ore is 8.4m tonnes copper content, the principal producers being Chile (17%), the United States (14%), the Soviet Union (12%) and Canada (8%).

6.2.4. Processing

The production of metallic copper from the raw materials from the mining industry includes the processes for concentrating the ores and the metallurgical industry, with the object of producing copper of high (99.99%) purity.

World production of refined copper is 9.8m tonnes, the principal producers being the United States (15%), the Soviet Union (12%), Japan (10%) and Chile (10%).

6.2.5. Consumption and uses

World consumption of copper in 1986 reached 10.1m tonnes, showing a mean annual rate of increase of 0.6% in recent years. The principal consumer countries were the United States (21%), the Soviet Union (13%), Japan (12%) and Federal Germany (8%).

Copper is used principally in electrical and electronic applications, such as motors, generators, power distribution systems, communications equipment and electrical cables.

It is also used for roofing, piping, ornaments, heat exchangers, domestic utensils, jewellery and the minting of coins.

6.3. The Tin Industry

6.3.1. Introduction

Tin is one of the essential metals for any industrialised society, and for some of its uses there are no substitutes. This metal has been known and used for 3000 years in the production of bronze alloys.

The value of tin lies in the fact that it improves and extends the potential for use of other metals. It is characterised by its malleability, ductility, low melting point and limited strength.

6.3.2. Reserves

The main source of tin is cassiterite, a high density tin oxide.

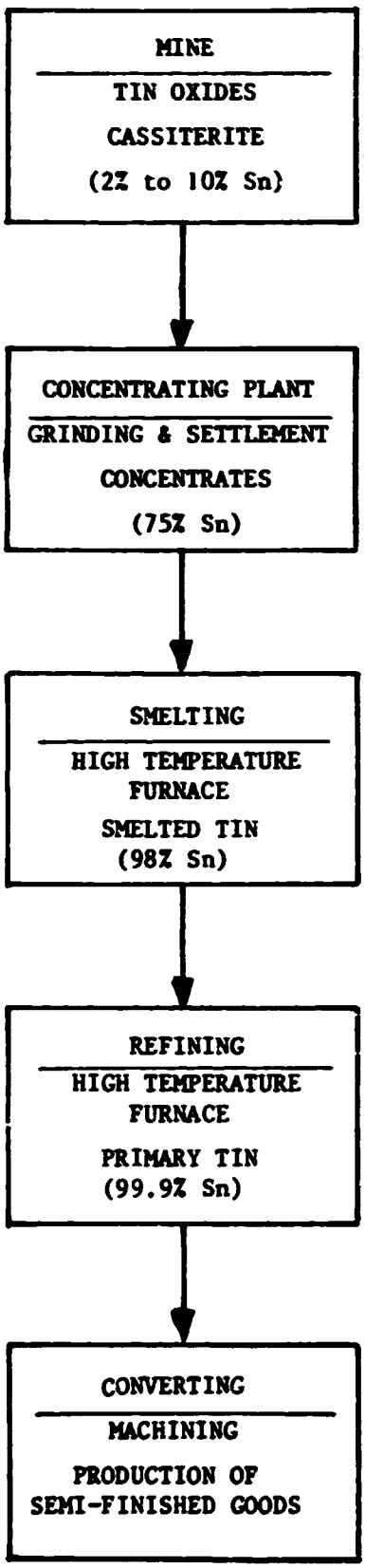

Diagram No.4 - PROCESS OF OBTAINING TIN

Total world reserves are 3.3m tonnes tin content, and at the present rate of production this represents supplies for 20 years. The principal deposits are located in Malaysia (33%), Indonesia (20%), Brazil (9%) and Thailand (8%).

6.3.3. Mining

The most widely used method is opencast mining, using hydraulic equipment such as dredgers, pumps and water-jets. However deeper deposits are mined using conventional underground methods.

World mining production is 180,000 tonnes metal content, the principal producers being Malaysia (16%), Indonesia (14%), Brazil (14%), China (12%) and the Soviet Union (8%).

6.3.4. Processing

Due to its high density cassiterite is concentrated using gravimetric processes, leading to a product with a tin content of 75% by weight. Subsequent treatment is carried out in smelting ovens to obtain ingots of metallic tin.

World production of metallic tin is 200,000 tonnes, the principal producers being Malaysia (22%), Brazil (13%), Indonesia (11%), the Soviet Union (11%) and China (10%).

6.3.5. Consumption and uses

World consumption of tin reached 226,000 tonnes in 1986, showing a mean annual increase of 1.2% in recent years. The countries with the largest consumption were the United States (19.3%), Japan (13.9%), the Soviet Union (11.5%) and Federal Germany (7.7%).

The greater part of the tin produced by the mining industry is used for tinning (tin-coating) steel or copper articles to prevent corrosion.

It is also used in the production of electric cables and thin laminates for wrapping foodstuffs.

Tin is used alloyed with lead in the production of solders, with copper and zinc in the production of bronzes and with copper, bismuth and antimony to produce fusible alloys and anti-friction metals.

6.4. International Trading in Aluminium, Copper and Tin

6.4.1. Exports of Aluminium

Total world exports of Bauxite in 1986 were 35m tonnes, Oceania, Africa, South America and the Caribbean being the exporting areas, the main importing areas being North America, Europe and Japan.

The principal countries exporting Bauxite are Guinea (13m tonnes), Australia (10m tonnes), Jamaica (4.5m tonnes) and Brazil (3.5m tonnes).

Exports of Alumina in 1986 totalled 9.5m tonnes, the exporting areas being Oceania, South America and the Caribbean and the principal importing areas North America and Europe.

The principal countries exporting Alumina were Australia (6m tonnes), Jamaica (1.5m tonnes) and Surinam (1m tonnes).

Exports of Aluminium in 1986 totalled 5.8m tonnes, the principal exporting regions being Europe, North America, Oceania and South America and the principal importing areas were Europe, Asia and North America.

The principal exporting countries for Aluminium were Canada (19.8%), Norway (11%), Australia (9.8%) and Brazil (5.5%).

6.4.2. Imports of Aluminium

In 1986 the principal countries importing Bauxite were the United States (7.2m tonnes), Federal Germany (3.5m tonnes), Canada (2.5m tonnes), Japan (2m tonnes) and Venezuela (2m tonnes).

The principal countries importing Alumina in 1986 were the United States (3m tonnes) and Canada (2m tonnes).

The principal countries importing Aluminium in 1986 were Japan (21.2%), the United States (20.8%), Federal Germany (12.2%) and France (6.6%), the total amount being 6.5m tonnes.

6.4.3. Exports of Copper

In 1986 exports of Copper Ores and Concentrates reached 1.5m tonnes fine content, and this figure had been maintained over the previous five years. The regions of origin of these raw materials are North America and South America, which together account for more than 50% of the world total, followed in importance by Oceania and Asia. The principal destinations are Asia and Europe (Table 6.2.6).

The principal countries exporting Ores and Concentrates in 1986 were Canada (22.1%), Chile (17.5%), Papua New Guinea (11.6%), the United States (11.3%), Indonesia (6.9%) and Mexico (6.4%).

In 1986 exports of Blister and Anodic copper reached 0.7m tonnes, showing a falling trend averaging -3.2% over the previous five years. The regions of origin were Africa and South America (Table 6.2.8).

The principal countries exporting Blister and Anodic copper in 1986 were Zaire (37.3%), Chile (27.0%), Peru (12.8%), Namibia (5.9%) and South Africa (4.0%).

In 1986 exports of Refined copper reached 2.96m tonnes, this figure having been maintained over the previous five years. The regions of origin were South America, which produces more

than a third of the world total, Africa and Europe (Table 6.2.10).

The principal countries exporting Refined copper in 1986 were Chile (30.3%), Zambia (15.8%), Canada (10.3%), Belgium (7.9%), Zaire (7.5%) and Peru (6.5%).

6.4.4. Imports of Copper

In 1986 imports of Copper Ores and Concentrates reached 1.5m tonnes fine content, the trend being steady over the previous five years. The principal importing regions were Asia and Europe, accounting for 90% of the total (Table 6.2.7).

The principal countries importing Ores and Concentrates in 1986 were Japan (56.6%), Federal Germany (10.4%), South Korea (7.8%), Canada (4.7%), Brazil (4.3%) and Spain (4.3%).

Imports of Blister and Anodic copper in 1986 reached 0.6m tonnes, with an alternating trend of highs and lows varying at average rates of +9.0% and -10.6% respectively over the previous five years. The principal region of destination is Europe, accounting for more than 75% of the total, followed by Africa with 10% (Table 6.2.9).

The principal countries importing Blister and Anodic copper in 1986 were Belgium (39.9%), the United Kingdom (13.2%), Federal Germany (11.6%), the United States (8.1%) and South Korea (5.8%).

Imports of Refined copper in 1986 reached 3.2m tonnes, with a steady trend over the previous five years. The principal regions of destination are Europe, Asia and North America (Table 6.2.11).

The principal countries importing Refined copper in 1986 were the United States (15.6%), Federal Germany (14.2%), Italy (11.1%), France (10.6%) and Japan (8.6%).

6.4.5. Exports of Tin

In 1986 exports of Tin Ores and Concentrates reached 45,000 tonnes fine content, this figure having risen over the previous five years due to large exports to China and Brazil. The regions of origin were Asia, Oceania and South America.

The principal countries exporting Ores and Concentrates in 1986 were Thailand (37.6%), Bolivia (20.9%) and Australia (17.7%).

In 1986 exports of Refined tin reached 164,000 tonnes with a clearly falling trend averaging -3.0% except in 1985 which showed a jump of +14.0% over the previous year due to trading with Brazil and China (Table 6.3.5).

The principal countries exporting Refined tin in 1986 were Malaysia (24.7%), Singapore (18.2%) and Brazil (11.7%).

6.4.6. Imports of Tin

In 1986 imports of Tin Ores and Concentrates reached 30,000 tonnes fine content, the trend being downwards up to 1985 and then changing to upwards. The principal importing regions were Asia, Europe and North America.

The principal countries importing Ores and Concentrates in 1986 were Malaysia (40%), the United Kingdom (35%) and the United States (15%).

Imports of Refined tin in 1986 reached 142,000 tonnes, with a rising trend averaging 5% over the previous five years. The principal regions of destination were Asia, Europe and North America (Table 6.3.6).

The principal countries importing Refined tin in 1986 were the United States (25.2%), Japan (22.4%), Federal Germany (12.4%), France (5.6%) and Italy (4.0%).

6.5. International Prices of Aluminium, Copper and Tin

6.5.1. Aluminium (Table 6.1.8)

At current prices aluminium has shown a rising trend over the last 30 years but with a sudden fall from 77.7¢/lb in 1983 to 48.8¢/lb in 1985. Over the last three years prices have recovered, reaching 72.4¢/lb in 1987.

At constant 1987 prices aluminium has shown a marked fall over the last 30 years from 100¢/lb in the Sixties, 80¢/lb in the Seventies and finally 70¢/lb in the Eighties. The lowest price recorded was 51.7¢/lb in 1985, the highest 102.7¢/lb in 1977.

6.5.2. Copper (Table 6.2.12)

At current prices copper showed a rising trend up to 1980 when it reached the highest recorded price of 101.4¢/lb; from then until 1986 the trend has been downwards; in that year the price was 64.7¢/lb. In 1987 copper was quoted at 81.0¢/lb.

At constant 1987 prices copper has shown a 10-year cyclic trend of highs and lows over the last 30 years. However in the Eighties there has been a clearly marked falling trend in prices; the lowest price recorded was 67.2¢/lb in 1986.

6.5.3. Tin (Table 6.3.7)

At current prices tin has shown a rising trend up to 1980 when it reached its highest recorded price of 846¢/lb; that year the trend was downwards until 1986 and the minimum recorded price of 294.1¢/lb. In 1987 prices recovered slightly to 308.8¢/lb.

At constant 1987 prices tin has shown a trend towards highs and lows with a 12-year cycle over the last 36 years: the highest price recorded was 1236.4¢/lb in 1979 and the lowest was 305.9¢/lb in 1986.

7. COUNTRIES COVERED BY THE STUDY

This work consists of a study of the economic complementarity of the following countries : Argentina, Bolivia, Brazil, Chile, Peru and Venezuela, in respect of the following non-ferrous metals : aluminium, copper and tin.

7.1. Principal Economic Indicators (Table 7.1)

7.1.1. Gross Domestic Product

The total value of the GDP of the countries being studied was $531 billion in 1986: Brazil and Argentina had the highest GDPs in the region whilst Peru and Bolivia had the lowest.

7.1.2. Population

The total number of inhabitants in the countries under study is 226 million: Brazil and Argentina have the largest populations, but it is Venezuela which has the highest population density of 20 inhabitants/km2. The countries with the smallest populations are Chile and Bolivia, whilst Bolivia has the lowest population density of 6 inhabitants/km2.

7.1.3. Exports and Imports

In 1986 the total exports from the region amounted to $47 billion: Brazil (50%), Venezuela (20%) and Argentina (15%) were the countries with the largest exports.

Imports into the region in 1986 totalled $34 billion: Brazil (41%), Venezuela (27%) and Argentina (13%) accounted for the greater part of the imports.

Brazil has the largest trading balance with a surplus of $8500m, followed by Argentina with $2600m. The trading balances of Peru and Bolivia show deficits of $320m and $166m respectively.

7.2. Production and Consumption of Aluminium, Copper and Tin

7.2.1. Argentina (Tables 7.2. and 7.2.1.)

Argentina does not produce Bauxite and imports approximately 350,000 tonnes of Alumina annually from Australia, refining the Alumina to Primary Aluminium. 1987 production of Primary Aluminium was 155,000 tonnes, with an upward trend of approximately 4% per year over the last 8 years. In addition

Argentina recycles an average of 6,000 tonnes of Aluminium annually.

The apparent consumption of Primary Aluminium in 1987 was 142,000 tonnes, with an average upward trend of 20% over the last 8 years.

The real consumption of Primary Aluminium was 45,000 tonnes on the basis of the balance between the apparent consumption in the manufacture of finished and semi-finished products for export.

The potential consumption of Primary Aluminium is 825,000 tonnes, with a per capita consumption of 1.20 kg/inhabitant.

The production of Copper in Argentina does not exceed 400 tonnes per year, but there is now a policy designed to identify and evaluate this mineral resource.

In 1986 the consumption of Refined Copper was 45,000 tonnes, with an average downward trend of -15% annually over the last 8 years but with a recovery in 1986.

The potential consumption of Refined Copper is 273,000 tonnes, giving a per capita consumption of 1.45 kg/inhabitant.

The production of Primary Tin was 400 tonnes in 1987, showing a rising trend over the last 8 years.

The consumption of Primary Tin was 1200 tonnes in 1987, showing an oscillating tendency over the last 8 years.

The potential consumption of Tin is 7800 tonnes and the per capita consumption is 0.05 kg/inhabitant.

7.2.2. Bolivia (Tables 7.2. and 7.2.2.)

This country does not produce Aluminium and imports finished products for its consumer needs; in 1983 these reached a total of 2500 tonnes, but the present demand is considered to be of the order of 1000 tonnes.

The consumption of Copper Ores and Concentrates has fallen progressively from 2600 tonnes fine content in 1981 to less than 300 tonnes in 1986. No information is available on Copper refineries or smelting works in Bolivia.

The consumption of Copper is very small, being less than 500 tonnes a year; this figure represents a per capita consumption of 0.07 kg/inhabitant, giving Bolivia a potential annual consumption of 58,000 tonnes.

The production of Tin Ores and Concentrates has fallen progressively from 30,000 tonnes fine content in 1981 to less than 9,000 tonnes in 1987; this trend has become more accentuated over the last 5 years with a mean annual decrease of -20%.

The production of Primary Tin has also fallen progressively in recent years from 20,000 tonnes in 1981 to less than 2,000 tonnes in 1987; the fall was very much greater from

1985 to 1987 with figures of -50% and -70% respectively for those two years.

The consumption of Primary Tin showed a rising trend between 1980 and 1983, increasing from 1000 tonnes to 2400 tonnes, but then fell to 1100 tonnes in 1986.

The per capita consumption of Tin is 0.17 kg/inhabitant with a potential annual consumption of 1600 tonnes.

7.2.3. Brazil (Tables 7.2., 7.2.3., 7.2.4. and 7.2.5.)

The production of Bauxite in Brazil reached 6.5 million tonnes in 1987, showing a rising trend of 15% annually over the last 5 years; according to future forecasts the Brazilians will sustain this increase over the next 10 years.

The production of Alumina reached a figure of 1.3 million tonnes in 1987, a rising trend with an average annual rise of 20% over the last 5 years; as in the case of Bauxite this trend will be sustained over the next 10 years.

The production of Primary Aluminium reached 850,000 tonnes in 1987, giving an average annual increase of 20% over the last 5 years; as in the previous cases this growth will continue over the next 10 years.

The consumption of Primary Aluminium was 425,000 tonnes in 1987, showing a rising trend over the last 5 years with an average annual increase of 15%. It is hoped that this increase will be maintained over the next 10 years, but with a lower rate of growth with larger quantities going for export and because of the slower rate of growth of the converting industry.

Brazil has a potential consumption of 3.6m tonnes and a per capita consumption of 3.07 kg/inhabitant.

The production of Copper Ores and Concentrates rose to 40,000 tonnes fine content in 1987, with a rising trend from 11,000 tonnes in 1981 to 70,000 tonnes in 1985, then falling to the present level.

The production of Blister Copper was 120,000 tonnes in 1987 with a rising trend of an average of 20% per year over the last 5 years. Production on a large scale began in 1983 with about 60,000 tonnes.

Production of Refined Copper began in 1982 with 57,000 tonnes; this remained constant until 1984 after which it increased progressively at an average rate of 30% over the last 3 years: production was 177,000 tonnes in 1987. It is hoped that this trend will be maintained over the next 10 years but without any greater production of ores, so that Brazil will have to receive major quantities of imported concentrates.

The consumption of Refined Copper was 260,000 tonnes in 1987; this represented a rising trend since 1983 with an average increase of 10%. The potential consumption in Brazil is 1.2 million tonnes and the per capita consumption is 2.3 kg/inhabitant.

The 1987 production of Tin Concentrates was 29,000 tonnes fine content, with a rising trend since 1980 and an annual rate of increase of 20% over the last 8 years.

The production of Primary Tin in 1987 was 28.8,000 tonnes with a rising trend since 1981 and an annual rate of increase of 25%.

In 1987 the consumption of Primary Tin was 8.2,000 tonnes showing a rising trend of 15% per year since 1981. The potential consumption of the country is 34.5,000 tonnes and its per capita consumption is 0.04 kg/inhabitant.

7.2.4. Chile (Tables 7.2. and 7.2.6.)

Chile produces neither Bauxite nor Alumina and imports all the Aluminium it consumes in the form of ingots, finished or semi-finished products.

The consumption of Primary Aluminium in 1986 was 4,500 tonnes, showing a fluctuating trend with a fall from 6,430 tonnes in 1981 to 3,660 tonnes in 1983 and then rising to 4,500 tonnes in 1986. The potential consumption of this metal in 326,000 tonnes and its per capita consumption is 0.37 kg/inhabitant.

The 1987 production of Copper Ores and Concentrates was 1.4 million tonnes fine content, showing a rising trend over the last 8 years with a mean annual rate of increase of 4.7%. Due to the discovery of new deposits, the expansion of production from the existing mines and the policy for the mining sector which Chile has pursued over the last 30 years, the rising trend in production will be maintained over the next decade with a higher annual increase than that quoted above.

The production of Blister Copper was 1.1 million tonnes in 1987, maintaining the rising trend of the last 8 years with an annual rate of increase of 2.1%. In the same way as for Copper Ores and Concentrates the trend will be maintained over the next decade with an even higher rate, due to the projects for expanding the smelting works and refineries.

The 1987 production of Refined Copper was 0.96 million tonnes, showing a rising trend over the last 8 years with a mean annual increase of 2.6%. It is considered that this rising trend in production will be maintained at an even higher rate over the next decade for the reasons set out above.

The 1987 consumption of Refined Copper was 48,000 tonnes: the observable trend shows a fall from 43,000 tonnes in 1980 to 24,000 tonnes in 1983, then a recovery in subsequent years at a much higher mean rate of 6% per year. The potential consumption of Copper in Chile is 108,000 tonnes and the per capita consumption is 2.93 kg/inhabitant.

Chile does not produce Tin but imports ingots, finished and semi-finished products to meet its consumer needs. These represented a total of 250 tonnes in 1986, an average annual rise of 25% over the last 4 years.

The potential consumption of Tin is 3,000 tonnes with a per capita consumption of 0.02 kg/inhabitant.

7.2.5. Peru (Tables 7.2., 7.2.7. and 7.2.8.)

Peru produces neither Bauxite nor Alumina; it imports Aluminium in the form of ingots, sheets, finished and semi-finished products.

The 1987 consumption of Aluminium was 5000 tonnes; consumption has risen at an increasing rate over the last 5 years from 3000 tonnes in 1983 to the present levels. Due to the economic situation affecting the country it is considered that consumption will experience a reduction, falling to the levels of previous years.

The potential consumption of Aluminium is 535,000 tonnes and the per capita consumption 0.25 kg/inhabitant.

The production of Copper Ores and Concentrates was 394,790 tonnes in 1987, showing a slightly rising tendency with a mean annual rate of 1.3% over the last 8 years: it should be pointed out that this increase is due to the commissioning of the Tintaya mine in 1985. It is expected that production will not experience any substantial variations during the next decade due to the expansion projects at Toquepala and Cuajone.

Production of Blister Copper was 286,575 tonnes in 1987 with a variable tendency in recent years of highs and lows, rising to a maximum in 1987. As in the case of the Concentrates this rhythm of production will be maintained over the next decade for the reasons which have already been explained.

The production of Refined Copper was 218,365 tonnes in 1987; over the last 10 years production had oscillated with highs and lows in a 3-year cycle. The maximum was 250,400 tonnes in 1981 and the minimum 194,750 tonnes in 1983. It is of interest to mention that whilst there is a direct relationship between the trends in Concentrates and Blister Copper there is no such relationship with the variations in the production of Refined Copper.

In 1987 the consumption of Refined Copper was 35,000 tonnes; a rising trend can be observed over the last 8 years with an annual rate of 20%, but it is however considered that these changes will be stabilised or will fall over the next decade due to the economic recession in the country. The potential annual consumption of Copper is 177,000 tonnes and the per capita consumption is 1.93 kg/inhabitant.

The production of Tin Ores and Concentrates reached 5,263 tonnes fine content in 1987; a rising variation in production can be observed from 1100 tonnes in 1980 to the present levels, the mean annual rate of increase being greater than 100%. It is considered that the growth of production will be lower in the coming years due to the fact that the investments in this sector will be directed towards metallurgical processes rather than towards opening up or extending mines.

Peru does not produce Primary Tin but exports all its Concentrates. There is a project for building a Tin smelter with a capacity of about 6,000 tonnes a year, so absorbing the national production of Concentrates and possibly also taking this raw material from Bolivia. It is hoped to complete the execution of this project in the region of Pisco, in the south of Peru, by the end of 1989.

The consumption of Primary Tin reached 500 tonnes in 1987, showing a rising trend over the last 5 years: a reduction in consumption is expected due to the economic situation in Peru. The potential annual consumption is 5,000 tonnes and the per capita consumption is 0.02 kg/inhabitant.

7.2.6. Venezuela (Tables 7.2. and 7.2.9.)

The production of Bauxite reached the total of 131,000 tonnes in 1987, with the start of the extraction of this raw material in the country by the opening up of the Los Pijiguaos in Estado Bolivar. Before 1987 Bauxite was imported from Guyana, Jamaica and Brazil for the production of aluminium. It is hoped that in 1988 the production from Los Pijiguaos will reach a million tonnes, its design capacity being 3 million tonnes: however the processing plant is designed to handle 6 million tonnes which is the projected production in the year 2000, intended to provide both for the domestic production of Aluminium and also for the exporting of Bauxite.

Production of Alumina began in 1983 with 560,000 tonnes, rising by 1987 to 1.36 million tonnes, this increase being achieved with a mean annual rate of growth of 20%. It is hoped that the rising trend will be sustained during the coming years with the Venezuelan plans for expanding this sector.

The production of Primary Aluminium was 440,000 tonnes in 1987, showing a rising trend over the last 8 years from 327,000 tonnes in 1980 and reaching the present levels at a mean annual rate of increase of 15%. It is considered that this trend will be sustained during the next decade, reaching 1m tonnes before 1995.

The apparent consumption of Primary Aluminium was 145,000 tonnes in 1987, an annual rate of increase of 10%. The real consumption is evaluated at 46,500 tonnes , the balance of the apparent consumption going to the production of finished and semi-finished products, most of which are intended for export. The potential consumption of Aluminium is 476,000 tonnes with a per capita consumption of 2.5 kg/inhabitant. It is important to point out that Venezuela has the highest index of per capita consumption in South America, and it is thought that this trend will increase over the coming years.

Venezuela does not produce Copper in any of its forms, importing it to meet its consumer needs: in 1987 this figure was 21,000 tonnes, increasing at a mean annual rate of 100%. It is expected that this trend will be maintained in the coming years, but at a much more moderate rate. The

potential consumption is 157,000 tonnes and the per capita consumption is 0.61 kg/inhabitant.

Venezuela does not produce Tin in any of its forms, importing it to meet its consumer needs; these were 1,000 tonnes in 1987 having increased rapidly from 300 tonnes in 1983 to 1000 tonnes in 1985, at which figure it stablilised in recent years. The potential consumption of Tin is 4500 tonnes and the per capita consumption is 0.04 kg/inhabitant.

7.3. Trading between the countries covered by the study

The total FOB value of Intraregional Exports in 1987 was $4,460 million with Brazil (42.2%) being the largest exporter, followed by Argentina 21.8%, Chile 16.3%, Bolivia 7.2%, Venezuela 6.7% and Peru 5.8%. The total FOB value of these exports in 1986 was $4,292m with the following percentages of the total : Brazil 26.8%, Argentina 24.4%, Chile 14.8%, Peru 12.4%, Bolivia 11.5% and Venezuela 10.2%. Brazil exports principally to Argentina, Chile and Venezuela. The remaining countries send a high percentage of their exports to Brazil (Tables 7.3.1. and 7.3.3.).

The total CIF value of Intraregional Imports was $4,316m in 1987 and $4,298m in 1986. In 1987 the distribution of these imports was as follows : Argentina 30.9%, Brazil 21.8%, Chile 16.7%, Venezuela 12.0%, Peru 11.7% and Bolivia 7.0%. In 1986 this distribution was : Brazil 36.0%, Argentina 27.9%, Chile 13.7%, Bolivia 9.0%, Venezuela 7.2% and Peru 6.2%. Brazil imports principally from Argentina and Venezuela: the remaining countries import principally from Brazil. (Tables 7.3.2. and 7.3.4.).

It may be seen from these figures that the destinations and origins of the products traded by Brazil, Argentina and Chile have remained largely unaltered over the last two years, but that this is not the position with Bolivia, Peru and Venezuela.

7.3.1. Aluminium (Tables 7.4.1., 7.4.2. and 7.4.3.)

In 1986 Brazil exported 1.62 million tonnes of Bauxite to Venezuela, these exports having shown a rising trend in recent years; however with the entry into production of the Los Pijiguaos mine in Venezuela the trend will be towards much smaller quantities in the coming years. Exports of Brazilian Bauxite to the other countries in the region are minimal.

Total Intraregional Trading in Crude Aluminium was 20,700 tonnes in 1986, Argentina being the largest importer with 52.6%, whilst Brazil and Venezuela were the largest exporters with 69.8% and 28.4% respectively.

In 1986 the International Exports from the countries covered by the study totalled 574,156 tonnes, the principal exporters being Venezuela (47.2%) and Brazil (43.8%). The principal regions to which these exports went were : Asia (46.5%), North America (43.7%) and Europe (16.3%).

The total International Imports into the countries covered by the study were 17,403 tonnes, the principal importers being Argentina (40.7%), Peru (19.6%) and Chile (16.7%). The

principal regions from which these imports came were : South America (65.9%), North America (33.4%) and Europe (11.8%).

7.3.2. Copper (Tables 7.5.1., 7.5.2. and 7.5.3.)

Chile exported 50,700 tonnes of Ores and Concentrates (fine content) and 18,000 tonnes of Blister Copper to Brazil.

In 1986 the total Intraregional Trading in Refined Copper was 153,267 tonnes, the principal exporters being Chile (89.6%) and Peru (10.1%) whilst Brazil (61.4%), Argentina (33.2%) and Venezuela (5.3%) were the principal importers.

Total international exports of Copper Concentrates were 316,900 tonnes (fine content), the only exporters being Chile (85.4%) and Peru (14.6%). The importing regions were : Asia (48.4%), Europe (26.8%) and South America (16.0%).

Total international exports of Blister Copper were 294,103 tonnes with Chile (67.8%) and Peru (32.2%) being the only exporters, the importing regions being Europe (64.2%), Asia (18.4%), North America (10.4%) and South America (6.1%).

Total exports of Refined Copper were 1.1 million tonnes , the only exporters being Chile (80.7%), Peru (17.6%) and Brazil (1.7%): the importing regions were Europe (54.9%), North America (16.0%), South America (14.9%) and Asia (13.8%).

Imports of Copper Concentrates and Blister Copper into the countries covered by the study come mostly from the same region, and have already been described.

International imports of Refined Copper totalled 178,203 in 1986, the only importers being Brazil (65.1%), Argentina (28.6%) and Venezuela (6.3%), the originating regions being South America (89.3%), Africa (5.0%) and North America (3.3%).

7.3.3. Tin (Tables 7.6.1., 7.6.2. and 7.6.3.)

We have no knowledge of any trade in Tin Ores and Concentrates between the countries covered by the study.

Trading in Primary Tin within the region totalled 1,731 tonnes in 1986, Brazil (72.7%) being the principal exporter, followed by Bolivia (27.3%). The largest importer was Argentina (75.8%), followed by Chile (11.6%), Peru (11.4%) and Venezuela (1.2%).

Exports of Tin Concentrates on the international market were 12,000 tonnes in 1986, the only exporters being Bolivia (62.5%) and Peru (37.5%): the importing regions were Europe (55.1%) and North America (44.9%).

Exports of Primary Tin on the international market were 26,190 tonnes, the originating countries being Brazil (67.1%) and Bolivia (32.9%) whilst the importing regions were Europe (54.4%) and North America (40.5%).

The region covered by the study does not import any Tin Concentrates through the international market.

Imports of Primary Tin through the international market were 2,476 tonnes in 1986, the principal importers being Argentina (50.8%), Venezuela (31.9%), Chile (8.1%) and Peru (8.0%): the exporting regions were South America (67.7%) and North America (30.3%).

8.THE STRUCTURE OF PRODUCTION AND PROCESSING PLANTS FOR ALUMINIUM, COPPER AND TIN IN THE COUNTRIES COVERED BY THE STUDY

8.1. The structure of the production of Aluminium, Copper and Tin

8.1.1. Argentina

Argentina imports 350,000 tonnes of Alumina from Australia, processing it in the refineries of ALUMINIOS ARGENTINOS S.A. (ALUAR), which are located in Puerto Madryn, Chubut, in the south of the country. In 1987 the production of this company was 145,000 tonnes.

The extraction of Copper is very limited; exploratory work is being carried out on the Capillitas deposit, in the Catamarca province to the east of the country with the participation of Japan, the Federal Republic of Germany and national bodies.

Production of Tin is also very limited with ESTAÑOS ARGENTINOS S.A. (ESTANSA), a company within the Pirquitas Group, having produced 360 tonnes in 1986 from its mine and smelting works near Palpala, Jujuy, in the east of the country. New deposits are being explored in Catamarca, but the present market conditions do not justify their development.

8.1.2. Bolivia (Tables 8.0.1. and 3.0.2.)

Bolivia does not produce Aluminium in any form, importing all its requirements.

The production of Copper is very limited; in 1986 it was 300 tonnes (fine content), the principal producers being the CORPORACION MINERA DE BOLIVIA (COMIBOL), the largest Bolivian state mining company, and companies in the private sector.

In 1986 the production of Tin Ores and Concentrates was 10,550 tonnes (fine content); this fell to 8,100 tonnes in 1987. The distribution of this by companies is as follows : COMIBOL (60%), Mediana Minería (24%) and Pequeña Minería (16%).

Tin Smelting is carried out solely by the EMPRESA NACIONAL DE FUNDICIONES (ENAF), a state company which has been integrated with COMIBOL under the present economic reorganisation policy. Production in 1986 was 6500 tonnes at the Vinto smelter, near Oruro. Projects exist for improving the economic efficiency whilst reducing the production capacity. The production capacity of Vinto is 30,000 tonnes, and a reduction to 7000 tonnes a year is envisaged: the study on this plant was carried out by the Klockner company of the Federal Republic of Germany.

8.1.3. Brazil (Tables 8.1.1., 8.1.2. and 8.1.3.)

In 1986 the production of Bauxite was 6.5 million tonnes: the principal producer was MINERACAO RIO DO NORTE S.A. (71%), followed by COMPANHIA BRASILEIRA DE ALUMINIO (13%), ALCOA S.A. (8%) and ALCAN ALUMINIO DO BRASIL S.A. (7%).

In 1986 the production of Alumina was 1.2 million tonnes, the principal producer being ALCOA S.A. (49%), followed by COMPANHIA BRASILEIRA DE ALUMINIO (27%), ALCAN ALUMINIO DO BRASIL S.A. (13%) and BILLITON METAIS S.A. (12%).

The production of Primary Aluminium was 0.76 million tonnes in 1986, the principal producers being ALCOA S.A. (30%), COMPANHIA BRASILEIRA DE ALUMINIO (21%), ALUMINIO BRASILEIRO ALBRAS S.A. (13%) and VALESUL ALUMINIO S.A. (12%).

The production of Secondary Aluminium in 1986 was 48,000 tonnes, the principal producers being TONOLLI DO BRASIL S.A. (46%) and METALUR Ltda (19%).

It should be noted that the majority of the companies cited in the above paragraphs have undergone very considerable expansion in recent years, with annual average increases in excess of 65%.

The production of Copper Ores and Concentrates and of Refined and Blister Copper is carried out by CARAIBA METAIS S.A. Production in 1987 was 28,732 tonnes of fine copper as Concentrates, 119,600 tonnes of Blister Copper and 146,969 tonnes of Refined Copper.

The 1987 production of Tin Ores and Concentrates was 28,523 tonnes (fine content), the principal producers being MAMORE of the PARANAPANEMA Group (68%), CESBRA of the BRX Group (10.5%) and BERA DO BRASIL of the BRUMADINHO Group (5%).

In 1987 the production of Smelted Tin was 29,046 tonnes, the principal producers being MAMORE of the PARANAPANEMA Group (70%), CESBRA of the BRX Group (11%) and BERA DO BRASIL of the BRUMADINHO Group (5%).

Increases in the production of Tin have been very considerable; in the case of MAMORE and CANOPUS an average annual rate of increase can be observed, whilst other companies are also expanding but at a slower rate.

8.1.4. Chile (Table 8.2.1. and 8.2.2.)

Chile has no companies producing Aluminium or Tin, all consumer needs being imported.

Production of Copper Ores and Concentrates has reached 1.4 million tonnes (fine content), the principal producers being CORPORACION DEL COBRE DE CHILE (CODELCO) (79%), EMPRESA NACIONAL DE MINERIA (ENAMI) (10%), DISPUTADA (5%) and MANTOS BLANCOS (4%).

The production of Blister Copper amounts to 1.1 million tonnes, the principal producers being CODELCO (79%), ENAMI (15%), DISPUTADA (4%) and MANTOS BLANCOS (3%).

The production of Refined Copper amounts to 0.95 million tonnes, the principal producers being CODELCO (77%), ENAMI (18%) and MANTOS BLANCOS (3%).

The principal Chilean producers have a mixed ownership structure with State holdings of 40-70%, 30-40% of foreign private capital and 10-20% national private capital.

8.1.5. Peru (Tables 8.3.1. and 8.3.2.)

There are no Aluminium producing companies in the country; ingots, sheets and profiles are imported to meet consumer needs.

In 1987 the production of Copper Ores and Concentrates was 395,000 tonnes (fine content), the principal producers being SOUTHERN PERU COPPER CORPORATION (63%), EMPRESA MINERA ESPECIAL TINTAYA S.A. (14%), CENTROMIN PERU (10%), MINERO PERU (7%) and other producers in the MEDIANA & PEQUEÑA MINERIA (6%).

The production of Blister Copper in 1987 was 286,000 tonnes, produced by SOUTHERN PERU (33%) at the Ilo smelting works and by CENTROMIN (17%) at the La Oroya smelting works.

The production of Refined Copper in 1987 was 218,000 tonnes, divided between MINERO PERU (79%) at the Ilo refinery and CENTROMIN (21%) at the La Oroya refinery.

SOUTHERN PERU is privately owned, with foreign capital, whereas the others are State companies.

Production of Tin Ores and Concentrates was 5,300 tonnes (fine content) in 1987, the only producer being the MINSUR company; its deposits are in the Puno region, near the Bolivian frontier.

At the present time there are no Tin smelting works in Peru and all its production of concentrates is exported. It is expected that the Pisco smelter, in the south of Peru, will be in production in 1989; this belongs to MINSUR and with its annual capacity of 6000 tonnes it will process all the production of the mine and possibly also concentrates from Bolivia.

8.1.6. Venezuela (Tables 8.4.1. and 8.4.2.)

Production of Bauxite in 1987 was 130,000 tonnes; BAUXIVEN is the only producer, and it is hoped that in the coming years the production will rise to 1.4 million tonnes.

Production of Alumina in 1987 was 1.36 million tonnes, the only producer being INTERALUMINA.

The production of Primary Aluminium was 423,000 tonnes in 1986, and the 1987 production is estimated to be 440,000 tonnes; the producing companies are ALCASA (31%) and VENALUM (69%).

These companies are State owned but operate with French and Swiss technological participation.

Venezuela produces neither Copper nor Tin, importing ingots, wire, sheets, etc. to meet its consumer needs.

8.2. Capacities for Processing Aluminium, Copper and Tin in the Countries covered by the Study

8.2.1. Argentina

There is only the ALUAR plant for converting Alumina to Aluminium; this has an installed capacity of 150,000 tonnes.

The installed capacity for producing finished or semi-finished Aluminium products is estimated to be approximately 220,000 tonnes, but only some 140,000 tonnes of this are being used, so that there is an annual surplus capacity of about 80,000 tonnes.

There are no smelters for processing Copper Concentrates: the annual capacity for processing Blister Copper is estimated to be approximately 12,000 tonnes, whilst the capacity for converting Refined Copper into finished and semi-finished products is estimated to be 80,000 tonnes of which only 30,000-40,000 tonnes are being used: there is thus a surplus manufacturing capacity of approximately 40,000-50,000 tonnes. There are no smelting works to process Tin Concentrates, so that the small production is exported; the total is not more than 1,000 tonnes annually.

8.2.2. Bolivia

There are no installations for processing either Bauxite or Alumina and only one plant for converting Aluminium bars with an installed and completely surplus annual capacity of 4,000-6,000 tonnes.

There is however a smelter for processing Copper Concentrates. The consumption of Refined Copper is minimal, this product being imported in the form of finished products.

The situation is different in the case of tin where Bolivia has an installed capacity for producing up to 30,000 tonnes of Refined Tin from concentrates and ores. All this installed capacity belongs to the Vinto refinery, but this is at the present time operating at a level of only 8,000-10,000 tonnes annually, so that there is a surplus capacity in Bolivia for handling 20,000-22,000 tonnes of refined Tin.

Substantially all the Refined Tin produced in Bolivia is exported in this form, since there is practically no installed capacity for converting Refined Tin into finished or semi-finished products.

8.2.3. Brazil

Brazil produces a surplus of Bauxite which is exported, inter alia, to Venezuela for converting into Alumina and Aluminium. This indicates that there is no surplus domestic capacity for processing Bauxite.

On the other hand Brazil imports approximately 285,000 tonnes of Alumina to satisfy the growing demand which by 1986 had reached 1,545,000 tonnes, mainly for the production of Refined Aluminium.

In regard to the capacity for converting Refined Aluminium into manufactured and semi-finished products it is estimated that the total capacity installed in the whole of the country is approximately 550,000 tonnes, of which about 430,000 tonnes are in use: there is thus a surplus capacity of approximately 120,000 tonnes at this level.

In the case of Copper there is the Caraiba metals smelter and refinery which has an annual processing capacity of about 450,000 tonnes: local supplies account for approximately 120,000 tonnes, so that there is a surplus processing capacity for concentrates from other countries of approximately 330,000 tonnes.

The annual capacity for converting Refined Copper to manufactured and semi-finished products is estimated to be 430,000 tonnes, but only about 270,000 tonnes of this are being used, leaving an available capacity of approximately 200,000 to 210,000 tonnes.

In the Tin sector Brazil has the capacity to process all the approximately 30,000 tonnes of Tin contained in the concentrates which it produces. All the exports are in the form of the metal, the exporting of concentrates not being permitted.

8.2.4. Chile

There are no plants in Chile for processing either Bauxite or Aluminium, Chile importing all its Aluminium requirements in the form of bars, profiles, etc.

Imports of Aluminium are estimated to be approximately 6,000 to 8,000 tonnes annually, so there is an available converting capacity of approximately 50%, given that the installed converting capacity in Chile is of the order of 15,000 tonnes per year.

There are however installations for processing Tin Concentrates but all the Refined Tin is imported at a level of above 300-400 tonnes per year.

In regard to Copper Chile exports 270,000 tonnes of Copper in the form of concentrates since it has a production of these which is greater than can be processed in its smelters and refineries; there is therefore no surplus capacity at this level. There is however unused capacity for processing

Blister Copper to Refined Copper since approximately 200,000 tonnes of this are exported annually.

It is estimated that the annual capacity for processing Refined Copper into finished and semi-finished products is 120,000 tonnes; of this only 60,000 tonnes are utilised, leaving a surplus capacity of 60,000 tonnes: this is not used because there is no market for the finished and semi-finished products which could be produced.

8.2.5. Peru

Although Peru has installations for processing Bauxite and Alumina all the Peruvian requirements for Aluminium are covered by annual imports of 5,000 to 6,000 tonnes of Refined Aluminium in various forms. It is estimated that the installed converting capacity is some 13,000 tonnes per year, leaving a surplus capacity of some 6,000 to 7,000 tonnes for the possible converting of finished and semi-finished Aluminium products.

In the case of Tin a smelting works and refinery is under construction; in principle this will process the production from the MINSUR company and possibly also Bolivian concentrates.

As in the case of Chile approximately 46,000 tonnes of Copper contained in concentrates are exported by Peru as a consequence of having a production which is greater than its smelting and refining capacities. It also exports 95,000 tonnes of Blister Copper which cannot be refined in the country because of a shortage of capacity.

In regard to the converting of Refined Copper into finished and semi-finished products it is estimated that the total capacity is 80,000 tonnes, of which only approximately 40,000 tonnes is used.

8.2.6. Venezuela

At the present time there is a shortfall in the production of Bauxite to produce Alumina and Aluminium. The Interalumina plants can process approximately 3,200,000 tonnes of Bauxite, all of which was imported up to 1986. It is however hoped that the Bauxite from Pijiguaros will make Venezuela self-sufficient from 1990 onwards.

The capacity for processing Alumina to Aluminium is fully utilised, the surplus being exported.

Finally the capacity for converting Aluminium into finished and semi-finished products is estimated to be 140,000 tonnes.

There are no smelters in Venezuela for processing Copper Concentrates: there is however capacity for converting Blister to Refined Copper and for converting Refined Copper to finished and semi-finished products; the under-utilisation of the installations at this level is only of the order of 20%.

There are no refineries in Venezuela for processing Tin Concentrates. There is some small-scale recuperation of tin from scrap to produce solders. The apparent total annual consumption of Tin in Venezuela is approximately 800 tonnes with an additional potential usage of 350 to 400 tonnes per year.

9.TRADE IN THE COUNTRIES COVERED BY THE STUDY

9.1. Argentina

9.1.1. The General Situation

Argentina is a country with immense natural resources, principally of the agricultural and agro-industrial type, followed by petroleum and its derivatives. Mining production in Argentina is small, being limited to the mines located near the border with Chile on the eastern slopes of the Andes. No commercial deposits of aluminium, copper or tin are known. It should be noted that Mining and Quarries contributed only 2.6% to the Gross National Product in 1986.

The national production of ingots of aluminium, estimated at 150,000 tonnes in 1986, was directed towards the national converting industry which consumes approximately 80,000 tonnes, leaving an exportable supply estimated at 70,000 tonnes.

It is the policy of the Argentinian Government to increase exports with the highest possible value added, with an exporting drawback of the order of 15%, largely corresponding to the taxes on fuels and ultimately to the electricity utilised.

It is considered that the complementation agreements with Brazil constitute a fundamental step towards supporting the exporting policies of the converting companies but not those simply exporting metal ingots.

ALUAR signed an agreement in 1986 with the Secretaría de Industria y Comercio Exterior (SICE) to arrive at more appropriate prices for the industries exporting finished aluminium products.

The production of copper is insufficient to meet the needs of industry, and this is why Argentina imports, without any great restrictions, ingots and wire bars, principally from Chile, as inputs for its own copper converting industries.

Argentina also imports, again without restrictions, tin ore and metal ingots for converting in the Argentinian Republic.

In all three cases the importing of the materials covered by the study requires the prior permission of SICE. Items negotiated under ALADI do not require Prior Permission (List II). Law 22095 covering Mining Promotion offers national or foreign investors in the exploration, mining and refining of metal ores a wide range of ancillary benefits including customs reductions and exoneration from Value Added Tax (VAT) during the first seven years of operation.

There are no installations in Argentina for concentrating or refining copper and tin, so that there is no possibility of complementarity at this level. In the case of aluminium there is a clear possibility of processing Venezuelan alumina

as a replacement of that which is at present obtained from Australia.

Limitations here would involve the quality of the alumina, which needs to be suitable for the ALUAR installations, and the problem of a lack of confidence in regard to the continuity of supplies of alumina from this country.

9.1.2. Limitations on Trading

There are no significant limitations on the importing of the metals and ores covered by the present study, since Argentina is not a major producer of any of them. However limitations do exist in the form of the Prior Import Licence for derived products which requires a Finding of Non-Competence on the part of the national industry. This requirement does not apply in the case of products negotiated under ALADI.

Customs duties are at a low level and there are no obstacles in the way of importing essential inputs such as the metals and ores which Argentina does not produce.

9.1.3. International Agreements

The general customs reductions, from which intra-ALADI trading in copper ores benefits (Customs Heading 74.01), fall within the scope of the 1980 Montevideo Treaty, which created ALADI (Asociación Latino-Americana de Integración) as a part of the ALALC Patrimonio Histórico.

Tin ores of Bolivian origin enjoy free entry to Argentinian territory, as do also electrolytic copper and copper wire (NALADI : 74.01.31.01 and 74.01.3.03) of Peruvian origin.

Argentina has granted free entry to its territory of aluminium ingots with a minimum purity of 99.5% and of Venezuelan and Brazilian origin (76.01.1.01) together with tin ingots (80.01.1.01) produced in Bolivia.

By virtue of the Commercial Integration Agreement (Acuerdo de Integración Comercial) No.1 between Brazil and Argentina free entry to Argentinian territory is granted to bauxite and metallic aluminium of high purity originating in Brazil.

However all the alumina used by ALUAR is imported from Australia by way of a long-term contract which terminates in 1994.

In a similar manner electrolytic copper and copper wire originating in Mexico and Peru can enter without payment of duty.

Tin metal of Bolivian origin can enter Argentina free of duty.

On 11 March of this year Argentina signed an Economic Complementation agreement with the objectives, inter alia, of strengthening the economic and commercial relationships between the signatory countries of the 1980 Montevideo Treaty, of diversifying reciprocal trade, of facilitating compensatory interchanges and other trading modalities and of developing

the economic integration and complementation between the regions of the signatory countries.

9.2. Bolivia

9.2.1. The General Situation

For the last two years practically all trading in Bolivian ores and metals has been through COMIBOL (Corporación Minera de Bolivia) and the Banco Minero.

Now, as a result of profound changes in the management of the Bolivian economy, trading has been liberalised and private companies, both national and foreign, are starting to operate in this field, exporting the production of mines and centred on tin, silver, lead, zinc and small volumes of antimony, bismuth, copper and cadmium.

It should be noted that the considerable fall in prices of metals in recent years have made the working of most of the Bolivian tin mines uneconomic, resulting in the enforced closing down of the only tin refinery in the country; this has now however recommenced the production of refined tin.

Bolivia exports part of its production of concentrates, principally casiterite (SnO_2) to Brazil and Peru.

Bolivian customs tariffs are 15% ad valorem CIF for all products.

Bolivia's foreign trade in 1986 was reduced to 700 tonnes of copper ores of which 521 tonnes went to Chile, and 23,600 tonnes of tin ores of which 200 tonnes went to Argentina and 350 tonnes went to Chile: the principal buyer was the European Economic Community with 17,400 tonnes.

Bolivia, as one of the least developed of the countries covered by this study, has benefitted from the inter-regional agreements which have existed and which still exist (ALALC, GRAN, ALADI etc.). However there is much scepticism amongst its entrepreneurs in regard to the implementation of these agreements. Expressions such as "Everythig works on paper, nothing works in practice" or that Bolivia is a "Cemetary of bankrupts" as a result of the failure by other countries to comply with the agreements for industrial allocations (compressors, oil-drilling rigs, ALUBOL, etc.) were commonly heard during the interviews which were held.

9.2.2. Limitations on Trading

Because of its situation of isolation from the Pacific Bolivia is faced with very high transport costs for its products. The location of the Oruro Refinery, at 3500 metres above sea level, means high land transport costs for carrying its products to their point of use.

Coupled with a relatively inefficient operation this means high costs for the metal which therefore has difficulty in

competing with the production from the most modern refineries in Malaysia, Thailand, China and Brazil.

Some ALADI countries have granted customs concessions for tin concentrates and all of them for metal of Bolivian origin.

9.2.3. International Agreements

Tin in metallic form, under Heading 80.01, is completely free of customs duties in Peru and Venezuela as a result of the Special Treatment of Bolivia within the Cartagena Agreement.

Argentina, Brazil and Chile, by virtue of their programmes of aid to Bolivia, allow free entry of tin metal of Bolivian origin.

9.3. Brazil

9.3.1. The General Situation

At the present time Brazil imports copper in the form of ores and ingots: it exports ores and ingots of aluminium and tin. It should be noted that according to the Banco do Brasil the total value of imports into Brazil of non-ferrous metals accounts for 5% of all imports.

There are price controls on domestic prices which primarily affect minor trading.

Import controls are effected by means of currency quotas which are valid for one year: however in the case of copper and other metals a licence is required (guia de importação) for each delivery. The licences are issued by the Cartera de Comercio Exterior (CACEX) which is the Export Trade Department of the Banco do Brasil, responsible for accommodating the requests of individual companies within the overall plan for External Trading which is revised annually. These licences have to be obtained before the embarcation of the merchandise and are valid for 90 or 180 days for ores and metals.

The Comisión Arancelaria is authorised to fix import quotas in cases where Brazilian production is lacking. A recent example (January 1988) is the reduction of the customs tariff for item 74.01.03.00 "Refined copper in bulk form" from 15% to 0% for a quota of up to 20,000 tonnes.

There are Free Zones, especially that at Manaus, which permit the free entry of industrial, agricultural, fish and other inputs which are to be used within the Free Zone. It should however be noted that the remoteness of Manaus from São Paulo and the south of Brazil results in high freight costs which frequently cancel out the customs' advantages of the Free Zone.

Brazil has an active policy for the development of exports, there being no obstacles at all to the exporting of aluminium ingots, these being the principal exportable product falling

within the scope of the present study. The State also encourages the export of aluminium products of high value added by way of benefits of a fiscal character and the Befiex (Decree 1219 of June 1972) consists of tariff rebates, free temporary importing and drawback arrangements.

Exporting companies or traders can be granted exemption from Sales and Income Taxes. There is also the FINEP system for financing exports.

A special system applies to exports of the so-called "abundant ores" (e.g. Bauxite and alumina) where the existing reserves cover the expected national demand over the next 25 years.

The attitude of entrepreneurs and officials of professional institutions is not very receptive towards complementarity with other Latin-American countries where aluminium and tin are involved. They regard their industries as self-sufficient, and in any case look more towards European, American or Asian markets as being better alternatives. Only in the case of copper, where there is a deficit, is there a receptive attitude towards the idea of complementarity with Peru or Chile. However the sale of Caraiba Metais to private interests will harden this attitude.

9.3.2. Limitations on Trading

The only significant limitations on trading with Brazil are the already cited requirements for import licences.

From the logistic standpoint it should be noted that the development policy for North and North-East Brazil has resulted in the installation of plants such as Aluminio do Brasil, Valenorte Aluminio, Caraiba Metais, Industrial Amazonense and others in the departments of Bahía, Pará and Amazonas which are very distant from the principal metallurgical centres, located more than 2000 km away in the neighbourhood of São Paulo. This means that in some cases the internal freight costs for metal products, of low unit value, are quite a lot higher than the costs of importing from overseas; in such cases the CACEX requirement to utilise the national product with its high freight cost distorts the cost structure of products for export.

Brazil has excellent roads, good sea routes and good international railways together with river transport to Colombia, Peru, Paraguay, Bolivia and Argentina, all this favouring international trade.

Customs tariffs are moderate, as in the following cases :

* Aluminium ore	15% and 0%
Copper ore	0%
Tin ore	0%
* Aluminium metal	3%
Copper metal	15%
Tin metal	15% and 30%

By the Acuerdo de Alcance Parcial No.12 between Brazil and Peru, Brazil grants a 67% preference on its national tariff

for imports under headings 74.01.3.01 "Electrolytic Copper" and 74.01.3.03 "Copper Wire".

By the mechanism of the Opening of Markets to Bolivia Brazil allows free entry to an annual quota of Tin Bars (80.02.1.01) to the value of US$ 200,000.

9.3.3. International Agreements

1980 Montevideo Treaty - ALADI

Within the framework of ALADI, the Asociación Latinoamericana de Integración, Brazil has not registered any concessions granted for copper and tin ores, for which its national tariff is zero, or for aluminium ore since it is a major producer of this.

Venezuela is a major importer of 26.01.04.02 "Non-calcined Bauxite", to an FOB value of US$ 38.7 million in 1986. Preferential treatment is granted by Venezuela to Brazilian ore.

Brazil does not export copper or ingots, but in 1985 it exported aluminium ingots to Peru to an FOB value of US$ 422,000, and to Ecuador to an FOB value of US$ 682,000. In the same year Uruguay received aluminium in ingots to an FOB value of US$ 1.0 million.

In all three cases there was preferential treatment for the Brazilian aluminium.

Brazil has granted a 75% concession to Chile for item 74.01.3.03 "Copper Wire".

9.4. Chile

9.4.1. The General Situation

A system of free trading is in force in Chile for aluminium and tin ores and ingots, these requiring approval by the Banco de Chile. Law 18687 of 4 January 1988 lowered the existing tariff from 20% to 15% ad valorem CIF, with effect from 5 January 1988, and this applies to materials covered by this study with the exception of copper ores and ingots: in the case of these products Resolution 462 of the Comisión Chilena del Cobre, dated 17.12.87 and published in the Diario Oficial No.32952 of 23.12.87, lays down administrative and procedural rules for copper and its sub-products with effect from 1 January 1988.

Sales of copper produced in Chile - in the words of President Frei "Chile's income" - have been developed very actively by the State by way of CODELCO, CORFO and PRO-CHILE, with the emphasis on the sales of copper products with a high local value added. This has led CODELCO to acquire a copper wire factory in Germany and one for copper tubes in Mainland China to ensure captive markets for their metal.

It can be said that, in general, the sales of Chilean copper are, directly or indirectly, a monopoly of State bodies operated with managerial intelligence and efficiency.

9.4.2. Limitations on Trading

There are no limitations on trading with Chile with its extensive sea coast, served by excellent roads and good coastal services. There are good rail, maritime and road links with Argentina.

Certain restrictions of a political nature should be mentioned, such as the lack of diplomatic relations with Mexico which makes trade difficult between the two countries, and the Beagle Channel incident with Argentina which has resulted in a reduction of reciprocal trading.

However Chile is very active in international negotiations, with the emphasis on finished products and non-traditional exports rather than on the products covered by the present study.

9.4.3. International Agreements

Chile is a participant in ALADI (Asociación Latinoamericana de Integración), having withdrawn from the Cartagena Agreement by effect of Decision 102, dated 30 October 1976.

Chile has concluded Alcance Parcial agreements under ALADI with all the signatory countries of the 1980 Montevideo Treaty, including the following tariff preferences for the products covered by the present study :

Ores of :

* Aluminium (Bauxite) :

  Preference of 45% granted on the tariffs for Argentina, Brazil, Mexico, Paraguay and Uruguay.

* Copper :

  No concessions granted or received.

* Tin :

  There are no special concessions since there are no tin refineries.

Metals :

* Aluminium :

Chile has granted Venezuela a 70% tariff preference on Aluminium Ingots (76.01.0.01).

* Copper :

Venezuela and Brazil have granted concessions of 80% and 75% respectively on their national tariffs for Chilean Ingots and Wire bars.

* Tin :

Chile has granted Bolivia a tariff concession of 50% on imports of Tin Ingots and Tin Bars with a purity of more than 99%.

It should be noted that, since Chile operates a general tariff system of 15% ad valorem, the concessions granted by Chile for imports are of little importance in absolute terms.

9.5. Peru

9.5.1. The General Situation

The export of ores produced by State companies is reserved for Minero Perú Comercial, the State Trading Company. Approximately 80,000 tonnes of refined copper are marketed through this company. The largest copper producer, the Southern Perú Copper Corporation, exports blister and cathodic copper either directly or through agency contracts with the State Trading Company, basically to countries outside the region.

Peru does not produce aluminium, and the tin it produces has been exported in the form of concentrates to countries outside the region. There is however a project in hand for refining tin in the country.

At the present time Peru is experiencing a very serious crisis in regard to a lack of foreign currencies, so it is very interested in complementarity schemes and other forms of trading which would minimise the usage of foreign currency which this country needs for importing food and inputs for its industry which is highly dependent on imported components. For this reason, and in the same way as all the other countries studied, it favours complementarity schemes only to the extent that they save foreign currencies in respect of imports but increase their foreign currency income in respect of exports.

Imports of ores and metals, like all other products, require a licence issued by the Instituto de Comercio Exterior with subsequent authorisation for payment by the Banco Central de Reserva. Obtaining the Import Licence does not guarantee that the Payment Licence will be obtained. Due to the present acute shortage of foreign currency the BCR frequently

cannot meet requests for foreign currency needed to cover all the Import Licences approved by the Instituto.

In 1986 imports into Peru of the materials covered by the study were as follows :

Ores : No copper ores were imported. A total of 283 tonnes of aluminium ore (26.01.04.00) were imported, mostly from Guyana, for the production of aluminium sulphate. None was imported from the countries covered by the present analysis.

Metals : There were no significant imports of copper, and none from the ALADI countries. Imports of Aluminium correspond to the Heading 76.01.01.89 "Raw Aluminium" :

	Tonnes	US$/CIF
* Argentina	79	114,218
* Brazil	321	443,863
* Venezuela	3,400	6,656,136
	3,800	7,421,217
* Other countries	1,487	1,170,876
TOTAL	5,287	8,592,093

9.5.2. Limitations on Trading

The limitations on trading derive from the foreign trade policy of the country and also from the foreign exchange and monetary policies.

In regard to exports of ores an aggressive policy for promoting exports and seeking new markets is lacking, but fundamentally there is a lack of an adequate mining policy.

As a result of the difficult foreign currency situation there is a shortage of imported mining inputs of all types, from reagents for flotation and mining equipment and spares down to tyres.

There are limitations on maritime transport, the very small national merchant fleet is reserved for carrying Peruvian ores: pooling arrangements have been arrived at to allow their transport by vessels under other flags. Maritime services to Brazil and with Venezuela are unsatisfactory because of the slowness of the voyages and their infrequency (a maximum of one vessel a month) between Peru and the Atlantic Coast.

There are regular services with Chile and with Argentina and good land services with Bolivia, Chile, Ecuador and Colombia.

9.5.3. International Agreements

9.5.3.1. ALADI - Peru is a signatory to the 1980 Montevideo Treaty and has Alcance Parcial agreements with Argentina, Brazil and Chile which include the following tariff preferences:

* Argentina - Peru grants a 60% preference on "Raw Aluminium of 99.5% purity in ingots", 76.01.0.01.

* Brazil - No tariff concessions have been granted by Peru to Brazil for the materials covered by this study.

* Chile - The Alcance Parcial agreement No.28 between Peru and Chile is in force; this does not include any mutual concessions in regard to the products covered by the present study.

9.5.3.2. Cartagena Agreement

Bolivia - Peru does not regard tin ingots as falling within the mechanism of Opening Markets in favour of Bolivia, but does include tin bars and rods under heading 30.02.1.01.

Venezuela - Peru has signed a Commercial Exchange Agreement with Venezuela which operates sixty days after the entry into effect of the Quito Protocol, that is to say sixty days as from 27 May 1988, fixing a preference consisting in a reduction of the import surcharge from 12% to 1% for the following products originating in Venezuela :

76.01.01.01 - Raw Aluminium, alloyed with not less than 10% of silicon.

76.01.01.99 - The same as ingots of aluminium.

9.5.3.3. Economic Complementation Agreement with Argentina

Described under section 9.1.3.

9.6. Venezuela

9.6.1. The General Situation

At the present time there is total freedom. All imports into Venezuela are subject to the approval of RECADI (Oficina del Régimen de Cambios Diferenciales).

There are incentives for non-traditional exports but these are not applicable to non-processed bauxite, although exports of refined aluminium in ingots do benefit from them. There are various funds for financing exports. Export sales of the products covered by the present study are, in general, made directly from the exporter to the buyer.

Decree No.255 of 1960 permits Venezuelan importing industries to obtain total or partial exoneration from customs duties when there is no production in the country or when it can be proved that production fails to meet the demand.

The Concejo Venezolano de la Industria, together with FEDECAMARAS (Federación de Cámaras) can intervene in obtaining the above cited exoneration.

9.6.2. Limitations on Trading

Venezuela is in a privileged position for trading with the East Coast of the United States and with Europe because of the short maritime routes which connect it with the major exporting ports of the United States and Europe. For this reason there has not been any major development in trading relationships with the Latin-American countries apart from Mexico and Brazil where there are maritime services which can compete in freight costs with those of the East Coast of the US and with Europe.

By contrast freight facilities to Argentina and Chile and to the Pacific coast are scarce and the rates are high. Trading relations with Colombia are carried out by land and by coastal vessels, with good routes to Cúcuta, the main link with Colombia.

Venezuela has no high level customs tariffs nor any non-customs restrictions for the ores and metals covered by the present analysis.

9.6.3. International Agreements

9.6.3.1. ALADI - The only preference granted by Venezuela within the ALADI Bilateral Agreements has been for Non-calcined Bauxite (26.01.04.02) originating in Brazil, with imports in 1986 reaching 1,620,032 tonnes to a CIF value of US$ 48.0m.

Venezuela has granted Chile a tariff preference of 80% on Copper Wire (74.01.3.03).

9.6.3.2. Cartagena Agreement

Venezuela has offered to come up to the level of the Andean Common External Tariff in regard to third party countries, maintaining for Peru a zero tariff for :

74.01.03.01	Electrolytic Copper
74.01.04.00	Alloyed Copper

It should be noted that Article 9 of the Agreement in force between Peru and Venezuela establishes that the same terminates 60 days after the entry into effect of the Quito Protocol, which modifies the Cartagena Agreement. The date of entry into effect was 25 May 1985, so that the former agreement would have terminated on 25 July 1988.

10.TARIFF CLASSIFICATION

10.1. NALADI - NABANDINA

The Study covers ALUMINIUM, COPPER and TIN in Argentina, Bolivia, Brazil, Chile, Peru and Venezuela.

The specific products covered are the metals and their principal commercial ores: the tariff classifications for these according to NALADI and NABANDINA are set out below.

It should be noted that the NABANDINA nomenclature, which is used in Bolivia, Peru and Venezuela, is less explicit in the case of the ores.

METALS : THE NALADI AND NABANDINA CLASSIFICATIONS COMPARED

	NALADI	Product	NABANDINA
Aluminium metal	76.01.1.01	Raw aluminium	76.01.01.00
	76.01.1.02	Waste and offcuts	76.01.02.00
Copper metal	74.01.1.01	Copper matte	74.01.01.00
	74.01.1.02	Cementation copper	
	74.01.2.01	Blister copper	74.01.02.00
	74.01.2.02	Black copper	
	74.01.3.01	Electrolytic copper	74.01.03.00
	74.01.3.02	Fire-refined copper	
	74.01.3.03	Wire bar	74.01.03.99
	74.01.3.04	Granulated copper	
	74.01.4.01	Alloyed	74.01.04.00
	74.01.9.01	Waste and offcuts	74.01.05,00
Tin metal	80.01.1.01	Ingots	80.01.01.01
	80.01.1.02	Ingots (alloyed)	80.01.01.02
	80.01.1.99	Other	-.-
	80.02.01	Scrap	80.01.03.00

ORES : THE NALADI AND NABANDINA CLASSIFICATIONS COMPARED

	NALADI	Product	NABANDINA
Aluminium ores			26.01.04.00
	26.01.6.01	Bauxite (aluminium oxide)	
	26.01.6.02	Calcined bauxite	
	26.01.6.99	Other	
Copper ores			26.01.02.00
	26.01.4.01	Atacamite (basic chloride)	
	26.01.4.02	Azurite (basic carbonate)	
	26.01.4.03	Bornite (Fe + Cu sulphide)	
	26.01.4.04	Chalcocite (sulphide)	
	26.01.4.05	Chalcopyrite (Fe + Cu sulphide)	
	26.01.4.06	Cuprite (cuprous oxide)	
	26.01.4.07	Malachite (basic carbonate)	
	26.01.4.08	Tenorite (cupric oxide)	
	26.01.4.99	Other	
Tin ores			26.01.07.00
	26.01.9.01	Cassiterite (oxide)	
	26.01.9.02	Stannite (Sn/Cu/Fe sulphide)	
	26.01.9.09	Other tin ores	

In regard to the Andean Group or the Cartagena Agreement it may be pertinent to point out that the following figure in the ALADI Common List as being free of duties into the Andean Countries :

Copper ores :

- Atacamite
- Azurite
- Bornite
- Chalcocite
- Chalcopyrite
- Cuprite
- Malachite
- Tenerite
- Other ores.

This opens up possibilities for exporting these ores to the other Countries of the Andean Group.

The following also figure in the Common List :

- . Copper-containing mattes
- . Blister copper
- . Black copper
- . Cementation copper
- . Electrolytic copper
- . Fire-refined copper
- . Copper wire.

All these can thus be exported free from duties between the Andean Countries.

With effect from 27 May the five Signatory Countries (Bolivia, Colombia, Ecuador, Peru and Venezuela) have ratified the Quito Protocol which modifies the Cartagena Agreement.

It should be noted that the Bilateral Agreements signed between the Andean Countries, such as that between Peru and Colombia, will be affected by the Quito Protocol in the following manner :

. Peru-Bolivia	- Not affected
. Peru-Colombia	- To be adapted to the Quito Protocol
. Peru-Ecuador	- To be adapted to the Quito Protocol
. Peru-Venezuela	- Terminates 60 days after Protocol comes into operation.

10.2. Harmonized System

In 1959 the Brussels Classification (ISIC) prepared by the Council for Customs Cooperation came into force, and the Harmonized System, unifying the systems of the United States, the European Economic Community, Japan, ALADI (including the Andean Group) and other countries should come into effect in 1988. Some countries have already adopted the Harmonized System whilst others, including the ALADI countries, will put it into effect by 1 June 1989 at the latest.

The basic Harmonized System, as it affects the products covered by the present study, is given on the following page for information.

NOMENCLATURE OF THE HARMONIZED SYSTEM

Metals - Aluminium	
76.01	Unworked aluminium
76.02	Aluminium scrap
76.03	Aluminium powder and particles
Metals - Copper	
74.01	Copper matte and cementation copper
74.02	Copper anodes for refining
74.03	Unworked refined copper and copper alloys
74.04	Copper scrap
Metals - Tin	
80.01	Unworked tin
80.02	Tin scrap
Ores - Aluminium	
26.06	Aluminium ores and their concentrates
Ores - Copper	
26.03	Copper ores and their concentrates
Ores - Tin	
26.09	Tin ores and their concentrates.

11. FORMS OF MARKETING AND FINANCING

11.1 Antecedents

All the Latin-American Countries, with the possible exception of Colombia, have suffered from the ravages of severe financial crises with very deep roots, reflected in :

* Mounting balance of payments deficits.
* Massive external debts.
* Devaluation of monetary units.
* High levels of unemployment.
* Reductions in the unit values of exports, with deteriorating terms of trade.
* Low efficiency of the productive apparatus in the agricultural, mining and manufacturing sectors.
* Major fiscal deficits in the National Budgets.

These problems, the solutions to which are both difficult and lengthy, are the cause of ongoing economic imbalances in each of the countries and a prolific source of social unrest and problems. Coupled with the specific threat posed by the traffic in drugs, and its consequences in Bolivia, Colombia and Peru in particular, they present a real threat to the very existence of a democratic system of government.

It is for these reasons that the countries find it imperative to adopt every possible measure to reduce the social effects of the ills briefly indicated above. One of the aspects of this complex reality is the need to increase the real incomes of the countries, that is to increase the entry of foreign currencies by exporting or to reduce outgoings by replacing imports.

It is of interest to note that the Board of the Cartagena Agreement is preparing an inventory of the various mechanisms for financing trade between the Andean countries.

11.2. New Forms of Trading

The scope of the present Study includes an investigation of various forms of trading in Latin America for reducing the need for using strong currencies, for contributing by new forms of investment to the raising of the level of value added on exports and for reducing freight costs by the logistical rationalisation of ore transport and by complementation mechanisms in the utilisation of ores and the existing installations in the Aluminium, Copper and Tin sectors.

The first non-conventional scheme was operated by Peru in 1974 when agreement was reached to pay US$ 300 million in oil to cover debts to the Japanese investors who had financed the North-Eastern oil pipeline.

11.2.1. Exchange

Compensated Trading is, in essence, the bartering of one product for another. The application of sophisticated commercial and banking techniques makes it possible to distinguish between the various forms which are operated in Latin America today, especially in the external trading of Brazil.

. Simple Barter - This is a type which is only operated between the controlled economy countries of Europe and Asia.

. Swap - This is generally a "package" put together by a trader who collects together various products from one or more countries to be exchanged for those of a similar total value from other countries. This requires sophisticated mechanisms for negotiation and the experience of the trader who receives a percentage of the total value of the operation for his services.

. Simple Compensated Trading - Consists of exporting goods to a country against imports of other goods from the contracting country, with cancellation of the effectively shared values.

. Triangular Counter-Purchasing - This takes place when country "A" exports to another country "B" which pays for the operation by means of exports to country "C" which in turn makes compensation to country "A", either by means of exports of by payment in currency. Since the negotiations in such a case are complicated there are few such operations which have been brought to completion.

. Counter-Purchasing - This is the utilisation by one country of its purchasing power in order to sell to another country. Country "A" makes its purchases from country "B" conditional on the purchasing by country "B" of goods originating in country "A". This is, in other words, the concept of equilibrating the balance of payments between pairs of countries, quite often operated between the Andean Countries. Such a concept is today the cause of a conflict between Japan and the United States.

. Purchasing of Production (or Offtake) - This occurs when a country contracts to purchase textile machinery for which it will pay, in whole or in part, by means of the goods produced on it. This offers the purchaser two major advantages: a secure market for his goods and a guarantee of the quality of the goods to be manufactured.

This method is well adapted to the acquisition of metallurgical plants, where part payment may be made by means of finished or semi-finished products.

11.2.2. Financing

A considerable variety of forms of financing have been devised for trade between Latin-American countries, and amongst those which have been observed are the following :

Clearing - This has been practised for many years within the ALALC/ALADI countries, on the basis of the Santo Domingo Agreement on Payments, under which exports from ALADI countries are credited to their accounts, centralised in the Peruvian Central Reserve Bank, whilst the respective total imports into ALADI are set against these, or used to liquidate them, every four months.

In 1987 the balances still to be paid represented only 17% of the total movements, that is to say a total of US$6 could be mobilised for every US$1 actually disbursed. This system is based on the correct and punctual payment of the balances; in practice there have been problems due to delayed settlements by some countries.

It should be noted that the Quito Protocol, ratified by the Andean Countries on 25 May 1988, envisaged in its Article 89 the establishment of an Andean financing system for trade between the Member States and those in the Andean sub-region, coordinated with the Andean Development Corporation and the Andean Reserve Fund for such proposals.

Clearing with Traders - A variant of clearing is that operated by some export companies (traders) with major resources and contacts: they receive goods from some countries against their purchases from other countries, all operating through the trader.

Acquisitions - As seen in paragraph 11.2.1. exports may be used under the offtake system to finance all or part of the acquisition of machinery or shares in companies in the importing country.

This is particularly valuable when the government of the importing country wishes to privatise companies and to receive goods in exchange for shares in such companies. Chile has initiated processes of this type in order to privatise some companies which are thus converted into Joint Ventures.

On other occasions the credits earned by raw material producing countries can be exchanged for shares in the debtor countries.

Payment in Services - Another method which has been practised in one or other form is that of services against products: a clear example of this would be the payment of maritime freight charges by means of concentrates or ingots. Technical services, studies and consultants can however be paid for in currency.

Multinational Companies - This heading is to be regarded as covering the formation and operation of Latin-American or Andean multinationals with the participation of foreign capital and which are to be involved in the function of trading in mining, metallurgical and metal engineering products. Such companies would operate in various member

countries and could employ one or more of the forms of payment indicated in the paragraphs above.

Projects for Andean Industrial Integration - Provisions are made in Article 40 of the Quito Protocol for the exploitation of an industrial range or family of products from various origins; these can be of short or medium duration for the manufacture of an entire range of mining products, such as the salts and other derivatives of aluminium, copper and tin, with great advantages for the processing plants for these products.

Customs duties - Although tariffs on the products covered by this study are relatively low (see sections on the individual countries) a rationalisation of trading which would permit their total removal would facilitate agreements between the ALADI countries in the mining, concentrating and refining sectors, and could then be extended to the derived products manufactured by one or more ALADI multinational companies.

Free Zones - Brazil, Chile and Venezuela have been pioneers in operating the concept of the Free Zone, and this has been extended to other ALADI countries with a favourable effect on trading in finished products.

Maritime Transport - As has already been seen one of the obstacles preventing efficient marketing of the products covered by this study, which are by their very nature of high volume and/or weight and which are of relatively low unit value, is the lack of suitable means of transport, whether coastal, trans-oceanic or on land.

Any actions which can be taken to improve and integrate this important factor in production can only have beneficial effects on the sector under study.

Use of the External Debt - A number of countries have implemented marketing practices, designed to develop their foreign trade, on the basis of payment of their External Debt. In such cases it is the government of the exporting country which pays the manufacturers for the exported goods, against a total or part credit for the importer, on behalf of the External Debt. The exports can be paid for, in whole or in part, with External Debt promissary notes, with the exporter profitting from the discount corresponding to the value of the goods in the Promissary Note.

Special Regional Programmes - Mention should be made of the regional and subregional bodies which promote schemes for developing exports throughout the whole of Latin America. Amongst these are BLADEX, CAF, CARICOM, JUNAC, SIECA and others; their support should be sought in regard to the development of trade in this Sector.

12. CONTRACT OR 'TOLL' AGREEMENTS

A contractual system called 'Toll' operates within the mining industry: this involves one of the parties using the installations of the other, when capacity is available on either a specified or ad hoc basis, and against payment for the facilities provided. The duly processed product is returned to its original owner for marketing or for subsequent utilisation.

Such contractual processing can be involved at any stage between the processing of raw materials into concentrates up to the converting of refined metals to semi-finished products. An example of this would be the processing of copper cathodes to produce wire which, after being returned, is then marketed by the owner of the cathodes.

The system can be operated whenever the owner of the raw material finds himself in one of the following situations :

- The producer does not own processing plants whereas the contractor has available capacity in plants which he has built for specific or other reasons.

- The producer has excess production which he cannot process in his own installations, and another processor has excess capacity which he can provide against payment for the service.

- The producer does not possess the economic or financial capacity for building or extending his processing installations, and so utilises the available capacity of the processor who has invested in his plant and who now benefits from the usage of his excess capacity, receiving an income which at least covers his variable costs.

This contractual or toll system, as described above, is widely used in the mining industry, both inside the country of the producer and also at international level. However whenever a country producing ores operates a toll agreement this is almost always operated within a developed country, and the processed products may be retained in that country or sent on to other developed countries.

In the countries covered by the study there is production which could be processed in this way, together with installations which could provide such a service. This is the case with the excess Peruvian and Chilean copper concentrates which could be processed in the Caraiba smelting works in Brazil; the refined copper is then returned to the ownership of the Peruvian or Chilean exporter for sale on the Brazilian market or re-exported to Peruvian or Chilean markets.

Similarly Brazilian Bauxite could be processed into Alumina and Aluminium in Venezuelan or Argentinian refineries, which obtain their supplies of this product from countries outside the region and even countries outside the continent.

The great advantage of this toll system is that the amount of money which is transferred from one company to another is only the payment for the service and not the total value of the metals involved.

The system eliminates the need for one country to buy from another, using scarce currency, those products which it needs to process in its installations which, for structural or economic reasons, have excess

processing capacity.

In countries such as Argentina and Brazil, with enormous processing capacities for both concentrates and also intermediate and refined products which are reduced at the present time to almost half their output, the alternative of having toll agreements with producer countries such as Peru and Chile would make it possible to use the present under-utilised capacities of their installations, and without having to pay out in foreign currency the full value of the materials involved.

Whilst the advantages of the toll system may seem to be greater for the producer countries, since they utilise their capacities and hence their investments, the servicing countries obtain considerable benefit from reversing the flow of currency needed for utilising their plants in such a way that, instead of having to pay for the products to be converted in their countries they receive foreign currency to the value of the service given, so becoming receivers instead of exporters of currency.

As has already been pointed out the concept of contract or toll operation can be employed at any point from the initial stages of the mining operation up to the converting of refined products into semi-manufactured goods, and may even be extended to cover finished products.

Semi-refined or finished products can be returned to the country of origin for the domestic market, can be marketed in the country of processing, or can be re-exported, on behalf of the original country, to a third country.

One limitation on this last alternative is the fact that the utilisation of finished products in countries or zones outside the region encounter restrictions on the importing of manufactured goods, given that these exports compete with those other products which have been converted in the developed countries from the same raw materials which they purchase from us at the present time with very little or no converting having been carried out on them.

This problem will be analysed in the study on complementarity at the level of semi-finished and finished goods, and for each specific case.

13. SPECIFIC POSSIBILITIES FOR COMPLEMENTARITY

It has been possible to identify some specific possibilities of complementarity in between the countries covered by the Study and in respect of the metals Aluminium and Copper.

13.1. Contract Processing of Copper Concentrates in Brazil

The Caraiba Smelting Works in Brazil needs annually some 450,000 tonnes of Copper Concentrates for its operation: of these only 120,000 tonnes are produced locally. The remaining quantity has to be imported, either from Peru and Chile or from countries outside the region such as Canada and Africa.

In order to pay for these imports Brazil uses foreign currency which could be saved if contract or toll agreements were established for the processing of Peruvian and Chilean concentrates.

The Caraiba smelter has recently been sold by the Brazilian Government to private interests, and it is to be hoped that the new administration will review the contracts for supplies of concentrates, and this would be an opportune time to examine the necessary mechanisms and facilities which would allow the contract processing of concentrates from Peru and Chile.

13.2. Contract Processing of Copper Cathodes in Brazil

The Continuous Casting plant at Caraiba Metais has a capacity for processing which is greater than the production of the refinery, leaving a capacity of approximately 70,000 tonnes available for the production of Copper Wire from imported cathodes. Peruvian and Chilean producers of cathodes could, instead of selling their cathodes as such or having them processed in German or Chinese plants, have them processed in the Caraiba plant for distribution either on the Brazilian market or for re-export to their own markets for wire.

13.3. Contract Processing of Copper Concentrates and Blister and Refined Copper between Peru and Chile

There are apparently no possibilities for complementarity between the Copper industries of Peru and Chile, since both appear to be mutually competitive. However, and for existing economic reasons, opportunities are available in which copper concentrates and blister or refined copper from Peru or Chile could be processed to more sophisticated products by using available capacities in the plants of the other country. These opportunities come about as the result of situations such as shut-downs due to strikes or climatic factors which affect transport and processing in the country of origin, or because of the advantages offered by the technical characteristics of any particular plant or smelter when processing a certain type of raw material.

The identification and location of these possibilities for complementarity require, more than a technical analysis, the goodwill of the parties.

13.4. Contract Processing of Brazilian Bauxite in Venezuela

The aluminium industries in Venezuela and Brazil have shown reverse patterns of development. Whilst Venezuela has rapidly become a producer of refined aluminium, importing the raw materials from Guyana, Jamaica and other countries, the Brazilian industry has developed from the production of bauxite to the production of refined aluminium, there being at the present time excess quantities of bauxite which cannot be processed in the Brazilian refineries.

Venezuela has already started working bauxite in the los Pijiguaos deposit which will produce sufficient ore to supply its smelters and so eliminate the need to import bauxite from other countries. However, and until it reaches this level of self-sufficiency, Venezuela could process in its own alumina and aluminium refineries the excess bauxite produced by Brazil.

13.5. Contract Processing of Venezuelan Alumina in Argentina

ALUAR, Aluminios Argentinos, imports about 350,000 tonnes of alumina from Australia at the present time to supply its Aluminium Refinery at Puerto Madryn, where it produces about 150,000 tonnes of refined aluminium.

This situation has arisen from the fact that, when the plant was constructed and sources of alumina were being sought for it, there were no safe supplies in Latin America, so ALUAR signed a long-term agreement with Australia for its supplies.

This contract expires in 1994; from this time, and given the progress of the Aluminium industry in Brazil and Venezuela, the ALUAR plant could receive its supplies of alumina through contract processing agreements with these countries.

Although not included in the terms of reference of this study various specific possibilities for complementarity in the area of Zinc and Lead concentrates and the converting of aluminium were nevertheless identified during the production of the study. These are as follows :

13.6. Contract Processing of Zinc Concentrates in Brazil

A possibility for complementarity exists in the contract processing of Peruvian, Bolivian and/or Argentinian Zinc concentrates in the Paraibuna Metals Refinery in Brazil.

At the present time this refinery imports about 100,000 tonnes of Zinc concentrates principally by purchase from Peru and also from outside the region. The possibility of Peruvian producers having their concentrates processed under contract in this Refinery would limit the need for Brazil to pay in foreign currency for the value of the same, so opening up the immense Brazilian market for Zinc to the Peruvian producers.

13.7 Contract Processing of Lead Concentrates in Bolivia

The Fundición de Plomo at Karachipampa in Bolivia has the capacity for processing approximately 50,000 tonnes of lead concentrates; this is totally shut down, having never started production because no concentrates were available to supply it.

Without making any observations on the circumstances under which this refinery was constructed the possibility exists of using its installations for processing Peruvian or Argentinian lead concentrates in order to provide its supplies. At the present time these concentrates are exported to North America, Europe or Japan, and the requirements of the smelters could be supplemented with the incipient production of lead concentrates in Bolivia.

The possibility of operating this plant is further improved by the fact that Bolivia supplies Argentina with natural gas, and at the present time Argentina is experiencing problems in paying Bolivia for this whilst, on the other hand, Argentina supplies Peru with grain, beef, etc., with a favourable trading balance, so that a triangular trading operation could be established which would allow the use of the Karachipampa installations in such a way as to simultaneously solve the problem of the payment of debts between Argentina and Bolivia and those between Peru and Argentina.

13.8. Converting of Aluminium in the ALUBOL plant in Bolivia

There is a plant in Bolivia with a capacity for processing between 4000 to 6000 tonnes of aluminium into bars, and this plant is totally paralysed. The plant, which includes units for smelting, extrusion, anodising, etc., was constructed with assistance under the ALALC agreements with the object of supplying the Peruvian and Chilean markets. However, conflicts of interests in both countries blocked the entry of Bolivian aluminium products and forced the plant to close down.

At the present time the installations at the plant are well maintained and could be put back into operation immediately if any of the countries in the region which produce aluminium were to decide to use the vacant capacity of this plant to convert the metal into semi-finished or finished goods.

Each and every one of these possibilities for complementarity necessitates further analysis to determine their feasibility. Within the limitations under which this study was carried out it was not possible to do this. In addition it will be necessary to break down the resistance of individuals, institutions and countries to new schemes which could, in some cases, affect the interests of the companies or countries involved.

INDEX TO TABLES

GLOSSARY OF SOME ACRONYMS USED IN THE STUDY
with English translations and
corresponding English acronyms
where these are available

AILA	Asociación de Industriales Latinoamericanos Association of Latin American Industrialists
ALADI	Asociación Latinoamericana de Integración Latin American Integration Association
ALALC LAFTA	Asociación Latinoamericana de Libre Comercio Latin American Free Trade Association
LIDE	Asociación Latinoamericana de Instituciones Financieras de Desarrollo Latin American Association of Development Financing Institutions
ALUAR	Aluminios Argentinos SA
BCIE CABEI	Banco Centroamericano de Integración Económica Central American Bank for Economic Integration
BID IBD	Banco Interamericano de Desarrollo Inter-American Development Bank
BLADEX	Banco Latinoamericano de Exportación Latin American Export Bank
BM WB	Banco Mundial World Bank
CACEX	Cartera de Comercio Exterior Export Trade Department of Banco do Brasil, SA
CAF ADC	Corporación Andina de Fomento Andean Development Corporation
CARICOM	Comunidad del Caribe Caribbean Community
CCA	Consejo de Cooperación Aduanera Customs Cooperation Council
CEMSLA	Centro de Estudios Monetarios Latino-americanos Centre for Latin American Monetary Studies

CEPAL ECLAC	Comisión Económica para América Latina Economic Commission for Latin America and the Caribbean
CODELCO	Corporación del Cobre
COMIBOL	Corporación Minera de Bolivia
CORFO	Corporación de Fomento de la Producción Production Development Corporation
CVG	Corporación Venezolana de Guayana
CCE EEC	Comunidad Económica Europea European Economic Community
ENAF	Empresa Nacional de Fundiciones
ENAMI	Empresa Nacional de Minera
ESTANSA	Estaños Argentinos SA
FAR ARF	Fondo Andino de Reservas Andean Reserve Fund
FELABAN	Federación Latinoamericana de Bancos Latin American Banking Federation
FINEP	Financiadora de Estudios e Projectos Agency for the Financing of Studies and Projects
FMI IMF	Fondo Monetario Internacional International Monetary Fund
INTAL	Instituto para la Integración de América Latina Institute for Latin American Integration
JUNAC	Junta del Acuerdo de Cartagena Board of the Cartagena Agreement
PROCHILE	Instituto de Promoción de Exportaciones de Chile Export Promotion Institute of Chile
RECADI	Oficina del Régimen de Cambios Diferenciales
SELA	Sistema Económica Latinoamericano Latin American Economic System
SICE	Secretaría de Industria y Comercio Exterior
SIECA	Secretaría Permanente del Tratado General de Integración Económica Centroamericana Permanent Secretariat of the General Treaty on Central American Economic Integration

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TABLES

Table 6.1.1. ALUMINIUM World reserves of Bauxite, 1985

	Millions tonnes	Percentages
SOUTH AMERICA	3760	17.905%
Brazil	2250	10.714%
Guyana	700	3.333%
Surinam	575	2.738%
Venezuela	235	1.119%
CENTRAL AMERICA & CARRIBEAN	2040	9.714%
Dominican Republic	30	0.143%
Haiti	10	0.048%
Jamaica	2000	9.524%
NORTH AMERICA	38	0.181%
United States	38	0.181%
EUROPE (1)	1642	7.819%
France	30	0.143%
Federal Germany	2	0.010%
Greece	600	2.857%
Hungary	300	1.429%
Italy	5	0.024%
Romania	50	0.238%
Spain	5	0.024%
Soviet Union	300	1.429%
Yugoslavia	350	1.667%
ASIA (1)	1960	9.333%
Popular Republic of China	150	0.714%
India	1000	4.762%
Indonesia	750	3.571%
Malaysia	15	0.071%
Pakistan	20	0.095%
Turkey	25	0.119%
AFRICA	6874	32.733%
Cameroon	680	3.238%
Ghana	450	2.143%
Guinea	5600	26.667%
Mozambique	2	0.010%
Sierra Leone	140	0.667%
Zimbabwe	2	0.010%
OCEANIA	4440	21.143%
Australia	4440	21.143%
OTHER COUNTRIES	200	0.952%
WORLD TOTAL	21000	100.00%

(1) Includes centrally planned economy countries

Source : Mineral Facts and Problems, Bureau of Mines, USA

Table 6.1.2. ALUMINIUM World production of Bauxite (Thousands tonnes)

COUNTRY/YEAR	1982	1983	1984	1985	1986	o/o	1987
SOUTH AMERICA	9029.6	10265.8	12843.6	11737.9	12250.8	13.4%	11320.2
Brazil	4186.5	5238.7	6433.1	5846.0	6446.3	7.1%	6446.3
Surinam	3060.0	2793.0	3374.9	3738.3	3730.6	4.1%	2800.0
Guyana	1783.1	2234.1	3035.6	2153.6	2073.9	2.3%	2073.9
CENTRAL AMERICA & CARIBBEAN	8687.0	7681.9	8734.9	6239.3	6963.9	7.6%	7996.5
Jamaica	8157.7	7681.9	8734.9	6239.3	6963.9	7.6%	7659.9
Other	529.3	-	-	-	-	0.0%	336.6
NORTH AMERICA	732.0	679.0	856.0	674.0	510.0	0.6%	581.0
United States	732.0	679.0	856.0	674.0	510.0	0.6%	581.0
EUROPE (1)	17689.5	17205.8	16834.0	17198.8	16863.3	18.5%	nd
Soviet Union	6400.0	6300.0	6200.0	6400.0	6275.0	6.9%	nd
Yugoslavia	3668.8	3500.0	3347.0	3538.0	3459.0	3.8%	3394.0
Greece	2845.5	2455.2	2296.2	2453.8	2225.0	2.4%	2457.8
Hungary	2627.0	2917.0	2994.0	2815.0	3022.3	3.3%	3101.1
France	1737.0	1595.3	1529.5	1529.6	1379.0	1.5%	1271.1
Other	411.2	438.3	467.3	462.4	503.0	0.6%	nd
ASIA (1)	5602.0	5462.2	5893.1	5904.2	6044.8	6.6%	nd
India	1854.0	1976.1	2078.0	2268.0	2338.0	2.6%	2916.0
Popular Republic of China	1950.0	1900.0	2000.0	2100.0	2200.0	2.4%	nd
Others	1798.0	1586.1	1815.1	1536.2	1506.8	1.7%	1393.6
AFRICA	12531.4	13864.7	15850.9	15331.5	16126.3	17.7%	16148.7
Guinea	11827.4	12986.0	14738.0	13956.0	14656.0	16.1%	14656.0
Other	704.0	878.7	1112.9	1375.5	1470.3	1.6%	1492.7
OCEANIA	23625.0	24372.3	31537.0	31839.0	32432.0	35.6%	34000.0
Australia	23625.0	24372.3	31537.0	31839.0	32432.0	35.6%	34000.0
WORLD TOTAL	77896.0	79531.7	92549.5	88924.3	91191.1	100.0%	nd

(1) Includes centrally planned economy countries
NOTE : The percentage figures refer to 1986.
Source : World Metal Statistics, USA, 1988.

Table 6.1.3. ALUMINIUM World production of Alumina (Thousands tonnes)

COUNTRY/YEAR	1983	1984	1985	1986	o/o	1987
SOUTH AMERICA	2343	3258	3473	3937	12.0%	3996
Surinam	1154	1237	1242	1471	4.5%	1363
Brazil	629	882	1096	1197	3.7%	1273
Venezuela	560	1139	1135	1269	3.9%	1360
CENTRAL AMERICA & CARIBBEAN	1907	1713	1622	1586	4.8%	1572
Jamaica	1907	1713	1622	1586	4.8%	1572
NORTH AMERICA	5336	5846	4744	4335	13.2%	5000
United States	4220	4720	3725	3320	10.1%	3950
Canada	1116	1126	1019	1015	3.1%	1050
EUROPE (1)	5406	6472	6023	6178	18.8%	6203
Federal Germany	1580	1701	1657	1560	4.8%	1313
Yugoslavia	1010	1135	1138	1117	3.4%	1097
France	1009	1031	877	884	2.7%	866
Other	1807	2605	2351	2617	8.0%	2927
ASIA (1)	1915	2132	2020	1684	5.1%	1461
Japan	1378	1488	1336	956	2.9%	711
Other	537	644	684	728	2.2%	750
AFRICA	564	535	565	572	1.7%	543
Guinea	564	535	565	572	1.7%	543
OCEANIA	7231	8781	8792	9423	28.7%	10105
Australia	7231	8781	8792	9423	28.7%	10105
TOTAL (1)	24702	28737	27239	27715	84.6%	28880
CPEC (2)	3667	4595	4156	5061	15.4%	5106
WORLD TOTAL = (1) + (2)	28369	33332	31395	32776	100.0%	33986

(1) Does not include centrally planned economy countries
(2) Centrally Planned Economy Countries

NOTE : The percentage figures refer to 1987.

Source : Metallstatistik 1983-1987. Metallgesellschaft, Germany.

Table 6.1.4. ALUMINIUM World production of Primary Aluminium
(Thousands tonnes)

COUNTRY/YEAR	1983	1984	1985	1986	o/o	1987
SOUTH AMERICA	901.2	1001.8	1121.0	1359.8	8.8%	1430.8
Brazil	400.7	455.0	549.2	757.4	4.9%	843.5
Venezuela	335.2	386.0	403.1	423.0	2.7%	430.8
Argentina	136.4	137.8	139.9	150.7	1.0%	155.1
Surinam	28.9	23.0	28.8	28.7	0.2%	1.4
CENTRAL AMERICA & CARIBBEAN	39.7	44.0	42.7	37.0	0.2%	75.7
Mexico	39.7	44.0	42.7	37.0	0.2%	75.7
NORTH AMERICA	4444.4	5321.0	4782.0	4391.7	28.3%	4891.0
United States	3353.2	4099.0	3499.7	3036.5	19.6%	3342.9
Canada	1091.2	1222.0	1282.3	1355.2	8.7%	1548.1
EUROPE (1)	6413.8	6523.4	6375.5	6498.0	41.9%	nd
Soviet Union	2400.0	2300.0	2300.0	2350.0	15.2%	nd
Norway	710.6	760.8	724.1	729.1	4.7%	798.8
Federal Germany	743.4	777.2	745.4	763.7	4.9%	737.7
France	360.8	341.5	293.2	321.8	2.1%	322.5
Other	2199.0	2343.9	2312.8	2333.4	15.0%	nd
ASIA (1)	1393.5	1620.1	1587.1	1556.1	10.0%	nd
Popular Republic of China	410.0	435.0	435.0	490.0	3.2%	nd
Japan	255.9	286.7	226.5	140.2	0.9%	40.7
India	207.7	268.5	266.2	257.1	1.7%	253.4
Other	519.9	1333.4	1360.6	1415.9	9.1%	nd
AFRICA	421.4	413.0	473.2	552.2	3.6%	572.0
South Africa	161.3	167.4	164.6	169.6	1.1%	172.2
Egypt	140.2	172.5	178.5	176.9	1.1%	179.4
Other	119.9	73.1	130.1	205.7	1.3%	220.4
OCEANIA	695.2	997.7	1095.2	1111.2	7.2%	1273.2
Australia	475.1	754.8	851.9	875.0	5.6%	1024.2
New Zealand	220.1	242.9	243.5	236.2	1.5%	249.0
WORLD TOTAL	14309.2	15921.0	15476.7	15506.3	100.0%	nd

(1) Includes centrally planned economy countries

NOTE : The percentage figures refer to 1986.

Source : World Bureau of Metal Statistics, USA, 1988.

Table 6.1.5. ALUMINIUM World consumption of Aluminium
(Thousands tonnes)

COUNTRY/YEAR	1982	1983	1984	1985	1986	o/o	1987
SOUTH AMERICA	410.9	474.9	562.3	615.4	732.0	4.5%	760.8
Brazil	281.9	270.6	294.8	347.5	423.7	2.6%	431.8
Venezuela	47.9	89.0	130.3	147.0	135.0	0.8%	135.0
Argentina	62.9	80.4	101.2	80.9	121.3	0.7%	142.0
Other	18.2	34.9	36.0	40.0	52.0	0.3%	52.0
CENTRAL AMERICA & CARIBBEAN	65.9	57.7	73.0	78.5	54.5	0.3%	nd
Mexico	64.4	55.9	71.0	76.0	52.0	0.3%	52.0
Other	1.5	1.8	2.0	2.5	2.5	0.0%	nd
NORTH AMERICA	3878.0	4469.0	4793.0	4628.0	4638.4	28.4%	4858.4
United States	3581.0	4221.0	4457.0	4282.0	4316.0	26.4%	4536.0
Canada	297.0	248.0	336.0	346.0	322.4	2.0%	322.4
EUROPE (1)	6368.8	6498.4	6567.6	6647.6	6916.8	42.3%	nd
Soviet Union	1880.0	1850.0	1800.0	1850.0	1885.0	11.5%	nd
Federal Germany	1000.2	1085.0	1151.6	1160.9	1186.7	7.3%	1185.7
France	578.4	613.4	579.3	586.1	592.6	3.6%	602.2
Italy	420.0	430.0	448.0	470.0	510.0	3.1%	465.6
United Kingdom	326.3	323.4	369.5	350.4	389.1	2.4%	372.6
Other	2163.9	2196.6	2219.2	2230.2	2353.4	14.4%	nd
ASIA (1)	3028.2	3432.2	3140.1	3480.2	3516.6	21.5%	nd
Japan	1654.2	1820.8	1572.0	1694.8	1624.2	9.9%	1696.9
Popular Republic of China	580.0	620..	630.0	700.0	750.0	4.6%	nd
India	219.7	218.5	310.0	297.6	310.0	1.9%	310.0
Other	574.3	772.9	628.1	787.8	832.4	5.1%	nd
AFRICA	171.4	177.6	191,4	212.6	179.1	1.1%	189.7
South Africa	69.3	62.8	76.8	77.0	75.4	0.5%	89.7
Egypt	58.0	67.0	70.0	62.9	58.0	0.4%	58.0
Other	44.1	47.8	44.6	72.7	45.7	0.3%	42.0
OCEANIA	236.0	268.3	297.4	318.2	323.3	2.0%	352.5
Australia	212.2	242.2	265.4	283.5	293.6	1.8%	318.7
New Zealand	24.0	26.1	32.0	34.7	29.7	0.2%	33.8
WORLD TOTAL	14154.0	15378.1	15624.8	15980.5	16360.7	100.0%	nd

(1) Includes centrally planned economy countries

NOTE : The percentage figures refer to 1986.

Sources : World Bureau of Metal Statistics, USA, 1988.
Metallstatistik 1983-1987. Metallgesellschaft, Germany.

Table 6.1.6. ALUMINIUM International trade - Exports of Refined Metal
(Thousands tonnes)

COUNTRY/YEAR	1982	1983	1984	1985	1986	o/o	1987
SOUTH AMERICA	343.2	504.5	379.3	661.2	661.0	11.2%	748.9
Venezuela	208.6	292.2	179.1	382.9	275.5	4.7%	302.8
Argentina	67.6	57.0	30.1	70.8	34.8	0.6%	12.0
Surinam	60.3	38.9	22.2	28.4	27.2	0.5%	3.2
Brazil	6.7	116.4	147.9	179.1	323.5	5.5%	430.9
CENTRAL AMERICA & CARIBBEAN	0.2	0.6	0.8	0.2	2.7	0.0%	nd
Mexico	0.2	0.6	0.8	0.2	2.7	0.0%	nd
NORTH AMERICA	1260.5	1286.1	1092.5	1425.7	1374.8	23.4%	1460.1
United States	364.1	360.7	259.6	374.9	211.1	3.6%	288.3
Canada	896.4	925.4	832.9	1050.8	1163.7	19.8%	1171.8
EUROPE	2018.4	2361.7	2184.3	2154.6	2136.9	36.3%	2299.6
Norway	545.4	637.4	638.7	643.8	646.5	11.0%	754.2
Holland	350.8	433.3	279.0	296.8	301.3	5.1%	314.4
Federal Germany	255.4	321.1	293.9	281.7	301.7	5.1%	333.6
France	182.7	160.7	146.6	115.4	143.3	2.4%	119.3
Spain	145.3	165.9	232.8	208.4	146.4	2.5%	106.9
Other	538.8	643.3	593.3	608.5	597.7	10.2%	671.2
ASIA	360.4	495.6	432.3	528.2	519.1	8.8%	535.8
Bahrain	157.0	191.6	109.8	74.3	136.8	2.3%	146.1
United Arab Emirates	125.3	147.3	143.8	150.7	155.6	2.6%	146.0
Indonesia	16.0	113.4	142.0	238.7	179.7	3.1%	179.7
Other	62.1	43.3	36.7	64.5	47.0	0.8%	64.0
AFRICA	330.2	315.1	281.1	218.9	365.4	6.2%	nd
Ghana	174.2	82.3	44.2	20.6	104.4	1.8%	nd
Egypt	84.6	69.6	99.9	55.9	115.6	2.0%	nd
Other	71.4	163.2	137.0	142.4	145.4	2.5%	nd
OCEANIA	325.9	413.2	536.7	785.8	763.3	13.0%	942.3
Australia	185.6	221.0	326.0	563.7	579.5	9.8%	707.3
New Zealand	140.3	192.2	210.7	222.1	183.8	3.1%	235.0
WORLD TOTAL	4687.2	5435.5	4978.3	5798.1	5884.4	100.0%	nd

NOTE : The percentage figures refer to 1986.

Source : World Bureau of Metal Statistics, USA, 1988.

Table 6.1.7. ALUMINIUM International trade - Imports of Refined Metal
(Thousands tonnes)

COUNTRY/YEAR	1982	1983	1984	1985	1986	o/o	1987
SOUTH AMERICA	ERR	3.6	5.9	ERR	ERR	ERR	nd
Brazil	10.8	3.0	4.6	2.6	1.1	0.0%	2.3
Venezuela	1.3	0.3	0.3	0.4	2.6	0.0%	nd
Argentina	-	0.3	1.0	-	-	ERR	nd
CENTRAL AMERICA & CARIBBEAN	28.3	10.7	25.1	29.7	3.6	0.1%	6.0
Mexico	28.3	10.7	25.1	29.7	3.6	0.1%	6.0
NORTH AMERICA	638.9	772.6	922.9	927.5	1409.0	21.8%	1294.9
United States	614.5	742.0	879.3	867.7	1344.5	20.8%	1241.5
Canada	24.4	30.6	43.6	59.8	64.5	1.0%	53.4
EUROPE	2055.8	2288.9	2346.7	2407.2	2633.3	40.8%	2528.9
Federal Germany	565.3	592.1	722.8	721.6	783.7	12.2%	734.0
France	352.0	394.6	365.0	395.9	428.0	6.6%	407.1
Belgium	267.4	289.0	311.0	307.9	307.4	4.8%	315.5
Italy	211.2	254.5	291.8	319.9	347.7	5.4%	376.9
Holland	195.5	284.6	133.0	135.2	151.1	2.3%	145.5
United Kingdom	154.2	163.6	172.1	147.4	182.2	2.8%	175.8
Other	310.2	310.5	351.0	379.3	433.2	6.7%	374.1
ASIA	2016.5	2605.5	2092.6	2604.3	2193.2	34.0%	2615.6
Japan	1446.6	1603.7	1347.8	1575.5	1366.0	21.2%	1835.3
Popular Republic of China	169.6	283.8	252.7	487.9	266.2	4.1%	148.1
South Korea	105.2	333.8	142.4	160.2	184.5	2.9%	200.2
Other	295.1	384.2	349.7	380.7	376.5	5.8%	432.0
AFRICA	0.8	0.9	0.8	0.3	0.4	0.0%	nd
South Africa	0.8	0.9	0.8	0.3	0.4	0.0%	nd
OCEANIA	13.9	5.2	0.7	1.1	0.8	0.0%	0.5
Australia	13.9	5.2	0.7	1.1	0.8	0.0%	0.5
WORLD TOTAL	4903.4	5850.4	5558.0	6138.4	6448.9	100.0%	nd

NOTE : The percentage figures refer to 1986.

Source : World Bureau of Metal Statistics, USA, 1988.

Table 6.1.8. ALUMINIUM International Prices (US¢/lb)

YEAR	CURRENT PRICES (1)	CONSTANT 1987 PRICES (2)
1950	17.713	111.769
1951	19.000	105.830
1952	19.410	108.114
1953	20.931	116.586
1954	21.784	99.989
1955	23.668	107.689
1956	24.032	105.981
1957	25.416	109.797
1958	24.790	104.862
1959	24.738	104.642
1960	26.000	109.980
1961	25.428	107.560
1962	23.875	100.036
1963	22.623	93.659
1964	23.741	96.863
1965	24.507	98.273
1966	24.500	95.550
1967	24.978	94.417
1968	25.583	92.866
1969	27.176	93.214
1970	28.716	92.753
1971	29.000	89.610
1972	26.409	73.945
1973	25.000	62.250
1974	34.133	84.991
1975	39.786	90.314
1976	44.341	94.890
1977	51.339	102.678
1978	53.075	97.658
1979	59.395	97.408
1980	69.566	98.784
1981	76.000	96.520
1982	76.000	90.440
1983	77.667	89.317
1984	61.054	67.770
1985	48.806	51.734
1986	55.869	58.104
1987	72.445	72.445

(1) Metals Week US Market
(2) Obtained by applying a correction for inflation in the United States

Source : Engineering and Mining Journal, 1988

Table 6.2.1. COPPER World reserves of Copper, 1985

	Millions tonnes	Percentages
SOUTH AMERICA	94	27.647%
Chile	79	23.235%
Peru	12	3.529%
Other	3	0.882%
CENTRAL AMERICA & CARIBBEAN	18	5.294%
Mexico	17	5.000%
Other	1	0.294%
NORTH AMERICA	74	21.765%
Canada	17	5.000%
United States	57	16.765%
EUROPE (1)	50	14.706%
ASIA (1)	26	7.647%
Philippines	12	3.529%
Other	14	4.118%
AFRICA	60	17.647%
Zaire	26	7.647%
Zambia	30	8.824%
Other	4	1.176%
OCEANIA	15	4.412%
Australia	8	2.353%
Papua New Guinea	6	1.765%
Other	1	0.294%
WORLD TOTAL	340	100.000%

(1) Includes centrally planned economy countries

Source : Mineral Facts and Problems, Bureau of Mines, USA

Table 6.2.2. COPPER World mining production
(Thousands tonnes, finished metal)

COUNTRY/YEAR	1982	1983	1984	1985	1986	o/o	1987
SOUTH AMERICA	1625.6	1614.2	1692.6	1791.1	1832.0	21.8%	1803.0
Chile	1242.2	1257.5	1290.7	1356.4	1399.8	16.6%	1375.0
Peru	356.3	322.2	364.7	391.4	397.4	4.7%	392.3
Brazil	24.4	32.1	35.2	41.0	34.0	0.4%	35.7
Other	2.7	2.4	2.0	2.3	0.8	0.0%	0.0
CENTRAL AMERICA & CARIBBEAN	241.7	208.8	182.7	182.0	185.5	2.2%	nd
Mexico	239.1	206.1	180.0	178.9	181.9	2.2%	206.3
Other (1)	2.6	2.7	2.7	3.1	3.6	0.0%	nd
NORTH AMERICA	1759.5	1691.1	1824.4	1844.4	1845.8	21.9%	1994.6
United States	1147.0	1038.1	1102.6	1105.8	1147.3	13.6%	1274.7
Canada	612.5	653.0	721.8	738.6	698.5	8.3%	719.9
EUROPE (1)	1809.9	1877.2	1914.9	1926.0	1913.1	22.7%	nd
Soviet Union	1010.0	1020.0	1020.0	1030.0	1030.0	12.2%	nd
Poland	376.0	402.3	431.0	432.0	435.0	5.2%	nd
Yugoslavia	119.3	129.5	116.2	116.7	116.7	1.4%	111.0
Sweden	55.4	74.6	85.8	91.8	87.4	1.0%	90.3
Other	249.2	250.8	261.9	255.5	244.0	2.9%	nd
ASIA (1)	836.5	850.6	855.9	872.8	883.2	10.5%	nd
Philippines	292.2	271.4	233.6	222.2	217.0	2.6%	215.0
Popular Republic of China	187.0	185.0	190.0	200.0	210.0	2.5%	nd
Other	357.3	394.2	432.3	450.6	456.2	5.4%	nd
AFRICA	1354.0	1425.9	1404.4	1340.2	1326.7	15.8%	1261.8
Zambia	529.6	591.3	576.0	510.8	512.9	6.1%	508.9
Zaire	502.8	502.2	500.7	502.1	502.6	6.0%	473.2
South Africa	207.1	211.8	212.0	203.9	203.2	2.4%	192.7
Other	114.5	120.6	115.7	123.4	108.0	1.3%	87.0
OCEANIA	415.3	444.7	400.1	434.8	427.0	5.1%	414.6
Australia	245.3	261.5	235.7	259.8	248.4	3.0%	223.0
Papua New Guinea	170.0	183.2	164.4	175.0	178.6	2.1%	191.6
WORLD TOTAL	8042.5	8112.5	8275.0	8391.3	8413.3	100.0%	nd

(1) Includes centrally planned economy countries

NOTE : The percentage figures refer to 1986.

Source : World Bureau of Metal Statistics, USA, 1988.

Table 6.2.3. COPPER World production of smelted Copper (1)
(Thousands tonnes, finished metal)

COUNTRY/YEAR	1982	1983	1984	1985	1986	o/o	1987
SOUTH AMERICA	1379.6	1413.5	1476.7	1523.1	1560.1	17.3%	1533.0
Chile	1046.8	1058.9	1098.3	1088.5	1124.1	12.5%	1100.1
Peru	323.2	295.9	331.1	354.0	335.0	3.7%	313.3
Brazil	9.6	58.7	47.3	80.6	101.0	1.1%	119.6
CENTRAL AMERICA & CARIBBEAN	61.7	69.9	70.4	71.1	58.9	0.7%	101.4
Mexico	61.7	69.9	70.4	71.1	58.9	0.7%	101.4
NORTH AMERICA	1433.2	1393.4	1623.4	1673.3	1668.6	18.6%	1729.3
United States	1020.8	987.0	1183.4	1193.3	1195.9	13.3%	1265.8
Canada	412.4	406.4	440.0	480.0	472.7	5.3%	463.5
EUROPE (2)	2415.9	2415.4	2437.4	2518.7	2534.7	28.2%	nd
Soviet Union	1130.0	1120.0	1120.0	1140.0	1155.0	12.8%	nd
Poland	360.0	357.0	365.0	380.0	370.0	4.1%	nd
Federal Germany	240.0	253.6	225.5	248.0	238.6	2.7%	240.0
Spain	135.0	118.0	127.2	120.5	135.2	1.5%	138.7
Yugoslavia	1[illegible].0	119.3	126.1	127.8	127.2	1.4%	140.0
Other	44[illegible]9	447.5	473.6	502.4	508.7	5.7%	nd
ASIA (2)	1524.2	1577.0	1584.8	1641.0	1747.8	19.4%	nd
Japan	1046.3	1061.9	929.0	932.6	962.1	10.7%	968.7
Popular Republic of China	235.0	225.0	245.0	275.0	330.0	3.7%	nd
South Korea	119.4	124.0	100.2	112.7	123.2	1.4%	132.9
Other	123.5	166.1	310.6	320.7	332.5	3.7%	nd
AFRICA	1319.2	1305.9	1248.8	1251.8	1246.2	13.9%	1210.5
Zambia	580.7	562.7	531.9	544.2	514.1	5.7%	523.2
Zaire	466.4	465.5	465.5	471.5	472.9	5.3%	449.1
South Africa	191.8	192.3	180.8	168.4	184.0	2.0%	172.7
Other	80.3	85.4	70.6	67.7	75.2	0.8%	65.5
OCEANIA	180.3	181.8	188.0	175.4	177.6	2.0%	171.5
Australia	180.3	181.8	188.0	175.4	177.6	2.0%	171.5
WORLD TOTAL	8314.1	8356.9	8629.5	8854.4	8993.9	100.0%	nd

NOTE : The percentage figures refer to 1986.

(1) Metal produced as anodes or blister copper
(2) Including centrally planned economy countries

Source : World Bureau of Metal Statistics, USA, 1988.

Table 6.2.4. COPPER World production of Refined Copper (1)
(Thousands tonnes, finished metal)

COUNTRY/YEAR	1982	1983	1984	1985	1986	o/o	1987
SOUTH AMERICA	1122.3	1117.5	1184.9	1231.9	1315.0	13.4%	1341.3
Chile	852.5	834.3	879.7	884.3	942.5	9.6%	957.7
Peru	224.5	194.7	219.0	226.8	225.6	2.3%	225.7
Brazil	45.3	88.5	86.2	120.8	146.9	1.5%	157.9
CENTRAL AMERICA & CARIBBEAN	77.7	76.0	83.7	115.5	81.5	0.8%	120.4
Mexico	77.7	76.0	83.7	115.5	81.5	0.8%	120.4
NORTH AMERICA	2032.1	2048.1	1993.8	1935.9	1972.8	20.0%	2051.8
United States	1694.3	1583.8	1489.5	1436.3	1479.4	15.0%	1560.6
Canada	337.8	464.3	504.3	499.6	493.4	5.0%	491.2
EUROPE (2)	3446.7	3510.1	3476.8	3575.8	3617.7	36.8%	nd
Soviet Union	1350.0	1400.0	1380.0	1400.0	1400.0	14.2%	nd
Belgium	457.8	404.5	396.3	412.6	414.2	4.2%	407.5
Federal Germany	393.6	420.3	378.8	414.4	421.9	4.3%	399.9
Poland	348.0	360.1	372.3	387.0	388.0	3.9%	390.0
Spain	171.9	158.6	156.4	151.7	155.1	1.6%	150.8
Other	725.4	766.6	793.0	810.1	838.5	8.5%	nd
ASIA (2)	1630.9	1725.3	1682.0	1735.9	1793.0	18.2%	nd
Japan	1075.0	1091.9	935.2	936.0	943.0	9.6%	981.3
Popular Republic of China	330.0	342.0	355.0	358.0	360.0	3.7%	nd
South Korea	115.8	134.8	140.6	150.0	165.0	1.7%	162.6
Other	110.1	156.6	251.2	291.9	325.0	3.3%	nd
AFRICA	932.6	985.9	920.7	907.1	877.2	8.9%	882.9
Zambia	587.0	573.5	521.9	510.0	487.3	5.0%	506.0
Zaire	175.0	226.9	225.2	226.8	218.4	2.2%	209.5
South Africa	142.5	157.7	148.4	145.5	143.2	1.5%	140.4
Other	28.1	27.8	25.2	24.8	28.3	0.3%	27.0
OCEANIA	178.1	202.6	197.2	194.3	185.0	1.9%	189.3
Australia	178.1	202.6	197.2	194.3	185.0	1.9%	189.3
WORLD TOTAL	9420.4	9665.4	9539.1	9696.4	9842.7	100.0%	nd

NOTE : The percentage figures refer to 1986.

(1) Metal refined electrolytically or by smelting, etc.
(2) Including centrally planned economy countries

Source : World Bureau of Metal Statistics, USA, 1988.

Table 6.2.5. COPPER World consumption of Refined Copper
(Thousands tonnes, finished metal)

COUNTRY/YEAR	1982	1983	1984	1985	1986	o/o	1987
SOUTH AMERICA	360.4	245.4	314.0	309.0	386.5	3.8%	404 8
Brazil	249.3	148.4	189.4	197.1	254.9	2.5%	258.7
Argentina	50.8	43.8	45.0	39.3	45.0	0.4%	48.0
Chile	32.8	24.3	35.3	25.7	36.4	0.4%	48.1
Peru	21.0	18.3	24.1	36.5	38.8	0.4%	38.0
Other	6.5	10.6	20.2	10.4	11.4	0.1%	12.0
CENTRAL AMERICA & CARIBBEAN	89.0	88.1	89.3	120.0	77.8	0.8%	nd
Mexico	87.5	86.1	87.3	117.5	75.3	0.7%	96.0
Other (1)	1.5	2.0	2.0	2.5	2.5	0.0%	nd
NORTH AMERICA	1816.7	1998.9	2353.7	2197.5	2327.1	23.1%	2405.3
United States	1658.1	1803.9	2122.7	1975.0	2101.5	20.9%	2173.0
Canada	158.6	195.0	231.0	222.5	225.6	2.2%	232.3
EUROPE (1)	4525.6	4471.6	4623.3	4621.1	4649.9	46.2%	nd
Soviet Union	1320.0	1300.0	1280.0	1305.0	1300.0	12.9%	nd
Federal Germany	730.8	737.0	791.7	753.8	770.7	7.7%	782.9
France	419.0	390.0	411.5	397.8	401.1	4.0%	413.0
United Kingdom	355.4	358.0	352.9	346.5	339.6	3.4%	329.5
Italy	342.0	325.0	348.0	362.0	394.7	3.9%	404.0
Other	1358.4	1361.6	1439.2	1456.0	1443.8	14.3%	nd
ASIA (1)	2005.6	2077.4	2320.5	2240.6	2406.9	23.9%	nd
Japan	1243.0	1216.3	1368.4	1230.8	1219.3	12.1%	1284.2
Popular Republic of China	398.0	398.0	409.0	446.0	471.0	4.7%	nd
South Korea	131.9	152.3	188.0	206.6	262.3	2.6%	262.0
Other	232.7	310.8	355.1	357.2	454.3	4.5%	nd
AFRICA	102.6	96.3	103.3	87.4	105.8	1.1%	91.5
South Africa	80.8	73.6	85.0	69.5	77.0	0.8%	73.1
Other	21.8	22.7	18.3	17.9	28.8	0.3%	18.4
OCEANIA	132.1	127.6	120.8	128.0	118.6	1.2%	125.8
Australia	131.4	127.2	118.1	125.9	116.6	1.2%	123.4
Others	0.7	0.4	2.7	2.1	2.0	0.0%	2.4
WORLD TOTAL	9032.0	9105.3	9924.9	9704.6	10072.6	100.0%	nd

NOTE : The percentage figures refer to 1986.

(1) Including centrally planned economy countries

Source : World Bureau of Metal Statistics, USA, 1988.

Table 6.2.6. COPPER International Trade - Exports of Ores and Concentrates (Thousands tonnes, finished metal)

COUNTRY/YEAR	1982	1983	1984	1985	1986	o/o	1987
SOUTH AMERICA	243.6	239.4	208.6	308.2	317.2	20.6%	310.8
Chile	203.1	196.5	178.3	265.5	270.7	17.5%	256.0
Peru	38.4	41.0	29.0	41.5	45.9	3.0%	54.8
Other	2.1	1.9	1.3	1.2	0.6	0.0%	-
CENTRAL AMERICA & CARIBBEAN	132.0	195.1	106.5	109.4	98.6	6.4%	81.1
Mexico	132.0	195.1	106.5	109.4	98.6	6.4%	81.1
NORTH AMERICA	453.2	356.5	400.5	436.9	515.7	33.4%	505.9
United States	195.3	42.7	61.4	116.3	174.3	11.3%	124.8
Canada	257.9	313.8	339.1	320.6	341.4	22.1%	381.1
EUROPE	32.7	29.8	34.5	44.6	47.4	0.0%	42.5
Norway	19.5	21.3	16.7	17.4	26.5	1.7%	24.3
Sweden	11.3	8.4	17.8	27.2	20.9	1.4%	18.2
Other	1.9	0.1	-	-	-	0.0%	-
ASIA	387.8	317.7	230.5	204.9	228.2	14.8%	nd
Philippines	280.0	211.7	124.3	87.4	93.3	6.0%	58.5
Indonesia	76.9	76.9	78.0	87.1	106.6	6.9%	53.6
Malaysia	30.9	29.1	28.2	30.4	28.3	1.8%	nd
AFRICA	90.4	93.1	95.0	100.4	84.1	5.5%	nd
Zaire	36.0	35.7	35.0	36.0	29.7	1.9%	23.0
Morocco	20.6	22.0	22.4	24.0	20.0	1.3%	nd
South Africa	14.5	15.2	16.2	21.0	17.0	1.1%	nd
Other	19.3	20.2	21.4	19.4	17.4	1.1%	21.2
OCEANIA	236.6	254.4	232.0	253.3	251.7	16.3%	185.3
Australia	63.3	71.9	64.9	84.6	72.9	4.7%	38.8
Papua New Guinea	173.3	182.5	167.1	168.7	178.8	11.6%	146.5
WORLD TOTAL	1577.1	1487.1	1308.9	1458.7	1542.9	100.0%	nd

NOTE : The percentage figures refer to 1986.

Source : World Bureau of Metal Statistics, USA, 1988.

Table 6.2.7. COPPER International Trade - Imports of Ores and Concentrates (Thousands tonnes, finished metal)

COUNTRY/YEAR	1982	1983	1984	1985	1986	o/o	1987
SOUTH AMERICA	2.6	22.3	21.9	41.0	65.3	4.3%	85.1
Brazil	2.6	22.3	21.9	41.0	65.3	4.3%	85.1
NORTH AMERICA	122.7	133.7	74.6	94.1	76.1	5.1%	68.0
United States	110.7	109.2	36.1	17.9	5.4	0.4%	11.6
Canada	12.0	24.5	38.5	76.2	70.7	4.7%	56.4
EUROPE	280.0	276.7	285.5	281.3	323.4	21.5%	302.5
Federal Germany	150.3	139.6	150.7	151.8	156.6	10.4%	123.7
Spain	63.0	58.3	53.6	41.9	65.3	4.3%	107.5
Sweden	28.5	26.4	12.5	24.7	12.3	0.8%	16.6
Other	38.2	52.4	68.7	62.9	89.2	5.9%	54.7
ASIA	1119.2	1037.3	1037.5	1030.9	1013.3	67.3%	1017.0
Japan	979.5	892.4	887.6	877.6	851.7	56.6%	804.9
South Korea	118.3	111.4	96.7	106.6	116.7	7.8%	166.1
Taiwan	21.4	33.5	53.2	46.7	44.9	3.0%	46.0
AFRICA	-	-	-	30.5	29.7	2.0%	23.0
Zambia	-	-	-	30.5	29.7	2.0%	23.0
WORLD TOTAL	1524.5	1470.0	1419.5	1477.8	1505.8	100.0%	1590.9

NOTE : (1) The percentage figures refer to 1986.
(2) Regions not included in the table import only small volumes.

Sources : World Bureau of Metal Statistics, USA, 1988.
CONSIDER, Anuario Estatistico, 1988. Brazil

Table 6.2.8. COPPER

International Trade -
Exports of Blister and Anodic Copper
(Thousands tonnes, finished metal)

COUNTRY/YEAR	1982	1983	1984	1985	1986	o/o	1987
SOUTH AMERICA	295.8	317.0	307.3	316.8	294.1	39.8%	209.4
Chile	198.7	224.3	210.5	190.1	199.4	27.0%	122.4
Peru	97.1	92.7	96.8	126.7	94.7	12.8%	87.0
CENTRAL AMERICA & CARIBBEAN	9.5	11.9	15.1	-	19.0	2.6%	nd
Mexico	9.5	11.9	15.1	-	19.0	2.6%	nd
NORTH AMERICA	2.0	7.5	8.4	18.0	16.0	2.2%	12.3
United States	2.0	7.5	8.4	18.0	16.0	2.2%	12.3
EUROPE	80.7	97.5	86.8	78.4	61.4	8.3%	49.1
Sweden	25.7	40.2	37.9	36.6	18.5	2.5%	13.1
Federal Germany	18.8	17.0	22.3	18.5	14.0	1.9%	5.1
Finland	13.8	15.0	17.7	7.8	15.7	2.1%	20.9
Belgium	11.9	11.3	-	-	-	0.0%	-
Other	10.5	14.0	8.9	13.5	13.2	1.8%	10.0
AFRICA	429.5	338.2	336.8	324.0	360.3	48.8	nd
Zaire	323.3	231.8	241.6	236.3	275.7	37.3%	254.3
Namibia	44.4	46.8	46.1	49.3	43.4	5.9%	nd
South Africa	39.1	34.7	28.8	21.3	29.2	4.0%	nd
Zimbabwe	22.7	24.9	20.3	17.1	12.0	1.6%	12.2
OCEANIA	7.2	8.4	5.4	-	-	0.0%	3.5
Australia	7.2	8.4	5.4	-	-	0.0%	3.5
WORLD TOTAL	824.7	780.5	759.8	732.2	738.8	100.0%	nd

NOTE : (1) The percentage figures refer to 1986.
(2) Regions not included in the table import only small volumes.

Source : World Bureau of Metal Statistics, USA, 1988.

Table 6.2.9. COPPER International Trade -

Imports of Blister and Anodic Copper
(Thousands tonnes, finished metal)

COUNTRY/YEAR	1982	1983	1984	1985	1986	o/o	1987
SOUTH AMERICA	2.0	2.2	11.4	19.2	18.0	3.0%	11.1
Brazil	2.0	2.2	11.4	19.2	18.0	3.0%	11.1
NORTH AMERICA	106.2	82.1	60.7	29.0	48.9	8.1%	43.5
United States	106.2	82.1	60.7	29.0	48.9	8.1%	43.5
EUROPE	440.8	410.4	477.6	458.3	471.5	78.5%	361.9
Belgium	213.8	194.3	214.0	215.5	240.0	39.9%	179.0
Federal Germany	81.2	68.9	85.5	78.0	69.8	11.6%	49.0
United Kingdom	68.1	83.7	88.4	65.4	79.5	13.2%	72.6
France	22.5	14.4	17.7	21.3	22.3	3.7%	19.0
Spain	22.0	17.9	20.9	23.6	16.5	2.7%	2.3
Other	33.2	31.2	51.1	54.5	43.4	7.2%	40.0
ASIA	86.4	73.9	94.3	67.6	62.4	10.4%	50.4
Japan	77.9	55.5	65.4	34.4	27.8	4.6%	27.9
South Korea	8.5	18.4	28.9	33.2	34.6	5.8%	22.5
WORLD TOTAL	635.4	568.6	644.0	574.1	600.8	100.0%	466.9

NOTE : (1) The percentage figures refer to 1986.
(2) Regions not included in the table import only small volumes.

Source : World Bureau of Metal Statistics, USA, 1988.

Table 6.2.10. COPPER International Trade - Exports of Refined Copper
(Thousands tonnes, finished metal)

COUNTRY/YEAR	1982	1983	1984	1985	1986	o/o	1987
SOUTH AMERICA	1013.2	992.4	1005.1	1074.5	1088.7	36.8%	1109.8
Chile	809.1	830.6	830.4	891.9	895.7	30.3%	930.0
Peru	204.1	161.8	174.7	182.6	193.0	6.5%	179.8
NORTH AMERICA	264.2	380.5	438.3	329.9	317.3	10.7%	307.3
Canada	232.6	298.5	346.0	277.1	304.8	10.3%	289.4
United States	31.6	82.0	92.3	52.8	12.5	0.4%	17.9
EUROPE	521.7	513.3	467.3	457.4	516.1	17.4%	546.5
Belgium	287.9	221.2	210.2	207.2	232.5	7.9%	252.5
Federal Germany	65.8	90.0	67.7	67.6	67.8	2.3%	92.9
Spain	68.0	71.5	66.4	69.4	62.3	2.1%	40.9
Sweden	28.4	23.1	22.9	12.2	37.9	1.3%	40.2
Other	71.6	107.5	100.1	101.0	115.6	3.9%	120.0
ASIA	44.6	215.6	132.3	199.5	210.0	7.1%	205.0
Japan	44.6	177.5	18.4	51.0	60.8	2.1%	52.4
Philippines	-	25.3	91.1	130.5	124.6	4.2%	115.0
Other	-	12.8	22.8	18.0	24.6	0.8%	37.6
AFRICA	825.0	880.6	819.0	806.4	761.5	25.7%	773.2
Zambia	602.6	570.5	530.1	505.0	466.3	15.8%	499.4
Zaire	156.0	218.5	221.7	226.4	222.8	7.5%	204.9
South Africa	66.4	91.6	67.2	75.0	72.4	2.4%	68.9
OCEANIA	7.2	8.4	5.4	-	-	0.0%	3.5
Australia	44.3	79.3	75.5	71.5	66.8	2.3%	81.6
WORLD TOTAL	2713.0	3061.7	2937.5	2939.2	2960.4	100.0%	2881.7

NOTE : (1) The percentage figures refer to 1986.
(2) Regions not included in the table import only small volumes.

Source : World Bureau of Metal Statistics, USA, 1988.

Table 6.2.11. COPPER International Trade - Imports of Refined Copper
(Thousands tonnes, finished metal)

COUNTRY/YEAR	1982	1983	1984	1985	1986	o/o	1987
SOUTH AMERICA	207.2	58.4	112.8	83.9	118.5	3.8%	150.2
Brazil	204.7	56.4	107.2	77.5	107.8	3.4%	125.4
Venezuela	2.5	2.0	5.6	6.4	10.7	0.3%	24.8
NORTH AMERICA	312.8	507.6	530.0	400.2	512.6	16.2%	521.7
United States	284.8	483.0	504.4	381.1	491.7	15.6%	505.3
Canada	28.0	24.6	25.6	19.1	20.9	0.7%	16.4
EUROPE	1810.5	1576.1	1746.5	1738.7	1816.9	57.6%	1741.7
Federal Germany	423.2	403.8	465.6	442.1	447.9	14.2%	396.0
France	367.9	339.0	342.9	325.4	334.5	10.6%	353.5
Italy	318.9	297.2	311.9	332.8	349.1	11.1%	371.8
United Kingdom	255.4	200.7	225.9	247.7	263.5	8.4%	238.8
Belgium	255.3	141.7	180.9	199.5	215.2	6.8%	208.4
Other	189.8	193.7	219.3	191.2	206.7	6.6%	173.2
ASIA	520.0	834.5	912.4	887.0	707.3	22.4%	764.0
Japan	295.8	190.4	470.2	356.1	272.4	8.6%	347.7
Popular Republic of China	110.9	485.9	254.0	355.7	171.1	5.4%	75.5
India	56.7	61.3	48.6	69.5	74.3	2.4%	74.0
South Korea	30.1	35.1	51.0	59.9	83.9	2.7%	106.8
Taiwan	26.5	61.8	88.6	45.8	105.6	3.3%	160.0
WORLD TOTAL	2851.3	2976.8	3302.0	3109.8	3155.5	100.0%	3083.2

NOTE : (1) The percentage figures refer to 1986.
(2) Regions not included in the table import only small volumes.

Table 6.2.i2. COPPER International Prices (US¢/lb)

YEAR	CURRENT PRICES (1)	CONSTANT 1987 PRICES (2)
1950	21.235	133.993
1951	24.200	134.794
1952	24.200	134.794
1953	28.798	160.405
1954	29.694	136.295
1955	37.491	170.584
1956	41.818	184.417
1957	29.576	127.768
1958	25.764	108.982
1959	31.182	131.900
1960	32.053	135.584
1961	29.921	126.566
1962	30.600	128.214
1963	30.600	126.684
1964	31.960	130.397
1965	35.017	140.418
1966	36.170	141.063
1967	38.226	144.494
1968	41.847	151.905
1969	47.534	163.042
1970	57.700	186.371
1971	51.433	158.928
1972	50.617	141.728
1973	58.852	146.541
1974	76.649	190.856
1975	63.535	144.224
1976	68.824	147.283
1977	65.808	131.616
1978	65.510	120.538
1979	92.334	151.428
1980	101.416	144.011
1981	83.744	106.355
1982	72.909	86.762
1983	77.861	89.540
1984	66.757	74.100
1985	65.566	69.500
1986	64.652	67.238
1987	81.037	81.037

(1) Metals Week US Producer Refinery
(2) Obtained by applying a correction for inflation in the United States

Source : Engineering and Mining Journal, 1988

Table 6.3.1. TIN World reserves of Tin, 1985

	Thousands tonnes	Percentages
SOUTH AMERICA	480	14.590%
Bolivia	140	4.255%
Brazil	300	9.119%
Other	40	1.216%
CENTRAL AMERICA & CARIBBEAN	10	0.304%
Mexico	10	0.304%
NORTH AMERICA	80	2.432%
Canada	60	1.824%
United States	20	0.608%
EUROPE	210	6.383%
United Kingdom	90	2.736%
Soviet Union	80	2.432%
Other	40	1.216%
ASIA (1)	2250	68.389%
Burma	10	0.304%
Popular Republic of China	80	2.432%
Indonesia	680	20.669%
Japan	10	0.304%
Malaysia	1100	33.435%
Thailand	270	8.207%
Other	100	3.040%
AFRICA	160	4.863%
Namibia	60	1.824%
Nigeria	20	0.608%
South Africa	30	0.912%
Zaire	20	0.608%
Zimbabwe	20	0.608%
Other	10	0.304%
OCEANIA	180	5.471%
Australia	180	5.471%
WORLD TOTAL	3290	100.000%

(1) Includes centrally planned economy countries

Sources : Mineral Facts and Problems, Bureau of Mines, USA
Mining Annual Review 1987. Mining Journal, London

Table 6.3.2. TIN World mining production
(Thousands tonnes, finished metal)

COUNTRY/YEAR	1982	1983	1984	1985	1986	o/o	1987
SOUTH AMERICA	36.9	41.3	42.4	46.9	41.0	22.7%	39.1
Bolivia	26.7	25.3	19.9	16.1	10.5	5.8%	8.1
Brazil	8.2	13.3	20.0	26.5	25.4	14.0%	26.0
Peru	1.7	2.4	2.2	3.8	4.8	2.7%	4.8
Argentina	0.3	0.3	0.3	0.5	0.3	0.2%	0.2
CENTRAL AMERICA & CARIBBEAN	-	-	0.1	0.4	0.6	0.3%	0.3
Mexico	-	-	0.1	0.4	0.6	0.3%	0.3
NORTH AMERICA	0.2	0.2	0.3	0.2	2.2	1.2%	3.5
United States	0.1	0.1	0.1	0.1	0.1	0.1%	0.1
Canada	0.1	0.1	0.2	0.1	2.1	1.2%	3.4
EUROPE (1)	23.0	23.8	25.4	24.9	23.8	13.2%	nd
Soviet Union	16.0	17.0	17.0	16.0	16.0	8.8%	nd
United Kingdom	4.2	4.1	5.0	5.2	4.3	2.4%	3.6
German Democratic Republic	1.7	1.8	2.5	2.8	2.8	1.5%	nd
Other	1.1	0.9	0.9	0.9	0.7	0.4%	nd
ASIA (1)	141.4	125.8	119.5	108.6	98.8	54.6%	nd
Malaysia	52.3	41.4	41.3	36.9	29.1	16.1%	30.4
Indonesia	33.8	26.6	23.2	21.8	24.6	13.6%	26.2
Thailand	26.2	19.9	21.6	16.6	16.8	9.3%	14.8
Popular Republic of China	16.0	17.0	17.5	18.0	22.0	12.2%	nd
Other	13.1	20.9	15.9	15.3	6.3	3.5%	nd
AFRICA	10.4	9.6	10.2	8.1	6.0	3.3%	5.7
South Africa	3.0	2.7	2.3	2.2	2.1	1.2%	1.4
Zaire	2.2	2.1	2.9	2.2	1.9	1.1%	1.9
Other	5.2	4.8	5.0	3.7	2.0	1.1%	2.4
OCEANIA	12.6	9.6	7.9	6.4	8.5	4.7%	7.7
Australia	12.6	9.6	7.9	6.4	8.5	4.7%	7.7
WORLD TOTAL	224.5	210.3	205.8	195.5	180.9	100.0%	nd

NOTE : The percentage figures refer to 1986.

(1) Includes centrally planned economy countries

Source : World Bureau of Metal Statistics, USA, 1988.

Table 6.3.3. TIN World production of Refined Tin
(Thousands tonnes, refined metal)

COUNTRY/YEAR	1982	1983	1984	1985	1986	o/o	1987
SOUTH AMERICA	28.5	27.7	35.0	38.0	33.2	16.6%	31.8
Bolivia	19.0	14.2	15.8	12.9	7.7	3.8%	2.6
Brazil	9.3	13.2	18.9	24.7	25.1	12.5%	28.8
Argentina	0.2	0.3	0.3	0.4	0.4	0.2%	0.4
CENTRAL AMERICA & CARIBBEAN	1.0	1.2	1.5	0.3	2.2	1.1%	2.2
Mexico	1.0	1.2	1.5	0.3	2.2	1.1%	2.2
NORTH AMERICA	5.3	3.9	5.3	4.5	4.5	2.2%	4.9
United States	5.1	3.7	5.1	4.3	4.3	2.1%	4.7
Canada	0.2	0.2	0.2	0.2	0.2	0.1%	0.2
EUROPE (1)	41.6	44.7	47.8	47.7	45.1	22.5%	nd
Soviet Union	17.0	18.0	18.5	18.2	18.0	9.0%	nd
United Kingdom	13.6	13.3	13.8	14.8	14.9	7.4%	17.3
Spain	3.7	3.7	4.4	3.5	2.0	1.0%	2.0
Holland	2.9	5.6	6.4	5.5	5.3	2.6%	4.0
Federal Germany	2.0	2.0	3.0	3.3	3.3	1.6%	nd
Other	2.4	2.1	1.7	2.4	1.6	0.8%	nd
ASIA (1)	140.1	121.3	113.5	111.0	110.5	55.1%	nd
Malaysia	62.8	53.3	46.9	45.5	43.8	21.9%	44.1
Indonesia	29.8	28.4	22.5	20.4	22.1	11.0%	27.2
Popular Republic of China	16.5	16.5	17.0	19.0	20.0	10.0%	nd
Singapore	4.0	1.8	3.5	4.0	0.5	0.2%	1.0
Other	27.0	21.3	23.6	22.1	24.1	12.0%	nd
AFRICA	6.5	5.8	5.8	5.3	3.2	1.6%	3.3
South Africa	2.2	2.2	2.2	2.1	1.9	0.9%	1.5
Nigeria	1.8	1.2	1.3	1.0	0.1	0.0%	0.6
Other	2.5	2.4	2.3	2.2	1.2	0.6%	1.2
OCEANIA	3.6	3.4	3.3	3.1	1.7	0.8%	0.9
Australia	3.6	3.4	3.3	3.1	1.7	0.8%	0.9
WORLD TOTAL	226.6	208.0	212.2	209.9	200.4	100.0	nd

NOTE : The percentage figures refer to 1986

(1) Includes centrally planned economy countries

Source : World Bureau of Metal Statistics, USA. 1988.

Table 6.3.4. TIN World consumption of Refined Tin
(Thousands tonnes, refined metal)

COUNTRY/YEAR	1982	1983	1984	1985	1986	o/o	1987
SOUTH AMERICA	9.5	8.8	9.7	10.1	11.9	5.3%	12.8
Brazil	4.9	4.3	4.3	4.6	6.2	2.7%	6.7
Argentina	1.3	1.2	1.2	0.8	1.6	0.7%	1.6
Bolivia	1.0	1.0	1.8	1.8	1.1	0.5%	1.2
Chile	0.7	0.7	0.7	0.7	1.0	0.4%	1.2
Venezuela	0.3	0.3	0.7	1.0	0.8	0.4%	0.8
Other	1.3	1.3	1.0	1.2	1.2	0.5%	1.3
CENTRAL AMERICA & CARIBBEAN	1.0	1.4	1.6	1.0	1.2	0.5%	1.2
Mexico	1.0	1.4	1.6	1.0	1.2	0.5%	1.2
NORTH AMERICA	50.0	49.6	53.5	55.4	47.3	20.9%	56.7
United States	46.3	45.5	49.4	51.5	43.5	19.3%	53.1
Canada	3.7	4.1	4.1	3.9	3.8	1.7%	3.6
EUROPE (1)	95.5	93.3	97.7	95.8	97.4	43.1%	nd
Soviet Union	27.0	29.0	30.0	30.0	26.0	11.5%	nd
Federal Germany	13.8	14.2	15.6	15.7	17.4	7.7%	17.3
United Kingdom	10.4	10.2	10.0	9.4	9.7	4.3%	9.8
France	8.2	7.6	7.8	6.9	7.6	3.4%	7.4
Poland	4.6	4.5	3.6	3.0	3.6	1.6%	nd
Italy	4.2	4.1	4.4	5.0	5.6	2.5%	5.0
Other	27.3	23.7	26.3	25.8	27.5	12.2%	nd
ASIA (1)	52.9	55.9	62.7	57.7	62.3	27.6%	nd
Japan	28.7	30.4	33.3	31.6	31.5	13.9%	31.5
Popular Republic of China	12.5	13.0	14.0	11.0	11.5	5.1%	nd
India	2.1	2.3	2.3	2.3	2.9	1.3%	2.8
South Korea	2.1	2.6	3.5	2.6	4.4	1.9%	4.0
Other	7.5	7.6	9.6	10.2	12.0	5.3%	nd
AFRICA	3.5	3.3	3.7	3.1	3.4	1.5%	3.5
South Africa	2.0	1.9	1.6	1.6	1.9	0.8%	1.9
Other	1.5	1.4	2.1	1.5	1.5	0.7%	1.6
OCEANIA	3.4	3.2	3.1	3.2	2.9	1.3%	2.5
Australia	3.2	3.0	3.0	3.1	2.8	1.2%	2.4
New Zealand	0.2	0.2	0.1	0.1	0.1	0.0%	0.1
WORLD TOTAL	215.8	215.5	232.0	226.3	225.9	100.0%	nd

NOTE : The percentage figures refer to 1986.

(1) Includes centrally planned economy countries

Source : World Bureau of Metal Statistics, USA, 1988.

Table 6.3.5. TIN International Trade - Exports of Refined Metal
(Thousands tonnes, refined metal)

COUNTRY/YEAR	1982	1983	1984	1985	1986	o/o	1987
SOUTH AMERICA	21.5	20.4	28.2	31.8	26.2	15.9%	22.8
Bolivia	17.1	11.6	13.6	11.7	7.0	4.3%	1.8
Brazil	4.4	8.8	14.6	20.1	19.2	11.7%	21.0
NORTH AMERICA	9.4	3.5	3.2	2.9	3.2	1.9%	1.9
United States	9.4	3.5	3.2	2.9	3.2	1.9%	1.9
EUROPE	8.6	4.5	16.1	10.0	20.2	12.3%	19.1
United Kingdom	5.4	1.0	11.1	7.3	13.6	8.3%	14.8
Federal Germany	2.0	1.4	1.4	1.1	1.3	0.8%	0.5
Other	1.2	2.1	3.6	1.6	5.3	3.2%	3.8
ASIA	113.2	120.2	97.3	124.8	114.4	69.6%	128.9
Malaysia	48.6	57.1	35.2	57.4	40.5	24.7%	49.6
Indonesia	28.6	21.3	23.0	21.9	23.8	14.5%	20.1
Singapore	17.9	20.8	17.9	20.3	29.9	18.2%	29.8
Thailand	15.0	17.7	18.5	18.0	14.8	9.0%	13.5
Popular Republic of China	3.1	3.3	2.7	7.2	5.4	3.3%	15.9
AFRICA	2.1	1.2	1.5	0.9	0.2	0.1%	0.6
Nigeria	1.9	1.1	1.3	0.9	0.2	0.1%	0.6
Other	0.2	0.1	0.2	-	-	0.0%	-
OCEANIA	0.7	0.5	0.4	0.4	0.1	0.1%	0.2
Australia	0.7	0.5	0.4	0.4	0.1	0.1%	0.2
WORLD TOTAL	155.5	150.3	147.6	171.8	164.3	100.0%	173.4

NOTE : (1) The percentage figures refer to 1986.
(2) Regions not included in the table import only small volumes.

Source : World Bureau of Metal Statistics, USA, 1988.

Table 6.3.6. TIN International Trade - Imports of Refined Metal
(Thousands tonnes, refined metal)

COUNTRY/YEAR	1982	1983	1984	1985	1986	o/o	1987
SOUTH AMERICA	2.0	1.7	1.9	1.9	2.2	1.6%	2.3
Argentina	1.1	0.9	0.9	0.4	1.2	0.8%	0.8
Peru	0.2	0.3	0.2	0.5	0.2	0.1%	0.5
Venezuela	0.7	0.5	0.8	1.0	0.8	0.6%	1.0
NORTH AMERICA	31.1	37.7	45.3	37.5	39.6	27.9%	45.3
United States	27.9	34.0	41.2	33.8	35.8	25.2%	41.6
Canada	3.2	3.7	4.1	3.7	3.8	2.7%	3.7
EUROPE	40.7	39.6	39.7	38.1	40.7	28.7%	40.0
Federal Germany	15.0	16.4	16.7	17.3	17.6	12.4%	17.9
France	8.4	7.9	8.0	6.6	7.9	5.6%	7.3
United Kingdom	5.2	4.8	4.5	3.9	4.2	3.0%	2.9
Italy	4.7	5.4	5.6	5.1	5.7	4.0%	6.1
Holland	3.8	2.0	1.7	2.3	1.3	0.9%	2.5
Belgium	2.2	2.0	2.0	1.6	2.0	1.4%	1.9
Other	1.4	1.1	1.2	1.3	2.0	1.4%	1.4
ASIA	33.4	37.0	40.5	39.1	59.1	41.7%	57.6
Japan	26.2	28.6	30.5	28.3	31.8	22.4%	32.0
South Korea	2.0	2.0	2.2	1.3	3.7	2.6%	3.6
India	1.9	2.1	2.3	3.3	3.1	2.2%	1.8
Hong Kong	1.5	1.8	1.6	3.9	3.6	2.5%	5.5
Other	1.8	2.5	3.9	2.3	16.9	11.9%	14.7
OCEANIA	0.2	0.1	0.1	0.2	0.2	0.1%	0.2
New Zealand	0.2	0.1	0.1	0.2	0.2	0.1%	0.2
WORLD TOTAL	107.4	116.1	127.5	116.8	141.8	100.0%	145.4

NOTE : (1) The percentage figures refer to 1986.
(2) Regions not included in the table import only small volumes.

Source : World Bureau of Metal Statistics, USA, 1988.

Table 6.3.7. TIN International Prices (US¢/lb)

YEAR	CURRENT PRICES (1)	CONSTANT 1987 PRICES (2)
1950	95.539	602.851
1951	127.077	707.819
1952	120.473	671.035
1953	95.845	533.857
1954	91.838	421.536
1955	94.735	431.044
1956	101.409	447.214
1957	96.261	415.848
1958	95.127	402.387
1959	102.053	431.684
1960	101.438	429.083
1961	113.311	479.306
1962	114.652	480.392
1963	116.652	482.939
1964	157.595	642.988
1965	178.202	714.590
1966	164.070	639.873
1967	153.434	579.981
1968	148.151	537.788
1969	164.498	564.228
1970	174.205	562.682
1971	167.348	517.105
1972	177.474	496.927
1973	227.558	566.619
1974	396.266	986.702
1975	339.818	771.387
1976	379.815	812.804
1977	534.595	1069.190
1978	629.579	1158.425
1979	753.889	1236.378
1980	846.001	1201.321
1981	733.046	930.968
1982	653.916	778.160
1983	654.778	752.995
1984	567.795	630.252
1985	525.896	557.450
1986	294.117	305.882
1987	308.835	308.835

(1) Metals Week New York Dealer
(2) Obtained by applying a correction for inflation in the United States

Source : Engineering and Mining Journal, 1988.

Table 7.1. PRINCIPAL ECONOMIC INDICATORS FOR THE COUNTRIES COVERED BY THE STUDY

	ARGENTINA	BOLIVIA	BRAZIL	CHILE	PERU	VENZUELA	TOTAL
GDP (US$m)	73,261	6,119	348,407	28,296	25,252	49,473	530,808
Population (persons)	31,030,000	6,611,000	137,987,000	12,271,000	20,207,000	17,914,000	226,020,000
Per capita GDP (US$)	2,361	926	2,525	2,306	1,250	2,762	(*) 2,349
Geographical area (km2)	3,761,274	1,098,581	8,511,965	756,626	1,285,215	912,050	16,325,711
Density of populations (inh/km2)	8	6	16	16	16	20	14
Imports (US$m)	4,574	723	13,897	2,914	2,829	9,235	34,172
Exports (US$m)	7,169	557	22,393	4,222	2,509	9,734	46,584

NOTE : Imports are quoted in CIF values, exports in FOB values.
All figures relate to the base year 1986.
(*) This figure represents the mean per capita GDP for the region.

Sources : Economic and Social Progress in Latin America, 1987
Inter-American Development Bank
Estados Financieros Internacionales, IMF

Table 7.2. PRODUCTION AND CONSUMPTION OF ALUMINIUM, COPPER AND TIN IN THE COUNTRIES COVERED BY THE STUDY

	ARGENTINA	BOLIVIA	BRAZIL	CHILE	PERU	VENEZUELA	TOTAL
ALUMINIUM							
Production (tonnes metal)	155,000	n.p.	845,000	n.p.	n.p.	400,000	1,400,000
Consumption (tonnes metal)	38,000	1,320	423,600	4,500	5,050	46,500	518,970
Consumption (kg/inh.)	1.20	0.20	3.07	0.37	0.25	2.50	
Potential consumption (kg/inh.)	26.60	26.60	26.60	26.60	26.60	26.60	
Potential consumption (tonnes metal)	825,398	175,853	3,670,454	326,409	537,506	476,512	6,012,132
COPPER							
Production (tonnes metal)	300	300	147,000	1,400,000	400,000	n.p.	1,947,600
Consumption (tonnes metal)	45,000	460	317,370	36,000	39,000	11,000	448,830
Consumption (kg/inh.)	1.45	0.07	2.30	2.93	1.93	0.61	
Potential consumption (kg/inh.)	8.80	8.80	8.80	8.80	8.80	8.80	
Potential consumption (tonnes metal)	273,064	58,177	1,214,286	107,985	177,822	157,643	1,988,976
TIN							
Production (tonnes metal)	400	10,500	25,200	n.p.	4,817	n.p.	40,917
Consumption (tonnes metal)	1,550	1,100	5,500	250	400	720	9,520
Consumption (kg/inh.)	0.05	0.17	0.04	0.02	0.02	0.04	
Potential consumption (kg/inh.)	0.25	0.25	0.25	0.25	0.25	0.25	
Potential consumption (tonnes metal)	7,758	1,653	34,497	3,068	5,052	4,479	56,505

NOTE : Potential consumption (kg/inhabitant) = US Consumption/US Population.
Potential consumption (tonnes metal) = Potential cons. (kg/inh.) * population of country
All data refer to the base year 1986. n.p. = no production.

Source : Metallstatistik 1983-1987. Metallgesellschaft, Germany.

Table 7.2.1. ARGENTINA - Aluminium, Copper and Tin Production and Consumption (tonnes)

YEAR	PRODUCTION						CONSUMPTION		
	ALUMINIUM		COPPER		TIN		ALUMINIUM	COPPER	TIN
	Primary	Secondary	Concentrates	Refined	Concentrates	Primary	Primary	Refined	Primary
1980	147,000	nd	nd	nd	400	200	nd	nd	1,200
1981	133,900	5,000	80	100	400	600	52,500	50,380	900
1982	137,500	6,000	38	100	300	200	62,900	49,100	1,300
1983	132,800	7,000	318	300	300	300	80,400	43,800	1,200
1984	137,800	7,000	323	200	300	300	101,200	45,000	1,200
1985	139,900	6,000	320	400	500	400	80,900	39,300	800
1986	150,600	nd	nd	300	300	400	121,300	45,000	1,600
1987	155,000	nd	nd	nd	400	400	142,000	nd	1,200

Sources : Metallstatistik 1983-1987, Metallgesellschaft, Germany.
Minemet Annuaire 1984, 1985, 1986. Penarroya, France

Table 7.2.2. BOLIVIA - Aluminium, Copper and Tin Production and Consumption (tonnes)

YEAR	PRODUCTION			CONSUMPTION	
	COPPER CONCEN-TRATES	TIN		PRIMARY ALUMINIUM	PRIMARY TIN
		CONCEN-TRATES	PRIMARY		
1980	1,884	27,367	17,648	nd	1,000
1981	2,637	29,830	20,005	1,006	1,000
1982	2,270	26,773	19,022	389	1,500
1983	1,902	25,278	14,164	2,544	2,400
1984	1,610	19,911	15,842	nd	1,800
1985	1,665	16,136	14,205	nd	1,800
1986	300	10,500	7,700	nd	1,100
1987	nd	8,300	1,800	nd	nd

Source : Bolivian Ministry for Mining and Metallurgy, 1987

Table 7.2.3. BRAZIL - Aluminium
Production and Consumption (tonnes)

YEAR	PRODUCTION				CONSUMPTION
	BAUXITE	ALUMINA	PRIMARY	SECONDARY	PRIMARY ALUMINIUM
1980	-	-	260,611	50,100	296,400
1981	4,662,600	496,639	256,418	36,040	261,700
1982	4,186,500	606,177	299,054	46,250	281,900
1983	5,238,700	786,648	400,744	43,016	270,600
1984	6,433,100	891,300	454,999	48,946	294,800
1985	6,433,200	891,000	549,171	44,828	347,500
1986	6,446,300	1,196,800	757,584	47,971	423,700
1987	6,565,000	1,273,000	945,000	nd	425,000

Sources : Anuario Estatistico del Setor Metalurgico (MIC), Brazil 1987.
Metallstatistik 1983-1987, Metallgesellschaft, Germany
Minimet Annuaire 1986, Penarroya, France.

Table 7.2.4. BRAZIL - Copper
Production and Consumption (tonnes, finished metal)

YEAR	PRODUCTION		CONSUMPTION
	CONCENTRATES	REFINED	REFINED
1980	-	-	246,000
1981	11,777	-	179,000
1982	24,482	57,000	249,300
1983	39,082	63,083	148,400
1984	58,500	61,334	189,200
1985	70,000	93,880	196,100
1986	35,000	155,990	254,900
1987	40,000	177,000	260,000

Sources : Anuario Estatistico del Setor Metalurgico (MIC), Brazil 1987.
Metallstatistik 1983-1987, Metallgesellschaft, Germany

Table 7.2.5. BRAZIL - Tin
Production and Consumption (tonnes, finished metal)

YEAR	PRODUCTION		CONSUMPTION
	CONCENTRATES	PRIMARY	PRIMARY
1980	6,930	10,132	5,962
1981	8,297	7,789	2,965
1982	9,500	9,298	4,870
1983	13,300	12,950	4,089
1984	20,000	18,877	4,203
1985	26,500	24,701	4,659
1986	25,400	25,104	5,700
1987	28,900	28,800	8,200

Sources : Anuario Estatistico del Setor Metalurgico (MIC), Brazil 1987.
Metallstatistik 1983-1987, Metallgesellschaft, Germany

Table 7.2.6. CHILE - Copper
Production and Consumption (tonnes, finished metal)

YEAR	PRODUCTION			CONSUMPTION
	CONCEN-TRATES	BLISTER	REFINED	REFINED
1980	1,067,700	953,100	810,700	42,900
1981	1,080,800	953,900	7[illegible]5,600	39,000
1982	1,242,200	1,046,800	852,500	32,800
1983	1,257,500	1,058,900	834,200	24,400
1984	1,290,700	1,098,500	879,700	35,300
1985	1,356,400	1,088,500	884,300	25,700
1986	1,399,800	1,124,100	942,500	36,400
1987	1,418,000	1,100,100	960,000	48,000

Sources : Minimet Annuaire 1986. Penarroya, France
World Bureau of Metal Statistics, USA, 1988.

Table 7.2.7. PERU - Copper
Production and Consumption (tonnes, finished metal)

YEAR	PRODUCTION			CONSUMPTION		
	CONCEN-TRATES	BLISTER	REFINED	REFINED	WIRE	TOTAL
1980	366,700	348,600	223,500	2,184	9,673	11,857
1981	327,600	302,300	250,400	2,053	16,920	18,973
1982	356,300	323,200	224,500	1,645	19,436	21,081
1983	322,200	295,900	194,750	658	19,671	20,319
1984	364,100	334,400	219,000	2,765	23,612	26,377
1985	400,850	354,000	226,800	3,351	29,960	33,311
1986	397,400	290,300	225,900	4,340	34,460	38,800
1987	394,790	286,575	218,365	4,500	31,500	35,000

Sources : Peruvian Ministry for Energy and Mining, 1987
Metallstatistik 1983-1987, Metallgesellschaft, Germany

Table 7.2.8. PERU - Tin: Production and Consumption
Aluminium: Consumption (tonnes, finished metal)

YEAR	PRODUCTION	CONSUMPTION	
	TIN CONCENTRATES	PRIMARY TIN	PRIMARY ALUMINIUM
1980	1,196	nd	nd
1981	1,461	nd	nd
1982	1,672	nd	nd
1983	2,487	400	3,000
1984	3,259	300	3,000
1985	3,779	600	4,000
1986	4,817	500	5,000
1987	2.528 (1)	500 (2)	5,000

(1) Figures for January-June
(2) Estimate for 1987

Sources : Anuario de la Mineria en el Peru, 1983-1987
Metallstatistik 1983-1987, Metallgesellschaft, Germany

Table 7.2.9. VENEZUELA - Aluminium: Production and Consumption
Copper and Tin: Consumption (tonnes)

YEAR	PRODUCTION			CONSUMPTION		
	BAUXITE	ALUMINA	PRIMARY	PRIMARY Al.	REFINED Cu	PRIMARY Sn
1980	-	-	327,901	nd	nd	nd
1981	-	-	313,523	nd	nd	nd
1982	-	-	273,633	nd	nd	nd
1983	-	560,000	335,304	89,000	2,000	300
1984	-	1,139,000	285,158	130,000	5,000	600
1985	-	1,135,000	402,835	139,000	6,000	1,000
1986	-	1,269,000	421,350	135,000	11,000	800
1987	131,000	1,360,000	440,000	145,000	21,000	1,000

Sources : Boletin Informativo de la Industria del Aluminio, 1985
Anuario Estadistico Minero de Venezuela, 1986
Metallstatistik 1983-1987, Metallgesellschaft, Germany

Table 7.3.1. COMMERCIAL TRADING, 1987

Intraregional trade between the countries covered by the study:

Exports, FOB, in US$ thousands

DESTINATION	EXPORTING COUNTRY					
	ARGENTINA	BOLIVIA	BRAZIL	CHILE	PERU	VENEZUELA
ARGENTINA	-	259,886	611,820	174,782	38,481	7,361
BOLIVIA	90,663	-	232,333	44,985	11,777	1,227
BRAZIL	539,344	19,478	-	350,492	112,319	117,784
CHILE	145,961	16,640	409,912	-	32,327	128,826
PERU	139,090	24,036	219,933	85,628	-	45,396
VENEZUELA	56,816	260	409,515	71,236	61,635	-
TOTAL	971,874	320,300	1,883,513	727,123	256,539	300,594
BREAKDOWN	21.8%	7.2%	42.2%	16.3%	5.8%	6.7%

NOTE : Breakdown = Country total/Sum of totals x 100%

Source : ALADI

Table 7.3.2. COMMERCIAL TRADING, 1987

Intraregional trade between the countries covered by the study:

Imports, CIF, in US$ thousands

ORIGIN	IMPORTING COUNTRY					
	ARGENTINA	BOLIVIA	BRAZIL	CHILE	PERU	VENEZUELA
ARGENTINA	-	92,265	612,214	159,022	174,065	47,300
BOLIVIA	304,763	-	14,567	8,360	7,385	0
BRAZIL	819,295	150,537	-	380,016	185,250	365,200
CHILE	152,409	41,276	20,374	-	85,116	44,000
PERU	46,203	18,210	120,092	27,926	-	60,500
VENEZUELA	12,609	1,214	172,303	143,732	51,558	-
TOTAL	1,335,279	303,502	939,550	719,056	503,374	517,000
BREAKDOWN	30.9%	7.0%	21.8%	16.7%	11.7%	12.0%

NOTE : Breakdown = Country total/Sum of totals x 100%

Source : ALADI

Table 7.3.3. COMMERCIAL TRADING, 1986

Intraregional trade between the countries covered by the study:

Exports, FOB, in US$ thousands

DESTINATION	EXPORTING COUNTRY					
	ARGENTINA	BOLIVIA	BRAZIL	CHILE	PERU	VENEZUELA
ARGENTINA	-	61,.00	698,00C	137,000	189,000	45,000
BOLIVIA	341,000	-	26,000	20,000	22,000	0
BRAZIL	507,000	387,000	-	318,000	217,000	307,000
CHILE	161,000	30,000	274,000	-	66,000	41,000
PERU	34,000	14,000	55,000	54,000	-	43,000
VENEZUELA	6,000	1,000	96,000	105,000	37,000	-
TOTAL	1,049,000	493,000	1,149,000	634,000	531,000	436,000
BREAKDOWN	24.4%	11.5%	26.8%	14.8%	12.4%	10.2%

NOTE : Breakdown = Country total/Sum of totals x 100%

Source : ALADI

Table 7.3.4. COMMERCIAL TRADING, 1986

Intraregional trade between the countries covered by the study:

Imports, CIF, in US$ thousands

ORIGIN	IMPORTING COUNTRY					
	ARGENTINA	BOLIVIA	BRAZIL	CHILE	PERU	VENEZUELA
ARGENTINA	-	354,000	691,000	149,000	60,000	6,000
BOLIVIA	76,000	-	124,000	34,000	15,000	1,000
BRAZIL	782,000	14,000	-	300,000	81,000	107,000
CHILE	123,000	5,000	248,000	-	56,000	148,000
PERU	177,000	12,000	152,000	65,000	-	48,000
VENEZUELA	43,000	0	332,000	40,000	55,000	-
TOTAL	1,201,000	385,000	1,547,000	588,000	267,000	310,000
BREAKDOWN	27.9%	9.0%	36.0%	13.7%	6.2%	7.2%

NOTE : Breakdown = Country total/Sum of totals x 100%

Source : ALADI

Table 7.4.1. COMMERCIAL TRADING, 1986

Intraregional trade between the countries covered by the study:

Exports and Imports of Raw Aluminium in tonnes.

DESTINATION	EXPORTING COUNTRY						TOTAL	BREAKDOWN
	ARGENTINA	BOLIVIA	BRAZIL	CHILE	PERU	VENEZUELA		
ARGENTINA	-		10,928 (1)				10,928	52.6%
BOLIVIA		-					0	0.0%
BRAZIL	367		-			(3)	367	1.8%
CHILE			3,392	-		1,700	5,092	24.5%
PERU					-	4,200	4,200	20.2%
VENEZUELA			170 (2)			-	170	0.8%
TOTAL	367	0	14,490	0	0	5,900	20,757	100.0%
BREAKDOWN	1.8%	0.0%	69.8%	0.0%	0.0%	28.4%	100.0%	

NOTE : Breakdown = Country total/Sum of totals x 100%

(1) Exports of Aluminium ores to Argentina = 7,965 tonnes
(2) Exports of Aluminium ores to Venezuela = 1,620,032 tonnes
(3) Exports of Aluminium oxides to Brazil = 65,000 tonnes

Sources : Minemet Annuaire 1987, Penarroya, France
INDEC, Argentina, 1987
Instituto de Comercio Exterior, Venezuela

Table 7.4.2. COMMERCIAL TRADING, 1986

International trade of the countries covered by the study:

Exports of Raw Aluminium in tonnes.

DESTINATION	EXPORTING COUNTRY						TOTAL	BREAKDOWN
	ARGENTINA	BOLIVIA	BRAZIL	CHILE	PERU	VENEZUELA		
SOUTH AMERICA	367		27,142			26,000	53,509	9.3%
CENTRAL AMERICA						2,500	2,500	0.4%
NORTH AMERICA	31,553		145,562			73,800	250,915	43.7%
EUROPE			86,274			7,060	93,334	16.3%
ASIA	19,727		78,905			168,600	267,232	46.5%
TOTAL	51,647	0	251,609	0	0	270,900	574,156	100.0%
BREAKDOWN	9.0%	0.0%	43.8%	0.0%	0.0%	47.2%	100.0%	

NOTE : Breakdown = Country or regional total/Sum of totals x 100%

Sources : Minemet Annuaire 1987, Peñarroya, France

INDEC, Argentina, 1987

Insciituto de Comercio Exterior, Venezuela

Table 7.4.3. COMMERCIAL TRADING, 1986

International trade of the countries covered by the study:

Imports of Raw Aluminium in tonnes.

ORIGIN	IMPORTING COUNTRY						TOTAL	BREAKDOWN
	ARGENTINA	BOLIVIA	BRAZIL	CHILE	PERU	VENEZUELA		
SOUTH AMERICA	10,928		367	3,392	4,200	170	11,465	65.9%
CENTRAL AMERICA								ERR
NORTH AMERICA	17		3,238	1,111	800	2,550	5,805	33.4%
EUROPE			1,049			1,000	2,049	11.8%
ASIA			133				133	0.8%
OCEANIA	(1)							
TOTAL	10,945	0	3,738	4,503	5,000	2,720	17,403	100.0%
BREAKDOWN	40.7%	0.0%	13.9%	16.7%	18.6%	10.1%	100.0%	

NOTE : Breakdown = Country or regional total/Sum of totals x 100%

(1) Argentina imported 600,000 tonnes of Bauxite from Australia

Sources : Minemet Annuaire 1987, Peñarroya, France

INDEC, Argentina, 1987

Instituto de Comercio Exterior, Venezuela

Table 7.5.1. COMMERCIAL TRADING, 1986

Intraregional trade between the countries covered by the study:

Exports and Imports of Refined Copper in tonnes finished metal.

DESTINATION	EXPORTING COUNTRY						TOTAL	BREAKDOWN
	ARGENTINA	BOLIVIA	BRAZIL	CHILE	PERU	VENEZUELA		
ARGENTINA	-		223	48,200	2,461		50,884	33.2%
BOLIVIA		-					0	0.0%
BRAZIL			-	87,000 (1) (2)	7,045		94,045	61.4%
CHILE			238	-			238	0.2%
PERU					-		0	0.0%
VENEZUELA				2,100	6,000	-	8,100	5.3%
TOTAL	0	0	461	137,300	15,506	0	153,267	100.0%
BREAKDOWN	0.0%	0.0%	0.3%	89.6%	10.1%	0.0%	100.0%	

NOTE : Breakdown = Country total/Sum of totals x 100%

(1) Exports of Copper concentrates to Brazil = 50,700 tonnes f.m.

(2) Exports of Blister Copper to Brazil = 18,000 tonnes f.m.

Sources : Minemet Annuaire 1987, Peñarroya, France

INDEC, Argentina, 1987

Instituto de Comercio Exterior, Venezuela

Table 7.5.2. COMMERCIAL TRADING, 1986
International trade by the countries covered by the study:
Exports of Copper in tonnes, finished metal.

DESTINATION	EXPORTING COUNTRY						
	ARGENTINA	BOLIVIA	BRAZIL	CHILE	PERU	VENEZUELA	TOTAL
SOUTH AMERICA							
- Concentrates				50,700			50,700
- Blister				18,000			18,000
- Refined			14,702	135,200	15,506		165,408
CENTRAL AMERICA							
- Concentrates							0
- Blister				2,600			2,600
- Refined			437	2,800	212		3,449
NORTH AMERICA							
- Concentrates				26,700	1,300		28,000
- Blister				29,500	1,148		30,648
- Refined			1,567	132,200	44,276		178,043
EUROPE							
- Concentrates				74,300	10,500		84,800
- Blister				130,900	57,800		188,700
- Refined			526	498,700	110,500		609,726
ASIA							
- Concentrates				119,000	34,400		153,400
- Blister				18,400	35,755		54,155
- Refined			1,674	126,800	24,821		153,295
TOTAL							
- Concentrates	0	0	0	270,700	46,200	0	316,900
- Blister	0	0	0	199,400	94,703	0	294,103
- Refined	0	0	18,906	895,700	195,315	0	1,109,921
BREAKDOWN as %							
- Concentrates	0.0	0.0	0.0	85.4	14.6	0.0	100.0
- Blister	0.0	0.0	0.0	67.8	32.2	0.0	100.0
- Refined	0.0	0.0	1.7	80.7	17.6	0.0	100.0

NOTE : Breakdown = Country or regional total/Sum of totals x 100

Sources : Minemet Annuaire 1987, Peñarroya, France
INDEC, Argentina, 1987
Instituto de Comercio Exterior, Venezuela

Table 7.5.3. COMMERCIAL TRADING, 1986
International trade of the countries covered by the study:
Imports of Refined Copper in tonnes.

ORIGIN	IMPORTING COUNTRY						
	ARGENTINA	BOLIVIA	BRAZIL	CHILE	PERU	VENEZUELA	TOTAL
SOUTH AMERICA	50,884		100,123 (1) (2)			8,100	159,107
CENTRAL AMERICA							
NORTH AMERICA			5,907			24	5,931
EUROPE			1,098			2,900	3,998
ASIA			175				175
AFRICA			8,792			200	8,992
TOTAL	50,884	0	116,095	0	0	11,224	178,203
BREAKDOWN	28.6%	0.0%	65.1%	0.0%	0.0%	6.3%	100.0%

NOTE : Breakdown = Country or regional total/Sum of totals x 100

(1) Brazil imported 50,700 tonnes of Copper concentrates from Chile
(2) Brazil imported 18,000 tonnes of Blister Copper from Chile

Sources : Minemet Annuaire 1987, Penarroya, France
INDEC, Argentina, 1987
Instituto de Comercio Exterior, Venezuela

Table 7.6.1. COMMERCIAL TRADING, 1986
Intraregional trade between the countries covered by the study:
Exports and imports of Primary Tin in tonnes, finished metal .

DESTINATION	EXPORTING COUNTRY						TOTAL	BREAKDOWN
	ARGENTINA	BOLIVIA	BRAZIL	CHILE	PERU	VENEZUELA		
ARGENTINA	-	54	1,258				1,312	75.8%
BOLIVIA		-					0	0.0%
BRAZIL			-				0	0.0%
CHILE		201		-			201	11.6%
PERU		198			-		198	11.4%
VENEZUELA		20				-	20	1.2%
TOTAL	0	473	1,258	0	0	0	1,731	100.0%
BREAKDOWN	0.0%	27.3%	72.7%	0.0%	0.0%	0.0%	100.0%	

NOTE : Breakdown = Country total/Sum of totals x 100

Sources : Minemet Annuaire 1987, Peñarroya, France
INDEC, Argentina, 1987
Instituto de Comercio Exterior, Venezuela

Table 7.6.2. COMMERCIAL TRADING, 1986
International trade of the countries covered by the study:
Exports of Tin in tonnes, finished metal .

DESTINATION	EXPORTING COUNTRY						TOTAL	BREAKDOWN
	ARGENTINA	BOLIVIA	BRAZIL	CHILE	PERU	VENEZUELA		
SOUTH AMERICA								
- Concentrates							0	0.0%
- Primary			1,258				1,258	4.8%
NORTH AMERICA								
- Concentrates		4,890			500		5,390	44.9%
- Primary			10,599				10,599	40.5%
EUROPE								
- Concentrates		2,609			4,000		6,609	55.1%
- Primary		8,611	5,649				14,260	54.4%
ASIA								
- Concentrates							0	0.0%
- Primary			73				73	0.3%
TOTAL								
- Concentrates	0	7,499	0	0	4,500	0	11,999	100.0%
- Primary	0	8,611	17,579	0	0	0	26,190	100.0%
BREAKDOWN as %								
- Concentrates	0.0	62.5	0.0	0.0	37.5	0.0	100.0	
- Primary	0.0	32.9	67.1	0.0	0.0	0.0	100.0	

NOTE : Breakdown = Country or regional total/Sum of totals x 100

Sources : Minemet Annuaire 1987, Peñarroya, France
INDEC, Argentina, 1987
Instituto de Comercio Exterior, Venezuela

Table 7.6.3. COMMERCIAL TRADING, 1986
International trade of the countries covered by the study:
Imports of Primary Tin in tonnes.

ORIGIN	IMPORTING COUNTRY						TOTAL	BREAKDOWN
	ARGENTINA	BOLIVIA	BRAZIL	CHILE	PERU	VENEZUELA		
SOUTH AMERICA	1,258			201	198	20	1,677	67.7%
NORTH AMERICA						750	750	30.3%
EUROPE			29				29	1.2%
ASIA						20	20	0.8%
TOTAL	1,258	0	29	201	198	790	2,476	100.0%
BREAKDOWN	50.8%	0.0%	1.2%	8.1%	8.0%	31.9%	100.0%	

NOTE : Breakdown = Country or regional total/Sum of totals x 100

Sources : Minemet Annuaire 1987, Peñarroya, France
INDEC, Argentina, 1987
Instituto de Comercio Exterior, Venezuela

Table 8.0.1. BOLIVIA
Principal producers of Tin, 1986
(Tonnes, finished metal)

COMPANIES	CONCENTRATES	SMELTING
COMIBOL	6,300	
MEDIANA MINERIA (Medium Mines)	2,520	
PEQUEÑA MINERIA (Small Mines)	1,705	
ENAF - VINTO		7,700
TOTAL	10,525	7,700

Source : Mining Annual Review 1987. Mining Journal, England

Table 8.0.2. BOLIVIA
Structure of the production of Tin, 1986
(Tonnes, finished metal)

COMPANY / YEAR	1982	1983	1984	1985	1986	1987
MINES :						
- COMIBOL	17,910	14,500	12,530	10,030	6,300	4,800
- MEDIANA MINERIA	4,000	6,250	6,190	3,710	2,550	2,100
- PEQUEÑA MINERIA	2,500	2,990	5,090	2,300	1,700	1,200
TOTAL - MINES	24,410	23,740	23,810	16,040	10,550	8,100
SMELTING :						
- ENAF	16,000	11,700	14,100	10,700	6,500	1,800
TOTAL - SMELTING	16,000	11,700	14,100	10,700	6,500	1,800

Sources : Mining Annual Review 1983-1987. Mining Journal, England
World Bureau of Metal Statistics, USA, 1988
Metallstatistik 1983-1987. Metallgesellschaft, Germany

Table 8.1.1. BRAZIL
Principal companies producing Aluminium metal (Tonnes)

COMPANY / YEAR	1980	1981	1982	1983	1984	1985	1986	1987
ALBRAS ALUMINIO DO BRASIL SA	-	-	-	-	-	8,706	98,861	167,525
ALCAN, ALUMINIO DO BRASIL NORDESTE SA	27,899	27,704	37,730	45,370	58,026	58,440	58,134	50,892
ALCAN, ALUMINIO DO BRASIL SA	60,031	59,461	60,796	61,748	61,569	61,681	62,103	61,763
ALCOA, ALUMINIO DO BRASIL SA	-	-	-	-	16,048	62,093	136,669	152,866
ALCOA ALUMINIO SA	89,311	88,537	89,674	90,239	89,860	90,433	90,529	90,002
BILLITON METAIS SA	-	-	-	-	10,429	41,372	61,630	62,284
BILLITON METAIS SA (RIO)	-	-	-	-	-	-	-	16,805
COMPANHIA VALE DO RIO DOCE (CVRD)	-	-	-	-	-	-	-	20,891
CIA BRASILEIRA DE ALUMINIO	83,370	80,536	96,636	120,265	127,916	135,675	158,826	168,982
VALESUL ALUMINIO SA	-	-	24,218	83,122	91,151	90,771	90,832	53,013
TOTAL	260,611	256,238	299,054	400,744	454,999	549,171	757,584	845,023

Source : Anuario Estatistico del Setor Metalurgico (MIC) Brazil, 1988

Table 8.1.2. BRAZIL
Principal producers of Aluminium (Thousands tonnes)

COMPANY / PRODUCT	BAUXITE	ALUMINA	PRIMARY ALUMINIUM	SECONDARY ALUMINIUM
ALCAN, ALUMINIO DO BRASIL SA	421	150	62	-
ALCOA ALUMINIO SA	513	591	228	-
BILLITON METAIS SA	-	138	61	-
CIA BRASILEIRA DE ALUMINIO (CBA)	818	319	159	-
MINERACAO RIO DO NORTE SA (MRN)	4,549	-	-	-
ALBRAS ALUMINIO BRASILEIRO SA	-	-	99	-
ALCAN ALUMINIO DO BRASIL NORDESTE SA	-	-	58	-
VALESUL ALUMINIO SA	-	-	91	-
FAE SA INDUSTRIA E COMERCIO DE METAIS	-	-	-	4
METALUR LTDA	-	-	-	9
REMESA SA INDUSTRIA E COMERCIO	-	-	-	4
TONOLLI DO BRASIL SA	-	-	-	22
OTHERS	145	-	-	9
TOTAL	6,446	1,197	758	48

Sources : Associação Brasileira do Aluminio. Anuario Estatistico, 1986
CONSIDER. Anuario Estatistico, Setor Metalurgico, 1988

Table 8.1.3. BRAZIL - Companies producing Copper
(Tonnes, finished metal)

COMPANY / YEAR	1980	1981	1982	1983	1984	1985	1986	1987
CARAIBA METAIS SA								
- Concentrates	-	-	24,400	29,064	31,359	28,594	30,769	28,732
- Blister	-	-	9,600	58,700	47,300	80,600	101,000	119,600
- Refined	-	-	4,812	63,083	61,334	93,880	115,990	146,969

Sources : CONSIDER, Anuario Estatistico, Setor Metalurgico 1988, Brazil
World Bureau of Metal Statistics, USA, 1988

Table 8.1.4. BRAZIL

Principal companies producing Tin metal (tonnes)

COMPANY / YEAR	1980	1981	1982	1983	1984	1985	1986
BERA DO BRASIL, BRUMADINHO Group	280	487	1,922	1,638	1,763	1,942	2,051
CESBRA, BRN Group	4,540	2,583	2,648	2,785	3,098	3,660	3,181
CIA BEST, BEST Group	1,108	565	751	791	894	1,187	1,062
COMIPA, COMERCIAL DE MINEIRAS DO SUL DO PARANA	-	-	-	-	-	141	565
FLUMINENSE, METALURGICO Group	848	61	105	155	161	135	135
MINAS BRASIL	118	78	82	86	130	139	63
MAMORE, PARANAPANEMA Group	3,088	3,765	3,790	7,176	11,848	16,217	17,068
MEQUIMBRAS, METAL QUIMICA BRASILEIRA	150	150	-	-	-	-	-
CANOPUS, RHODIA SA Group	-	-	-	110	724	915	609
OTHERS	-	-	-	209	279	365	389
TOTAL	10,132	7,689	9,298	12,950	18,897	24,701	25,193

Source : Anuario Estatistico del Setor Metalurgico (MIC), Brazil

Table 8.1.5. BRAZIL

Structure of the production of Tin (tonnes, finished metal)

COMPANY	CONCENTRATES		SMELTED METAL	
	1986	1987	1986	1987
BERA DO BRASIL, BRUMADINHO Group	1,996	1,390	2,050	1,578
CESBRA, BRN Group	2,844	3,000	3,181	3,230
CIA BEST, BEST Group	1,008	1,367	1,063	1,392
COMIPA, COMERCIAL DE MINEIRAS DO SUL DO PARANA	510	581	595	550
METALURGICO Group	-	-	192	155
MAMORE, PARANAPANEMA Group	19,454	19,251	17,068	20,435
CANOPUS, RHODIA SA Group	778	1,297	609	1,278
OTHERS	1,073	1,637	390	429
TOTAL	27,663	28,523	25,147	29,046

Sources : Anuario Estatistico del Setor Metalurgico (MIC), Brazil
Informativo do Setor de Estanho. SNIE Brazil, 1987

Table 8.2.1. CHILE - Principal companies producing Copper
(Tonnes, finished metal)

COMPANY / YEAR	1981	1982	1983	1984	1985
CODELCO :					
- CHUQUICAMATA	472,404	552,830	558,840	563,000	548,700
- EL TENIENTE	291,926	335,924	304,890	285,400	321,300
- ANDINA	52,739	54,345	61,370	105,100	113,400
- EL SALVADOR	76,542	89,821	86,960	96,300	93,600
OTHERS :					
- ENAMI	nd	172,200	118,800	113,400	124,400
- MANTOS BLANCOS	nd	nd	35,600	39,400	56,600
- DISPUTADA	nd	57,400	59,400	61,300	76,700
- PUDAHUEL	nd	nd	14,900	13,000	14,000
- EL INDIO	nd	nd	10,100	8,900	9,800
TOTAL	893,611	1,262,520	1,250,860	1,285,800	1,358,500

nd = no data available

Source : Mining Annual Review 1980-1987. Mining Journal, England

Table 8.2.2. CHILE - Principal producers of Copper, 1986
(Tonnes, finished metal)

COMPANY	CONCENTRATES	BLISTER	REFINED
CODELCO-CHILE			
- CHUQUICAMATA	518,000	485,000	470,000
- EL TENIENTE	363,700	300,000	165,000
- ANDINA	121,200		
- EL SALVADOR	99,200	100,000	96,000
ENAMI	146,100	167,678	172,910
MANTOS BLANCOS	54,200	30,000	30,000
DISPUTADA	72,200	40,000	
PUDAHUEL	13,000		14,000
EL INDIO	10,200		
OTHERS	1,600		
TOTAL	1,399,400	1,122,678	947,910

Source : Mining Annual Review 1980-1987. Mining Journal, England

Table [illegible]. PERU - Principal companies producing Copper
(Thousands tonnes, finished metal)

COMPANY / YEAR	1980	1981	1982	1983	1984	1985	1986	1987
SOUTHERN PERU	259.5	227.7	259.3	225.7	261.3	269.6	242.2	248.0
TINTAYA	-	-	-	-	-	21.3	52.6	57.1
CENTROMIN	30.0	25.8	23.1	31.9	46.7	38.3	39.9	39.3
MINERO PERU	33.3	31.5	34.0	32.7	30.8	27.7	28.2	26.6
PATIVILCA	5.0	4.5	5.5	5.1	5.5	5.5	5.4	5.1
CONDESTABLE	2.2	2.4	3.2	3.5	3.7	3.8	3.2	3.8
PACOCOCHA	1.5	1.6	1.2	0.9	1.0	2.2	2.3	2.2
MINSUR	2.1	1.7	1.3	1.2	1.1	1.2	2.0	1.8
ALGAMARCA	1.5	1.8	1.9	2.1	2.4	2.1	1.9	1.7
NOR-PERU	2.8	2.8	3.3	2.8	2.1	2.4	0.9	0.7
KATANGA	1.5	1.3	2.8	1.2	1.5	1.0	1.1	0.8
OTHERS	27.2	26.5	20.7	15.1	8.6	7.4	7.9	7.2
TOTAL	366.7	327.6	356.3	322.2	364.7	385.0	386.0	394.8

Source : Ministry of Energy and Mines, Peru, 1988

Table 8.3.2. PERU

Principal producers of copper, 1987

[Table not included in text]

Table 8.4.1. VENEZUELA

Companies producing Aluminium (tonnes)

COMPANY / YEAR	1980	1981	1982	1983	1984	1985	1986	1987
BAUXITE :								
- BAUXIVEN	-	-	-	-	-	-	-	130,000
ALUMINA:								
- INTERALUMINA	-	-	-	560,000	1,138,000	1,120,000	1,269,000	1,360,000
ALUMINIUM METAL:								
- ALCASA	105,832	111,298	92,545	104,524	119,848	121,171	nd	nd
- VENALUM	222,069	202,225	181,088	230,780	265,310	274,623	nd	nd
- TOTAL	327,901	313,523	273,633	335,304	385,158	395,794	423,000	440,000

Sources : Boletin Informativo de la Industria del Aluminio 1985, Venezuela
Metallstatistik 1983-1987. Metallgesellschaft, Germany
Proyecto Bauxiven, Venezuela, 1985

Table 8.4.2. VENEZUELA

Principal producers of Aluminium, 1987 (tonnes)

COMPANY / PRODUCT	BAUXITE	ALUMINA	PRIMARY ALUMINIUM
BAUXIVEN	130,000	-	-
INTERALUMINA	-	1,360,000	-
ALCASA	-	-	135,000 (e)
VENALUM	-	-	305,000 (e)

Sources : Boletin Informativo de la Industria del Aluminio 1985, Venezuela
Proyecto Bauxiven, Venezuela, 1985
Minimet Annuaire 1986. Peñarroya, France
Metallstatistik 1983-1987. Metallgesellschaft, Germany