Japan International Cooperation Agency (JICA)

Under Secretary of Mining,
Ministry of Economy and Public Works and Services
of The Argentine Republic

THE STUDY ON THE FEASIBILITY FOR THE REACTIVATION OF HIPARSA IN THE ARGENTINE REPUBLIC

FINAL REPORT

DECEMBER, 1998

International Consulting Service Co., Ltd.

in association with

KOBE STEEL, LTD.

Japan International Cooperation Agency (JICA)
Under Secretary of Mining,
Ministry of Economy and Public Works and Services
of The Argentine Republic

THE STUDY ON THE FEASIBILITY FOR THE REACTIVATION OF HIPARSA IN THE ARGENTINE REPUBLIC

FINAL REPORT

DECEMBER, 1998

International Consulting Service Co., Ltd.
in association with
KOBE STEEL, LTD.

PREFACE

In response to a request from the Government of the Republic of Argentine, the Government of Japan decided to conduct the Feasibility Study of Reactivation of HIPARSA (Hierro Patagonico Rionegrino Sociedad Anonima) in the Republic of Argetnine, and entrudted the study to Japan International Cooperation Agency (JICA).

JICA sent a study team, led by Mr. Norihisa Harano of International Consulting Service Co. to the Republic of Argentine three times from February to November, 1998.

The team held discussions with the officials concerned of the government of the Republic of Argentine, and conducted related field surveys. After returning to Japan, the team conducted further studies and compiled the finalr results in this report.

I hope this report will contribute to development of raw materials of iron and steel industry in the Republic of Argentine and to the enhancement of friendly relations between our two countries.

I wish to express my sincere appreciation to the officials concerned of the Government of the Republic of Argentine for their close cooperation throughout the study.

December 1998

Kimio Fujita
President
JapanInternational Cooperation Agency

Mr. Kimio Fujita
President
Japan International Cooperation Agency
Tokyo,Japan

December, 1998

Dear Mr. Fujita,

Letter of Transmittal

We are plesed to submit to you the Study on the Feasiblity for the Reactivation of HIPRSA in the Argentine Republic. This Final Report is made with reference to the advices and suggestions of the authorities concerned of the Government of Japan and your Agency, and also comments made by the Ministries of the Argentine Republic and other authorities concerned during discussions which were held in the Argentine Republic.

The Study Team confirms that this Project is technically surely possible and financially shows not so high profitability basing on the reactivation investment of 210 million U.S.Dollar but economically certain profitability will be attained if the Argentine Government will take several measures to make Project more attractive of which details are recommended by Study Teams in this Report.

We wish to take this opportunity to express our sincere gratitude to your Agency and Ministry of Foreign Affairs. We also express our deep gratitude to Under Secretary of Mining, Ministry of Economy and Public Works and Services of the Argentine Republic, Provincial Government of Rio Negro Province, HIPARSA and the other authorities concerned of the Government of the Argentine Republic for the close cooperation and assistance extended to us during our investigation and study.

Very truly yours,

Norihisa Harano
Team Leader
The Study on the Feasibility
for the Reactivation of HIPRSA
in the Argentine Republic

CONTENTS

Chapter 1

PURPOSE OF THE STUDY

The problem at present in Argentina is that the expansion of the economy does not well lead to the decrease of the unemployment rate. In Buenos Aires province where the capital of Argentina, Buenos Aires, is located, about 80% of the national population and GDP is concentrated. To relax this one-point concentration of the economy through romotion of the local economy has been one imortant theme of today.

The former HIPASAM (Hierro Patagonico de Sierra Grande Sociedad Anonima Minera), located in Rio Negro Province in the southern part of Argentina, was established in 1962 as a state-owned enterprise belonging to the Department of Defense. It was planned to mine 3.5 million-t per year of iron ores from its mine and dress the iron ores to produce pellet feed and to produce 2.0 million-t per year of pellets from the pellet feed. Of the north, east and south deposit, the south deposit was developed and the facilities were began to be constructed in 1971. The construction of pelletizing plant was completed in 1979 at last.

Problem was that phosphorus content in the iron ore could not be decreased in the concentration plant to the level required at the market. In addition, various troubles occurred in the pelletizing plant and the production amount was only about 0.45 million-t per year on average. The low productivity and the corresponding deficits caused the plant to shut down the operation in May 1991. In 1993, the former HIPASAM was transferred to the management of Rio Negro province. Today, HIPARSA, established by Rio Negro Province, manages maintenance of the iron ore mines and the concentration plant and the pelletizing plant including the shipping facilities.

Rio Negro Province would like to resume operation of HIPARSA for generation of employment opportunities and effective use of the invested capital because the province has no other prosperous industries. As part of reactivation of HIPARSA, Rio Negro Province plans to produce HBI, which has a higher added value and be more suitable for export than pellets, by making good use of the domestically available natural gas.

The purpose of this study aimed at establishing the plan for reactivation of HIPARSA based on the most suitable scenario selected from the viewpoint to technology and economy. To be specific, the study made the followings.

① Review of the markets for pellets and HBI worldwide, including Argentina
② Review of the conditions of HIPARSA when it was operated and today.
③ Study of the technologies applicable to HIPARSA.
- Study of the possibility of decreasing phosphorus content of iron ores through mineral dressing test and a study of method for modifying the concentration plant
- Execution of pot grate test and study of the method for modification of the pelletizing plant
- Study of efficient mining method

④ Preparation of scenarios for reactivation of HIPARSA
⑤ Selection of the most suitable scenario from those prepared in item ④ above through their comparative study
⑥ Execution of feasibility study of the reactivation scenario selected in item ⑤ above and corresponding establishment of the plan for reactivation of HIPARSA

Chapter 2

BACKGROUND OF THE STUDY

HIPASAM (Hierro Patagonico de Sierra Grande Sociedad Anonima Minera) started operation as a state-owned company under the federal government (Ministry of Defense) in 1971 to produce iron ore pellet for the domestic iron/steel industry.

It had to stop operations in May 1991. Reasons of the stoppage include that the removal of phosphorus in the concentration process was not up to the design requirements, that the operation of the pelletizing plant was not smooth and the designed capacity of 2 million-t of pellet per year was not achieved. In August 1993 the company asset was transferred to the Rio Negro Province and HIPARSA (Hierro Patagonico Rionegrino Sociedad Anonima) established by the Provincial government is maintaining the plant. The maintenance is costing the provincial government $200,000 per month.

The Rio Negro government having no significant industry in the province wishes to restart the plant to utilize the existing asset and to create employment in the province. As one of the alternative plans the Government wishes to utilize natural gas available in the province and produce HBI which has more added value and could be exported.

With this background the Federal Government of Argentina requested the Japanese Government to carry out a feasibility study on the revitalization of HIPARSA (ex-HIPASAM) for HBI production.

The Japanese Government formed and dispatched a project team to establish the background of the request and the status of the plan, to start collection of data and information, and to discuss with the relevant organizations regarding the scope of the study. During the course of the discussions it was confirmed that the main purpose of the study is the revitalization of HIPARSA, and the production of HBI being one of the alternatives.

The Japanese Government dispatched another team in November 1997 to finalize the scope and details of the study. The present report is the result of the study based on the scope agreed upon at that occasion by the both Argentina and Japanese Governments.

2.1 NATIONAL AND PROVINCIAL POLICY

2.1.1 National development plan

Some policy measures connected with the revitalization of Argentina's economy started during the previous regime such as the Austral plan. But Argentina's present economic policy started to work with the Convertibility Plan of 1989. Since then the value of peso ($) gained stability against foreign exchange represented by the US$.

With the privatization of the State owned enterprises and normalized tax collection the Government gained fiscal balance. The free market economy policy gave the economy a sense of innovation and a need for competitiveness Furthermore confidence in the Argentina economy by domestic and foreign investors grew.

Contribution of investment growth to the growth of the total demand rose to the 20% level during 1991-1996. In 1997 the contribution of investment reached 44%.

In 1997 exports of Argentina grew 8.4% above those of 1996. This growth rate is second only to China among major countries in the world. Cumulative growth 1994-1997 of Argentina's export was 94% while the world average was 51.8%.

Industrialization for import substitution was the major basic industrialization policy of Argentina before the1990's. The present policy is to the contrary. Industrialization for export and economic growth. With the economy back on the growth track Argentina regained the confidence of foreign capital which started to flow into Argentina pushing up the investment ratio to a healthy level. At the present moment export earnings are not enough to cover the import bill as the demand for imported capital goods is so strong. The deficit is

being covered by the inflow of foreign capital.

In the mining industry Argentina's policy is growth through attracting domestic private capital and foreign capital and technology. With the legal and tax framework including incentive measures established foreign investment started to flow into Argentina. Foreign investment in the mining industry was about US$ 6.5-billion, more than 9 times the yearly average of 1981-1990.

2.1.2 Present situation of mining and industrial policy and the legal/tax framework

2.1.2.1 Legal framework of Argentina mining

Legal framework of Argentina mining consists of several laws and regulations including following:

1 Mining Code
2 Mining Investment Law No. 24.196
3 Regulating Law of mining Investment Decree No. 2686/93
4 Mining Reorganization Law No. 24.224
5 Federal Mining Agreement Law No. 24.228
6 VAT Funding Law No. 24.402
7 Decree No. 779/95
8 Mining Updating Law No. 24.498
9 Environmental Protection for the Mining Industry Law No. 24.585

Some of the major factors are described below, based on the main features in the Mining Code and Mining Investment Law.

(1) The Mining Code

The Mining Code, enacted by the National Congress on 25 November 1886 provides the basic framework of the mining activities in Argentina. It specifies the systems of ownership with respect to the ores and determines how the right to develop the mineral fields is acquired and forfeited. The National Constitution (Section 75, subparagraph 12) confirms that there is just one sole Mining Code for the whole country and the application thereof is entrusted to the National or Provincial Authorities depending on the

location of the mining resources. The Mining Code provides for the essential rights and regulates the procedures to acquire and extinguish those rights while the Provinces provide for the formal procedural rules to exercise such rights before the pertinent mining authorities.

The Mining Code has been subject to several amendments, with the most important and recent ones having been made by Laws No. 24,224 (Mining Reorganization Law), 24,498 (Mining Updating Law) and 24,585 (Environmental Protection for the Mining Industry Law), of 1995.

Main features of the Mining Code are described below.

1) Mining Ownership

The National State and the Provincial States have the original ownership of the mines located within their respective territories. The State grants individuals the power to search for mines to develop and dispose of them as owners subject to the provisions of the Mining Code.

Private ownership of the mines is set forth by the legal lease. The legal lease is based on the provisions of the Mining Code and neither the authority nor the interested party may amend such provisions or set conditions, modalities, etc. which are inconsistent with the provisions prescribed by the Mining Code.

A mine title gives to the owner a property right. This right is exclusive, without time limit, upon compliance with the following requirements: payment of the rent, and submission of an investment plan, transferable upon agreement or in case of death. It may be mortgaged and charged with further rights by the Mining Code. The State does not charge any price for the mining

lease, nevertheless a periodic rent must be paid for conservation thereof.

2) Mines Category

There are several mine categories. First category mines are formed by the main metal-bearing and non-metal bearing substances, solid mineral fuels and geothermal sources (endogenous steams). Such mines are granted to the discoverer. Second category mines are formed by the metal-bearing substances not provided for in the first category, non-metallic substances, and the salt mines, salt peter and peat beds. This category is granted preferably to the owner of the land and, if such owner fails to exercise the preference without the term fixed, to the discoverer. The second category also includes the ores and precious stones located in the river beds and running waters and placers. They also include the cleared lands, tailings and slag heaps and abandoned facilities. But these cases are intended for the common use -collective exploitation - although they may also be the subject of exclusive leases.

Third category substances are formed by the group of application rocks, the set of which forms the quarries, and belong exclusively to the owner of the land.

3) Exploration and Exploitation

In connection with the substances of the first and second category which may be the subject of a lease, any individual or legal entity (Argentina or foreign) capable of acquiring rights may be the owner of mining exploration and exploitation rights.

a) Exploration

Exploration is not a mandatory stage since the lease of a mine may be acquired by a direct discovery. Nevertheless mining exploration which includes prospecting, is essential since it represents the natural technical process to determine the existence of an economically exploitable field.

The Mining Code regulates the exploration right or prospecting with the following main characteristics.

The exploration mining lease entitles to an exclusive right, so that any mine discovered by a third party within the perimeter of the mining lease belongs to its owner, not to the discoverer.

a-1) The surface extension of each exploration mining lease may reach 10,000 ha.

a-2) One same person may not own more than 20 leases per province, that is to say 200,000 ha. Any mining lease may be joint or separate. Mining leases are granted by measure units of 500 ha. or fraction thereof.

a-3) The exploration term is 150 consecutive days for the first measure unit of 500 ha. or fraction granted, with the addition of 50 days more for each additional unit (or fraction) which may have been granted. The maximum possible period is 1,100 days for each mining lease of 10,000 ha. (that is to say 20 measure units) granted.

a-4) The explorer must submit to the mining authority a minimum work schedule, and is bound to meet such work schedule. The mining lease may be revoked by official decision or upon request of a party if the work schedule

submitted is not met.

a-5) The permit is granted after publication of notices in the Official Gazette.

a-6) The holder of the exploration permit or prospecting may state (that is to say, apply for the legal lease of) the number of mines discovered within the perimeter of the permit (observing the maximum amounts regarding mining claims to be later considered).

For the prospecting, the granting State must be paid a rent only once, upon presentation of the application. The amount thereof is $400 per measure unit of 500 ha or fraction.

b) Exploitation

The interested party may have access to the exploitation either through exploration permits or through a direct discovery.

Discoverer is deemed to be the first one who applied for the registration of the mine, except in the case such priority arises from fraud or willful misconduct.

The discovery statement must be submitted to the mining authority, observing the requirements prescribed by the Mining Code, the most important of which are: to indicate the point of discovery and the area intended for the exclusive survey. The survey area may reach up to double the area of the maximum mining claims for exploration which may be applied for. As from the day of registration the discoverer is authorized to begin the exploitation of the field, and no eventual objections may interfere with the performance of the exploitation work. The discoverer is obliged to publish at his expense notices in the

Official Gazette, summoning all those who deem themselves entitled to object to the discovery.

The discoverer is obliged to make, within one hundred days to be counted as from registration of the statement, the legal work evidencing the characteristics of the field discovered, which is an essential condition for the proper location of the exploitation mining lease.

Upon expiration of the term to perform the legal work and during thirty consecutive days thereafter, the discoverer must apply for the measurement and delimiting of the mining claims (lots) which shall form part of the mine, defining therein the number thereof within the maximum amounts permitted by the Mining Code.

The application for measurement is also subject to publication in the Official Gazette, for purposes of the objections which may be made. The testimony of the measurement action and approval and registration is the formal title to the ownership on the mine.

The mineral exploitation process, including commercialization thereof, enjoys a tax exemption, granted by the Mining Code itself, at a national, provincial and municipal level for the term of five years counted as from the mine registration. This benefit is added to those provided for by other laws encouraging the business.

4) Vacant Mines

Another manner to have access to mining property through mining lease is to apply for mines registered as vacant, which are those which, having an original owner on account of discovery, were declared forfeited.

The lessee receives the mine in the same status the previous owner had it, with the sole obligation to pay the rent due by the previous lessee, until the date of forfeiture.

5) Mining Right

There are three conditions for Mining right:

- Payment of the mining rent.
- Minimum Investment.
- Revitalization of the mine paralyzed during more than four years, when so required by the mining authority.

The exploitation rent is the annual contribution paid by the miner to the granting state (national or provincial) to keep the lease in force. Such rent is paid in two equal installments annually.

In case of nonpayment of one annual rent and upon lapse of two months, the mining authority demands payment to be made within forty-five days. If the lessee fails to pay, his right is forfeited. The owners of registered contracts which affect the mining lease (for instance mortgage, lease) may redeem the forfeited lease paying the rent due.

The amount of the rent is fixed by a national law (Law No. 24,224 of Mining Rearrangement). It is determined according to the category of the mines. Generally, the amounts are, for the first category, $80 per annum per mining claim; those for disseminated minerals pay $800 per mining claim and those of second category, $40. The discoverer is exempt from payment of the rent for three years as from the registration of the mine.

In addition to the payment of the mining rent the lessee must make an investment in fixed assets for the exploitation of the mine not inferior to three hundred times the value of the annual rent to be

paid for the mining lease. The investment must be made within the term of five years (during the first two 20% must be invested each year; the balance shall be invested within the three remaining years). The mining lease is forfeited if said investment is not made during the terms fixed.

If the exploration or exploitation work of the mine is suspended for more than four consecutive years the mining authority may request the lessee to submit a strengthening or revitalization schedule which must be met within the term of five years. Failure to submit the schedule or to comply with it results in the forfeiture of the mining lease.

In all cases of forfeiture (except when the owners of registered contracts exercise the redemption of mines forfeited on account of rent due) the mining lease must be registered as vacant, at the disposal of the one applying for it first.

6) Easements and Condemnation of the Surface Land

The exploration or exploitation lessee is entitled to encumber the surface property with any easement which may be required for the performance of the work, after indemnifying the owner.

The exploitation lessee enjoys an additional right which is the right to demand the compulsory sale of the land which may be necessary to perform the mining work and infrastructure jobs and services.

Conversely, the lessee may be forced by the owner to acquire the surface when the exploitation is permanent or when the land has become inappropriate for common use.

7) Environmental Protection

The holder of a right, whether an exploration or exploitation right, is obliged, before commencing the work, to submit to the pertinent authority a Report on Environmental Impact prior to the commencement of business. The authority shall analyze this report and shall issue the Statement on Environmental Impact, approving the conditions so that the activity may be developed preserving the environment. The environmental impact report must be updated every two years.

8) Provincial Royalties

Law No.24,196 on Mining Investments fixed the maximum amount of 3% as the value of the mineral at mine-head. The modalities and methods to calculate and pay the royalties are subject to provincial regulations.

9) Mining Procedures

As previously mentioned, the Provinces fix their own rules of procedure for the exercise of the rights regulated in the Mining Code. Diversity regarding mining procedures, related to our Federal system, is in the process of being substantially mitigated by regional and national initiatives tending to homogenization.

(2) Mining Investment Law No.24.196

The Mining Investment Law has several provisions aimed at the promotion of investment in the mining industry such as provisions to guarantee fiscal stability for 30 years, accelerated amortization of preparatory and start up investments.

Main features of those provisions provided in the Mining Investment Law are as follows.

1) Activities the Law could be applied

a) Included

a-1) Prospecting, exploration, development, preparation and extraction and extraction of mineral substances included in the Mining Code.

a-2) Crushing, milling, beneficiating, pelletizing, sintering, briqueting, primary manufacture, roasting, foundry, refinery, sawing, carving, polishing and shining, provided they are done by the same economic unit and regionally integrated with activities.

b) Excluded

b-1) Liquid and gaseous hydrocarbons.

b-2) Industrial manufacture of cement based on roasting inclusive, of mineral materials.

b-3) Industrial manufacture of ceramics.

b-4) Sand and boulders.

2) Fiscal Stability

Mining ventures included in the Mining Investment Law can enjoy fiscal stability for a period of 30 years counted as from the date of presentation of the feasibility survey. Fiscal stability means that framework of the Mining Investments Law shall not bear more total

tributary burdens, defined at the moment of presentation, for mining activities as a consequence of increases in tax and rate contributions, whatever their denomination, either national, provincial or municipal, or the creation of new ones which could apply to them as included in the laws. The above also applies to exchange and duties systems, excluding rate of exchange and reimbursements and/or returns of taxes due to exports.

A 30-year fiscal stability is guaranteed to parties concerned since it is considered to be a sufficiently wide span to cover development of any mining activity included in the present regime. Fiscal stability is granted as from the submitting of a feasibility survey of each project.

Fiscal stability does not mean that either townships, provinces or even the National State are unable to modify their respective fiscal structures -What is meant is that no modification in the fiscal structure will imply any increase in the type and amount of taxes to be levied on the mining firms when such firms submitted their feasibility studies, the authorization of which is given by the Federal government. In other words, the nature or fiscal stability is quantitative instead of qualitative -i.e. the conceptual fiscal structure is not so much interesting as the numerical fiscal structure.

3) Value Added Tax (V.A.T)

The provisions do not include the Value Added Tax. V.A.T. is excluded from the fiscal stability guarantee since it has been considered neutral to the economic financial equation, however relevant to the classical tax schedule.

4) Income Tax

The mining firms may deduct, from the income tax balance, 100% of the amounts invested in surveys, exploitation, special studies, mineral or metallurgical test, pilot plants, applied research and other tasks whose aim is determining the technical economical feasibility.

Deductions referred to may be made notwithstanding the treatment which may apply as amortizable investment expended according to the income tax. Deduction of investments performed during the exploration stage up to the determination of feasibility, implies a double deduction of such investments on the balance sheet where profits are discriminated. As regards new projects, such a deduction will be effective as of productive process is implemented.

Capital investments made for the execution of new mining projects and the expansion of productive capacity of the existing mining operations, as well as those required during operation shall be included in the following amortization system for Income Tax.

a) Investments made for equipment, civil works and construction to supply the necessary infrastructure for its operation, such as access routes, roads, capture and transportation of the generation of electricity, camps, staff homes, works for health, education, communication services, and other public services such as police, post offices and customs, shall be amortized as follows.

60% of the total amount of the infrastructure unit, during the fiscal year when it is commissioned, and 40% in equal portions during the next two years.

b) Investments made for the purchase of machinery, equipment, vehicles and installations not included in the above paragraph, shall be amortized at the rate of one third per annum, as from startup.

The profits stemming from the contribution of mines and mining rights, such as social capital, in companies developing activities shall be exempt from Income Tax. The contributor and the companies collecting said assets must keep the contribution in their corresponding assets for a period of no less than five (5) consecutive years as from their entry. An accelerated redemption is allowed so that the cash flow is improved during the fifth years of a project, a time where monetary fluency is much sought.

5) Assessment of Reserves

The assessment of mineral economically exploitable reserves performed and certified by a responsible professional of each area, may be capitalized up to 50%. The assessment of the reserves of minerals must include the corresponding technical economic feasibility survey of the exploitation of said reserves. The following basic factors shall be considered:

- Measured reserves.
- Structural features of the field and its useful. contents.
- Market situation.
- Exploitation of the total investments required for the exploitation of measured reserves.

6) Supplementary Provisions

Parties registered in this investment regime for mining activities shall be exempt from the Tax on Assets as from the fiscal year corresponding to the time of inscription.

7) Imports

Mining firms shall be exempt from the payment of import duties or any other duties, special taxes or services for the introduction of capital assets, and materials to be determined by the authority of application which may be necessary for the execution of activities. The exemptions or the consolidation of rights and duties shall extend to spares and accessories needed for the start up and development of the corresponding activity.

8) Royalties

The Provinces may not collect royalties over and above 3% on the "mine-head" value of the mineral extracted.

9) Preservation of the Environment

In order to avoid and correct the alterations suffered by the environment due to mining activity, companies may establish special provisions to that effect. The annual amount shall be left to the criterion of the company, but shall be considered deductible from the determination of income tax, up to a sum equivalent to 5% of the operational extraction and benefit costs. The above provision, in its unused amounts, must be returned to the treasury when productive cycle has been completed.

2.1.2.2 Tax framework of Argentina for mining and industrial project

(1) National Taxes

1) Income Taxes

a) Levied upon income of Argentina source earned by any person regardless of his nationality, residence or domicile. Moreover since the fiscal year ending is 01-04-92, this tax is also levied on Argentina residents in connection with the income earned abroad (world income criterion).

b) Income is understood as all the revenues, sales or enrichment susceptible to a periodicity which implies the permanence of the source which originates them.

c) This periodicity condition does not apply in the case of revenues earned by the corporations or enterprises to which the balance sheet theory is applicable, and are therefore affected by this tax whether such condition is met or not.

d) In order to fix the net income all the necessary expenses to obtain the same, and those required to maintain and preserve the generating source, shall be deducted from the gross income as prescribed by law.

e) In the case of an individual, the net income subject to tax is obtained by subtracting the personal deductions authorized by law from the aggregate of first, second, third and fourth category net income.

f) The branches and any other permanent businesses of foreign companies, individuals or entities shall keep all their accounting records separately from their parent companies, so as to reflect exactly the net income of Argentina source.

g) The legal acts carried out between a foreign capital local company and the individual or legal entity domiciled abroad directly or indirectly controlling the same, shall be regarded as entered into between independent parties when their services and conditions comply with the usual market practice between independent entities, or as the case may be, with the Foreign Investment Law or with the Law on the Transfer of Technology.

h) Tax rates referred to in this section is 33%. There is a plan to increase the rate to 35% under way.

h-1) Corporation and commercial limited partnership, in the proportion pertinent to the limited partners, organized in Argentina; 33%.

h-2) Business, industrial, farming, mining and any other type of entities organized as permanent enterprises, belonging to associations, corporations or firms, whatever their nature, organized abroad, or to individuals residing abroad; 33%.

h-3) Other types of companies different from the ones mentioned under **h-1)** above, including de facto corporations: they are not subject to income tax, and the net tax benefits are assigned to their partners at year-end, and they are the ones who shall pay the tax. If any of the members are abroad, the entity paying the benefits shall withhold from those earnings the amount which results from applying 33% on those profits.

h-4) Other income concepts, as long as they do not fall under any of **h-1)** through **h-3)**, are subject to withholding at the time of their payment when the beneficiaries live abroad.

The applicable tax rate amounts to 33% and the law presumes a percentage as net income without admitting evidence to the contrary.

Table-1, details the concepts contemplated by the law and the percentage of presumed income. The effective tax rate is obtained as product of the percentage of presumed income and the then effective tax rate.

Table-1 Percentage of presumed income

	Foreign Beneficiaries	Presumed Income
A)	Agreements which duly observe the requirements of the Law on Transfer of Technology.	
1	Services deriving from available technical assistance, engineering or consultancy services which are not available in Argentina in the opinion of the competent authority regarding technology transfer, provided however they are duly registered and they have been effectively rendered.	60%
2	Services resulting from assignment of rights or licenses for the exploitation of letter patents and other objects which are not included in point 1 in this paragraph.	80
3	Services mentioned in points **1** and **2** above which fail to duly observe the requirements of the Law on Transfer of Technology.	90
B)		
1	Exploitation in Argentina of copyrights, provided however that the respective works are duly registered with the National Copy-right Department and that the benefits arise from the assumptions provided for in paragraph **j)** section 20, and that the requirements provided for therein are observed.	35

2	Amounts paid to artists residing abroad engaged by the national, provincial or municipal State, by the institutions covered by paragraphs **e), f)** and **g)** of section 20 to perform in Argentina for a period of up to two (2) months during the fiscal year.	35
C)	Interest paid for credits whatever their origin or nature obtained abroad.	15
D)	Fees and other compensations to persons working temporarily in Argentina as intellectuals, technicians, professionals, artists not covered by paragraph **B),** sportsmen and other engaged in personal activities, who in order to perform their duties do not stay in Argentina for more than six (6) months during the fiscal year.	70
E)	Leasing of movable made by lessors domiciled abroad.	40
F)	Renting or leasing of real property located in Argentina.	60
G)	Transfer for consideration of property located, placed or used for profit in Argentina belonging to firms and corporations organized, settled and located abroad.	50
H)	Other non-anticipated concepts.	90
I)	Trip or time charter.	10
J)	International news agencies.	10
K)	The exploitation in Argentina: a) Foreign motion picture films. b) Magnetic video and audio tapes, recorded abroad. c) Radio and television programs broadcast from abroad. d) Telex, facsimile or similar services sent from abroad. e) Any other foreign means of projection, reproduction, transmission or broadcast of images or sound.	50
L)	Amount of the premiums ceded, net of cancellations, to foreign companies.	10
M)	Tickets and cargoes fee pertaining to the shipment between Argentina and foreign countries.	10
N)	Gross income derived from the container business for transportation in Argentina or from Argentina to foreign countries.	20

The agents domiciled in Argentina pay taxes exclusively on the income of Argentina source through the withholding regime as a sole and final payment.

This tax has not been levied upon the payment of dividends and profits to foreign beneficiaries since April 1992, in the case of businesses belonging to companies organized abroad.

Modifications have also been made to the treatment of dividends and distributions of shares resulting from accounting revaluation or adjustments, which shall not be computed by the beneficiaries thereof in order to determine the net income and shall not be subject to withholding as a sole and final payment in the case of foreign beneficiaries.

2) Value Added Tax

The following explanation does not clarify whether export sale and exporters are subject to value added tax although the nature logically shows that export should not be the subject.

a) This tax is levied on:

a-1) The sales of movable located in Argentina

a-2) The works, leases and rendering of services, carried out in Argentina

a-3) The definitive import of movable

b) Persons subject liable for this tax are those who are:

b-1) Currently engaged in the sale of movable or enter into temporary business agreements

b-2) Carrying out in their own name or on behalf of third parties, sales and purchases

b-3) Definitively importing movable in their own name and on their own, or on behalf of third parties

b-4) Construction companies that build on real property of their own, which fall under the tax bracket since they are in business for a profit

b-5) Rendering taxable services

b-6) Lessors in the case of taxable leases

b-7) Those who as transient unions of companies, collaborative entrepreneurial groups, consortia, non-corporate associations or any other individual or group entities, which fall under any of the situations provided for in paragraphs **b-1)** *through* **b-6)** *are also included*

c) The general tax rate is 21%

d) Tax is computed in the following way;
The pertinent tax rates are applied to the aggregate sum of the net prices of sales, leases, works and rendering of taxable services. Upon determination of the tax, the amount resulting from applying the pertinent tax rates on the returns, allowances or discounts which have been obtained on the net price shall be added thereto. The Fiscal Debit is thus calculated.

The tax resulting from applying the pertinent interest rate on the amounts of the taxes, allowances or returns granted for the taxable sales, leases and rendering of services shall be added to the tax which has been invoiced for the final purchase or imports of goods, leases and rendering of services, including the tax resulting from investments in tangible assets. Thus the Fiscal Credit is determined.

The deduction of the Fiscal Credit from the Fiscal Debit shall in fact determine the tax to be paid which shall be made effective on a monthly basis. Should the balance be a credit balance, the same shall be applied to future obligations for the same tax.

Imports are exempt from this tax and subject to a special recovery regime of the fiscal credits which will have been invoiced to the exporter of goods, services and leases effectively designated for exportation.

As this tax is collected on consumption, it does not contemplate any special features for the mining activity; at present, all the minerals are being covered by this contribution.

3) Taxes on foreign currency sales, purchase, exchange and change

This tax is levied upon transactions in foreign currency, in Argentina and with the participation of banks and entities authorized to carry out exchange transactions.

This means that when the payment of imports, remittances of funds or profits abroad or any other type of transaction are made in a currency other than the legal tender in Argentina this tax shall be levied thereon.

The tax rate shall be 0.3% both for the purchase transactions and the sale of foreign currency. This tax is reduced to 0.2% for the transactions related to foreign trade (Exports, Imports and Financing thereof).

In the case of reacquisition agreements, provided however the parties thereto are the same the tax rate is 0.1%.

(2) Provincial Taxes

1) Mining Tax

Rio Negro Province has a Resolution 47/96 to levy tax on mining production. Tax varies with minerals produces. For Iron Ore, the current rate is $2 per ton of ore mined. The provincial government suggests the possibility of mitigating the tax burden if the feasibility study shows the necessity.

2) Gross Income Tax

All the Provinces in Argentina levy a tax on income resulting from the various profitable production, commercialization and service activities, whose tax rates apply to the gross income accrued, the deduction of the V.A.T. being admitted. Such tax rates vary according to the activities, namely:

a) Primary activities (mining extraction): 1.0%

b) Industrial activities (mineral production and transfer): 1.5%

c) Business activities (commercialization of mining products): 3.0%

d) Mining extraction without invoicing and export: generally not taxed

In Rio Negro Province, production and sale of HBI is subject to 3% Gross Income Tax on the sale amount.

3) Stamp Tax

This tax is levied upon any type of documented transactions (purchase agreements, assignments, mining leases, etc.), the tax rate varying from 0.1% to 3%, according to the transactions or the amount involved.

Moreover a number of rates are regulated for administrative operations or services whose values are generally low.

In Rio Negro Province, the stamp tax rate for sales contracts is in principle, 1.2% of the amount of sales, to be borne by the seller and the buyer on a 50/50 basis; each party bearing 0.6%.

4) Real-estate Tax

The real-estate tax may be provincial or municipal, according to the location of the real property (inside or outside the urban area). In general a difference is made between urban and rural real property in order to determine the tax rates, whose percentages vary as follows:

a) Urban property: 0.4% to 2% upon assessed valuation

b) Rural property: 0.5% to 3.5% upon assessed valuation

Current real estate tax on HIPARSA properties is $6,800 per year, according to the provincial government.

5) Vehicles Tax

This tax may be Provincial or Municipal, according to the place of registration of the vehicle. Usually a tax rate is fixed (applied upon the appraised value) but some Provinces have a fixed value according to the weight and model. The following per centages are given as an example:

a) Automobiles: 1% to 4%

b) Trucks, pick-up trucks, etc.: 0.7% to 2.5%.

Rio Negro provincial government suggested $300 per year would be enough for trucks, buses and vehicles to be operated on the public roads. Vehicles operated in the mine/plant area and not operated on public roads are not taxed.

(3) Municipal Taxes

According to Sierra Grande Municipality, there are two categories of taxes on the municipality level; Service Tax and Hygiene /Safety Tax.

1) Service Tax

This tax is levied for the services rendered to maintain streets within the city limit, and levied on houses. The tax rates are $8 to $13 per month according to the size and quality of houses within the city. In mine and plants areas of HIPARSA, this tax is not applicable.

There are 600 HIPARSA company houses in Sierra Grande. Maximum amount would be around $120,000 per year.

2) Hygiene/Safety Tax

This tax is levied on the sales amount of the company operation at the rate of 0.6%. The tax is used for keeping hygiene/safety standards of the municipality life. Annual amount of this tax for HIPARSA would be at maximum around $600,000 per year.

(4) Incentives by the Federal/Provincial Governments

There is no unified and comprehensive law for the development of Patagonia. There are some individual laws for promotion of Patagonia economy. The only one which may have favorable effect to the present project is the rebate system for the export from Patagonia ports. The system gives the rebate for the export amount in accordance with the following schedule (**Table-2**).

Table-2 Patagonia export rebate rate schedule

Year	Rate of rebate
1999	7% of exported value
2000	6
2001	5
2002	4
2003	3
2004	2
2005	1
2006on	nil

2.1.3 Present situation of privatization policy

Since 1991 the Government has carried out a major privatization program encompassing most major sectors of the economy; Electric Power, Airlines, Petroleum, Gas, Steel, Railroads, Telephone. This process will be virtually completed by the year 2000 with the privatization or leasing of most enterprises that remain under the control of the Federal Government. In particular the Government has announced its intention to privatize the Banco de la Nacion the largest bank in the Country. Studies on the modalities and timing of such privatization will be conducted during the coming months with a view to introducing enabling legislation to Congress. The privatization of the BHN which has already received legislative approval is being implemented in stages during 1997～1999.

The Government also intends to lease telecommunications frequencies, some nuclear and hydroelectric power plants, and national airports. At the same time the government intends to launch in 1998 a comprehensive review of the regulatory framework for privatized public services, including any necessary restructuring of regulatory agencies.

In the above-mentioned context, reactivation of HIPARSA will be entrusted to private sector through an open tender based on the framework in which the federal and provincial governments would work out to attract interest of private sector after submission of the present study and recommendations.

2.1.4 Environmental policy and regulations

Argentina is suffering from a variety of pollution problems that are more serious than one would expect in a country of its upper-middle levels of income and economic development.

Argentina's pollution problems are mainly the result of the gradual increase of the urban population and industrial development combined with an inadequate regulatory framework and a long standing deficit in sanitary and waste treatment infrastructure.

Argentina's environmental pollution problem are not insurmountable. Their effective management requires the development of a clear vision of the type of environment, a comprehensive strategy for pursuing the vision, and based on that strategy, significant improvements in the regulatory framework to provide appropriate incentives for environmentally sustainable decision making, improvements in the management of sector agencies, and investments.

On the other hand unless corrective measures are taken pollution problems are likely to become much worse. As industrialization and urbanization continue growing industrial discharges will pose a growing threat to public health, erode the cities attractiveness as a locus of investment, and possibly affect the marketability of Argentina's exports abroad.

As part of the transformation of the economy and the state, the Government is making a strong effort to complete structural reforms involving the privatization of public services (including water supply, sewerage and solid waste disposal) and the decentralization of regulatory responsibilities and social programs to the Provinces and Municipalities.

2.1.4.1 Conceptual framework and regulation

The excessive pollution levels in many parts of Argentina point to the need to improve and strengthen the Government's strategy for the management of environmental pollution.

Pollution problems are very location-specific. Therefore it is almost impossible to have adequate information to formally implement the conceptual framework. In addition in Argentina the concentration of pollution problems in the cities also mandates a more detailed consideration of the urban setting. Therefore the development of an integrated pollution control strategy will have to consider objectives in related sectors, such as health, urban development, industry and transport, with which coordination is required.

One of consequences of privatization and decentralization over the last fifteen years has been that many efforts of data collection and surveillance of environmental quality have been abandoned. There is little monitoring of ambient water quality, and virtually none of air quality, and virtually no analysis of its health effects and other economic damage.

(1) Groundwater Contamination

Groundwater contamination is a major concern as a large share of households (28% in the country, but 65% in the outer ring of AMBA (Area Metropolitan de Buenos Aires) which is not connected to the water network, uses groundwater to meet its daily needs. A recent survey in suburban Buenos Aires (not including the Federal Capital) found that 47% of the households were connected to the public network, 23% relied on handpumps, and 24% on electrical water pumps.

However, in very broad terms a dualistic pattern emerges with one cluster of pollution problems that affect the major metropolitan areas and a second cluster that prevails in smaller cities and towns, as summarized on **Table-3**.

Table-3 Two pattern of Environmental Pollution in Argentina

Pollution Problems of Metropolitan Areas (Buenos Aires, Cordoba, Rosario and Mendoza)
-Ground and surface water pollution from untreated domestic sewage and industrial effluents(severe in small local streams) -Air and noise pollution from transport and industrial sources (severe in central locations, industrial concentrations, Mendoza and Cordoba) -Inappropriate disposal of solid wastes and industrial hazardous wastes (especially in periurban areas)
Pollution Problems of Medium and Small Cities and Towns
-Ground and surface water pollution from untreated domestic sewage and inadequate collection and disposal of solid waste -Water and air pollution from major local industries: ! petrochemical industries, lime quarries (Pampas region) ! oil production, sugar refining, lead smelters (Northwest region) ! oil fields, uranium extraction (Cuyo region) ! oil fields, coal mining (Patagonia region)

This indication is supported by a 1988 analysis of 868 domestic water samples in Gran Buenos Aires, which found that the groundwater resources are substantially polluted .In six out of the 13 Municipalities covered in the study, the median nitrate content reached or exceeded the allowable limit of 45mg/liter, and about 34% of the samples showed evidence of bacterial contamination.

The main source of groundwater contamination is believed to be the septic tanks used by households (71% in Gran Buenos Aires, 62% in the country) that are not connected to sewerage. A second major source are industrial effluents, which are also frequently disposed of in leaching pits and septic tanks.

(2) Surface water contamination

The pollution of rivers and coastal waters in and around the major urban areas of Argentina has been extensively documented. Obras Sanitarias has estimated that 2.2 million m^3/day of raw sewage and 1.9 million m^3/day of industrial effluent flow from the AMBA in the Rio de la Plata.

As one of the most polluted local streams the Rio Matanza-Riachuelo, receives discharges from both domestic and industrial sources (some 20,000 plants of which nearly 2/3 do not have treatment facilities while only 3 percent of the remaining regularly operate them).

(3) Air pollution

Air pollution is primarily an inner city problem for drivers, pedestrians, workers, shoppers and residents who are subject to vehicle pollution. Most of the pollution in downtown areas can be attributed to vehicles and most of that in the suburbs to industrial emissions and, in some areas, the burning of garbage. However, there is very little systematic information about air pollution levels and compositions. Some available measurements are shown in **Table-4** and environmental regulation of air pollution in Argentina are shown in **Table-5**.

Table-4 Selected Air Pollution Measurements

Location/Pollutant	SPM(Tg/m^3)	SO_2(Tg/m^3)	NO_X(Tg/m^3)	CO(ppm)	Pb (Tg/m^3)
Capital Federal (selected measurements in July 1993 and May 1994)	70-90	3-18	38-240	Day: 7-14 Even: 5-9 Night: <1	0.3-3.9
Mendoza (selected measurements in July 1993)	30-250	0.2-5.4	0.6-5.3		
Cordoba (annual averages based on regular measurements 1988-1991)	80-192	32	41-50		
Palpala, Jujuy (average of 82 24 hr measurements in 1990)	209	46.3			22.9
US EPA Primary Standards	75 (Annual Geometric Mean)	80 (Annual Arithmetic Mean)	100 (Annual Arithmetic Mean)	9 (8-hour Average)	1.5 (Quarterly Average)
Argentina standards	150	80	100	10	1.5

SPM : Suspended Particular Matters Tg/m^3 : $10^8 \times$ g/m^3

Table-5 Environmental regulation of air pollution in Argentina

Component	Maximum Value (μ g/m^3)	Term of Measurement
CO	40	1 h
	10	8 h
SO_2	850	1 h
	400	24 h
	80	1 year
NO_2	400	1 h
	180	24 h
	100	1 year
Pb	1.5	3 sec.
Particulate Matter	150	24 h
Fraction of Respirable	50	1 year
Ozone	235	1 h
(Photochemical oxidant)	120	8 h
SH_2	8	30 min.

Air pollution data for Buenos Aires are extremely limited. Based on available data it can be concluded that carbon monoxide (CO) concentrations regularly exceed standards during the daytime. No sufficient data are available to allow a similar judgment for sulfur dioxide (SO_2), nitrogen oxides (NO_x), or particulate.

(4) Hazardous Wastes

A recent study estimates that about 47,000 t/year of hazardous wastes are produced in the Province of Buenos Aires alone mostly by the metallurgical-electronic (46%) and chemical-petrochemical (44%) industries. It is illegal to dispose of these wastes in the sewers or sanitary landfills.

(5) Solid Waste

In most parts of the country solid waste is collected by municipal contractors and deposited in open-air dumps where some of it is burned. Local concerns focus on the coverage of collection, which is inadequate in the regular settlements which concentrate the poorer population. In the absence of collection, garbage piles up in empty lots and local streams, where they constitute a source of water contamination, and to a lesser extent, a breeding ground for disease vectors.

(6) Noise Problems

Noise pollution is caused primarily by heavy, congested traffic. It is a major problem in the downtown area of larger cities and along major traffic arteries. Measurements in Rosario have determined noise levels of 100 dB at peak hours, well above the WHO

recommend Standard of 80 dB. 20,000 to 50,000 people in this city of 600,000 are estimated to be exposed to noise levels that pose a serious risk to hearing. Ambient noise in Argentina is shown in **Table-6**.

Table-6 Ambient noise in Argentina
(Iron Ore Mining, Iron & Steel Manufacturing, and Mini Steel Mill)

	Maximum Allowable L_{eq} (hourly) in dB(A)	
	Day time (7-22)	Night time (22-7)
Residential	55	45
Institutional		
Educational		
Industrial	70	70
Commercial		

2.1.4.2 Managing industrial pollution

(1) Problem and current policies

Industrial discharges are a major source of air, water and solid waste pollution in Argentina. In principle, these discharges are regulated by the Provinces through a framework of zoning regulations and industrial operation permits. A 1992 National law assigned responsibility for the regulation of hazardous wastes to SERNAH.

Over 60% of all industrial production is concentrated in the Area Metropolitan de Buenos Aires (AMBA). In most parts of the country, air pollution from industrial sources is regarded as a less serious concern. The problem of the disposal of hazardous wastes is also largely an industrial one which is greatly exacerbated by weaknesses in the regulatory framework and by the absence of any approved disposal facility.

In 1985 the National Economic Census reported, there were about 44,000 industrial establishments in AMBA. Following previous trends, this number had probably declined to about 35,000 by 1994.

As shown in **Table-7**, the metal products & machinery sector stands out as having consistently a higher proportion of its discharges receiving treatment. About 36% of all manufacturing wastewater is discharged to sewers, 39% to nearby rivers and streams, and 21% to stormwater drains (which mostly flow into rivers or streams).

Table-7 Percentage of discharges treated to different levels by sector

Sector	Percentage of wastewater discharges receiving treatment:				Total volume of wastewater discharges thousand m^3/day*
	Pre-treated	Primary Mechanical	Primary Chemical	Secondary	
Chemicals	44	51	46	17	1.0
Beverages	19	17	15	17	35.6
Food	48	69	26	25	57.9
Metals/machinery	57	70	46	40	28.1
Paper	12	53	71	5	30.5
Textiles	49	93	47	21	42.8
Other	44	53	27	18	68.8
All	40	58	36	21	264.5

*Establishments covered by SERNAH survey

There are regulations governing the maximum contamination of wastewater discharged by industrial and similar sources to municipal sewers as shown in **Table-8**. Thus, discharges to municipal sewers should be (pre-) treated to meet these standards.

Table-8 Average pollutant concentrations for industrial discharges to sewers which violate discharge standards

Industry	Average pollutant concentrations for emissions which violate specific sewer discharge standards (mg/liter):				
	TSS	BOD	COD	Detergent	Chromium
Meat packing	752	2020	461	30.1	—
Other foods	826	1712	664	19.8	—
Textiles	307	1023	286	21.0	0.33
Tanneries	526	1050	447	6.1	36.80
Soaps, etc.	1837	3866	675	217.9	—
Other chemicals	331	1171	471	12.1	0.86
Metals /machinery	451	625	416	—	46.00
Others	1216	658	344	9.5	5.15
Discharge standards(mg/l)	100	200	80	5	0.2

(Source: Staff estimates based on Aguas Argentina's data)

In the environmental survey of this time, the industrial sector belongs to iron ore mining, so that Mine Law is applied to this sector. Maximum values of waste water discharged from iron ore mining and related sectors are shown in **Table-9**.

Table-9 Effluent from iron ore mining,
iron and steel manufacturing, and mini steel mill (Maximum Value)

(Unit: mg/liter)

	Iron Ore Mining	Iron and Steel Manufacturing	Mini Steel Mill
pH (-)	6－9	6－9	
Total Suspended Solid	50	50	50
Oil and Grease	10	10	10
Cyanide ・free	0．1	0．1	0．1
・weak acid	0．5		
・total	1．0	1．0	
Phenol	0．5		
COD	150	250	
Ar	0．1		
Cd	0．1	0．1	0．1
Cr			0．1
Cr	0．1	0．5	0．5
Cu	0．5		0．5
Fe	3．5		
Pb	0．2	0．2	0．2
Hg	0．01	0．01	
Ni	0．5		0．5
Zn	2	2	
Total Metal	10		
Temp. increase (℃)		3 ≧	3 ≧

(Source: Pollution Prevention and Abatement Handbook toward Cleaner Production [the World Bank Group] 1997 September)

In the SERNAH survey establishments reported that 19% of wastewater discharged to sewers was pre-treated, 34% received primary mechanical treatment, and 21% received primary chemical treatment. The purpose of treating industrial wastewater before it is discharged to sewers should be to meet sewer discharge standards. If the reported pre-treatment or primary treatment operations were properly carried out, it is very unlikely that over 85% of all establishments would violate the sewer discharge standards with high average levels of concentration of the main pollutants. The inference must be that some of the treatment facilities are not being operated in a manner that permits them to achieve their design levels of efficiency in removing pollutants. Therefore, simple change of existing industrial wastewater treatment facilities may permit significant or even large reductions in the overall levels of water pollution caused by industrial emissions.

(2) Large enterprises

For the large part most enterprises recognize the need to improve their environmental performance and the general economic benefits that this will bring. They have access to the necessary management, technical and financial resources, so that the primary issue is one of establishing clear priorities and guidelines so that they can embark upon a program of upgrading their facilities and performance. Among the usual heavily polluting industries, the paper and pulp industry provides an interesting contrast in environmental performance. A very similar process has been occurring in the steel industry with the additional element of privatization.

In the case of major emission sources such as the La Plata refinery, the provincial authorities -with assistance from SERNAH- must sit down with the management and negotiate an agreement on bringing the plant into compliance with local and national environmental regulations.

This agreement should cover the followings.

1) The initial priorities to be addressed by plant management

2) The relevant standards for air, wastewater and solid waste emissions that will apply in the longer term to the plant as a whole and immediately to any new units within the plant

3) A schedule for bringing the plant into compliance with the standards over a period of 6-8 years plus any explicit exemptions from this compliance requirement

4) Arrangements for continuous or intermittent monitoring of the performance of the plant as well as for reviewing the agreement after some appropriate period

Such agreement should be backed up by clear economic incentives including charges for certain types of air emissions as well as wastewater discharges and solid waste disposal. Such charges should vary according to the associated pollution loads and should include stiff additional penalties for violating the provisions of the agreement.

(3) Hazardous Waste Management

A recent study of hazardous waste in the Province of Buenos Aires lists the petroleum, chemical, petrochemical, metal, leather and textile industries as the major sources of hazardous wastes. The same study also contains a list of industries which claim that they would have difficulties in paying the treatment costs for the hazardous waste they produce because of their economic situation. These include the leather tanning and textiles industries among the major hazardous waste producers plus the timber, paper, mechanical assembly, ceramics, glass and batteries. It is said that the cost of dealing with all solid

wastes (non-hazardous as well as hazardous) is barely more than 1% of value-added in the worst of these industries.

Recently, a national Hazardous Waste Law (Law 24.051 of 8 January 1992) has become effective. SERNAH has issued regulations pertaining to this law (Decree 831/93 of 23 April 1993 and Resolution 242/93 of 24 June 1993)

(4) Environmental Policy and International Competitiveness

There are strong grounds for believing that the opening up of the Argentina economy will bring environmental benefits by accelerating the adoption of newer, cleaner technologies, the influence of foreign investors who expect their local operations to achieve higher levels of environmental and operating efficiency, and the preferences of customers in some foreign markets that suppliers should, where possible, conform to the "green" certification requirements such as those of ISO 14,000 .

While some kinds of environmental regulation may indeed impose a significant burden on certain industries, there is no evidence to believe that this would be a major consideration in Argentina at present.

2.1.4.3 Impact on environment

The development of an effective pollution control strategy requires a comprehensive assessment of the actual responsibilities and sustainability of the institutional agreements. The objective is to outline a sustainable vision of the organization of the environmental policy making for the country as a whole, rather than just the national level.

One important feature of Argentina's institutional framework is the system of government, in which the Provinces delegate functions to the Central Government. This implies that there are as many ways of organizing the control of pollution as there are Provinces.

A second unusual feature is that the institutional structures of the Government are rapidly changing.

- In 1965, a comprehensive national environmental agency was first established as the Direccion Nacional de Sanidad under the Ministerio de Salud Publica.
- In 1973, environmental matters were taken over by the Secretaria de Recursos Naturals y Ambiente Humano under the Ministerio de Economia.
- In 1976, its functions were dispersed.
- In 1980, its functions were reappeared under the Ministerio de Salud Publica y Medio Ambiente, where it was later recognized as the Secretaria de Vivienda y Medio Ambiente under the Ministerio de Saludy Accion Social.
- In 1987, national environmental policy was placed under the responsibility of the Subsecretaria de Politica Ambiental reporting to the secretaria General de la Presidencia.
- In 1989, this became the Comision Nacional de Politica Ambiental.
- Since 1991, the Secretaria de Recursos Naturals y Ambiente Humano (SERNAH) reports directly to the President.

At present there are plans to elevate SERNAH to the status of a Ministry which would give it greater status and autonomy.

(1) The current institutional situation

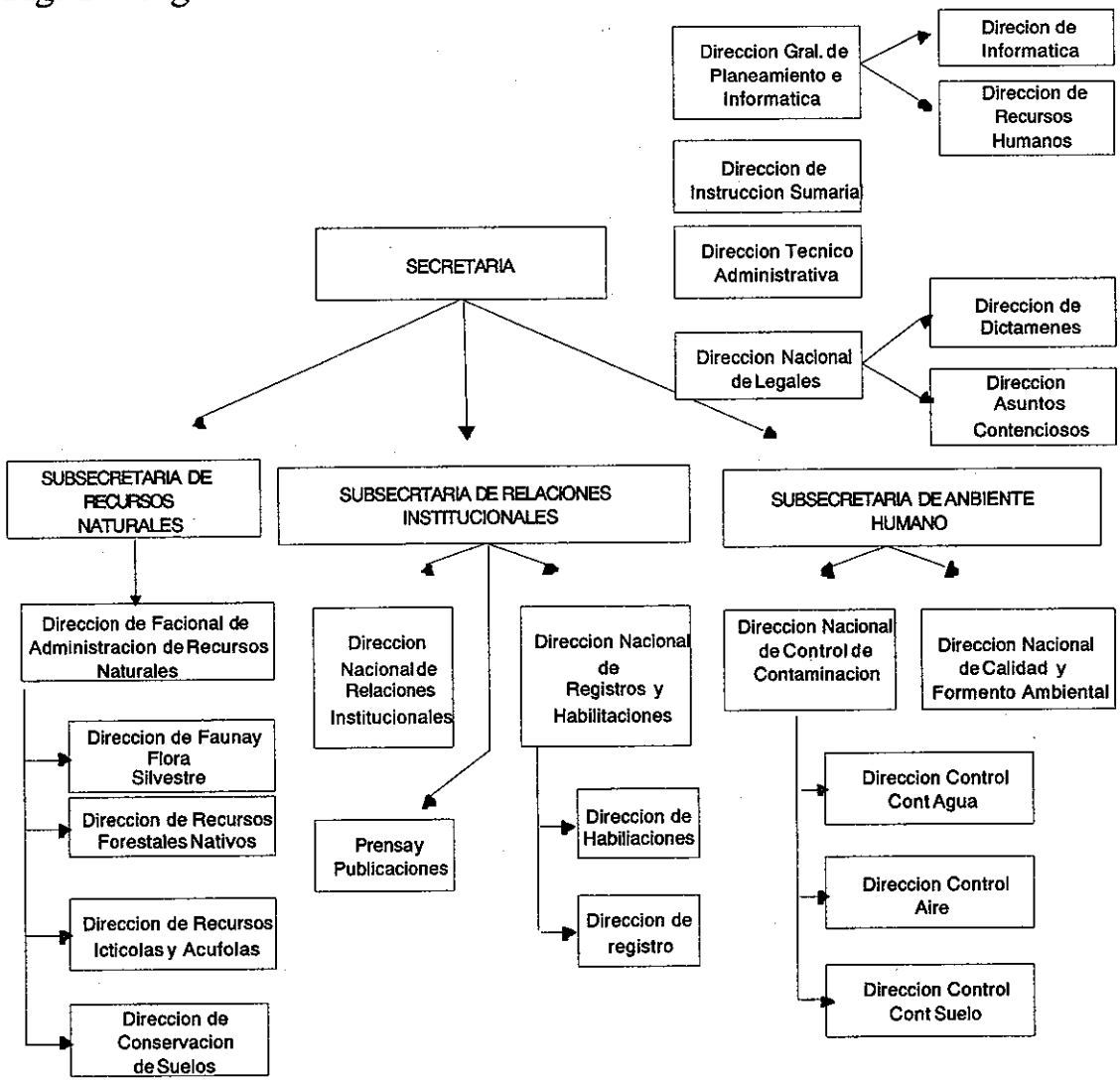
In principle most environmental matters are the responsibility of the Provinces unless expressly delegated to the National Government. However, under certain circumstances, the National Novernment can assume authority for specific environmental issues. Environmental authority at the National level includes, among others, responsibility for inter provincial waterways (i.e. the major rivers), and the construction of hydro-electric plants.

1) National Agency

The national organization of environment policy centers around the Secretaria de Recursos Naturales y Ambiente Humano(SERNAH), a cabinet level agency reporting directly to the President and with a total staff of 359. It is generally expected that SERNAH will become a full fledged Ministry within a short period of time. SERNAH includes subsecretariats for institutional relations, human environment, natural resources, and the National Parks administration, as well as the Instituto Nacional de Ciencias y Tecnicas Hidricas (INCYTH) (shown in **Fig.-1**).

SERNAH is working on a reorganization of environmental policy making in Argentina, but it has not yet had enough time to deliver in many areas. SERNAH is not alone in dealing with the environment at the national level. The number of other national agencies is quite large as seen in **Attachment-1**.

Fig.-1 Organization chart of SERNAH



Attachment-1 National agencies with environmental responsibilities

SERNAH is not alone in dealing with environmental issues at the National level. Just to illustrate the complexity of the system, here is a partial list of other agencies involved : The Ministry of Economy and Public Works has a say in policy guidelines in agriculture, mining, fishing and energy. Through the Planning Secretariat, it manages the ElAs for public investment .The Education Ministry is responsible for environmental education. The Interior Ministry is involved in issues raised by inter provincial rivers. The Ministry of Defense is also an active player. The Air Force and the Navy monitor air and water contamination. The Prefectura Nacional Maritima polices environmental pollution through (i) Servicio de Salvamento, Incendio y Contaminacion (SERSICO); (ii) Control de la Contaminacion de Aguas Portuarias y Vias Navegables; (iii) Division Mercancias Peligrosas are active in monitoring and policy related issues. The policia Federal is involved in enforcement through the Division Preservacion Ambiental, Recursos Naturales y Delitos Ecologicos. The Ministry of Health and Social Action through its Housing and Environmental Quality Secretariat sets and enforces norms on pollution, resettlement, environmental impacts of infrastructure projects and manages the registry of polluting sources. The Ministry of External Relations and International Trade addresses international aspects of the environment. The Secretariat of Agriculture, Cattle and Fisheries does environmental research through its Instituto de Technologia Agropecuaria (INTA). Other public agencies involved include the Consejo Federal de Agua Potable y Saneamiento (COFAPYS), the Servicio Nacional de Agua Potable (SNAP), the Coordinacion Ecologica Area Metropolitana (CEAMSE), and the Comision Nacional de Energia Atomica (CNEA).

The most recent additions to this list are the recently created regulatory entities in electricity, gas and water. All have environmental units responsible for monitoring the environmental requirements of concessions contracts but not all have the same powers. For instance, while the energy entity is allowed to charge fines, the water entity is not.

2) National-Provincial coordination

National-Provincial relations are complex. As a common practice, the National Government enacts laws applicable in its jurisdiction, and then invites the Provinces to adhere to such law. If the Province decides to adhere to the national law (or decree, regulation, standards, etc.), it may adopt such law in total or in part. The Province determines also the provincial authority which will implement such law or it may delegate the powers to implement the law to the Municipalities.

A case that illustrates the complexity of national-provincial relations is the National Hazardous Waste Law 24.051 of 1992. This law covers the generation, manipulation, transport, treatment and final disposal of hazardous waste.

At the level of national-provincial relations, SERNAH hosts the forum in which all provinces and the national government discuss common themes. In 1993, SERNAH successfully negotiated an environmental pact ("Pacto Ambiental Federal") with all the provinces. This pact is a political instrument that signals the willingness to coordinate Provincial and National efforts.

3) Provincial Agencies

At the Provincial level, the capacity for the management of environmental problems differs widely. A partial summary of institutional responsibilities and applicable regulations is provided in **Table-10**. In general, the Provincial standards are adapted from National standards.

Table-10 Summary of Environmental Regulation and Institutions

	National	Provincial	Municipal
Water	GUIDELINES. Jurisdiction over national waters (1989 Decree); civil and criminal codes for water resource protection. MONITORING of national waters through SER; random checks by Ministry of Health; ETOSS monitors emissions of AA. ENFORCEMENT. SERNAH has enforcement power for national waters; Navy enforces in international waters (ocean, Rio de la Plata).	GUIDELINES. Jurisdiction over inter-provincial waters. MONITORING through provincial environment or health agencies; increasingly role for water-basin organizations ENFORCEMENT in provincial waters; i.e. province of Buenos Aires has policia Ecologica	GUIDELINES. In some Provinces, grant permits that need to be approved by Province. MONITORING delegated to Municipalities by most Provinces.
Air	GUIDELINES, Basic air law from 1973 never regulated. MONITORING AND ENFORCEMENT is ,IN theory, role of the Ministry of Health.	GUIDELINES. Provinces have not adhered to national law; some have own law.	GUIDELINES through Municipal ordinances. MONITORING AND ENFORCEMENT. Car emissions are controlled through random spot checks.
Hazardous Waste	GUIDELINE, Basel Convention ratified; national Law 24.051 of 1992 and regulation by SERNAH; currently applies only in GBA and for inter provincial transportation. MONITORING AND ENFORCEMENT By SERNAH; includes hazardous waste register.	GUIDELINE. Few Provinces have adhered to national law; Several Provinces have their own hazardous waste laws.	
EIA	GUIDELINE. National Public Investment Law requires EIA for selected public sector projects; Additional sectoral requirements (dams, energy, mining, etc.)	GUIDELINES. Several Provinces have own EIA laws.	

The regulation of water pollution involves the greatest degree of institutional complexity. The discharges of AA (Ague Argentina) are strictly controlled by the water regulatory entity .

Provincial Governments enforce the law for provincial waters, suggesting a high potential for overlap between the National and Provincial levels.

Since in many Provinces, environmental agencies (ministries, secretariats or sub-secretariats) are still relatively new, there are still some overlapping problems between them and health agencies who used to be responsible.

(2) Steps towards a reform of environmental institutions

SERNAH is aware of many of the problems and of the necessity to streamline the problems and of environmental policy in Argentina. It is very actively working at reorganizing its institutions to establish a more transparent and ultimately more effective national environmental system. This effort includes the work on a National environmental policy, a National action plan and a National information system.

(3) Pollution control cost and environmental impacts

The available data consistently shows that the environmental control costs are a very small component of total production costs and value-added.

Table-11 draws upon the results of a 1989 survey of pollution control costs by industry in the U.S.

Table-11 Pollution control costs for U.S. industries producing traded goods

Standard Industrial Classification (USSIC)		Pollution control costs as percentage of value-added			Pollution investment as percentage of total investment
		Air	Water	Solid Waste	
201	Meat products	0.1	0.8	0.2	4.3
2011	Meat packaging	0.1	0.7	0.2	7.4
203	Preserved fruit & vegetable	0.0	0.5	0.3	4.2
204	Grain mill prods	0.3	0.3	0.3	2.5
207	Fats & oils	0.4	0.7	0.2	4.0
2075	Soybean oil mills	1.0	0.5	0.3	4.3
2077	Animal & marine fats and oils	0.2	0.4	0.1	9.8
221	Cotton fabric mills	0.3	0.7	0.3	1.2
222	Manmade fabric mills	0.0	0.2	0.2	0.9
225	Knitting mills	0.1	0.3	0.1	2.0
226	Textile finishing, except wool	0.1	0.9	0.2	1.7
228	Yam & thread mills	0.0	0.2	0.1	0.2
261	Pulp mills	1.0	2.2	0.7	22.3
262	Paper mills	1.1	2.2	1.0	7.8
263	Paperboard mills	1.0	1.8	0.8	12.1
281	Industrial inorganic chemicals	1.0	1.6	1.2	12.4
282	Plastics materials & synthetics	0.6	1.1	0.9	8.2
283	Pharmaceuticals	0.1	0.3	0.2	4.3
285	Paints & allied prods	0.2	0.3	0.8	5.0
286	Industrial organic chemicals	1.1	2.5	1.4	12.0
289	Misc. chemical products	0.3	0.8	0.7	5.5
291	Petroleum refining	5.5	2.6	1.4	13.1
311	Leather tanning & finishing	0.3	2.4	1.2	6.5
331	Blast furnace & basic steel prods	1.7	1.5	0.8	6.8
332	Iron & steel foundries	1.5	0.5	1.0	10.6
333	Primary nonferrous metals	4.2	0.5	0.7	14.0
334	Secondary nonferrous metals	4.4	1.0	1.6	25.0
335	Nonferrous rolling and drawing	0.4	0.9	0.9	4.0
336	Nonferrous foundries	0.4	0.5	0.9	7.0
3471	Metal plating & polishing	0.7	5.2	2.7	26.0

The primary concerns about industrial pollution in Buenos Aires, Cordoba, Rosario and other Metropolitan areas focus on the liquid and solid waste from a limited number of industries dominated by medium and small enterprises. The main offenders are listed in **Table-12**.

Table-12 Selected environmental impacts of medium and small enterprises

Nature of Impact	Source of impact	Technical alternatives
Liquid effluents	-Slaughterhouses, cold storage, and meat processing -Tanning and leather -Metal finishing and electroplating -Light chemicals -Dairy products	-Good housekeeping -Enhanced industrial efficiency -Waste minimization -Recycling and reuse of waste as a byproduct -On-site waste treatment-coagulation, precipitation, sedimentation, filtration, biological treatment facilities
Solid, toxic and hazardous wastes	-Metal finishing and electroplating -Automotive parts -Light chemicals	-Waste minimization and recovery -Solid waste disposal in special land fills after neutralization -Hazardous and toxic waste incineration

(4) Use of environmental impact assessment

The Environmental Impact Assessment (EIA) is one of the critical instruments of environmental regulation, particularly for addressing major environmental impacts, cross-media issues, and projects involving resettlement of the affected population.

A promising instrument for making the EIA process more transparent and efficient is the application of social damage costs for comparing environmental damages with project benefits. One of the requirements for the EIA would be to show that the investment project is economically viable when taking its environmental and social externalities fully into account.

To facilitate the preparation of EIAs, the responsible government agency should develop estimates of shadow prices for environmental damages (i.e., a monetary amount per ton of each pollutant) from economic analysis (including, initially, studies of damage costs or abatement costs done in other countries). Ultimately, shadow prices should be regionally differentiated to reflect local conditions with different levels of damage costs (e.g., taking into account meteorological conditions and the diluting capacity of the local water bodies.).

In Argentina, EIAs are required in about half a dozen Provinces, and at the National level, the new Public Investment Law requires EIA for selected public projects or projects with public contributions or guarantees. The implementing regulations have been issued gradually (shown in **Attachment-2**).

Attachment-2 EIA in Argentina

The new National public investment law requires EIA for selected public projects or projects with public contributions or guarantees. The Provinces and the Municipalities can have their own requirements with respect to this instrument which means that while there is no national EIA, in some parts of the country investors already have address local requirements as in Cordoba, Neuquen, Rio Negro, Mendoza, and Tierra de Fuego.

A more systematic use of EIA is essential to ensure the comprehensiveness and quality of environmental management. Perhaps some experiences could be drawn from the energy sector, where EIA has been required since 1987. Lack of training is a major problem, to carry out EIAs on a Provincial level. It took Cordoba for instance about a year to put in place the procedural requirements and train Municipal administrations in understanding the value and importance of the instrument.

(5) A general Environmental Law

The critical jurisdictional issues that have constrained effective environmental management in Argentina could be clarified with a law that defines the National environmental system, i.e. the roles and responsibilities of the Federal and Provincial Governments in regards to environmental policies and management. This law would have to be consistent with the 1994 Constitution's requirement that the National Government dictate "minimum requirements," but respect the "local jurisdictions". Examples of such laws already exist in Honduras, Brazil and Peru.

In addition, the law should provide a sound legal basis for the introduction of effluent fees, and other economic instruments for environmental management, by establishing the general principle that the State has the right to charge those that use the country's natural and environmental resources, i.e., the "polluter pays" principle.

(6) Framework of Environmental Law in the mining activity

The settlement of environmental condition by Mining Law (No. 24585) is as follows.

1) Applied scope for environmental protection

a) environmental protection in the mining activity

b) applied business scope

b-1) all business action connected with prospecting of ore, boring, mining, development, manufacturing, extraction, and storage, in addition, closing of a mining area.

b-2) crushing, grinding, refining, pelletization, sinterization, briqueting, primary elaboration, calcination, smelting, refinery, polishing, glossing, process which new technology is added to, and treatment of all waste.

c) jurisdiction Government Office is determined by each Provincial Government

2) Formalities related to environmental management

a) presentation of a letter of application in relation to environmental impact before starting of business action.

b) authorization by a letter of decree

c) authorization or rejection of a letter of application is determined within 60 days.

3) Regulation of environmental protection and preservation

A letter of application with respect to environmental impact includes the following items.

a) preservation and place of environmental impact area

b) description of mining activity project

c) geology, water quality, air, plants and animals, configuration, and change of society-culture

d) each countermeasure in relation to prevention, relaxation, regeneration, return, and repair

e) used manner

4) Responsibility for environmental obstruction

5) Violation and restraint

6) Education and environmental protection

7) Interim management and action

2.1.4.4 Survey of the environmental conditions and regulations on site (at Sierra Grande)

(1) Mine site (Area Ⅰ)

In Area Ⅰ solid waste discharged from the mine and the concentration plant is piled up into the dumping dam, which is known as Laguna Blanca and has an area of about 4 km×5 km by eye measurement. The area of dam has a natural surface shape like that of a basin. It was confirmed that no people live in or around the basin. All waste water from the mine site (Area Ⅰ) is collected and stored in the Laguna Blanca.

(2) Pelletizing plant site (Area Ⅱ)

The Pellet plant site (Area Ⅱ) is located separately at the seaside at a distance of about 32 km from Mine Site. No people live around the plant site. But at a distance of about 8 km in the northern direction a small health-resort (known as Baln El Salado) is located. It was confirmed that no pollution problem has happened there since the start of the pelletizing plant operation. In this survey period the weather was fine and the wind was generally light, but sometimes it was windy and dusty. We were told that district of Sierra Grande area in Rio Negro belongs to the Patagonia area and during the year the wind can be strong and blows with the velocity of typhoon occasionally.

(3) Solid waste and its utilization

Solid waste like non-magnetic ore from the pre-concentration plant and tailing ore from the concentration plant in the Area Ⅰ has been piled up at Laguna Blanca. But it was developed about ten years ago

that the apatite ore is separated from magnetic ore in the concentration plant and is able to be used as a raw material of fertilizer.

In the pelletizing plant no solid waste was generated

(4) Waste water

In Area Ⅰ, all waste water from the mine site is collected in the Laguna Blanca and a small volume of waste water is kept in there.

In Area Ⅱ, waste water from the pelletizing plant is collected in deposit ponds near to the plant and part of the overflow water from ponds after the fine solid are removed is returned to the plant and the rest flowed to the sea.

(5) Weather conditions at the site (at Sierra Grande)

1) The precipitation volume

The precipitation volume is 200 mm yearly average.

2) Wind velocity

Wind velocity is strong throughout the year.

3) The direction of a wind

Wind blows from the west to the east.

(6) Analysis of drinking water at Sierra Grande

HIPARSA maintains and supplies drinking water from two water springs to the city in which about 6,000 peoples now live. The water quality of Los Berros and La Ventaana the location of the water springs is given in **Table-13**. It is certified that the water from both springs is able to use as drinking water.

In the environmental protection of mine activity in Argentina various standards of water quality are regulated in the Mine Law (No.24585) and are given in **Table-14**.

Table-13 Water quality of drinking water at Sierra Grande

/1997.10.21

(Unit: mg/liter)

	Los Berros	La Ventana
Conductivity	569 umhos/cm	489 umhos/cm
Hardness	128	170
Total Alkaline	124	147
Cl^-	50	35
SO_4^{--}	94	66
NO_3^-	10	8
NO_2^-	0.005 ≧	0.005 ≧
Ca^{++}	25	26
Mg^{++}	16	25
Residual Cl	1	1
Total Fe	0.1 ≧	0.1 ≧
S	1.3	1.2
As	0.05 ≧	0.05 ≧

Table-14 Environment Regulations of Water in Argentina

Unit: ug/l

Component	Source of water supply for beverage	Surface of the fresh water for the underwater life protection	Surface of the sea-water for the underwater protection	Surface of the brine for the underwater life protection	Source of water supply for irrigation	Drinking water for domestic animals
pH	6.5~8.5	6.5~8.0	6.5~8.5	6.5~8.5	6.8~8.5	6.8~8.5
SS(Suspended Solid)	1×10^6	1×10^6	1×10^6	1×10^6	1×10^6	1×10^6
Dissolved oxygen	5000	5000	5000	5000	5000	5000
Al	200		1500		5000	5000
Sb	10	16				
As	50	50	0.5		100	600
B		750			500	5000
Ba	1000		1000			
Be	0.039					100
Cd	6	0.2	5		10	20
Co					50	1000
Cyanide	100	5	5	5		
Zn	6000	90	0.2	170	2000	50
Ca					200	1000
Cu	1000	2	4	50		
Cr(Total)	50	2			100	
Cr(+6)	50		18	50		
F	1500		1400	1400	1000	1000
Hg	1	0.1	0.1		2	1000
Ni	25	25	7.1	100	200	500
Nitrate	10000					
Nitrite	1000					
Ag	60	0.1	6			
Pb(Total)	50	1	10	10	200	1000
Se	10		10		20	100
U	100	20	500		10	50
Mn		100			10	2
V		100			100	200

(7) Environmental regulation of soil

Environmental regulation of soil is given in **Table-15**. Each regulation for agriculture and industry is different, and the regulations for industry are more generous than for agriculture.

In accordance with the results of survey at this time the application for environmental protection in the mining activity is summarized below as follows.

1) All business action connected with prospecting of ore, boring, mining, development, manufacturing, extraction, storage, and closing of mining area.

2) If a new plant for direct reduction is projected to be constructed this plant is regulated by Mine Law (No. 24585) and EIA in accordance with that a presentation has to be made to jurisdiction government office.

Table-15 Environment Regulation of Soil in Argentina

(Unit: μg/g)

Composition	Agriculture	Industry
Sb	20	40
As	20	50
Ba	750	2000
Benceno	0.05	5
Be	4	8
B	2	–
Cd	3	20
Cyanide (Free)	0.5	100
Cyanide (Total)	5	500
Zn	600	1500
Co	40	300
Cu	150	500
Compound (Compuestos)	0.1	10
Cr (Total)	750	800
Cr(+6)	8	–
Eatano	5	300
F	200	2000
Hg	0.8	20
Mo	5	40
Ni	150	500
Ag	20	40
Pb	375	1000
Se	2	10
Sulfide (Element)	500	–
Ta	1	–
V	200	–

2.1.4.5 Measurement method and result

The World Bank understands an overall work situation to the environment in Argentina by using the investigated documents and materials which investigates an environmental situation for Argentina where environmental maintenance is not in order still enough, and is a summary. Especially, in Argentina, the method maintenance and the correspondence which corresponds to it are considerably late remarkable the environmental pollution of the Buenous Aires city. However, it was clarified that the maintenance of an environmental method was especially later because the industry which stood out was also a little in other states. Then, an environmental condition of Sierra Grande city in Rio Negro state where HIPARSA existed was investigated in this project.

It was found that HIPASAM did not execute the investigation concerning the environment at all after they began to operate, and the data did not remain.

On the other hand, the state government clearly shows an environmental standard based on the mining law about the water quality. However, a clear standard is not shown about other environmental elements. The drinking water of the Sierra Grande city is in the range of an environmental standard in As, NO_3^-, and NO_2^-.

(1) Measurement method

Area Ⅰ: Plants and Environmental elements which becomes object
Conc. Plant: Waste water, Solid waste, Reutilization of solid waste
Laguna Blanca (pond): Waste water
Laguna Negro(pile): Solid waste

Area Ⅱ: Slurry transportation: Waste water
Pelletizing plant: Waste water, Particularte Matter, NOx, SOx, CO gas
HBI plant: Waste water, Particularte Matter, NOx, SOx, CO gas

(2) Results

1) Air quality

In Area Ⅰ, the Pollutant radiates chiefly an atmospheric material from the manufacturing plant, and is NOx, SOx, Oxidants, CO, and is Particulate Matter, etc.. The resolution is restricted in Provincial Level as **Attachment-3-1** (Resolution 242/97).

On the other hand, law 20284/73 is shown an Standard, Alert, Alarm, and the Emergency level in Federal Level. For instance, the case of photochemical Oxidants and NOx is indicated as **Attachment-3-2.**

2) Water quality

In Area Ⅱ, the main Pollutants is chiefly discharged drain, and is a pH, a heavy metal ion, P, Cl, and BOD, etc.. These are examined in Chapter 9.

It is necessary to investigated EIA based on these standard values.

Attachment-3-1 Resolution 242/97

SO_2	1.300 mg/Nm^3	3 h
	0.365 mg/Nm^3	24 h
CO	10.0 mg/Nm^3	9 h
	40.0 mg/Nm^3	1 h
O_3	0.235 mg/Nm^3	1 h
NO_2	0.367 mg/Nm^3	1 h
Particulate Matter (PM)	0.15 mg/Nm^3	24 h
pb	0.002 mg/Nm^3	3 month

Attachment-3-2 Law 20284/73

	Photochemical Oxidants	NOx
Standard	0.1 ppm/h	0.45 ppm/h
Alert	0.15 ppm/h	0.6 ppm/h
Alarm	0.25 ppm/h	1.2 ppm/h
Emergency	0.40 ppm/h	-

2.2 PRESENT SITUATION OF MACRO ECONOMY AND IRON ORE MINING SECTOR

2.2.1 Present situation of macro economy

Argentina is endowed with an agricultural sector in the fertile Pampas capable of producing a sizable export surplus and achieving its economic development and industrialization mainly relying on the export of grain and beef. Argentina attained one of the highest standards of living in the world by the 1920's. Because of the prolonged postwar economic stagnation after World War II however the country is now classed as one of the upper middle-income countries in terms of per capita income by the World Bank classification (refer to the **Graph-1** and the **Table-16**).

Graph-1 Per Capita GDP

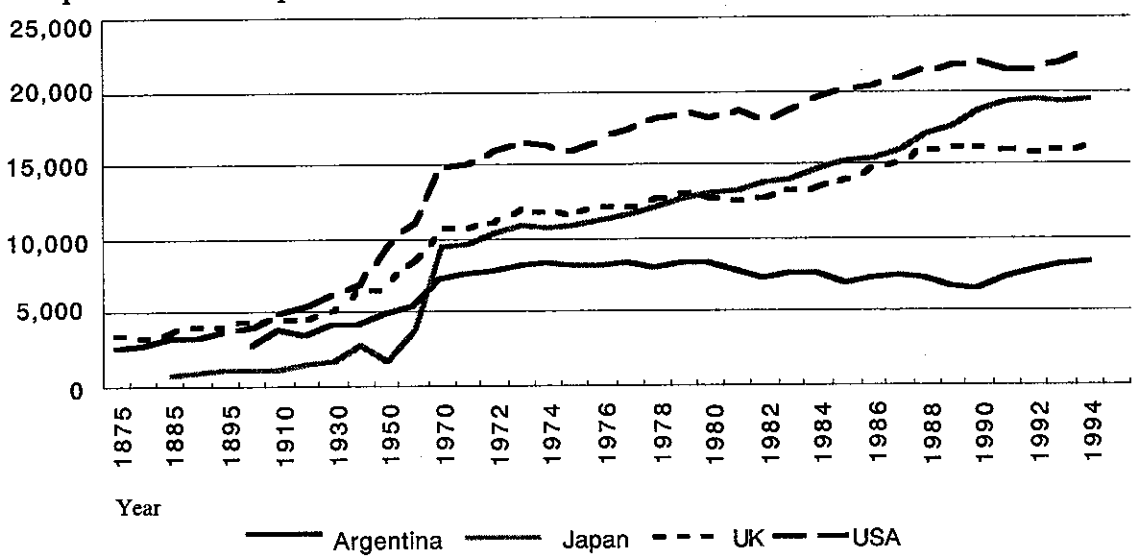


Table-16 Long Term Growth of Per-capita GDP of Argentine, Japan, UK and USA
1000 Geary-Khamis Dollars in 1990

	Argentine	Japan	UK	USA
1870	1,311	741	3,263	2,457
1871			3,421	2,508
1872			3,394	2,545
1873			3,441	2,604
1874			3,463	2,531
1875			3,511	2,599
1876			3,508	2,574
1877			3,503	2,594
1878			3,479	2,646
1879			3,428	2,915
1880			3,556	3,193
1881			3,649	3,223
1882			3,725	3,341
1883			3,726	3,338
1884			3,704	3,326
1885		818	3,654	3,269
1886		883	2,581	3,295
1887		913	3,797	3,372
1888		866	3,936	3,284
1889		901	4,115	3,416
1890	2,152	974	4,099	3,396
1891		920	4,065	3,471
1892		974	3,933	3,732
1893		970	3,897	3,482
1894		1,077	4,120	3,318
1895		1,081	4,211	3,648
1896		1,011	4,345	3,509
1897		1,022	4,360	3,774
1898		1,201	4,528	3,784
1899		1,100	4,670	4,056
1900	2,756	1,135	4,593	4,096
1901	2,880	1,161	4,551	4,469
1902	2,717	1,086	4,628	4,426
1903	2,992	1,147	4,540	4,556
1904	3,191	1,143	4,528	4,415
1905	3,479	1,113	4,623	4,648
1906	3,518	1,248	4,736	5,085
1907	3,459	1,275	4,784	5,071
1908	3,657	1,268	4,550	4,566
1909	3,699	1,251	4,612	5,023
1910	3,822	1,254	4,715	4,970
1911	3,746	1,304	4,815	5,052
1912	3,904	1,332	4,868	5,207
1913	3,797	1,334	5,032	5,307
1914	3,302	1,276	5,038	4,805
1915	3,244	1,375	5,408	4,870
1916	3,092	1,568	5,506	5,465
1917	2,790	1,602	5,544	5,254
1918	3,248	1,605	5,583	5,666
1919	3,307	1,758	4,980	5,687
1920	3,473	1,631	4,651	5,559
1921	3,471	1,789	4,238	5,329
1922	3,636	1,762	4,427	5,546
1923	3,898	1,741	4,545	6,171
1924	4,055	1,767	4,698	6,240
1925	3,919	1,814	4,912	6,290
1926	3,994	1,801	4,713	6,610
1927	4,156	1,799	5,075	6,584
1928	4,291	1,917	5,115	6,577
1929	4,367	1,949	5,255	6,907
1930	4,080	1,780	5,195	6,220
1931	3,712	1,768	4,906	5,698
1932	3,522	1,887	4,916	4,914
1933	3,621	2,042	5,039	4,783
1934	3,845	2,019	5,354	5,120

	Argentine	Japan	UK	USA
1935	3,950	2,040	5,537	5,473
1936	3,912	2,159	5,762	6,211
1937	4,125	2,227	5,937	6,438
1938	4,072	2,356	5,983	6,134
1939	4,148	2,709	5,979	6,568
1940	4,161	2,765	6,546	7,018
1941	4,304	2,764	7,143	8,215
1942	4,284	2,711	7,294	9,753
1943	4,182	2,714	7,394	11,532
1944	4,579	2,558	7,071	12,348
1945	4,356	1,295	6,737	11,722
1946	4,665	1,389	6,440	9,207
1947	5,089	1,482	6,306	8,896
1948	5,252	1,660	6,441	9,075
1949	5,047	1,731	6,641	8,954
1950	4,987	1,873	6,847	9,573
1951	5,080	2,072	7,022	10,338
1952	4,727	2,277	6,987	10,596
1953	4,884	2,412	7,242	10,810
1954	4,986	2,511	7,509	10,549
1955	5,237	2,695	7,759	10,948
1956	5,290	2,868	7,823	10,970
1957	5,468	3,051	7,913	10,981
1958	5,705	3,200	7,864	10,746
1959	5,245	3,459	8,137	11,145
1960	5,559	3,879	8,571	11,193
1961	5,865	4,307	8,780	11,285
1962	5,682	4,647	8,789	11,796
1963	5,459	4,990	9,070	12,137
1964	5,929	5,514	9,486	12,687
1965	6,371	5,771	9,668	13,316
1966	6,321	6,327	9,800	14,017
1967	6,397	6,954	9,962	14,225
1968	6,573	7,757	10,320	14,719
1969	7,033	8,625	10,487	15,028
1970	7,302	9,448	10,694	14,854
1971	7,535	9,726	10,852	15,158
1972	7,642	10,378	11,194	15,846
1973	7,970	11,017	11,993	16,607
1974	8,344	10,800	11,787	16,362
1975	8,132	10,973	11,701	16,060
1976	7,978	11,309	12,023	16,773
1977	8,322	11,727	12,308	17,461
1978	7,828	12,186	12,742	18,168
1979	8,256	12,754	13,087	18,489
1980	8,245	13,113	12,777	18,270
1981	7,655	13,484	12,599	18,569
1982	7,306	13,817	12,826	18,027
1983	7,456	14,093	13,299	18,547
1984	7,503	14,602	13,603	19,597
1985	6,912	15,237	14,046	20,050
1986	7,320	15,542	14,614	20,426
1987	7,413	16,101	15,265	20,880
1988	7,183	17,028	15,988	21,463
1989	6,655	17,757	16,288	21,783
1990	6,581	18,548	16,302	21,866
1991	7,089	19,240	15,867	21,366
1992	7,616	19,425	15,738	21,558
1993	7,985	19,379	15,915	21,972
1994	8,373	19,505	16,371	22,569
1995	9,889	19,909		
1996	10,309	20,632		
1997	11,042			
1998				
1999				

Source: OECD, Monitoring the World Economy 1820 - 1992, 1993-97 added by JICA Team

Economic development in Argentina was chiefly characterized by low long-term economic growth. The annual average rate of growth was 3% during 1950-1980 which was less than a half of the growth rates achieved by the other major Latin American countries like Brazil and Mexico. The investment ratio was stagnant and the investment efficiency low partly because the country pursued Industrialization through import substitution policies which heavily protected domestic industries supplying the limited domestic market.

Under the rapid liberalization of the economy by the previous Government the long-protected domestic industries faced International competition during the later half of the 1970's. Coupled with the overvalued peso the country's industrial production dropped substantially from the late 1970's to the mid-1980's. The downturn of the industrial sector which accounts for one fourth of production and employment has been the primary cause of the current overall economic stagnation.

Investments have been adversely affected by the continued deterioration of the economic environment, most notably, high inflation, decreases of external and domestic demand, discontinuity of economic policies and so on. The ratio of investment went from bad to worse since the beginning of the 1980's, staying at 13% in 1985. Considering the rapid pace of the on-going technological innovations in the world, substantial shortfalls of plant and equipment investments which should embody such innovations is likely to constrain the future growth of the Argentina economy.

Argentina economy has a structure similar to those found in the developed countries, as seen in the diversified industrial sector, modern agriculture, the developed financial sector and others. Self-sufficiency in energy is also a definite advantage for the future economic development. Moreover, the high standards of living, the sizable presence of the middle classes and the labor force with high levels of education, which are results of the past economic development, can be considered as favorable factors

for the future of the economy.

In June 1985, the inflation rate reached 1000% per annum, and the Austral Plan was imposed, freezing wages and prices. The plan worked to hold hyper-inflation, but it could not sustain the effect to radically improve the basic conditions of the economy. President Menem, after being elected in 1989, set out a grand plan to radically change the situation. The program directed the economy to a free market system, and opening up the economy to world competition, with controlled deregulation. It included the reform of the administration structure, balanced budget, privatization of state-owned enterprises, suppression of currency issue, and tax collection improvement. The Convertibility Plan in 1991 suppressed inflation, and the period of rapid economic growth started.

The side effect of privatization was unemployment, which increased in early 1997, is seemingly being absorbed by the growing employment demand by the growing economy and deregulation.

With the economy back on the growth track, Argentina regained the confidence of foreign capital, which started to flow into Argentina, pushing up the investment ratio to a healthy level.

The process was interrupted by the effects of the Mexican exchange crisis in late 1994, but the effect was absorbed and recovery started by mid-1996. There are signs also of overcoming the spill-over effects of the Asian crisis by early 1998, but there are indications to show that the effect was absorbed and contained, and the Argentina economy is back on the previous growth track.

Table-17 shows the major benchmark figures of the Argentina economy during 1990～1997.

Table-17 Principal Economic Indicators of Argentina

Million Pesos at 1986 prices

	1990	1991	1992	1993	1994	1995	1996	1997
GDP	9213.1	10180	11229	11931	12948	12355	12881	13962
Growth rate (%)		10.5	10.3	6.3	8.5	-4.6	4.3	8.4
Gross Domestic Fixed Investment	1232.2	1620.8	2164.1	2510.5	3056.9	2559.9	2771.7	3524.1
Export	1181.3	1121	1144.6	1171.9	1358.3	1667	1775	1911
Import	547	960.4	1598.7	1813.3	2221.4	1964.5	2295.2	2918.8

(Source: Macroeconomic Activity Report No.4 -March 1998- Ministry of Economy and Public Works and Services)

2.2.2 The present situation of the social environment

Argentina's economy is getting back to the growth track, as described in 2.2.1. In this section, the most basic and important resource of a nation, population, is briefly reviewed to examine the future potential of Argentina for further economic growth. It should be noted, however, that various social factors such as political stability, confidence in the government policies, education and cultural system affect the economic performance. The economy is a complex system.

Argentina's population in 1991 was 32.6 million, with 49% male and 51% female. The population is expected to reach 47 million in 2025 with 23,995,722 females and 23,164,604. males (**Table-18**).

Population density is 11.7 per km^2 for all of Argentina, with 2,165 for Buenos Aires district. In the urban areas of the Federal Capital, the density is 14,827. Rio Negro, on the other hand, has a density of 2.5.

Table-18 Population Forecast for Argentina (1990～2025)

(Unit: 1,000)

	1990	2000	2010	2020	2025
Total Population					
Total	32,527	37,032	41,474	45,347	47,160
Female	16,559	18,868	21,119	23,076	23,996
Male	15,969	18,163	20,355	22,271	23,165
Urban Population	28,257	33,166	37,891	41,961	43,834
Female	14,572	17,069	19,452	21,503	22,451
Male	13,685	16,097	18,439	20,458	21,383
Rural Population	4,270	3,866	3,582	3,386	3,326
Female	1,987	1,799	1,666	1,573	1,545
Male	2,283	2,066	1,916	1,813	1,782

(Source: INDEC-CELADE, 1996, Serie Analisis Demografico 7)

Age structure of Argentina's population shows a balanced distribution of pyramid shape, implying growth potential during future decades. (**Graph-2** and **Table-19**). Also shown is the population structure of Rio Negro Province(**Graph-3** and **Table-20**).

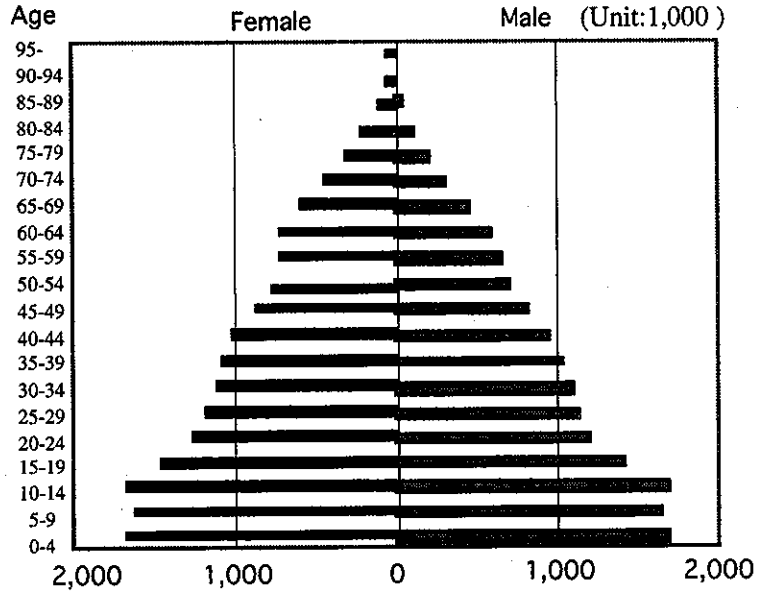
Argentina's educational level judging from the percentage of enrollment at tertiary school being 41% of the age group is one of the highest in the Latin American countries. (The World Bank, World Development Report 1997, p.227) This would prove the higher quality of Argentina's work force although there may be other factors which affect the quality other than education such as work habits, cultural effect on work etc.

The unemployment rate almost tripled from 1988's 6.3% to 1995's 17.5%, probably due to privatization of major state owned enterprises and the slow down of economic activities caused by the Mexican crisis. The rate showed improvement in 1997 although the spill-over effect of Asian crisis still remains to threaten the Argentina economy.

There have been many comments that there is a tendency among Argentina's population to regard themselves as middle-class. If this self image comes from the efforts to keep what has been attained by productivity and efficiency improvement, the effect will be further growth of Argentina economy and more openings for employment; and lower unemployment.

Graph-2 and Table-19

Population of Argentina by age group and sex (1991)



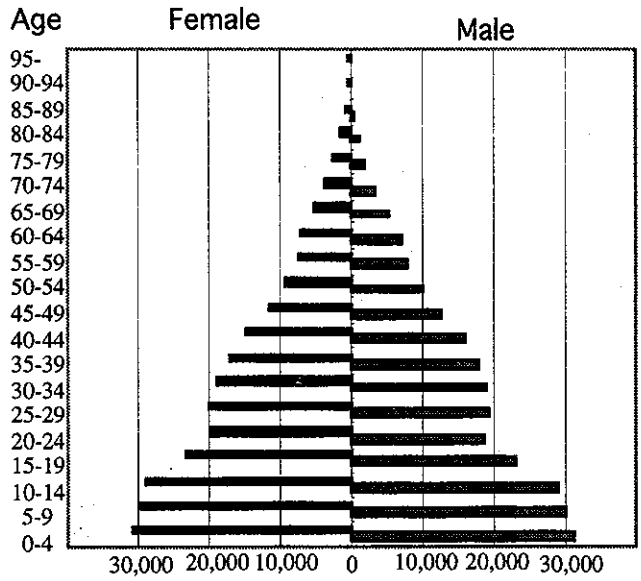
(Unit:1,000)

Age group	Female	Male	Total
Total	16,677	15,940	32,617
0-4	1,654	1,696	3,350
5-9	1,620	1,658	3,278
10-14	1,656	1,687	3,343
15-19	1,432	1,418	2,850
20-24	1,240	1,214	2,454
25-29	1,167	1,137	2,304
30-34	1,120	1,094	2,214
35-39	1,076	1,043	2,119
40-44	994	970	1,964
45-49	858	832	1,690
50-54	767	723	1,490
55-59	709	652	1,362
60-64	703	602	1,305
65-69	583	482	1,064
70-74	436	325	761
75-79	334	223	557
80-84	201	120	321
85-89	90	48	138
90-94	30	13	43
95-	7	3	10

(Source: INDEC, Censo Nacionalde Poblacion y Vivienda 1991, Serie B)

Graph-3 and Table-20

Population of Rio Negro by age group and sex (1991)



(Unit :1)

Age group	Female	Male	Total
Total	252,619	254,153	506,772
0-4	30,667	31,300	61,967
5-9	29,654	30,151	59,805
10-14	28,739	29,091	57,830
15-19	23,308	23,061	46,369
20-24	19,471	18,568	38,039
25-29	20,057	19,389	39,446
30-34	18,862	18,873	37,735
35-39	17,175	17,644	34,819
40-44	14,575	15,762	30,337
45-49	11,624	12,690	24,314
50-54	9,309	10,198	19,507
55-59	7,630	8,117	15,747
60-64	7,102	7,002	14,104
65-69	5,201	5,142	10,343
70-74	3,800	3,280	7,080
75-79	2,756	2,163	4,919
80-84	1,542	1,076	2,618
85-89	789	459	1,248
90-94	276	133	409
95-	82	54	136

(Source: INDEC, Censo Nacionalde Poblacion y Vivienda 1991, Serie B)

2.2.3 Present situation of the iron ore mine and iron ore mining sector

Sierra Grande (HIPARSA) is the only existing iron ore mine developed so far in Argentina. The data provided by the Undersecretariat of Mines shows that there are no significant Iron ore deposits in Argentina.

ZAPLA used to mine iron ore in northern Argentina. The mine was closed due to high cost and to low iron content. ZAPLA is currently importing iron ore from Brazil, and operates small scale blast furnace, using charcoal as reductant.

Judging from the available data on iron ore deposits and mining projects, no major iron ore mining activities are foreseen in Argentina.

2.2.4 Development plan for the iron ore mine and iron ore mining sector

Sierra Grande (HIPARSA) is the only iron ore mine in Argentina and there is no other iron ore mine development plan. Steel companies in Argentina are importing iron ore, mainly from Brazil.

2.2.5 Present situation of investment / trade

The annual growth rate of GDP of Argentina reached 8.4% for 1996-1997, second only to China among the major world countries. Most of the factors for the economic growth such as investment, consumption, export showed growth. Among them, the investment showed a remarkable increase as a result of recovery of confidence of investors, domestic and overseas on the future of the Argentina economy. In 1997, investment grew 27.1%, contributing 44% to the growth of the total demand.

Imports grew as capital goods imports grew in line with the strong demand caused by growth of investment, resulting in renewal of production facilities and a stronger competitive position. The deficit of the balance of trade is financed by foreign investment, which is the source of the driving force for the growth of the Argentina economy.

During 1981-89, foreign investment was US$ 700-million, during 1990-96 US$ 5.5-billion. In 1997 only the total reached US$ 21-billion, showing recovered confidence on the Argentina economy.

Argentina exports are showing growth as a result of recovery of competitiveness and favorable circumstances such as the establishment of Mercosur. The export growth during 1994-1997 was 94%, far above the world average for export growth; 51.8%. Mercosur started in January 1995 Argentina, Brazil, Paraguay and Uruguay. Chile and Bolivia are scheduled to join and there are negotiations for cooperation or integration with other South American countries and regional groups such as the Andean group.

Mercosur is the fourth largest economic group in the world after EU, NAFTA and APEC. Argentina is enjoying the benefit of free trade within Mercosur based on her competitiveness in agriculture and with the natural gas/petroleum advantage together with large amounts of investment and a capable work force (refer to **Table-17**).

2.3 GENERAL SOCIAL AND ECONOMIC CONDITIONS OF RIO NEGRO PROVINCE

2.3.1 Present situation of social and economic conditions of Rio Negro Province

As mentioned in 2.2.2, Argentina's population in 1991 was 32.6million, with 49% male and 51% female. The population is expected to reach 47million in 2025, with female 23,995,722, male 23,164,604. Rio Negro Province's population in 1991 was about a half million (506,772), male 254,153 (50.2%) and female 252,619 (49.8%), more male proportion than the national average. Population wise, Rio Negro is only 1% of Argentina. Age wise, the population of 20-24 years old segment shows larger dent compared with the national figure, showing possibility of outflow of this segment to other part of the country. (refer to **Table-20**)

Population density is 11.7 per km^2 for total Argentina, 2,165 for Buenos Aires district. In the urban area of federal capital, the density is 14,827. Rio Negro, on the other hand, has the density of 2.5.

Argentina's education level, judging from the percentage of enrollment to tertiary school; 41% of age group, is one of the highest in the Latin American countries. (The World Bank, World Development Report 1997, P.227) This would prove the higher quality of Argentina's work force although there may be other factors to affect the quality than education such as work habits, cultural effect on work etc. For Rio Negro province, there is no comparable data available. Considering the large gap between the capital area and other parts of Argentina, we can expect lower educational level. A part of the population would go out of the province for higher education (refer the dent of the population segment of age 20-24).

National unemployment rate almost tripled from 1988's 6.3% to 1995's 17.5%, probably due to privatization of major state owned enterprises and the slow down of economic activities caused by Mexican crisis. The rate showed improvement in 1997 although the spill-over effect of Asian crisis still remains to threaten the Argentina economy. There is no unemployment data for comparison for Rio Negro province. Since there is no significant industry in the province, unemployment rate data, even though available, may not mean much. It would suffice to consider the impact of HIPARSA creating job opportunity of at least 750 employment as a single entity in Sierra Grande. The total employed population of the province is 120,356 (public sector 42,704 and private sector 77,652).

There is a fluorite mine in operation near Sierra Grande. Bentonite is the largest mining product followed by Gypsum in the province. About 30 to 50% of Bentonite is exported to Brazil.

According to the statistics, the value of mineral production of Rio Negro province was about $6-million to $18-million per year. The feasibility study by HIPARSA presumes concentrate transfer price to HBI process at $23/t. The order of magnitude of the present project would be $20-million per year. This simple and crude comparison shows the importance of HIPARSA reactivation for mining industry in Rio Negro province.

2.3.2 Development plan for Rio Negro Province

There is no official plan for development of mining and industry in Rio Negro Province. Nor there is any integrated law or plan for the development of mining and industry in Patagonia. The only actual implementation of a large industry is Aluminum Argentina in Chubut province. In Rio Negro Province, a Zona Franca project started in middle of 1998 near Punta Colorada.

There are, however, some laws and plans to assist economic activities and growth of the region. One of them is the Rebate System for Export from Patagonia Ports. Refer to 11.1-(6)-4) of Chapter 11.

Chapter 3

IRON ORE PELLET AND HBI MARKET

3.1 ARGENTINA IRON AND STEEL MARKET

Argentina now has 4,200,000 t/year of crude steel production and they estimate it's production in 2005 at 5,000,000 t/year. Raw material, iron ore (no local production yet) has been mostly imported from Brazil, taking advantage of the Mercosur tax incentive. In 1996, the consumption of iron products were about 5,500,000 t and about 2,000,000 t were exported and about 1,600,000 t were imported.

Taking advantage of the tax incentive within the Mercosur zone, trade between Brazil/Argentina has increased steadily year by year, this has been also applied to the iron trade. In Argentina, there are four mills, that have EAF(electric arc furnace) and two mills with blast furnaces. After reactivation of HIPARSA, they will be possible customers (buyers) of HIPARSA pellet, competing with Brazilian iron ore.

* All source from CIS

3.1.1 Present situation of steel supply

Present production of crude steel is approx. 4,200,000 t/year and CIS (centro de industriales siderurgicos) estimates production in 2005 at 5,000,000 t/year.

Table-21 Production of crude steel in 1997 by company

Company name	(kilo-t)
SIDERAR	1,867
ACINDAR	1,148
SIDERCA	903
ACEROS ZAPLA	149
ACEROBRAG (ACEROS BRAGADO)	91
CIF	12
Total	4,169

(Source:CIS 1997)

Table-22 Production of crude steel in 1997 by company and kind

(kilo-t)

Company name	Carbon	Alloy	Total
SIDERAR	1,867		1,867
ACINDAR	1,147	1	1,148
SIDERCA	355	547	902
ACEROS ZAPLA	68	80	148
ACEROBRAG	91		91
CIF	7	5	12
Total	3,535	633	4,168

(Source:CIS 1997)

Table-23 Production of crude steel in 1997 by product and process

(kilo-t)

Product	EAF	BOF	Total
Steel ingot	43	96	139
Forging ingot	10		10
Mold piece	12		12
C/C billet	1,027		1,027
C/C billet for seamless pipe	903		903
C/C slab		1,867	1,867
C/C mini slab	211		211
Total	2,206	1,963	4,169

(Source:CIS 1997)

Companies, that have EAF are possible buyers of HIPARSA HBI.

Table-24 Production of crude steel in 1997 by company and process

(kilo-t)

Company	EAF	BOF	Total
SIDERAR		1,867	1,867
ACINDAR	1,148		1,148
SIDERCA	902		902
ACEROS ZAPLA	53	96	149
ACEROBRAG	91		91
CIF	12		12
Total	2,206	1,963	4,169

(Source:CIS 1997)

Table-25 Production of pig iron by blast furnace in 1997 by company

Company name	(kilo-t)
SIDERAR	1,971
ACEROS ZAPLA	108
TOTAL	2,079

(Source:CIS 1997)

Above two companies in **Table-25** have blast furnaces. They maybe possible buyers of HIPARSA pellet.

Table-26 Production of sponge iron by direct reduction in 1997 by company

Company name	(kilo-t)
ACINDAR	825
SIDERCA	671
TOTAL	1,496

(Source:CIS 1997)

Table-27 Production of semi-finished products in 1997 by company

Company name	(kilo-t)
SIDERAR	1,867
ACINDAR	1,148
SIDERCA	908
ACEROS ZAPLA	123
ACEROBRAG	91
TOTAL	4,137

(Source:CIS 1997)

3.1.2 Present situation of steel demand

Table-28 Present situation of steel demand

(kilo-t)

	Apparent consumption	Export	Total
1990	1,461	2,585	4,046
1991	2,384	1,833	4,217
1992	3,367	1,128	4,495
1993	3,294	1,235	4,529
1994	4,152	1,351	5,503
1995	3,451	1,966	5,417

(Source:CIS 1995)

3.1.3 Scrap market

Table-29 Scrap market

(kilo-t)

	1993	1994	1995
Total consumption	1,137	1,189	1,299
Recycle	411	512	564
Domestic market	718	672	729
Import	8	5	7
Export	1	3	11

(Source:CIS 1996)

In scrap market, there are almost no quantity of import and export, as well as Brazil.

3.1.4 Present situation of foreign trade

As to iron ore, there is no supply from domestic production and almost all is imported from Brazil. Taking advantage of the import tax incentive within Mercosur, hereafter Argentina will concentrate on importing iron ore only from the Mercosur country (Brazil).

Table-30 Import of iron ore

(kilo-t)

Origin	1991	1992	1993	1994	1995
CHILE	51	- -	90	172	113
CANADA		61	--	--	--
BRAZIL	2,179	3,454	3,115	3,931	4,116
PERU	80	32	--	--	--
VENEZUELA	--	27	--	--	--
TOTAL	2,310	3,574	3,205	4,103	4,229
(US$/t)	43.17	38.81	34.35	28.66	34.62

(Source:CIS 1995)

Table-31 Tax difference (Import of Argentina)

Product	Arancel no.	From Mercosur	From out of Mercosur
Iron Ore	2601.11.000	0%	2.0%
	2601.12.000	0%	2.0%
	2601.20.000	0%	2.0%

(Source: HIPARSA)

Table-32 Trade balance of steel in 1995/1996/1997

(US$1,000)

	Import		Export	
	1995	1996	1995	1996
BRAZIL	347,740	347,216	34,354	42,901
MERCOSUR	362,365	360,565	90,456	98,209
WORLD	775,575	839,916	790,061	860,837

(Source:CIS 1996)

3.1.5 Situation of main domestic mills for purchase of HIPARSA pellet

SIDERAR (TECHINT Group)

- They are interested in purchasing BF-pellet, subject to an acceptable price and quality, in comparison with iron ore from Brazil, which is now the main supplier to Argentina.

- An important point in quality is the phosphorus content. Previous BF-pellet ex-HIPASAM was out of specification because of the high phosphorus content (more than 0.1%).

- SIDERAR will study to use HIPARSA HBI for their BOF in future, because;
  - it is difficult to procure a lot of scrap constantly
  - in order to get higher productivity at BOF

- Discharging port is San Nicolas.

ACINDAR

- They are interested in purchasing 200-300 kilo-t/year of HIPARSA HBI, if the price and quality (phosphorus content) meet with their requirements.

- ACINDAR made it clear that if the phosphorous content is higher than a certain level, they will not purchase (There is no bonus-penalty formula for adjustment of price against high phosphorus content)

- Discharging port is Villa Constituicion.

ZAPLA

- This company is interested in purchasing 250,000 t/year of HIPARSA HBI, which is replace of purchased scrap.

- ZAPLA has problem in production of pig iron by charcoal, because of severe limitation of the production of charcoal in ecological reason (protection of forest zone), so they will consider to replace pig iron to HBI too.

- Transportation is by vessel from Punta Colorada to Barranqueras (Provincia Chaco), from where upto Jujuy (Provincia Jujuy, where locate ZAPLA mill) by railway. Anyway this logistic is rather complicated.

ACERBRAG (PIERO Group)

- This new company started operation from June 1997, after taking over the bankrupt company ACER BRAGADO and now purchases 10,000 t of scrap from the domestic market, competing with ACINDAR, etc.,

- They are expanding their plant and in the year 2000 will consume 250,000 t/year of scrap and/or HBI, therefore they are interested in the purchase of HBI, when HIPARSA HBI production commences.

- However they can receive HBI/scrap only by truck (they have no discharging port facility). Mill location is about 400km from Buenos Aires city.

- ACERBRAG now belongs to PIERO Group and they are interested in participation in International tenders for HIPARSA, in order to secure raw material supply domestically.

3.2 MERCOSUR, AS AN EXPORT MARKET OF HIPARSA HBI

Argentina mills suggested the sales possibility of HIPARSA HBI to Mercosur (Brazil) in addition to the pellet market in Argentina, because;

- There are many mills, which have EAF facilities. They are at present consuming domestic pig iron and scrap (both well balanced and no import of HBI), but are facing difficulty to procure pig iron as ecological reason (on account of severe protection of Amazone forest, charcoal blast furnace mills are obliged to reduce pig iron production). So they are possible buyers of HIPARSA HBI in future.

- Also Brazilian blast furnace mills are studying to consume HBI for getting higher productivity, which will create new demand of HBI in Brazil.

- One steel maker is operating HBI plant of 310 kilo-t/year scale for captive use only (it is said that this production cost is very expensive because using high cost of Brazilian natural gas from off-shore)

- Brazil has tax incentives and also advantageous payment terms on imports from Argentina, in comparison with from outside of Mercosur, according to the Mercosur agreement. However Venezuela could be in competition with Argentina HBI, after their participation in Mercosur, which is scheduled by the year 2000.

- Brazil has no project for HBI production because of the lack of an economic natural gas supply (however one steel maker have project to produce HBI in Tornidad Tobaco, at where it is obtainable low cost of natural gas) .

- In order to overcome ocean freight competition, HBI (not BF pellet/DRI) is the most suitable product.

There are less sales possibilities for HIPARSA HBI in the other countries in Mercosur - Uruguay, Paraguay, Chile, who are not existing users.

3.2.1 Mill list, of those that have EAF/blast furnace in Mercosur (Brazil)

In the Mercosur market, possible buyers of HBI exist only in Brazil, where the following mills have EAF, blast furnace, DR.

Table-33 Mill list, that have EAF, Blast furnace, DR in Brazil

Company name	EAF	Blast furnace	DR
ACESITA		○	
ACOMINAS		○	
SIDERURGICA ALTEROSA		○	
SIDERURGICA BARRA MANSA	○		
BELGO	○		
CIA SIDERURGICA BELGO	○	○	
COSIPA		○	
CSN		○	
DEDENI	○		
GERDAU	○	○	○
MANNESMANN		○	
METALSIDER		○	
SIDERURGICA RIOGRANDENSE	○		
SIDERURGICA SAO CRISTOVAO		○	
SIDERPA		○	
CIA SIDERURGICA DE TUBARAO		○	
USIMINAS		○	
VDL SIDERURGIA		○	
VIENA SIDERURGICA DO MARANHON		○	
VILLARES METALS	○		
ACOS VILLARES	○		

(Source: Iron and Steel Works of the World)

3.2.2 Scrap and pig iron market in Brazil

Table-34 Scrap market in Brazil

(kilo-t)

	1991	1992	1993	1994	1995	1996	1997
Plant generated scrap	3,719	4,180	4,354	4,199	4,090	4,061	3,845
Purchased in domestic market	2,545	2,660	2,755	2,967	3,242	3,441	3,994
Consumption	6,278	6,784	7,455	7,274	7,065	7,460	7,709
Imports	89	211	114	149	8	8	17
Exports	3	1	15	1	3	12	24

(Source: BRAZIL STEEL DATA BOOK 1998)

Table-35 Pig iron market in Brazil

(kilo-t)

	1992	1993	1994	1995	1996	1997
Blast furnace Coke	16,218	16,493	17,057	17,849	17,051	18,832
Charcoal	6,669	7,220	7,902	7,115	6,027	6,130
Electric reduction furnace	170	187	133	57	-	-
Total	23,057	23,900	25,092	25,021	23,978	24,962
Exports	2,548	1,913	2,631	2,870	2,539	2,563

(Source: BRAZIL STEEL DATA BOOK 1998)

3.2.3 Import tax difference of HBI (Import into Brazil)

Table-36 Import tax difference (Import into Brazil)

Product	Arrancel no.	From Mercosur	From out of Mercosur
HBI	7203.10.000	4%	9%
	-IMPORT TAX	0%	5%
	-IPI	4%	4%

(Source: Japanese trading firm)

Taking into consideration the large difference in import tax in Brazil between from Mercosur and from out of Mercosur, Brazil is quite a feasible market for HBI export from Argentina.

Moreover Argentina is able to give favourable payment terms to Brazil, in accordance with Brazilian import regulations.

from Mercosur	no limit of sight
from out of Mercosur	at sight or minimum 360 days

But, if Venezuela participates in Mercosur or other new organizations in America (which was discussed positively in the summit of the Americas in Chile, last April, 1998), Venezuela HBI could become a strong competitor in Brazilian market against HIPARSA HBI in the future.

3.3 WORLD HBI MARKET

World steel production is forecast at 1-2% growth per year to 2010, which means 800 million-t in 2000, 850 million-t in 2005, and 900 million-t in 2010, as shown in **Graph-4.**

Such growth in the significant increase in steel demand and exports are expected especially in the developing countries that have low production costs.

In the meantime **Graph-5** shows a breakdown of world steel production by process;

-CO/BF/BOF --Coke oven/blast furnace/basic oxygen furnace
(input--coal, iron ore and scrap)
-CO/BF/OH --Coke oven/blast furnace/open hearth
(input--coal, iron ore and scrap)
-EAF --Electric arc furnace
(input--scrap, DRI, HBI, pig iron and virgin iron units)

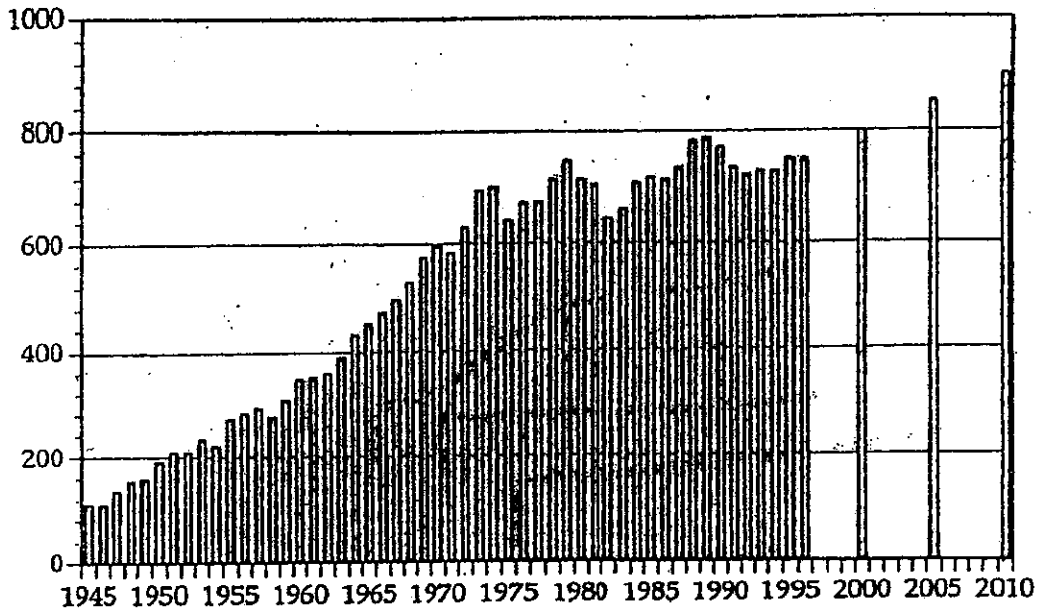
Now that steelmaking by the EAF route is growing significantly faster than any other process because;

① EAF steelmaking is low cost at smallscale production size
② Economy of scale of CO/BF/BOF is more than 2～3 million-t capacity, which means US$2～3-billion order
③ EAF facility have quite low economy of scale such as 120,000 t/year and are flexible enough to produce customer grades in small quantities
④ It is difficult to obtain environmental permits for new coke plants in industrialized countries and a coke shortage is predicted by the year 2010

Graph-6 shows pig iron, scrap and DRI actual consumption. It means that DRI/HBI use is increasing world wide, as EAF mills have captured a large share of steel production.

Graph-4 World steel production

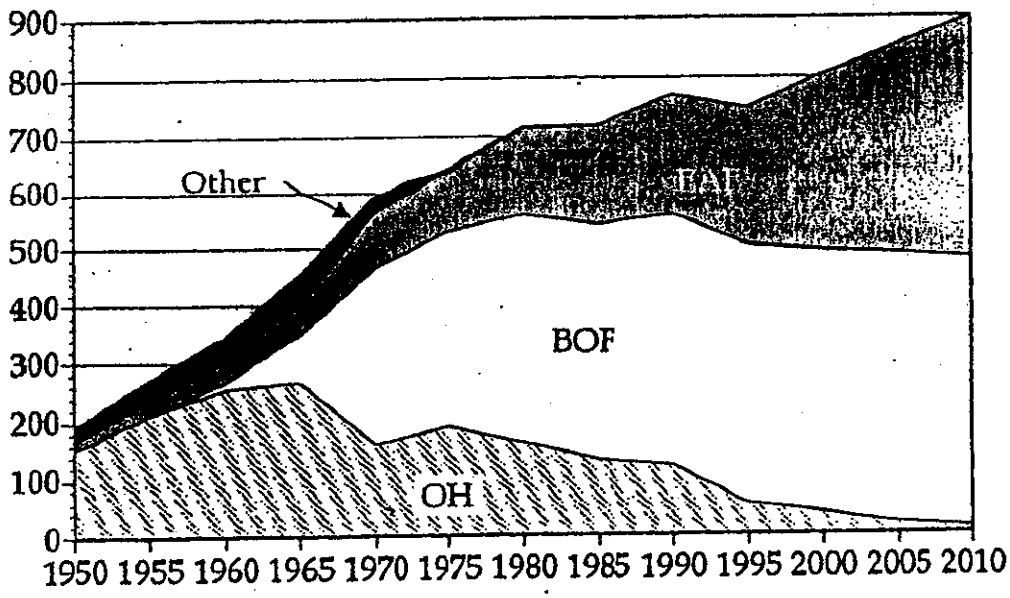
(million-t)



(Source: MIDREX 1997)

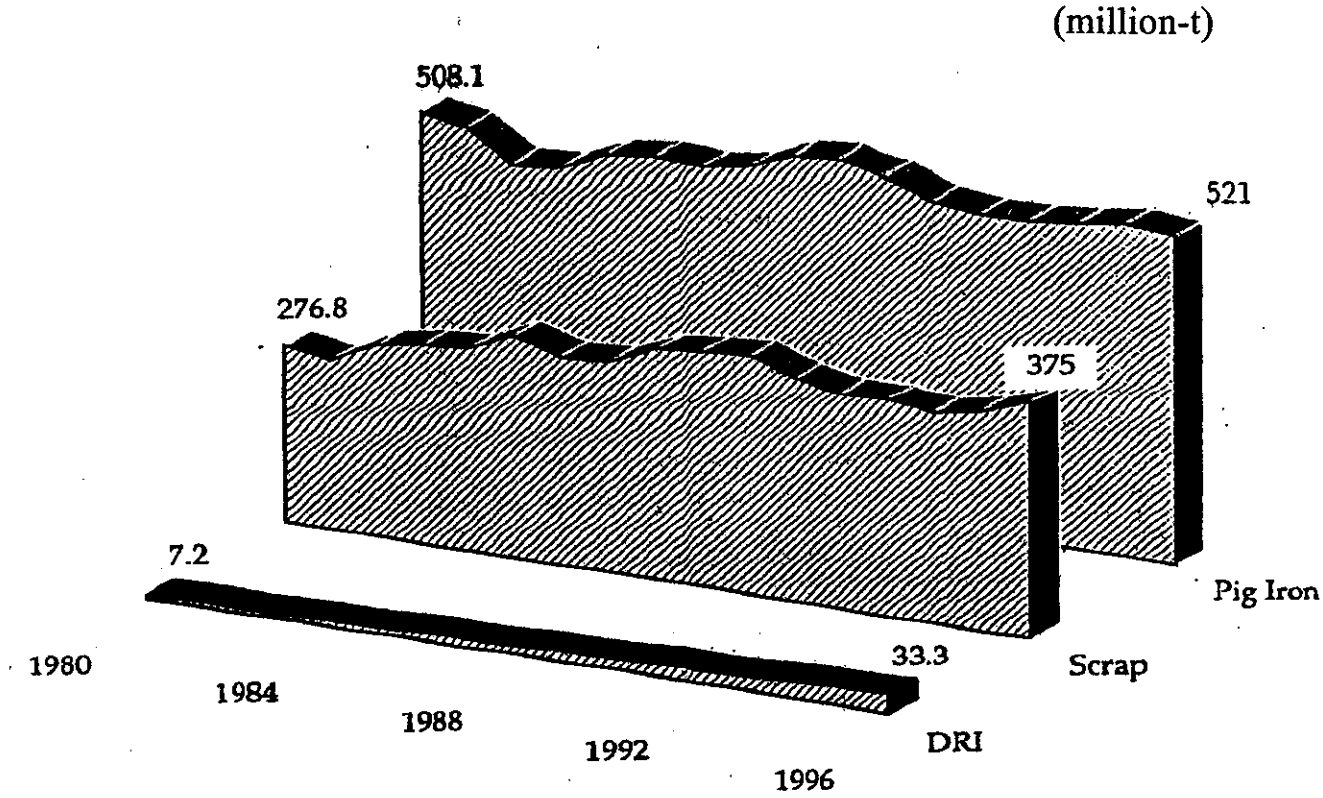
Graph-5 World steel production by process

(million-t)



(Source: MIDREX 1997)

Graph-6 World metallic consumption



(Source: MIDREX 1997)

3.3.1 World direct reduction industry

Since 1970, world DRI production has grown tremendously (**Graph-7, Graph-8, Graph-9, Graph-10**) and as shown in **Graph-11** (World DRI/HBI production 1970-2000) and in **Table-37** (World DRI/HBI production by country 1970-2000), most DRI also HBI is produced in developing countries with access to high quality iron ore and low cost natural gas.

It is therefore said that increased demand for DRI/HBI are trends in the present steel industry because of the reason followings.

(1) Growth in EAF steelmaking

Less investment capital, operating cost advantage, cleaner and lower scale against BOF. Fluctuation of scrap availability and reasonable price of electricity help this possible growth.

(2) Expansion into higher quality products

Now HBI have independent price value against scrap, as EAF steelmaker is unavailable to produce high quality products using scrap alone.

(3) Increase in demand for purchased scrap

(4) Little growth in prime scrap supply

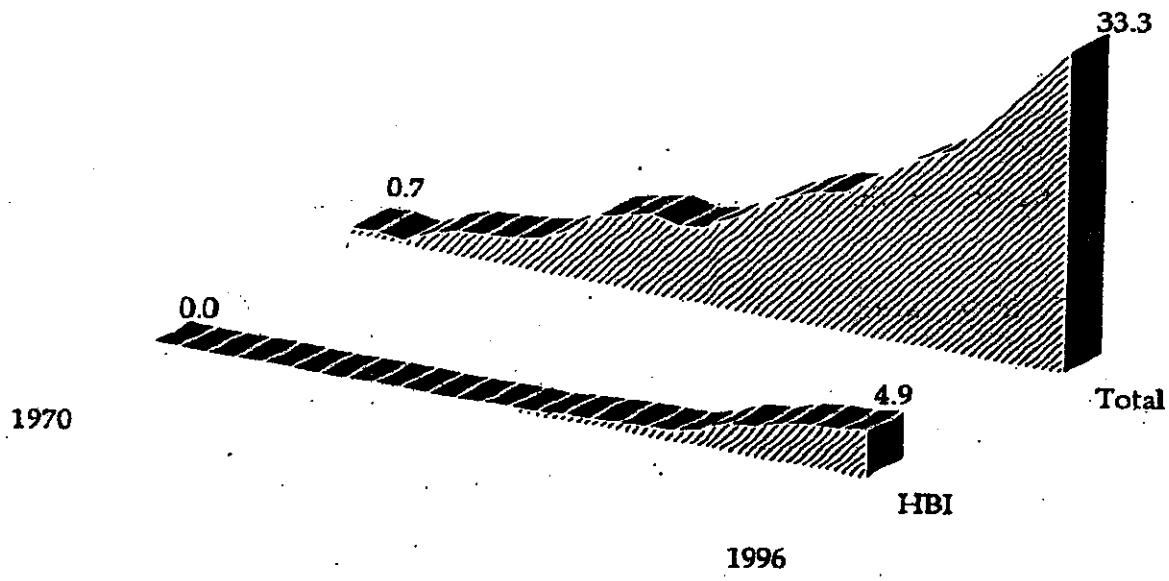
HBI is valued equivalent to prime scrap (**Graph-12, Graph-13, Graph-14**) and not enough prime scrap.

(5) Insufficient quality of purchased scrap

Worldwide scrap supply is huge -approximately 400 million-t/year consumed. However, most have high metallic residual prime (low residual) scrap supply cannot satisfy total needs of hi- quality steel producers.

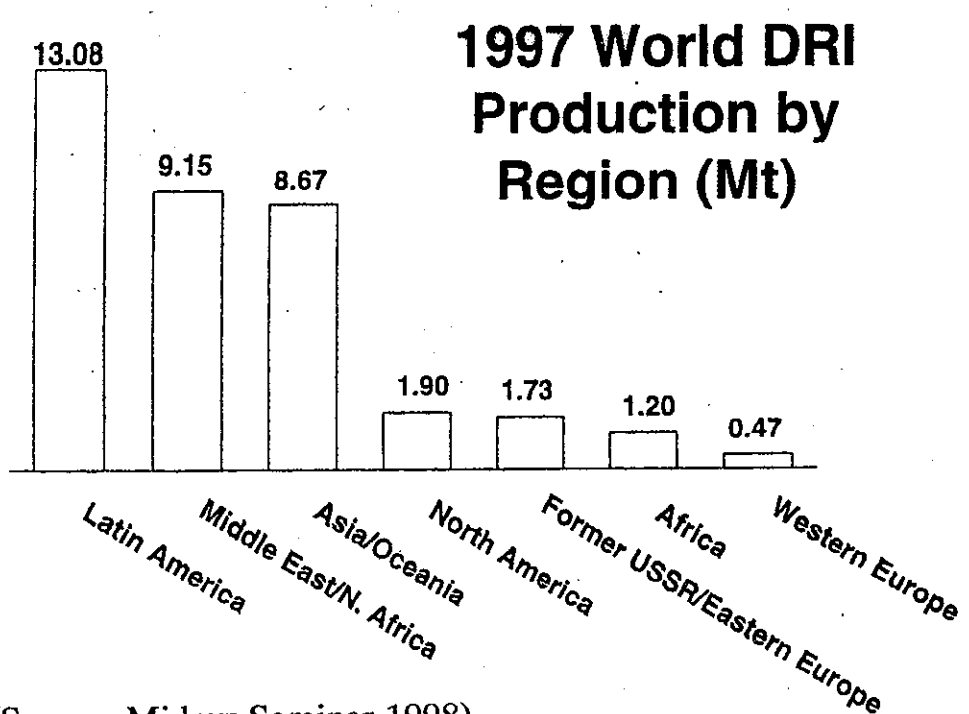
It is said that "if HBI could be delivered to your mill at a price comparable to scrap which you buy, how much would you purchase?"

Graph-7 World DRI production



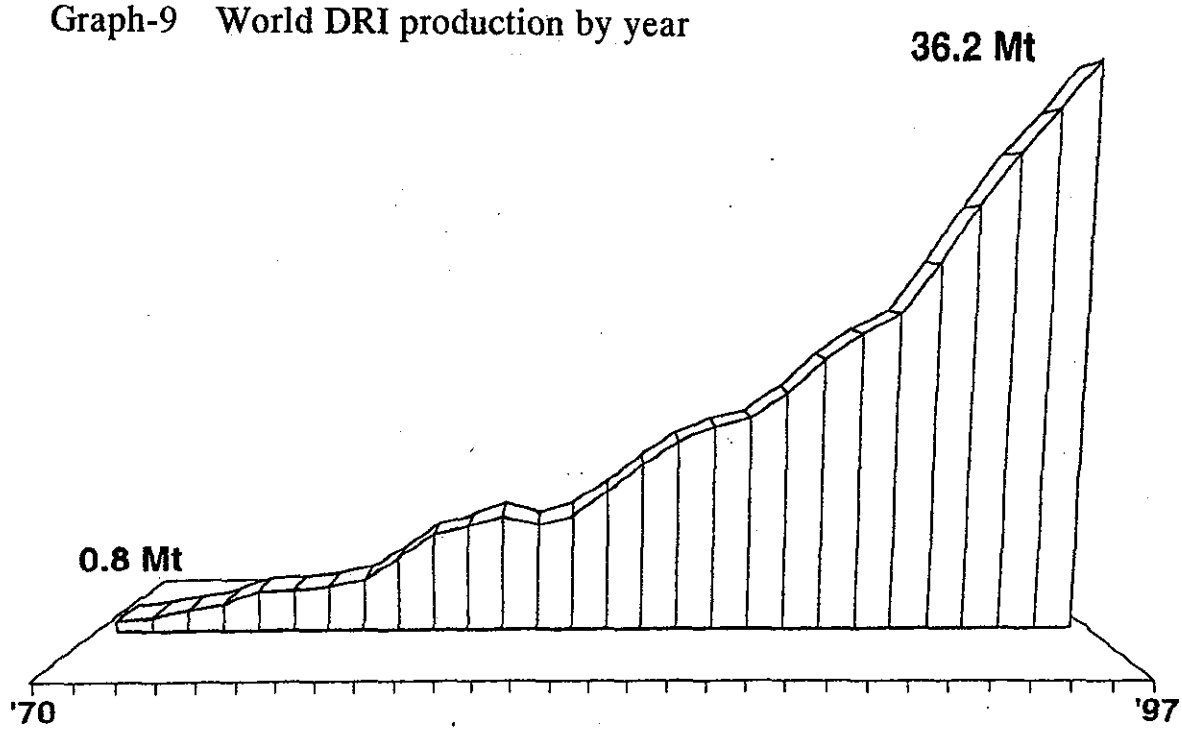
(Source: MIDREX 1997)

Graph-8 World DRI production by region



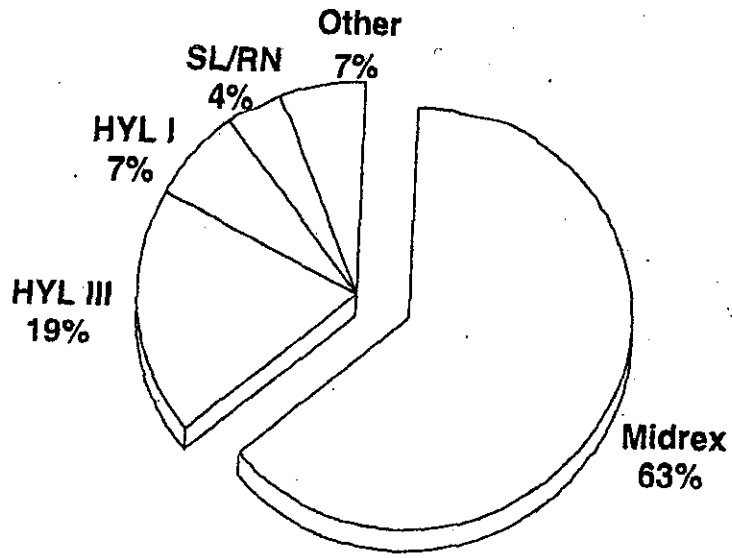
(Source: Midrex Seminar 1998)

Graph-9 World DRI production by year



(Source: Midrex Seminar 1998)

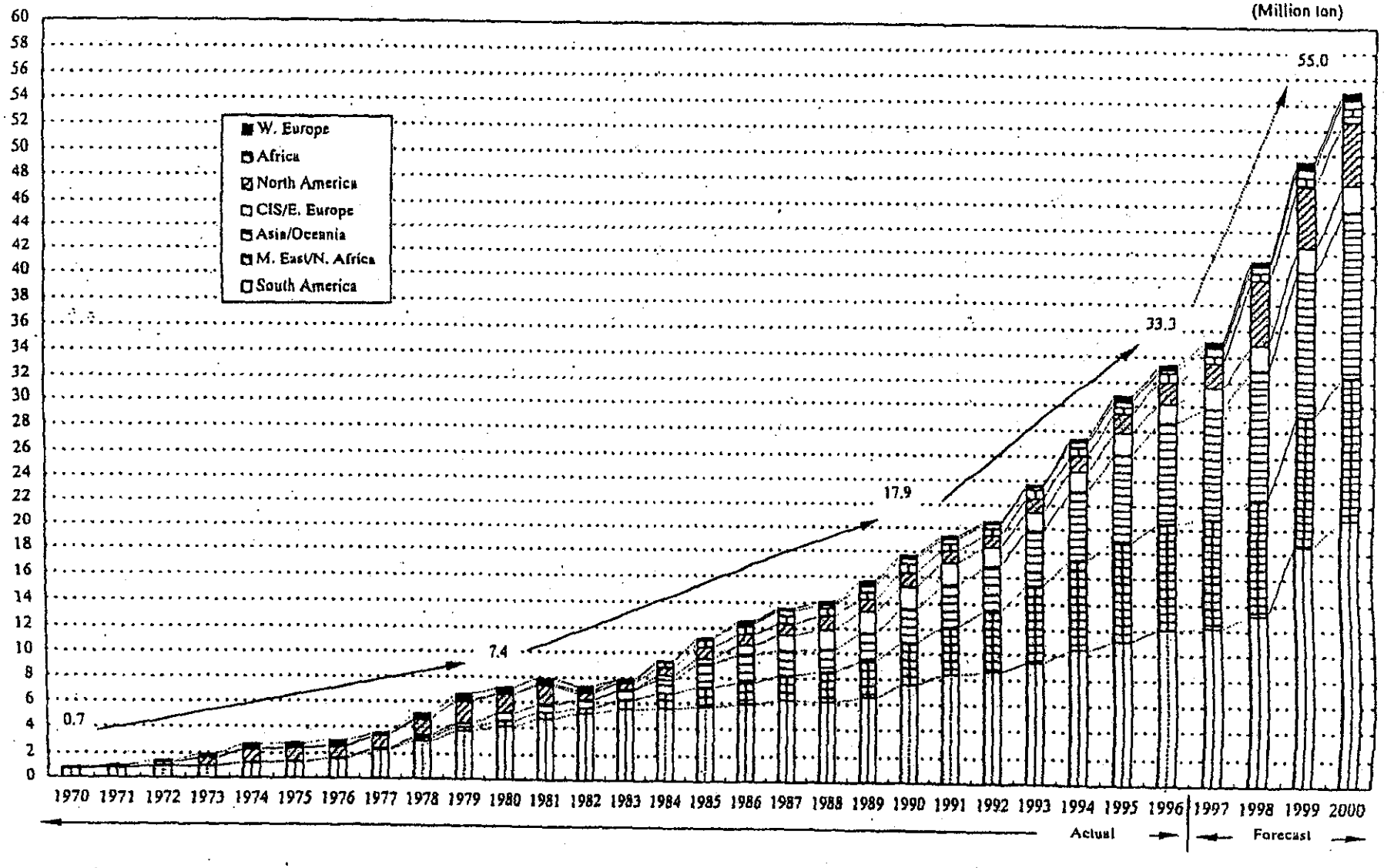
Graph-10 World DRI production by process



Total Production 36.2 Mt

(Source: Midrex Seminar 1998)

Graph-11 World DRI/HBI Production (CY1970 - CY1996 Actual/CY1997 - CY2000 Forecast)



(Source ; Japanese Trading Firm)

Table -37

World DRI/HBI Production by Country (CY1970 - CY1996 Actual/CY1997 - CY2000 Forecast)

(Unit: Million Tons)

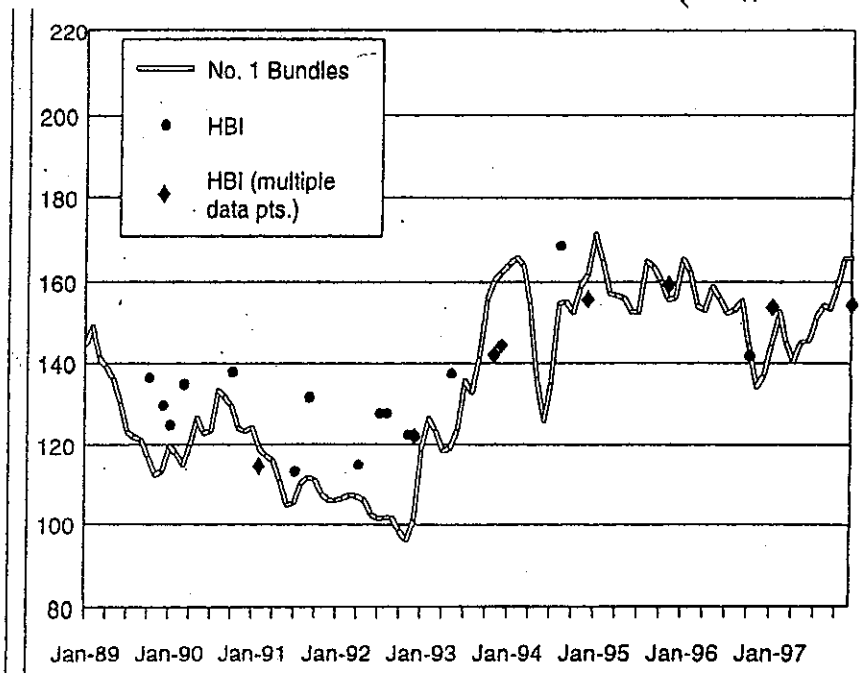
	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Canada				0.2	0.35	0.39	0.3	0.36	0.65	0.92	0.89	0.96	0.5	0.54	0.5	0.74	0.69	0.73	0.77	0.71	0.73	0.56	0.63	0.74	0.77	1.01	1.42	1.42	1.42	1.42	1.42
US	0.06	0.12	0.3	0.45	0.67	0.65	0.56	0.57	0.54	0.79	0.62	0.54	0.07		0.12	0.14	0.16	0.21	0.29	0.29	0.39	0.41	0.39	0.44	0.48	0.46	0.45	0.57	3.53	3.53	3.53
North America	0.06	0.12	0.3	0.65	1.02	1.04	0.86	0.93	1.19	1.71	1.51	1.5	0.57	0.54	0.62	0.88	0.85	0.94	1.06	1	1.12	0.97	1.02	1.18	1.25	1.47	1.87	1.99	4.95	4.95	4.95
Argentina							0.03	0.29	0.4	0.85	0.78	0.83	0.89	0.95	0.91	0.99	0.95	1.04	1.07	1.17	1.03	0.91	0.98	1.16	1.27	1.33	1.42	1.42	1.42	1.42	1.42
Brazil				0.01	0.15	0.22	0.26	0.33	0.31	0.26	0.27	0.23	0.23	0.25	0.26	0.29	0.3	0.31	0.2	0.26	0.29	0.29	0.29	0.25	0.22	0.3	0.34	0.34	0.34	0.34	0.34
Mexico	0.68	0.76	0.87	0.85	1.01	1.02	1.24	1.51	1.84	1.69	1.86	1.94	1.71	1.76	1.67	1.61	1.57	1.56	1.69	2.18	2.48	2.47	2.44	2.73	3.24	3.7	3.9	3.9	4.61	5.49	5.49
Peru											0.02	0.05	0.04	0.05	0.08	0.05	0.06	0.05	0.05	0.05	0.04	0.03	0.03	0	0.02	0	0.02	0.05	0.05	0.05	0.05
Trinidad & Tobago											0.02	0.19	0.24	0.28	0.24	0.23	0.38	0.49	0.59	0.69	0.7	0.7	0.68	0.73	0.94	1.05	1.07	1.15	1.39	3.01	3.01
Venezuela							0.02	0.17	0.43	0.9	1.12	1.45	2	2.23	2.4	2.56	2.89	2.94	2.57	2.18	3.02	4.02	4.23	4.51	4.71	4.72	5.34	5.34	5.35	7.85	9.85
Others																														0.45	0.68
South America	0.68	0.76	0.87	0.86	1.16	1.24	1.55	2.3	2.98	3.7	4.07	4.69	5.11	5.5	5.56	5.73	5.95	6.29	6.16	6.53	7.56	8.42	8.65	9.38	10.4	11.1	12.09	12.2	13.16	18.61	20.84
Bahrain																														0.45	0.9
Egypt																	0.03	0.47	0.77	0.8	0.71	0.62	0.85	0.85	0.78	0.85	0.83	0.86	1.22	1.58	1.58
Iran									0.15							0.03			0.03	0.09	0.29	0.7	0.83	1.65	2.63	3.23	3.81	3.81	3.81	3.81	3.81
Iraq											0.02								0.02	0.17	0.17										
Libya																				0.09	0.5	0.78	0.85	0.94	0.85	0.97	0.83	1.09	1.38	1.53	1.53
Qatar									0.08	0.32	0.42	0.46	0.45	0.39	0.5	0.49	0.49	0.47	0.5	0.53	0.58	0.55	0.62	0.56	0.6	0.63	0.64	0.64	0.64	0.64	0.81
Saudi Arabia													0.01	0.35	0.73	0.99	1.17	1.04	1.08	1.21	1.09	1.12	1.61	2.01	2.11	2.13	2.3	2.3	2.3	2.5	2.95
M. East/N. Africa	0	0	0	0	0	0	0	0	0.23	0.32	0.44	0.46	0.46	0.74	1.23	1.51	1.69	1.98	2.4	2.89	3.34	3.76	4.76	6.02	6.97	7.81	8.41	8.7	9.35	10.51	11.58
Nigeria													0.08	0.16	0.15	0.22	0.11	0.14	0.14	0.13	0.11	0.12	0.05	0.04	0.04	0.02	0.02	0.05	0.05	0.05	0.05
South Africa				0.03	0.06	0.07	0.09		0.08	0.11	0.12	0.12	0.1	0.08	0.27	0.42	0.79	0.84	0.73	0.84	0.9	0.9	0.91	0.87	0.98	0.95	0.9	1.1	1.1	1.46	1.83
Africa	0	0	0	0.03	0.06	0.07	0.09	0	0.08	0.11	0.12	0.12	0.18	0.24	0.42	0.64	0.9	0.98	0.87	0.97	1.01	1.01	0.96	0.91	1.02	0.97	0.92	1.15	1.15	1.51	1.88
China																												0.2	0.2	0.2	0.2
India											0.01	0.02	0.03	0.04	0.08	0.09	0.17	0.19	0.19	0.26	0.61	1.15	1.44	2.21	3.12	4.28	4.83	4.83	4.83	4.88	4.92
Indonesia									0.02	0.14	0.41	0.48	0.44	0.57	0.74	1.08	1.36	1.07	1.02	1.26	1.41	1.43	1.37	1.5	1.62	1.86	1.8	1.94	1.94	1.94	1.94
Japan								0.02	0.03																						
South Korea																															
Malaysia																												0.37	0.75	0.75	0.75
Myanmar (Burma)															0.04	0.52	0.58	0.59	0.5	0.64	0.62	0.62	0.55	0.71	0.99	1.09	1.48	1.52	1.52	1.52	1.52
Thailand												0.01	0.01		0.01	0.03	0.02	0.03	0.02	0.02	0.02	0.01	0.01	0.02	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Australia																														0.15	0.48
New Zealand	0.02	0.03	0.05	0.06	0.09	0.1	0.1	0.1	0.12	0.15	0.15	0.16	0.16	0.16	0.17	0.17	0.08												1.13	1.69	2.69
Others																														0.23	0.68
Asia/Oceania	0.02	0.03	0.05	0.06	0.09	0.1	0.1	0.12	0.17	0.29	0.57	0.67	0.64	0.77	1.04	1.69	2.22	1.88	1.73	2.18	2.66	3.21	3.37	4.43	5.74	7.25	8.13	8.88	10.39	11.4	13.2
Germany	0.03	0.04	0.17	0.3	0.39	0.36	0.41	0.16	0.35	0.51	0.45	0.48	0.32	0.07	0.1	0.1	0.17	0.2	0.27	0.35	0.31	0.26	0.17	0.18	0.28	0.41	0.37	0.5	0.5	0.5	0.5
Italy									0.01	0.01																					
Sweden												0.01	0.01	0.01	0.01																
W. Europe	0.03	0.04	0.17	0.3	0.39	0.36	0.41	0.16	0.36	0.52	0.45	0.49	0.33	0.08	0.11	0.1	0.17	0.2	0.27	0.35	0.31	0.26	0.17	0.18	0.28	0.41	0.37	0.5	0.5	0.5	0.5
CIS/E. Europe														0.02	0.37	0.42	0.75	1.26	1.6	1.7	1.69	1.7	1.58	1.54	1.71	1.68	1.5	1.73	1.95	2.07	2.07
Total	0.79	0.95	1.39	1.9	2.72	2.81	3.01	3.51	5.01	6.65	7.16	7.93	7.29	7.89	9.35	11.17	12.53	13.53	14.09	15.62	17.69	19.32	20.51	23.65	27.37	30.69	33.29	35.15	41.45	49.55	55.02

(Source : Japanese Trading Firm)

Graph-12 North America scrap and HBI prices

(US$/t delivered)

HBI is Valued Equivalent to Prime Scrap

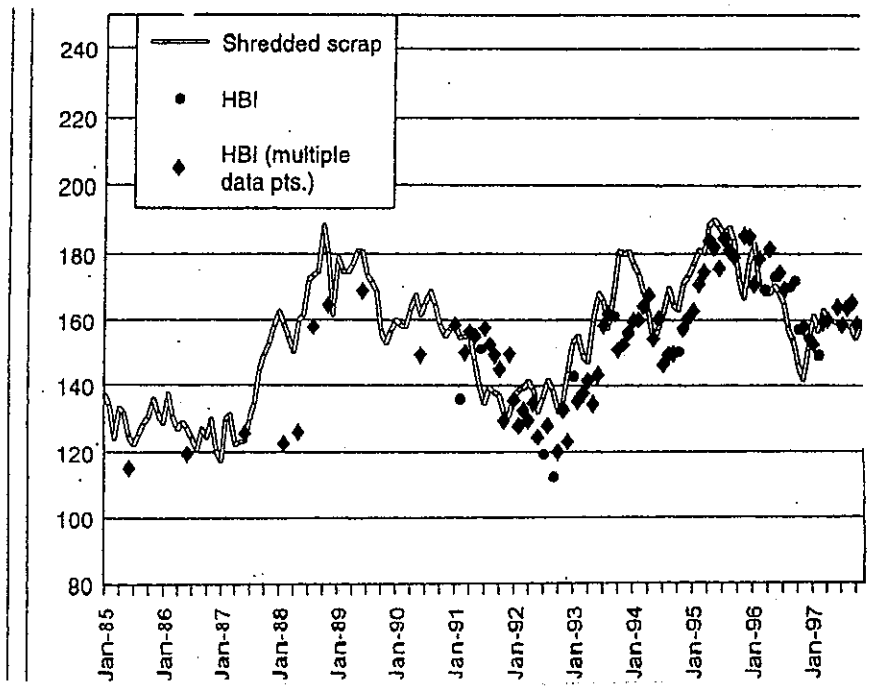


(Source: Midrex Seminar 1998)

Graph-13 Asia scrap and HBI prices

(US$/t CIF East Asia)

HBI is Valued Equivalent to Prime Scrap

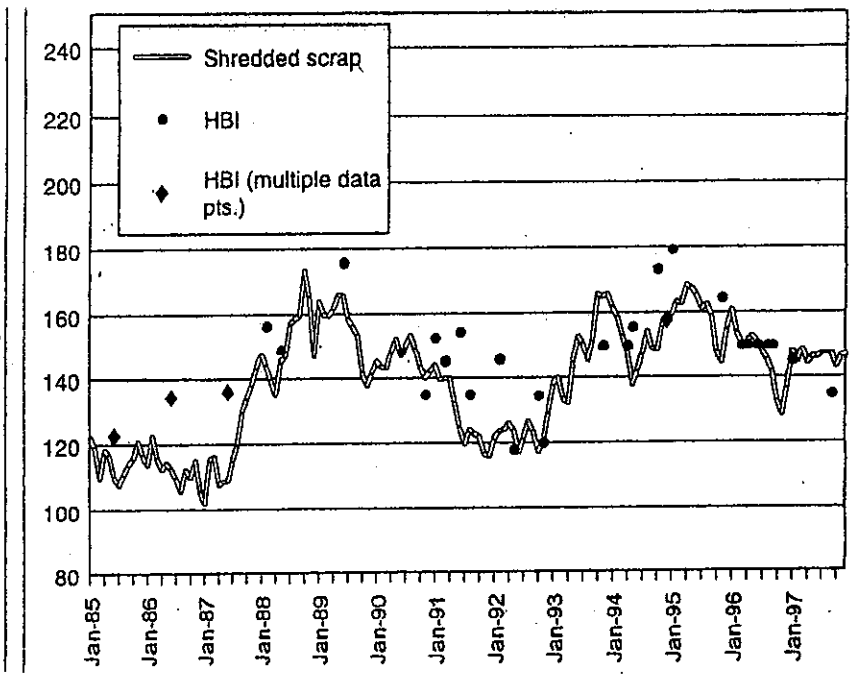


(Source: Midrex Seminar 1998)

Graph-14 Middle East / Europe scrap and HBI prices

(US$/t Mediterranean)

HBI is Valued Equivalent to Prime Scrap



(Source: Midrex Seminar 1998)

3.3.2 DR production forecast

Table-38 shows DR project Situation in world up to 2000 by country and total DR production forecast as follows (**Table-39**).

Table-38 DR Project in world (~2000 year)

(million-t)

Region	Country	Supplier	Process	Product	on Stream	Capacity	Captive	Sale	Total
Asia	Korea	HANBO	MIDREX	DRI	1999	800	800		800
	Thailand	Nakornthai	INMETCO	DRI	1997	400	400		400
	China	Tienjin Pipe	DRC	DRI	1996	300	300		300
	India	Lloyds Steel Industries	OSIL	DRI	1997	150	150		150
		Monnet Ispat	JINDAL	DRI	1998	100	100		100
		Jindal Strips	JINDAL	DRI	1998	100	100		100
		Bihar Sponge Iron	SL/RN	DRI	1998	150	150		150
		Tata Sponge Iron	TISCO	DRI	1998	120	120		120
		Total				620	620		620
M. East	Saudi Arabia	HADEED	HYL-III	DRI	1998	1,100	1,100		1,100
	Bahrain	ISPAT	MIDREX	DRI	1999	1,200		1,200	1,200
	Qatar	QASCO	MIDREX or HYL-III	HBI	1999	2,000	400	1,600	2,000
N. America	U.S.	TUSCALOOSA (BSC)	MIDREX	DRI	1997	1,100	300	800	1,100
		AIR (Georgetown/Birmingham)	MIDREX	DRI	1998	1,200	1,000	200	1,200
		KMI	FASTMET	HBI	1999	900		900	900
		QUALITECH	IRON CARBIDE	I. C.	1998	660	660		660
		Total				3,860	1,960	1,900	3,860
S. America	Mexico	IMEXSA	MIDREX	DRI	1997	1,200	1,200		1,200
		HYLSA	HYL-III	DRI	1997	675	675		675
		Total				1,875	1,875		1,875
	Venezuela	COMSIGUA	MIDREX	HBI	1998	1,000		1,000	1,000
		POSVEN	HYL-III	HBI	1999	1,500	1,000	500	1,500
		Orinoco Iron (BHP/Sivensa)	FINMET	HBI	1999	2,000		2,000	2,000
		Total				4,500	1,000	3,500	4,500
	Trinidad & Tobago	NUCOR	IRON CARBIDE	I. C.	1994	330	330		330
		LTV/C-CLIFFS	CIRCORED	HBI	1998	500		500	500
		Caribbean Ispat	MIDREX	DRI	1998	1,360		1,360	1,360
		Total				2,190	330	1,860	2,190
Oceania	Australia	BHP	FINMET	HBI	1998	2,500		2,500	2,500
Africa	Egypt	ANSDK	MIDREX	DRI	1997	800	800		800
	S. Africa	Saldanha Steel	MIDREX	DRI	1998	804	804		804
		SCAW Metal	DRC	DRI	1997	150	150		150
		Total				954	954		954
CIS	CIS	Lebedinsky	HYL-III	HBI	1998	1,000		1,000	1,000
Total				(Construction)		24,099 (17,999)	10,539 (10,139)	13,560 (7,860)	24,099 (17,999)

(Source: Japanese trading firm)

Table-39 DR production forecast

(million-t)

	1994	1995	1996	2000	2005	2010
Asia	5.8	7.1	8.1	11.0	13.3	15.2
N. America	5.7	6.2	6.7	15.3	18.6	18.9
S. America	10.3	6.6	6.8	10.2	12.9	16.6
Middle East	5.6	6.0	6.7	10.4	11.6	12.6
Oceania	0.0	0.0	0.0	3.2	4.5	4.5
Others	0.9	4.9	4.7	7.4	13.8	12.8
Total	28.3	30.8	33.0	57.5	74.7	80.6

(Source: Japanese trading firm)

3.3.3 Forecasted average HBI prices

Table-40 are forecasted average HBI pricees for 1997-2010. During this period, HBI price will be lower on account of low steel demand. But when demand increases, price of all iron, steel and HBI too will rise accordingly.

Table-40 Forecasted average HBI prices

(1997-2010 US$/t)

North America	155 delivered
Europe/Middle East	160 CIF
Asia/Oceania	165 CIF

(Source: MIDREX 1997)

3.3.4 Trade of DRI/HBI

In 1996, 6.9 million-t of DRI/HBI were shipped worldwide (**Table-41**). However, 1997 onwards it's figure have jumped drastically (**Table-42**), because many companies now prefer to procure it economically on the open market, instead of producing everything "In-House".

Table-41 DRI/HBI receipts (1996)

Country	Tonnage (million-t)
Belgium	0.108
Canada	0.030
China	0.050
Egypt	0.195
Europe	0.211
India	2.543
Indonesia	0.293
Italy	0.075
Korea	0.964
Malaisia	0.010
Mexico	0.302
Peru	0.060
Philippines	0.024
South Africa	0.188
Spain	0.243
Taiwan	0.105
US	1.118
Venezela	0.050
Unknown destinations	0.322
Total	6.891

(Source: MIDREX 1997)

Table-42 World merchant HBI demand

(million-t)

	1997	1998	1999	2000	2005
North America	9.61	9.73	9.85	9.97	9.97
Western Europe	2.43	2.50	2.50	3.07	3.07
Asia/Oceania	8.95	10.26	12.25	13.65	15.48
Middle East/North Africa	1.35	1.09	1.34	1.61	1.61
Latin America	0.86	0.70	0.70	0.70	0.70
Former USSR/Eastern Europe	0.11	0.21	0.44	0.59	0.59
Africa	0.33	0.33	0.33	0.33	0.33
World Total	23.64	24.82	27.41	29.92	31.75

(Source: MIDREX 1997)

3.3.5 Rough scheme of project and demand of HBI in the world

Therefore it is feasible for HIPARSA to put their HBI into the merchant market as quantity wise (750 kilo-t/year), considering the trend in world trade balance of HBI.

Table-43 Constructed plant of HBI at end of 1996

(kilo-t)

Own consumption	Sale to merchant	Total
7,530	6,560	14,090

(Source: CIS)

Table-44 Demand of merchant of HBI

Year	1998	1999	2000	2005
kilo-t	24,810	27,400	29,920	31,740

(Source: MIDREX)

Table-45 Balance of demand and offer of merchant HBI

(kilo-t)

	1998	1999	2000	2005
Demand	24,810	27,400	29,920	31,740
Offer	13,450	13,450	13,450	20,000
Balance	-11,360	-13,950	-16,470	-11,740

(Source: CIS)

3.3.6 Iron ore pellet requirement for DR

Up to the year 2000, requirement of iron ore pellet for DR demand will increase significantly in N. America and during 2000-2005 in Asia and up to 2010 in S. America its requirement will rise, according to DR projects.

Table-46 Iron ore pellet requirement for DR

(million-t)

	2000	2005	2010
N. America	19.7	22.4	22.4
Asia	9.8	13.0	15.6
Middle East	14.4	16.2	17.7
S. America	9.9	13.1	17.6
Others	8.5	9.9	9.9
Total	62.3	74.6	83.2

(Source: Japanese trading firm)

Table-47 Iron ore production capacity forecast

(million-t)

	1995	1996	2000	2005	2010
N. America	112.0	107.4	110.1	114.5	115.4
W Europe	35.1	33.6	31.3	26.5	26.5
S. America	295.7	197.5	234.7	245.6	250.5
Oceania	148.6	149.7	174.5	206.9	208.5
Asia	210.2	207.4	219.9	222.3	238.6
Africa	47.6	46.5	53.9	53.9	59.6
E. Europe	134.7	130.6	132.9	135.1	135.1
Middle East	7.7	9.0	10.6	11.1	11.1
World Total	901.7	881.7	967.9	1,015.9	1,045.3

(Source: Japanese trading firm)

3.4 TRANSPORTATION OF DRI/HBI FROM HIPARSA

3.4.1 Distribution of HIPARSA pellet

Distribution of HIPARSA pellets are realized by following two ways.

(1) By truck

By truck for domestic clients, who have no receiving port facility. At present, small lots of pellet are despached to domestic cement factory.

(2) By ship

By ship for domestic clients and for export from Punta Colorada, HIPARSA berth. In past, HIPASAM has shipped several lots of pellet to domestic mill SOMISA but any lot of shipment for export has not been realized. HIPARSA port conditions are stated in 3.4.3 in details.

3.4.2 Handling/Shipping

Handling and shipping of DRI/HBI transportation are manualized as IMO CODE, which to be refered to **Attachment-4**.

* Source from MIDREX

Attachment-4 IMO CODE FOR HBI TRANSPORTATION

DEFINITION

A material emanating from a densification process whereby the DRI feed material is at a temperature greater than 650℃ at time of moulding and having a density greater than 5.0 g/cm^3.

BC No.	IMO Class	MFAG Table No.	Approximate Stowage Factor m^3/t	EmS No.
016	MHB	-	** 0.35	B15

** (to be verified by shipper)

PROPERTIES

Material may slowly evolve hydrogen after contact with water. Temporary self-heating of about 30℃ may be expected after material handling in bulk.

Approximate Size : Length 90 mm to 130 mm
Width 80 mm to 100 mm
Thickness 20 mm to 50 mm
Briquette weight 0.5 kg to 2.0 kg
Fines : Up to 5% (under 4 mm)

OBSERVATIONS

Open storage is acceptable prior to loading.
Loading, including transfer from one ship to another, during rain is unacceptable.
Unloading under all weather conditions is acceptable. During discharge a fine spray of fresh water is permitted for dust control.

SEGREGATION AND STOWAGE REQUIREMENTS

Boundaries of compartments where DRI is carried should be resistant to fire and passage of water.
Separated from materials of classes 2, 3, 4 and 5 and class 8 acids.

SPECIAL REQUIREMENTS

Certification

A competent person recognized by the national Administration of the country of shipment should certify to the ship's master that the DRI, at the time of loading, is suitable for shipment.
Shippers should certify that the material conforms with the requirement of this Code.

Shippers' requirements

The shipper may provide advice in amplification of this Code but not contrary thereto in respect of safety during carriage.

Precautions

1. Prior to loading :
   All cargo spaces should be clean and dry. Bilges should be sift proof and kept dry during the voyage. Wooden fixtures such as battens, etc., should be removed. Where possible, adjacent ballast tanks, other than double bottom tanks, should be kept empty. Weatherdeck closures should be inspected and tested to ensure integrity.

2. Hot moulded briquettes should not be loaded if product temperature is in excess of 65℃ (150℉).

3. Cargo spaces containing DRI material may become oxygen depleted and all due caution should be exercised upon entering such compartments.

4. Adequate surface ventilation should be provided.

5. Radar and RDF scanners should be adequately protected against dust during loading and discharging operations.

3.4.3 HIPARSA port condition

(1) Place of port

Punta Colorada (provincia Rio Negro).

(2) Operator

HIPARSA.

(3) Loading equipment and berth

This is the iron ore loading berth, which belongs to HIPARSA, although there has been no activity for the past few years (pellet shipment for old-SOMISA) loading facilities are well maintained.

This consists of a 1,500 m conveyor belt of which 1,000 m juts out seawards supported on piling. At the eastern end of the piling there are 2 pairs of mooring dolphins, one pair abreast on the north side and the other on the east side enabling a vessel to berth either on the northern or the eastern pair of dolphins. Reported depth alongside: Eastern Dolphins 45′ low water. Northern Dolphins 35′ low water. Vessels of up to 70,000 DWT have loaded.

The dolphins on either berth are set approximately 65 m apart and are fitted with 2 bollards and a capstan for the reception of backsprings. There are mooring buoys laid ahead and astern of the dolphins to take head and stern lines.

The maximum loading rate is 2,000 TPH. The conveyor belt at its extremity is fitted with a platform and an auxiliary belt, capable of

rotating through 176° , moving horizontally 31 m and giving a 42 m outreach to serve either berth.

NOTE:

- These port facilities are only for loading (conveyor belt is only for out-going cargo) .
  Shipping condition is "THINC" 24 hours run, except in bad weather and difference of ebb/flow is about 8 m.
- Government of Provincia Rio Negro has project to establish "Zona Franca" at Punta Colorada, including HIPARSA berth.

(4) Vessel service to Punta Colorada

It is easy to obtain space and reasonable ocean freight under charter vessel base for export and domestic (cabotaje) transportation.

In case of HBI export (for example, to Brazil), it is feasible to load on return empty vessel, after discharging iron ore pellet from Brazil at San Nicolas (SIDERAR) and Alumina from Brazil at Puerto Madryn (ALUAR).

Chapter 4

PAST SITUATION OF HIPASAM

HIPASAM (Hierro Patagonico de Sierra Grande Sociedad Anonima Minera) started operations as a state-owned company under the federal government (Ministry of Defense) in 1962 to produce iron ore pellet for the domestic iron/steel industry.

It had to stop operations in May 1991. Reasons of the stoppage include that the removal of phosphorus in the concentration process was not up to the design requirements, that the operation of the pelletizing plant was not smooth and the designed capacity of 2 million-t of pellet per year was not achieved. In August 1993 the company asset was transferred to the Rio Negro Province and HIPARSA (Hierro Patagonico Rionegrino Sociedad Anonima) established by the Provincial government is maintaining the plant.

In this chapter, why HIPASAM was forced to stop operation is explained.

4.1 CORPORATE MANAGEMENT

Information on the Corporate Management of the ex-HIPASAM was very scarce. According to the 1983 HIPASAM organization chart, the number of total employees was 1,177 of which the head office contained 122 and Sierra Grande plant site 1,055. The team was informed that there were actually over 400 people in the HIPASAM head office, which indicates a top-heavy organizational structure. Generally speaking, in State-owned companies, there is a tendency for over-employment and inclusion of social services within the scope of company activities.

The sale was to another state-owned steel making company in Argentina. The sales structure and the status of a State owned company may not have induced sales and marketing efforts, or incentives for quality and productivity improvement.

Inherent undesirable characteristics of the HIPASAM operation may have been the higher cost of iron ore and the higher content of phosphorus concentrate. On the other hand, HIPASAM could enjoy low cost natural gas and electricity in Argentina. Corporate Management could have tried various plans for solving the problems when HIPASAM was forced to suspend operations in 1991.

The mentality and attitude of the labour force in the State owned companies could have been similar to what is found in other countries. It is very important to protect the rights and income of the labour force. If the increase in wages received by labor, however, exceeds the growth of the added value generated by the operations of the company, it will eventually eat up the source of income or discourage further capital investment.

The jetty at Punta Colorada has been maintained in good condition, and can be used for export of HBI. The jetty cannot be used for unloading operations at present as the conveyor system is only designed for loading.