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Argentina Mining Sector Review

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ARGENTINA

MINING SECTOR REVIEW

ACRONYMS AND ABBREVIATIONS

| | | |
|---------|---|--|
| APT | : | Additional Profits Tax |
| BANADE | : | Banco Nacional de Desarrollo |
| BGS | : | British Geological Survey |
| BRGM | : | Bureau de Recherches Géologiques et Minières, France |
| BHP | : | Broken Hill Proprietary (Australia - USA) |
| CFM | : | Consejo Federal de Minería |
| CNEA | : | Comisión Nacional de Energía Atómica |
| CONICET | : | Consejo Nacional de Investigaciones Científicas y Técnicas |
| CPM | : | Provincial Mining Corporation |
| CRA | : | CRA Group, Australia |
| CRAS | : | Centro Regional de Aguas Subterráneas |
| DEP | : | Directorate for Studies and Projects |
| DEY | : | Directorate for Mineral Deposit Evaluations |
| DNM | : | National Directorate of Mining |
| EEC | : | European Economic Community |
| FM | : | Fabricaciones Militares |
| GDP | : | Gross Domestic Product |
| GOA | : | Government of Argentina |
| GTZ | : | Gesellschaft für Technische Zusammenarbeit, Germany |
| HIPASAM | : | Hierro Patagónico de Sierra Grande S.A. Minera (FM) |
| INPRES | : | Instituto Nacional de Prevención Sísmica |
| IPEEM | : | Instituto Provincial de Exploraciones y Explotaciones Mineras |
| JICA | : | Japanese International Cooperation Agency |
| LAC | : | LAC Minerals Company, Canada |
| LAN | : | Local Area Network |
| MIS | : | Management Information System |
| MDF | : | Mining Development Fund (Fondo de Fomento Minero) |
| NDM | : | National Directorate of Mining |
| NGO | : | Non-Governmental Organizations |
| NOA | : | N.W. Argentina Cooperation Plan |
| RTZ | : | Rio Tinto Zinc Mining and Exploration Limited, UK |
| SGN | : | National Geological Service / National Geological Service Directorate (as of Jan. 1993) |
| SM | : | Federal Secretariat of Mining |
| SOMISA | : | National Steel Company |
| SPM | : | Provincial Secretariat of Mining |
| SRNAH | : | Secretariat for Natural Resources and the Human Environment |
| UK | : | United Kingdom |
| UN | : | United Nations, New York |
| UNDP | : | United Nations Development Program, New York |
| USGS | : | United States Geological Survey |

VAT : Value Added Tax
YCF : Yacimientos Carboníferos Fiscales
YMAD : Yacimientos Mineros de Agua de Dionisios
YPF : Yacimientos Petrolíferos Fiscales

= = = = =

Au : gold
Ag : silver
Cu : copper
Fe : iron
K : potassium
Ma : magnesium
Mo : molybdenum
Pb : lead
Sn : tin
U : uranium
W : wolfram
Zn : zinc

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ARGENTINA, MINING SECTOR REVIEW

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P R E F A C E

This study is the product of a cooperative effort between the World Bank and the Government of Argentina. The Government of Argentina is currently taking a series of new initiatives in an effort to develop the mining industry. Many aspects and issues concerning the sector changed considerably from the time when the main analytical work was done (late 1992) to the time of the completion of this document (May, 1993); this should be kept in mind by the reader.

Much of the information used in the preparation of this report was gathered and compiled during an approximate 3-week mission to Argentina in August 1992. The mission was led by E. Bolte (AFTIE - now IENIM) ^{1/} and included Alfredo Dammert (LA4TF), Leo Maraboli (AFTIE - now IENIM) and Fred Barnard (consultant). Bilateral assistance was provided and comprised of technical teams representing the Geological Survey of Finland, which reviewed private sector mining, and Swedish Geological International (SGAB International AB), which focussed on sector institutions. A second mission by Peter Fozzard (Task Manager) and Alfredo Dammert took place in April 1993, during which the results of the study were discussed with the Government. The support of Federal Government authorities (principally the Secretary of State for Mining, Angel Maza and his staff) and Provincial Government authorities in Catamarca, Chubut, Jujuy, Mendoza, Salta and San Juan was of particular value to the team. The Bank missions express their thanks to all government and private individuals, mining companies and the participating and contributing Governments of Finland and Sweden. Final report preparation was carried out by Peter Fozzard (IENIM) and processing and compilation by Véronique Allain (IENIM).

Notwithstanding the collaborative nature of this study, the conclusions and recommendations are ultimately the responsibility of the Bank team. Paul Meo, Division Chief of the concerned Country Department, LA4TF, guided this study throughout.

^{1/} Under a January 1, 1993 partial reorganization of the World Bank's functional structure, mining sector specialists, previously housed in AFTIE, were incorporated into a new Industry and Energy Department, Division of Industry and Mining (IENIM).

EXECUTIVE SUMMARY AND IDENTIFICATION OF KEY ISSUES

Present Situation

1. Mining is currently not a major economic activity in Argentina. The sector only accounts for about one-half of one percent of GDP. In 1991, the total production value of the sector was estimated at US\$490 million, a decline from US\$870 million in 1980 (in constant prices) largely due to a recession in the national construction industry. The value of mineral exports reached US\$78 million in 1990, about 0.6 percent of all Argentine exports. Mineral imports were US\$665 million in the same year, of which iron-ore and alumina were the most important, Argentina is deficient in these minerals.

2. Production in the mining sector output, particularly with regard to exportable products, is far below the country's potential. Three relatively small mines, by international comparison, account for over 80 percent of the country's metallic minerals production and two others, also relatively small operations, account for 75 percent of gold production. The six major "mining provinces" are Catamarca, Chubut, Jujuy, Mendoza, Salta and San Juan. Numerous, close to 400, small mining operations exist in these provinces. Most are involved in the non-metallic (industrial minerals) sector.

3. Argentina, because of its structural geological history, may not have the same enormous geological potential for mineral discoveries as some of its neighboring countries, e.g. Chile. However, it still has large areas of very favorable geology which are largely unknown due to the paucity of high-quality exploration activity. This in turn is due to an overall lack of investment in the mining industry. The present level of annual investment in exploration does not exceed US\$10 million. In order to achieve the sector's growth potential through discoveries of new mines, historical data demonstrates that over US\$45 million must be invested annually in exploration. Most of this investment must come from foreign private investors.

4. The poor performance of the mining sector in Argentina has resulted from a combination of primarily internal factors. In particular, holdings of large reserve areas by provincial governments present a continuing major obstacle to attracting private investment.

5. In addition to problems related to government intervention, the regulatory framework, comprised of a frequently amended federal code ^{2/}, which has been enabled and administered by a mix of provincial mining and fiscal regulations, is so diverse, outdated and complicated that potential investors have found it very difficult to do business and have been provided with few guarantees. There have been some federal mining promotion efforts such as the Mining Promotion Law of 1979 and a Mining Development Fund, both suspended in 1989, which led to the creation of subsidized mining operations that are not economically viable and have resulted in considerable fiscal losses. Since suspension of these schemes some provinces have established their own incentive schemes including, again, tax exemptions and reductions of royalty payments (mining royalties are collected by the provinces).

^{2/} The Mining Code of 1986

6. In addition to the fact that large areas of land are tied up by federal and provincial reserves and hence not easily available to private investors, the complex structure of the land concession management system (the mining cadastre) and the weaknesses of the provincial governments have resulted in a situation whereby other prospective areas are being tied up for many years without any work being performed. It is also very common in most countries, Argentina being no exception, for land speculators, including government organizations, to overvalue land holdings hence making it difficult to negotiate with investors. In an active (minerals) investment market it is essential that land be readily available for investment, initially for exploration, at a fair cost and for the turnover of land holdings to be enforced so that land becomes immediately available to subsequent investors once it is no longer being properly used.

7. On the fiscal side, the general income tax has not been a major problem, but some provinces have levied royalties of up to 10 percent; this is generally considered as unreasonably high. The imposition of elevated royalties leads to sub-optimal investment and mining decisions. In effect, royalties at any level are *ad valorem* taxes and reduce the amount of ore which can be mined - they increase the so-called cut-off grade for mineral deposits. Recently, many provinces have suspended collection of royalties. This may be an extreme shift. However, Chile imposes no royalty fees and Argentina must compete with Chile for investment.

8. An adequate public institutional structure is essential to support sector administration and development. In Argentina the institutional structure at both federal and provincial levels has been inadequate, inefficient and unfocussed. There has been a notable lack of inter-institutional cooperation and duplications of effort are noticed. The Secretariat of Mining, recently upgraded from an Undersecretariat, has many regional offices which have been largely idle and staff at Headquarters in Buenos Aires have recently been concerned with planning of restructuring and developing more recent legislative incentives. No geological surveying work has been done for a considerable time and there is a resulting lack of technical data available to investors. Furthermore much important technical data is disseminated throughout various institutions and is in danger of being lost. In most of the provinces the situation is even worse. Many of their critical sector support activities such as the licensing and administration of mineral rights, technical work, provision of technical assistance to small-scale miners, collection of land rentals and royalties and monitoring and enforcement of health, safety and environmental matters, have virtually ceased. Most of the Provincial mining corporations are ineffective and should be largely privatized or dismantled.

9. A further constraint to mining development in Argentina is the general lack of infrastructure, particularly as present and potential future mining areas are located in remote mountainous areas. The major industrial centers and ports are also far removed from these mining areas making transport of many bulk products extremely expensive even if adequate transport infrastructure exists. However, many of the mining areas are close to Chile and hence closer to Chilean entry and exit routes. This situation must be taken advantage of. In addition to transport, existing energy costs are very high and provision of adequate water for some operations in the arid mountainous and plateau regions will represent further limitations. Generally, therefore, mining operations will be expensive to install and maintain.

10. On the positive side, the Government is in the process of taking new initiatives aimed at attracting new investment into the sector. These new initiatives include a Mining Sector Restructuring Law, a Mining Investment Law which guarantees tax stability over the long term and a Federal Mining Agreement which promotes closer Federal-Provincial collaboration. In addition, a Presidential Decree of late 1992 considerably improved the sector institutional arrangements, one

of the positive results being the resumption of geological map compilation activities to provide investors with basic data.

11. Environmental, health and safety issues are new to the Argentine mining sector. There is no national environmental law although a draft code is currently being processed through the legislature. The existing federal mining code provides for few provisions in these critical areas. Some provinces have taken the initiative and established their own frameworks for environmental protection but this process is not coordinated at the national level. However, many provinces are not presently concerned with these issues and one of the most recent mining agreements negotiated by a province with a foreign investor takes no account of environmental protection measures. This is detrimental to the investor as well as the country. The recently revitalized Secretariat for Natural Resources and the Human Environment is not yet competent enough to perform the enormous tasks of establishing specific regulations and standards. Sector specific norms, regulations, standards and their enforcement must be uniform across the country as health, safety and the environment in mining is very much of national concern.

Key Issues for Sector Development

12. Numerous issues have to be carefully addressed by the Government at the federal as well as provincial levels to enable the mining sector to increase its contribution to the economy and develop in a sustainable and environmentally sound manner. This report considers the following as the most crucial issues:

- **Mining sector policy and strategy.** The Government is urged to develop and publish a carefully designed mining sector policy and strategy that sends the right signals to investors. It must be consistent with the liberalization and deregulation policies in place at the macroeconomic level. It must encourage foreign private investment. This sector policy document should address all key issues and use as a basis the recent initiatives being developed and adopted.
- **Cooperation between the federal and provincial governments.** Government should make every effort to continue improving this relationship so that each level of government has clearly defined responsibilities. This positive association must recognize the fact that the Provinces are the owners of the mineral resources. The current arrangement, which consists of a Federal Mining Code administered by differing Provincial enabling regulations has proven to be a failure in the past. The government may need to consider moving toward a system of total Provincial autonomy, whereby each Province develops its own Mining Code as well as Regulations.
- **New mineral legislation.** Instead of making piecemeal improvements and amendments to the Mining Code through the enactment of new laws, Government should consider taking steps to design and promulgate new modern mineral legislation. Enabling Provincial regulations and federal regulations (particularly those concerning environmental, health and safety issues) must be developed in parallel. The legislation and regulations should provide for clear, simple procedures that are easy to enforce in order to build confidence on the part of the investors that they will not be subject to arbitrary or unfair treatment. Approvals for exploration and mining licences

should be based on explicit criteria and should involve minimal discretion on the part of the authorities ^{3/}.

- **Institutional restructuring.** Restructuring and strengthening of the sector federal and provincial institutes is of considerable importance to support and administer sector growth. At both federal and provincial levels this should be done along the lines of the simple models proposed in this report. Provincial institutional restructuring should include divestment of the provincial government and quasi-government mining companies and particularly the release of reserve areas through auctions or other methods so they become available to the private investor.
- **Formation of an independent Geological Survey.** The sound formation of an independent Geological Survey organization is of particular importance and its first priority task must be to retrieve and collate existing information before it becomes dispersed during the privatization of state-owned companies such as Fabricaciones Militares. Very recent initiatives (see below) have been taken in order to resolve this issue.
- **Special sector promotion schemes.** It is strongly recommended that governments, federal and provincial, do away with specialized sector promotional schemes which generally waste scarce fiscal resources. The eventual guaranteed fiscal package must aim at fair revenue sharing of generated value added rather than maximizing public employment.
- **Health, safety and environmental issues.** The Government should place considerable importance on the development of health, safety and environmental regulations standards and procedures. Considerable progress can be made in this area by including norms and procedures in the proposed new Mining Code.

Recent Initiatives

13. In July 1989, the government initiated a reform of economic policies involving stabilization and deregulation of the economy and the privatization of public enterprises. The privatization program includes the sale and divestment of federal public mining sector enterprises. These macroeconomic policy changes are having a favorable effect on the sector, but investors are awaiting similar divestment and privatization at the provincial level of government.

^{3/} A small number of countries have been successful in attracting new mining investment by foreign companies in recent years. A study of the Mining Legislation in six jurisdictions, namely Chile, Papua New Guinea, Indonesia, Botswana, Ghana and the State of Nevada, U.S.A. (**Comparative Study of the Mineral Laws and Relative Investment and Fiscal Laws of six Selected Countries**, Duncan, Allen and Talmage; Washington D.C.; July 1990) was prepared for the World Bank. This study will be made available to the Argentina authorities. The study outlines the common principles underlying the mining legislation for these six jurisdictions. It also illustrates some of the different approaches taken to ensure good access for potential investors for exploration of prospective land.

14. **Mining Investment.** The Mining Investment Law contains a number of important improvements over the failed Mining Promotion Law of 1979. It envisions the establishment of agreements between the federal and provincial governments on mining taxation and incentives. Many of these changes, including long-term guarantees that taxation will not be changed throughout the life of a mining project, represent a change for the better. By agreement with the provinces a general royalty level of 3 percent is proposed which is also more reasonable. It also ensures some direct rent collection by the provinces. However, there are some aspects of the new law which may be inconsistent with Argentina's macroeconomic policies.

15. **Mining Sector Restructuring.** The Mining Sector Restructuring Law makes provisions for the way in which geological mapping is carried out, formally creates a Federal Mining Council comprised of Provincial delegates to advise the Federal government on national mining policies and concerns, changes levels and types of concessional land rentals and seeks the establishment of mining sector duty-free zones.

16. In late December 1992, a Presidential Decree brought about positive sector institutional restructuring by forming, as a major Directorate of the Secretariat of Mining, a National Geological Service Directorate and bringing other relevant sectoral institutions under the overall administration of the Secretariat; this initiative included the consolidation of a new National Institute of Mining Technology. This report still urges Government to consider following the institutional models presented and in particular giving greater autonomy to the Geological Service.

17. An additional very recent initiative (May, 1993) is the formulation of a Federal Mining Agreement which makes an effort to bring about greater cooperation between the Federal Government and the Provinces. All the recent initiatives are considered to be positive steps in the right direction and demonstrate considerable resolve by the present administration to improve the way the mining sector operates in Argentina. It will be interesting to see what influence these modifications will have on increasing the level of investor interest. One of the reasons that the Mining Code of 1886 is so complex is because of the numerous partial reforms it has been subjected to. This report therefore recommends that a fresh start should be made to sector legislative reform, underpinned by the proposed mining sector policy and strategy document.

Sector Development Strategy

18. This report proposes that the core of a mining sector development strategy is the creation of a mutually beneficial partnership between the federal and provincial governments on the one side and private mining investors on the other. Historically, this partnership has never been achieved in Argentina and is possibly the primary reason why development of the sector has lagged behind most of Argentina's neighbors and many other developing countries around the world.

19. The report proposes a strategy, sub-sector by sub-sector, which carefully and systematically addresses all identified issues. The Government has two main options for bringing about sectoral reform:

- Making a totally new beginning
- Continuing a program of incremental adjustments

It is recommended that the Government adopt the first option. Recommendations are made in the report with respect to attracting private investors into Argentina, phasing out of government intervention in productive activities, establishing the roles of the federal and provincial authorities and organizations, the key elements of fiscal policies and, particularly ensuring that the tax package balance the requirements of the federal and provincial authorities with those of the private investor. Clarification and simplification of the regulatory framework is considered essential for success as is institutional reform. It is recommended that the government set out its strategy in a sector policy paper. This can be a very important medium for establishing the foundation to the required, mutually beneficial partnership essential for success. Then, environmentally sound and sustainable mineral resource development can contribute to the country's economic development in line with its very good potential.

BACKGROUND, SCOPE AND OBJECTIVES OF STUDY

1. An initial analysis of the performance of the mining sector was made by the World Bank at the request of the Government in late 1989. In early 1992 when overall economic reform was seen to be well underway, the Government of Argentina and the Bank agreed that an in-depth study of the mining sector was necessary. In August 1992, a Bank mission was mounted incorporating experts from Finland and Sweden, bilaterals that had demonstrated a keen interest in assisting the GOA in the development of its mining sector. The combined Bank-bilateral mission completed its main work at the end of August 1992 and discussed with the GOA the main findings of the sectoral analysis through a detailed Aide Memoire. Finnish mining specialists coordinated by the Geological Survey of Finland presented a separate report entitled "Review of Argentine Private Sector Mining (September 1992) and Swedish experts of Swedish Geological International presented a report entitled "Institutional Framework within the Mining Sector of Argentina" (September 1992). Selected findings from these reports have been incorporated into this Bank sectoral analysis.

2. The scope of work was as broad as possible. Generally, it focussed on the status of private exploration and mining activities, public sector (mainly provincial) involvement in land holdings and mine development, the roles of the federal and provincial governments, geological potential for mineral development and the adequacies of sectoral institutional arrangements to support sector growth through private investment. Section 2 of the report examines the mineral potential, Section 3 focuses on means of attracting investment into mining, Section 4 the mining policy framework, Section 5 fiscal policies and incentives, Section 6 and Annex 1 the regulatory framework, Section 7 the public mining institutions, and Section 8, infrastructure and the environment. Annexes to the report deal more specifically with the situation regarding the current sector legislation, small, medium and principal mining operations and mining development in specific Provinces.

3. The main point of coordination for this mining sector analysis was the Mining Secretariat of the Ministry of Economy, Public Works and Services. At the federal level, meetings were also held with the Mining Commissions of the Senate and Chamber of Deputies. At the provincial level, visits were made to six Provinces: Catamarca, Chubut, Jujuy, Mendoza, Salta and San Juan. *The overall objective of this comprehensive study was to analyze the various components of the mining sector in an effort to determine why it is under-performing and to propose a course of action which could lead to its orderly and sustainable growth.* In general, such a course of action would be aimed at simplifying the way that the sector operates and lifting numerous cumbersome restrictions which hamper doing business in a country with, otherwise, reasonably attractive mining potential which has to compete for investment on a global scale and with attractive neighbors such as Bolivia, Chile and Peru.

4. While this sector study was underway, the GOA was proceeding with partial sectoral reform largely through the design and promulgation laws of Mining Sector Restructuring (Reordenamiento Minero) and Mining Investment (Inversiones Mineras) laws. Both proposed laws ask for cooperation from the Provinces. *The mission commented on some of these draft legal projects and generally advised that more in-depth analysis was required of all key issues. The draft laws were submitted to Congress by Minister Domingo Cavallo on January 25, 1993, and the Mining Investment Law was ratified in April 1993.*

SECTORAL BACKGROUND

Role of Mining in the Argentine Economy ^{4/}

1.1 Mining is currently not a major economic activity in Argentina. The sector accounts for only about one-half of one percent of GDP. In 1991, the total production value of the sector amounted to an estimated US\$490 million. This is detailed in Table 1.1 below, which shows the value of production of main minerals from 1970 through 1991. Construction materials, mainly limestone, granite, marble and onyx, account for the highest share, over 60%, of the value of mining production. Production of construction materials is performed in most provinces while mining of other minerals is concentrated in the mountain provinces. Mining of metallic minerals is not significant and is concentrated in a small number of operations producing zinc, silver and lead, and gold and silver. The total value of production of metallic minerals amounted to about US\$59 million in 1991. Non-metallic mineral production, of which borates were the most important, was US\$93 million in 1991, and other minerals, such as coal, semi-precious stones and uranium accounted for US\$36 million.

1.2 Mineral exports reached US\$78 million in 1990, about 0.6% of Argentine exports. Lead and zinc concentrates and refined products accounted for two-thirds of this value, and borates for most of the remainder. Mineral imports were much more significant at a value of US\$665 million, or 16% of Argentina's total imports in monetary terms. Iron ore imports were the most important category with US\$126 million. Alumina imports for the aluminum smelter in Chubut amounted to US\$70 million. The other most significant imports were: sodium carbonate for the glass and detergent industries (US\$31 million), refined copper, mainly for electricity supply (US\$27 million), and titanium oxides for manufacturing of paints and pigments (US\$25 million).

Past Performance of Mining

1.3 Mining activities in Argentina increased during the 1970s but declined during the 1980s. The value of mineral production increased from an estimated US\$740 million in 1970 to US\$870 million in 1980 (in 1991 prices). This increase can be attributed mainly to the development of borate mining to supply local and Brazilian markets, and to increases in production of construction materials in order to meet the demand of the strongly growing domestic building industry. The decline to US\$490 million in 1991 is mainly due to the crisis of the construction industry in Argentina, which significantly affected the production of limestone, granite and other construction materials. The increase in gold production between 1980 and 1991 was mainly due to the development of the YMAD gold mine in Catamarca and the Mina Angela in Chubut. Production of iron ore by HIPASAM in the province of Rio Negro came to a halt in 1990. The world tin crisis caused the closure of the tin

^{4/} The statistical information for mining in Argentina is incomplete. Production statistics used in this report refer to the major mining provinces, which are: Catamarca, Chubut, Jujuy, Mendoza, Salta, and San Juan. They account for about 70% of Argentina's mineral production. If construction materials are included (not traditionally part of the mining sector), this share is reduced to 37%. This report is based mainly on findings in these six provinces, but the conclusions and recommendations are considered representative for the country as a whole.

mine in Jujuy in 1991. Among non-metallic minerals, production of borates declined as markets shrunk both domestically and in the main foreign market, Brazil.

Table 1.1
MINERAL PRODUCTION, 1970-91
(US\$ million of 1991)*/

| Mineral | 1970 | 1980 | 1991 | % Change | |
|------------------------|------------|------------|------------|-------------|-------------|
| | | | | 1980/91 | 1970/91 |
| Metallic Minerals | <u>60</u> | <u>53</u> | <u>59</u> | <u>+ 11</u> | <u>-</u> |
| of which gold | 27 | 23 | 27 | + 12 | - |
| Non-metallic Minerals | <u>76</u> | <u>120</u> | <u>93</u> | <u>- 23</u> | <u>+ 22</u> |
| of which Borates | 17 | 62 | 46 | - 26 | + 171 |
| Construction Materials | <u>518</u> | <u>638</u> | <u>302</u> | <u>- 53</u> | <u>- 42</u> |
| of which Limestone | 180 | 215 | 105 | - 51 | - 42 |
| Other Minerals | <u>86</u> | <u>59</u> | <u>36</u> | <u>- 39</u> | <u>- 58</u> |
| Total | <u>740</u> | <u>870</u> | <u>490</u> | <u>- 44</u> | <u>- 34</u> |

*/ Volume data were converted to value data using 1991 mineral prices.
Source: Secretariat of Mining, Buenos Aires.

1.4 Despite the decline in mineral production during the last decade, mineral exports grew during both the 1970s and the 1980s. The total main export products and export values are presented in Table 1.2. These exports originated mainly from two mining companies - Boroquimica and Minera Aguilar. Mineral imports experienced a substantial increase during the 1970s, from US\$429 million in 1970 to US\$1,320 million in 1980, but declined to US\$665 million by 1990. Between 1970 and 1990 imports of some products increased substantially. Imports for iron ore increased from US\$20 million to US\$126 million, sodium carbonate from US\$7 million to US\$31 million, and for titanium dioxide from US\$0.7 million to US\$25 million. Imports of refined copper remained stable at about US\$30-40 million during the 1970s and 1980s.

TABLE 1.2
MINERAL EXPORTS
(US\$ MILLION - CURRENT PRICES)

| | 1970 | 1980 | 1990 |
|--------------------------|------|------|------|
| TOTALS | 8.2 | 71.2 | 78.1 |
| Main products: | | | |
| Lead / zinc concentrates | -- | 22.3 | 23.6 |
| Silver | -- | 12.6 | -- |
| Tin / Tungsten | -- | 11.2 | |
| Borates | -- | 15.4 | 14.7 |
| Zinc ingots | -- | -- | 21.4 |
| Lead ingots | -- | -- | 3.3 |
| Others | -- | 9.7 | 15.1 |

Structure of The Mining Industry

1.5 Table 1.3 presents the 1991 structure of the mining industry in the six key mining provinces. The five largest companies in these provinces produce US\$95 million, over one-half of total mineral production in the six provinces. Three companies account for over 80% of Argentina's metallic mineral production: Minera Aguilar, the main zinc and lead producer in the country, and YMAD and Cerro Castillo, which account for over 75% of gold production in Argentina. Boroquimica annually produces borates valued at US\$35 million, which accounts for 38% of Argentina's production of non-metallic minerals (excluding construction materials). Dona Amalia, the major limestone producer, has an annual output of about US\$11 million. Other producers in these six provinces, consist of small and medium mines, most of which register an annual output below US\$1 million. There are an estimated 400 small- and medium-scale mining operations in Argentina, the majority of which are in the six main mining provinces. Details of small- and medium-scale mining in Argentina and the mining situation in the six main mining provinces are described in Annex 2 and Annex 3. The operations of the largest Argentine metal mines are summarized in Annex 4.

Table 1.3
PRINCIPAL MINING PRODUCTION OF SIX PROVINCES

| PROVINCE | SOURCE | PRODUCTS | Estimated Value of Production in 1990 (US\$ million) |
|-------------------------------|----------------|--|---|
| Catamarca | YMAD | Gold, silver | 7 |
| | Dona Amalia | Limestone | 11 |
| | Small mines | Limestone, precious stones, other | 10 |
| Chubut | Cerro Castilo | Gold, zinc, silver | 10 |
| | Small mines | Kaolin, barite, limestone, other | 10 |
| Jujuy | Minera Aguilar | Zinc, silver, lead | 32 |
| | Medium mines | Limestone | 10 |
| | Small mines | Borates, limestone, other | 1 |
| Mendoza | Medium mines | Uranium, gypsum, clays, salt, other | 9 |
| | Small mines | Bentonite, limestone, other construction | 5 |
| Salta | Boroquimica | Borates | 35 |
| | Small mines | Perlite, sodium sulfate, salt | 8 |
| San Juan | Medium mines | Limestone, marble, aluminum sulfate, other | 10 |
| | Small mines | Limestone, marble, aluminum sulfate, other | 22 |
| Total of Six Provinces | | | 180 |

Mining Development Strategy

1.6 The present stagnation of mining in Argentina has resulted from a combination of external and internal factors. Economic and political instability in Argentina has had a major effect on the development of mining. Periodic economic crises and a highly regulated economy have made potential investors wary. Government mining promotion efforts were poorly conceived and caused a drain on federal and provincial fiscal resources.

1.7 Another important detrimental factor was the heavy involvement in mining development by the federal and provincial governments, both directly in exploration and development and indirectly through interventionist sector policies and regulations. Direct government involvement occurred through the establishment of federal and provincial reserve areas in many of the known geologically promising zones and the creation of security zones in the mineral rich border areas. Argentina's most promising mineral areas have been effectively withheld from private development

through these measures. The mining policy framework and the administrative arrangements for the sector have also not been supportive of development. Mining sector policies have been characterized by outdated laws and procedures as well as generally ineffective institutional arrangements. The dominion over mineral rights rests with the provinces and there has been insufficient cooperation between federal and provincial mining institutions. Provincial mining institutions are also frequently too weak for effective policy implementation.

1.8 In July 1989, the Government initiated a **reform of economic policies**, which involved the stabilization and deregulation of the economy and the privatization of public enterprises. In order to reduce the fiscal deficit, the Government took measures to increase revenues and to divest loss-making federal public enterprises. The divestiture program included the sale of public enterprises related to mining, such as the steel companies (SOMISA and Altos Hornos Zapla), an iron ore mine (HIPASAM), a coal mine (YCF) and Fabricaciones Militares (FM) which holds several mining concessions. The divestiture of federal mining assets is now virtually completed.

1.9 The overall sector strategy in Argentina, which has lagged well behind major reforms in competing countries, has remained seriously flawed. Whereas the overall economic policy reform has been noted by potential investors, there remains a wait and see attitude before committing serious high-risk investments; some of these concerns seem understandable. The existing regulatory system for the sector is ineffective and the public mining institutions are only starting to emerge from a period of disarray. An enormous task lies ahead for creating a truly effective and consolidated regulatory and institutional framework. In addition, some of the provincial governments continue their strong interventionist policies. The effective privatization efforts being taken at the Federal level should be extended to the Provincial level.

MINERAL EXPLORATION AND GEOLOGICAL POTENTIAL

Actual Exploration and Required Level of Effort

2.1 The geological, or exploration, potential of a country is the most important factor in determining where investors will place their high-risk money in efforts to find and develop mines. The level of exploration investment clearly determines the manner in which the mining industry develops. If successful, exploration will lead to a chain of events through the detailed evaluation of mineral deposits, the completion of feasibility work and mine development. However, this whole process, from the decision to invest in exploration onwards, requires adequate, uncomplicated and clear support from government. In other words, mine development is determined and controlled by government policies. It is critical for governments to be competitive in attracting exploration investment. To do this they must present clear rules of the game that guarantee the entire process; exploration, development, production, marketing, fiscal and environmental.

2.2 Present low level of exploration

It is difficult to accurately estimate the present annual level of exploration expenditure for all metallic and non-metallic minerals. However, available information suggests an annual level of about US\$10 million from all sources, public and private. This is far below the level that will generate new discoveries and stimulate industrialization in the short to medium term. Given typical time lags of about 10 years between start-up of exploration and the beginning of production, this low level implies continued stagnation of the industry for some time to come. Based on historical data for Canada and Australia, the average cost of finding and evaluating a medium to large-scale economic mining operation is between US\$35 million and US\$50 million.

2.3 Historically, the federal and provincial governments have played a major, yet generally ineffective, role in executing exploration programmes which have included those wholly or partially financed from various sources of external assistance: UNDP, JICA (Japan), GTZ (Germany), EEC, USGS etc. More recent work by GTZ, EEC and USGS was suspended due to the lack of "guaranteed" funding from the GOA. As seen from the estimated exploration expenditures by public sector sources provided in Table 2.1, the major players have been Fabricaciones Militares (FM) and the provinces. Excluding coal (YCF), about US\$450 million has been invested over the last 30 years with no startling discoveries. These negative results are largely due to the fact that monies were spent unwisely; on large iron-ore prospects, on socially or politically motivated work, on basic research and because of wastage through inefficiency.

Table 2.1.
Estimated Exploration Expenditure

| Institution | US\$ Millions | Years |
|-------------------------|----------------------|--------------|
| Fabricaciones Militares | 200 + | 30 |
| Fondo de Fomento Minero | 23 | 8 |
| Secretaría de Minería | 50 | 8 |
| CNEA | 70 | 35 |
| YCF | 40 | 40 |
| Provinces | 100 | 15 |
| Total | 483 + | |

2.4 Over the last decade some foreign private companies have carried out exploration activities but nothing compared with the level of work in, for example, Chile and Bolivia. Work has included further studies at Aguilar by St. Joe (the Aguilar mine now owned and operated by Comsur, Bolivia), studies of El Pachon porphyry copper by both St. Joe and RTZ (UK), RTZ's work on borax near Salta and investigations of gold properties, various programmes by BHP aimed at gold and copper and the exploration and study of YMAD's Bajo de la Alumbrera copper-gold deposit in Catamarca through the assistance of JICA (Japan). More recently some junior as well as major mining companies have acquired rights over identified mineral deposits such as Bajo de La Alumbrera (copper-gold), Andacollo (gold) and El Durazno (copper-molybdenum-gold). These companies include Musto Exploration and American Resources at the junior end of the scale and Placer Dome (Canada), Anglo American (South Africa) and LAC at the other. Some recent interest is being shown by Australian-based groups such as CRA and Newcrest.

2.5 Required level of exploration investment

It is difficult to assess what level of exploration investment would be either justified or required to support optimal industry growth in Argentina assuming there were limited country risks and that an adequate enabling investment environment had been established. Studies by the Bank have generally indicated that robust growth of an underdeveloped minerals sector, such as that in Argentina, could require an annual exploration investment of about 10 percent of the value of mineral production. Some examples of the relationship between exploration investment and value of mine production are set out in Table 2.2. Like Brazil, Argentina is seriously underperforming.

2.6 Based on this yardstick and the examples provided, Argentina should be attracting an annual exploration investment of at least US\$45 million to US\$50 million annually; about five times the present estimated level. It is also very clear that this level of investment, as well as the expertise required to carry out effective modern exploration work, must originate from the foreign private sector. This just serves to underline the importance of implementing, without delay, the basic sectoral changes suggested in other sections of this report to bring about an enabling investment environment.

Table 2.2
Exploration Investment in Relation to Value of Production

| Area | Production Value | Exploration Investment | Ratio (%) |
|-----------------------|---------------------|---------------------------|--------------|
| (US\$) millions | | | |
| Canada (metals, 1990) | 10,250 | 535 | 5.2 |
| Alaska (1990) | 533 | 63 | 11.8 |
| Argentina (1992) | 490 | 10 | 2.0 |
| Brazil (1990) | 4,500 a/ | 50 | 1.1 |

a/ Excludes informal mining

Geological Potential, Production Prospects and the Data Base

2.7 Geological potential

Argentina is considered to have good geological potential for the discovery of both metallic and non-metallic mineral deposits . However, from the point of view of structural development Argentina lies to the south of the craton-dominated shield terrane of Brazil (typified by massive iron-manganese deposits, diamondiferous kimberlites and greenstone gold), largely to the south of the silver-lead-zinc-antimony-tungsten-tin metallogenic province of Bolivia and to the east of the Peruvian-Chilean pluton dominated porphyry copper terrane. Southern Peru and northern and central Chile is the world's premier copper province and contains about 40 percent of known global resources. The lateral zoning of mineral belts and different paleoclimatic conditions across the Andes dictate that there is no direct duplication of Chile's mineral wealth. Even though it is unlikely that the cordillera region of Argentina will host world-class copper reserves similar to Chuquicamata and Escondida, very good possibilities remain open for the discovery of copper deposits similar in type to Andina, Disputada, Pelambres and El Teniente. The great number of hydrothermal alteration zones recognized but not explored to date in the Argentine Andes augurs well for the future of the mining industry. Documented opportunities exist for the discovery and development of many commodities; lead-zinc-silver, tin, a variety of gold mineralization models (including those of the El Indio Type of Chile), uranium, coal and a wide range of industrial minerals, including a variety of ornamental rocks (e.g. marbles and granites), and construction materials.

2.8 *Despite not having the enormous geological potential of some of its neighbors, Argentina's very good potential can still be classified as vastly unknown due to the paucity of continued and high-quality exploration activity.* This lack of exploration activity has been caused by a combination of, a) high economic and political risk for many decades, b) a hostile investment climate, c) the fact that the main mineral provinces in western and northwestern Argentina are far removed from required support infrastructure and, d) a perceived geological potential lower than its immediate western and northwestern neighbors.

2.9 Argentina has a surface area of 2.7 million square kilometers, in comparison with Chile (0.76 million km²), Bolivia (1.1 million km²) and Peru (1.3 million km²). Whereas close to 80 percent of Chile and more than 50 percent of both Bolivia and Peru are favorable for the discovery of metallic mineral deposits, only about 25 percent of Argentina is comprised of fold, suture and intrusive-volcanic arc terrane with known and indicated metallic mineral potential. However, this still represents a large surface area. Because of basic, favorable, cordilleran geology, the north-western area of Argentina, from the region of Mendoza and San Juan up to the border with Bolivia, appears to be the most favorable geological area both as far as known mineralization and unknown (undiscovered) potential is concerned.

2.10 The provinces of Jujuy and Salta demonstrate the geological "transition" from Bolivian metallogeny to northern Andean Chilean magmatic arc terrane. The western part of Jujuy is characterized by the lead-zinc-(silver) belt of Bolivia, represented by the famous Aguilar mine, in the central zone, the antimony-gold province of Bolivia is represented by the Cerro Salle and Maria Angelica prospects, and more to the north and west, tin-tungsten-(silver) of Bolivia is represented by the mineralization of the now inactive Pirquitas mine as well as numerous epithermal (gold, silver, mercury, sulphur) prospects and the high inter-montane evaporite basins of Puna which contain boron, lithium, potassium and other salts.

2.11 These evaporite deposits extend into Salta (e.g. Salar de Hombre Muerto etc.) as do the volcanic hosted epithermal deposits. The western part of the province enters into the magmatic arc zone of Chile with porphyry copper prospects (e.g. Tacataca) and the Eastern Cordillera contains many past producers and prospects with potential for base and precious metals (Concordia, La Poma, Esperanza, La Colorada, Incachule, Diablillos, etc.).

2.12 The southern extension of a broad area and mix of Bolivian and Chilean Andean geology in Jujuy and Salta shows a transition, in Catamarca, into the narrow Andean zone typical of central (Neuquen) and southern (Patagonia) Argentina. This transition zone is characterized by porphyry copper prospects of a similar model to some Chilean porphyries but with far less tonnage and grade. Examples are the Farallon Negro complex which include Bajo de la Alumbrera and Bajo el Durazno. They are associated with typical epithermal precious metal polymetallic systems (e.g. Farallon Negro/Alto de la Blenda and Capillitas).

2.13 The San Juan and Mendoza provinces further south are characterized in their western parts by similar Andean geology to Catamarca and represent the Central Andean zone of Argentina comprised of typical E-W zoned tectonic domains characterized by both sedimentary and magmatic (volcanic-plutonic) geology hosting characteristic mineralization. Many of the Jurassic to Cretaceous sediments host copper-uranium-vanadium deposits (e.g. El Ambrado, San Romeleo) and the Upper Cretaceous to Tertiary magmatic arc area hosting typical porphyry and epithermal systems; copper-molybdenum-gold-lead-zinc-silver-manganese (El Pachon porphyry copper and Valle de Cura gold/silver). Most of the eastern part of San Juan province contains the Sierra Pampeana which currently produces non-metallics such as travertine, marble and clays including bentonite.

2.14 Andean geology thins from Neuquen to Chubut but still contains typical porphyry (copper) prospects (Campana Mahuida) and volcanogenic related epithermal systems such as Andacollo and Huemules (gold-silver-lead-zinc). The eastern part of Neuquen is comprised of the Neuquen Sedimentary Basin, which contains, in addition to petroleum and gas reserves, a varied assortment of industrial minerals (barite, celestite, diatomite, asphaltite and clays). Volcanic rocks of the Somuncura massif in northeastern Chubut contain the gold-silver-lead-zinc mineralization of

Mina Angela (Cerro Castillo) and are a propitious host for similar epithermal and disseminated polymetallic mineralization.

2.15 Thus, Argentina is composed of several distinct geological provinces each of which is significantly different to the others in terms of geological origin, structural development history and resulting ore-generating processes which have taken place. It is dominated in the northwest and west by a strip of the southern Andean Cordillera and in the east by a series of sedimentary basins interrupted by the Pampean ranges around Catamarca and San Juan and the volcanic massifs of Patagonia in the south: Somuncura and Deseado (Santa Cruz). The map (inside back cover) provides a broad outline of the geology and main mineralized prospects. This wide range of different geological terranes provides for a wide range of different minerals from sedimentary hosted industrial minerals and materials, to uranium, coal and evaporitic salts and a mix of "typical" Bolivian and Chilean magmatic (intrusive-volcanic) arc precious metal and polymetallic vein and porphyry (disseminated) systems.

2.16 Geological information

The regional geological data base of Argentina is deficient. So far less than 20 percent of the country is covered by published geological maps. Considerably more actual geological mapping has been carried out, but compilation and publication of maps was suspended from 1987 until the end of 1992. This unfortunate reduction in the amount of basic data available to potential investors was brought about by a change in policy to concentrate on efforts to "promote" mineral development and reduce the collection, evaluation and dissemination of basic data. Subsequently some provincial governments performed some geological work to provide information for potential investors with specific projects in mind. The National Program of Geological Mapping was re-initiated by the present Government authorities early in 1993 and ten 1:250,000 scale maps, each covering about 13,000 km² (1.5 degrees long. by 1.0 degree lat.) are presently being compiled for publication. This represents the initiation of a 33 mapsheet program of which 8 will be completed by universities, 8 by provincial delegations and 17 by SGN. The Government is obviously demonstrating its serious intention to re-vitalize this important process. Discussions are also being held with Australian, Canadian and U.S. authorities to provide assistance in increasing the country's geological mapping requirements.

2.17 The use and availability of other geo-information systems is varied. Generally acceptable aerial photography and imagery (Landsat) is available in the country. However the present use of such existing data, in the context of available interpretative techniques, is constrained by the lack of appropriate hardware and software, as well as experience. Considerable geochemical information is available through CNEA and FM, in particular, but it appears that very little geophysical data, particularly relevant airborne data such as a combination of magnetometry and spectrometry, is in the public domain. Certainly, various agencies hold considerable potentially useful airborne geophysical data; YPF, YCF, FM and CNEA. Drillhole information is abundant with the largest amount of data held by the same agencies. Much of this data has not been made available to the federal Secretariat of Mining.

2.18 It is of utmost priority that all relevant information be made available to the federal Secretariat of Mining (SM) (actually the National Geological Service (SGN) when formally established) so that it can initially be sorted, classified and catalogued on to a standard data base system (eg. MRDS, Micro-isis). This would only be the start of a process which would need to involve the upgrading of much information, establishment of interactive data sets and re-evaluation vis-a-vis its value to the understanding and prediction of mineral potential. The collection of all new

data would thus be geared to continued integration into the pre-established data sets leading to a continuous process of data collection, interpretation and dissemination. The Government (SM) has estimated that it would cost about US\$12 million (1992 terms) over a period of 5 years to carry out the immediate required process of compilation, interpretation and dissemination (publication) of existing information, which would need to include some field checking activities. It is probable that outside expert advice on modern methodologies of data treatment would be required. The cost estimate and time frame do not appear to be unreasonable. The Government is now fully aware of the importance of this work in an effort to attract quality investors into the country. Again, the present authorities are gearing-up to correct this deficiency. With a Decree (No. 816/92) in place to create a countrywide geological/mining databank, funding and organization are required to activate the process.

2.19 **Prospects for future production**

Without more exploration knowledge than is presently available, it would be unwise to predict how the varied and generally attractive geology of Argentina would translate into increased value of mineral production once an enabling investment environment has been established and Argentina becomes a real competitor as far as attracting exploration investment is concerned. Initially, it is expected that increased earnings would be derived from medium-scale high-unit value (grade) polymetallic mines with substantial precious metal credits; mines that would require start-up capital of not much more than US\$50 million each. Over the medium term, reasonable macro-economic stability being maintained, it would be reasonable to predict, or for the Government to set a target, of doubling the present value of US\$490 million to US\$1,000 million or 20 percent of present production in Chile (US\$5,500 million) and 50 percent in Peru (US\$2,000 million).

2.20 As far as the mining sector's potential (direct) contribution to GDP is concerned, a best case scenario might be that the investment climate roughly follows the Chilean and Mexican routes. This could result in a contribution by the mining sector of 1 to 3 percent of GDP, a similar proportion to countries such as Bolivia (2-3%), India (2%), Thailand (3%) and Ireland (3%). However, even assuming Argentina's legal and fiscal climate attains that of Chile or Mexico there are serious infrastructural impediments: geographic isolation on a global basis; large distances from areas of greatest potential (the Andean strip) to the consumer heart of the country (Buenos Aires) combined with the rugged terrain, low population density and general shortage of water and energy resources along the cordillera regions. It is, therefore, highly unlikely in the foreseeable future that Argentina's mineral industry in GDP terms, will approach those of Mexico (4%), Peru (10%) or Chile (13.7%).

ATTRACTING INVESTMENT INTO MINING

Local and Foreign Investors

3.1 The private sector, both local and foreign, has been reluctant to commit the large high-risk resources required to carry out effective exploration work and mine development. Parallel with this situation, due to the various factors analysed in this report, companies controlled by the provinces and the state held and continue to hold, exploration and mining licenses over geologically promising areas without performing any meaningful work. The Government must change the perception of Argentina by private investors as well as the reality. Who will be the main players? Federally controlled companies (eg. FM) have virtually discontinued their involvement in mining. Small-and medium-scale Argentine-owned mining companies will continue to play an important role and will become more proficient with experience, as occurred in Bolivia and Peru. Very important investors for the GOA to target will be the large international mining companies and an important group of so-called "juniors" that generally operate out of Canada, Europe and Australia.

3.2 Large international mining companies have the option of investing anywhere. They have the capital and expertise to find and develop large orebodies with an extensive life. On the way they may find good economic mineralization that does not meet company criteria, in which case they will generally sell out to a smaller company; but even via this route they will contribute effectively to development. The junior company often has the expertise to find and develop ore bodies but depending on the size, location and risk, may require participation of a large company or other juniors for later development. They generally do not have recourse to large exploration budgets. Other juniors often seize incentives to promote known properties and profit largely on the capital markets whether these are in Vancouver, London or Dublin. Some junior companies are already playing a role in Argentina (e.g. Musto Resources in Bajo de la Alumbrera). While it is still too early to evaluate their success (or otherwise) in promoting development, it is important that they are also encouraged to raise financing and invest in the sector.

3.3 In order to attract the large international mining companies - and these must be targeted as a top priority - it is important to take into account the corporate policies and strategies of such companies. Most of the large international players prefer to conduct their own grassroots exploration activity rather than buy-in on known properties in an advanced stage of evaluation and development. They require guaranteed access to land and have the necessary motivation, experience, knowledge and access to capital resources to develop projects from scratch, even in difficult areas. Given the past neglect of exploration activities in Argentina and the inability of government entities to effectively conduct exploration, these large companies have an important role to play in the development of the Argentine minerals industry.

3.4 Recent World Bank surveys of large and "junior" international mining companies have provided important information on the criteria for investing in countries like Argentina:

- **Mineral Potential and Infrastructure:** The primary criteria influencing investment are mineral potential and infrastructure. If these criteria are favorable, international mining companies are prepared to commit funds and expertise for exploration and development.

- **Mining Rights and Fiscal Terms:** Given good geological prospects, a guarantee of mining rights before starting exploration is an essential pre-condition. Among other critical factors are a modern mining code, contractual stability, a stable fiscal regime, unrestricted profit repatriation and access to foreign exchange. Accelerated depreciation and amortization are welcome, but generally not considered essential for the investment decision.
- **Ownership and Control:** International mining companies are generally not prepared to invest in countries with mandatory local majority participation. Minority local participation, however, is considered positive by some companies.
- **Political and Economic Risks:** International mining companies are concerned about political and macroeconomic instability. In high-risk countries, large export-oriented mining projects have been isolated from national political and economic developments by establishing "enclave" operations. This has not been feasible in Argentina.
- **Risk Premia:** Mining investments in Argentina require a higher return than similar investments in the developed mining countries. The perceived higher risk in Argentina requires a target return on equity of probably 25 to 30 percent with a payback of 2 to 4 years in comparison to the 20 percent return and 5 to 6 years payback which are normally required in industrialized countries.
- **Geo-Information:** Sector information, in particular basic geological data which would facilitate mineral exploration, is important for attracting investment. Such information is seriously deficient in Argentina.

The Key Factors Determining Mining Investment

3.5 Mining companies are experienced in dealing with commercial and technical risks associated with exploration and mineral development, but they are concerned about "political" risk and legal and fiscal constraints imposed by the government. The risks and constraints facing mining investors in Argentina fall into three broad categories:

- ***The ability to do business. This includes:***
 - *obtaining exploration rights; and*
 - *converting exploration rights into mining rights*
- ***The ability to control costs and be competitive:*** This includes risks that the government may:
 - unilaterally change the tax burden of a mining company;
 - impose price controls on inputs and outputs;
 - direct mining companies to undertake unprofitable investments, including investments in down-stream processing activities;

- require excessive employment; and
- require unreasonable infrastructure and social investments.
- ***The ability to have access to foreign exchange:***
 - mining companies need adequate access to foreign exchange at the market rate to pay for imports, service debt, repatriate capital and pay dividends to foreign shareholders.

3.6 Access to foreign exchange is no longer a constraint in Argentina, but the country has not yet established a well demonstrated track record in mining development and foreign investment. As Argentina maintains the current structural adjustment policies, privatization and deregulation, the country will establish over time a track record which will tend to reduce the risk level perceived by mining investors. There is, however, substantial scope in Argentina for improving, in the short term, the ability of mining investors to do business and to control costs and be competitive. This can be done by:

- *Establishing a sound modern mining code with clear enabling regulations, particularly for the issuance of exploration and mining rights.*
- *Assuring mining investors unrestricted access to promising areas and the right to mine following successful exploration. Mining companies should also be permitted to transfer or trade exploration and mining licenses subject to well-defined criteria.*
- *Enacting a guaranteed fiscal regime which clearly sets out taxation, access to foreign exchange, capital repatriation and permits rates of return on investment comparable to those of competitor countries (e.g., Bolivia, Chile, Mexico).*
- *Establishing efficiently operating mining institutions, both at federal and provincial levels, with clearly delineated responsibilities.*

The Experience of Other Countries

3.7 It is instructive to see how other countries successfully initiated the development of their mining sector. Successful mining countries follow different development strategies but have several key features in common ^{2/}:

- Sound macroeconomic policies with few restrictions on mineral exports and imports of plant, equipment, services and supplies for mining operations.
- A legal framework which clearly defines the mining investor's rights and obligations. This framework covers all important features of mining including exploration, operation and marketing. The framework applies to the whole country.

^{2/} Recent (1991-1992) surveys carried out by the World Bank.

- Security of tenure to give the investor assurance of being able to enjoy the fruits of success.
- A fiscal package which shares equitably the value added generated in mining among the parties involved.
- Guarantees of access to foreign exchange for debt service, profit transfer and imports of inputs.
- Sector institutions which are well organized to effectively provide services and information to investors.

3.8 Of late, Chile has been the most successful country in attracting mining investments. It follows a strong private-sector based policy. Mining comes under the general foreign investment law with no special provisions. Mining rights enjoy the full protection of property rights. In other countries such as Indonesia and Papua New Guinea, which have been somewhat less successful than Chile, mining investments and operations are tightly regulated by the government through project-specific agreements. Government discretion, however, remains limited in the two countries. Chile may therefore represent the best example for Argentina, although important differences exist due to the country's federal structure and the lack of a mining tradition in Argentina. Also a lead can be taken from Mexico. In a short space of time, Mexico has opened up its sector through the implementation of promotional policies and the lifting of restrictions and barriers backed by sound new mining legislation.

THE MINING POLICY FRAMEWORK

Economic and Sector Policies

4.1 A sound economic framework is an indispensable prerequisite for mineral development. The mining industry needs sound macroeconomic and trade policies, a market-based foreign exchange regime, access to credit financing at market interest rates and taxation arrangements that are competitive and fair to both the government and the investors. Mining tends to be capital and import intensive and normally requires a long-term commitment by the investor. Before committing major financial resources for exploration and development, mining investors therefore require an effective and reasonably stable economic framework.

4.2 Since 1989, Argentina has made considerable progress in introducing an economic policy framework which satisfies most of the requirements of mining investors. Import tariffs have been sharply reduced and quantitative import restrictions eliminated. Tariffs and other restrictions on mineral exports have also been abolished. Past excessive domestic regulations and price controls, including restrictions on trade in minerals, have been largely lifted. Inflation has been greatly diminished. Foreign exchange and credit market policies have also been liberalized.

4.3 A reasonable and stable exchange rate is an important ingredient for the mining industry. Even though linkages to the local economy, particularly for larger scale mining operations, tend to be more limited than for other industries, mining is by no means isolated. In Argentina, as in many other countries, local costs such as labor and energy account for a high percentage of operating costs. As for any capital intensive activity, mining requires that exchange rate movements significantly cover major cost increases arising from inflation. Otherwise mining activities and particularly those geared to export, would be subjected to a severe reduction or loss of profitability. Mining companies also need unrestricted access to foreign markets to import necessary specialized equipment and consumables as well as to export their products. This implies the absence of import and export licensing requirements and the unrestricted availability of foreign exchange to pay for imports, to service debt and to effect dividend transfers.

4.4 Overall, the macroeconomic policy framework needed for supporting sound mining development is now in place, possibly with two exceptions. First, the current exchange rate levels result in relatively high production costs, affecting competitiveness in both export and domestic markets. In the medium- and long-term, however, the real exchange rate can be expected to be more favorable to exporters than currently. Second, small- and medium-scale mining enterprises find it difficult to access credit financing. Ongoing improvements in Argentina's financial and capital markets could possibly increase the availability of term credit for these smaller but important mining projects. By mid-1993, the National Bank of Argentina (BNA) may enter the market to provide credit financing including working capital. A certain degree of caution will, however, be required.

4.5 The renewed interest of international mining companies -- both the "majors" and the "juniors" -- in initiating exploration activities is largely due to the strongly improved Argentine economy. However, they will need to be convinced that current sound economic policies will be maintained in the longer term. In addition, the mining sector policy of the GOA is still in disarray, and reform lags behind the reforms at the macroeconomic level. *Argentina does not yet have a mining development strategy which would be consistent with the macroeconomic policies of liberalization and deregulation. Given the dominion of the provinces over mineral resources, it*

may not be easy to agree on a uniform sector strategy for the whole country. But there is an urgent need to establish such a strategy if the remaining constraints to investment in Argentine mining are to be eliminated.

The Role of the State

4.6 Federal and provincial governments have legitimate concerns regarding the role mining plays in development. In the past, this has generated a conflict between government objectives in mining development and the long-term profit maximizing objective of private investors. The determination of federal and provincial governments to be directly involved in mining and to assume a major share of the value added generated by the sector was a major reason why international mining companies would not invest in Argentina. In particular, investors found that they faced insurmountable difficulties in obtaining attractive concessions under acceptable terms. Experience in other countries which have successfully attracted mining investment shows that there need not be a conflict between government control of sector development and a strong private sector role in mining. Successful mining countries have generally established a strict separation of responsibilities. Governments set sector policies, administer concessions and licenses, collect taxes and fees, monitor exploration and mining activities, and provide targeted technical assistance. Exploration, development and production activities are left to private entrepreneurs who have the resources and expertise to perform these functions better than government institutions.

4.7 Since 1989, the federal government has initiated steps to achieve a more efficient division of responsibilities in the mining sector. Federal government institutions aim at finalizing divestiture of all mining assets by the end of 1993. Federal government institutions would then only perform functions of policy setting, administration and research functions. Provincial governments, on the other hand, have been reluctant to reduce their direct involvement in mining. They have generally maintained large areas as provincial reserves. Some provinces have even increased the reserved areas by acquiring property from federal institutions. Provincial governments and provincial mining corporations have also entered into a number of joint venture agreements with private investors on exploration and feasibility work on provincial reserves. Joint ventures between provinces and private investors perpetuate direct government involvement in mining and do not lead to rapid development of the provincial mining resources. The transparent and carefully phased divestiture of provincial mining assets to the private sector would considerably accelerate mining development.

4.8 The implementation of effective mining policies requires the establishment of strong public institutions with clear terms of reference. Given the federal organization of the country and the dominion of the provinces over mineral resources, a key requirement is the establishment of clear lines of responsibility between federal and provincial authorities. At the same time, federal and provincial sector institutions should cooperate closely in order to avoid overlap and to achieve the necessary levels of efficiency in sector administration. Currently, the performance of both federal and provincial mining institutions is unsatisfactory. Institutional responsibilities are not well defined, and cooperation between institutions is ineffective.

Development of an Effective Mining Sector Strategy

4.9 The Government must develop a total sector framework to increase mining investment and become competitive both regionally and internationally. Such a sector development strategy must take into account the various issues enumerated in Section 3 of this report. Because of the federal system and the complexity of operating under federal laws and provincial dominion of mineral rights, particular attention must be given to:

- *Continuation of current macroeconomic policies, especially market-based foreign exchange and trade policies.*
- *A clear division of responsibilities between federal and provincial authorities. This should be consistent with both the dominion of the provinces over mineral resources and responsibility of the federal government to determine the economic policy framework for the country.*
- *Coordination at the federal level of country-wide geological activities and the technical, statistical and cadastral data base through a national geological survey institute and a department of mines.*
- *Divestment of the provincial mining assets to the private sector as soon as possible. This is particularly important for the provincial reserves which tie up land. The Bank mission found this to be a major obstacle to private investment at this time.*
- *The development and administration of clear and realistic environmental guidelines and standards which must be similar for all provinces.*

4.10 The establishment of such a mining sector strategy would ***best be accomplished in the first instance through the development and promulgation of a Mining Policy Paper. It is imperative that this Paper be developed and agreed upon both at the federal as well as the provincial level. This Policy Paper would incorporate and be developed around the recent initiatives being taken by the Government.*** A contemporaneous or subsequent Sector Action Program would spell out the details of the measures to be taken in the areas of overall policy, legislation, organization etc., as well as a timetable and designated responsibilities. It is also important that the meat of the Policy Paper and Action Program be discussed with the private sector as well as other interest groups and committees both within and outside government; (e.g. NGO's, professional and trade organizations, academia and research interests).

4.11 A variety of options are open to the GOA for implementing an effective mining sector strategy. However, the two obvious options are:

- *Wiping the slate clean and making a new beginning*
- *A program of incremental adjustments and improvements*

Under the first option, new mining legislation would be designed and a new institutional structure developed at the federal and provincial level. Under the second option incremental adjustments would be made to the existing legislation and institutional structure until the desired end result was achieved over time. This report strongly recommends that the Government make every effort to adopt the first option largely because the present Mining Code, its amendments and various regulations are outdated and overly complex.

FISCAL POLICIES AND INCENTIVES

Taxes and Incentives in Mining Development

5.1 As a general principle, all sectors of the economy should be subject to the same, or very similar, taxation for investments to be made efficiently. Such tax neutrality across sectors means that investment and production decisions are not influenced by differential taxes or incentives but by sectoral differences in potential profits and risks. Taxes and any incentives should apply equally to all players: local and foreign private investors as well as any state enterprises. Characteristics specific to mining, such as high degree of risk and fluctuating market prices, must be taken into account. Another factor to take into account is the fact that the basic decision to invest in a country by a mining enterprise is strongly influenced by the total tax package, including federal and provincial charges. In the specific case of Argentina it is important that this tax package be competitive with, in particular, regional competitor countries.

5.2 Mineral production generates so-called "rents": the value of output less all direct and indirect costs of production, including the minimum rate of return on capital required to entice an investor to commit funds in the first place. The division of this generated rent between the state and the investor must be fair to both parties. A division tilted in favor of the state implies a disincentive to invest and the degree of tilting in favor of the investor is a balancing act which is an incentive that, if tilted too far in favor of the investor, can cause distrust in government and lead to continued renegotiations. In addition to taxes, primarily corporate income (profits) taxes, it has been customary for many governments to levy royalties on mineral production as a means of securing a guaranteed portion of the generated rent. Some governments also attempt to obtain a share of the rent through free or so-called "carried" equity in private financed mining projects. Some countries use an APT (additional profits tax) to capture part of windfall profits which can, rarely, occur when a bonanza part of an orebody is discovered and, or, commodity prices skyrocket beyond project feasibility projections.

5.3 A very important sector-specific tax or fee levied in some form or another by most countries is the land-rental payment ("canon"). Not important for generating large revenues, the main functions of the land rental system are to: a) cover the administrative cost of running the cadastre (land management system - verification of location and tenure of concessions); and b) ensuring the effective use of land, particularly at the exploration stage. Land rentals can be used in a variety of ways, somewhat commonly combined with timeframes, annual investment commitments and surface area reduction over time. Many developing countries, including Argentina, have mismanaged this very important system which has led to large areas of land being tied up at virtually no cost and without providing revenues at either the provincial or federal levels.

5.4 Governments in some mining countries have believed that establishing a well designed tax system is not sufficient for developing a strong mining sector. They have recognized that in order for the mining sector to develop to its full potential, additional incentives must be provided to account for its special characteristics:

- Mining involves a high degree of risk and is highly capital intensive.
- Mining projects have normally long lead times and investors have to wait several years to generate a positive cash flow.

- Mining operations are frequently located in remote areas with inadequate infrastructure.
- Small-scale miners frequently lack the ability to operate efficiently. They also have inadequate marketing experience, particularly in foreign markets.
- Mining investors usually have inadequate access to credit financing, since banks consider mining a high credit risk.

5.5 Several mining countries have attempted to overcome the above constraints to mining development by providing special incentive schemes for the sector. Typical incentives include tax concessions, low interest rate credit lines, cash subsidies, free technical assistance, purchasing schemes which include subsidization, and provision of infrastructure and public utilities at reduced cost. In practically all countries, incentive mining promotion schemes have proved to be a failure. Normally, only few new viable projects have been attracted with special incentives. In many cases, operations have collapsed once subsidization ended. The fiscal cost of incentive programs have tended to be high in relation to the results. Given these results, most mining countries have discontinued their special incentive schemes for the sector.

Mining Promotion Schemes in Argentina

5.6 In 1975, the federal government issued a Mining Promotion Law (Ley de Promocion Minera No. 22095) aimed at supporting the national mining industry. The Law was revised in 1979, mainly to include foreign mining investors. The revised Law was suspended in 1989, although the companies registered under the Law prior to its suspension continue to benefit from the incentives. While no additional mining companies have been registered since 1989, the 130 mining operations currently in the Register of Beneficiaries ^{6/} represent the most important part of Argentina's mining sector. As tax reductions/exemptions are the main incentives provided by the Law, mining companies in Argentina practically pay no federal taxes.

5.7 The Mining Promotion Law provides two categories of incentives. *General incentives*, which involve mainly two types of benefits: (a) allowing investment expenditures to be deducted from taxable profits; and (b) reduction of value added taxation over a 15-year period, including a complete exemption during the first seven years of operations. *Special incentives* under the Mining Promotion Law, which are received by a total of 57 mining projects, include reductions in federal taxes during a 15-year period (full tax exemption during the first seven years and reductions at a declining scale thereafter). In addition, enterprises operating under special incentives may use accelerated depreciation of their assets; enjoy additional deductions of parts of investment expenditures from taxable income (national investors may deduct 200 percent of the investment amount) and are exempted from import duties ^{7/}.

^{6/} A total of 430 enterprises are currently registered, only 130 of which are mining companies. It is not clear whether or not the 300 non-mining companies also receive the benefits. The Government estimates that the fiscal cost through 1989 was US\$348 million.

^{7/} Art. 270 of the Mining Code provides additional incentives that exempt mining investors from all federal, provincial and municipal taxes for the five years after registration of the project. This incentive scheme is still in effect.

5.8 A third promotion scheme is the Mining Development Fund (Fondo de Fomento Minero), which was also suspended in 1989. The fund financed projects mainly for exploration expenditures (including preparation of feasibility studies) by nationally owned small- and medium-scale enterprises. In addition to federal cash contributions, the Fund was financed by duties imposed on imports of minerals (2% duty on imports from Latin America, 6% on imports from other regions). Between 1975 and 1989, the Fund financed a total of about 100 projects.

5.9 The Secretariat of Mining recently completed an evaluation of the results of the Mining Promotion Law and the Mining Development Fund. The Secretariat of Mining estimates that the total annual fiscal cost of the general incentives provided by the Mining Promotion Law (income tax and value added tax reductions) is currently about US\$73 million. The fiscal cost will decline over time as lower tax reductions apply. The tax exemptions and reductions under the special incentives of the Mining Promotion Law are estimated at US\$3.8 million per year. Again, this amount should reduce over time ^{§/}. Finally, the Mining Development Fund disbursed a total amount of US\$23 million between 1975 and 1989.

5.10 The overall cost-effectiveness of the incentive programs are difficult to determine. The Secretariat of Mining estimates that every dollar spent for tax incentives generated over US\$25 in additional production. This estimate does not appear realistic. Given the decline of production by mining enterprises during the 1980s, the incremental incentive/output ratio may even have been negative. Furthermore, there are strong indications that the Mining Promotion Law helped to establish a large number of non-viable enterprises. Several provinces including Mendoza, San Juan and Catamarca, report a decline of mining production in recent years of up to 60 percent, while most mining enterprises continued to benefit from the tax reductions provided by the Law. The poor results of the incentives are confirmed by observations in the six main mining provinces (see Annex 3). The majority of small- and medium-scale mining enterprises are operating under extremely difficult financial situations and a substantial number of previously subsidized mining operations may close down or reduce production in the near future.

5.11 Since suspension of the federal Mining Promotion Law in 1989, several mining provinces have established their own incentive legislation. Mendoza has a Ley de Promocion Fronteriza with incentives financed by a 1.5 percent provincial sales tax. Mendoza has also recently established a development fund (using part of the provincial oil and gas revenues) to finance projects. Both promotion schemes emphasize mining operations, although other sectors may also benefit. The province of San Juan established a specific Mining Promotion Law following the federal example. The Mining Promotion Law of San Juan provides general incentives, in the form of provincial tax exemptions, and special incentives which are defined in negotiations between the investor and the provincial government. The main special incentives are reductions of royalty payments and direct provincial contributions to the project cost. The provincial incentive schemes require in-depth project evaluations. Provincial administrations are not staffed to conduct such evaluations. The risk of wasting scarce fiscal resources is therefore large and this report strongly recommends against such schemes.

§/ The SM study estimates that the total fiscal costs of the Mining Promotion Law and the Mining Development Fund during 1975-89 were US\$372 million, most of which occurred in the later years.

Current Mining Taxation in Argentina

5.12 In accordance with the provincial dominion over mineral resources, specific mining taxes are collected by the provinces. The non-sector specific taxes are federal taxes. The special provisions and effects of federal taxes on mining are as follows:

- *The profit tax* is currently 20 percent for corporations and 36 percent for other enterprises. A withholding tax of 20 percent is imposed on dividend payments to foreign residents. There may be exemptions/reductions of withholding taxes, except in cases where double taxation agreements and other regulations would result in a transfer of taxes to foreign tax authorities. Corporate profit taxation provides for a mining depletion allowance. The value of the reduction of the mineral *in situ* may be added to cost as additional depreciation.
- *The tax on net assets* was introduced in 1990. The tax rate is 1 percent. In mining, the value of the deposit is considered part of the asset. Its value may be reduced by the depletion. Profit tax payments may be deducted from the asset tax.
- *The value added tax (VAT)* varies between 16 percent and 25 percent. Mining is fully subject to this tax. Exports receive a reimbursement of VAT payments.

5.13 The most important provincial and municipal taxes for mining are as follows:

- Most provinces have a *sales tax* with a wide range of rates according to the product involved. For example, in the province of San Juan the sales tax on unprocessed minerals is 1 percent and on processed minerals, 1.5 percent.
- *Royalties* of up to 10 percent *ad valorem* have been charged in some provinces. High royalty rates have recently been reduced to more reasonable levels. In most provinces royalties are currently suspended. The majority of the provinces are currently considering levying royalty rates of between 3 and 5 percent.
- The federal mining code determines the level of *land rental* but revenues from this source are collected by the provinces. The current land rentals for small areas and short periods of time are excessively low whilst the rentals for large areas, required for effective exploration work by large investors during initial activities, are excessively high. In any event, the provincial administrations are not effectively collecting these revenues. This situation contributes to the inefficient use of land and often results in a barrier to entry by serious investors.

5.14 The current levels and structure of mining taxation are unsatisfactory for both the investor and the government. Mining investors seem to be generally satisfied with federal taxation - which is considered reasonable, when compared with other mining countries - although foreign investors are discriminated against with respect to the withholding tax. Also, mining companies that export complain about delays in the reimbursement of the VAT which reportedly can take up to one year. An important issue arises from the risk of changes in federal tax levels that mining investors cannot effectively mitigate. In other mining countries, investors frequently establish agreements with

the government on taxation for the life of the project. As mining investors in Argentina have to deal with provincial governments, contractual arrangements on federal taxation would require special provisions ^{2/}.

5.15 Given the inability of the Government to effectively collect taxes on mining - income tax, royalties and land rental payments in particular - is there a means to change the system so that rental is derived as minerals are produced? Any such system would involve increased royalties and reduced profits taxation. It is possible that such a system would be easier for the Government to manage but it presents grave disadvantages. Such sector-specific taxation would severely distort required tax neutrality across sectors and royalties are a disincentive to investors. Royalties do not take into account the cost of mining and have the effect of decreasing the amount of ore that can be mined. This results in sub-optimal investment and operating decisions. The ability of the Government to collect its share of rent at the federal as well as the provincial level is not specific to the mining sector but is a common problem which requires due attention and falls outside the scope of this report.

New Government Initiatives

5.16 During this sector mission work in Argentina (August 1992), the Government was analyzing various options for providing new incentives to the mining sector. The SM had prepared a draft Mining Investment Law (Anteproyecto Ley de Inversiones Mineras) which in a sense would replace the Mining Promotion Law of 1979 which was suspended in 1989. This new Law (Ley de Inversiones, Mineras) was submitted to Congress by the Ministry of Economy as part of an "initiative package" in January 1993. This package consists of a Mining (Sector) Restructuring Law (Ley de Reordenamiento Minero) as well as the above-mentioned Ley de Inversiones Mineras.

5.17 The newly proposed Mining Investment Law was approved and enacted at the end of April 1993. New investors as well as the provinces have the option to accept or reject the provisions. Should the long-term (30 years) tax guarantee be violated in any way at any level, then the investor has a right to start proceedings through claim filing. A comparison between the new law and the old mining promotion law is given in Table 5.1.

^{2/} Art. 412 of the Mining Code permits the federal authorities to establish mining agreements with investors, but only if the provinces agree. Such agreements have apparently not materialized. Recent initiatives have been taken; see New Government Initiatives.

Table 5.1
Comparison of Incentives Provided by the
Mining Promotion Law of 1979 and the
New (1993) Mining Investment Law

| Incentive Category | Mining Promotion Law of 1979 | New Mining Investment Law |
|---------------------------|---|--|
| Profit taxation | Deductibility of total investment Accelerated depreciation of investment | Deductibility of expenditures for exploration and feasibility work Accelerated depreciation of investment |
| Value added tax | Exemption for seven years; reduction for additional eight years | No exemption or reduction |
| Tax on net assets | Exemption for seven years; reduction for additional eight years | Complete exemption |
| Royalties | No provision | Establishment of 3% maximum royalty ex-mine. |
| Import duties | Duty exemption for machinery and equipment | Duty exemption for machinery, equipment, supplies and spares |
| Accounting rules | No special provision 50% of mineral reserves can be capitalized | Special reserve for environmental protection measures 50% of mineral reserves can be capitalized |
| Tax stability | No provision of tax stability | Tax stability for 30 years proposed at federal, provincial and municipal levels |

5.18 *The new Mining Investment Law* contains a number of important improvements over the previous Mining Promotion Law of 1979. It envisions agreements (Convenios de Adhesion) between the federal and the provincial governments on mining taxation and incentives. Such agreements would remove an important constraint to mining investment in Argentina by reducing the risk for the investor of unilateral changes in mining taxation. Tax stability, including a maximum royalty of 3 percent, would be guaranteed at both federal and provincial levels. The new law would

also avoid a costly and cumbersome evaluation of investments, which was required under the Mining Promotion Law. The new law only requires the inscription in a register which is open to all qualifying enterprises ^{10/}. Furthermore, it includes a provision for covering the environmental cost of mine closures. Tax-deductible reserves may be established to pay for such costs. Finally, the fiscal cost of the incentive package will be much reduced as compared to the Mining Promotion Law of 1979. In particular, the new law only provides for income tax deductibility for exploration and project preparation expenditures, while the Mining Promotion Law allowed the deduction of the total investment.

5.19 The new mining investment law represents an important Government initiative and is certainly a step in the right direction. However, this initiative must be accompanied by other changes discussed in this report for there to be a major impact on mining development in Argentina. From the fiscal point of view, some special incentives that remain may result in reduced revenue by the federal and provincial governments and the new law may raise an issue of consistency with the country's macroeconomic policies. Exemptions and reductions in profit taxes and import duties may not be consistent with overall tax and duty arrangements. Other economic sectors would probably demand tax concessions similar to those provided to mining. In general, with a sound macroeconomic and overall fiscal regime in place and with consistent and transparent sector laws, there is no real need for a special incentive regime for mining. A mineral taxation package, which has proved supportive of mining development in other countries, is presented in the following section of the report.

5.20 The new mining investment law seeks the collaboration of the provinces (and municipalities), but constitutionally cannot enforce these federal proposals. As in the past, it will not be known until the implementation stage, whether such an approach will work. As is evident throughout this report, the Federal - Provincial relationship is a crucial issue. Alternatives aimed at resolving this problem, particularly with respect to taxation, royalties, land rentals and land management (the mining cadastre), are briefly outlined in Section 6.

5.21 *The Mining Sector Restructuring Law* is somewhat diverse in nature. It covers geological mapping, the formal creation of a Federal Mining Council (Consejo Federal de Minería), modifications to the exploration and mining concession land rental fees (the "canon minero") and seeks to empower the executive branch of the Government of Argentina to establish special customs (duty free) zones for the mining sector. The geological mapping provisions spell out the importance of the work, set out guidelines of products (including scales of geological maps to be published) and types of other maps (thematic), provides for the creation of another commission to assess progress of geological mapping and seeks to establish the Secretariat of Mining as the single authority for geological mapwork and that budgetary provisions be made to carry out this work. Normally these types of details would be covered by internal regulations of the Secretariat of Mining or equivalent institutes, even though the broad scope of institutional responsibilities needs to be set out by law.

5.22 The legal establishment of a Federal Mining Council certainly has merit. As fully supported by this report, it provides a vehicle for the federal and provincial authorities to develop a national mining policy which covers and integrates the needs of the nation as well as the provinces. This Federal Council will act as an advisory body to the Secretariat of Mining. How effective it

^{10/} All mining activities, except oil and gas and some construction materials (cement, ceramics, non-metalliferous sands) qualify.

might become is difficult to predict. The changes proposed to concession rental fees are discussed later in this section. The entire land-rental and management system, a very complex subject, could have been subjected to more in-depth specialized studies. Recent changes, however, provide access to larger exploration areas by the private sector: 1,000 km² per company per province. This matter is further discussed under Paragraph 5.25, in the "Land Rental" section. The proposed development of sector-specific duty free customs zones does not appear to be compatible with overall macro-economic policy as it will distort total taxation neutrality across sectors. Instead, a duty draw-back scheme is proposed below (ref. Import Duties). A recent Government proposal suggests lifting import duties on many capital goods.

5.23 Another very recent initiative being taken by the Government (April-May, 1993) is the preparation of a *Federal Mining Agreement (Acuerdo Federal Minero)*. Signed by the President of Argentina, concerned federal ministries and authorities and the Provincial Governors on May 6, 1993, this Agreement is scheduled to be ratified by Congress as a Law and the Federal Executive (Poder Ejecutivo Nacional) and the Provincial Governments have compromised to adopt its recommendations immediately. Although it is more of a political document than a sector-specific law, the Agreement does attempt to bring the Federal and Provincial Governments closer together in promoting private investment in the sector. On the other hand, it appears to reinforce the Provincial role in the auctioning of Provincial mining reserves. This report recommends that more precision could be included in such an arrangement, particularly with respect to the manner in which Provincial reserves are treated (ref. Section 6 of this report).

The Proposed Mining Taxation Package

5.24 Mining investors aim at minimum tax payments while the Government's main benefit from mining is tax revenues. Experience in other mining countries demonstrates that an effective tax system can be established that meets the reasonable objectives of both the government and the investors. The following principles should be observed in designing a mining taxation package:

- *Investors prefer profit-related taxes to production-related taxes. The government is interested in receiving tax payments as soon as production starts. A viable tax package attempts to strike a balance between these two positions, avoiding excessive royalties, import duties and sales taxes which have to be paid independently of profitability.*
- *Mineral taxes should be consistent with the taxation of other sectors in the Argentine economy. There should be no special tax concession for mining, as is currently envisaged in the new Mining Investment Law.*
- *Taxes should be stable over the long term. This is an important requirement for attracting investors to Argentine mining. Due to Argentina's federal structure, taxes are imposed by both the federal and the provincial governments. Conventions between the federal and provincial governments may be the most effective instrument for providing tax stability to the investors.*

- *A well-designed tax regime can only provide tax revenues to the governments and guide investors to the most profitable mining projects if the tax collection system is effective and fair. Improvements are needed in mining tax collection mechanisms at every level of government.*

5.25 In order to meet the above criteria for an effective tax package, the following changes of the existing taxation of mining should be considered.

- **Royalties.** Mining investors do not like royalties which are considered to be a production cost, and frequently have to be paid before a positive cash flow is achieved. On the other hand, royalty payments are the most important fiscal benefit that the provinces derive from mining. Following the proposal in the new Mining Investment Law, it is therefore recommended that a uniform 3% royalty for all minerals be applied in all the provinces. A low, uniform royalty will help attract investors. However, it is necessary to decide the royalty determination point. *The newly proposed Mining Investment Law proposes an ex-mine royalty with no further definition. Ex-mine is only appropriate for a few minerals and is not appropriate for large mining operations. In virtually all mining operations involved, royalty should be based on the value of concentrates (ex-concentrator) or, particularly for precious metals, ex-smelter. It appears that the newly proposed royalty arrangements were drawn up without due consideration of the various issues.*
- **Corporate Profit Tax and Dividend Withholding Tax.** There are no current Argentine profit taxation issues in mining, although two aspects of the tax should be reviewed. First, Art. 270 of the Mining Code provides complete tax exemption, including exemption from profit taxes, during the first five years after registration of a mining project. It is recommended that this tax exemption, which is not applied in other sectors, be eliminated. This measure would re-establish neutrality of taxes across sectors. Second, current income tax legislation provides for a depletion allowance. The value of the mineral extracted may be deducted from taxable revenues. However, a depletion allowance, which may be given to the owner of the mineral in the ground, is not consistent with Argentine mining legislation. The mineral in the ground belongs to the province, not to the mining company. It is recommended that the depletion allowance for mining companies be abolished.
- **Depreciation.** Mining normally requires heavy initial capital expenditures which are depreciated over longer periods of time. Accelerated depreciation allowances help provide relief during the initial period of operations. Such allowances would normally change the timing of tax payments but would not affect the total amount of taxes paid over the life of a mining project. The following depreciation provisions should be considered for Argentine mining:

Exploration expenditures could be fully amortized in the first year and subsequent exploration expenditures within the licensed area could be expensed in the year in which they occur. They should not be tax deductible, as established in the new Mining Investment Law. Capital assets and intangible development expenditures could be depreciated over ten years or the estimated life of the mine, whichever is less. Following the proposal in the new Mining Investment

Law, investors should be able to opt for accelerated depreciation during the initial period of operations. The maximum depreciation rate, however, should be limited to 20-25 percent per year (implying a four to five year depreciation period) and not over three years as established in the new mining investment law.

- **Import Duties.** Import duties have been substantially reduced in recent years. Nevertheless, the remaining duties tend to increase the risks for mining investors since they raise the total pre-operation expenditures for exploration and development. However, across-the-board duty exemption for mining machinery and equipment, now being proposed, is not appropriate. Duty exemptions for mining sector imports would not be consistent with Argentina's overall trade policies. A functioning duty draw-back scheme, which would also reimburse exporters for duties paid on imported equipment, would address most issues of import duty payment.
- **Land Rental.** A well structured land rental "canon" is a crucial instrument, particularly since it can cover administration costs and achieve a better allocation of exploration concessions. The proposals for reform made in the new Mining (Sector) Restructuring Law are an improvement to the present situation, but like the new provisions of the investment law are piecemeal and have not been given due consideration. The changes proposed to Congress include a change in land rentals (canons) for most types of deposits (Categories 1 and 2, ref. Section 6 of this report) of interest to the typical mining investor to Pesos 400 (US\$400) per 500 Ha for 150 days which then still becomes subject to the complexities of Article 28 of the existing Law regarding the relationship between the numbers of "measurement units" (not pertenencias) and the duration they can be held and then reduced in size. In approximate practical terms this implies, as an example, that exploration land rentals would cost the investor about US\$8,000/year per 100km². The level may be reasonable for small concessions, e.g. one or two units (5km² - 10km²) but is excessive for a major investor who wishes to initially screen large areas which may be in excess of 1,000km². It can be concluded that new changes are not in line with the modern day requirements of the industry. The Secretariat of Mining should make an in-depth study of the entire land-rental/work requirement/timeframe concession mechanism.
- **State Participation.** Governments frequently wish to be equity partners in mining projects, both to collect dividend payments and to assure that the project is operated in accordance with agreed policies. The agreement between YMAD in Catamarca and Musto on the Bajo de la Alumbrera project provides for a 20% state equity share. Rent collection by the state (provinces) need not involve free equity participation. A well-designed tax system is a mineral rent collection system superior to state equity participation. Experience in other mining countries has shown that, even where mining is highly profitable, dividend payments tend to be modest, since they are made only after taking care of all other expenditures.
- **Mining Tax Collection.** An effective tax regime cannot serve its purpose if the tax collection system is deficient. Deficient collection procedures are currently

a major reason for the small amounts of mining taxes collected by the provinces. Most provinces have practically suspended collection of royalties and are not fully enforcing the regulations for collecting the land rental. Mining tax collection systems have to be much more effective, if the provinces are to benefit from mining development. A practical step toward collecting more mining taxes could be achieved by transferring the responsibility for collecting royalties and land rental (canon) from the mining administration to the tax administration in the provincial governments. Such a transfer would remove possible conflicts of interest from within the provincial mining administrations.

THE REGULATORY FRAMEWORK

The Mining Code and Regulations

6.1 The federal Mining Code (Law) forms the legal basis for mining in Argentina. Introduced in 1886, it has experienced a large number of changes including a few major amendments. It also retains much of its ancient and outdated character. One of the major problems in Argentina is that the provincial governments are responsible for implementing this federal code. This is an anomalous situation unlike, e.g. Australia and Canada, where the individual provinces (states) actually "own" and implement their own laws. This ownership is more logical when, as in Argentina, the provinces hold dominion over their natural resources. The provinces have issued regulations which are intended to enforce the federal code and provide rules for use by the provincial mining administrations as well as for the mining industry housed in each province.

6.2 The Argentine Mining Code and the provincial regulations do not reflect the requirements of modern mining legislation. Also, although there are similarities in the regulations between the different provinces, the differences are important as well as confusing to some mining investors. Additionally, there are cases of inconsistency between the regulations and the federal code. Experience from other countries with developed mining industries clearly demonstrates that mining legislation which does not meet the principal requirements of major mining companies, represents an important constraint to mining development; it is an obvious barrier to entry ^{11/}. Above all, modern mining legislation, be it federal or "provincial", must:

- provide access and tradeable title to areas of land which, at least initially, are sufficiently large to permit high-tech rapid screening to assist in initial target selection;
- encourage the rapid turnover of land so that other investors can participate fully in the exploration cycle;
- apply equally to all investors, foreign or domestic;
- set out clearly defined rules and regulations which minimize government (regulatory) discretion and procedural and, or, interpretative ambiguity; and
- prescribe procedures for settlement of disputes in courts of arbitration.

^{11/} A small number of countries have been successful in attracting new mining investment by foreign companies in recent years. A study of the Mining Legislation in six jurisdictions, namely Chile, Papua New Guinea, Indonesia, Botswana, Ghana and the State of Nevada, U.S.A., (*Comparative Study of the Mineral Laws and Relative Investment and Fiscal Laws of Six Selected Countries*, Duncan, Allen and Talmage; Washington D.C.; July 1990) was prepared for the World Bank. This study will be made available to the Argentina authorities. The study outlines the common principles underlying the mining legislation for these six jurisdictions. It also illustrates some of the different approaches taken to ensure good access for potential investors for exploration of prospective land.

6.3 Measured against these basic criteria, Argentine legislation, including the newly proposed laws (Investment and Restructuring), fall short of the requirements for promoting a vigorous minerals industry. Further details and examples are provided in Annex 1. In summary, the many ambiguities in the Code, the lack of clear title, the provincial regulations, and the absence of detailed procedures on the settlement of disputes creates a particularly serious obstacle to attracting the required level of investment. A reform of the regulatory framework for mining in Argentina is urgently required.

6.4 There are potentially three options for carrying out this reform:

First: Designing a new modern Federal Mining Code and "standard" enabling Regulations which would be used by the provinces for administration of the Code.

Second: Attempting to improve both the Federal Code and the provincial mining regulations in a piecemeal fashion through amendments (now being adopted by the Secretariat of Mining).

Third: Drawing up a new Federal Code which only deals with matters of federal concern and drawing up entirely new legislation (code and regulations) for each province.

6.5 The third option may be the only way of eventually eliminating the eternal problems encountered in cooperation between the federal and provincial governments - particularly as long as the provinces are the owners of the mineral wealth. However, this would be a fundamental change requiring considerable time which cannot be regarded as a viable option in the foreseeable future. It would require a tremendous duplication of effort, and hence cost. However, this fundamental approach should not be discarded out of hand. It is an issue which requires further study.

6.6 This report opts for the first alternative. The construction of the new Code would be done with the full participation of the provinces, the industry and the federal legislature. Standard regulations, similar to the present initiatives ^{12/}, could be developed for adoption by the provinces. New provincial regulations would obviously be consistent with the new Code. Presently, the Government argues against this "new beginning" approach because a) the process may create a period of juridical uncertainty, and b) the process was previously attempted and failed.

Mining Investment Agreements

6.7 Investment agreements are often an indispensable condition for foreign investors of major projects in countries where the risk of unilateral changes by the government to the investment rules is considered high because of lack of track record and economic difficulties. Given the uncertainties resulting from the current Mining Code and its regulations, investment agreements for specific mining projects would have several important functions in Argentina. First, from the

^{12/} The mining regulations of most mining provinces are currently being amended with a view to increased uniformity in the Nuevo Cuyo and NOA regions. Such uniformity of provincial regulations would have room for considerable institutional diversity among provinces. For example, the special role in the administration of concessions afforded in some provinces to the Mining Judge could be maintained.

investor's point of view, an investment agreement can considerably reduce the risks involved, given the deficient legal framework for the sector. Second, investment agreements would provide assurances to investors if the mining legislation were to be fundamentally changed in the future. Third, in the case of Argentina, perceived risks are exacerbated by the country's federal structure. Investors face the risk of policy changes at both the federal and provincial level. Prior to committing themselves to major long-term investments, mining companies may want assurances from the federal authorities on the Mining Code, environmental legislation, federal taxation and trade and foreign exchange policies. Assurances would also be required from provincial authorities regarding mining rights, provincial taxation and royalties, etc. (ref. Section 5).

6.8 Investment agreements also provide advantages for the government by ensuring appropriate conduct of investors. Investors may attempt to reduce their (federal) tax obligations through under-pricing of mineral sales, over-leveraging of the project's financial structure, making excessive payments to parent companies for services and supplies, and making high interest shareholder loans. The investment agreement can be used to ensure arms-length pricing, a satisfactory debt structure and limits on payments to associated companies. Environmental protection measures to be taken by the investor -- which currently have no satisfactory legal and institutional basis in Argentina -- can also be clarified in investment agreements.

6.9 Although large mining investors would have a strong interest in obtaining specific contractual assurances with respect to taxation and foreign exchange regulations, there are serious difficulties in establishing effective mining investment agreements in Argentina. Several important assurances can only be obtained from the federal government but, due to the provincial dominion over Argentina's mineral resources, investment agreements have to be established with provincial institutions ^{13/}. This situation creates an important obstacle to investments by large international mining companies in Argentina. The federal government has attempted to overcome this constraint to large-scale mining investment by adding a specific section to the Mining Code (Titulo XIX: De la Minería a Gran Escala). Article 412 of this section stipulates that the provinces may permit the federal authorities to establish investment agreements (contratos) for large-scale exploration and exploitation in areas under provincial dominion. The investment agreements would contain the detailed rights and obligations of the investor, the federal government and the provinces. In particular, the provinces would maintain their rights to land rental and royalties and could share in profits and other benefits. However, no investment agreement has materialized under Title XIX of the Mining Code. It appears that the provinces are unwilling to transfer part of their rights over mineral resources to the federal government.

6.10 Given the advantages of mining investment agreements in Argentina's legal framework, the Secretariat of Mining, together with the mining administrations of the provinces, could consider the option of drafting model investment agreements which would be applied by both federal and provincial authorities. Such a document could be a temporary measure until new legislation is promulgated. Once effective new mining legislation is in place, the model agreement would be supplementary to the revised legislation. The model investment agreement could address the following main issues:

^{13/} The agreement between YMAD and Musto on the Bajo de la Alumbrera project stipulates that YMAD will take all steps possible to obtain favorable treatment by the federal tax authorities.

- **Clarification of Mineral Rights.** This would be particularly important since the Mining Code and regulations leave many issues unaddressed.
- **Obligations of the Investor.** This would include the details of work requirements; infrastructure provision; environmental, employment and training obligations; health and safety requirements; and environmental obligations.
- **Fiscal Provisions.** Royalties would be agreed upon within the recently proposed uniform 3% maximum rate. Regular federal taxes (on profit, value added, and assets) would not be included in the model agreement. However, assurances should be provided in the agreement that the taxation provisions -- for both federal and provincial taxes -- will be stable over the life of the project.
- **Financial Aspects.** This would include minimum debt equity ratios, criteria for payments to associated companies, and product pricing arrangements.
- **Foreign Exchange Arrangements.** This would mainly relate to assurances on the availability of foreign exchange for imports of inputs, debt service and dividend payments, and capital repatriation rights at the end of the project. The use of off-shore accounts by the investor could also be clarified.
- **Legal Safeguards.** Arrangements for settlement of disputes should be included in the agreement.

6.11 The decision to offer - as an interim measure - mining investment agreements requires some deliberation because, a) the considerable effort required may be better directed at re-writing the basic legislation; b) no two mining projects are the same, and c) a model agreement, and each project agreement may require legislative sanction at both federal and provincial levels.

Provincial Mining Reserves and Privatization

6.12 Article 409 of the Mining Code permits the provinces to establish mining reserves of up to 200,000 Ha for a period of four years to conduct basic geological investigations. Article 410 permits a prolongation of the period by five years for conducting more detailed exploration work. Most mining provinces have reserved the maximum area permitted under the law, but very little exploration or development work has been undertaken on provincial reserves since their establishment. In most cases, the original prospects investigated during various regional exploration programs of the 1960s and 1970s (the UN-supported Plan Cordillerano, Plan Patagonico, Plan NOA, Fabricaciones Militares programs, CNEA program) have not been significantly upgraded by additional drilling or other work since the original programs ended.

6.13 The mineral reserve status on some properties has been maintained continuously for up to 30 years through a succession of measures: federal reserves (either directly owned by the government or through FM) were transmuted into provincial reserves in the 1980s which, in some cases, were then transferred to provincial corporations. For some time, the provincial governments and corporations have planned to joint-venture provincial reserves, refraining from their own active participation in mining activities. While some provinces have made plans toward activating their reserves, closer examination reveals that there are generally no detailed programs and timetables for

bringing reserves under active exploration. *For all practical purposes, major prospective areas are being withheld from systematic exploration through the continued maintainance of fiscal reserves, some of which may be even held in conflict with the time limitations of the Federal Mining Code.*

6.14 Following the privatization measures of the federal government, the provinces have recently taken preparatory steps for joint-venturing of projects on mining reserves. Practically all mining provinces and their mining corporations have established the legal and organizational framework for joint-venturing of mining projects, but so far only YMAD (which is majority owned by the province of Catamarca, but was established under federal law) has actually concluded an agreement with a private foreign investor. YMAD's agreement with the Canadian junior mining company International Musto Explorations Ltd. on implementing the Bajo de la Alumbrera gold/copper project in Catamarca was signed in January, 1992. The mining corporations in other provinces seem to generally follow the contractual arrangements between YMAD and Musto for joint-venturing projects in their concession areas, although there are some important differences resulting mainly from the level of prior investments in the different reserve areas of the provinces.

6.15 The investment agreement between YMAD and Musto establishes an unincorporated joint venture (Union Transitoria de Empresas) between the two companies. YMAD permits Musto to conduct exploration activities (phase one) and installation and operation of a mine (phase two) on its concession area. Musto is solely responsible for the investment, the subsequent operation of the facilities and the marketing of the production. YMAD remains owner of the deposit and the future mine. Musto will make several cash payments to YMAD at different stages of project implementation. YMAD will receive a 20% profit share in the future operation, after all debt incurred in implementing the project has been repaid. YMAD is currently evaluating bids for other projects in its concession area. The agreements to be reached on such projects would be similar to the arrangement with Musto.

6.16 The mining corporation of the province of San Juan (Instituto Provincial de Exploraciones y Explotaciones Mineras - IPEEM) has recently established the contractual arrangements for attracting investors to the provincial mining reserve (Pliego de Bases y Condiciones). As in the case of the YMAD/Musto agreement, exploration and investment agreements would be signed between the investor and IPEEM, giving the investor the right to explore and operate on IPEEM's concession area against certain payments. The main payment to IPEEM would be a royalty of 3% of production value. There would be no profit sharing. IPEEM would be responsible for payments of the land rental (canon) and royalties to the provincial government.

6.17 It should be noted that the investment agreements for the development of provincial mining reserves do not involve privatization of state-owned assets. YMAD, IPEEM and the other provincial organizations remain owners of the concessions. The provincial institutions are also involved in selecting the private investor, evaluating the exploration and investment program, monitoring implementation and operation, and collecting fees and royalties from the private operator. YMAD will provide members of the board of directors for the joint ventures. YMAD will also collect dividend payments for their share in the joint venture.

6.18 The procedures being adopted by the provinces for securing investment in their reserves is one option. It is the most cumbersome one and can only be used for specific well delineated mineral targets (such as Bajo de la Alumbrera) and few companies. It is also very likely that such agreements will be renegotiated over time. The continued existence of large provincial mineral reserves is a key investment constraint which should be removed as soon as possible. Geologically unproven areas of provincial reserves should either be auctioned off under carefully designed

provisions or released into the general concessional system. This measure should be linked to the phasing out of the provincial mining corporations.

6.19 While FM aims at a complete divestiture of its mining assets, the procedures selected are not optimal. FM has already divested several mines (Capillitas, Famatina, Salar del Hombre Muerto). The remaining properties include two closed iron ore mines, and prospects for iron sulfide, gold, nickel-copper, and rare earths. FM plans to offer all its remaining assets as a package: several unrelated mineral properties, a large inventory of drilling and earth-moving equipment, an assay laboratory, warehouses, an inventory of air-photo negatives and prints, drill core samples, and extensive files of geological and metallurgical reports. The remaining staff of 30 persons would also have to be employed by the investor. In addition, any buyer must agree to spend \$5 million on exploration in Argentina. It is improbable that FM will receive a reasonable price for the package sale of its mining assets. The staff of FM which is handling the divestiture has recommended that a very low minimum price be stipulated, provided that the other conditions -- in particular the continued employment of the remaining staff -- are met. FM's divestiture procedures are designed to secure the jobs of a small number of employees. FM should not be privatized from within as there are obvious conflicts of interest. The procedures should be redesigned, aiming at achieving a maximum price for the assets while taking due account of the rights of the employees.

INSTITUTIONAL STRUCTURE

Background

7.1 Effective public mining sector institutions are essential for supporting and administering mineral development. In most developed and successful mining countries, public institutions and agencies are responsible for:

- establishment of mineral development policies, and setting objectives, strategies and the regulatory framework;
- administrative functions, centered on licensing and registration of mineral rights;
- monitoring and enforcement of compliance with rules and regulations;
- inspection, evaluation and enforcement of sector-specific environmental, health and safety regulations;
- obtention of basic geological and mineral information; the establishment of the technical data base;
- assessments of multi-sectoral land use and specialized studies related to natural hazards and phenomena, such as volcanism, earthquakes and floods; and
- the publication and dissemination of information and maps including the promotion of promising target areas to potential mining investors.

Depending on the level of development and specific requirements, institutional responsibilities may also include such tasks as: evaluation of company exploration proposals, compilation of sectoral statistics, participation in international programs and projects, marine geology and investigations, petroleum and geothermal energy support, technical assistance to industry, central repositories for physical specimens (e.g. drill core), general research and training, geological museums, special area investigations (e.g. Antarctic) and other specialized work such as environmental geochemistry, geological engineering (e.g. tunnel construction), and hazardous waste disposal research.

7.2 In Argentina, institutional structure and performance at the federal and provincial levels have been inadequate, inefficient and unfocused. The basic structure of a sectoral institution in a federally structured administration as found in Argentina, should include, at a minimum:

At the federal level:

- a head of sector: ministry, council, or secretariat;
- a mines department, office or bureau; and
- a geological survey organization.

At the provincial or state level:

Depending very much on a variety of factors such as the main economic focus of the state or province, availability of funding etc.;

- a geological or mines office (federally outposted or provincial); and
- specialized offices (also federally outposted or not) such as: seismic monitoring, laboratories, and hazardous wastes.

7.3 This implies that a state or province in which mining or quarrying plays an important role, or where there is known to be favorable geology for the future development of mineral resources, should organize and finance a mines and, or, geological office to represent the specific interests and requirements of the state. A state or province could, in theory, opt to contract such services from federal offices. In specific provinces or regions (hence "housed" in a province but serving a greater area) federal as well as provincial representation may be required. This section of the report looks at the present federal and provincial institutional structure and proposes how this might be improved. A detailed overview of the various institutes is provided in Annex 5.

Present Federal Organization

7.4 At the Federal level, the head of the mineral sector is the Secretariat of Mining ^{14/} (SM), which has recently been upgraded from a sub-Secretariat level, with the aim of improving sector development. This reflects recognition by the Government of Argentina of a need for competent and focussed leadership of the sector and a need for a sound institutional structure. SM is an integral part of the Ministry of Economy, Public Works and Services. SM's main mandated responsibilities include: i) policy, strategy and regulatory aspects; ii) sectoral coordination, promotion and basic research; iii) monitoring and enforcement of compliance with the regulatory framework; and (iv) managing the other sector institutes (see para 7.7).

7.5 SM remained virtually paralyzed by restructuring through 1992, but is just starting to perform some important specific activities. It has recently organized a promotional meeting of potential investors which attracted a good response from international mining companies and has proposed new sector restructuring laws (ref. Section 5, New Government Initiatives). A further promotional meeting organized by the World Trade Center, Denver, and sponsored by the U.S. Trade and Development Agency, is scheduled for June 1993. SM is also making efforts to attract technical assistance programs for geological mapping, monitoring of mineral exploration work and priority activities such as compilation of exploration information into data-banks.

7.6 Through 1992, SM was comprised principally of a National Directorate of Mining (DNM) ^{15/}, and a fledgling National Geological Service (SGN) ^{16/}. In late 1992, after the sector mission, Presidential Decree 28/18 was issued as an "urgent" measure (quasi-law) while Congress was in recess. Whereas this Decree requires confirmation, it does structure the federal sector

^{14/} Secretaría de Minería

^{15/} Dirección Nacional de Minería

^{16/} Servicio Geológico Nacional

institutional set-up in line with the structure proposed by this report. In addition to the National Directorate of Mining, the fledgling geological service was established as a daughter directorate of SM: the National Geological Service Directorate. Early in 1993, the National Directorate of Mining was comprised of three directorates: Investment, Evaluation and Development. The new National Geological Service Directorate is also developing three principal directorates: Regional Geology, Mineral Resources and Applied and Environmental Geology. Total staffing under the new structure of the SM is 309, of which 134 are professional level. All but 90 are distributed in eight regional offices and ten technical units ^{17/}. The National Directorate of Mining counts on 76 staff, of which 30 are professional level, and the Geological Service has a staff of 216, of which 91 are professional level. Presently, only 22 professional level staff are assigned to regional geology issues whereas 52 are assigned to mineral resources activities. Further reallocations of responsibilities are required to strengthen basic regional geological functions and every effort should be made to convert the present Geological Service Directorate of the SM into an autonomous Geological Survey organization which would preferably incorporate the present quasi-independent INTEMIN, INPRES and CRAS. The entire organization presently functions with an annual budget of about US\$5 million equivalent. Funding for geological mapping during 1993 is extremely limited at an approximate level of US\$600,000, but the present SM has managed to supplement this through arrangements with universities for 8 of the programmed 33 mapsheets (see para 2.16). For 1994, a budget request of US\$9.0 million is being placed for the new National Geological Service Directorate.

7.7 The decentralization of SM seems inefficient. The abundance of regional offices and units is both undesirable and unworkable under existing conditions. Since suspension of the Mining Promotion Law in 1989 and until very recently, most of these regionally posted staff have no clear function. In efforts to improve this situation, the staff (90) in Buenos Aires were assigned to DNM, during 1992, to form two units: the Directorate for Studies and Projects (DEP) ^{18/}, and the Directorate for Mineral Deposit Evaluations (DEY) ^{19/ 20/}. Their respective efforts have been focused on sectoral restructuring, with particular emphasis on planning for a comprehensive reorganization of SM, and the formulation of new mineral promotion and incentive legislation as discussed in Section 5. Despite these initial efforts, further restructuring and strengthening is required. Observed inadequacies in the capabilities of SGN were addressed by transferring all resources of DEP to SGN. As now planned, SGN will consolidate these resources with already available regional staff. Additionally, two other groups have just been integrated under the operational structure of SM: the Centro Regional de Aguas Subterráneas (CRAS) and the Instituto Nacional de Prevención Sísmica (INPRES) ^{21/}. Detailed organization, tasks and objectives for the new SGN are still being defined and planned. The Center for Mining Industry Investigations (CIIM), previously part of INTI (see Annex 5, Page 6), has been incorporated into the National Institute of Mining Technology

17/ Regional offices and technical units in: Salta, Tucumán, La Rioja, Córdoba, San Juan, Mendoza, Chubut and Patagonia.

18/ Dirección de Estudios y Proyectos

19/ Dirección de Evaluación de Yacimientos

20/ This arrangement was of short duration during 1992.

21/ INPRES is responsible for seismic monitoring and research on anti-seismic engineering. It has generated seismic hazard maps, and a national building code. It also collaborates with the Civil Defense on seismic disaster prevention matters. CRAS is responsible for studies and monitoring of underground water.

(INTEMIN ^{22/}) and placed under the administration of SM. This reorganization appears to be a positive move and brings most of the federal level mining-geology sector institutes together under one roof.

7.8 The newly proposed sector restructuring law ^{23/} in part further addresses the issue by stressing the importance of geological mapping and creating a commission for assessing geological mapping standards and requirements (see also Section 5).

Present Provincial Organization

7.9 The typical institutional arrangement for the 24 provinces consists of a Provincial Secretariat of Mining (SPM) ^{24/} with: i) a legal unit for sector administration and a technical unit to provide geological and technical support, and assistance to miners; and ii) a Provincial Mining Corporation (CPM), in most provinces, for managing mineral reserves. These institutions express a keen interest in mineral development but their past performance has been poor. The SPM units operate with acute budget restrictions, except possibly for Neuquen and Mendoza, which benefit from oil revenues. This circumstance has resulted in cut-backs or elimination of SPM field activities, thus affecting: i) monitoring and enforcement of health, safety and environmental regulations, now virtually dormant in all provinces; and ii) geological work, technical services and assistance to miners, (now only provided in exceptional cases). Some administrative functions, including the licensing of mineral rights, although less affected by budgetary cuts, are nevertheless inadequate because of the general weakness of provincial governments, and the lack of staff incentives. However, the issuance of exploration and mining licenses can take years. Cancellation of concession rights, because of non-compliance with fee payments and work requirements is rare. Royalty and land rental fees are rarely collected. Clearly, the overall PSM setup is in dire need of full-scale reorganization. In some instances, this must be done on a case-by-case basis tailored to the specific requirements of each province.

7.10 Provincial inadequacies are recognized by some provincial governments, and these have taken initiatives through regional agreements to facilitate and attract mining investments; the NOA ^{25/} and Nuevo Cuyo ^{26/} development regions. These aim at achieving uniformity of regulations, royalty levels, administrative procedures, and consolidated data-banks. However as yet they have been unable to address many of the key constraints.

7.11 The Provincial Mining Corporations (CPM's) were created as a vehicle for public involvement in mining development although they are barred, under the federal Mining Code, from actually operating mines. Their main tasks have included exploration and deposit evaluatory work as well as the promotion of specific mining projects (e.g. Bajo de la Alumbrera). Generally their

^{22/} Instituto Nacional de Tecnología Minera

^{23/} Ley de Reordenamiento Minero

^{24/} Secretaría Provincial de Minería. In some provinces, concession administration is the responsibility of a mining judge in the provincial court and not SPM.

^{25/} Provinces of NW Argentina region: Catamarca, Jujuy, Salta and Tucumán

^{26/} Provinces of Nuevo Cuyo region: Mendoza, La Rioja, San Juan and San Luis

performance has been poor, often requiring provincial and, or, federal subsidies to cover financial loss. As an example, in the province of Catamarca public financing to the amount of US\$20 million (over the last decade) has been used to sustain the uneconomic gold/copper projects of YMAD. In addition to their general poor performance, the private sector generally finds that many of the CPM's are difficult, if not impossible, to do business with for a variety of reasons including excessive and time-consuming bureaucracy, red tape and corruption.

Other Institutions

7.12 There are many other public institutions dealing directly or indirectly with the minerals sector. The most important at the federal level are probably CONICET, the Consejo Nacional de Investigaciones Cientificas y Tecnicas with a budget of US\$180 million, and a Consejo Federal de Minería (CFM) which is being used to promote mining interests in the Provinces. It has a working relationship with the federal legislature: both the Senate and House. Activities being undertaken by CFM are probably useful but could also be handled by SM directly. Generally there is little coordination between sector institutions, they often have overlapping activities and produce little relevant information for either internal or public consumption. CONICET has recently indicated an interest in the creation of its own "geological survey". Such dichotomy and duplication of effort should be avoided. Details of other sector organizations and institutions are presented in Annex 5.

Institutional Restructuring Requirements

7.13 Comparing institutional structuring requirements with the minimum "model" structure and tasks outlined in Paras. 7.1 - 7.2, it is clear that while the Federal Government has made positive progress to reorganize along required lines, the Provincial institutions are lagging behind. Nevertheless, institutions at both the federal and provincial levels require further strengthening, consolidation and restructuring. For the foreseeable future, this report recommends that the new institutional set-up in Argentina should be kept as simple as possible, in line with the proposed model. The basic functions (mandates) of these institutes should also be specific so that overlaps and duplications are avoided. Additionally, federal and provincial authorities should be clearly mandated in order to optimize institutional focus and resource utilization. The new organizational structure should take into account the phasing out of all activities related to the participation of government agencies (federal and provincial) in mineral ownership, prospect development and operational involvement.

7.14 In line with the model, the federal institutional setup should be as follows:

- Secretariat of Mining (SM)
- National Directorate of Mining (DNM)
- National Geological Service (SGN)

For the time being a small mining-specific environmental unit of one or two persons should be established within this setup, preferably within DNM. This unit should initially be charged with the responsibility of developing mining-industry specific norms and requirements in close cooperation

with the Secretariat for Natural Resources and the Human Environment (SRNAH). Environmental concerns are addressed in Section 8 of this report.

Federal Secretariat of Mining:

7.15 The SM should be the head of the minerals sector, this would, include *inter alia* federal geological and related activities and studies; mining, metallurgical, minerals marketing and sector specific research; environmental, work safety and health issues. In particular, to boost development of the minerals industry in the country, the SM should:

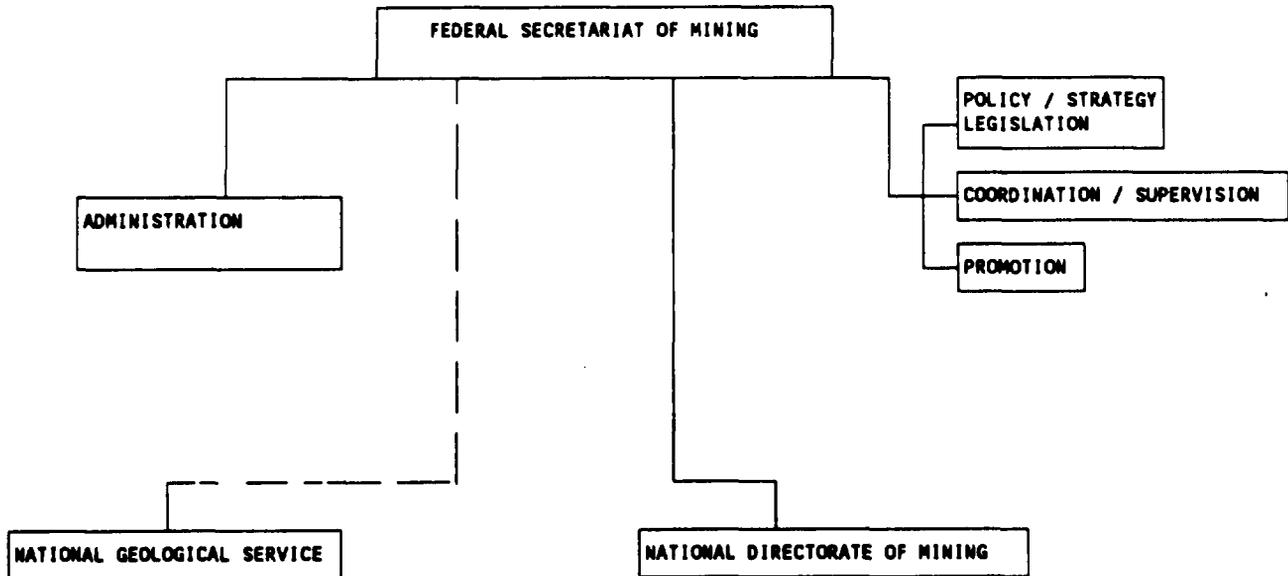
- establish a national minerals sector policy and strategy (ref. Section 4),
- be the leader in the upgrading and continuous monitoring of sector policy work and issues;
- lead the development of new, comprehensive, modern mining legislation ^{27/};
- coordinate and lead industry promotional efforts;
- coordinate international, bi-lateral and other technical assistance efforts;
- provide assistance to provinces as required and where necessary be the focal point of coordination with the provinces on sectoral issues;
- set the framework to ensure national coordination of, at least: a) the mining cadastre, b) all pertinent sector data base information (geology, geophysics, geochemistry, drilling etc.), d) mineral sector statistics, and e) mining sector environmental issues.

Certainly one of the most important jobs for SM at this time of change and restructuring is to ensure the preservation of existing geo-information before it is either lost or becomes difficult to locate during the break-up and privatization of FM and other federal and provincial organisms. These activities should clearly be the purview of the new SGN, but SM should take into account the capacity of CONICET when considering this issue. During the on-going restructuring process, the Government of Argentina must decide on the overall relationship between the geo-scientific arm of CONICET and the new SGN.

^{27/} Ref. Section 6

7.16 Figure 7.1 sets out a proposed organizational structure for SM:

Fig. 7.1
Proposed Structure of Overall Sector Institutes;
Secretariat of Mining.



The proposed structure of SM is simple: an administration unit and three "working" units or departments, 1) policy, strategy and legislation; 2) coordination and supervision; and 3) promotion. The policy, strategy, legislation and promotional functions are self evident. The proposed unit for coordination and supervision will largely devote its energies toward the coordination of work with the provinces, the coordination of assistance efforts into the sector (bilateral, international etc.), coordination with other federal entities and overall sector supervisory duties on behalf of the Secretary. Staff should not exceed 10-12 professionals. Required expertise would be in: sector administration, natural resource and environmental law, mining engineering, geology, mineral economics, financial analysis, statistics and public relations/informatics.

7.17 As indicated, at least for the foreseeable future, the National Directorate of Mining, although having a specific identity, could be an integral office within SM. Normally there may be a conflict of interests in such arrangements (ie. the SM setting policies and also policing them), but in the case of Argentina, administration of sector policies is the purview of the provinces. It is proposed that whereas the SM be the head of the sector, the present National Geological Service Directorate should be a separate legal entity (a National Geological Service or Survey) and as far removed as possible from the political arena of SM. Nevertheless, it would provide SM with key advice in many areas of mineral sector development and for the foreseeable future report administratively to SM. Later it may be found more convenient to "house" SGN differently as its

research activities are not totally compatible with the role of the Ministry of Economy, Public Works and Services.

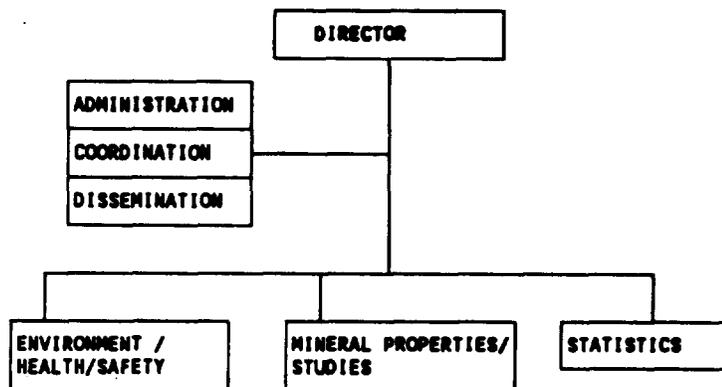
National Directorate of Mining:

7.18 DNM should probably be a small unit within the overall structure of SM. If there is a future need for it to expand, then it would need to assume its own identity removed from SM. In other countries, including many in South America, such an office's main and most important function is to administer exploration and mining concessions. In Argentina these key functions are the domain of the provinces. Taking into consideration the "model" functions set out in Para. 7.1 above, the new DNM could:

- establish a central documentation and information unit for the assembly and dissemination of sector information, (e.g. production statistics, production costs, investment, imports, exports, processing, commodity prices);
- develop a central country-wide cadastre and public register of mining claims for public information purposes;
- form a unit for the monitoring of compliance with environmental, health and mine safety rules, regulations and standards; and
- provide assistance to the provinces.

7.19 DNM should draw its staff from existing resources in SM. It would obviously need to work in very close cooperation with the provinces and may need to outpost one or two staff to major mining provinces. The proposed structure of DNM is provided in Figure 7.2.

Figure 7.2
Proposed Organic Structure of the
National Directorate of Mining.



7.20 The four main units of DNM would be: one for administration, coordination (with other federal agencies, NGO's and the provinces etc.) and dissemination of information; a unit for sector environmental, health and safety matters; one for mineral properties (the centralized cadastre) and studies; and one for statistics. Legal inputs may be required for matters related to environmental legislation and monitoring. This expertise can be provided by SM.

7.21 The main operational functions of the **administration, coordination and dissemination unit** are somewhat self-evident. This unit should house the main mining information data base, and would be the main point of contact with the public for providing information through regular and special publications and information fact sheets, etc.. The **environment, health and safety unit** would monitor and ensure compliance with applicable rules, regulations and standards. In these important areas it is essential that these rules and regulations be of a national scope and do not vary from province to province or municipality to municipality. The unit should be empowered to recommend and initiate the closing down of mining operations that are not in compliance.

7.22 The major task of the **minerals properties and studies unit** will be the compilation of a countrywide centralized mining cadastre and public register. Information will need to be transmitted regularly, on a weekly basis, from the provinces using a computer supported LAN system. The purpose of this centralized system would be a) to provide federal government with the status of concessions; and b) to enable potential investors to investigate land positions without the initial need for travel to the provinces. This unit should cooperate with the provinces on investigations of abnormalities and would be responsible for special studies required from time to time. The **statistics unit** would be responsible for compiling and analyzing all sector statistical data.

7.23 For the foreseeable future, DNM's professional staff should probably number between 15-20, rather than the 30 that is presently provided for. The main areas of required expertise will be: in informatics, technical editing and publishing, land management and surveying, environmental and mining engineering, health and mine safety, as well as statistics.

National Geological Service:

7.24 *From the technical point of view, the proposed SGN should lead the way in promoting the development of the mining industry in Argentina.* The SGN will have much broader multidisciplinary terms of reference as outlined in the model institutional responsibilities (Para. 7.1). With the support of SM and all relevant arms and institutes of the Government (FM, Provinces etc.) its single most urgent task should be the collection, assembly, indexing, compilation and dissemination of the geological and mineralogical data base of the country, particularly for the use of mining investors. This will require a major effort.

7.25 SGN should be the federal hub for the carrying out of geo-scientific activities. Its main activities will include:

- regional geological mapping of the country - starting and emphasizing work in areas of priority mineral economic potential;
- compilation of thematic maps - structure, geophysics, geochemistry, metallogenetic, hydrogeological, geological hazards, and;
- formation and consolidation of national technical data banks and information facilities;

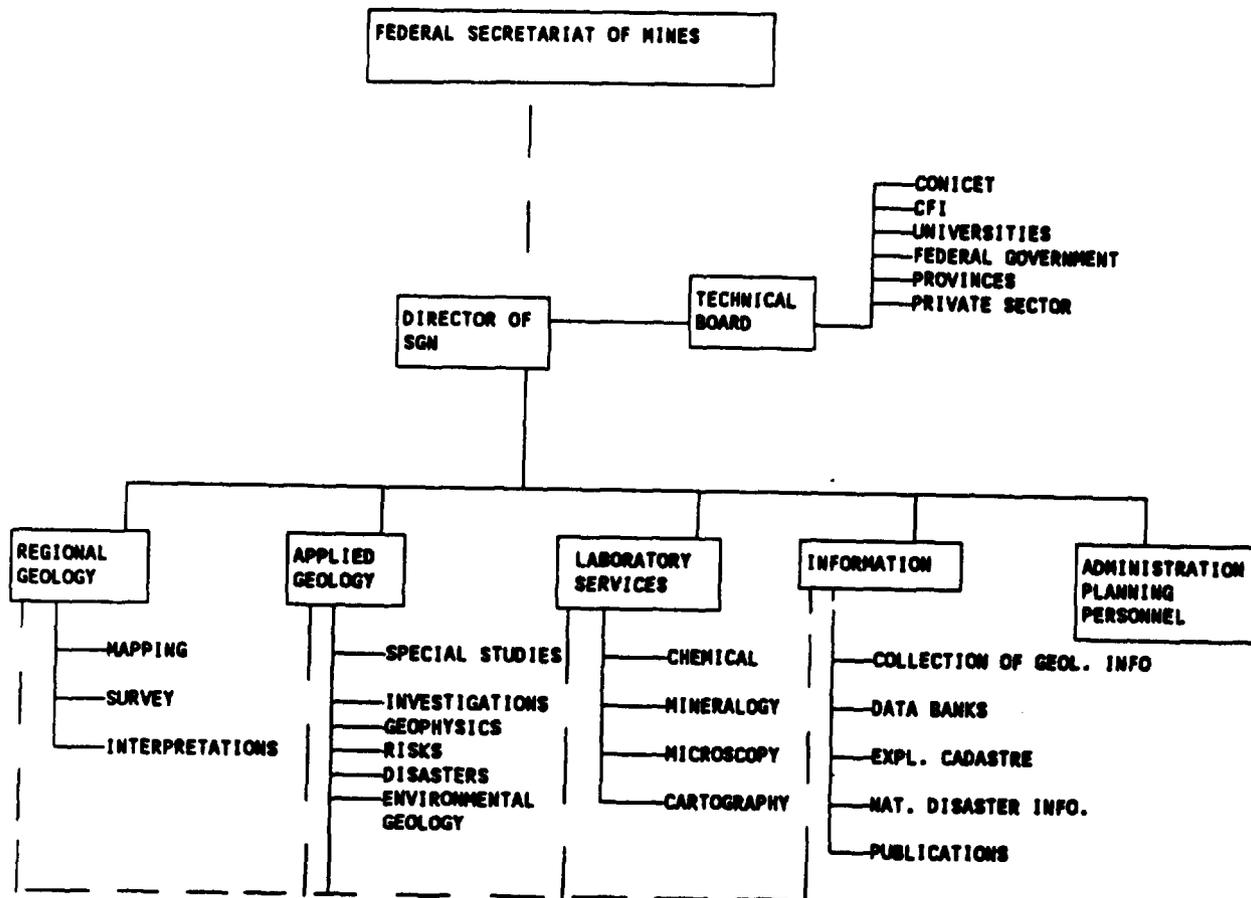
- carrying out special geological and mineralogical studies, including engineering geology, and on-going geological processes such as earthquakes, volcanism, landslides, etc.;
- multisectoral land-use (environmental) studies, and;
- the provision of specialized contracting services, particularly to provinces, municipalities and other Government agencies.

As far as direct involvement with the mining sector is concerned, the SGN should not become actively involved in detailed prospection, exploration or prospect evaluation. This is high risk, highly specialized, high-cost work which is better left to the private sector.

7.26 As proposed, SGN would be a technical body largely devoted to applied investigations in basic geology and dedicated to gathering, processing and disseminating information through the use of modern, but proven, techniques and methodologies. SGN would cooperate with related research institutions both nationally and internationally and would also play an important role as a training institution for young graduates in the earth sciences. Starting from almost zero, SGN must first of all consolidate its position on the most important topics and should severely limit major field activities during the next 2 - 3 years. Field activities during this initial period of consolidation should be directed at the field checking of existing data rather than the acquisition of new information. These latter activities can be phased in over time and will eventually require the establishment of some field offices outposted to the provinces. The headquarters of SGN should if possible be separated from SM but for the time being should be located at least in the vicinity of Buenos Aires for ease of contact with the outside world - particularly potential investors.

7.27 The suggested outline of the organic structure to be adopted by SGN is provided in Figure 7.3:

**Figure 7.3
Proposed Organic Structure of
the National Geological Service**



The General Director or General Manager of SGN should preferably not be a political appointment - continuity of tenure for at least 4 to 5 years would be required to establish the new organization and the post should be held by a management level geoscientist of repute. The General Manager should be assisted by the SM itself but principally by a Technical Board comprised of representatives from the provinces, the private mining sector, academia, research (e.g. CONICET). This Technical Board should be totally different from the Federal Mining Council (CFM) being established under the new Mining Restructuring Law. The Board should approve policy, the broad work program, budget and staffing levels. While the restructured SGN should be as simple and focused as possible, it probably should have five operational units or Departments.

7.28 The functions of a **Planning, Administration and Personnel Department** are self-evident. A **Regional Geology Department** could be responsible for production of regional scale (e.g. 1:250,000) maps of the country including thematics. There should be a flexible cross-support management structure which would allow any one department to draw on expertise from other departments to participate in specific projects (e.g. thematic maps). The **Regional Geology Department** is the most important at this stage in the development of SGN as it would be responsible for what has been emphasized as the top priority job, the collection and collation of all available geoscientific data (ref. Para.7.25). This would include defining systems, technical norms and standards for map content and presentation. The SGN would do well to "borrow" such norms from established systems (e.g. France's BRGM, USA's USGS or UK's BGS).

7.29 Apart from the area of environmental geology, the other functions of a proposed **Applied Geology Department**, geophysics, geochemistry, natural disasters etc. should be developed slowly, in line with requirements. The initial focus of the environmental group would be the assemblage of all existing relevant information into its own data base with a view to highlighting specific areas which would need special attention vis-a-vis mining development. A **Laboratory Services Department** will eventually form a key supporting role to all activities of SGN. It should also be charged with the assembly of a central physical specimen store, particularly of drillhole information from all sources.

7.30 A **Department of Information** would need to be established early in the development of SGN as it will assume the key functions at the national level of obtaining, organizing and disseminating geo-scientific information, particularly for the support of promotional efforts to attract new investors to the minerals industry. Eventually, this department's main objectives will be the development and maintenance of minerals and geo-scientific data bases and marketing of information produced by SGN in all its activities. It will be the main public window of SGN.

7.31 It follows from the above outline of structure, skills and priorities that the GOA should emphasize the early establishment of the **Departments of Regional Mapping and Information**. The best, most experienced and most up-to-date professionals should be selected for the key posts in these departments as well as the **Environmental Geology Unit** of the **Applied Geology Department**. As a general guideline, initial professional staff could be limited to between 50 and 80 (presently about 90) with total staffing of between 120 and 150 (presently 216). When SGN has completed its most important tasks of information gathering and sorting and is ready to start with the acquisition of new data (eg. field mapping), then staffing of the professional cadre will need to rise to at least the 250 level - say after eight to ten years. Precise manning schedules should be prepared on the basis of detailed work plans, yet to be developed but of utmost priority for SGN's management.

Provincial Organization

7.32 It is of utmost importance to restructure and strengthen the mining organizations in the provinces, particularly those with mining potential. Their present weakness can be regarded as one of the most important barriers to sector development. Regardless of the initiatives being taken by some provinces for cooperation on the regulatory and fiscal framework (NOA and Nuevo Cuyo), the provincial organizations must be competent enough to administer the federal mining code through their own regulatory framework. It is of little use to develop a modern regulatory framework if the institutional capabilities are insufficient to effectively carry out its administration, particularly in the all important sub-sectors of land management (the cadastre) and environmental monitoring.

7.33 A completely new sectoral mining regulatory package should be developed at the same time that the proposed new mining code is drawn up, at least for the provinces with recognized mining potential. This regulatory package, possibly with minor adjustment to satisfy specific circumstances, should then be adopted by the provinces. While this package is being developed, the required restructuring and staff training of the provincial institutes could take place.

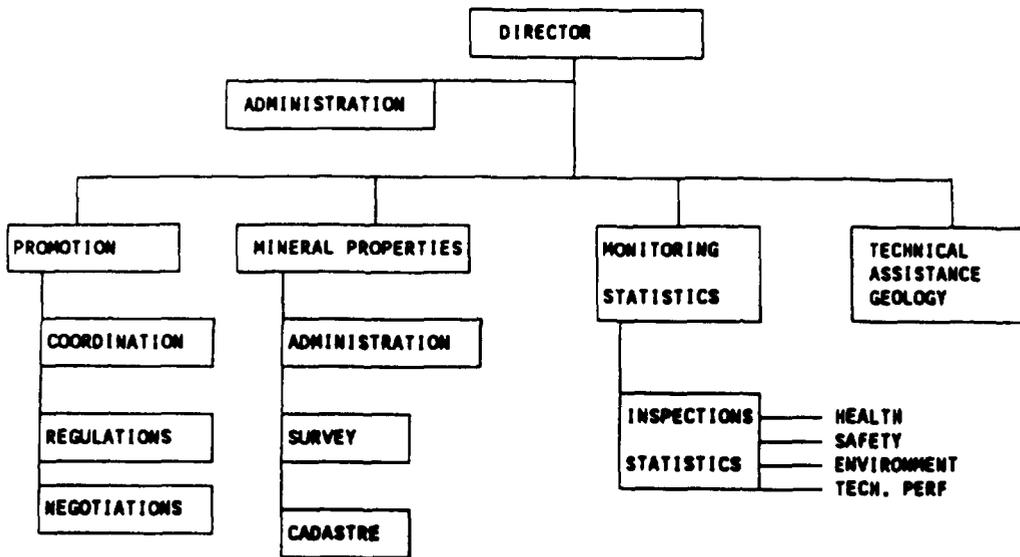
7.34 The need for the provinces to divest both their property (land) holdings and company activities, through auction or otherwise, has been discussed in Section 6 of this report. The main areas of responsibility of the restructured provincial mining secretariats would be:

- the administration of mineral rights; managing the provincial cadastre and public mining register;
- monitoring and enforcement of compliance with relevant legislation;
- coordination with federal authorities on regulation of environmental, work safety and health issues;
- under the administration of mineral rights, ensuring the collection of required land rental fees and royalty payments;
- overall coordination on sectoral issues with the federal SM and daughter institutes as well as with other provinces including the provision of required sector statistics in standardized format;
- where required, and preferably with the federal secretariat's assistance, negotiation of exploration and mining agreements with the private sector and, possibly, the provision of technical assistance to small-scale miners on a non-reimbursable basis; and
- in provinces with major geological potential for mining development, the provision of specific geological and thematic information to investors.

7.35 The size and staffing of SPM offices will vary depending on the importance of the sector. In provinces with good mineral potential a professional staff of between 10 and 20 may be required. In provinces where there is little mining activity there may only be a requirement for 2-3 professionals. Areas of required expertise would be: mining engineering, geology, mineral economics, environmental geology/engineering, mining law, land surveying, informatics and statistics.

7.36 A proposed model organizational structure is provided in Figure 7.4. The proposed secretariat for a "mining province" would have four main units under a Director. A **Promotion Unit** would lead provincial efforts in attracting investors, be responsible for negotiating with the private sector and study regulatory requirements. The "hub" of the secretariat would be a **Mineral Properties Unit** in charge of the provincial cadastre and responsible for processing, surveying and authorizing mineral exploration and mining concessions. It is these units in most provincial secretariats that require the most repair. A **Monitoring or Statistical Unit** would be responsible for compliance in all areas outside the cadastre as well as compiling all relevant provincial statistical information. A fourth unit, **Technical**, would provide services, where required and not available from other sources (e.g. federal authorities), to assist small scale mining enterprises, and even carry out geological investigations when such services are not readily available from federal institutes.

Figure 7.4
Proposed Organic Structure of the Provincial Organizations



7.37 As well as establishing an effective structure for the sector, it is also of great importance that the provinces develop and implement effective procedures for the implementation of functions outlined in para 7.34. In particular, serious investors are very concerned that licensing procedures be clearly specified and that licences are issued according to explicit criteria without undue delay or favoritism towards any particular parties. It is also important that there be satisfactory procedures for collecting taxes, royalties, land rentals and administrative fees in a prompt and orderly manner and that all investors both, local and foreign, and public and private be accorded similar treatment. (These would best be collected by the tax authorities as proposed in para. 5.24). Geological data should be readily available and accessible to all parties and, to the extent that negotiations take place between government and investors, the government should be well prepared with and represented by qualified staff with clear mandates to negotiate.

INFRASTRUCTURE AND ENVIRONMENT

Infrastructure Issues of Mining in Argentina

8.1 Inadequate infrastructure is an important constraint to mining development in Argentina. The country is large (2.8 million km²) and mining is generally located in remote mountainous areas. Argentina's railway system normally does not reach the mining areas and the road system in the mining provinces tends to be under-developed. The major industrial centers and national ports are at large distances from the mining areas, raising the cost of inputs and of marketing. In several cases the transport cost of processed minerals is as high as the mining and processing cost. Costs of power and water supply are also high. Mining companies face the options of paying for the connection to a regional power system or installing their own power generation. Both options involve high costs. Water supply may be an even more serious problem than power supply, as much of the present and potential mining activity is located in arid areas. Finally, the isolated location of mining operations requires the establishment of fully developed mining camps. Mining companies frequently provide housing, schools and hospitals for the workers and their families, adding substantially to investment and operating cost.

8.2 Mining companies have attempted to transfer part of the high cost of infrastructure to the provinces and the municipalities. Until 1989, small- and medium-scale miners have benefitted from the minerals purchasing scheme, which involved substantial marketing subsidies, operated by the Banco Nacional de Desarrollo (BANADE). After 1989, mining companies attempted to obtain special exemptions on taxation of fuel and electricity to reduce their transportation and power supply costs, so far without success. The larger-scale mining investors have been successful in transferring a major share of the infrastructure cost to the provinces and their mining corporations. For example, the agreement between YMAD and Musto on the development of the Bajo de la Alumbrera project in Catamarca stipulates that YMAD must provide, at no cost to Musto, housing and other facilities that exist at a neighboring mine site. YMAD is also responsible for power and water supply to the new mine. The model agreements for other provinces also promise government assistance in ameliorating the cost of infrastructure.

8.3 While the Argentine mining areas are frequently at large distances from national ports and industrial centers, they tend to be close to ports and other mining operations in neighboring Chile. Until recently the difficult political relationship with Chile prevented Argentine miners from using infrastructure facilities in Chile. During the 1970s the Argentine government created a security zone within 50 km of the country's borders. Creation of this zone had a particularly detrimental effect on mining development. Citizens of neighboring countries were prohibited from owning and controlling businesses in the security zone, preventing, in particular, Chilean mining companies from investing in Argentina. Delays in the issuance of mining and exploration licenses in the border area to all parties was another effect, as special clearances were required from the military authorities. Transportation of goods through the border area was severely restricted, which prevented mining companies in Argentina from obtaining inputs and exporting products through Chilean ports.

8.4 The recently signed border agreements between Argentina and Chile and the Convenio Binacional de Integración Minera will bring substantial improvements for Argentine mining companies. The agreements will also help attract Chilean and Chilean-based investors to Argentina. The agreements are expected to have considerable importance for exploration and mining in the Andean region north of Mendoza. For example, the El Pachon copper deposit in San Juan province

is only 10 km from the Los Pelambres copper mine in Chile. Los Pelambres is less than 150 km by road from the Chilean coast, while El Pachon is over 1,500 km by road from Argentine ports.

8.5 The actual dismantling of the border restrictions has proved difficult in practice and actual improvements in cross-border flow of mining goods and services have not yet occurred. To accelerate the process, the Government has recently established a Mining Action Program (Programa de Accion Minera) with working groups analyzing issues of legislation, transport and geology in the border region. The working group analyzing cross-border transport problems aims at identifying the constraints to a free flow of mining products. However, what may now be required is action rather than dialogue and analysis.

8.6 A vital component of reformed mining policies should be clear rules on the provision and operation of infrastructure. Few provincial governments are financially able to provide the necessary new infrastructure to support new mines or to drive roads into remote geologically promising areas or to specific new projects far from existing infrastructure. There is little doubt that new dedicated infrastructure to support specific mining projects should be the responsibility of the owners and operators. This is also a good reason why Argentina should be attracting major companies capable of financing and operating the entire project, including related infrastructure.

8.7 In cases where dedicated infrastructure may already be in place for either operational or non-operational projects and where such projects may be turned over to the private sector, the best option for (Provincial) governments is to charge user fees, tolls or levies. The option of using existing infrastructure to secure equity participation for the provincial government is not recommended. In this way, the government would participate in a risky business venture. Also, dividend payments are likely to be much lower than rental payments under a lease or user fee arrangement.

8.8 Another alternative is the construction and ownership of infrastructure by enterprises other than the mining company or government. In some countries, public utilities already operate at arms length from the government or have been privatized. This provides opportunities for the supply of infrastructure by third parties. For example, independent power companies could supply electricity and independent consortia could build and operate railways. In any case, government policy and any mining or investment agreements should clearly spell out the terms and conditions regarding infrastructure development, operation, maintenance and use. This will reduce uncertainty and help improve the investment climate.

8.9 There may be a case for the government to strengthen the long-neglected infrastructure in the border areas. Public investments in access roads and improvements of border crossings may provide exceptionally high returns in terms of development. Major infrastructure investments in these areas would, however, require careful prior study.

Environmental Issues

8.10 The issues of environment, health and safety are essentially new to Argentine mining. Because most of the population lives in the flat, well-watered "pampa humeda" agricultural region, there is a relatively low level of concern for environmental degradation. Much of the country (including most of the areas with mining potential) is very sparsely inhabited. Since past mining activity has been relatively slight, Argentina provides an opportunity for establishing a new well-designed basis for environmentally sound mining development. The following conditions peculiar to Argentina should be taken into account in designing this basis:

- Many current and potential mining areas are within or (more commonly) upstream from agricultural areas: fruit and grape culture in the north, and oviculture in Patagonia. Since water is a scarce commodity in most of Argentina, possible contamination of, particularly, ground waters will require careful consideration. Thus, considerable emphasis has to be placed on water management and liquid waste treatment.
- Very little, if any, base line data exist regarding the natural concentration of potentially harmful metallic elements (such as cadmium, lead, etc) in the weathering zone of mineralized areas. This baseline data must be developed so that future environmental standards can be developed and effective monitoring carried out on new projects.

8.11 Argentina has no national environmental law, although a draft Environmental Code (Codigo Ambiental Nacional) is currently being processed through the legislature. The draft Environmental Code, however, only presents a broad outline of future institutions and regulations. There are a number of initiatives to establish more specific regulations and standards at the national level, but regulations specific to mining have not yet been considered. The national Mining Code includes a number of health and safety provisions (mainly in Art. 282-294) but makes only one reference to environmental protection^{28/}. Given this situation, several provinces have established their own legal framework of environmental protection, without coordination at the national level. The province of Cordoba has already introduced its own environmental code and is regarded as the province most conscious of and advanced in environmental questions. The province of Mendoza is also preparing its own legislation. In most other provinces the environmental issue seems to be a new and lightly treated subject. For example, the agreement between YMAD and Musto on implementing the Bajo de la Alumbrera project in Catamarca does not mention any requirement for environmental protection measures. Similarly, the model agreement established in San Juan for joint venturing of provincial mining reserves disregards environmental protection issues.

8.12 The federal environmental authority is the Secretariat of Natural Resources and Human Environment, SRNAH (Secretaria de Recursos Naturales y Ambiente Humano) in the Ministry of Economy. It was formed in 1973, suspended in 1976, and reestablished at the end of 1991. Its Directorate of Environmental Quality and Development (Direccion Nacional de Calidad y Fomento Ambiental) is responsible for all aspects of environmental protection and has played a major role in

^{28/} Art. 282 states that mining should be performed subject to the rules of environmental protection.

drafting the new Environmental Code. The Secretariat is not yet staffed to perform the enormous tasks of establishing specific regulations and standards and of monitoring and enforcing their implementation. The Secretariat receives some technical assistance from the Inter-American Development Bank, but recognizes that additional sector-specific assistance is needed. In the field of environmental protection in mining, the Secretariat aims at establishing close cooperation with the SM. Additional cooperative arrangements with the provinces on environmental issues in mining are also needed. Most provinces have now established environmental offices, mostly as part of their ministries of economy. The national research organization CONICET intends to become involved in technical aspects of environmental affairs.

8.13 The current lack of adequate environmental regulations and standards as well as the undefined institutional responsibilities have a seriously detrimental effect on mineral development in Argentina. International mining companies are reluctant to invest in countries which do not have reasonably well defined environmental criteria. They fear that stringent standards and requirements may be imposed on them *ex post* which could involve additional costs in operating a mine. Argentina urgently needs to take action in two areas:

- environmental policies, standards and procedures should be established; and
- institutions should be strengthened so that implementation of standards and procedures can be effectively monitored and enforced.

8.14 This report proposes that the Government prepare a comprehensive Environmental Management Program for the mining industry. Such a program would set priorities and timetables for establishing standards and procedures and the supporting institutional infrastructure. The program should also address the more immediate question of bringing the environmental practice of existing mining operations up to an acceptable standard. Pending comprehensive legislation, problems at existing mining operations should be identified and initiatives taken to address them. At existing operations, environmental audits and health and safety reviews should be initiated to identify the most critical areas for improvement. A realistic timetable should then be agreed with the company and subsequently implemented under government monitoring.

8.15 With respect to new projects, the environmental management program should determine the requirements and procedures. A Baseline Environmental Study should be carried out to provide needed information on the status of vegetation, rivers, metal dispersion, air quality and wildlife before a new mining project commences. The baseline study provides the reference against which the impact of the mining operation will be measured. It provides a safeguard for the company by identifying pre-mining environmental problems.

8.16 The baseline study should be followed by an Environmental Impact Assessment and an Environmental Action Plan to mitigate any negative effects. The action plan, which should be based on the baseline study and impact assessment, should be an essential condition for approval. The requirement to conduct an impact assessment of project start-up and to develop an action plan should form part of the investment agreement recommended for all larger mining projects. Finally, there should be clearly defined reporting requirements with sanctions if environmental standards are not met or environmental problems go uncorrected.

8.17 For larger mining projects, there is also a need for a Social Impact Analysis to assess the impact, if any, of the project on affected communities. Procedures and mitigation methods need to be established so that affected people are adequately represented, especially in cases where relocation may be necessary, where established forms of economic activity are replaced by mining, or where indigenous people are affected.

8.18 The proposed environmental management program needs to be undertaken without the benefit of an existing set of environmental, health and safety standards for mining. However, no effective environmental impact assessments and environmental action plans can be performed without such standards. It is therefore proposed that, temporarily, the government adopt the standards developed in other countries. These temporary standards – which would only have the purpose of providing the reference framework for impact assessments and action plans for existing and new mining operations – should be modified for conditions in Argentina and for specific policy objectives of the government.

8.19 In formulating standards and legislation there is a choice between command and control policies and market-based policies. Most countries tend to rely on command and control policies which involve setting emission or effluent standards, and requiring that such standards be met. Some countries are introducing market-based policies by imposing pollution taxes or permitting pollution rights to be traded. Under current conditions in Argentina, command and control policies are probably most appropriate, although in the longer-term a possible role of market-based policies should be considered.

8.20 Given the current organizational status of (SRNAH), the SM should take the leading role in designing the proposed environmental management program and implementing the measures under the program. This should occur in close cooperation with SRNAH and the relevant provincial institutions. It may be practical to establish agreements (convenios) among the institutions in this regard. It is essential to ensure that the same standards and procedures for conducting impact assessments and designing action plans are applied in all provinces. In the longer term, the leading role in environmental protection in the mining sector should be assumed by the SRNAH, which could delegate some monitoring and enforcement activities to the provincial authorities.

CONCLUDING STATEMENT

The future development of the mining sector in Argentina will depend largely on the ability of the GOA to attract new, high risk, serious capital from foreign mining companies who have the technical and managerial capabilities to find new deposits and develop new mining operations. Argentina must compete with other countries to attract such investors. Investors require competitive terms and conditions, and strong assurances that the investment environment will be stable and that the "rules of the game" will not change. But the federal and provincial governments should also obtain a fair share of the value added generated by the sector. This can best be achieved through fiscal arrangements which are reasonable for all parties.

Good mining policies and a fair tax and incentive system will help attract investors only within a sound regulatory framework and functional sector institutions. Serious investors require the assurances of a well-designed Mining Code and related enabling regulations. There is need for a complete review of existing mining legislation in Argentina, as the current Mining Code is both complex and out-dated. Investors also require supportive and efficient public mining institutions. Mining investors frequently withdraw in the face of "red-tape" and dubious and non-transparent business practices. Given the current lack of a clear distribution of responsibility between federal and provincial institutions and the severe weaknesses of most public mining institutions in Argentina, the government faces a substantial task of institution building both at the federal and provincial levels.

This report proposes the creation of a mutually beneficial partnership between the federal and provincial governments, on the one side, and private mining investors on the other. Both groups share common objectives of seeing Argentina's mineral resources identified and developed in an orderly, cost-effective and environmentally sound manner. There are strong indications that a number of investors are now willing to enter into such a partnership. Recently, the federal Government has taken positive steps towards creating a more favorable investment environment. However, serious investors are waiting for the federal and provincial governments to continue the process of establishing sound policies, effective regulations and functional institutions before committing themselves to major investments.

The recently proposed creation of a Federal Mining Council, comprised of Provincial delegates to advise and coordinate needs of the provinces with the interests of the country, may pave the way for solving the long-standing differences of opinion between the federal and provincial governments. If these efforts do not work in practice, the government may have to consider delegating almost total autonomy to the provinces and disbanding the federal Mining Code.



OVERVIEW OF THE MINING CODE AND REGULATIONS

The key features of the Code are:

- The Code recognizes the provincial dominion over minerals, which is established in the country's Constitution of 1853. The Mining Code applies to the whole country, but detailed regulations and the administration of the Code are the responsibility of the provincial governments (prior to their abolishment, federal mining regulations applied to federal territories).
- The provinces are responsible for administration, monitoring and enforcement of specific provincial regulations.
- The government is not allowed to operate mines, except for a number of "strategic" minerals identified by the Mining Code. Oil and gas, coal, and uranium are the main minerals designated for government exploitation.
- The Mining Code distinguishes between three categories of minerals:
 - Category 1 includes most metallic minerals, a small number of non-metallic minerals (e.g., mica, phosphates, sulfur, borates) and some precious stones;
 - Category 2 includes precious stones and metalliferous sands found in placers, saltpeter, salt, and most non-metallic minerals; and
 - Category 3 includes construction and ornamental materials.

The different categories have varying concession arrangements. Category 1 minerals can only be exploited by obtaining a concession from the provincial government. Category 2 minerals also require a concession, except for the surface owner. Category 3 minerals do not require a concession; they can only be mined with the permission of the surface owner.

- The Mining Code establishes an exploration license which is issued for up to twenty units ("cateos") of 500 Ha each. An investor may obtain a maximum of 100 cateos (i.e., 50,000 Ha) per province for exploration. Mining licenses are issued for areas of 100 Ha ("pertenencia").
- Exploration licenses are granted with time limitations depending on the number of cateos. Parts of the concession area have to be relinquished over time.
- To remain in good standing, holders of exploration licenses have to perform work requirements and pay land rentals ("canons"). The canon for areas under exploration rises exponentially for larger exploration areas and longer exploration periods. The canon for mining licenses varies by mineral.

- Prior to initiating mining development, the investor has to present a detailed implementation plan for approval by the authorities. The investor may lose his license if he does not fulfill the agreed investment program.
- The provincial governments and their mining corporations may establish fiscal reserve areas at no cost of up to a total of 200,000 Ha per province for exploration purposes for periods of up to four years. Such areas may be held by the province for an additional five years if mineralized areas have been found.

The provincial governments are responsible for implementing the Mining Code in an exercise of their dominion over the mineral resources. The mining provinces have issued Regulations which are intended to provide guidelines for the provincial mining administration and for investors and operators of mining projects in the province. A typical set of regulations of a mining province would consist of the following provincial laws:

- Laws that establish the provincial mining institutions, their organization, functions and responsibilities. In most cases, the institutions include a Secretariat (or Department) of Mining and a Mining Corporation. Some provinces have also established an advisory committee (Consejo Minero) to supervise and assist the Secretariat.
- A Law that creates the Register of mining and exploration activities.
- A Code of Procedures (Codigo de Procedimientos Mineros) that presents the details of administering mining concessions. This Code is the principle legal basis for the provincial mining administrations.
- Regulations for monitoring and enforcing federal and provincial mining legislation (Reglamento de Policia Minera).
- A provincial mining incentive decree (Decreto de Promocion Minera), which complements -- in some provinces substitutes -- the federal mining incentive program.
- A law establishing the royalty payments for different minerals and categories of mining enterprises.
- A small number of provinces have separate environmental protection legislation ^{1/}.
- A varying number of other regulations covering special provincial mining issues from penalties for infractions of the law to the administration of licenses for Category 3 minerals (construction material).

^{1/} San Juan: Ley para la Preservacion de los Recursos de Agua, Suelo y Aire y Control de la Contaminacion.

Although there are similarities between the mining regulations of the provinces, the differences are important and confusing to mining investors. There may also exist inconsistencies with the federal Mining Code. For example, the Mining Code stipulates a time limit for maintaining provincial mineral reserve areas. Provincial legislation in this matter is without any time limit and in some provinces mineral reserves have been held for longer periods of time than determined by the Mining Code.

The procedures for the mining police seem to be similar in most provinces, since a common draft was prepared by the federal government in the 1950s. Major differences among provinces, on the other hand, exist in the regulations for administering exploration and mining concessions. Several provinces afford a key role in the administrative process to a mining judge. In the majority of provinces the Secretariat of Mining is responsible for issuing and withdrawing exploration and mining concessions. There are also large differences in the complexities and length of the processing requirements for obtaining a license in different provinces.

The Argentine mining legislation falls well short of what is required for the promotion of a vigorous mining industry. The legislation appears to be highly restrictive and excessively regulatory. It seems to be tailored to meet the requirements for monitoring and control of small-scale mining, but is largely not suited for large-scale mining (which was probably meant to be performed by the government). The more recent addition of the Mining Code of a section on large-scale mining (Article 412-450) does not correct this deficiency. The legislation also does not provide investors with the full and unrestricted right to hold title to the ground under exploration or exploitation. The legislation does not state clearly that a successful explorer also has the right to proceed with exploiting the resource. The many ambiguities in the Mining Code and the provincial regulations and the absence of detailed procedures on settlement of disputes between the investor and the authorities represent particularly serious obstacles in attracting large-scale investors.

A more detailed review of the Argentine Mining Code reveals a large number of specific deficiencies. The main points are listed below:

- The classification of minerals in three different categories (Art. 3-5) is not practical. All minerals should be administered under the same regulations for exploration and exploitation.
- The limits on number and size of concessions are arbitrary and confusing. The initial periods of 300-700 days for exploration permits are too short for modern exploration methods (Art. 27-29).
- The payments for exploration and mining concessions are unnecessarily complex. They vary unsystematically for different minerals, length of time and size of concession (Art. 28 and 271).
- Art. 282 - 294 stipulate the conditions for mine operations. They provide inadequate and outdated rules on health, safety and environment in mining.
- Art. 412 - 450 deal with large-scale mining. The same rules should apply for all size categories of mining. (Only artisanal mining may require specific regulations, but this is not relevant in the Argentine context).

- **The Mining Code maintains several protectionist features. Art. 434 requires mine operators to preferably (a) employ Argentinians, (b) use Argentine ships in the transport of equipment materials and production, and (c) process domestically a maximum of the mineral extracted. (Several provinces therefore vary their royalty rates according to the degree of processing performed in the province).**
- **A major constraint on the optimal implementation of a mining project is in Art. 273 of the Code. Investors are required to present to the authorities an investment program. The investment has to meet a minimum limit and has to be completed within a five-year time period, independent of size and nature of the project. In each of the first two years, 20% of the total amount has to be spent. Given the diverse nature of mining projects such limits of investment amount and implementation period are unrealistic.**

ISSUES OF SMALL- AND MEDIUM-SCALE MINING

1. **Management.** Management performance is poor in most small and medium operations. This is reflected in: (a) insufficient exploration of deposits prior to investment and during production; (b) inadequate preventive maintenance resulting in high operating costs; (c) absence of training programs; and (d) deficient technical and financial controls.
2. **Operations.** The following operational issues are the most significant: (a) *equipment*: the use of outdated equipment and processes; (b) *production methods*: modern technology is absent in most operations; primitive mining methods are being employed in most small mines; and (c) *maintenance*: there is generally inadequate maintenance and a need to replace equipment in most operations.
3. **Labor.** Several Argentine universities offer degrees in geology, but only one, the Universidad de San Juan, offers a degree in mining and metallurgical engineering. Therefore, mining engineers have to be generally recruited from abroad. Skilled labor is also not readily available. Skilled workers are sometimes recruited from Chile. Labor turnover is high. The labor laws require that mines with more than 200 employees provide housing, schools, hospitals, electricity and sanitary services. Apart from such costs, the cost of labor is not high for Argentine mining. Monthly wages vary between US\$250 and US\$400 plus about 50% for social benefits.
4. **Infrastructure.** Infrastructure is a prime concern for small- and medium-scale mining, given the remoteness of most operations. Main problems in Argentina are: (a) *transportation*: roads are generally inadequate and normally carry only small loads (28-30 tons). Railroad transportation is unreliable (shipments between Neuquén and Buenos Aires take up to six months); (b) *communications*: the telephone network works badly and tariffs for long distance calls are very high; (c) *power*: electricity costs are about UScents 8-14/khW which is about two times as high as in Chile and other mining countries; and (d) *housing and social services*: the remoteness of mining communities results in the need for companies to provide housing, schools and health services. Housing and social services requirements raise the costs of production by about 10%.
5. **Marketing.** Until 1989, the National Development Bank (BANADE) performed the marketing of minerals on behalf of most small- and medium-scale miners. BANADE purchased the production in the mining areas, generally at very favorable prices. The scheme also included working capital financing and substantial subsidies. As many of the operations were unecomomic in their own right, the discontinuation of the BANADE program caused a crisis of small- and medium-scale mining in Argentina. Entrepreneurs have no marketing expertise and practically no access to working capital financing by commercial banks. Some small- and medium-scale producers perceive good market prospects for relatively scarce products such as tiles of high quality clays, travertine and marbles, and perlite for filter elements. High expectations are also placed on the Chilean market and on cooperation with Chilean producers. However, such expectations may not materialize. Small mining companies do not have enough information about market volumes and quality requirements. There is practically no co-operation among small producers in this regard. Federal and provincial government institutions are not staffed to provide technical assistance in marketing.

6. **Financing.** Small- and medium-scale mining companies in Argentina experience difficulties in obtaining financing. Bank financing is not available because mining is considered a risky business. Furthermore, Argentine banks have little experience with financing of mining. Other options, e.g., obtaining financing through partnerships with foreign investors has also proved unsuccessful in the past. As Argentina's macroeconomic situation has improved, it may become easier for medium-sized companies to obtain financing. The small-scale miners, however, will have continued problems of financing projects, in some cases because the property is not properly studied and the project is deficiently prepared. Generally, however, small-scale mining is not a bankable proposition anywhere.

7. **Taxation.** Taxation is not a major concern for small- and medium-scale miners. Taxes are generally moderate in Argentina and are rarely paid: 30% federal taxes on profits and 1% on fixed assets, plus a provincial tax of 1-3% on gross sales. Royalties on production have been suspended in most provinces. Land rental for mining properties (canon) is also low and is not collected systematically in most provinces.

8. **Exploration.** Small- and medium-scale miners rarely perform any systematic exploration.

9. **Environment, Health and Safety.** Although small- and medium-scale producers are aware of the need for environmental control, little is being done to reduce pollution. For example, the surroundings of many crushing plants and lime kilns suffer from heavy dust pollution. Existing health and safety regulations are also not enforced. Several small- and medium-scale producers express the view that regulations in Argentina should be less strict than in industrialized countries in order not to hinder the development of the mining industry. Such an attitude may prove to be a serious constraint to introducing proper environmental, health and safety standards in Argentine small- and medium-scale mining.

SITUATION OF MINING IN SELECTED PROVINCES

Jujuy

1. **Economy.** Jujuy is an important agricultural producer in Argentina: agriculture and agroindustry account for about 35% of provincial GDP, with tobacco, sugar cane, and citrus fruits as the main products; mining accounts for about 6% of GDP; and the public sector for another 30%.
2. **Institutional Set-up.** The mining sector is organized as follows: (a) a Directorate of Mining under the Secretariat of Economy covering geology, development, promotion, energy, mining policy and administration, with 59 staff; (b) a Mining Tribunal under the Provincial Government, with 15 staff; and (c) Universidad de Jujuy with a Mining Engineering Department and a Mining Research Institute.
3. **Geological Potential.** Jujuy's geological potential is good, but mining faces operational difficulties due to the remote location of the province. Jujuy's geology is closely related to that of Bolivia, with several of Bolivia's mineral belts entering into Jujuy: (a) within the Puna occur a series of borate- and lithium-bearing salt marshes and a number of epithermal gold/silver/ mercury/sulfur prospects; (b) the Bolivian tin/tungsten belt extends southward into Jujuy, where the Pirquitas mine (currently inactive) was the main's source of Argentina's tin production; (c) the Bolivian antimony/gold belt projects into central Jujuy; and (d) the lead/zinc belt of Bolivia extends into Western Jujuy (location of the Aguilar mine).
4. **Mining Activity.** The value of mining production in Jujuy declined by about 30% during the 1970s and 1980s, due to the closing down of tin mines during the world tin crisis and the decrease in production of construction materials because of the national construction crisis. The 1991 value of mineral production is estimated at about US\$43 million, of which almost 85% arises from the zinc/silver/lead mine of Minera Aguilar, the largest mining company in Argentina. Aguilar is owned by a consortium of Bolivian investors (70%) and Rio Tinto Zinc (30%). Two companies, Minera Tea and Minetti S.A., produce limestone accounting for about 8% of the mineral production. Borate accounts for another 5%.
5. **Main Projects.** There are currently no major mining projects in Jujuy. FM owns a number of mineral properties which may attract future investment.
6. **Main Issues.** The granting of concessions is a major problem in Jujuy. There is a backlog of about 1,500 applications. Most existing mining concessions are held by "speculators" who have no intention of investing in exploration and development. Serious investors are unable to obtain concessions. Another problem is the royalty which remain too high in spite of their reduction in December 1991.
7. **Actions Considered.** Jujuy is a participant in the NOA treaty. The following actions are being considered by the provincial government: (a) the Province will assign a specific budget to the Mining Police for supervision of concessions; and (b) the Province plans to reduce royalties to 1-3%.

Salta

8. **Economy.** Salta's main products are agricultural (vegetables, tobacco and sugar) and agroindustrial (refined sugar, cigarettes and alcohols), accounting for 15% and 15.2% of GDP respectively. Mining and quarrying accounts for about 4% of provincial GDP, employing 3,000 workers.

9. **Institutional Set-up.** The mining sector is organized as follows: (a) a Directorate of Mining under the Secretariat of Industry and Mines, composed of a Technical Department and an Administrative Department, with 37 employees; (b) a Mining Council; (c) a Mining Court to administer concessions; (d) an Exploration Center under the Federal Government, with 8 staff; (e) the provincial Mining Corporation "La Casualidad"; (f) a Directorate of Fabricaciones Militares which possesses reserves in the Province; (g) Universidad Nacional de Salta offering degrees in geosciences; and (h) the Institute for Mineral Processing.

10. **Geological Potential.** Salta is located in the Andes of Northern Argentina. Several parallel north-south geological belts run through the province: (a) the western Andes containing a volcanic segment which includes similar geology to the porphyry-copper belt of Chile; (b) the Puna, underlying the rest of the western lobe, which is a volcanic plateau with many epithermal gold-silver-sulphur deposits, and salt marshes containing salts of sodium, lithium, potassium and boron; (c) the eastern Andes with prospects and high potential for base and precious metals; (d) the sub-Andean zone of central Salta containing a number of lead-zinc and non-metallic prospects of limited potential; and (e) the Chaco Basin, in the eastern third of the province with little potential, except for hydrocarbons, which are currently produced in modest amounts.

11. **Mining Activity.** Although Salta possesses some areas of potential for non-ferrous and precious metal mining, their economic viability is not known. Past exploratory work was limited by border zone restrictions and by the influence of Direccion General de Fabricaciones Militares a holder of large reserve areas in the province. Total mining production in 1991 was about US\$43 million most of which came from production of borates. Production of borates has declined by almost one-half due to the crisis in Brazil, the major market for this product. The most important producer, Boroquimica, accounts for more than 80% of production of borates and derivatives in the province with 7 small producers accounting for the remainder. About 20 small companies produce perlite, sodium sulphate, and salt. The provincial company "La Casualidad" was created in 1975 to exploit a sulphur mine, but the mine closed down in 1985.

12. **Main Projects.** Fabricaciones Militares and La Casualidad own in equal shares three properties at La Colorada (zinc/copper/lead/silver); La Casualidad also owns some areas with alluvial gold and a sulphur deposit. It is uncertain whether private investors will show interest in participating in exploration/exploitation of these projects which may require state company participation.

13. **Main Issues.** The issue of the role of Direccion General de Fabricaciones Militares (FM) with respect to its reserve areas may be resolved in the near future if the privatization of assets of Fabricaciones Militares can be successfully concluded. (In 1970, FM was assigned 71,000 ha which after geological work was reduced to 5,650 ha distributed in 18 areas which showed potential). Before the recent abolition of legislation for border zones, it took about 10 months to grant a concession; this has

been now reduced to about 4 months for all areas. Royalties are high, ranging from 3 to 10% depending on the type of mineral.

14. **Actions Considered.** Salta is a participant in the NOA treaty. The following actions are being considered: (a) the Provincial Government plans to reduce royalties to 3%; and (b) Fabricaciones Militares and La Casualidad plan to offer concessions in their reserve areas for possible joint-venturing.

San Juan

15. **Economy.** San Juan is basically agricultural (agriculture and agroindustry generate 41% of GDP), concentrated around San Juan City. Mining activities account for 5.5% of GDP.

16. **Institutional Set-up.** The mining sector is organized as follows: (a) a General Directorate of Mining under the Ministry of Production. It has three divisions for technical, legal, and mining registry matters; (b) a Mining Council; (c) an Exploration Center under the Federal Government with 15 staff; (d) the provincial Mining Corporation - IPEEM, with 9 staff; and (e) the Universidad Nacional de San Juan, Argentina's premier mining school since 1900 with three institutes - Mining Research, Geology, and Photometric Research.

17. **Geological Potential.** San Juan consists of the following regions: (a) the Andes in the Western part, with porphyry copper deposits and epithermal gold-silver belts, of high potential but difficult access; (b) the northeastern part, the Sierra Pampeana, containing non-metallic minerals and construction materials, some of which are currently under production (travertine, marble, bentonite, clays); and (c) the southeastern part, the Cuyo Basin, with hydrocarbon potential but no current production.

18. **Mining Activity.** Past production of metallic and precious metals has dwindled, leaving only significant output of non-metallics and construction materials. About 30% of production comes from medium mines and the remainder 70% from small mines. Total value of production in 1991 is estimated at US\$32 million, of which construction materials (limestone and marble) accounted for about US\$21.5 million and aluminum sulphate for about US\$6 million.

19. **Main Projects.** Although no final decision has been made, following the discovery of copper deposits in "El Pachón", Minera Aguilar has shown interest in their development in partnership with Chilean investors. Minera Valle del Cura is analyzing the feasibility of exploiting the Sancarrón gold mine.

20. **Main Issues.** Royalties were suspended in 1967. Under the Nuevo Cuyo treaty, they would be reintroduced, probably at an acceptable level of 3%. IPEEM holds about 60,000 ha of mineral reserves, mostly adjacent to or near the Chilean border. IPEEM should transfer the area to private investors. Lack of personnel in the provincial government results in excessive delays in granting concessions: permits for exploration take an average of 26 months, while concessions for exploitation take up to 10 years (measurements must be done by government employees). Such delays reduce opportunities for serious mining. Total concession areas cover approximately 1.2 million ha, of which only 1,000 ha

are being exploited. Producers complain about lack of credit, high power costs (US\$20/Kwh) and slow reimbursement of VAT on exports.

21. **Actions Considered.** San Juan is a participant in the treaty of Nuevo Cuyo. All properties in hand of IPEEM have been presented for tender (closing date is March 1993) - conditions put forward include a monthly fee for exploration and a royalty to the Province (3%) if production takes place. To date, no investors have been attracted.

Catamarca

22. **Economy.** Catamarca has been historically a mining province, given its geography with 77% of its area covered by mountains. In spite of a decline in recent years, mining is still important, representing currently about 10% of provincial GDP. Nevertheless, the most important source of employment is the public sector which absorbs 46% of the work force.

23. **Institutional Set-up.** The mining sector is organized as follows: (a) a Provincial Mining Secretariat, with a General Directorate covering geology, mining police, topography, promotion, supervision and laboratory; (b) a Mining Judge which administers concessions; (c) SOMICA-DEM, the provincial mining company; (d) YMAD, a mixed federal-provincial mining company created to exploit a copper/gold/silver deposit, with over 500 employees; and (e) Dirección General de Fabricaciones Militares, which possesses several properties in the province.

23. **Geological Potential.** Catamarca's geology provides a good mineral potential, but with relatively high costs of development and transport. It has the following regions, with about three-quarters of its territory situated in the Andes: (a) the western part along the Chilean border with good potential for epithermal gold/silver/copper deposits; (b) the Puna in the northwest with several salt marshes with known concentrations of borates, lithium and salt; (c) the eastern part with polymetallic epithermal-mesothermal-porphyry mineralization where the most important projects are located (Alto de la Blenda, Bajo de la Alumbrera, Capillitas, etc.); and (d) the Sierra Pampeana in the southeastern quarter, with non-metallic potential (salts of sodium and magnesium, as well as lithium and beryllium).

24. **Mining Activity.** Historically, Catamarca has been an important mining center, with important production of tungsten. Due to depressed markets and the closing down of the federal development bank (BANADE), which in past years provided subsidized credit and purchased the production of small miners, most mining operations have closed down. By 1991, 733 mines were registered but active were only: (a) YMAD's Farallón Negro/Alto de la Blenda gold and silver mine which accounts for about 25% of Catamarca's mining production by value and about 40% of Argentina's gold production; (b) Cantera Doña Amalia, the main limestone producer in the province, accounting for over 40% of Catamarca's mining production by value; and (c) 16 small mining companies producing rodocrosite, lithium, borate, marble and mica. These operations accounted for an estimated total value of production of about US\$28 million in 1991.

25. **Main Projects.** Several exploration concessions have been granted to international mining companies with an option for exploitation: (a) Lithium Corporation has signed a contract with FM for

exploration of lithium (investment US\$5 million, duration 5 years) with option for exploitation during 40 years (estimated investment requirement US\$100 million); (b) Victor Contreras/American Resources Corporation have signed a contract with SOMICA-DEM and FM for exploration of the copper/gold/silver deposit of Capillitas-Cerro Atajo to do a feasibility study with option for exploitation; (c) Musto has signed a contract with YMAD to do a feasibility study of the copper/gold/silver/molybdenum deposit of Bajo de la Alumbreira (cost of US\$4.2 million, duration 18 months) with option for exploitation (estimated investment requirement US\$500 million); (d) YMAD is offering the copper/gold/silver/molybdenum deposit of Alto de la Blenda for exploration and development. It also intends to offer for development Bajo el Durazno, Bajo San Lucas, Agua Tapada, and Bajo las Pampitas; (e) American Resources Corporation has signed a contract with Agua Rica (private) to explore and prepare a feasibility study for the copper/gold/molybdenum deposit Mi Vida, with a sale option; (f) American Resources has presented a project to obtain concessions in the Provincial Reserve Areas of Antofalla, la Hollada and Diablillos; and (g) the Province has released its copper/gold reserve area La Borita for exploration to Pacific Rim (Northern area) and to Sovereign Gold (Southern Area).

26. **Main Issues.** Many state organisms and public enterprises play a role in Catamarca's mining sector: the Provincial Enterprise SOMICA-DEM which holds 115 ha of reserve areas, YMAD which possesses an area of 343 Km², and FM. Both SOMICA-DEM and YMAD have serious administrative and financial problems which affect the areas under their control. In spite of administrative problems, the Provincial Mining Secretariat claims that the granting of concessions does not take long: an average of three months for exploration concessions and four months for exploitation concessions. However, there is little follow-up on the fulfillment of obligations by concessionaires. As a consequence, there are 200 concessions outside provincial reserves, of which only ten are in operation. Royalties range from 0 to 10% depending on the value of production, with gold mining at the upper end of the range. Receipts from royalties and land rental are deposited in a mining fund to finance mining infrastructure. Small miners are suffering from lack of financing and marketing assistance. Only 16 small mines are currently in operation.

27. **Actions Considered.** Catamarca is a participant in the NOA treaty. The following actions are being considered by the Provincial Government: (a) to reduce royalties to 3% with further reductions if the mineral is processed in the Province; and (b) to secure private participation in a number of important exploration and exploitation mining projects.

Mendoza

28. **Introduction.** Mendoza is a fairly rich province, with well-developed agriculture, light industry, petroleum, some non-metallic mining, and the federally-run Sierra Pintada uranium mine. Mining accounts for about 0.6% of provincial GDP, while petroleum and natural gas account for 29%.

29. **Institutional Set-up.** The organization of the mining sector is as follows: (a) a General Directorate of Mining under the Ministry of Economy, with 64 staff, of which 15 are professionals, covering legal, geological, promotional, and administrative aspects; (b) a Mining Council for solving legal disputes on concessions; (c) an Exploration Center under the Federal Government with 8 staff; (d) a research center CRICYT, with limited activities related to geology and analysis of mineral deposits; and

(e) Escuela Industrial Técnica Minera, a technical school offering two-year degrees in petroleum and mining.

30. **Geological Potential.** Mendoza contains: (a) a 600-km stretch of the Andes, with several porphyry, base and precious metals prospects; (b) the Sierra Pampeana, a north-south belt in the central part, containing prospects of base metals, fluorite, manganese, sandstone copper, and uranium; and (c) the eastern half, with the Neuquen and Cuyo basins, with mineral potential for petroleum, various non-metallic minerals, and evaporitic salts.

31. **Mining Activity.** Mining in Mendoza is underdeveloped: about 10 medium and 39 small mines were in operation in 1991 accounting for a total value of production of US\$14 million, of which construction materials (limestone and marble) accounted for about US\$8.3 million, uranium for about US\$2.2 million, and non-metallic minerals (bentonite, talcum and salt) for the remainder. Production of construction materials declined by about 50% in 1991 with respect to previous years due to the construction crisis.

32. **Main Projects.** The largest is Minera Tea's Potassium Salts Project. Total cost of the project is estimated at US\$64 million, and is expected to start-up production by end-1993.

33. **Main Issues.** The only royalties imposed by the province is on uranium (7%). Royalties collected on petroleum and natural gas extraction are destined partially into a fund of US\$10 million per year to finance projects, including mining. Also, 1.5 % of the provincial sales tax is destined to finance projects on border areas. A main problem is the existence of 873 concessions, most of them unproductive. Another issue is the existence of 20,000 ha of provincial mining reserves, which is inactive. Due to lack of administrative capacity it takes between six to twelve months to register a concession.

34. **Actions Considered.** Mendoza is a participant in the Nuevo Cuyo treaty . The following actions are being considered: (a) except for Paramillos, the Government will release all other provincial reserves; (b) the Concession Authority will be placed under the Provincial Courts; and (c) a Provincial mining census will be completed by end-1992.

Chubut

35. **Economy.** Chubut only has 360,000 inhabitants, concentrated along the coast, the lower Chubut River valley, and the Andes foothills. The economy is heavily dependent on natural gas and petroleum production and refining; petroleum royalties yield US\$5 million per month. Other activities include fishing, oviculture and some industry. The most important enterprise in the latter category is the privately owned ALUAR aluminum smelter near Puerto Madryn, which produces 170,000 tpy of aluminum from imported alumina. The plant employs 940 persons.

36. **Institutional Set-up.** The organization of the mining sector is as follows: (a) the General Directorate of Mines and Geology, under the Subsecretariat of Economic Development in the Ministry of Economy covering geology and mining services, mineral economics, mining register and hydrocarbons

(22 staff); (b) the Provincial Mining Corporation, PETROMINERA, to monitor the province's royalties from petroleum (9 staff) and its mineral reserves (1 staff); and (c) a Directorate of Environment under the same Subsecretariat.

37. **Geological Potential.** The geology of Chubut is divided in three categories: (a) the western 15% within the Andes, which contains porphyries (copper/molybdenum), epithermal deposits (gold/silver/lead/zinc/copper), and gold placers; (b) the north-central 10% underlain by Somuncura volcanic rocks with potential vein and disseminated deposits (gold/silver/copper/lead/zinc); and (c) the sedimentary platform covering 75% of the province which contains clays, gypsum, and has potential for sandstone, copper and uranium.

38. **Mining Activity.** Total value of mining production in 1991 was approximately US\$20 million with almost US\$10 million arising from Mina Angela which produces gold/zinc/silver concentrates. Mina Angela started production in 1977 and has been expanded several times. Several small operators produce kaolin, barites, limestone and ornamental stones. In 1992, EACA S.A. started trial operations of the gold/silver Mina Huemules.

39. **Main Projects.** Most of the known mineral prospects in Chubut are in Provincial Reserves under PETROMINERA. PETROMINERA has taken the following actions on two of its four reserve areas: (a) it has leased Huemules to EACA S.A. which has performed some exploration work and is probably producing some gold; and (b) it is offering for lease Arroyo Luque which has gold potential.

40. **Main Issues.** Both the Mining Directorate and PETROMINERA want to remain active in the exploration and mining business, rather than turning over their concessions to private investors. This policy is not optimal for rapid development of Chubut's mineral resources.

MAIN METAL MINING OPERATIONS

Mina Aguilar

1. **Background.** The Aguilar mine is located in the province of Jujuy, in the Altiplano, west of the town of Humahuaca, 240 kilometers from San Salvador de Jujuy. A paved road connects it to both the Pan-American highway and the General Belgrano railway. The Aguilar mining complex produces lead and zinc concentrates, and silver as a by-product. Lead and zinc have been typically exported in shares of 40 and 25 percent of output, respectively. However, recent depressed local markets have increased the lead export share to 80 percent.

2. The Aguilar area was already known in pre-colombian times. Subsequent mining in the seventeenth century is well attested by remnants of silver smelting, about five kilometers south of the mineralized areas. Modern mining activities started in 1929, with the creation of the Compañia Minera Aguilar S.A., which began production in 1936 after developing the mine and establishing ore concentrating facilities, a township and roads. Main components of the facilities are, a concentrating plant, loading facilities for concentrates and supplies at Las Cruces, and dedicated townships, at an elevation of 4,500 m and for the concentrator and supporting services, at an elevation of 4,000 m.

3. Management of Aguilar is currently concerned about a need to improve operational efficiency and cost effectiveness. Local costs are high, while ore grades of the mine are falling. These factors have reduced competitiveness. While cost information was not made available, it was indicated that until 1979, aggregate run of mine production exceeded 20 million tons, with average metal contents of 7.38 percent lead, 8.47 percent zinc, and 172 grams of silver per ton of ore. By comparison, in 1988 average metal contents were down to 4.57 percent lead, 6.34 zinc, and 120 grams of silver per ton of ore. Management is examining the adoption of lower cost mining techniques, and ways to improve productivity, including possibilities of further expansions of production.

4. **The Mineral Deposit.** The Aguilar mineral deposit is situated in the western part of a dome shaped geological formation. It extends over a length of 2,000 m, a width ranging between 200-300 m, and a vertical extension of 1,000 m. Main mineralization is emplaced in: (i) a breccia with galena as the principal sulphide, and lesser amounts of sphalerite (ZnS) and chalcopyrite (CuFeS₂); and (ii) comparatively small lenses of massive sulphides principally as galena, and lesser amounts of sphalerite, pyrite and pyrrhotite. Additionally, minerals are found in vertical fractures with north-south strike, which occasionally form veins of "stock-work" type.

5. Geological work involves surface and underground drilling of 6,000-7,000 m annually to explore new areas, improve known reserves from the possible to probable category, and detail limits of already known deposits. Current reserves exceed 5 million tons of proven and probable mineral, which contain about 3.8 percent of lead, 6.5 percent of zinc, and 90 grams of silver per ton of ore. This is sufficient to support mining for about 9 years, at ongoing production rates.

6. **Processing.** Run-of-mine ore is processed into two mineral products, both of which contain silver as a by-product: (a) lead concentrates of 300-350 tons monthly, with a lead content of 76 percent, and 1,660 grams of silver per ton; and (b) zinc concentrates of 600-700 tons monthly, with a zinc contents of 45 percent, and 150 grams of silver per ton. Process efficiencies are: (i) recovery percentages of 84 for lead, 89 for zinc, and 71 for silver; and (ii) tailing contents of 0.5 percent for lead and 0.6 for zinc, with 20 grams per ton for silver. Domestic smelting is done separately by independent operators, in seven relatively small smelting facilities, which appear to use technologies ranging from artisanal to intermediate, by international standards. There is a clear need for a comprehensive assessment of environmental effects and the options for mitigation and control.

7. **Support Services.** A main support actively focuses on training, monitoring of ventilation and of generation of gases and dust, and working conditions. Other main support services include: (a) modern laboratory facilities; (b) water supply from natural springs; (c) thermo-power units of 7,500 KVA; (d) compressed air supply of 200 cubic meter per minute, by 11 compressors; (e) surface and underground heavy duty maintenance facilities; (f) repair shops for light vehicles and electric components; and (g) computer facilities for payrolls, MIS, ore reserve determinations, and mine planning.

8. **Employment.** The workforce has recently been reduced from approximately 1,500 to 1,100 permanent employees. Housing facilities include 1,542 units, which are provided free of charge. Medical services include hospital assistance. Schooling is also provided, with about 2,000 students in primary level, 800 in secondary, and 300 children in care units. Scholarship support for university and secondary school is given to over 150 students. Additionally, support is given to two technical schools.

Mina Angela

9. **Background.** The Angela mine is located in the province of Chubut, south-east of the town of Jacobacci. A 120 km dirt-road connects it to this town, whose transport facilities include a railroad station and an airstrip. The Angela mine produces polymetallic concentrates for export mainly to Belgium, which contain lead, zinc, copper, gold and silver. The mine produced about 433,000 tons of run-of-mine ore from 1979 to 1985. Main units are the mine, concentrating plant, a township and supporting services. Total employment is about 340. Management of Angela has aimed at increasing production capacity in an effort to reduce costs.

10. **The Mineral Deposit.** The mineralization is mostly primary, extending over an area of about 3 km in diameter. Main minerals are gold, silver, galena, sphalerite and chalcopryrite, which are found in massive, breccia and banded forms. Six main mineralized structures have been established with lengths of 200-500 m, depths of 150-200 m, and widths of 1.2-3.0 m. Estimates made during the past decade established measured reserves at nearly 0.6 million tons, and geological reserves of an additional 0.6 million tons. Metal contents are gold and silver at 2.81 and 50.6 grams per ton of ore, respectively, lead at 1.8 percent, zinc 4.58 percent, and copper 0.445 percent. These reserves are sufficient to support mining for about 10 years at current production rates.

11. ***Mining and Concentrating.*** The Angela mine produces about 350-400 tpd of run-of-mine ore. This underground mine was developed over a period of 10 years establishing about 5,500 m of horizontal galleries, 400 m of shafts, 200 m of vertical chimneys, and 500 m of incline drifts. Ore is mined by standard "cut-and-fill" methods, with mechanized modern drilling, excavating, loading and hauling equipment. Run-of-mine ore reportedly contains 3.5/4.0 g Au, 50g Ag, 2.9% Pb, 5.6% Zn and 0.38% Cu.

12. Ore is trucked to the concentrating plant, where it is processed into two products: (a) lead-copper concentrates with gold and silver as by-products (500 tons monthly); and (b) zinc concentrates with silver and cadmium as by-products (1,000 tons monthly). Concentrates contain 75-80 g/ton Au and 800 g/ton Ag. Metals are: 55% Pb, 60% Zn and 8% Cu.

Farallon Negro - Alto La Blenda

13. ***Background.*** The concession rights for the Farallon Negro and Alto la Blenda mines are held by Yacimientos Mineros de Agua de Dionisio (YMAD). The mines are adjacently located in the province of Catamarca, at an elevation of 2,600 m. Access is by dirt-road to the provincial highway at a distance of 25 km, which connects with the town of Belen at a distance of 100 km. The closest railway station is Andalgalá at a distance of 180 km. The Farallon Negro mine has been in production since 1978. It is an underground mine worked by "cut-and-fill" methods. Its run-of-mine ore contains manganese, gold and silver. A leaching and agitating plant is used for gold and silver recovery, while less costly heap-leaching is used for processing ores with lower metal contents. The mine has reserves to support current mining for about three more years. Additional exploration and development work is envisaged to increase ore reserves and mine life. The Alto la Blenda mine annually produces 490 kg of gold and 4,100 kg of silver and by world standards could be classified as a small operation. Current reserves are sufficient to support a mine life of 10 years. Annual production of gold and silver from Farallon Negro is about 840 and 9,850 kg, respectively. YMAD is currently forming a joint-venture to raise US\$10.5 million for implementing feasibility studies. These would permit a production increase of 50 percent.

14. ***The Mineral Deposits.*** The Farallon Negro mineralization within three geological structures of 2,000-3,000 m length, 1-32 m width and 200-240 m in depth. Ore reserves are about 0.5 million tons, with gold and silver contents of 4.42 and 86.42 grams per ton, respectively. The Alto la Blenda deposit has four main mineralized vein structures with of 550-1,200 m length and 0.5-6 m width. They contain ore reserves of about 1.5 million tons with gold and silver contents of 6.53 and 127.09 grams per ton respectively.

15. ***Mining*** is generally by underground "cut-and-fill" methods, with limited surface work. In 1985, production was about 96,000 tons, with 15.5 percent from the surface, 79 percent from Farallon Negro, and 5.5 percent from Alto la Blenda. By end of 1991, Alto la Blenda produced 168,000 tons at 24,000 tons annually. Currently, annual production has increased to 75,000 tons. The proposed project would improve mechanization, and modify and increase processing plant installations to treat 135,000 of ore annually.

16. **Processing** : the facility operates at 87 percent of rated capacity. Recoveries are approximately 90 percent for gold, and a very low 32 percent for silver. The processing cycle is comprised of crushing, grinding, cyanide leach, precipitation and fusion.

17. **Support**. Main support installations are: (a) thermo-power units to supply existing requirements; (b) compressors for air supply to the mine; (c) maintenance facilities; and (d) water supply from a distance of 25 km. Community services include 104 units of housing, hospital and schooling.

MINING SECTOR INSTITUTIONS

Overview of The Institutional Structure

1. Argentina is a federal state with 24 provinces. Provincial governments consist of governors and ministries. Mining matters are dealt at both national and provincial levels, and different laws and procedures for mining exist in different provinces. A number of state companies and institutes, national as well as provincial, also play an important role. Geoscientific and mining research is carried out by various organizations. In addition, the universities train mining specialists and perform research.

2. Mining related organizations may be divided into the following functional groups:

(a) Policy, administration and basic technical work:

- (i) Federal: Secretaria de Minería (SM)
- (ii) Provincial: Subsecretaria de Minería or equivalent (SPM)

(b) Mining and/or exploration:

- (i) Fabricaciones Militares (FM)
- (ii) Yacimientos Petroliferos Fiscales (YPF)
- (iii) Yacimientos Carboniferos Fiscales (YCF)
- (iv) Comision Nacional de Energia Atomica (CNEA)
- (v) Provincial mining corporations

(c) Research

- (i) Consejo Nacional de Investigaciones Cientificas y Tecnicas (CONICET)
- (ii) Consejo Federal de Inversiones (CFI)
- (iii) Instituto Nacional de Prevencion Sismica (INPRES)
- (iv) Instituto Nacional de Ciencia y Tecnologia Hidrica (INCITH)
- (v) Instituto Nacional de Tecnologia Industrial (INTI/CIIM)
- (vi) Investigaciones y Desarrollos Mineros (IDEMSA)
- (vii) Centro Regional de Investigaciones Cientificas Tecnologicas (CRICYT)
- (viii) Direccion Nacional del Antartico

(d) Training and research

- (i) Universities

3. The functions of these organizations with respect to mining are summarized in the table below. Most of these functions are covered by more than one entity, in particular, exploration and geological mapping.

4. Concerning mining exploration, the SM practically ceased activities in 1989 when Ley de Promocion Minera was suspended, although it still has regional offices in the provinces with about 190 staff. Fabricaciones Militares also plans to discontinue its role in exploration.

The Structure Of Institutions And Responsibilities

| | -----Institutions----- | | | | | | | | | | | | | |
|----------------------------|------------------------|----|----|----|----|----|----|----|----|----------|----------|----|---|---|
| | 1a | 1b | 2a | 2b | 2c | 2d | 2e | 3a | 3b | 3c 3d | 3e 3f | 3g | 4 | 5 |
| Policy and Law | X | X | | | | | | | | | | | | |
| Permitting and Control | | X | | | | | | | | | | | | |
| Statistics | X | X | | | | | | | X | | | | | |
| Data Banks | X | X | X | X | | | | | X | X | | | | |
| Geological Mapping | X | X | X | X | X | X | | | | | | | X | |
| Satellite Image | X | X | | X | | | | | | X | | X | X | X |
| Natural Disasters | | | | | | | | | X | X | | X | X | |
| Ore Exploration | X | X | X | | X | X | X | | | | | | | X |
| Ore Exploitation | | X | | | X | X | X | | | | | | | X |
| Basic and Applied Research | | | | | | | | | | | X | X | X | |
| Financing Research | | | | | | | | X | X | | | | | |
| Education | | | | | | | | | | | | | X | |

1. Organizations for Policy, Administrative and Basic Technical Work
 - a. Federal: Secretaria de Minería (SMfed)
 - b. Provincial: Subsecretaria de Minería or equiv. (SMprov)
2. Entities Performing Mining and/or Exploration
 - a. Fabricaciones Militares (FM)
 - b. Yacimientos Petrolíferos Fiscales (YPF)
 - c. Yacimientos Carboníferos Fiscales (YCF)
 - d. Comisión Nacional de Energía Atómica (CNEA)
 - e. Provincial mining/exploration/promotion organizations
3. Research Organizations and Councils
 - a. Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET)
 - b. Consejo Federal de Inversiones (CFI)
 - c. Instituto Nacional de Prevención Sísmica (INPRES)
 - d. Instituto Nacional de Ciencias y Tecnología Hidráulica (INCITH)
 - e. Instituto Nacional de Tecnología Industrial (INTI/CIIM)
 - f. Investigaciones y Desarrollos Mineros (IDEMSA)
 - g. Centro Regional de Investigaciones Científicas Tecnológicas (CRICYT)
 - h. Dirección Nacional del Antártico
4. Universities
5. Private Sector

Most provinces carry out exploration work with the intention of promoting development and providing information to private investors. Some of these (Neuquen, Chubut, Catamarca, La Rioja, Santa Cruz, San Juan) own mineral deposits and prospects through provincial mining corporations. Although the same provinces intend to reduce their role in exploration none of them is considering abolishment of the mining corporation.

5. Although several institutions (e.g., YPF, YCF and CNEA) are involved in geological mapping, few maps have been produced since 1987. With the reduction in geological work of the state petroleum, coal and uranium companies, there is currently no institution active in geological mapping.

6. Various types of data banks for geoscientific or mining information have been established during the last few years. These are: (a) a mining and geological data bank created in 1990 at SM with the objective of compiling and distributing geological and mining information; (b) mineral occurrences and bibliographical data banks established in CFI, which are the most important source of computerized information within the Argentine mining sector (7,000 records on mines and prospects and 16,000 bibliographical references); (c) statistics on mining and mining companies (INFOMIN) developed at CFI with the cooperation of the Organizacion Latinoamericana de Minería (OLAMI) with the objective of standardizing information in Latin America; and (d) bibliographical data developed at various other institutions. In addition, a number of provincial institutions are establishing their own data banks. There is however no coordination and information may be lost as many institutions discontinue their role in mining.

Main Public Sector Organizations other than SM

7. *Provincial Mining Administrations.* The provincial entities responsible for mining are mainly constituted as mining secretariats or directorates under the provincial ministry of production or of economy. Except for the mining judge, which in some cases is under the secretariat/directorate and in other cases under the provincial court, the organization is similar in all provinces. Variations in personnel numbers are however substantial. A rich province like Neuquen has a Directorate of Mining with more than 50 employees, while other provinces have only 10 or 20 staff. The functions are usually divided into legal and technical areas. The following tasks may be included among the responsibilities: (a) granting of and supervising mining concessions; (b) supervising mining activities (mining police); (c) preparing mining statistics; (d) preparing mineral resources inventories; (e) carrying out primary exploration activities; (f) developing information on provincial mineral resources and mining activities; (g) advising public and private miners; (h) providing laboratory services; and (i) preparing geological and topographical maps (only Neuquen). With the possible exception of Neuquen and Mendoza, the provinces lack financial resources to adequately carry out their functions. As a result, mining policy activities, preparation of statistics, and research activities are usually deficient.

8. *Consejo Federal De Minería.* This council is currently being organized to promote mining interests in the provinces. Its members are representatives of the provincial governors. The council meets two times a month in Buenos Aires, and deals with common issues such as reform of mining laws and regulations. It has working relationship with the Mining Commissions in the Senate and the Lower House of the Argentine Congress.

9. ***Fabricaciones Militares (FM)***. This organization was created under the Ministry of Defense to secure supplies from domestic production. It owns mines (HIPASAM, iron ore producer) and mineral reserves in different provinces. It also has a geology department which has done substantial geological mapping, the most important being a map of the Jujuy and Salta provinces (scale 1:400,000) in 1979. As part of its privatization program, the government has decided to privatize FM's geology department.

10. ***Yacimientos Petroliferos Fiscales (YPF)***. YPF, the state petroleum company, has an exploration department which maintains data banks on geological and seismic information, maps, graphical information, satellite imagery data, etc. Although by law YPF is obliged to provide all information to the Secretaria de Hidrocarburos, YPF has become the information center within the sector because the Secretaria has not had the resources to handle and store such information. Given the government's plans to privatize YPF, consideration should be given on how to preserve this information.

11. ***Yacimientos Carboniferos Fiscales (YCF)***. YCF, the state coal mining company, has carried out exploratory work from the beginning of the 1950s until recently. YCF is currently being restructured and privatized. YCF possesses some valuable geological information, such as reports, maps, mineral analysis, etc. which should be made accessible to the interested public.

12. ***Comision Nacional de Energia Atomica (CNEA)***. CNEA, created in 1952, performs activities ranging from mining of uranium to production of nuclear energy (it has two nuclear plants with a third under construction). It mines the Sierra Pintada deposit in Mendoza, with an annual output of 150 tons per year of yellow cake. Production is scheduled to double. Production costs are high and exploitation of the deposit is continued for reasons of security of supply. Over the years, CNEA has carried out extensive exploratory work, ranging from regional aeromagnetic/radiometric surveys and geological mapping to detailed geological, geophysical and geochemical work and drilling in areas of major interest. The resulting material is kept in archives; a computerized data bank is also being set up. A well equipped laboratory, serving the nuclear complex as well as outside clients, is located in Mendoza, and a small laboratory in Buenos Aires carries out mineralogical research.

13. ***Yacimientos Mineros Aguas de Dionisio (YMAD)***. YMAD was formed in 1958 by the Federal Government, the Catamarca Province and the National University of Tucuman for the exploitation of the Farallon Negro and the Alto de la Blenda gold deposits in Catamarca. Current gold production is 28-35 kg per month. YMAD has excess of personnel (500 employees for a 350 ton ore per day production) and has accumulated a debt of US\$20 million. YMAD is forming joint ventures for the exploration of its mineral properties.

14. ***Corporacion Minera de Neuquen (CORMINE)***. Created in 1975, CORMINE has about 60 employees. Its main activities have been: (a) undertaking exploration work in the old gold field of Andacollar; (b) executing tunnel drifting to investigate gold in the Erika and Sofia mines with negative results; and (c) preliminary exploration of four other deposits which are being negotiated with private companies.

15. ***Instituto Provincial de Exploraciones y Explotaciones Mineras (IPEEM) of San Juan Province.*** IPEEM was established in 1990 for administering the province's mining properties. The organization consists of four directors (representing the main provincial parties) and 5 employees, and an annual budget of US\$200,000. All properties, comprising of 10 state reserve areas with a total 72,000 ha, have been presented for tender.
16. ***Sociedad Minera de Catamarca (SOMICA).*** SOMICA was created in 1986 as a mixed enterprise (Province 51%, private investors 49%) with the aim of promoting mining in the province. SOMICA, since its creation, has not been able to carry out major exploration works and has focussed on small-scale rhodocrosite (manganese) production. The province is studying the privatization of SOMICA.
17. ***Petrominera, Sociedad del Estado of Chubut Province.*** Petrominera was created in 1989 for exploration of the province's mineral and petroleum resources, and administers the provincial mineral reserves as well as YPF's secondary oil fields. It has a staff of 6 persons. Petrominera has: (a) signed several agreements for exploitation of its secondary oil fields, which provides an income of US\$1 million per year; and (b) signed a contract in 1989 for the exploitation of the Huemules gold deposit with Empresa Argentina Cemento Armado. Petrominera plans to invest its revenues in mineral exploration on its remaining properties.
18. ***La Casualidad of Salta Province.*** Formed in 1985 in cooperation between the provincial government and the municipality of San Antonio de los Cobres, it has three employees administering three mineral properties. Its large copper/lead/zinc sulphide deposit La Colorada is owned jointly with Fabricaciones Militares and was offered for international tender in 1991 with negative results.
19. ***Consejo Federal de Inversiones (CFI).*** Founded in 1952, CFI provides technical assistance to the provincial governments for the planning and formulation of development projects in a variety of fields, including mining. This organization is financed by provincial contributions. It is directed by a board composed of the provincial governors. CFI employs 30 geologists among its staff. Recently CFI has been involved in mining promotion activities, creating a data base registering more than 7,000 mineral occurrences and 16,000 mining and geological bibliographical references.
20. ***Consejo Nacional de Investigaciones Cientificas y Tecnologicas (CONICET).*** With an annual budget of US\$180 million, CONICET is the principal source for financing technical and scientific research in Argentina. Geoscientific research has an important part in CONICET's functions: most scientists within the field of geoscience are financed by this institution. The CONICET has expressed interest in a role in establishing a geological survey institution.
21. ***Centro Regional de Investigaciones Cientificas y Tecnologicas (CRICYT).*** CRICYT was founded in 1973 by agreement between CONICET, the province of Mendoza, and the National University of Cuyo. A small part of CRICYT's research is related to geology or mineral deposits. CRICYT is hosting the Instituto de Investigaciones Aplicadas de Ciencias Espaciales which performs satellite image processing.

22. ***Instituto Nacional de Tecnologia Industrial (INTI)***. INTI is a metallurgical institute for applied research on ores and metals, and has provided services to many Argentine mines. It is well equipped and has a staff of about 30 professionals. It is financed by taxes on industrial production.
23. ***Instituto Geografico Militar (IGMA)***. A military institution, IGMA is responsible by law for the topographic mapping of the country. Presently, IGMA is the only source of topographic data required for geological mapping and cadastral work. Once a very active institution, IGMA has suffered a severe reduction in personnel. The map production process is semi digital. A total of 70 maps in various scales were printed in 1991. Total coverage of the country at the scale 1:250,000 required for geological mapping, is scheduled to be completed within 5 years.
24. ***Universities***. Twelve universities in Argentina offer programs in geoscience: Buenos Aires, La Plata, Cordoba, Bahia Blanca, Rio Cuarto, Comodoro Rivadavia, La Pampa, San Juan, San Luis, Catamarca, Tucuman and Salta. A total of 60 to 80 geologists graduate each year. The University of San Juan has in addition to geological sciences a degree in mining engineering. Several universities have also started teaching environmental geology.
25. ***Environment, Health and Safety***. The principal federal environmental authority is the Secretaria de Recursos Naturales y Ambiente Humano, which was reestablished in 1991. This organization deals with the general aspects of environment conservation and has played a central role in elaborating a proposal for a national environmental code, now in Congress. Certain provinces, i.e., Cordoba and Mendoza, are introducing their own legislation and institutional arrangements in this area, but with minimal coordination with GOA. Provincial organizations are responsible for inspections regarding worker's health conditions and mine safety.

INDEX OF SELECTED MINERAL DEPOSITS AND DISTRICTS

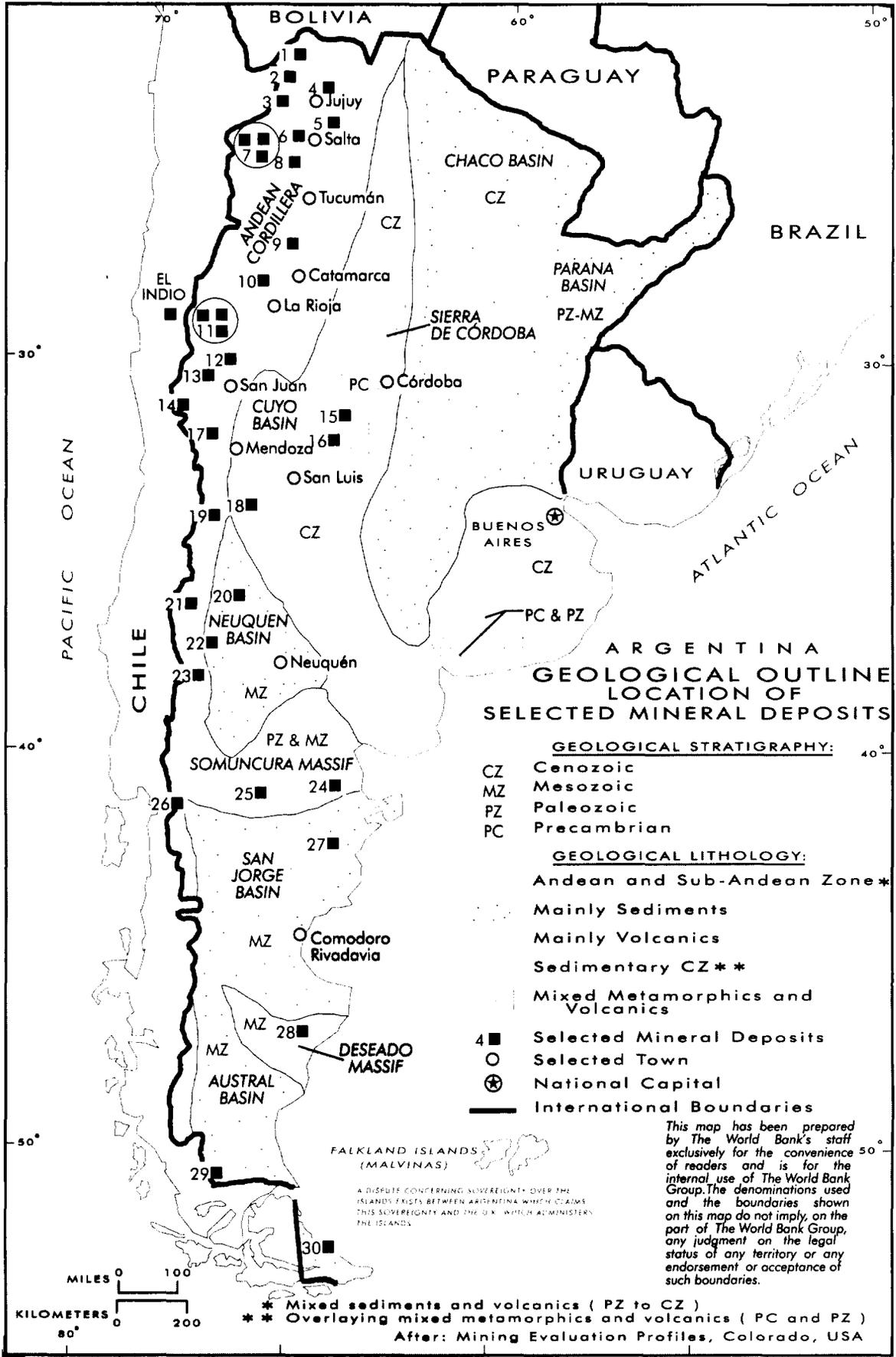
Ref.: Map IBRD 24900

| DEPOSIT / DISTRICT | DEPOSIT TYPE | CONTAINED MINERALS / METALS |
|---|------------------------|---------------------------------|
| 1. Providenda * | sandstone-hosted | Ag-(Cu) |
| 2. Pirquitas * | mesothermal | Sn-Ag |
| 3. Pan de Azucar * | mesothermal | Pb-Zn-Ag |
| 4. Aguilar + | MVT or sedex | Zn-Pb-Ag |
| 5. Zapla * | sedimentary | Fe |
| 6. Concordia-La Poma * | epithermal | Pb-Ag-(Zn) |
| 7. Puna salar region | evaporites | |
| . Salinas Grandes | | borates |
| Salar de la Puna | | Li-K-Mg |
| Salar de Pastos Grandes | | borates |
| Tincalayu + | | borates |
| Salar de Ratonés | | borates |
| Salar del Hombre Muerto | | Li-K |
| Santa Gertrudis | | Li |
| 8. El Quevar | epithermal | Au-Ag-Pb-Zn |
| 9. Farallon Negro | porphyry complex | |
| Agua Tapada | | Cu-Au |
| Farallon Negro-Alto de la Blenda + | | Au-Ag-(Mn-Pb-Zn) |
| Bajo la Alumbreira | | Cu-Au |
| Bajo El Durazno | | Cu-Mo-Au |
| Capillitas Mine + | | rhodochrosite- (Cu-Pb-Zn-Ag) |
| Cerro El Atajo | | Au |
| Mi Vida | | Cu-Mo |
| 10. Nevado de Famatina, and La Mejicana - Los Bayos | porphyry epithermal | Cu-Mo-Au Au |
| 11. El Indio belt | epithermal | Au-Ag-(Cu) |
| Lama, Zancarron, Rio Frio, Vacas Heladas, Cerro Carmen, Retamal, Valle del Cura, etc. | | |
| 12. Hualilan + | epithermal | Au |
| 13. Castano Viejo * | epithermal | Pb-Zn-Ag |
| 14. El Pachon | porphyry | Cu-(Mo) |
| 15. Los Avestruces * | skarn | W |
| 16. Carolina * | placer | Au |
| 17. Paramillos | porphyry complex | Cu-(Pb-Zn)-Au |
| 18. Sierra Pintada + | sedimentary | U |
| 19. Cerro Infiernillo | porphyry | Cu-Mo-Au-Ag |
| 20. Malargue | evaporite | K |
| 21. Andacollo-Erika, and Cerro Malal | epithermal placer | Au Au |
| 22. Huitrin * | sedimentary | celestite |
| 23. Campana Mahuida | porphyry | Cu-Mo-Au |
| 24. Sierra Grande * | sedimentary | Fe |
| 25. Cerro Castillo-Angela + | epithermal | Au-Ag-(Pb-Zn) |
| 26. Huemules + | epithermal | Au-Ag-(Pb-Zn-Cu) |
| 27. Dique Ameghino + | epithermal | kaolin |
| 28. Cerro Vanguardia | epithermal | Au-Ag |
| 29. Rio Turbio + | sedimentary | coal |
| 30. Tierra del Fuego | marine placers | Au |

+ indicates current producer

* indicates recent former production

MAP SECTION

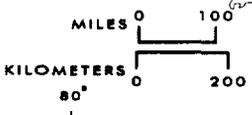


**ARGENTINA
GEOLOGICAL OUTLINE
LOCATION OF
SELECTED MINERAL DEPOSITS**

- GEOLOGICAL STRATIGRAPHY:**
- CZ Cenozoic
 - MZ Mesozoic
 - PZ Paleozoic
 - PC Precambrian
- GEOLOGICAL LITHOLOGY:**
- Andean and Sub-Andean Zone*
 - Mainly Sediments
 - Mainly Volcanics
 - Sedimentary CZ**
 - Mixed Metamorphics and Volcanics
- 4 ■ Selected Mineral Deposits
 - Selected Town
 - ⊕ National Capital
 - International Boundaries

This map has been prepared by The World Bank's staff exclusively for the convenience of readers and is for the internal use of The World Bank Group. The denominations used and the boundaries shown on this map do not imply, on the part of The World Bank Group, any judgment on the legal status of any territory or any endorsement or acceptance of such boundaries.

FALKLAND ISLANDS (MALVINAS)
A DISPUTE CONCERNING SOVEREIGNTY OVER THE ISLANDS EXISTS BETWEEN ARGENTINA WHICH CLAIMS THIS SOVEREIGNTY AND THE U.K. WHICH ADMINISTERS THE ISLANDS.



* Mixed sediments and volcanics (PZ to CZ)
** Overlaying mixed metamorphics and volcanics (PC and PZ)
After: Mining Evaluation Profiles, Colorado, USA