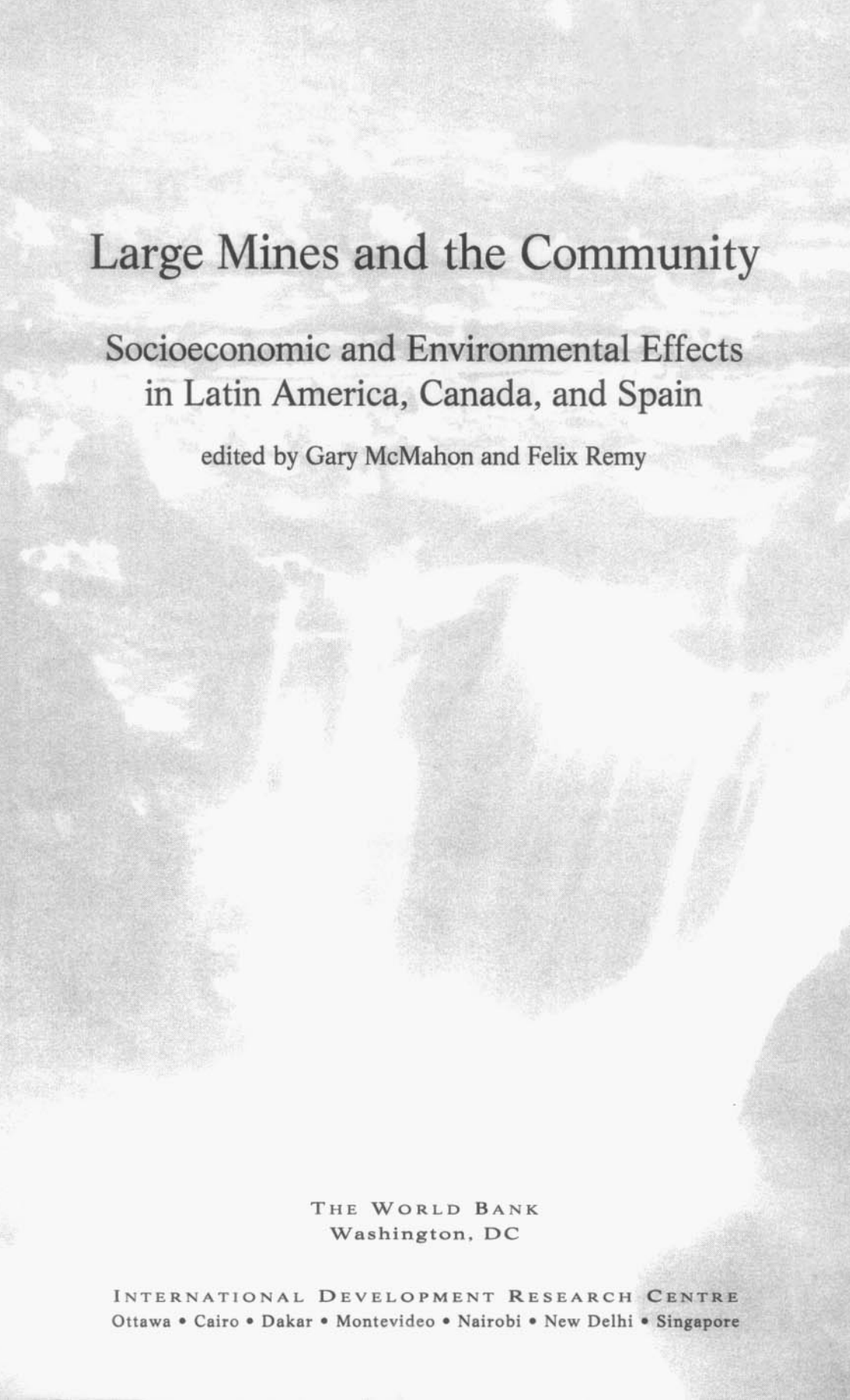

Large Mines and the Community

Socioeconomic and Environmental Effects
in Latin America, Canada, and Spain



Edited by Gary McMahon and Felix Remy



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Foreword

The costs and benefits of large-scale mining to local communities and the evolution of the relationship between mining companies and communities is a subject that has become important in countries spanning the globe. To date, however, it is also a subject on which there has been a dearth of comprehensive research. In a context in which this relationship is changing rapidly — albeit unevenly and unsystematically — the need to develop tools that will allow the assessment of the impact of different approaches to this relationship has become paramount.

To address this need, a project on large mines and the community was launched in three traditional Latin American mining countries — Bolivia, Chile, and Peru — where mining has been an important part of the economy for centuries. Given the relatively long and extensive mining history of the three countries, it is believed that these studies will provide important lessons to other countries in the region and around the globe. It was also decided to include studies from Canada and Spain so as to compare the experiences of developed and developing countries and to share lessons learned. The experience of Canada, with its well-established mining industry and involvement of aboriginal peoples that live in many of Canada's mining regions, has important parallels with the Latin American situation. The study of the Almadén mercury mine in Spain, the oldest active mine in the world, looks into a community profoundly affected for over 2 000 years by a mine that is now facing closure.

The project was developed by in-country research teams and staff members of the Industry and Mining Division of the World Bank (now part of the Mining Department) and the International Development Research Centre (IDRC) of Canada. It was officially launched in Lima in June 1998 with financial support from IDRC, the World Bank, the Canadian International Development Agency (CIDA), and the Government of Spain. The country studies were undertaken by teams from the Universidad Católica (Bolivia), the Universidad de Chile (Chile), the Grupo de Análisis para el Desarrollo (Peru), Carleton University (Canada), and International Institutional Consulting (Spain), as well as by Graham Parsons, an independent consultant in Saskatchewan, Canada.

This book is the final result of these efforts. It contains an independent analysis of the various effects of large-scale mining on local communities,

with three medium-scale mines included for contrast. The authors have explored the reasons for varying performances and lessons learned for future operations. The general message of the book is a hopeful one: the relationship between mining operations and local communities is undergoing a largely positive evolution, and there are very practical programs and policies that can be followed to increase the probability of such experiences. A more specific message of the book is that these are more likely to take place if the three major stakeholders — the local community (including such groups as civil society, local government, labour unions, and women's groups), the mining company, and the central (or state/provincial) government — work together in a trilateral framework toward ensuring long-term, sustainable benefits to the community, benefits that will not disappear when the mine eventually closes. It is our hope and belief that the studies contained in this book will play a key role in the development of best practices with respect to mining and the community, which can be used to guide the policy and actions of all stakeholders.

We would like to thank CIDA and the Government of Spain for their support for this project, Real Lavergne for his assistance in the development and monitoring of this project, Jean-Claude Lauzier for his contributions to the development of the project, and numerous participants in project workshops in Lima and Santiago.

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CHAPTER 1.

Key Observations and Recommendations: A Synthesis of Case Studies

Gary McMahon and Felix Remy

Introduction

This book presents six studies that investigate the impacts of medium- and large-scale mines on local communities. Each examines the economic, social (including health and education), cultural, and environmental effects of the mining operations on the communities. The studies' primary goal is to analyze the mining operations costs and benefits upon the surrounding vicinity from a multi-dimensional perspective. Strong emphasis is placed on the sustainability of any benefits received by the communities. Second, the authors explain the legal and consultative processes that often led to quite different results. Third, the authors identify the best or good practices from the perspectives of all stakeholders in the management of the development, extraction, and closure phases of a mining operation, paying particular attention to sustainable socioeconomic development.

Two factors have affected increased globalization of trade markets in recent years: The decline of the communist trading block and the increased environmental control in developed countries. One of the most notable results of this has been the marked increase in exploration and mineral development activities by local and multinational companies in developing and transition countries. Many countries that have recently begun the transition to a market economy (or moved away from a reliance on state intervention in the economy) see the development of the mining sector as vital for the reactivation of their economy. In particular, revenues from this sector are often the most important (and easiest to manage) source both of foreign exchange and fiscal revenues.

The capital-intensive nature of mining requires very large amounts of investment capital and, in most cases, considerable technological upgrading.¹

¹ In this document, the mining sector does not include oil and gas. Although much of the discussion also pertains to that sector, it is excluded from this project due to its distinctive characteristics.

Consequently, many governments of countries with significant mining potential have changed their investment and mining codes to attract foreign investors.² The results of these actions have been impressive. Between 1990 and 1997, while global exploration investment went up 90 percent, it increased fourfold in Latin America. From another perspective, the share of exploration investment in other developing countries rose from 1990 to 1997, but by the year 2000 it returned to the 1990 level. However, Latin America increased its share by 123 percent (from 13 percent to 29 percent) from 1990 to 1997, and then maintained that share from 1997 to 2000, when exploration investment was sharply reduced worldwide.³

At the same time, with the recently diminished role of the state in the mining industry and a more active international community, expectations regarding the responsibility of mining companies in the protection of the environment and their relationship with local communities have changed. It is now generally accepted that the potential detrimental effects that mining can have on fragile ecosystems and local communities should be prioritized. While it is generally true that large international mining companies are better environmental citizens than smaller, domestically owned mines, a number of negative incidents has drawn widespread interest in and criticism of their practices. On the one hand, local and international environmental groups have become increasingly involved in mining disputes. On the other hand, local communities have become increasingly concerned that they shoulder all of the negative impacts of mining but receive few of the benefits, especially as capital-intensive, large mining operations only generate a fraction of the jobs that they did a generation or two ago.

The emphasis this analysis places on the development of the local community is relatively new in terms of economic research on mining. Traditionally, most research has focused on the macroeconomic effects, determining the benefit (or lack thereof) to the mining sector's impact on the national economy. Often the discussion has been centered on the natural resource curse or the related Dutch disease. On the contrary, there is little analytical research on the microeconomic or regional effects that focus on socio-cultural and, especially, environmental effects. In contrast, the studies

² Most of this reform has taken place in Latin America although the momentum is beginning to spread to developing countries in other regions of the world.

³ Exploration investment generally leads to project investment of a much greater amount, although there is no clear relationship and the amounts are spread over a number of years.

in this book are primarily concerned with whether or not large mining operations can produce net sustainable benefits to local communities, and, if so, whether there are policies or processes that can increase positive and reduce negative impacts. In order to determine the net benefits, it was necessary to analyze all relevant impacts — economic, social, cultural, health, and environmental. The key issues addressed in each of these areas are discussed in this introductory chapter.

Three of the six studies cover mines located in developing countries. They cover a total of seven mines in Bolivia, Chile, and Peru and each study follows similar methodologies, addressing the issues described above. The other three studies are on mines located in developed countries, each of which was selected to provide further illumination to the results of the Latin American studies and provide additional lessons for all developing and transition countries involved in large-scale natural resource extraction. Chapter 5 examines community and regional development in the area of the Almadén mercury mine in Spain, the oldest continuously operating mine in the world with at least 2000 years of operation. Chapter 6 examines the history of mine-community relations in Canada, using a number of mini-case studies. Finally, chapter 7 looks at the community effects of the uranium industry in northern Saskatchewan, a part of Canada mostly populated by aboriginal peoples.⁴

This chapter summarizes the main conclusions of the studies, culminating in a synopsis of lessons learned, conclusions, and recommendations.

Key issues

It was noted in the introduction that the researchers investigated the economic, social, cultural, environmental, and health impacts of medium- and large-scale mining operations on local communities. The key issues that they addressed in each area are outlined here.

Economic issues

The opening of a large mine has economic consequences at the national, state or provincial, and local levels. Large mines create employment directly in both the construction and operating phases, indirectly through input demand, and even more indirectly through the so-called multiplier effects of the

⁴ Native peoples in Canada are customarily referred to as aboriginal peoples while in Latin America they are called indigenous. We use both terminologies in this book depending on the context.

demands for goods and services by their employees. Large mines also provide foreign exchange earnings and tax revenues. Although the level of the tax burden, including indirect taxes, remains an important issue, many countries have reduced taxation levels and eased repatriation requirements in order to attract foreign investment. But in some countries obsolete fiscal regulations have been applied, depriving the host country of a fair share of any benefits. At the same time, many countries have been decentralizing tax and expenditure systems.

These observations have many implications.

1. Spin-off economic benefits. Who is it that benefits from the direct, indirect, and multiplier effects of the opening of a large mine? Are there provisions for local and indigenous communities? Are there any commitments "to buy locally"? Will there be any attempt to train local residents for skilled or semi-skilled positions? Will informal or small-scale mines be displaced by the proposed new operation?
2. Income benefits. What will be the general effect on wages and incomes in the local area? Is it likely that the prices of some basic goods will increase dramatically, causing hardship to those community members not receiving benefits from the new economic conditions? In sum, the income distribution effects of the opening of a new mine are likely to be substantial and have potentially serious effects.
3. Taxation. The division of taxes and royalties among different levels of governments is an important factor in determining the geographic and end-use distribution of the benefits and costs of the mine. The influx of new migrants puts great strains on the existing social and economic infrastructure. It is essential that some mechanism exists to ensure an orderly expansion of activities and provision of services.

Environmental issues

There does not seem to be any hard evidence that large international mining companies seek pollution havens in which to conduct their operations. With some exceptions, they use the same technology in developing countries that they do in their home countries, and they often supersede the local environmental standards. However, there have been a number of large incidents in recent years which mining critics eagerly point out. In this study, primarily through discussions with the various stakeholders, the researchers made an assessment of the general environmental performance of the mining

operations and their general compliance to national and international processes and standards.

Social and cultural issues

It is not just economic implications that pose a concern. There are equally grave social and cultural repercussions to opening a new mine, particularly when indigenous populations are affected. For instance, an influx of new workers may lead to social problems due to a lack of adequate housing and infrastructure, growth of bars and prostitution, easier access to the area due to road development, and deficient educational and medical facilities. Moreover, workers from other regions of the country or abroad usually bring different lifestyles and patterns of behaviour and arouse local resentments. Usually, the average “imported” worker will be wealthier than the local population: this may magnify their importance in the eyes of some local residents, especially the young.

The uneven distribution of benefits and costs from the mine may also upset existing social hierarchies and have dramatic cultural consequences. On the other hand, if managed properly, the increased employment, wealth and commerce caused by the mine opening can lead to a cultural revival, especially in a depressed area. Of particular concern is the case where the cultural adaptation of indigenous and non-indigenous local communities may be quite different. While the latter may not find their cultural base threatened by the large mine and welcome its employment opportunities, the indigenous peoples may believe that they and their culture will be overwhelmed by the arrival of large number of workers and their families.

Similar to economic benefits and costs, the distribution of social benefits and costs is likely to be unequal, particularly if there are indigenous populations. In the past, companies often acted as a surrogate government, providing infrastructure, schools and medical care. While in recent years this may continue to be true for the company’s employees, it is less and less true for the community at large. Therefore, local governments need to be empowered and financed to provide such services. An important part of the analysis in this project was to analyze the implicit distributional effects of the provision of government and company services. The related impact on poverty reduction was also a focus of the project.

Health issues

The health impacts of the opening of a large mine are an important factor from the environmental, social, and cultural perspectives. The pure economics of a large mine opening can also have significant health impacts if it leads to higher incomes and tax dollars spent locally on health-care provision, including better medical facilities. Nevertheless, the potential negative health impacts associated with mining generally receive most of the attention.

The most direct health concerns are occupational health and safety issues. Large mining companies have become quite conscientious in this area, although care must be taken that special local circumstances are given adequate due.

There are also important types of health impacts via the environmental nexus. First, there are the effects due to flow contamination. Such pollutants can lead to increased morbidity via direct consumption or via effects on the quality or quantity of crops contaminated by polluted irrigation water or air. Second, environmental disasters can have similar effects and, if involving toxic substances such as cyanide, could result in death. Third, the long-term effects of pollution stocks can have serious morbidity and mortality impacts, especially if they include the slow leak of toxic substances and heavy metals into the environment.

Even if the production processes of a new mine are completely clean, there is still likely to be a significant health impact due to social effects. On the positive side, the company may act as a surrogate government and provide health facilities that previously did not exist. On the other hand, immigration may bring in new diseases or, just as importantly, result in the spread of diseases related with prostitution, such as venereal diseases and AIDS. In general, the more isolated or "virgin" is the territory into which the mining operation is entering, the greater is the socially related health impact.

Legal and consultative issues

Just as important as what took place is why it took place. Of particular importance are the regulatory framework in effect at the time of project development, coupled with the consultative processes followed in the negotiations leading to the opening of the mine, as well as mediation methods for any conflicts which later develop. Final outcomes significantly depend on the clarity and specificity of fiscal and environmental regulations and standards, as well as who is involved in the negotiations and the "rules of

the game.” Moreover, the mining companies themselves may have codes of conduct for dealing with environmental issues and local populations. Non-governmental organizations (NGOs) can also play an important role in the negotiations, especially with regards to environmental and indigenous issues, where they may be better informed than public authorities.

The outcomes of negotiations will also be greatly influenced by the existing legal framework. Of particular importance are these five factors.

1. The rights of local and indigenous communities with respect to natural resources, land claims and general land invasion;
2. The legal position with respect to mining in national parks and the effects on biodiversity;
3. The general state of judicial systems and law enforcement, particularly with respect to the ability of local and indigenous groups to demand effective representation;
4. General environmental legislation, especially with regards to individual or class action litigation and the existence of “ecological” crimes; and
5. The legal responsibilities of mining companies with respect to local and indigenous communities and environmental protection in general.

The mining operations

The six studies analyzed in this book cover thirteen mines or mining regions, including Inti Raymi and Puquio Norte in Bolivia; Escondida, Candelaria, and Fachinal in Chile; Yanacocha and Antamina in Peru; Almadén in Spain; Cameco in northern Saskatchewan; and Voisey Bay, Diavik, Sussex, and Sudbury Basin in Canada.

Inti Raymi, Bolivia: This large-scale gold mine is only 42 km from Oruro, a medium-sized city located at an important crossroads in the altiplano of Bolivia. The region has a long history of mining. The immediate area of the mine is characterized by very low productivity agriculture and high levels of out-migration. The mine began production in the 1980s, and there was a major increase in capacity in the early 1990s. During the 1990s, Inti Raymi was by far the most important mine in Bolivia and a major contributor to exports and regional GDP, but its reserves are now quite low.⁵

⁵ Until recently the mine was expected to close within three years but recent discoveries may extend its life to ten years or more. However, this new lease on life is quite dependent on the development of a bioxidization process that would make exploitation of the new reserves economically feasible.

Puquio Norte, Bolivia: This medium-scale gold mine is located in the Bolivian lowlands about 180 km east of Santa Cruz de la Sierra. The mine is very close to San Ramon, a town of about 6 000 people located at an important crossroads. The economy of the area is based on agriculture and commercial activities; mining is not traditional. Population growth is very high in the region. Puquio Norte was commissioned in 1997 with reserves for about seven years. While significant locally, it is not an important mine from the national or regional point of view.

Escondida, Chile: This very large copper mine is 300 km from the medium-sized city of Antofagasta. The region is a dry desert with a long mining history with other important operating mines. Escondida started production in December 1990. It has reserves for over 50 years and is a major contributor to Chilean exports, fiscal revenues, and regional GDP.

Candelaria, Chile: This large copper mine is located 20 km south of Copiapó, a medium-sized town, in the coast of the Chilean 3rd region. As in the case of Escondida, the mine is located in a dry desert and the region has a long mining history. It has reserves for 34 years. Candelaria is an operation with significant impact in the regional economy.

Fachinal, Chile: This medium-scale gold mine is in a semi-wilderness area, about 25 km from the small town of Chile Chico. Tourism is the most important local activity and job opportunities are scarce; mining is not a traditional activity in the area. Fachinal was commissioned in 1996 and presently has reserves for about eight years. While significant locally, it is not important from a national point of view.

Yanacocha, Peru: This very large gold mine is located 45 km from Cajamarca, a medium-sized city. The economy of the area is based on agriculture and domestic tourism; mining is not a traditional activity. The region is one with high levels of poverty and lack of basic needs. Yanacocha first began production in 1993 and has expanded several times since. It is a very low-cost producer with reserves for at least 15 years, and is an important contributor to exports, fiscal revenues, and regional GDP.

Antamina, Peru: This very large-scale copper mine is under construction and should be in production by late 2001. It is located in a very poor highland area of Peru dominated by small towns and low productivity farming. Antamina has reserves for at least 40 years. It is projected to be a very important contributor to Peruvian exports, fiscal revenues, and regional GDP.

Almadén, Spain: The state-owned mercury mine at Almadén has been in operation for over 2 000 years and perhaps much longer. Historically, the region has been very dependent on the mine as a source of employment and income. Other activities in the lightly populated region are farming and rustic tourism. Due to the decline in the demand for mercury caused by environmental concerns, the mine is currently operating at low levels of production. During its history the Almadén mine has been an extremely important source of export and fiscal revenues for Spain although this is no longer the case.

Cameco, Northern Saskatchewan, Canada: Cameco, the world's largest uranium mining company, has four uranium mines in operation in northern Saskatchewan. It was formed when provincial and federal state-owned companies were merged and privatized in 1988. The mines are all located in remote, cold climate sites, in a region heavily dominated by aboriginal peoples living in poor conditions. Cameco is a very important employer in northern Saskatchewan as well as a significant generator of fiscal revenue for the entire province. In the 1990s between 40 to 50 percent of its employees were aboriginal peoples.

Voisey Bay, Labrador, Canada: This very large-scale nickel deposit is located in a remote area of northern Canada mostly inhabited by aboriginal peoples. Construction is currently delayed due to stalled negotiations between the owner, International Nickel Company, and the Government of Newfoundland. When in operation the mine is expected to employ about 1 400 people on a fly-in, fly-out basis. About 25 percent of the jobs are to go to local Innu and Inuit peoples. The mine is expected to generate \$296 million in annual income in Labrador and \$1 billion annually for the entire province of Newfoundland.

Diavik Mine, Northwest Territories, Canada: This large-scale diamond mine in a very remote area of northern Canada is scheduled to open in 2003. The inhabitants of the region are mostly aboriginal. It is expected to provide 411 jobs, with employment of northerners to eventually be 100 percent. Agreements with the company also provide for significant purchases from northern businesses.

Sussex, New Brunswick, Canada: This medium-scale potash mine was built in the 1980s in a well-established area that is economically dependent on farming plus pulp and paper. Most of the 334 employees are from surrounding communities. About 50 percent of all expenditures by the company go directly to the local region.

Sudbury, Ontario, Canada: The Sudbury Basin contains very large nickel and copper mines. It is located at an important crossroads between both southern and northern as well as eastern and western Ontario. During the last century, Sudbury has evolved into a major mining and regional service center. Companies selling mine-related goods and services have access to 90 mines within a 500 kilometre radius. Moreover, many Government services have relocated to Sudbury. While at one time the Sudbury Basin was considered one of the world's major mining environmental disasters, it now is a global technological leader in high productivity and environmentally friendly technologies.

Latin America: costs and benefits of the mining operations

In this and the following section the results of the studies in Bolivia, Chile, and Peru are summarized. The analysis begins with the economic costs and benefits of mining to the local communities, progresses social and cultural impacts, and finally presents environmental effects. The processes that helped determine the results are examined in the section entitled "Lessons learned and recommendations." Gold and copper are the primary products of four and three of the mines, respectively. All the copper mines represent large-scale operations, though two of the gold mines are medium-scale operations.

Economic costs and benefits

As noted earlier, most previous research on the mining sector has focused on its macroeconomic effects. To put the operations in context, the contributions to fiscal and exports revenues are discussed here, but no analysis is made of the direct or indirect implications of these amounts. Here, the focus is on a number of key microeconomic variables concerning local communities. These include land acquisition, employment and salary levels, business creation and development, multiplier effects, infrastructure creation, contribution to local taxes, training and education for mine employment as well as effects on local prices, particularly basic commodities and housing.

Table 1 contains the available data on investment, production, export revenues, and fiscal revenues for the mines in this study. For the large-scale mines, the amounts of investment and production are generally very large. The Table shows that the large-scale mines in Latin America have generated substantial export revenues and, except for Inti Raymi, healthy fiscal

revenues too. The medium-scale mines are not significant from a macroeconomic perspective.

In a number of cases, land acquisition was a very crucial economic and social issue. Although it can be seen in Table 2 that prices paid were generally far above pre-mine market values, the negotiations often were very difficult. Moreover, local people usually had a different conception of what a land acquisition contract is than the mining firm, and tried to reopen the contracts (often successfully) when new information came to light or circumstances changed. Contracts were never reopened on the grounds the company had originally been too generous.

Whenever disputes arose, the two most important points of contention were a lack of consistency in pricing coupled with lack of alternative sources of employment and income for the sellers of the land. Even though the

Table 1. Investments, production, export revenues, fiscal revenues.

| Large-scale mines | Investment | Production | Export revenues (% of total export revenues) | Fiscal revenues (% of total fiscal revenues) |
|--------------------------------------|--------------------------------------|--|--|--|
| Inti Raymi, Bolivia | \$200 million (1990–1994) | 10 435 kg of gold (1998) | 11% (1998) | \$4.2 million in 1998 |
| Yanacocha, Peru | \$492 million (1993–1998) | 41 300 kg of gold (1998) | \$250 million in 1998 (4.6%) | \$164.4 million in total from 1993–1997 (1.6%) |
| Antamina, Peru (projected annual) | \$2.296 billion (1998–2002) | 250 000 mt of copper; 150 000 mt of zinc | \$950 million (10%–15%) | \$83 million per year (2.5%–3%) |
| Escondida, Chile | \$2.3 billion (1990–1998) | 851 000 mt of copper in 1998 | \$1.96 billion in 1998 (8.9%) | \$253 million in 1996 (1.92%) |
| Candelaria, Chile | \$902 million (1988–1997) | 215 000 mt of copper in 1998 | \$656 million in 1998 (3%) | \$30 million (total from 1993–1996) |
| Diavik, Canada (projection) | \$850 million | N/A | N/A | \$4 million per year |
| Northern Saskatchewan, Canada | 1986 US \$2.5 billion (1953–1998) | 10 924 million tonnes uranium (1998) | \$379 million (3.1%) (1998) | \$72 million (2.4% provincial own source revenues (1998)) |
| Almadén, Spain | – | – | – | – |
| Medium-scale mines | | | | |
| Puquío Norte, Bolivia | \$25 million (1993–1997) | 861 kg of gold (1998) | 0.8% (1998) | \$0.32 million in 1998 |
| Fachinal, Chile | \$85 million (1994–1996) | 1400 kg of gold and 78 000 kg of silver in 1998 | \$30 million in 1998 (<<1%) | – |
| Sussex, Canada | – | 770 000 tonnes of potash and 700 000 tonnes of rock salt per year | – | – |

landowners received a sum far beyond the present value of their holdings, it was often consumed or poorly invested, and later on the former peasant farmer had no source of income.

In order to overcome difficulties associated with pricing, it is important to be transparent in negotiations either with landowners, or with communities in the case of the ownership of common land. If different vendors perceive that others have received a better deal, not only will they try to reopen their contracts but ill feelings will be generated. Pricing becomes a particularly difficult challenge when land is bought over time. Yanacocha in Peru paid much larger amounts for land bought in the late 1990s versus the early 1990s, amounts that largely reflected changing market conditions caused by the renewed dynamism in the area due to the mining operation itself as well as the defeat of Sendero Luminoso. This led to a great deal of bitterness on the part of early sellers and brought social forces such as the Catholic Church on their side. In the end the early contracts were renegotiated and several side payments were renegotiated which included jobs and social programs. Antamina, perhaps learning from the difficulties that Yanacocha had faced, bought almost all the land that it thought it might need at one time, paying the same amount for land of similar quality.

Side payments, such as preferred employment, are one method to avoid or, if necessary, of overcoming the difficulties that arise when former landowners have spent the money they received for their land and have no other income sources. Another method that can be used in the case of the sale of community owned lands is to keep the funds in some sort of trust. In the case of Inti Raymi in Bolivia, one community (La Joya) included a representative from the mining company as part of a three-member board of trustees to help prevent both wasteful investments and corruption.

Table 2. Land acquisition.

| Large-scale mines | Price range (per ha)/ average price (per ha)/ number of hectares | Previous market price (per ha) | Side payments | Savings and investment | General comments |
|-------------------------------|--|--------------------------------|--|---|---|
| Inti Raymi, Bolivia | \$300–\$1000/ \$368/ 5 746 ^a | \$30 | Preferred employment for locals, including training; Constructed 135 houses at \$11 000/house for dislocated villagers | High percentage invested | Prices paid depended on quality of land and availability of alternative sites; artisanal miners given areas |
| Yanacocha, Peru | \$37–\$600/ \$152/ 4 069 | \$44 (1992) | Rotating employment for land vendors | 50% invested payment (other lands, houses, taxi) | Great variation in prices of similar quality land over time |
| Antamina, Peru | \$100–\$1000/ \$480/ 7 141 | \$30 | \$33 000 to 52 renters on mine site | Communities 100%; renters 80%; landowners (not known) | Negotiated common price all at once with prices only depending on quality of land |
| Escondida, Chile | Negligible (unoccupied desert) | Negligible | – | – | – |
| Candelaria, Chile | Negligible (unoccupied desert) | Negligible | – | – | – |
| Diavik, Canada | Negligible | Very low | Royalties to aboriginal groups, Local hiring policy with first priority to affected groups | | Must negotiate impact and benefit agreements with aboriginal groups who own land |
| Northern Saskatchewan, Canada | Negligible | Very low | Employment performance monitoring Preferential local training and hiring policies Procurement contracts to local business New company development for Indian and community based business | | Must negotiate impact and benefit agreements with local residents prior to development |
| Almadén, Spain | – | – | Preferred employment for locals | – | Miners have right to agriculture activities on mine property |
| Medium-scale mines | | | | | |
| Puquio Norte, Bolivia | N/A / 7 200 | Very low | None | Not relevant | All land bought from a foreigner; COMSUR allowed artisanal miners to stay with conditions |
| Fachinal, Chile | – | – | – | – | – |
| Sussex, Canada | – | – | – | – | – |

^a Inti Raymi also paid \$22 222 per hectare for land adjacent to the local town site.

With the possible exception of some environmental externalities (discussed below), there were substantial benefits and few economic costs to the communities near the mining operations. Given the great technological advances in mining in the last 30 years (including the prevalence of labour-saving open-pit mining), direct employment in the Latin American mines has usually been small but not insignificant, except during the construction phase where it was substantial. Moreover, it has often been an important source of work for relocated peoples (usually peasant farmers).

As can be seen in Table 3, the indirect employment effects are often extremely important. Employment in sub-contracted firms or suppliers of

Table 3. Employment.

| Large-scale mines | Direct employment | Indirect local mining employment (mine contractors and suppliers) | % of direct and indirect mining posts filled by local residents | Local non-mine employment generated by mine ^a | Total mine related employment as share of total employment |
|--------------------------------------|-----------------------------------|---|---|--|--|
| Inti Raymi | 716 | 246 | 65% | 2 500 | 25% (60) * |
| Yanacocha | 269 | 3 885 | 90% | 6 000 | 14.4% of county (provincial) |
| Antamina (projected) | 1 250 (4 000 during construction) | 3 750 | 80% | 4 000 | 2.8% of department |
| Escondida | 2 000 | 6 200 | >80% | 5 200 | 9% of Region II |
| Candelaria | 860 | 450 | 86% | 1 012 | 7% of Region III |
| Diavik (projected) | 411 | | >70% | | |
| Northern Saskatchewan (1998) | 1 254 | 937 | 49% | 1 620 | 27% |
| Almadén (average over last 50 years) | 1 351 | 50 | 90% | — | — |
| Medium-scale mines | | | | | |
| Puquio Norte | 118 | Very small | 30% (approx) | | 10% (25% of manual labour) |
| Fachinal | 265 | 250 | <30% | 900 | — |
| Sussex | 345 | 615 | >90% | — | — |

* — The first figure includes Oruro; the bracketed figure is the 2 communities closest to the mine site (La Joya and Chuquifia)

^a This is the number of jobs generated due to the expenditure of contractors and suppliers on local inputs and the employees of the mining company, mine contractors, and mine suppliers in local markets (i.e. the "multiplier effect").

mine-related goods and services is often equal to or much higher than mine employment — fourteen times as high in the case of Yanacocha. In turn, estimated non-mine related employment generated through multiplier effects is often much higher than direct or indirect mine employment — about 2.5 times as high as the others combined in the case of Inti Raymi. In summary, for all of the large-scale mines, the total effects of the operations on local and regional employment can be substantial.

Outsourcing is critical for both the size and sustainability of the mining operations' economic impact. This point cannot be over-emphasized: it is perhaps the strongest result proven by these studies. In most cases, outsourcing increased over time and was the key source of entrepreneurial development. Moreover, the multiplier effects of the operation were much greater if there was substantial local outsourcing because of the bigger monetary injection and because employees of contractors usually spend more of their own money in the local economy. While all of the larger mines worked actively to develop local contractors and suppliers, Escondida's program designed to assist local companies in quality control is the most noteworthy. This company's program has been so successful that many of its local contractors not only supply other firms in the region but are supplying mining companies in other regions of Chile.

While business creation to sell basic commodities or recreation to miners usually happened on its own, business creation for outsourcing began more readily and on a larger scale when the mining company played a proactive role. Yet, there is room here for governments to be more proactive and not just rely on company initiative. An interesting example of how not to proceed occurred in the case of the Fachinal gold mine in Chile. Many new shops opened to provide basic goods and recreation to the miners but the company made an agreement with a subsidized government supplier that was able to undercut most of these local operations. Moreover, the company opened a large canteen to provide recreation for the miners. Both of these developments have had significant negative effects on the local community and led to much bitterness towards the mine.

As shown in Table 4, with the exception of Puquio Norte in Bolivia, salaries for miners and contractors are much higher than general local levels in the cases where data exists. As noted in the discussion on employment, the local monetary injection is much larger than the salaries to the mine employees, and this amount is increased through the multiplier effects. The last column of Table 4 contains the estimated multipliers for the various

Table 4. Salaries and wages.

| Large-scale mines | Average monthly salary (non-management) | Mine salaries relative to local salaries | Average monthly salary for employees of mine contractors | Mine contractor salaries relative to local salaries | Annual monetary injection to local economy (mine employees and contractors) | Estimated multiplier |
|--------------------------------------|---|---|--|---|---|-------------------------|
| Inti Raymi (1997) | \$678 | 450% higher | \$350 | 250% higher | \$9.3 million | 2.79 |
| Yanacocha (1997) | \$1 155 | 300% | \$700 | 180% | \$21.7 million | 2.53 |
| Antamina (projection) | \$1 000 | 200% | — | — | \$29.8 million | 1.42 |
| Escondida | \$1 800 | 254% | — | — | \$279.6 million | 5.7 |
| Candelaria | \$1 300 | 233% | — | — | \$39 million | 1.76 |
| Diavik (projection) | \$3 750 | Much lower | — | — | \$40 million | — |
| Northern Saskatchewan, Canada (1998) | \$3 700 | 440% for north; 674% northern Indian; 240% provincial average | \$2 700 | 330% for north; 490% for northern Indian; 175% provincial average | \$64.7 million (wages and salaries only) | 2.4 |
| Almadén, Spain | \$500 | 125% (average over last 50 years in constant 1998\$) | \$500 | 125% | \$8.4 million | |
| Medium-scale mines | | | | | | |
| Puquio Norte (1998) | \$290 | Same | — | — | — | N/A (probably very low) |
| Fachinal | \$764 | 157% | — | — | \$7.6 million | 1.76 |
| Sussex | — | — | — | — | \$34 million | — |

mines. These vary widely and largely depend on the ability of the local community and region to take advantage of the opportunities offered by the mining operation. The multiplier associated with Escondida is extremely high given the development of an increasingly sophisticated network of mining contractors and suppliers in the Antofagasta area.

In theory, infrastructure creation can be one of the most important benefits of a mining operation as it encourages development of other economic opportunities. However, as can be seen in Table 5, in the Latin American studies this was generally not the case as most of the mines are not far from existing roads. The exceptions are Escondida — which is in the middle of a desert, so opening up the route did not provide many other opportunities — and Antamina. In the case of Antamina, a mine still under development, it is expected that the building of a paved road to the coast will have a very strong positive impact on local development, especially in agriculture and tourism. In most cases, the most important expenditures on infrastructure were for construction of or upgrading local roads, schools, and

hospitals. An interesting exception occurred in the case of Puquio Norte in Bolivia, where the company and local community combined funds to build a gas pipeline to the mine that was larger than necessary to meet the company's needs. The extra capacity was used to provide electricity to the local rural population.

If properly channeled to the region, local taxes can be an extremely important benefit of the mine, as was the case with Inti Raymi in recent

Table 5. Infrastructure and local taxes.

| Large-scale mines | Roads and ports | Power | Hospitals, schools, and other | Local taxes |
|-------------------------------|---|--|---|---|
| Inti Raymi | Minor roads | Generating station for mine not suitable for rural areas | High quality local schools in rural and urban areas; high quality rural health center | 10% of department budget (1998) |
| Yanacocha | Built and upgraded local roads; assisted in maintenance of road to coast | None | High quality school; rural water and sanitation projects | \$7 million per year (1993–1997) ^a |
| Antamina | Major upgrading of road to coast and Lima (in progress); secondary roads upgraded | None | Technical and secondary schools (built by community with land payments) | \$16.6 million per year once in production |
| Escondida | Port of Coloso (only for company use); road to mine; local roads in port area | High voltage power line | International school; water tanks | \$2.2 million (1997) |
| Candelaria | Port at Punta Padrones (only for company use), 22 kms of road | — | Sports complex; created primary and secondary school | — |
| Diavik (projection) | — | — | — | \$1.2 million per year |
| Northern Saskatchewan, Canada | Significant road expansion, including a connected network | High voltage power lines with local access | Recreational facilities; health care facilities; water and sewage | 1995 US \$42.4 million (1985–1996) |
| Almadén, Spain | Worse than national standards | At national standards | High school; university; hospitals; sports complex; much higher than national standards | Negligible |
| Medium-scale mines | | | | |
| Puquio Norte | Insignificant | Electricity for rural areas | None | Negligible (paid to Santa Cruz department) |
| Fachinal | Road improvements (25 kms) | — | — | — |
| Sussex | — | — | — | \$6 million per year to provincial government |

^a This is the approximate regional contribution to regional taxes based on the legal percentage of taxes that are supposed to go to the regions, although it is not certain that they actually are redistributed.

^b This amount only includes royalty payments. An unknown amount of corporate income tax would also be paid.

years. In Peru substantial taxes from a mining operation also should go to the local and regional levels but it is unclear if they actually have, as the case of Yanacocha illustrates. In general, the fiscal systems in the three countries are quite centralized, suggesting that this is an important area for some type of reform in order to bring more sustained benefits to the local community. However, funding by foundations established by the mining companies substitute for local taxation to some degree.

Training and education for mine employment was significant for all of the mines except Puquio Norte and Fachinal. The most interesting example of such training occurred at Escondida, where significant emphasis was placed on upgrading attitudes towards work.

Finally, fears that the mining operations would result in large price increases were mostly unjustified in Escondida, Candelaria and Inti Raymi. But there were some problems in Yanacocha, Puquio Norte and Fachinal, primarily concerning rents and real estate values.

Social and cultural externalities

Discussions of the social and cultural externalities of large natural resource projects usually focus on the negative impacts, such as increases in crime and prostitution, cultural conflicts with indigenous peoples or local communities in general, the upsetting of existing social hierarchies, and the creation of envy between those who benefit from the project and those who do not. However, the studies in this book also illustrate that there can be positive spin-offs also, especially in the areas of health, training, education, and the creation of social capital; that is, capacity for local governance, homogeneity of the community, as well as communication links with and within the community. In the absence of well-endowed local governments, foundations set up by the mining companies play a very important role in structuring, coordinating and funding the activities that make such positive externalities possible.

It was noted earlier that the mining companies have played an important role in the development of health and educational infrastructure (Table 5). As can be seen in Table 6, the larger mines have also played a strong role in providing health facilities and programs and "non-mine" training and education. However, there appear to be economies of scale in the provision of such services, because the medium-scale mines do not provide them, nor any other social services of note, except to their own work force.

Table 6. Social programs.

| Large-scale mines | Founda-tion | Health | Education | Training | Other |
|---------------------------|-------------|---|---|--|---|
| Inti Raymi | Yes | Several | Several | Mine; agriculture; business and com-munity management; weaving; small business development | Social capital development |
| Yanacocha | Yes | Several | Large number | Agriculture | Forestation; food security program; social capital development |
| Antamina (planning stage) | No | — | — | Agriculture; small business development | — |
| Escondida | Yes | Cancer research; upgrade children's hospital; out-patient hospice | School upgrading; scholarships; international school | Technical mine training; micro-enterprise develop-ment; labour market insertion; apprentice-ship program; quality training for local suppliers | — |
| Candelaria | No | Various small projects | Funds primary and secondary school; fund-ing to techni-cal school; scholarships | Technical mine training, training in modern industrial practices, training for local suppliers | Funds "Environmental Brigades" in local schools |
| Diavik | No | — | — | Support business development | Socioeconomic monitoring agreement |
| Northern Saskatchewan | No | Several community health drug and alcohol treatment; healing lodges | Scholarships; awards; train-ing program; northern college | Multi-party training program — \$7 million from 1993–1998, 50% of funding from industry; skills training; work placements | Regional development programs by government and industry; com-munity effects environmental monitoring com-mittees; commu-nity economic development committees |
| Almadén | No | Specific cares for mercury-related diseases | Elementary school with national standards | Artisanal jobs | — |
| Medium-scale mines | | | | | |
| Puquio Norte | No | None | Improvement of local school | None | — |
| Fachinal | No | — | — | Technical mine training for locals | — |
| Sussex | No | — | — | — | — |

Some of the larger mines have set up "arm's length" foundations to provide these goods and services. The advantages of a foundation are that it can bring in money from other sources and it is independent of the mine

operation. On the other hand, it may also be divorced from the strategic thinking of senior management and be one of the first areas cut during a downturn. All of the foundations place a strong emphasis on training to increase the skills necessary for sustainable community development, as well as health issues for women, and mothers in particular.

The mining companies, generally through their foundations, are involved in creating social capital. The Inti Raymi Foundation, for example, trains locals in the design and preparation of projects that they can present for funding, including organizational matters. The entrepreneurial development program of Escondida was noted in the last sub-section. However, the indirect creation of social capital is likely more important for the communities. They are learning how to organize, how to negotiate with both companies and central governments, and how to take advantage of the opportunities offered by the mining operations to pull themselves up by their own bootstraps.

In addition to the previously mentioned economic dimension of land acquisition, there are strong social and cultural ramifications. The largest effects were in the two Peruvian cases where traditional socioeconomic relations among pastoral peoples were disturbed and family groups were occasionally broken. Social relationships may have also been disturbed by the large amounts of money paid for land in the cases of Inti Raymi, Yanacocha, and Antamina.

Nevertheless, in none of these cases was there any significant upsetting of the social hierarchy, although there was often movement among the different levels. Of more importance was the envy created by the new economic opportunities and land payments. In particular, there was rivalry between those villages directly affected by the mine operation and those in the nearby region of the mine. In general, the majority of the direct economic benefits went to those directly affected by the mine, while the other areas were able to glean more from indirect benefits. In fact, one of the primary purposes of the foundations was to give a more widespread distribution of the benefits of the operation to the surrounding communities that were not directly affected by the mine operations. As previously noted, in one sense the foundations were doing what could be expected of tax dollars paid to the local and regional governments by the mining companies.

Many of the mines are located in areas with substantial indigenous peoples that are familiar with mining, so the mine operations were not a cultural shock to them. Perhaps the only exception was the lowland peoples of Bolivia near the Puquio Norte mine but nonetheless, these indigenous

peoples are quite westernized, and there are few true “Amazonian” indigenous peoples in the area. The only problem that the lowland people had was with the customs and work habits of the influx of the highland indigenous peoples. In fact, cultural and social conflicts among in-migrating national workers and local workers were quite strong in two of the areas which possessed no tradition of mining, and hence no established work force with these skills. The Fachinal mine avoided this problem by filling most of its posts with workers from the region, who underwent an intensive training program offered by the company.

Prostitution and related diseases are the major social problem in most of the areas, although alcohol abuse was also noted. However, given the integration of most of the mineworkers with local communities, these problems were not very severe. They were most evident in Cajamarca (near Yanacocha), where residents have complained of the large increase of “sex” bars, and in Fachinal, where the community is very small.

Environmental externalities

When mining is the topic, the environment is never far behind. In the analysis of any potential mining operation, whether the benefits of the mine are greater than the environmental costs is often the first question asked. In these Latin American studies, one objective of the researchers was to analyze the environmental costs thoroughly; not by undertaking physical tests, but by investigating the damage caused by any ongoing environmental problem or major environmental accident. However, researchers found that it was hard to separate fact from fantasy when it came to the environmental performance of the mining companies.

In none of the mines was there any obvious evidence of substantial environmental damage. All the mines made significant efforts to minimize environmental damage and when minor incidents occurred, the companies responded quickly. Nevertheless, in at least three cases — Inti Raymi, Puquio Norte, and Yanacocha — many parties have complained of substantial environmental damage. However, the researchers were never able to verify such damage; nor was there any evidence of substantial accusations made by the usually vociferous international environmental NGOs.⁶

⁶ While the environmental performance of the seven Andean operations covered was satisfactory, some isolated, punctual incidents with little, if any, permanent impact, such as a mercury spill in Yanacocha in June 2000, were depicted as typical of the performance of the mines and as affecting the permanent impact of these operations on their neighboring communities.

It seems likely that the claims of environmental damage were due to a combination of two different forces. The first was poor communications with the communities and unsatisfactory efforts at public relations by the mining company, coupled with the regrettable historic environmental performance of mining companies in the three countries. Especially in the earlier years of operation, many mining companies were very secretive about their operations and did not do a proper job of explaining and demonstrating to the public that they were taking proper care of the environment. The second reason was that local politicians and community members in general used the environment as a political tool. They would create distrust towards the company on environmental concerns in order to extract larger concessions from it on other matters. This political motivation seems to have been particularly strong in the cases of Inti Raymi and Yanacocha.

Latin America: negotiation and implementation processes

In order to conclude which of the processes and strategies followed can be considered as being “best practices,” the case researchers analyzed the processes used and the linkages to end results that were actually achieved. Therefore, the following definitions and objectives were applied to each case study.

1. Processes: analyze strategies followed by stakeholders;
2. Trilateral relationships: study the formal and informal relationships between the mining company, community, and central government; and
3. Best practices: research the processes and policies that led to the best impacts.

In the relationship between the mining operation and the surrounding communities there are always at least three major players: the local (and regional) community, the central government, and the mining company. Ideally this results in a trilateral relationship in which representatives of the three main parties keep an ongoing, three-way dialogue in order to facilitate the design and implementation of a local as well as regional development plan. However, as the cases reviewed illustrate, the more usual case in the Latin American context is that the company negotiates with the central government and the local community (or government) separately. There is very little communication between government and the local community.

These “two-sided triangles” typified all Latin American studies with the possible exception of the ongoing case of Antamina in Peru. In most cases, the central government has only played a major role by previously

establishing a legal and fiscal regime, environmental regulations, and major infrastructure projects, and only later granting the mine a licence. In fact, as all three countries have modern mining codes, most regulations are not negotiable. All mines must follow modern environmental laws, undertake environmental impact assessments, and are inspected by central government representatives. However, a pernicious effect of the weak communication between government and the local community (the incomplete side of the triangle) is that almost all fiscal revenues go to the central level, and that very few communities benefit from these resources. In Bolivia a royalty goes to the departmental level, which has benefited communities in the area of Inti Raymi but not those in the area of Puquio Norte, because the departmental capital is relatively far away. In Peru the “*canon minero*” — a type of royalty amounting to 20 percent of the income tax paid to the central government — should be returned to the region. However, only a minimal amount has in fact been disbursed to the local communities.

Given that these regulations were already in place, the initial concern of the companies dealt with land acquisition. There is very little in the mining laws of the three countries with respect to local economic benefits or social and cultural issues, a situation which pretty much left it to the initiative of the companies to define the quality of relationship they wanted with their neighboring communities. In such a context, the absence of a complete triangular dialogue becomes a serious shortcoming for the establishment of sustainable development. When mining operations were established, there was no formal relationship between the company and the local government (except for Antamina). In general, the local governments did not play a significant role when mining operations were established as companies dealt directly with landowners or community representatives. In recent years this is changing, however, and it is more common for local governments to represent the community interests.

Despite the lack of a formal relationship, by far the most important side of the “triangle” has been the link between the companies and the local communities. In all cases there have been significant interactions, both negative and positive, between the companies and different local community groups (municipal authorities, community based organizations, NGOs, church, universities, landowners). In most cases these relationships have become much more profound over the years, partly due to a natural evolution of the relationships. But this is also due to changing global perceptions of the role of mining companies with respect to their host communities, and to a

better understanding by the mining companies of the values and aspirations of the local communities. For instance, in the case of land acquisition from indigenous populations, it has taken decades for the companies to understand that the closure that they interpreted as finalizing a transaction was interpreted by the other side as the initiation of a long-term relationship, and that consequently land prices had to take into account social considerations.

As a result of the above, the mines that were built most recently began with many of the community interactions that took several years to develop in other cases. Antamina, the most recent mine, has begun with an effort to build a "profound relationship" with the local communities. While part of this change is likely due to learning from experience, certainly a large part is due to increasing pressure on large mining companies by communities and other stakeholders, including international NGOs and the shareholders of the international mining companies. In the past, communities were often satisfied with the large number of jobs that accompanied a large mine operation. However, technological progress has greatly reduced the number of jobs, so communities want other things as compensation.

The achievement of sustainable development by the communities is or should be the dominant goal of the relationship between mining companies and the communities. Communities want support from the mine in the economic, social, cultural, and environmental areas when it is operating. But they also need to address these issues once the mine closes. Accordingly, there has been a great emphasis on developing the human and social capital, as well as the physical infrastructure that will allow the community to continue to prosper after the mine closes. In this regard, outsourcing and the related development of new skills and businesses are seen as a crucial step in the evolution of the community.

For the most part, although the central governments in the three Andean countries maintain a close relationship with the companies, related to the implementation and monitoring of the mining, fiscal, environmental and labour policies and norms, these governments have abdicated their local community responsibilities to the companies. As noted, communities gain little from tax revenues generated by the mines and there is little formal pressure from the central governments on the companies to provide services to the communities. However, companies are often put in a position where they have to fill a void left by the central government. This has become particularly important in the last five years. As the role of the state in the mining sector has diminished and the international community has become

more involved, it is now generally accepted that the welfare and development of those most affected by mining — the local communities — must be prioritized. As the local governments do not have access to the resources, companies are put in the position of having to provide social services and to participate in the process of design, coordination and funding of local development programs or face social unrest.

Over time, the participation of the mining companies in the local context of the three Andean countries has become much more sophisticated, as companies have moved from assistential type models, where the company primarily provides welfare types of services, to production oriented models based on fomenting new businesses linked to the mining operation to sustainable community development models. Each step has built on its predecessors rather than replaced them, and at each step there has been a large increase in the level of community participation in the decision and design process. This trend is consistent with the realization that sustainability can only be achieved when community members feel that they are partners in the decisions that affect their lives.

Clearly there is a large role for the central government to play with respect to community development, even if it is as simple as transferring more of the fiscal revenues generated by the mine to the local and regional governments. In this next section, the role of the central government in Canada and Spain in filling in the third side of the triangle of communication will be examined.

Case studies from developed countries: Spain and Canada

Although environmental concerns are mentioned briefly, the main thrust of these studies was on the evolution of the tripartite relationship between communities, companies, and central (or higher level) governments. The main result is that the three parties are learning from experience. There is a strong positive trend over time with communities receiving increasingly sustainable benefits from mining operations. The scope and size of these can vary greatly, however, depending on the location of the mine and the access to markets, both of which can greatly shape the realistic economic alternatives.

Almadén, Spain

The Almadén mercury mine has been in operation for over 2 000 years, perhaps as long as 6 000 years. It contained over 30 percent of the world's

reserves of mercury. Other activities in this depressed, lightly populated area include crop-based agriculture, sheep farming, and tourism. The population of Almadén reflects the evolution of the mine.

During recorded time, Almadén has been owned by the state. Community members have few alternatives and see the state as obliged to give them employment. The workers have low productivity and there is little innovation. The mercury is very high grade — six times the global average — so there has been little emphasis on increasing productivity. Management's main concern has always been producing more. The estimated present value of production from the 16th century is about \$30 billion. In fact, historically the mine has been so important to the Spanish Crown that it was twice used to guarantee enormous sovereign loans.

Although from the 16th to 18th century, the government used infrastructure improvements and tax incentives to attract workers, in the 19th and 20th centuries there was little investment of rents in the area until 1975. There has only been good road infrastructure to the zone since 1985. (See Tables 1 to 6 for some of the main characteristics of the Almadén mining operation.)

Surprisingly, mercury contamination in the area is negligible. The most serious environmental problem is heavy deforestation as wood has been used for centuries to build tunnels and feed the fires needed in the metallurgical processes. Nevertheless, except for the trees, the flora and fauna are in relatively good shape.

In 1978, the Spanish government made the first serious attempt to diversify the area. These attempts became critically important as the market for mercury diminished, largely due to environmental concerns. The main elements of this plan, called Plan de Reconversion de Comarca de Almadén (PRECA, reconversion plan for the Almadén District) — were the following:

1. develop new mercury mines as well as lead and zinc mines;
2. develop a large 9 000 hectare agricultural area, including reforestation;
3. increase the production and sale of local agricultural products;
4. promote the production and sale of downstream mercury products;
5. market mining technical expertise; and
6. a slaughterhouse.

PRECA was financed 75 percent by the state and 25 percent with resources of the mine. There was little or no private sector or community participation in its design. Despite some technical successes, it has had very heavy losses and the state has had to make large capital injections. The

failure was due to poor planning, a lack of community buy-in, no involvement or responsibility of the private sector, and a general placement of financial concerns after technical concerns. The fall in mineral prices in the 1990s and the environmental pressure on the market for mercury complicated the situation further. To date, the state has bailed out PRECA to the amount of \$150 million, although, to put this figure in perspective, in current dollars rents to the state from the mine just from 1960–1970 were about \$900 million.

The authors do not think that the problems with PRECA were caused by choices they made, but due to the poor methodology that was followed. Part of the reason for the lack of private enterprise in the plan was the long history of Almadén with state ownership and the district's almost complete reliance on the state. The plan also began way too late, only when the writing was on the wall. Project leaders were chosen by political connections, not by experience and professional capacity, and so the leadership of PRECA often changed with political fortunes.

Clearly Almadén is a typical example of a mining operation resulting in non-sustained development. For most of its history the mercury mine was used as a treasure chest of the Spanish Crown. Little if any of the rents went back to the area, little attention was paid to developing the area or diversifying production, and the community never participated in the decisions that most affected it. The efforts that were made were not well thought-out and were probably too late.

Canada: Evolution of mine-community relationships

There is strong evidence in Canada that mining can both promote the socioeconomic well being of communities and be environmentally benign. Mining also leads to the development of clusters of activities centered on the mining operations, and it is even capable of resulting in the creation of a “mining metropolis” with a strong manufacturing sector. Nevertheless, socioeconomic agreements are crucial when dealing with aboriginal peoples. These should include employment quotas or targets, special training programs, targets for local procurement, support for local business development, support for women's employment and training, and a supportive work environment for distinctive cultures.

The first of the two chapters on Canada gives an overview of the evolution of mine and community relationships, focusing on four mines or mining regions — Voisey Bay, Labrador; Diavik, Northwest Territories;

Sussex, New Brunswick; and Sudbury, Ontario. (See Tables 1 to 6 for some of the important economic and social characteristics of these mining operations.) The one factor common to most mining communities (however defined) in Canada is that their relationship with mining companies has evolved from paternalism to partnership, with both sides striving — with the help of governments — for sustainable community development. The active role of government in working with the local communities to facilitate this evolution has solidified the triangular dialogue which has been particularly important in the context of aboriginal communities, as there is usually a strongly asymmetric relation in the information held by mining companies and these communities. Given the poverty of many of these communities, it will usually be necessary to provide public funding for NGOs or consultant services to work with aboriginal peoples confronting a new mining project. Furthermore, a very important element in the evolution of the community-company relationship is the strong trend for new Canadian mines to be located in remote areas with predominant aboriginal populations. In most cases, high levels of poverty and unemployment characterize the aboriginal communities. Consequently, the needs of the inhabitants of the communities are generally very acute and their demands reflect their situation.

There are many different types of mining communities in Canada:

1. long-established communities dependent on the mine;
2. company towns;
3. long-established communities with diversified economic bases that have become home to new mines;
4. fly-in, fly-out operations;
5. temporary encampments; and
6. major, long-established mining cities.

Of the six types of mining communities identified by the authors, in recent decades the fly-in, fly-out and major, long-established mining cities have become the most important. Where feasible — due to a combination of location and the number of deposits — there has been a determined effort to develop a “mining metropolis” in Canada, of which Sudbury is the best example. At the other extreme, given the remote and difficult, cold climate locations of many new mines, fly-in, fly-out operations have become quite common.

The pattern of community development in Canada is similar to the Latin America cases, albeit more evolved. In the first years of the mining operations, local community members tend to fill the lower skilled jobs and

provide unsophisticated services to the mine, especially if it is in a remote location. However, as the community matures it is common for it to provide vehicle repair, machine shop services, welding, sheet metal work, plumbing, and electrical services. In areas with multiple mining projects, the next step for local business is complex construction projects. Finally, in major mining areas, production occurs of complex mine equipment that is also sold to other regions or countries. The Sudbury Basin is probably the best example of such a “mining metropolis” with a population of about 250 000 persons, 5 000 jobs in manufacturing, and a number of important government services.

The development of a well-established tripartite process among communities, companies, and governments has been instrumental to laying the foundations of sustainable development in many mining communities in Canada. As noted above, many of the new mines in Canada are located in areas predominantly inhabited by aboriginal peoples. While these operations provide many opportunities, there are many social problems to overcome, including the impact of the mine on traditional activities. Until the 1990s aboriginal peoples had very little participation in negotiations of mine development on or near their lands. Aboriginal peoples now can and do demand training programs for mine work and some assurances of buying local inputs. Companies must negotiate impact and benefits agreements with their communities. The Diavik diamond mine in the Northwest Territories provides for substantial purchases from northern businesses and includes a policy of eventual 100 percent northern employment.

Oddly enough, the increase in fly-in, fly-out operations coupled with employment guarantees in the impact and benefits agreements are now helping aboriginal communities. This is because:

- there are no semi-permanent or temporary communities to attract southern Canadians;
- small aboriginal communities are not broken up as young males flock to new mine sites; and
- traditional activities can be pursued in down periods.

In Canada, as in most mining countries, there has been a strong trend towards stricter environmental regulations and better environmental performance. In particular, there is a heavy emphasis on mine closure and rehabilitation. Companies usually have to set up environmental funds, especially when tailings must be stored into perpetuity. Comprehensive environmental reviews that include detailed analysis of social and cultural factors must be undertaken and they are generally functioning well. There is

also a trend towards cooperative monitoring of environmental management programs, especially in aboriginal areas.

Uranium mining in northern Saskatchewan, Canada

The uranium mining experience in northern Saskatchewan demonstrates the evolution of company and community relations — with the participation of the provincial government — from one in which local communities had little input, to one that may well approach the most sophisticated models of tripartite relationships to be found anywhere in the world. Over about a twenty-year period the situation in northern Saskatchewan evolved from one characterized by minimal direct impacts and large negative externalities to one with large and positive direct impacts and externalities. Over this relatively short period of time, good policies and practices have moved the mining industry from a situation in which it primarily generated revenues for faraway governments, to one in which it is the leading force for dynamic community development. Such development is clearly more sustainable in a regional context where new mines are replacing old mines, and the effects can take place over several generations.

Northern Saskatchewan is a remote area, home mostly to aboriginal peoples, who make up 87 percent of the population. Only 40 000 of Saskatchewan's one million inhabitants live in this area, which is about 60 percent of the size of France. In 1995, 44 percent of the population was still below the Canadian poverty line. Uranium exploration began in the 1940s and in the 1950s the first significant production began. Until the late 1980s, companies belonging to the provincial or federal governments undertook most production.

The first large-scale operation was El Dorado, a state-owned enterprise which began operations in 1953 near Beaverlodge. The province and the federally owned company built a town called Uranium City. Most of the jobs and virtually all of the procurement at El Dorado — which closed in 1982 — went to persons and companies from outside of northern Saskatchewan. Uranium City attracted migrants from all over the region, resulting in social problems such as crime, alcoholism, and prostitution. Perhaps more importantly, it caused out-migration from small, traditional aboriginal communities. When the mine was decommissioned, local communities were not invited to participate in the planning, even though closure meant the death of the town of about 3 000 persons.

The unsatisfactory situation at El Dorado gave rise to significant opposition to uranium mining in Saskatchewan, from both southerners — mostly for environmental reasons — and aboriginals — due to a lack of economic benefits combined with potentially large social, cultural, and environmental costs. Concern with the effects of uranium mining coupled with the discovery of new, very rich deposits near Cluff Lake resulted in the Bayda Commission, which finished its report in 1978.

Implementation of the recommendations of the Bayda Commission resulted in an about-face in the acceptance of uranium mining by aboriginal peoples. In fact, their opposition to uranium mining declined by over 50 percent in the 1980s as the benefits to aboriginal communities increased and the costs declined. Among the recommendations of the Bayda Commission were:

- a movement from bipartite to tripartite consultations;
- inclusion of socioeconomic and cultural effects into the decision making process rather than a sole focus on the environment; and
- northern revenue-sharing of those fiscal revenues generated by uranium mining.

More importantly, the Commission laid out the foundation for uranium development in northern Saskatchewan that evolved and developed through the 1980s to include:

- best efforts (rather than targets) to deliver social and economic benefits;
- cooperative tripartite negotiations;
- increased monitoring of environmental and occupational health and safety performances;
- community based consultation procedures; and
- recognition of social spending as a legitimate royalty deduction for companies.

The movement from state-owned to privately-owned corporations has also been very important with respect to the levels of investment, ability to quickly adapt to new situations, and a stronger commitment to community development by firms whose survival and prosperity depends on strong, healthy relations. By the end of the 1980s the state was no longer involved directly in uranium mining after the provincial and federal state-owned companies merged to form Cameco Corporation, which was in turn quickly privatized. Cameco and other privately owned uranium mining companies have moved rapidly in the 1990s to take advantage of the lessons learned

during the period of state-run mining operations. They have worked with the communities and various levels of government to dramatically increase the levels of benefits to residents of northern Saskatchewan, while at the same time they have been fulfilling more and more stringent environmental regulations.

The heart of the programs supported by Cameco and other mining companies are training for northern residents — most of whom have not completed secondary school — for both direct mine employment and mine procurement. (See Table 6 for some of the social programs supported by Cameco.) The training for mine employment of aboriginal peoples has had large cost savings to the companies by reducing the prevalent extremely high turnover. Moreover, the government investment has also been rapidly repaid simply due to the decrease in welfare related payments. With respect to procurement, similar to Escondida in Chile, Cameco has placed strong emphasis on quality enhancement.

Employment in uranium mining of long-time northern Saskatchewan residents has increased from 31 percent in 1983 to 48 percent in 1998. Employment in contractors to the mines of long-time northern Saskatchewan residents has increased from 38 percent in 1992 to 52 percent in 1998.

Fly-in, fly-out has become the preferred method of mine employment. This practice allows members of small traditional communities to enjoy the benefits of mining without having adverse effects on the population of these villages. It also allows the miners to participate in traditional lifestyles for roughly 50 percent of the time.

Lessons learned and recommendations

The above studies on community costs and benefits of mining operations have generated a number of significant results. While any conclusions must be treated with caution, given the size of the sample and the differences across countries, there are important lessons to be learned for most or all countries involved in mining.

The studies have demonstrated clearly that there often are substantial social and economic benefits to local communities from mining operations, but they do not come automatically. Mining is an activity that will come to stay in a region “through thick and thin,” and it is a powerful vehicle for transferring technologies and skills to developing countries and remote regions. Yet, some regions that possess no history of mining and hence no

work force, nor an industry ready to take advantage of new opportunities, have needed proactive interventions to jump start the development process.

The key issue is the identification and sustainability of benefits. It was particularly important that there were proactive policies and training with respect to mine employment, non-mine employment, and goods and services provision. The most successful cases were those where the local communities (often gradually) provided many of the goods and services needed by the mining companies. In some cases, the mining companies played an active role in training their suppliers to enhance the quality of their products. The skills developed in all of these cases often were transferable to other industries. Companies and communities that took a long-term view, including mine closure, were also more likely to have a clearer vision of what types of training and programs might provide sustainable benefits.

The studies confirm that sustainability is closely related to the local participation of the neighboring communities in the decisions affecting them. The need to ensure sustainability through increased participation of the local communities is present in the Canadian cases and quite consistent with the more recent — and less evolved — Latin American experiences. Most importantly, the Canadian cases illustrate the importance of the participation of government in the process, and the establishment of a trilateral dialogue. It is critical that the three main stakeholders — the community, company and government — all have direct communication with each other, in addition to a formal three-way dialogue where other stakeholders also participate. A key result of the studies is that legal licence is no longer adequate. Companies must obtain a social licence, and this depends on consultation, participation, and, increasingly, a strong trilateral dialogue.

Sustainability is partially dependent on the provision of infrastructure that could be used for other activities. In our sample, the case of Sudbury showed how in the right conditions, infrastructure provision can result in a vibrant industrial community. It seems likely that infrastructure creation will be one of the largest benefits of the Antamina mining operation in Peru.

In sum, the key characteristics of sustainability are:⁷

- non-renewable resource development should not threaten the environment and the renewable resources upon which future generations depend;
- mineral wealth should be maintained from one generation to the other;

⁷ These are summarized from Conservation Strategy Committee 1986.

- sustainable mining balances economic growth and protection of the environment by sensible trade-offs that consider all costs and benefits in the decision making process;
- recognizing that mining will affect the social structure and culture of local people and considering these impacts as part of the decision-making process;
- reducing, reusing and recycling while avoiding the waste of the resource base by inefficient mining techniques; and
- policy and taxation decisions which consider the economic health of the mining industry.

There were few negative social and cultural effects in the sample. With the exception of Canada, none of mines were in areas with substantial numbers of indigenous peoples who had not been exposed to mining or at least modern industrial culture. In the Canadian case, it has taken many years of experience and learning to eliminate or mitigate negative effects on aboriginal peoples. In the Latin American case studies, the biggest social problems were associated with land acquisition and the cultural clash between (usually domestic) immigrants and residents of the area. Clearly, there is no issue that is more likely to cause long-term damage to company-community relations than land purchases that are lacking in transparency and fairness, where the latter signifies that the company pays the same amount for land of similar quality, whenever it is purchased.

At a more general level, when a company is about to enter a new country or a new region it should ensure that it knows the country and communities that it is entering, including their social composition and political dynamics. In this regard, baseline studies must be undertaken in order to have a good understanding of the local situation, and to monitor the progress of the community. The relationship that it is endeavouring to establish must include a long-term vision, even if — as in the case of the junior companies — the development is not permanent. The company must be clear that the responsibility it is about to assume in front of the local communities is part of its corporate ethics. It is not an obligation, but a practice, that the medium-term must benefit both the company and the community. Thus, the final objective of a company's assistance must be to strengthen local governance and the local capability to formulate projects.

The implementation of a successful development strategy for the local communities demands an adequate institutional design and the organized participation of the community. An important consideration for a company

which is about to undertake an initiative related to local economic development refers to the instruments to be used for the channeling of funds and project implementation. Some companies have chosen to set up a “foundation” as an independent institution and assign them such responsibility. However, the foundation is, in fact, controlled by the mining company and the degree of local participation is independent from the mere presence of a foundation or of a company. A more recent alternative is the establishment of an informal “Governance Board” where the main stakeholders are represented and which acts on the basis of consensus building by the main stakeholders.

The creation of local social capital was found to be extremely important in all of the studies. Local communities are generally at a profound disadvantage when negotiating with large mining companies, and it often takes considerable effort and several years before they can be considered true partners. In the interim, higher level governments must fund NGOs or other institutions to provide advice and training to the local community members. Over the longer term, foundations or similar institutions — funded by both companies and governments — have become a very common way of providing social services and, more importantly, building up human and social capital in communities. In many respects, these have become partial substitutes for governments. It also seems likely that there are economies of scale in the delivery of such services as the medium-scale mines in the sample provided relatively much smaller amounts. A regional approach, grouping mining operations with considerable public input, may be necessary in such cases.

There were also few negative environmental effects. As the focus of the study was on modern mining operations, most of the mines were using up-to-date environmental practices. In the older mines that were included (Sudbury and Almadén) there was an environmental legacy from the past, although much had been done to improve the situation. Nevertheless, the communities and other stakeholders often used the environment as a political tool in order to extract concessions from the mining companies. At times, the mining companies partially invited problems due to poor communication strategies.

In sum, there were not many minuses in the accounting ledger. But in some cases there were also not many positives. Accordingly, the communities were not always very accepting of the mining operations. This was particularly true of the smaller medium-scale mines. Note that while the

past agenda has been on reducing the minuses, the new agenda is on increasing the positives.

With respect to processes, there is a clear tendency for them to become more open. The more recently developed mines in the sample followed more open processes than older mines. Moreover, the processes of older mines generally became more transparent over the years. These results are probably not unique to the mining industry, but all part of a global trend in this direction, partially due to pressure from interest groups. The supposed trilateral relationship was mostly two bilateral relationships with the exception of the more recent Canadian experiences and Antamina. In general, the company and the central government had a relationship with respect to macro issues, and communities were rarely at the table when negotiations took place. On the other hand, the company and the local communities had a bilateral relationship with respect to micro issues that developed in an informal manner. Most community initiatives were led by the companies, often with substantial community involvement. Central governments largely abdicated responsibility on community issues to companies with the exception of Canada. Nevertheless, most fiscal revenues generated by the mine went to central (or higher level) governments.

The importance of good communication from the company to the communities cannot be overestimated. Companies should begin early, be open, and give lots of information. It is essential to have a clear mission statement and human resource and environmental policies. There must be a dedicated group in the company with this task.

It is clear from the case studies that that central government needs to become more involved in the community development work in the Andean countries. Its role in the trilateral dialogue with the local communities and the mining companies is essential. Only the participation of central government will ensure the adequate insertion of the local plans with the national programs, thus multiplying their beneficial impact. In this context, central governments should:

- redistribute more tax revenue to local governments — or simply ensure that law-mandated redistributions are complied with (although often this will need to be accompanied by capacity building at local levels);
- promote social responsibility among the companies and the opening towards mining enterprises among the communities (this could initially be accomplished by playing the role of go-between that shows both the company and the community the fundamental nature and legitimate aspirations of each side); and

- play a proactive role in community development programs either directly or indirectly through the use of NGOs, community-based organizations, or religious organizations.⁸

A strong lesson from the Andean studies is the need for a concerted local economic development plan to be available as early as possible. Institutional and organizational weaknesses of the local populations constitute one of the key bottlenecks to local economic development. Capacity-building takes time, thus the need for an early start. A concerted process involving the participation of the local population (not just the local leaders) should bring about a reasonable action plan where the company can express its priorities. This is very different from unilaterally deciding what is good for the community. The company should start working on such a plan at the earliest possible stage, and, preferably during exploration, an information and consultation strategy should be implemented quickly.

The funds assigned by a company to finance a community development program should constitute only the seed capital of a broader financial strategy funded through other means. The company's contribution should be a minority contribution under a reimbursable credit scheme, once the productive projects are in operation. This support should be positioned to recover at least part of the amount invested — and certainly not the total assigned to productive projects. This financing would not subsidize nor lend at rates below market; it would simply make available to the community financial instruments that the market does not offer.

There were strong lessons for developing countries from the case of Almadén. Despite over 2 000 years of operating one of the most profitable mines in history, there had been little community development. For centuries the central government took everything and gave nothing back until it was too late to be effective. Even the community development programs that were undertaken in the last 20 years were run by the central government with very little community involvement or private-sector participation in their design or operation.

⁸ The Andean countries have preferred not to include community development provisions in their national mining legislation, as it bureaucratizes a process that they believe needs to be left flexible, given the unique considerations of each mining operation and the local communities in the area. Yet, it must be noted that some countries, such as the Philippines and (potentially) Indonesia, are opting to move in this direction. Companies are generally against such provisions as it gives them legal obligations even when the mine is not profitable.

The Canadian studies contain equally strong lessons for developing countries. They show a number of cases of successful, proactive community development. Particular importance should be placed on the process that has evolved in Canada over time and the development of a tripartite relationship. This tripartite relationship was made viable by the proper funding of the process. While provincial and federal governments have extracted large financial flows from the mining companies in the form of royalties, fees and taxation, a substantial portion was returned to the mining region in the form of health and social service payments, welfare and regional development spending. The Canadian experience also shows that the role of government is more important in areas where there are indigenous peoples. Nevertheless, even in such cases, the private sector should still play the lead role in sustainable community development.

The most important result of the Canadian experience, however, is that it clearly demonstrates that although there are some rules that apply to all mining operations — e.g. tripartite negotiations, transparency — each mine has its own historical, social, cultural, and geographical characteristics that preclude the use of a “one size fits all” prescription. For example, not every mining city has the potential to be a mining metropolis — for this to occur, it is important to be in an area with many operations and not too far off of the beaten track. Training programs and other community initiatives are also more likely to have long-term success if a regional approach is taken, which in turn is only feasible when a succession of mines is being developed. Similarly, while the infrastructure that a large mining operation brings to a region can be its most important contribution to the local community, in remote regions with little possibility of significant industrial development due to climatic or geographic conditions, fly-in, fly-out mining is the preferred choice.

In sum, the goal is not to provide the community with a given package of benefits but to maximize the benefits that it receives. In the Latin American and the Canadian examples, the benefits received were partially due to the policies and strategies followed. But they are also partially due to the situation. It is important that the policies and strategies followed are adapted to the realities of the given operation, including its size, geographic location, climate, and socioeconomic and cultural conditions.

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CHAPTER 2.

Bolivia: Turning Gold into Human Capital

Fernando Loayza, Ismael Franco, Fernando Quezada, Mario Alvarado

Introduction⁹

Mining in Bolivia

In spite of developments in agriculture and agro-industry and the corresponding economic diversification in eastern Bolivia, mining continues to play a significant role in the country's economy. Table 1 illustrates the importance of mineral exports with respect to total exports and foreign exchange earnings. Although the dominant role of mining has decreased, it continues to be the primary export sector in the national economy. Mining also plays a secondary role as a generator of funds for the national treasury, although in this area, too, the sector's contribution has decreased significantly.

Table 1. Bolivia: Principal indicators of the mining sector's impact (percent).

| | Average 1980–1985 | Average 1993–1998 |
|---------------------|----------------------|----------------------|
| Mineral exports | 48.2 | 39.4 |
| Mining royalties | 8.0 | 0.6 |
| Contribution to GDP | 9.0 | 5.9 |
| Employment | 4.4 | 2.1 |

Source: Central Bank of Bolivia, External Bulletin Nº 20 and External Bulletin 1980–1988.

Mining's contribution to the GDP and employment levels has decreased and is not highly significant at the national level. Within traditional mining regions such as Potosí and Oruro, however, this industry's contribution remains significant, as shown in Table 2. Between 1993 and 1998, these sectors received between 73 percent and 92 percent of mining royalties, a principal source of financing.

⁹ The authors would like to thank the Mining Policy Research Initiative of the International Development Research Centre of Canada and the Mining and Industry Division of the World Bank for providing funding that made this study possible.

Table 2. Mining's contributions (percent) to GDP of Oruro, Potosí and Bolivia.

| Departments | Average 1980–1985 | Average 1991–1996 | Difference |
|-------------|----------------------|----------------------|------------|
| Oruro | 32.3 | 28.1 | -4.3 |
| Potosí | 51.4 | 35.2 | -16.2 |
| Bolivia | 9.0 | 5.9 | -3.2 |

Source: Based on information provided by the National Institute of Statistics, National Accounts Department.

Potosí and Oruro's mining has decreased in importance since the 1950s. This decline was exacerbated by the crisis in tin mining of the mid-1980s. Currently, both sectors register the lowest income and human development levels in the country, and consequently the region experiences high levels of emigration. This situation appears to offer proof to those people who believe that mining does not contribute to sustainable development at the local or regional level.

Mining and local development

Various studies on the mining industry and its local context have identified a typical model in which a specific type of local community and its relationship to a given mining operation can be predicted. In this model, the community is usually located in a remote region. Although the literature recognizes that such communities are not totally isolated from the market economy, in general the community's link to the market is secondary and complementary. The community's economy is essentially self-sufficient and sustains a culture and particular form of organization that is different from the market economy. (MEM 1996, 1997; Labat-Anderson Inc. 1997; May 1998; Kumalo 1999) Meanwhile, the type of mining operation prevalent in the literature is one characterized by its large size, with an annual turnover of US \$100 million or more. Such operations are usually run by a transnational mining company that maintains the corporate culture of competition in international markets, such as Rio Tinto, P.T. Freeport Indonesia, and Comalco.

The relationship between these specific types of local communities and mining operations produces several predictable results. Workers and others are attracted to the area by road construction and the promise of job opportunities because of the mine's opening. This migration entails high risks for the local communities, since the new arrivals bring diseases or alcoholism to the area. In addition, the migrants compete with local residents for the use of natural resources (May 1998). Increased demand for land

causes a rapid increase in property and land prices. Worsening inequalities in income distribution favours young adults, modifying their position and prestige vis-à-vis their elders and affecting traditional social structures in the process (Labat-Anderson Inc. 1997). The growing population places excess demands on services and infrastructure such as roads, schools and hospitals.

According to Bisset (1996), such impacts are common during the mine's construction and exploitation phases and typically are followed by more severe impacts after the operation closes. Unemployment would increase significantly and property and land prices plummet. The demoralizing nature of a recession and unemployment causes an increase in alcohol and drug use among residents. The author even predicts that "many people would lose their cultural ability to survive without a paying job. Faced with the lack of alternative economic activities, severe social impacts can be foreseen — a potentially spectacular contraction." (Bisset 1996, pp. 9-10) In response to this situation, "local communities are demanding compensation far above what they have received in the past. They want infrastructure, training for mining or other jobs, and social services, including education and health." (McMahon and Strongman 1999, p. 8).

Evidence from case studies of large mining and petroleum projects show that a purely compensatory attitude on the part of the company toward the community is incapable of achieving sustainable development at the local level. Thus, a new trend proposes to replace compensation with the formation of social capital. (Labat-Anderson Inc. 1997; May 1998) Social capital formation focuses on the importance of strong social ties that make human groups more cooperative, productive and innovative. According to this focus, progress and development require groups or communities capable of identifying their limitations and the strategies necessary to overcome them. This in turn requires trust and experience among group members (May 1998, p. 22). The social capital focus favours community empowerment over mere compensation in goods and resources. A community's ability to identify its problems and their possible solutions is the best mechanism for promoting sustainable development.

From compensation to social transformation

This study evaluates the relationship between mining operations and local communities, identifying the impacts and transmission mechanisms for a type of local community that is substantially different from the predominant model in the research literature. Although the local community in this study

is still a rural community whose economy is based on subsistence agriculture, its distinctive characteristic as an indigenous social unit is its state of "de-structurization." This means that the local community is in an advanced state of assimilation regarding the values of urban culture and the market economy. In contrast to the remote community so predominate in literature, these communities are connected to the urban realm by way of markets, roads, and highways. More importantly, the community's adolescents and young adults struggle to integrate into the urban world and end their marginalization. In this struggle, however, they do not abandon their ties to the community or the land, since these are the last refuges to which they can turn if insertion in the urban world becomes too difficult. Such communities represent some of the principal sources of marked migration from the country to the city that are so prevalent in Latin America.

As this study will argue, the opening of a large mining project next to local communities of the type described above produces impacts that are distinct (and usually opposite) to those expected under the prevalent model. For example, migratory flows involve displacement to urban centers because periodic commuting to the mine becomes an option. Moreover, employment at the mine or with associated subcontractors may provide sufficient income to enable a relatively smooth transition to the urban world and, in many cases, a higher rank on the socioeconomic scale.

In other words, the opening of a large mining operation can serve as the catalyst for a socioeconomic transformation at the local level, reducing the importance of compensation. In addition, the concept of sustainable development of a community takes on a different meaning, since it does not take place within the community itself but rather in the negation of the community within a westernized, urban social context. This implies that, in such cases, a socially responsible company should contribute to enabling the community to transform itself. It is not a matter of compensating for changes to a social system. What is critical is to convert these changes into a new or different equilibrium within a social entity which is in the process of change.

The significance of this study is to show that the relationships between large-scale mining and local communities do not follow a singular pattern, as literature suggests. It is necessary to establish a taxonomy of possible and relevant cases that contribute to the formation of recommendations. When this is achieved, then the state, mining companies and local communities can take actions oriented toward achieving the highest levels of well-being for members of the communities involved.

Methodological focus

This investigation analyzes two case studies: the operation of Minera del Sur at Puquio Norte, and the operation of Inti Raymi at Kori Kollo.

The Puquio Norte mining operation represents an excellent pilot case because the socioeconomic, cultural and environmental baseline of its area of social influence was easily determined. It began operation in March 1997, less than two years before the fieldwork for this study commenced. Therefore, reconstructing the baseline was less difficult and more reliable than an operation such as Inti Raymi, which began operations during the second half of the 1980s. Although the region where Puquio Norte is located has been home to mining operations since colonial times, these were largely artisanal operations. Until the discovery of the Puquio Norte deposit, there had been no industrial-scale mining operation in the region. Because of this historical presence, the Puquio Norte case presented little “noise” or interference in the perceptions of local residents. A similar situation in western Bolivia is unlikely.

The main disadvantage of Puquio Norte was its size. Although this investigation is geared to an analysis of the impacts of large-scale mining operations, Puquio Norte is a relatively small operation by international mining standards. For example, Yanacocha in Peru produces 1 050 000 ounces and Inti Raymi in Bolivia produces 350 000 ounces of gold per year, while Puquio Norte produces just 27 500 ounces per year. Not counting silver production, Puquio Norte represents only 3 percent of Yanacocha’s production, and 9 percent of Inti Raymi’s production. This is a structural limitation of the Bolivian mining industry, which apart from Inti Raymi and the San Cristobal project¹⁰ (currently in the engineering design phase and thus not eligible for this study), consists solely of small mining operations.

Inti Raymi was chosen because it is the most important mining operation currently underway in Bolivia and because it contrasts with the Puquio Norte case. While Puquio Norte’s area of social influence enjoyed economic growth during the period of study, Inti Raymi’s area of social influence, at the rural level, experienced economic decline. In contrast to Puquio Norte, Inti Raymi had to compete with local community members for access to mining resources. Inti Raymi’s policy toward the local community has consistently supported social and economic development requirements

¹⁰ A silver mining project in the Los Lipez area that would require an investment of approximately US \$450 million.

without demanding, in exchange, a counter-contribution on the part of the community, as has been the case with Puquio Norte.

In our investigations of the case studies, we adopted an empirical research focus. The study's design and execution, therefore, did not assume a specific theoretical focus. We have favoured a multidisciplinary analysis with the goal of establishing, through detailed and integral fieldwork, how and why a mining operation impacts on its area of social influence.

Puquio Norte

Antecedents

At the end of the 1980s, the Minera del Sur Company, (COMSUR 1992)¹¹ began exploration activities in the new Bolivian mining frontier of the Precambrian region. This is part of the Brazilian Shield located in the eastern part of the country where geological formations of economic interest exist, including precious metals and stones, as well as manganese. The company's exploration activities resulted in the discovery of the Puquio Norte gold deposit located 11 km from the town of San Ramón by highway. Puquio Norte is an open-pit operation that treats 1 500 tonnes per day by way of the carbon-in-leach process; the mine's lifespan is estimated at seven years.

COMSUR's exploration activities in this region were made possible after Rio Tinto, a British-based transnational mining company, acquired one-third of its shares. This enabled the incorporation of strict environmental and occupational safety standards at COMSUR's operations. Rio Tinto's association with COMSUR was geared toward the discovery of a large-scale mineral deposit, which has still not occurred. When small deposits like Puquio Norte are discovered, COMSUR develops and administers them, defining all necessary policies for their exploitation, including environmental, personnel and community relations. Rio Tinto makes suggestions in any area it considers pertinent, but does not define business policies or administer the mining operations.

Environment

COMSUR was the first company to discover, develop and exploit a mineral deposit in the Precambrian region on an industrial scale. Thus, the company

¹¹ COMSUR is a Bolivian company composed of several mining operations. Its most significant undertakings are: Porco (zinc-silver-lead), Don Diego (zinc-lead-silver), Bolívar (zinc-lead-silver), COMCO (silver) and Puquio Norte (gold).

became a source of information on modern mining's impacts on ecologically sensitive regions such as the Bolivian Amazon. According to company executives, the mining operation complied with the most stringent international standards as well as with Bolivian regulations. In addition, officials decided not to construct a mining camp in order to minimize the risks and social costs involved in relocating the miners after the mine's inevitable closure. Instead, Puquio Norte's miners and employees integrated with the civil population of San Ramón.

Following practices that are in place at the international level, environmental management at Puquio Norte is based on principles of zero discharge and systematic monitoring. The zero discharge principle means that effluents are not discharged from the production process. Ore is crushed, milled and put in solution, then circulated from water tanks to the processing plant and back. Sterile solids from the plant are pumped to the tailings dam where they are separated from liquids by gravity. The water from the dam is recycled back to the plant. In this way, water loss occurs only through evaporation.

The effectiveness of this process depends on the stability and impermeability of the tailings dam. The material used in the dam's construction are the solids that remain after the mining process, and because of this region's climatic and ecological characteristics, these have a high natural capacity for revegetation and regrowth. To guarantee its impermeability, the dam is lined with compacted clay covered with a layer of geo-membrane, a flexible plastic.

According to company personnel, monitoring activities are fundamental to Puquio Norte's environmental management. Monitoring is performed on: surface water (10 points) and ground water (3 points); the volume and level of the San Julián River¹²; the pH and cyanide content of the tailings dam; soil at four points located north, south, east and west of the mine; sterile material from the mine; and dust and noise. Since the mine is currently extracting oxidized material from the deposit, there is no acid rock drainage.

In terms of closure and rehabilitation, Puquio Norte plans to cover the dam with oxidized material and revegetate the area. Despite its projected

¹² The San Julián River provides water to the town of San Ramón and the Puquio Norte mining operation.

seven-year lifespan, our fieldwork research was unable to identify a closure and restoration plan in place for the operation.

Local community perceptions

Although the town of San Ramón is aware of COMSUR's presence in the area because of the Puquio Norte operation, this knowledge is fragmentary, partial, and often incorrect. Such a situation becomes fertile ground for false perceptions and misunderstandings regarding the impact of the mining operation.

Several interviewees expressed concern about the environmental risks associated with Puquio Norte and supposed benefits that the mining operation would leave in the region. For example, due to the intense rains the region usually receives, some residents worry about the stability of the tailings dam, which is located upstream from the capture point for the town. This concern is expressed because, according to reports, the tailings dam at COMSUR's Porco operation in Potosí ruptured in August 1996 from severe climatic conditions.

The sensitivity of some San Ramón residents to potential environmental impacts of the Puquio Norte operation was evident when the morning paper *El Deber* reported that the tailings dam had burst, contaminating the San Julián River. The report was a false alarm. The company reacted with an open door policy, welcoming inspection visits and the collection of samples by authorities from the government, San Ramón, and the university. Such a response allowed national, regional and local authorities to verify, *in situ*, the high environmental standards by which the operation is managed. Nevertheless, not all San Ramón residents share this opinion, and some still express concern about the environmental risks of the mining operation.

This type of perception regarding mining is not exclusive to the area around Puquio Norte. Although the issue has not been studied systematically, the Bolivian population generally distrusts the mining industry. According to business people and field experts, this perception is due to the mining sector's history since the colonial era, which has been fraught with frustrations as well as negative environmental and social impacts. As such, modern mining operations such as Puquio Norte or Inti Raymi must bear the brunt of this legacy in spite of the fact that they comply with stringent environmental standards. Moreover, as we will see in the section on Inti Raymi, this legacy can give rise to a situation in which the environment

becomes a mechanism for political pressure by local organizations toward the company or government in order to obtain greater returns at the local level from mining. In this context, an objective analysis of the company's environmental management is influenced by political positions that seek greater benefits from mining activities.

The local context: the town of San Ramon¹³

During the period of discovery, construction and opening of the mine, Puquio Norte's area of social influence — the town of San Ramón¹⁴ — experienced rapid economic growth. According to our estimates, between 1992 and 1998, the average monthly income in San Ramón grew at an average annual rate of 17.4 percent. This growth prompted the construction of the interdepartmental Santa Cruz-Trinidad highway, which passes through San Ramón where the road forks toward Trinidad one way, and the towns of San Javier, Concepción, San Ignacio de Velasco and San Matías in the other direction. The highway provides a link to the department's capital, serves as a connecting axis between the departments of Santa Cruz and Beni, as well as a link between the towns located in the western part of Santa Cruz, near the Brazilian border.

Prior to the discovery of Puquio Norte, San Ramón experienced an intense immigration process because an alluvial gold deposit was discovered in the surrounding area and the construction of a highway. People from the interior of Bolivia were attracted by the prospect of amassing a fortune or simply earning a bit of money during the fierce economic crisis of the 1980s. As a result, towns such as San Ramón, where gold deposits accessible to artisanal mining were discovered, became migration magnets for hundreds of people. Almost all San Ramón residents were caught up in the gold rush. In

¹³ Based on secondary information and an orientation field visit, the towns of San Ramón, Santa Rosa de la Mina and San Javier were selected as Puquio Norte's area of social influence. During the course of our field work it became evident, however, that San Javier was linked to Puquio Norte solely by way of municipal responsibilities. In addition, the mine has no presence in Santa Rosa de la Mina and none of its residents work at the mining company. In contrast, a highway links San Ramón to Puquio Norte. A few San Ramón residents work at the mining company and the company's technicians, administrators and workers live in San Ramón. For the most part, Puquio Norte workers and their families shop at the local market, and access local health and education services.

¹⁴ San Ramón is located 180 kilometers east of the city of Santa Cruz de la Sierra. It belongs to the Santa Rosa de la Mina canton, Ñuflo de Chávez province, Second Municipal Section (San Javier) of the Department of Santa Cruz.

addition, hostels, hotels, bars, cantinas and street stalls sprang up, offering various goods and services.

Although artisanal mining activities declined in the early 1990s, the interdepartmental highway's termination at the nodal location of San Ramón meant the town remained a destination point for migrants. According to our estimates, between 1992 and 1998 the town grew at an annual rate of 17.8 percent. This population growth invigorated economic activity (especially commerce), accelerated the process of urbanization, and prompted the regional electrification project. The fact that significant population growth was accompanied by exceptional economic growth is indicative of the notable dynamism experienced by San Ramón during the 1990s.

Mestizaje and westernization

It is evident that by the mid-1990s, when construction of the Puquio Norte mine began, the population of San Ramón was extremely diverse, both socially and culturally. First, there were the long-standing San Ramón residents who, even before 1980, did not recognize an ethnic identity, spoke only Spanish, did not use traditional dress, and did not make traditional crafts, despite the fact that the area was once inhabited by Chiquitano Indians (D'Orbigny 1994). Second, there were the immigrants to the region's communities and villages who arrived between 1982 and 1987 during the gold rush, and who consider themselves peasants or *cambas* due to their *mestizaje* — or advanced state of acculturation. Third, there was a wave of immigrants from the Andean region and the valleys. According to the majority of interviewees, less than 50 percent of the current population of San Ramón is made up of *collas* (western Bolivia natives).

Land tenure

Until 1995, San Ramón had 3 200 hectares of communal land. Due to population growth from constant immigration, these lands were divided for the benefit of the most senior residents. Lands adjacent to the urban center were ceded to the municipality so that they could be divided into urban lots. This enabled a process of relatively ordered urban growth for San Ramón, but in exchange, the town lost its communal lands, which were the principal reference and space for collective unity.

In terms of lands affected by the mining operation, there was no transaction with San Ramón residents or authorities, since COMSUR had acquired lands from a citizen of foreign origin by the name of Gehard. Now

COMSUR owns 250 hectares of land, of which approximately 30 hectares are affected by the mining operation. Subsoil rights were acquired from the state by way of 7 200-hectare mining concession. COMSUR acquired plots within San Ramón from the municipal agency in order to build housing for the company's technical personnel. Other employees and workers have acquired their own plots of land or rented housing, according to their convenience and needs.

Impacts of the mine on San Ramón

Employment

Although COMSUR tried to hire the greatest number of local residents possible, *Ramoneños* are nevertheless a minority of the 118 member work force, equivalent to 30 percent. There are two reasons for this. First, Puquio Norte's salaries provide income levels similar to those San Ramón residents can earn in alternative activities. In addition, 13.5 percent of a worker's salary is withheld for social security and contributions to the National Housing Fund. For families used to working as independent producers, as the majority of San Ramón residents are, such withholdings are considered simple taxes, since many view their condition as salaried workers as a temporary situation. Second, local residents prefer activities that do not imply a relation of dependence and it is difficult for them to become accustomed to the discipline of working at a mining company that entails complying with a work schedule and safety measures. This attitude was confirmed by 100 percent of the interviewees.

Table 3 presents the statistics for absenteeism and acts of disobedience by workers at Puquio Norte between February 1998 and January 1999. Workers from eastern Bolivia (San Ramón and Santa Cruz) had an average absenteeism rate that was 45 percent higher than the rate for workers from other regions of the country. In addition, workers from other parts of Bolivia committed 38 percent fewer acts of disobedience than workers from eastern Bolivia.¹⁵

¹⁵ To address the problems of absenteeism and worker indiscipline, guidelines have been issued and the area superintendants and section bosses conduct motivational workshops.

Table 3. Puquio Norte: Absenteeism and worker disobedience.

| Origin | Workers | Absenteeism (days) | Acts of disobedience |
|---------------|---------|--------------------|----------------------|
| San Ramón | 19 | 67 | 9 |
| Santa Cruz | 3 | 20 | 3 |
| Other regions | 67 | 183 | 23 |
| Total | 89 | 270 | 35 |

Source: Puquio Norte, COMSUR.

Approximately 50 percent of workers are western migrants who arrived on their own accord before the mine opened. Only 20 percent of workers, mostly experienced miners, were contracted directly by the company in the western part of Bolivia. Thus the majority of mine workers are from San Ramón, (30 percent locals and 50 percent immigrant residents from the western Bolivia), representing 25 percent of the total salaried workers in San Ramón.

Income

The opening of Puquio Norte has had direct and indirect impacts on income levels in San Ramón. Direct impacts include workers' salaries and subcontractors' fees. As we mentioned earlier, the monthly salaries at the mining operation are similar to the average monthly income in San Ramón, or approximately US \$290 in 1998 according to our estimates.¹⁶

Three types of subcontractors in the region provide goods and services to Puquio Norte. During construction, local sawmills sold important quantities of wood to COMSUR. Since production began, COMSUR has employed transport services available in the area. Four of the 42 transport firms in San Ramón were contracted by Puquio Norte, two for the daily transport of company personnel to the mine site and the other two for transportation of material from the mine to the mineral processing plant. Approximately 30 dump-truck subcontractors are from the interior of Bolivia. During the construction and exploitation phases, hotel owners have also benefited from the periodic arrival of delegations of technical personnel and executives from COMSUR's central and regional offices. In addition, San Ramón's location along the highway means there is a constant flow of travellers to local hotels and hostels.

¹⁶ The estimate for income levels for 1998 was obtained through a random stratified sample that involved in-depth interviews with 47 people.

In addition to the economic agents mentioned above, our fieldwork found that other classes of San Ramón society increased their income levels from spending by Puquio Norte technicians, workers and employees. For example, merchants and farmers benefited from the sale of staple goods. However, this effect was lessened by the fact that most clothing purchases were conducted at large markets in San Julián or Santa Cruz de los Andes, which offer greater variety and are easily accessible by highway. Nevertheless, several technicians, workers and employees invested in houses or land in San Ramón. Due to San Ramón's condition as an immigration center, many Puquio Norte personnel invested in the region. In addition, a portion of workers' income was spent in town, implying that part of the payment to workers and, to a lesser degree, subcontractors was converted into income for other town residents. In other words, the mine-generated income has a multiplier effect in the area of social influence, which shows the importance of systematically evaluating not only the direct income paid by the mine to local residents, but also the destination of spending by the mine's personnel and subcontractors. Such an analysis was conducted for the Inti Raymi operation that is discussed in the second part of this chapter.

Prices

Approximately 22 percent of San Ramón's population are vendors, primarily of clothes and food, though a small minority sells agricultural inputs and tools. Most vendors have agreements with suppliers from the city of Santa Cruz de la Sierra regarding the provision of mass goods to San Ramón at wholesale prices. As such, retail prices of mass goods in San Ramón are equal to those in Santa Cruz de la Sierra. Thus the market in San Ramón is highly competitive and any price increase resulting from product scarcity is immediately eliminated from the market. In this context, increased spending directly and indirectly attributable to the mine is unlikely to have affected the consumer price index in San Ramón.

The cost of housing and rent in San Ramón has increased dramatically in recent years due to the wave of immigrant arrivals. In consequence, the opening of Puquio Norte may have had positive impacts on inflation in the housing market, although it has not been possible to obtain sufficient information to conduct an analysis of this.

Company policy toward the community

COMSUR's policy strove to avoid a paternalistic or benefactor relationship with the community of San Ramón. The objective is to avoid a situation in which the community becomes accustomed to subsidies, leading to possible conflicts with the company. According to COMSUR executives, the policy is also the result of the operation's moderate profit margin, which has led the company to focus on cost reduction. Nevertheless, this does not mean that COMSUR does not cooperate with San Ramón; rather, the company provides assistance on the condition the community provides a counter-contribution in exchange. The community of San Ramón is aware that it can enter into agreements with COMSUR on the condition that it complies with the principle of mutually beneficial counter-contributions.

For example, high rates of population growth during the 1990s led to chronic overcrowding at the San Ramón primary and secondary schools. School directors were forced to reject new students or move students to other classes in the interim. Contributing to this difficult situation was the influx of the children of those immigrant families that provided services to COMSUR, leading the company and school directors to sign an agreement of mutual cooperation. In the agreement COMSUR committed to monthly contributions of approximately US \$500 during the 10-month school year; the school in turn agreed to enroll the children of COMSUR personnel.

Infrastructure and mining royalties

COMSUR and the Rural Electrification Cooperative (CRE) co-financed the construction of a 220-km gas pipeline between Mineros and the San Julián River. It provides energy to the mine and gas to the recently constructed thermoelectric plant in San Ramón that provides electric energy to the region north of Chiquitanía.

Initially, COMSUR planned to build a gas pipeline between 1.5 and 2.0 inches in diameter at a total cost of US \$1.6 million for the section between Mineros and the San Julián River. Nevertheless, the company had no problem agreeing to the joint construction with CRE of a 3-inch diameter pipeline, at a cost of US \$2.4 million. COMSUR contributed US \$1.6 million to the project's financing, while CRE contributed the additional US \$800 000 required to widen the pipeline's diameter to 3 inches. Thus COMSUR is the owner of two-thirds while CRE owns the remaining third.

This project was possible thanks to the opening of Puquio Norte and has had significant positive impacts in San Ramón and the surrounding area

since it enabled rural electrification in the region of Chiquitanía. However, the project required the installation of a thermoelectric plant and subsequent infrastructure for the distribution of electric energy, works that could have been financed by mining royalties paid by the Puquio Norte mine.¹⁷ However, mining royalties constitute a departmental income and are distributed according to the department's budget. Rural municipalities such as San Javier (to which San Ramón belongs) have no control over budget allocations, and have not received any development projects or similar works that could be directly attributed to COMSUR's mining royalties for the Puquio Norte mining operation.

This lack of coordination between public investment policy and mining royalties as a potential financing mechanism generated undeniable social losses in the case of the rural electrification of San Ramón and the Chiquitanía region. The CRE had been negotiating with international cooperation agencies regarding financing for the construction of the thermoelectric plant, a process that delayed the project for three years. This illustrates the need to improve public investment policy instruments in order to avoid situations where the needs of small local communities surrounding a mining operation, such as San Ramón, are marginalized in favour of centrally determined needs at the departmental or national level.

Overall, the Puquio Norte operation has had a positive impact on jobs, income levels, and infrastructure development within its area of social influence. It is important to emphasize that the intensity of these impacts is at least partially related to population flows in the area. For example, in the case of San Ramón, the mine's positive impact has been heightened by the town's role as migration center. Several minor negative impacts were identified, such as an increase in housing prices and the saturation of public services, including schools. Among the corrective measures taken, the company is making extra tax contributions to improve the local school system.

In terms of the distribution of benefits generated by the mining operation, the local population has suffered the consequences of the lack of coordination between fiscal mining policy and public investment policy. This is an area that could be improved considerably for the benefit of the local communities. There are important benefits from investing in infrastructure or complementary public services resulting from works linked to the opening of

¹⁷ Puquio Norte pays royalties equivalent to 9.5% of San Ramón's income. This is a significant figure, since it is equivalent to approximately 85% of the total taxes paid by San Ramón residents.

a mine, such as the generation of electric energy from the construction of the pipeline.

Finally, there is concern among some San Ramón residents regarding the environmental risks entailed by a relatively large mining operation and its impact on the regional ecology. The company's policy of openness regarding the environment has been useful but apparently insufficient given the negative precedents established by the national mining industry's traditional lack of attention to environmental impacts.

Inti Raymi and its local context

Antecedents

The Inti Raymi mining company was founded in 1982 by the Bolivian group Zeland Mines S.A. and the Texan group Westworld Inc. Its goal was intensive exploration of the Kori Kollo deposit located in the province of Saucarí, 42 km northeast of the city of Oruro. Since then, Inti Raymi's shareholder structure has evolved, reflecting changes in the mining operation. In 1999, 88 percent of the shares belonged to Battle Mountain Gold Company of the United States and 12 percent to Zeland Mines. In the same year, Inti Raymi had no other exploration activity underway except for Kori Kollo, although it had several exploration prospects. In 1999, preliminary results indicated important gold reserves in La Joya that could possibly double the operation's lifespan if the bio-oxidation metallurgical tests were positive.

Inti Raymi is a pioneering and innovative company whose Kori Kollo operation has been the reference point in Bolivian mining since its discovery and development. Inti Raymi brought new technology and production methods to Bolivian mining, including open pit mining and the concentration of minerals through leaching. The operation has been active in the introduction of technological changes, such as induced polarization and magnetic prospecting in exploration, cycle optimization and the use of pregnant solution. Such changes have enabled important increases in the recovery of gold and the reduction of costs (Loayza 1999). Moreover, Inti Raymi is the first industrial company in the country to establish a foundation to promote the social and economic development of local communities within its area of influence.

The mining operation

The Kori Kollo deposit is located within sub-volcanic or intrusive rocks, possibly originating in the tertiary period. The operation had two phases for oxide and sulfide production that provided much of the income necessary for the company's social policy, which will be addressed in following sections.

The oxide and sulfide projects have been mined in an open pit. This has required the excavation of the Kori Kollo mountain, which over time will become a lake. In Andean culture, some mountains are considered gods and thus the object of adoration and worship; however, this is not the case with the Kori Kollo mountain. Nevertheless, some community members feel that the disappearance of Kori Kollo has influenced the climate, since the mountain served as a windbreak for the strong air currents that affect the area.

Oxides were treated by heap leaching followed by the precipitation of gold and silver using the Merrill-Crowe method. In total, approximately 9.4 million tonnes of oxide were treated, the wastes from which were re-treated once the sulfide project had finished and then deposited in the tailings dam constructed for the sulfide operation.

Once the existence of approximately 64 million tonnes of mineral sulfide was proven, the company decided that the best method of treating this reserve were the carbon-in-leach process and the ZADRA process for putting the gold and silver in solution. The project was designed to treat 14 500 tonnes per day and in 1999 the company reached a capacity of approximately 20 000 tonnes per day. The product is gold ore, whose approximate content is 80 percent gold and 20 percent silver. Refining is done outside Bolivia.

Local context and population flow

Inti Raymi's mining operations, deposit, and camp are located within the territory of two communities, Chuquiña and La Joya, located in the cold and dry central highlands. In addition, the operation has relations with communities adjacent to Chuquiña and La Joya, as the action radius of the company's social arm, the Inti Raymi Foundation, encompasses 25 communities. Finally, Inti Raymi has important direct and indirect relations with the city of Oruro, the department's capital and administrative base.

Chuquiña

When Inti Raymi began operations in the area during the mid-1980s, Chuquiña's structure constituted a social and territorial unit, whose central

axis was the village of Chuquiña. The community of Chuquiña is of Aymara origin and is part of the province of Saucarí. In addition, it forms part of the ayllu¹⁸ Chariri, which together with 11 other ayllus, makes up the larger social and territorial unit known as the Marka,¹⁹ with its ceremonial center in the village of Toledo (Ayllu Sartañani 1994). Nevertheless, by the mid-1980s, this traditional system of organization had lost practically all relevance in the area dominated by the republican state organizational system.

During this time Chuquiña's lands were divided. One secondary road connected the community to the principal highway to La Paz and another connected it to the city of Oruro. Transportation service was restricted to trucks or a few buses once or twice a week. It was necessary to cross the Desaguadero River at different points by boat. During the rainy season, the road became impassable since there were no embankment or drainage ditches.

Chuquiña's economy depended on sheep farming. Average family income, although the highest among the adjacent communities due to larger sheep flocks, was not sufficient to prevent the gradual migration toward urban centers, especially to the city of Oruro. In 1969, out of a total of 220 families, 91 emigrated to other parts of the department of Oruro and the country's interior. In 1987, out of a total of 97 families, 62 emigrated outside of the area (Rojas 1995).

Nevertheless, this migratory process has not been definitive since many families continued administrating their land and livestock from the city of Oruro. Normally, they returned to their lands on the weekends and during planting and harvest times. This behaviour stemmed from a development strategy consistent with the maintenance of two complementary sources of income: a job in the city as a worker (either public employee or merchant) and agricultural producer in their own community of origin. This strategy was possible due to the short distance between Chuquiña and the city of Oruro (42 km) and the availability of cheap labour from the region's impoverished campesinos. These people were contracted on a part-time basis by the migrants for agricultural and livestock tasks necessary to maintain production.

¹⁸ The ayllu is the territorial, social, kinship and identity unit in the socio-ethnic organization of Andean culture.

¹⁹ The Marka is the territorial unit that corresponds to the grouping of ayllus that constitute a larger unit in the Andean organizational system.

La Joya

The village of La Joya is approximately 5 km from Chuquiña. During the mid-1990s, this community also adapted its organization to the political administrative system in effect throughout Bolivia. In contrast to Chuquiña, however, La Joya was not part of an Andean social and territorial organizational system. Until 1953, the area now occupied by La Joya was the *hacienda*²⁰ of La Barca, which was later expropriated during the agrarian reform process in favour of the families living on the estate.

By the mid-1980s, the most important activities in the community of La Joya were agricultural and livestock production and cooperative mining. Because they were not located along the Desaguadero River, the population's land parcels were smaller and less appropriate for grazing than those in Chuquiña. After the severe drought of 1982–1983, many residents migrated to the city of Oruro and other towns throughout the country. Other residents were obliged to take up artisanal mining in the La Joya mountain in the hopes of obtaining a complementary source of income. By the beginning of the 1980s, artisanal miners had formed the mining cooperatives of La Joya Ltd. and Concepción de Mayo Ltd., which exploited the mining concessions belonging to Inti Raymi.

Adjacent communities

In the mid-1980s, the adjacent communities that benefit from the Inti Raymi Foundation had an organizational structure similar to those for Chuquiña or La Joya. Their economy was and still is based primarily on subsistence agriculture and livestock production — a reality that is similar to Chuquiña and La Joya, except that these communities lack the presence of artisanal mining. Infrastructure consisted of an embanked road connecting several communities with the city of Oruro, while passing through Chuquiña toward Carangas. The most distant communities were linked by way of less-passable back roads. As with Chuquiña and La Joya, migration was the common denominator in the area.

²⁰ Rural estates, or *haciendas*, were large extensions of land belonging to a single landowner and dedicated to agricultural production. Their domain included the residents who lived on the land.

The city of Oruro²¹

By the mid-1980s, the department and city of Oruro suffered a severe economic recession due to the drastic contraction in the mining industry, whose decline affected all other sectors. The city was favourably located for national and international commerce. It is linked to the Chilean port of Iquique by way of the Oruro-Pisiga-Iquique highway and to the port of Antofagasta by way of the Oruro-Uyuni-Antofagasta railroad. In addition, a paved road links Oruro to the largest cities in the country. Because of its strategic location, the city of Oruro has become the commercial emporium in Bolivia, especially for imported goods.

Acquisition of lands

As owner of the concessions in the La Joya-Chuquiña mining district, the Inti Raymi Mining Company S.A. (IRSA) acquired the lands necessary to exploit the deposit and to install the mining and administrative infrastructure. Inti Raymi believed that the richest part of the deposit was in La Joya, and so paid community residents nearly US \$1 000 per hectare, in spite of the fact that local market prices were on the order of US \$20–30 per hectare. Once the exploration study was concluded, however, it revealed that the Kori Kollo mountain, located in the jurisdiction of the Chuquiña canton, had a much more attractive deposit than that located in La Joya. But to acquire land in Chuquiña, the company adopted the following policy: acquire lands by phases according to the needs of the operation²²; negotiate separately with each landowner; offer a price per hectare significantly higher than the average price in the area²³; and once the mine closed, make every effort to restore the lands to their natural condition and return them to their prior owners.

In spite of the agreements signed by the parties, community residents continued with complaints, disagreements and pressures toward the company. During the course of our fieldwork, it was evident that community

²¹ The city of Oruro is the capital of the department of the same name, located 230 kilometers south of the city of La Paz.

²² Inti Raymi bought 500 hectares from the Chuquiña community for the construction of its productive facilities, paying US \$500 per hectare. Later, for sulphide mining operation, the company acquired approximately 1 000 hectares at a cost of US \$300 per hectare for the construction of the tailings dam. Finally, the company bought nearly 4 100 hectares at US \$350 per hectare for the construction of the evaporation ponds for the sulphide operation.

²³ According to company officials, the value of these lands was estimated at between US \$15 and US \$30 per hectare.

members used the issues of land and the environment (which will be addressed in a following section) as mechanisms of pressure with which to obtain additional benefits from the company. While pressures based on supposed environmental contamination by the mining operation have not been effective, pressures for additional compensatory benefits in exchange for the land are growing. In July 1999, community members staged a one-day work stoppage and occupied the area near the crusher, demanding additional compensation for the relocation of the community of Chuquiña.

The relocation of Chuquiña

In the early 1990s, the sulfide exploitation required the installation of a new processing plant near the town of Chuquiña. The company bought 9 hectares of land in Chuquiña at a cost of US \$200 000 in the eastern section of the town. The technological change from heap leaching to leaching in agitation tanks was going to require a finer grain in the mill as well as a 350 percent increase in production, entailing a significant increase in noise and dust levels that would have disturbed community residents. Thus, the company began negotiations with community residents, proposing to move the town to a new location far enough away from the mining operation to avoid disturbance. In contrast to what occurs in most towns in the Bolivian highlands, the company offered to build new housing for all current Chuquiña homeowners and to provide all basic services, including a new modern hospital.

After lengthy negotiations, community members finally accepted the company's offer to move the town to a new location called Villa Nueva Chuquiña. The houses would consist of two bedrooms, a kitchen, dining room, bathroom, and patio. The company would provide construction material that did not exist in the area, such as cement and iron bars, as well as labour. For their part, community members provided locally available construction material, such as rocks, sand and an assistant bricklayer. The relocation process attracted several community residents who had years before moved to the city of Oruro or other departments. These return residents were included in the Villa Nueva Chuquiña project. By 1999, 135 houses, market facilities, hospitals and educational centers had been built at a cost of US \$1.8 million for the company.

In spite of the agreements mentioned above, Chuquiña's relocation was not free of discrepancies and criticisms. Some residents resisted the move to the new town out of fear of being tricked by the company and losing their

houses in the old town. Those who rented houses feared losing their tenants. Some residents argued that since the town of Chuquiña, especially its church, dated to the colonial era, it had great historic value in terms of preserving the memory of their ancestors and would be at risk from the company's mining activities.

Toward the middle of 1992, a conflict developed between the company and the Oruro Human Rights Assembly over complaints lodged by Chuquiña residents.²⁴ For its part, the company demanded compliance with the negotiated agreements, renewing its commitment to conduct operations in a way compatible with the environment and citizens' rights. Finally, the community agreed to the relocation and several members ended up renting their houses to workers from the interior of the country because many of them had already established residence in the city of Oruro.

Company-community relations

As analyzed above, one of the company's most serious challenges from the beginning was achieving local community acceptance within an unfavourable context created by the company's competition with locals for access to mineral resources and land. In addition to land acquisition and the town's relocation, Inti Raymi was able, after several conflicts, to buy and freely transfer the gold concessions of "Independencia," "Vera," and "Iroco" in favour of the cooperatives holding the La Joya concession, even assuming subsistence costs for the first month. From then on, the company gradually dedicated itself to activities of cooperation and assistance to local communities in order to facilitate its insertion in the local context.

During the oxide phase, Inti Raymi became subject to multiple demands on the part of neighboring communities and civic institutions in Oruro that included the donation of sporting equipment and the construction of social infrastructure works such as secondary roads. When construction on the sulfide project began in the early 1990s, Inti Raymi was a pioneer in social assistance. Nevertheless, Inti Raymi's experience shows how easily a company's efforts at social action can be diluted in the medium term if they

²⁴ Complaints included: supposed threats by company officials to demolish the church and the town; company pressures regarding relocation to Villa Chuquiña; invasion of the town's urban radius; that the new mining methods would contaminate the town, which would end up inhabitable due to its proximity to the smelter; impediments to the residents' free movement because of the construction of a TRANCA; and the suspension of transportation of children to the school in Villa Chuquiña. See Córdova, 1993.

are not accompanied by an adequate sustainable development strategy for the region. In order to systematically attend to these needs, in 1991 the company decided to create the Inti Raymi Foundation.

The Inti Raymi Foundation

The foundation was established as a means of leveraging financial resources (in addition to those provided by the company) for investment in the region. Initially, the foundation was successful at mobilizing state resources from the Social Investment Fund in the area. Since 1997, the foundation has received funds from Spanish and Dutch international cooperation agencies as well as the Inter-American Foundation.

The Inti Raymi Foundation adopted a participatory policy designed to include community priorities in its plans and projects, as well as involve community residents in its activities. The foundation has presented itself as a willing partner eager to cooperate in the design and execution of projects sponsored by the communities. From the administrative and financial points of view, this policy entailed the foundation's role as a counterpart agency and pre-investment funder for community projects. The foundation's important role in developing effective community management capacity, however, has not been understood by some residents. During our fieldwork, it was evident that several beneficiaries view the foundation as illegitimate since it does not exclusively invest its own resources but rather, in many cases uses public funds.

In order to define the activities to be discussed with the communities within its scope of action, the foundation carried out a two-stage process involving:

1. a diagnosis and characterization of its area of action; and
2. creating a series of community workshops designed to identify and prioritize infrastructure needs.

Using these demands as a starting point, the foundation designed projects that emphasized agricultural and livestock activities, as well as those geared toward improving health, basic education, hygiene and water supply.

Mining's dual role

Despite the creation of the Inti Raymi Foundation as a mechanism for social development projects that address the communities' most pressing needs, the company continued to directly attend to the demands and requirements of the communities of La Joya and Chuquín. There were two reasons for this.

First, the company considers these communities part of its area of strategic action. Interaction with such communities was much less structured than with the other communities targeted by the foundation. Avoiding conflicts was a priority for the company and relations with La Joya and Chuquiña were the responsibility of the highest executive levels within the company. For its part, residents of the two communities did not directly relate to the mining company; instead their interaction was always mediated by community authorities. For example, during the land acquisition phases, the company always initiated contacts with community leaders, while residents waited for the go-ahead from their leaders prior to any direct negotiation with Inti Raymi.

Second, the mining company has been much more accessible to La Joya and Chuquiña's demands than the Foundation because the latter uses a clearly defined methodology for approving projects. Its priority is to support activities that promote regional development, including after mine closure, rather than merely avoiding conflicts that could delay the normal timeframe for a mining operation.

It is important to note that this duality in relations between Inti Raymi and its area of social influence has been successful in avoiding conflict or confrontations. In some cases, it led the company to adopt assistential and even paternalistic positions with respect to La Joya and Chuquiña. This occurred due to the joint circumstances of a favourable market and the high quality of the Kori Kollo deposit. Now that gold prices have dropped to their lowest point in 30 years, the sustainability of this policy is precarious, to say the least. The company has been systematically reducing costs but pressure from La Joya and particularly Chuquiña have not let up. Since there has been little change in the area's difficult social and economic conditions, the communities could react confrontationally to the company and its mining activities. The company is faced with the serious challenge of how to maintain trouble-free community relations during a market slump, after having established relations during an economic boom.

Environment²⁵

Just like a coin, the issue of the environment at the Kori Kollo operation presents two opposing sides that form a whole. On the one hand, there are the technical aspects of the company's environmental management policies; on the other, there is the natural environmental degradation prevalent in the area and the resulting political pressure on the company and the government. Both aspects are fundamental to understanding the relationship between the company and its surrounding social context.

The analysis that follows addresses each side of the coin. We have attempted to emphasize that in a context like that faced by Inti Raymi, the relation between a large mining project and its environmental impact is not limited to technical management of the operation itself, as many companies wrongly assume. On the contrary, interest groups use the environmental issue as an opportunity to question the legitimacy of mining activities, particularly at the local community level. If this reality is not incorporated in a timely and appropriate manner within the company's environmental management and communication policies, the best technical efforts can do little, later on, to reverse the mutual distrust between the mining operation and the local community. This not only constitutes a source of conflicts and tensions during the operation of the mine, but also will likely continue beyond the closure of the mine.

Environmental management at the mining operation

As we saw in the first part of this section, the Kori Kollo operation advanced rapidly. In less than a decade it went from a project worth a few million dollars (the oxide mining operation) to the most important industrial project in the country. By the early 1990s, it had an estimated investment of US \$150 million. Financing this was beyond the Bolivian financial and banking system's capacity. Thus, the project turned to international financial

²⁵ This section is based on information from different sources. Its goal is to obtain an objective analysis of Inti Raymi's environmental management. The sources were: (i) Oruro's regional environmental evaluation as undertaken by the Swedish Geological AB in the Oruro pilot project (1993 and 1996); (ii) Internal company documents such as "Environmental Management at the Inti Raymi Mining Company" written by Marwin Columba, Superintendant of Environmental Control; (iii) Interviews with key company and community informants; (iv) Press articles and other information found in bulletins such as "Informa y Opina" by the Pastoral Society; and (v) the technical evaluation conducted by one of the present authors during the early 1990s with the support of environmental specialists (Loayza 1999).

institutions such as the World Bank, the Overseas Private Investment Corporation, and the Andean Development Corporation. Even though Bolivia had not passed an environmental law at that time, Inti Raymi's operation had to comply with strict monitoring and environmental impact mitigation norms.²⁶

The Inti Raymi mining operation, like Puquio Norte, is based on the principles of zero discharge and systematic, continuous monitoring. The water used in the processing plant is recycled. The resulting tailings from the concentration process are sent in pulp form to the tailings dam, where the solids are separated from the liquid, which is recycled back to the treatment plant. Following international standards, the leftover cyanide solution in the dam is kept under 50 parts per million by way of the application of hydrogen peroxide, which facilitates radiation's ability to break down cyanide. Due to their high salinity, waters flowing from aquifers into the mining pit are not discharged into any water body. They are discharged into the evaporation ponds, specifically constructed to liberate water through evaporation. The salt that remains at the end of the project is deposited in the base of the mine pit and, over time, covered with water.

In order to avoid the formation of acid rock drainage, both the tailings dam, which will accumulate approximately 65 million tonnes of tailings, and the sterile solids generated by the mine, which will be in the magnitude of 70 million tonnes, will be encapsulated with oxidized material. The base of the sterile deposit is a four-foot thick liner made from oxidized material extracted during the operation's first stage. The liner of the tailings dam has been made impermeable with a layer of compacted clay in order to avoid the tailings coming into contact with ground and surface water.

Because the Desaguadero River flows close to the mine, a 5-km dam has been constructed around the mine site. The dam will prevent floodwaters from entering the mine as well as discharge from the mine entering the river. The site also has a ring of monitoring ponds throughout the operation, which are used to take monthly samples of physical parameters and tri-monthly tests of chemical parameters. In addition to water quality, soil and air quality are also monitored. The goal of the restoration program is to restore lands affected by the mining operation to their original condition.

²⁶ As an example, in 1997, Inti Raymi was granted first prize by the Latin American Mining Organism (OLAMI) in the category of large-scale mining in the ecology and environment competition.

While conducting the fieldwork, we observed that the mine's restoration programs have already begun, affecting 70 hectares in 1999. In addition, also underway within the area of the mining operation are the rehabilitation of green spaces and artificial lakes which are home to regional bird species such as ducks and flamingos. Finally, according to company officials, the company has established a fund to cover the costs of adequate closure measures.²⁷

Currently, there have been no confirmed incidents of contamination or environmental damage due to the mining operation. Nevertheless, visits to the area and conversations with local residents and Oruro inhabitants demonstrate that the dominant perception is that the operation has significantly and negatively affected the region's ecology.

The environment as an instrument of political pressure

As we explained earlier, the discovery and exploitation of the massive Kori Kollo deposit coincided with the crisis in the state-directed economic model, revealing this model's defects. First, centralism resulting from the state's role as economic planner had practically asphyxiated regional aspirations. Thus, the crisis provoked regional movements. Second, with the drop in metals prices, the mining departments of Potosí and Oruro suffered severe unemployment and recession. Inevitably, the population of these mining regions has questioned the mining industry's long-term contributions to the areas. Among other aspects, criticism has been leveled against the amount and distribution of mining royalties paid to the central government and the regions.

Within this context of decline, Inti Raymi's arrival as a dynamic operation (and the most important gold mine in South America) served as a starting point from which to attack the centralist model and promote its reform. Newspapers from the period 1993–1998 reflect the uncertainty regarding gold and mining royalties on the part of Oruro institutions. Oruro institutions lobbied the central government to impose higher royalties on Inti Raymi's gold operation, suggesting that a greater percentage of these royalties go to the department. One of the main arguments employed in this fight was the environmental degradation that the mine left in its wake. In other words, Oruro institutions were demanding higher royalties not only

²⁷ Bolivian environmental legislation does not require the establishment of a fund or monetary reserves for restoration or rehabilitation activities associated with the closure of a mine.

because the resources were located in the department, but also as a form of compensation for the environmental harm or risks associated with mining. Western Bolivia's experience with mining contamination since colonial times was cited. Because this perception was based on experience, Inti Raymi faced the difficult challenge of persuading the population of its responsibility and commitment to environmental management. The situation became even more complicated because Inti Raymi's sulfide project commenced simultaneously with the natural degradation of the Uru-Uru and Poopó lakes. Mining's negative environmental reputation led to the belief that such degradation was largely due to the Inti Raymi operation.

The department of Oruro is part of the closed basin or high Andean plateau that serves as a drainage system from Lake Titicaca to Lake Poopó by way of the Desaguadero River. The volume and depth of Lake Poopó depends primarily on the level of Lake Titicaca, which in turn is subject to cyclical fluctuations due to natural events such as the El Niño phenomenon.

"The close relationship between water levels in Lake Titicaca and the size and depth (or even the existence) of water in Lake Poopó, is due, of course, to the fact that the volume of the Desaguadero River (which contributes approximately 80 percent of the water that feeds Lake Poopó) varies depending on the level of water in the lake that it drains. Between 1984 and 1987, Lake Titicaca reached its maximum level... The result was a tremendous expansion of Lake Poopó, which reached a surface area of 3 500 square kilometers in 1986 and a maximum depth of 9 meters... In subsequent years, Lake Titicaca's water level dropped once again...It is not surprising that during recent years, Lake Poopó has almost ceased to exist as a lake with a visible surface of water" (SGAB 1997, pp. 38-39).

The gradual disappearance of the principal lake in the department of Oruro, which coincided with Inti Raymi's sulfide mining operation, had serious effects on the region's flora and fauna. For example, as the lake disappeared, fish species such as *orestia* and *pejerrey* could no longer feed many of the communities scattered around the lake. In addition, the lake's disappearance negatively affected local flora, because soil salinity increased. This situation negatively affected local campesinos. Inti Raymi was accused

of being responsible for these processes, in part so as to pressure the company for compensation.²⁸

Initially, the company did not realize that mining's environmental impacts and risks could be cause for such concern and fear among local communities. The company was slow to develop a communications or community relations policy to focus on dispelling fears and creating trust, even at the cost of suffering a few delays or adjustments in the project's schedule. Local residents say they were not consulted about the use of cyanide in the oxide mining operation, which could have served to dispel fears in a timely manner. Moreover, after a few isolated incidents involving animals that evaded company security and drank from the cyanide ponds, the company compensated the owners far above the market value of their livestock in order to avoid conflict. Such action gave the community the false impression that the operation's negative environmental impacts explained the high compensation.

Thus, the mining industry's negative environmental legacy, the local population's distrust of the company and its activities, combined with the company's insufficient and tardy attempts at communication with local residents all opened the door to fear and uncertainty. If we add in the political manipulation of the environmental issue, together with the phenomenon of the natural degradation of the area, the discrepancy (which in the authors' opinion exists) between the operation's level of environmental management and the communities' negative perception of the operation is not surprising.

In conclusion, this section has shown that the most basic feature of the relationship between Inti Raymi and local communities is the distribution of benefits generated by mining activities. For local residents, the arrival of the mining operation is both an opportunity and a threat. It is a threat because the

²⁸ For example, the following press clippings from the time are highly revealing: "The use of toxics and poisonous chemical products represents a grave danger, not only to residents' health, but also to soil fertility, water quality and environmental equilibrium, the contamination of which is caused by Inti Raymi's use of cyanide in its gold mining operations, poisoning not only the site but taking its deadly effects to the Poopó and Uru-Uru lakes, endangering and destroying the fish populations, the only source of sustenance for the residents and town of Oruro." OPINION, 3 September 1991, "*Mining companies contaminate the soil, water and environment.*"

"Jaimes (from the department of Oruro) was emphatic in attributing the disappearance of all vestiges of life in the area around lakes Poopó and Uru-Uru to the effects of lethal cyanide used by the Inti Raymi company in Saucari... Lake Poopó is dead, there is no longer any life because all the species of flora and fauna have disappeared, affirmed the interviewee..." La Patria, 27 October 1993, "*Inti Raymi responsible for ecological disaster in the department.*"

mine competes with residents for land and mineral resources, but it is also an opportunity because it can provide them with resources or, as we will see in the following section, well-paid jobs. Due to the deposit's richness and the cooperation of company executives, Inti Raymi adapted to the situation by developing an assistance policy vis-à-vis local communities with the goal of avoiding conflicts that could affect the normal functioning of mining activities. Over time, it became apparent that the region's pressing needs required a more structured and effective response, and so the company created the Inti Raymi Foundation. Thus, the company's initial assistential role matured into the role of an agent committed to local development. But because the company's assistentialist policy was not eliminated, it effectively developed a dualistic response to local residents' demands. In other words, the company seeks to promote local development but also seeks to avoid conflicts.

Impacts of Inti Raymi

In this section we analyze the principal economic and social impacts in the mining operation's area of influence.

Employment and human resources management

Inti Raymi's policy is to give hiring preference to workers from the communities of Chuquña and La Joya. Table 4 shows the evolution of the local communities' share of mine employment.

From 1990 to 1997, between 54 percent and 68 percent of Inti Raymi workers were from the communities of Chuquña and La Joya. The number of contract workers, as a response to pressures from local communities for jobs, is notable. Thus, between 1997 and 1998, when international gold prices fell approximately 30 percent and Inti Raymi was forced to reduce costs, contract workers were the most severely affected, practically disappearing from the work force. Clearly, this type of employment was largely surplus or unnecessary to the operation and had to be abandoned when the company's economic situation went through difficulties. This explains the smaller percentage of workers from Chuquña and La Joya for the year 1999.

Training

Initially, Inti Raymi's mining operation was heavily weighted toward unskilled labour. Nevertheless, the technological changes implied by the shift to sulfide mining required the company to train workers by way of three

Table 4. Inti Raymi: Employees from Chuquiña and La Joya.

| Classification | 1990 | 1995 | 1997 | 1999 |
|--|-------------|-------------|-------------|-------------|
| Workers | 120 | 158 | 179 | 217 |
| Workers at Sermat and La Barca (*) | 50 | 53 | — | — |
| Contract workers | 30 | 250 | 283 | 15 |
| Workers from Chuquiña and La Joya | 200 | 461 | 462 | 232 |
| Technicians and employees | 0 | 0 | 0 | 0 |
| Total from Chuquiña and La Joya | 200 | 461 | 462 | 232 |
| Total workers at Inti Raymi | 295 | 855 | 761 | 493 |
| Workers from Chuquiña and La Joya as a percent of total workers IRSA | 67.8 | 53.9 | 60.7 | 44.0 |

(*) Until 1996, the mining operation contracted the services of Sermat and La Barca, dedicated cargo transport and mining exploration service providers, respectively. Starting in 1997, these companies were acquired by Inti Raymi, with many of their workers being absorbed in the process.

Source: Prepared with information provided by Inti Raymi S.A.

programs focusing on equalization, professionalization and specialization. All operators and employees at the oxide operation were trained in order to proceed to the sulfide operation.

The equalization program involved the development of cognitive tools such as language, technical knowledge and quantitative training, as well as general technical skills in areas such as mechanics or electricity. The professionalization program was oriented to training operators in relation to their job positions. Courses consisted of 20 percent theoretical training and 80 percent practical training. Finally, the specialization program formed specialized resources within the area of professionalization. For example, within the area of auto mechanics, a specialty could be electronic injection. Whereas 51 percent of workers were trained under the first program, 25 percent were in the second and 3.3 percent in the third.

Importance of employment originating in the mining operation

The impact of the mining operation on employment in Chuquiña and La Joya can be evaluated in relation to the communities' economically active population (EAP). The analysis includes employment by subcontractors engaged in various services such as transport, food service, operative contracts, cleaning and civil works. In 1997 an estimated 143 additional jobs for local residents were created with subcontractors.

Table 5 presents the total impact of the mining operation on employment in Chuquiña and La Joya. Note that the direct employment at the mine plus indirect employment with subcontractors equals 56.2 percent

Table 5. Inti Raymi: total impact on the EAP of Chuquiña and La Joya.

| Employment generated by the mining operation | Jobs | Impact on the EAP of Chuquiña and La Joya |
|--|------------|---|
| Workers at the mining operation | 462 | 42.9% |
| Subcontractors | 143 | 13.3% |
| Total | 605 | 56.2% |

Source: Prepared using information from Inti Raymi S.A, the National Institute of Statistics, and fieldwork data.

of the EAP of Chuquiña and La Joya for the year 1997. Due to the human capital development experienced by much of Inti Raymi's labour force, which we will discuss later, the possibility of unemployment problems once the mine inevitably closes is low.

Income

Direct impact on income of local communities

Table 5 showed that most employment generated by the company in Chuquiña and La Joya was through the direct hiring of workers at the operation, who have always received salaries higher than the regional average, as we can appreciate in Table 6.

The wage differential between Inti Raymi workers and the department's average is increasing over time. A similar situation occurs with the variations in the opportunity costs for the average worker from Chuquiña or La Joya, which is the sum of the average income of a worker in the city of Oruro and that of an agricultural producer in the department of Oruro. As a result, residents from La Joya, Chuquiña and adjacent communities have a strong incentive to enroll as workers at the mining operation. During our

Table 6. Inti Raymi: Average monthly salary (US \$).

| Classification | 1990 | 1995 | 1997 | 1999 |
|--|------|------|------|------|
| Workers | 218 | 535 | 678 | 760 |
| Contract workers (*) | 200 | 280 | 350 | 390 |
| Average monthly income in the department of Oruro (**) | 99 | 132 | 142 | n.a. |
| Average monthly income for a worker in the city of Oruro | 89 | 120 | 129 | n.a. |
| Average income for rural farmers | 42 | 41 | 44 | n.a. |
| Opportunity cost | 131 | 161 | 173 | n.a. |

(*): Including workers at Sernat and La Barca.

(**): Average earnings from work, capital, natural resources, and business training.

n.a.: Not available.

Source: Prepared using information from Inti Raymi S.A, the National Institute of Statistics, National Employment Survey, Nov., 1999, and data obtained in field work.

fieldwork, various interviewees from the rural area adjacent to the mine expressed their indifference and — in some cases — opposition to the Inti Raymi Foundation's activities. Nevertheless, they all expressed the desire to one day get a job at the mine. When asked about their expectations regarding Inti Raymi, they have very clear ideas: they value the foundation's support, but do not expect it to significantly change their lives; in contrast, a job at the mine represents a significant change.

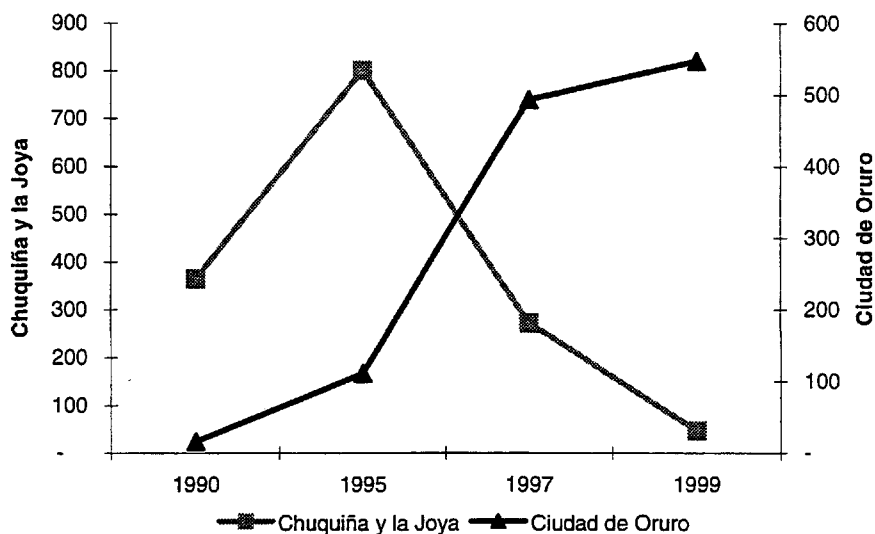
Indirect impact on income of local communities

Indirect impacts on communities' income result when wages earned at the mining operation are spent on goods or services produced in Chuquiña and La Joya. Among the goods consumed by mining personnel are meat, different varieties of potatoes and potato products, and Andean grains such as quinoa, wheat and barley. In turn, this indirect income is not usually spent on goods produced in these communities. However, because recipients view it as an extraordinary income, they usually spend it on the acquisition of durable goods or clothing. Thus the wages spent by workers in the area around the mine do not have an expanded multiplier effect in the area.

Migration to the city of Oruro

Until 1995, 83.7 percent of mine personnel resided in Villa Chuquiña and La Joya, while 10.6 percent lived in the city of Oruro and the rest in other cities. However, this high level of local residence was not desired as local residents aspired to live in a city like Oruro, and their income levels made this possible. Due to a growing state of frustration, in spite of repeated refusals by mine administrators to provide transportation from the mine site to Oruro, in 1996 the union decided to contract a transportation fleet using its own resources. Later, union negotiations with the company resulted in an agreement that Inti Raymi would cover 50 percent of transportation costs and later assume all such costs.

Figure 1 illustrates two unmistakable tendencies. Between 1990 and 1995, the number of mine workers, employees and technicians residing in Chuquiña and La Joya reached its peak, due fundamentally to the company's policy. In contrast, between 1995 and 1997, the local population decreased drastically while the number of workers living in the city of Oruro increased.

Figure 1. Place of residence of mine workers.

The year 1995 represented a historic turning point for Chuquibambilla and La Joya residents. Consolidating their residence in the city of Oruro implied a better standard of living and multiple new opportunities for them and their families. Moreover, this change did not imply a jump into the unknown or the transition to an unfamiliar and risky world. In addition to having stable incomes, the company facilitated access to housing and vehicles and, in some cases, assisted with real estate investments in other cities in the country.²⁹

Impact on income in the city of Oruro

Table 6 showed the mine workers' salaries were significantly higher than the average income in the city of Oruro. This was also true of technicians and professionals employed at the mine. In the following section we analyze the impact of these salaries on the city of Oruro.

Workers invest approximately 40 percent and technicians 25 percent of their income in real estate. Nearly 45 percent of the income is spent in the city of Oruro. According to data collected during our field work, the average worker is relatively frugal and has the following investment priorities: the purchase of a plot of land in Oruro; the construction of a house on this plot; their children's education (with aspirations of becoming a professional with a university education); the purchase of a plot of land in another city; the

²⁹ The facilities granted by the company to workers were interest-free cash loans in order to obtain bank credits.

purchase of a store or commercial venue; the purchase of a minibus to provide urban transport services; and the purchase of an automobile.

Although mine workers earn considerably less than technicians, they devote a greater proportion of their income to savings and investments. For their part, technicians and employees have the following investment priorities: acquisition of real estate (or if they are already owners, additions to and improvement of their property); changing their existing automobile for a more recent model, which involves a mixture of investment and consumption; and financial assets, which are generally obtained in the banking system, such as savings accounts or fixed-rate deposits.

Discounting wages spent on investments and in the communities of Chuquiña and La Joya, nearly 100 percent of the remaining wages are spent in the city of Oruro. This is because Oruro is probably the cheapest city in the country. As a result, investment spending and consumption in the city of Oruro together represent 78 percent of workers' income and 86.25 percent of technicians' and employees' incomes. A portion of this spending, however, leaves the city of Oruro in the form of payment on imports and goods and services produced elsewhere in the country. Discounting these losses, the resulting net spending in turn becomes income for other families in Oruro, and so on, successively.

The sum of this successive spending represents the income multiplication of wages and salaries paid by Inti Raymi. The estimate of this multiplier effect is presented in the first column of Table 7.

Table 7 shows that in 1997, every dollar paid by Inti Raymi as wages and salaries became US \$2.6 in income in the city of Oruro's economy. For example, the approximately US \$7.1 million paid in salaries became US \$18.3 million for the economy of Oruro. This impact can be more concretely appreciated comparing it to the number of families that the income could maintain. The average family in Oruro had an annual income

Table 7. Inti Raymi: Impact on income in the city of Oruro, 1997 (US \$).

| Impacts | Workers, technicians and employees | Subcontracted employees | Total |
|----------------------|---|------------------------------------|--------------|
| Income earned | 7 132 961 | 3 649 151 | 10 782 961 |
| Direct impact | 5 580 000 | 3 650 000 | 9 230 000 |
| Indirect impact | 12 720 000 | 8 210 000 | 20 930 000 |
| Direct plus indirect | 18 300 000 | 11 860 000 | 30 160 000 |
| Multiplier | 2.5656 | 3.2528 | 2.7982 |

Source: prepared by the authors using their fieldwork data.

of US \$2 691 in 1997; thus the indirect income generated by the mining operation would have maintained approximately 6 800 families that year, or 18 percent of families living in the city.

Using this methodology, we can estimate a multiplier of 3.25 for the income earned by the operation's subcontractors³⁰ residing in Chuquiña, La Joya and the city of Oruro, as shown in the second column of the same table. Considering both the direct and indirect effects, in 1997 approximately 6 percent of Oruro families could have been maintained with this income. The multiplier effect of both types of income — workers plus subcontractors — is shown in the third column, which could have maintained approximately one-fourth of the families residing in Oruro.

Infrastructure

Inti Raymi's infrastructure development program constructed road and communications works. These works were incremental improvements in the area's roadway system.

The company built a bridge across the Desaguadero River and a highway connecting the city of Oruro at a cost of US \$320 000. The project benefited various communities in addition to Chuquiña and La Joya by significantly improving the links among the communities and to the national highway system and the city of Oruro. Instead of travelling along poorly maintained roads and crossing the river by boat, community members could now travel quickly and comfortably along well-maintained highways, completing the journey in much less time than before. The project also helped facilitate the migration of families living in these communities to the city of Oruro. With the new highway and the bridge it is now possible to live in Oruro and work at the mining operation. In addition, the project facilitated the integration of the rural population into the city of Oruro.

Departmental income

Gold production in Bolivia was subject to minimal royalties on the order of 1 percent and 1.5 percent of the gross sales value. This was because most of the country's gold came from alluvial river deposits north of La Paz, produced by mining cooperatives and individual gold panners. Gold nuggets were easily smuggled out of the country, which invariably happened when

³⁰ The interviews conducted established that Inti Raymi's subcontractors consume or invest 100% of their income in the city of Oruro. This could be due to the fact that in most cases, the companies are already in the process of consolidation in the Oruro market.

the government raised gold royalties beyond minimum levels. Thus, during its first few years, Inti Raymi's oxide operation benefited from this exceptionally favourable tax treatment.

Once the oxide operation became well-known and was treating several thousand tonnes a day, the government decided to differentiate the gold produced in Kori Kollo from alluvial gold and subjected the former to royalties of 3 percent. Estimates realized by the National Mining Secretary show that for the period 1993–1996, during which gold prices fluctuated between US \$350 and US \$400 per troy ounce, Inti Raymi paid mining royalties equivalent to between 9 and 12 percent of profits. During this same period, taxes on profits in Chile fluctuated between 15 and 35 percent, in Argentina and Venezuela reached 30 percent, Peru 38 percent and Mexico between 35 and 40 percent.

In 1997, the government reformed the mining tax regime and established a single system that combined mining royalties with income tax. Since then, Inti Raymi's gold production has been subject to the *Impuesto sobre las Utilidades de las Empresas* (IUE, Corporate Income Tax) and royalties between 4 percent and 7 percent of the gold value according to international market prices. Under the new regime, the IUE is applicable as a fiscal credit upon paying mining royalties. All royalties paid are destined to the department in which an operation is located — in Inti Raymi's case, the department of Oruro.

As shown in Table 8, Inti Raymi contributed 14 percent and 10 percent of the total departmental income during the years 1997 and 1998, respectively. These figures reveal the absence of other large mining operations in the department of Oruro and the country in general, a phenomenon that has existed since the 1980s. This is even clearer when we consider Inti Raymi's contribution to the department's total royalty-related income. Between 1993 (when the sulfide operation commenced) and 1998, Inti Raymi was responsible for between 74 percent and 99 percent of Oruro's income from mining royalties. Thus, the Inti Raymi deposit is the principal natural resource currently exploited in the department of Oruro. Without the Inti Raymi operation, the department would be virtually without income from natural resources.

Table 8. Inti Raymi: Mining royalties and departmental income (thousands of US \$).

| Income and royalties | 1990 | 1993 | 1997 | 1998 |
|---|-------|-------|--------|--------|
| Oruro's budget | | | 33 094 | 41 776 |
| Royalties paid to Oruro | 1 679 | 2 443 | 6 284 | 5 358 |
| Royalties paid by Inti Raymi | 964 | 2 415 | 4 643 | 4 179 |
| Inti Raymi's contribution to the department | | | 14.0% | 10.0% |
| Inti Raymi's contribution to royalties | 57.4% | 98.8% | 73.9% | 78.0% |

Source: Vice Ministry of Mines and Metallurgy, Sector Policy Analysis Unit; Inti Raymi.

In terms of the department's budget appropriations, there is no correlation between the source of income and how it is spent. Instead, income is expended according to political considerations and usually goes to areas with greater influence within the department, such as the city of Oruro. As a result, it is possible that the mining royalties could, for example, be spent on agricultural development projects, on projects in the city of Oruro, or the community of Chuquiña. During the interviews with regional government officials, we did not detect that the actions of Inti Raymi or its foundation had had the effect of displacing public investment in the area. On the contrary, it is more probable that public investment in the region increased due to the Inti Raymi Foundation's active role as a mobilizer of public resources.

Human development and social capital

Personnel at the mine

Although subject to debate, perhaps the greatest impact on human development in the area resulted from employment of a significant number of Chuquiña and La Joya residents at the mine. The company's work conditions favoured the social and economic development of workers' families by offering higher incomes as well as access to quality health and education services.

For Chuquiña and La Joya residents, employment at the mining operation brought a 400 percent increase in income levels. Residents went from being agricultural producers and poorly paid workers or functionaries in the city Oruro to stable and well-paid jobs comparable to middle-class levels in the city. Moreover, since their frugal habits enabled them to save approximately 40 percent of their income, and because the company did not tolerate alcoholism, workers spent their income acquiring land, real estate, and small businesses such as stores. Thus workers and their families went

from being socially and ethnically marginalized to being upwardly mobile residents in Oruro.

In terms of health care, the change was also positive and significant. In many cases, families had neither individual or family health coverage, and employment at the mining company entailed full coverage of medical insurance. In terms of education, the mine brought favourable conditions both for workers and their children. As mentioned earlier, workers were exposed to an educative process framed around developing and applying the skills required by a company such as *Inti Raymi*. It is not difficult to imagine that these workers and technicians are well paid both within and outside the mining industry. For example, the workers, technicians and employees interviewed during our fieldwork did not express concern for their future after the mine closes. They assume they will be able to find work at other mining companies or in other industries if need be, thanks to their professional training and specialization in such jobs as a mechanic or electrician.

In addition, migration to Oruro increased the educational opportunities available to *Inti Raymi* workers' children, both in terms of formal education and the advantages offered by the environment of an urban society. The children of these new members of the middle class were able to advance beyond a primary school education, which is the level attained by 59 percent of the department. (National Institute of Statistics, National Housing and Population Census 1992; Muller and Associates 1997).

Human development in communities adjacent to the operation

The presence of the company and the *Inti Raymi* Foundation in these communities enabled the development of alternative economic activities and the improvement in health and education services.

The company and the foundation constructed primary and secondary schools capable of housing 1 000 students in the communities of Chuquiña and La Joya.³¹ The schools are similar in quality to the average private school in the city of Oruro, and include mechanics and welding workshops, computer laboratories, library, and sports facilities. In addition, the company provided children from La Joya and Nueva Chuquiña with breakfast, uniforms, and school supplies.

³¹ These works had 90 percent co-financing from FIS.

In addition, the Inti Raymi Foundation supported the construction of an educational infrastructure through the formulation of pre-feasibility and feasibility projects presented to the Social Investment Fund. The result has been an improvement in learning conditions and compliance with the population's demand for quality educational infrastructure. In addition, Caritas and the Anti-Hunger Foundation, with participation from parents, have been providing school breakfasts in order to combat the low nutritional levels that negatively effect learning. Likewise, the foundation has provided teaching material each year. Schools have received book donations that complement other learning materials and help improve learning conditions. Finally, the foundation granted bonuses to local teachers who agreed not to interrupt their teaching responsibilities. However, such improvements have not improved dropout rates caused by migration.

Simultaneous to building the new community of Chuquiña, Inti Raymi constructed a hospital similar to a top-level private medical center in the city of La Paz. According to the hospital's director, "there is no health center of this kind in the city of Oruro." Among other services, the hospital offers medical and dental attention, childbirth facilities, an isolation ward, and a laboratory for the detection of tuberculosis. The hospital attends to 24 area communities with a total of approximately 5 200 inhabitants.

The foundation has established a health care system composed of a reference center (the Health Center of Villa Chuquiña); monthly visits to the communities by an itinerant doctor-and-nurse team; health promoters³² in each city; and transportation service to the city of Oruro for those requiring specialized medical attention. This system has allowed important gains, as shown in Table 9.

The principal efforts of the Inti Raymi Foundation at the rural level were focused on improving the region's agricultural productivity in order to boost incomes and living standards for the region's inhabitants. To that effect, the foundation conceived and developed the Livestock Promotion Center (CEPROGAN), which provides technical assistance and training to agricultural and livestock producers within the foundation's scope of action in the areas of livestock production, soils, grazing lands, and forestry. Although this program has benefited local campesinos, it has not managed to raise income levels sufficiently to avoid the systematic abandonment of the region.

³² Community members trained as health workers promoted health-care programs offered at the local health center. They also assist in childbirth and first aid.

Table 9. Adjacent communities: Comparative health indicators.

| | 1995 | | 1996 | | 1997 | | 1998 | |
|---|-------|------|-------|------|-------|------|-------|------|
| | No. | % | No. | % | No. | % | No. | % |
| New consultations per 100 residents | 2 998 | 55.1 | 3 179 | 58.4 | 3 831 | 70.4 | 4 446 | 96.2 |
| Dental consultations per 100 residents | 265 | 9.7 | 541 | 19.9 | 615 | 22.6 | 723 | 65.7 |
| Malnutrition (moderate and severe) under 2 years of age | 44 | 14.5 | 22 | 7.2 | 22 | 7.2 | 32 | 29.4 |
| Malnutrition (moderate and severe) under 5 years of age | 69 | 9.3 | 41 | 5.6 | 40 | 5.4 | 32 | 29.4 |
| Prevalence of malnutrition under 5 years of age | 349 | 47.3 | 232 | 31.4 | 289 | 39.2 | 174 | 55.9 |
| Attention to pregnancy before the 5th month | – | 24.9 | – | 21.8 | – | 35.2 | – | 27.7 |
| Coverage of home childbirths by medical personnel | 34 | 26.2 | 29 | 22.3 | 34 | 26.2 | 1 | 4.8 |
| Childbirth coverage | 58 | 33.3 | 61 | 35.1 | 64 | 36.8 | 27 | 57.4 |
| Tetanus vaccinations | 345 | 33.9 | 399 | 39.2 | 224 | 22.0 | 61 | 21.0 |

Source: SNIS 1995 to 1997, 1998 Villa Chuquíña Health Center.

Formation of social capital

The Inti Raymi Foundation's policy is to seek community participation so that its projects reflect local priorities and get community members to participate in the solution of their problems. The Local Development Fund (FONDEL) illustrates such efforts and their results.

FONDEL is an investment fund created by the Inti Raymi Foundation and Inter-American Foundation (IAF) with initial capital of US \$300 000, to which each institution contributed 50 percent. FONDEL was created to counteract widespread poverty in the area by solving some basic problems, such as the lack of negotiating and management capacity on the part of local communities. These problems are relatively simple for most organizations in the modern world, but have long been unsurpassable for communities within the foundation's area of influence.

The strategy adopted by FONDEL was that each participant — FONDEL, the beneficiary community, and the state — has clearly defined roles and responsibilities with which they must comply. FONDEL establishes the procedures, fixes relations among diverse actors, and co-finances projects. The community identifies, develops and executes the

projects, in addition to providing local materials and labour. Other private organizations and the state provide co-financing and technical assistance.

FONDEL works according to projects. Each must comply with the following stages: identification of the project; formulation of the project profile; successful search for financing; project execution; supervision of the project execution; and project maintenance for the benefit of current and future generations. In each of these stages, the communities are trained by the foundation.

FONDEL's initial results are encouraging, including the construction of productive and basic hygiene infrastructure and the strengthening of communities' management capacity. It is important to note that initial FONDEL contributions were multiplied by 2.85. In addition, communities have been the principal contributors to FONDEL projects, providing 37 percent of total resources.

Human development in the city of Oruro

Although subject to debate, the foundation's principal contribution to human development in the city of Oruro (which as we have seen is a center of attraction for human resources) has been the establishment of the Multi-Service Educational and Intercultural Center (CEMEI). The foundation became involved in education because it is an issue common to all foundation projects; one which represents its central thrust of development. The city of Oruro suffered poor-quality public education services, characterized by lack of infrastructure and equipment such as libraries, furniture, and teaching materials, as well as low professional levels among teachers.

In the area north of Oruro, the foundation initiated an innovative project inspired by the Jesuit-sponsored Multiservice Educational Center (CEMSE) in La Paz. The foundation's project, known by its initials CEMEI³³, provides teaching materials to the city's public schools and implements innovative teaching methodologies at a well-equipped center periodically attended by all students from area schools. CEMEI encourages free expression and creativity, and provides access to technology, new teaching methods and resources that complement the educational process.

³³ CEMEI was constructed by the Inti Raymi Foundation with co-financing from FIS. In addition, FIS gave support to cover the 25% of the administrative costs for 18 months.

According to parents and teachers, the center's support is very important because it provides children with a space offering novel elements — workshops, a gymnasium, sports field, video library, and computer lab — that keeps them off the street. Students receive support to enjoy those school activities that teachers cannot always provide given the lack of equipment in their schools. CEMEI figures confirm these goals. Between 1996 and 1998, coverage increased from 12 000 to 16 000 participants, reaching the limit of 1 000 participants per day, above which the quality of attention and services would suffer. CEMEI's attends to approximately 30 percent of Oruro's students.

Impacts, best practices and sustainability

Using the Bolivian experience, this study has evaluated the positive and negative impacts that the opening of an industrial mining operation can have on the its socioeconomic area of influence. In this section we discuss the study's implications for public policy and business strategies, with the goal of contributing to a maximization of benefits and minimization of identified costs.

One of the study's most important results has been to show that a mining operation's costs and benefits (and their intensity or magnitude) depend on the characteristics of the socioeconomic and cultural context into which the operation inserts itself. As a result, in a socioeconomic context, the potential costs and benefits identified, as well as the best practices recommended, are applicable in Inti Raymi and Puquio Norte's areas of influence. The fundamental characteristics of these areas are: origin linked to native cultures (the predominance of western culture notwithstanding); rural communities connected by good highways to urban centers or important cities; marked migration of local populations; and an agrarian-based economy which possesses an important and growing flow of commercial goods.

Potential benefits

Employment and income

Employment is one of the most efficient mechanisms for distributing benefits among rural communities. Employment permits the productive use of the labour force with high levels of productivity and, as a result, income. In addition, the growing importance of information and advanced technology

used in the mining industry provides local workers with opportunities for training and skills acquisition, as well as work discipline. For example, the Inti Raymi sulfide operation provided local workers with education and training to which they would never have had access, otherwise. Finally, high and stable income levels provide workers and their families the means to acquire assets as well as access to new opportunities. This is essential if rural peasant families are to escape the social and economic marginalization to which they are commonly subjected.

In addition to these multiple benefits, other forms of compensatory (or surplus) employment also usually arise, as in the case of Inti Raymi. In such a situation, that policy should be considered part of an efficient benefit-distribution policy rather than a strictly personnel policy.

This study has shown that while employment at the mine has significant impacts on rural communities, affecting a significant portion of the EAP, the multiplier effect of mine salaries primarily occurs at the urban level, especially in cities where the provision of goods and services and a considerable population is concentrated. In the case of Inti Raymi, for example, the multiplier effect in rural communities was practically zero, while in the city of Oruro, each dollar paid by the company became approximately 2.8 dollars in income, benefiting approximately one-fourth of the families residing there.

Infrastructure, mining income and public investment

Since mining operations are located in rural areas with infrastructure deficiencies, the construction of these facilities is another important mechanism for promoting regional development in a mining project's area of social influence. Puquio Norte, for example, required the construction of a 220-kilometer pipeline, which provided an opportunity for the Rural Electrification Cooperative to assume the additional cost of widening the pipeline in order to electrify not only the town of San Ramón but also all of Chiquitanía Norte.

The maximization of benefits derived from the infrastructure works depends on the level of state involvement in their construction and financing. Infrastructure works are commonly public goods that can produce high social benefits that do not correspond to the private sector. For this reason, works initiated exclusively by private sector entities, such as a mining company, do not maximize the collective well being. For example, if the gas pipeline to Puquio Norte had been extended to Trinidad in the department of Beni, the

benefits for the eastern region of the country would have been considerably greater. A work of such magnitude, however, would not only have required widening the pipeline but also nearly doubling its length. Investment in infrastructure works represents an additional cost that can make a mining project less feasible and thus endanger all the other positive effects for the region's development. This situation can be minimized if the state assumes partial or total financing.

In current circumstances in Bolivia, portions of mining royalties or taxes are seldom invested in rural areas contiguous to the mining operation. We suggest incorporating infrastructure works with clear local benefits within the department's budget in relation to royalties or taxes paid.

Local development promotion

Increasingly, mining companies are taking part in the local development process by establishing foundations. Inti Raymi is a pioneering company in this respect. In general, this study found that the Inti Raymi Foundation had positive effects. The most effective programs were those oriented to basic infrastructure development, the provision of basic health and education services, and the formation of social capital. In other words, the most effective programs were those oriented to the provision of goods and public services. Projects geared toward productive ends, which are part of private investment, have had positive impacts but their efficiency and sustainability is debatable.

The study also showed that, notwithstanding the creation of the Inti Raymi Foundation, the company continued to directly address community needs within its area of social influence. Over the long term, this dualistic approach to company-community relations hurt the company's image. A best practice for a socially responsible strategy would be to avoid dualistic actions in the social context. It is evident that entities specializing in social work, such as a foundation, provide the greatest benefits.

Magnitude and sustainability of benefits

This study has shown that population flows will determine the magnitude and sustainability of the benefits from a mining project to its area of social influence. Benefits are diluted or even disappear when they are focused on an area with high emigration levels. In contrast, benefits are heightened in an area receiving migration flows. Thus, mine-sponsored productive diversification will be more effective and sustainable in a migrant-receiving

area, where the multiplier effect of mining-related income is most evident. As such, a diagnosis of general population flows within the area of social influence is important when designing a company's social programs. This analysis should be conducted during the project's environmental and social baseline studies.

Potential costs

Natural resource competition

Mining companies often compete with local communities for natural resources, particularly land and water. For example, Inti Raymi had to compete with its neighbors for natural resources, land, and minerals. One practice that allowed the company to avoid or overcome conflicts with the local community has been compensation, in the form of assets similar to those displaced or, when that was impossible, compensation by an asset whose market value exceeded the value of the displaced asset.

Nevertheless, problems have arisen due to the fact that Inti Raymi established a mechanism for individual negotiation with each one of the community members that sold land. Due to differences in prices among land of similar quality, a few community members have complained to the company, arguing for higher compensation and, in some cases, have initiated legal action. While it would be naïve to deny the existence of opportunistic attitudes aimed at obtaining advantages from the company, it is also evident that the company's approach to negotiation generated mistrust within the community. As a result, land negotiations should be collective or the conditions offered by the company be made public. Transparency is essential to building the trust necessary for conflict-free, company-community relations which can so easily compensate for additional costs.

Environment

This study has shown that in countries like Bolivia, the environmental management of an industrial mining project has two intimately related facets: The technical facet linked to environmental standards and practices applied, and the public facet related to the company's and the industry's image within society. As a result, it is not enough to comply with strict environmental standards or practices; it is also necessary to respond to the public's perception of mining. Both facets merit careful attention from the outset, which will give results in form of community relations based on mutual trust.

In addition to impeccable technical standards, sound environmental management means creating trust and credibility among local communities. We suggest the adoption of ongoing information and consultation policies with local communities, particularly those that feel exposed to risks from mining activities, and certification of a company's environmental programs by a credible third party that inspires confidence in the local communities.

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CHAPTER 3.

Chile: Size Does Matter

*Julio Castillo, José Miguel Sánchez, Verónica Kunze, and Rodrigo Araya*³⁴

Introduction

The main objective of this study is to analyze the relationship between large-scale mining projects and affected local communities in Chile. There are three fundamental dimensions that we will consider: the economy, the environment, and social development.

Our analysis is based on detailed case studies of three mining projects. While the cases selected do not pretend to offer a statistical representation, they present a range of characteristics (in size, geographic location, type of operation, and methods of relating to local communities) that allow us to draw conclusions and lessons applicable to other mining projects. The usefulness of the case studies is not limited to the knowledge of concrete experiences between large mining projects and the community, nonetheless they permit us to propose some “best practices” for future mining projects. These best practices derive from observed “actions” in the cases or “omissions” detected over the course of the study.

The three mining projects analyzed are La Escondida (Region II), La Candelaria (Region III) and Fachinal (Region XI). The first two projects are located in areas with long mining traditions, while the third is where mining has never had much economic importance. In terms of size, Escondida is a mega-project, according to international standards, while Candelaria is a medium-sized operation. Fachinal is a much smaller operation, but one that can nevertheless be considered large-scale mining and which has a significant impact on the area where it is located.

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This study presents the conceptual framework, followed by an exploration of three case studies. We then present a series of conclusions and propose a series of best practices to follow.

Conceptual framework

The objective of this section is to present the conceptual framework and the variables analyzed in the three cases. These variables are grouped together in the areas of the economy; the environment; as well as social and human development capital, and community-company relationships. We use each variable group to analyze the relationships between mining mega-projects and local communities. In addition, we present the methodology used to collect, organize, and interpret information for each case study.

Methodological model

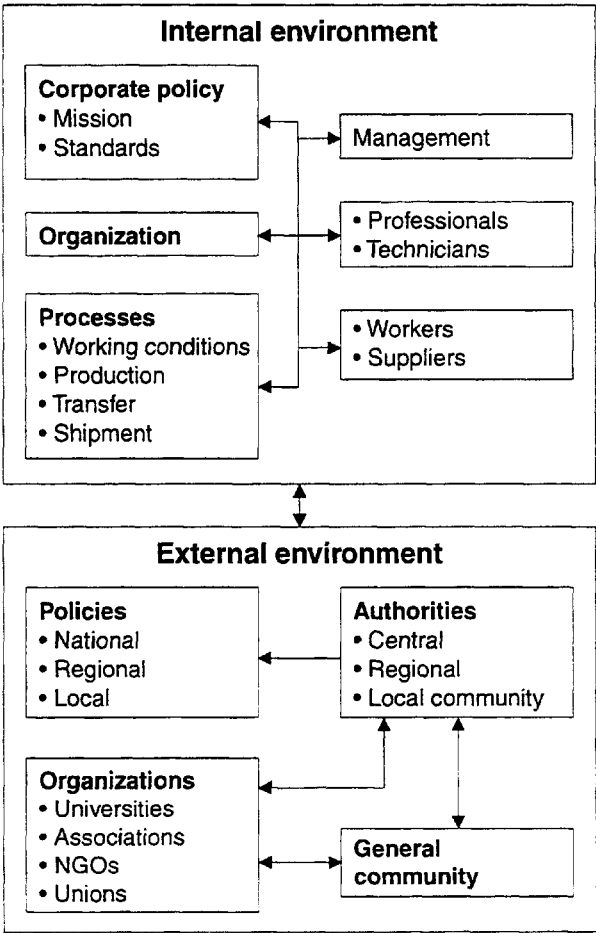
The methodological model used to analyze the dimensions and variables is common to the three case studies. It distinguishes between the corporate context that gives rise to the projects (the internal realm of the companies themselves) and the greater community (the external realm). This schema is presented in Graph 1, which is used to systematize mining companies' "best practices" with regards to both the internal and external realms.

We gathered primary information through qualitative techniques and used secondary information taken from studies conducted by public entities, universities, business organizations, and the mining companies themselves. The qualitative primary information was obtained through in-depth interviews with key informants, such as managers from the three companies, regional mining, labour, and health authorities, Regional Environmental Commission officials, union leaders, NGO and regional association representatives, in addition to university professors and researchers specializing in mining.³⁵

³⁵ The methodology of the In-depth Interview (II) supposes a situation of direct conversation on specific themes proposed in a broad manner by the interviewer. The interviewee is asked for his/her perspectives that emerge during the interview. The interviewer turns over the direction of the conversation to the interviewee, although the interviewer controls the conversation by way of content guidelines. This method enables the argument sequences and emotional positions that structure the conversations to be studied. In particular, the way in which distinct collectives participate in the conversations are studied, with a view to analyzing their experience and social practice. Interviews lasted approximately 20 to 40 minutes.

We will focus on the companies' policies and their impacts on the community. Nevertheless, the information generated by various company officials is contrasted with the visions of other relevant actors from the external realm mentioned earlier.

Figure 1. Internal and external environment of the firm.



Internal context

The companies' internal realm is composed of a series of institutional relations that comprise a corporate model. It determines the way in which the company defines its corporate policy, organization, and the processes between the different actors within the company.

The first component of a company's internal realm is its corporate policy, which is a mental model shared by company representatives and understood as a series of corporate decisions that characterize the institution's culture. This model defines the corporate guidelines for "how

things are done.” Two important elements of a corporate policy are the mission statement and standards that the company establishes or assumes.

The mission statement outlines the company’s corporate model and defines its reason for being. It provides the guidelines that are translated into policies and strategies with regards to the company’s internal and external realms.

Safety standards help define the quality of the workplace by establishing the correct operating procedures for activities within the company. These standards can be based on international norms, such as ISO 9000 and 14000, which companies can assume in order to create safe working conditions.

A company’s “organization” refers to the definition of functions and the rights and obligations associated with each function. Organization allows companies to establish each person’s responsibilities in order to avoid overlap or omissions in certain areas. For example, it is important that the company define which organizational division is in charge of information generation and distribution, both internal and external.

A company’s “processes” refer to conditions under which work is carried out, production takes place, materials are moved and shipped, etc. The company defines guidelines for how both direct employees and subcontractors should perform these processes. In some cases, companies put more emphasis on guidelines for direct employees, while subcontractors and suppliers (in the areas of exploration or food service) are not subject to the company’s internal guidelines. This can generate inconveniences, especially in terms of community relations. Thus, it is important that everyone associated with the company be held to and understand its guidelines.

External realm

The external realm in which a company operates is often heterogeneous in terms of its organizational characteristics, complexity and level of participation. In such cases, companies must adapt to the structured discourses expressed in national, regional and local policies, but should also incorporate the opinions and impressions held by other, less organized members of the community. Likewise, in terms of organization, companies relate with highly organized social actors such as national, regional, and local political authorities, universities, business associations, workers associations, NGOs, producer confederations, and social organizations — as well as with the community in general.

Given the complexity of the external realm, companies should design strategies for optimal relations with each of the distinct social actors. An important element is the information policy toward the community, which determines the level of consultation with and participation of each community actor with respect to the mining project. Another important element is the distribution of benefits within the community, which range from taxes and royalties to sporadic petitions from less organized groups. It is necessary to distinguish between short- and long-term actions that a company can undertake regarding community benefits.

Issues such as training, education, health, local development, and environmental impacts are important in the external realm. Companies should define their role in each of these areas, as well as their corresponding rights and obligations. They should define their level of involvement in each of the aforementioned themes, which can range from a commitment to comply with the applicable laws to full participation in local or regional bodies. The type of commitment made has strong implications for the definition of short- and long-term policies.

Variables analyzed

In this section, we present the variables analyzed in each case study, which are classified as economic variables; environmental variables; social and human capital variables; and variables in community-company relations.

Economic variables

Economic variables quantify the economic impact of the mining project in terms of its contribution to the economic development of the host region, as well as the direct economic benefits that can accrue to the country, such as foreign exchange earnings, employment, investment, trade balance, and technological support.

Environmental variables

The environmental policies of the companies in our three case studies allow us to identify the practices they develop as part of the relations they establish with the surrounding area.

The safety and quality standards variable refers to the designs, controls, evaluations and actions that companies establish in order to mitigate the impacts of productive processes such as mineral extraction and

processing. For our objectives, it is important to define these standards and identify the potential best practices that the companies employ in this area.

Social and human capital

Socio-cultural dimension of the project

The socio-cultural dimension of a mining project refers to the impact the project has on variables such as health, education and training, work shifts, community relations, communication strategy, and citizen participation.

The socio-cultural impact of a mining mega-project on the community has been one of the most relevant issues for environmental authorities, community organizations, and the mining industry. From the exploration stage to the mine's closure and abandonment, there are diverse points of contact and potential conflict between communities and mining interests with regards to social, socioeconomic, and environmental issues.

In northern Chile, mining is without a doubt the most important economic activity. The history of mining goes back to the first settlements recorded in the area. This tradition has been a central component of regional identity. The presence of international companies in the first decades of the century had a considerable impact on the region's history. Workers' movements and political parties appeared as early strategies of establishing community counterweights to the presence of mining mega-projects. Thus, there are historical references to the relations between mega-projects and local communities that are present in the collective memory. This long history has produced resistance to the presence of foreign mining companies.³⁶

Health

There are various dimensions to relation between health and mining, which are important to distinguish.

An analysis of the issue of health within a mining company requires the identification of company strategies for addressing problems related to worker health, stress management, obesity, alcohol and drug use, sexually transmitted diseases, and accidents. The common denominator among these strategies is that the company has control over detecting and neutralizing the

³⁶ There are several phases to the presence of foreign companies: first the Spanish, then the British (both for nitrates), later the North Americans (copper mining) and currently multinational companies (mostly copper).

effects of mining work on the health of its workers via the design of preventative plans and programs.

The health and community theme refers to the impact that large mining projects can have on the health of the general population of a specific community. At this level, issues such as prostitution, sexually transmitted diseases, alcoholism and drug use are significant. Another important aspect of the relationships between large mining projects and health is the benefits that mining companies can provide to local communities.

Education and training

Education and training have become recurring themes within discussions of the modern mining industry. The industry's general shift to clean production technology has produced a strong demand for a skilled, multifunctional work force for its diverse operations. The country's educational centers have not necessarily produced workers who can meet this demand. Faced with this reality, the companies in this study have developed diverse strategies for the formation of the work force their operations require.

Companies can organize work shifts in different ways, from a normal work shift in which the worker returns home each day (in cases where the mine is located close to town) to 20 or 10-day stints that oblige the worker to remain in camps adjacent to the mine. There are pros and cons to each of these schemes for the company, workers and their families. In many cases, the mine's remote geographic location requires prolonged stays at the project site in order to maintain continuous exploitation. However, long stays at camp generate a series of problems for workers and their families that are difficult to evaluate.

Community-company relations

The community's perception

Traditionally, good relations with the local community have not been an important part of the mining culture. For its part, the local community tends to view mining activities as isolated and oriented toward a purely economic end. The community is apprehensive about being excluded from the benefits produced by the mining project and requires information about the status of the project.

In turn, the mining industry is conscious that its activities are costly, risky and require huge investments in exploration in order to determine if a

deposit is worth exploiting. Given the uncertainty of success, the mining company has little interest in establishing relations with the community until the project is well underway. In this scenario, community relations have traditionally not been a company's first priority.

Thus, a situation of fear and mistrust arises from the lack of communication and comprehension between the mining industry and the community.

A community's response to mining company interests is shaped by mining's historic legacy. Thus, in areas with a long mining tradition, such as northern Chile, communities' expectations are different from those in areas where this tradition does not exist, such as the extreme southern region of the country.

Strategic communication with the community

A company's communication strategy is key to understanding certain aspects of its relations with the community. In this study, we examine the ways the three mining companies approached such communications from the beginning of operations.

Citizen participation

Citizen participation refers to the degree of involvement by the general public or community organizations in the mining project's development. Participation can vary depending on the different stages of the mining operation. It is important to understand each company's strategies with respect to citizen participation in order to determine whether it really exists.

Integration of company employees in the community

Another important variable in community-company relations is the integration of employees and workers in the cities and towns near the mine. The way the company approaches this integration can be a determining factor in how the community perceives the project.

Community benefits

The variable of community benefits refers to the positive impacts from the mining companies or alliances established with other firms that directly benefit the community.

The Case of La Escondida Mining Company

Description of the project

On March 15, 1989, construction began on the La Escondida mining project. The first shipments of copper concentrate began on December 3, 1990. Exploration activities began in 1978 and lasted four years, after which ensued a period of technical studies and the search for financing.

La Escondida is located in the Atacama desert 3 000 meters above sea level, to the southeast of Antofagasta and 240 kilometers south of Chuquicamata. It is the third-largest copper deposit in the world after Chuquicamata (Chile) and Bingham Canyon (USA). The mine is owned by BHP-UTAH (57.5 percent), Río Tinto of London (30 percent), Jeco of Japan lead by Mitsubishi (10 percent) and the International Finance Corporation (2.5 percent).

The mineral deposit has reserves of 1.8 billion tonnes with an average grade of 1.59 percent copper. Planning for the mine considered the utilization of 662 million tonnes with an average copper grade of 2.12 percent. Initially, the mine's lifespan was estimated at 52 years from the start of production. Nevertheless, new investments have increased production capacity significantly and the lifespan is now estimated at 34 years.

Project infrastructure includes a well field 25 kilometers east of Escondida in the Punta Negra salt flats, with a water supply system capable of providing 65 000 GPM at an average of 12 000 GPM at maximum capacity. This salt water is treated by reverse osmosis for consumption. Additional infrastructure includes a high-voltage energy line connected to SING, a 165-kilometer mineral pipeline for transporting concentrate from the plant to the port of Coloso and a filtration plant to eliminate water from the concentrate. The port facility at Coloso, located 15 kilometers south of Antofagasta, can house ships of up to 45 000 DWT.

Economic variables

In recent years Region II has experienced a series of social and economic changes, to which La Escondida mine has contributed significantly. Nevertheless, it is difficult to isolate those impacts directly attributable to the mine. This is because various mining companies have been operating in the region simultaneously with La Escondida.

In 1999, Region II had an estimated population of 461 300 inhabitants and a population density of 3.7 inhabitants per square kilometer. The region's

economy is based on mining, which generates close to 59 percent of the gross regional product. Copper is the region's principal product, representing between 52 percent and 55 percent of national copper production.

Production

Within the region, GDP per capita rose from US \$2 923 in 1985 to US \$11 420 in 1996, a 290 percent increase. Meanwhile, GDP per capita for the entire country rose from US \$1 360 to US \$4 994 in the same period, an increase of approximately 260 percent.

Region II has been one of the country's fastest growing regions during the last decade. Between 1988 and 1997, while the country grew at an average rate of 8 percent per year, Region II grew at a rate of 9.6 percent. The mining sector grew 71.6 percent in the region for the same period, while the national average for mining sector growth was 43.2 percent. While these figures are not solely attributable to Escondida, the company has had a significant influence.

The company's production levels, for both concentrate and cathodes, are represented in Table 1.

The production of copper concentrate (41.4 percent fine copper content) in 1997 was 2 098 256 tonnes. National copper production in 1998 was approximately 3.7 million metric tonnes. Escondida contributed 23 percent of national copper production for that year. Its average share from 1994 to 1998 was also 23 percent. Thus we can determine that Escondida's contribution to the national GDP was on average approximately 2 percent between 1991 and 1996 (Escondida Mining Company 1997a).

Table 1. Escondida Production: 1990–1998.

| Year | Metric tonnes | | |
|------|---------------|----------|---------|
| | Concentrate | Cathodes | Total |
| 1990 | 8 900 | 0 | 8 900 |
| 1991 | 298 386 | 0 | 298 386 |
| 1992 | 336 632 | 0 | 336 632 |
| 1993 | 388 756 | 0 | 388 756 |
| 1994 | 481 249 | 2 382 | 483 631 |
| 1995 | 438 831 | 28 083 | 466 914 |
| 1996 | 792 272 | 49 089 | 841 361 |
| 1997 | 868 678 | 64 021 | 932 699 |
| 1998 | 829 495 | 47 418 | 876 913 |

Source: Escondida Mining Company.

In 1997 copper production in Region II was approximately 2 million metric tonnes and Escondida's contribution to regional copper production was 55 percent for this year. This means that Escondida contributed to 34 percent of the regional GDP between 1991 and 1996 (Escondida Mining Company 1997a). Meanwhile, 54 percent of Region II's GDP came from the mining sector in general (Aroca 1999).

Investment

Foreign investment in the region during the period 1990–1998 was US \$5.33 billion, or approximately 20 percent of the national total, almost US \$27 billion. Approximately US \$11 billion correspond specifically to mining investments during this period, in which Escondida invested nearly US \$2.3 billion. Thus Escondida's impact on foreign investment was 8.9 percent at the national level, 21 percent at the regional level and 44.4 percent within the mining sector.

Exports

Escondida's exports quadrupled between 1991 and 1998, from US \$466 million to US \$1.96 billion. In 1997, exports from Region II represented 30.2 percent of the total national exports. For that same year, Escondida represented 30.3 percent of exports from Region II, 18.3 percent of national mineral exports and 9.1 percent of the country's total exports.

Taxes paid

It is possible to determine Escondida's direct contribution to the Chilean government by looking at the destinations of national and regional budget allocations. Contributions to the national budget are related to income tax payments. Tax contributions to the region are related to payments for land rights and permits related to the Escondida operation.

Between 1990 and 1998, the company paid US \$1.19 billion in income taxes, of which US \$253 million were paid in 1996, US \$331 million in 1997, and US \$111 million in 1998. The decrease in taxes paid for 1998 reflects lower incomes due to the drop in world copper prices. The 1996 value represents 25.6 percent of total income taxes paid by the mining sector³⁷ and 10.5 percent of total income taxes collected by the state.

³⁷ Estimate by Gémines Consulting using a representative sample of mining sector companies.

Table 2. Destination of Escondida's regional payments (US \$).

| Payment destination | National | Regional | Total | % |
|---------------------|----------|-----------|-----------|--------|
| National budget | 331 000 | | 331 000 | 12.9% |
| FNDR | | 1 260 000 | 1 260 000 | 49.2% |
| Municipal | | 970 000 | 970 000 | 37.9% |
| Total | 331 000 | 2 230 000 | 2 561 000 | 100.0% |
| Percent | 12.9% | 87.1% | 100.0% | |

Source: Escondida Mining Company.

In addition, Escondida made periodic payments of surface fees and permits, which are necessary for the normal functioning of operations. These include mining patents, real estate contributions, purchases, obligations, leases, patents, rights, and municipal circulation permits.

These payments go to the state budget according to the distribution represented in Table 2, which shows Escondida's contribution to the estimated budget for the year 1997. According to the table, 87 percent of payments for land rights and permits go the regional budget, whether through the National Fund for Regional Development (FNDR) or the municipalities.³⁸

Escondida's contribution to the regional budget is significant, considering that for 1997, Escondida made payments of US \$1.26 million that went to the FNDR for Region II, which represented 20 percent of the total contribution of mining patent payments and more than 6 percent of the fund's total.

Employment

Escondida directly employs approximately 2 000 permanent workers, of whom 80 percent are from Region II, 11 percent from Regions I and III, with only 9 percent being from Santiago and other regions in Chile.

Using an input-product matrix for Region II, Aroca (1999) estimated the employment multiplier for Escondida. Considering subcontractors as service providers and not as direct Escondida workers, and without considering the effect of salaries and wages paid to workers in the region, this author arrives at a multiplier of 3.1. In other words, for each worker hired by Escondida in the region, 3.1 additional workers are hired. The employment multiplier for the rest of the regional mining sector is only 1.04.

³⁸ In this case, corresponding are payments made to the Illustrious Municipality of Antofagasta.

By assuming that all wages and salaries are spent in the region and adding a line for these remunerations and a column for regional consumption to the input-product matrix, the author obtains a multiplier of 5.7. In other words, for every worker hired by Escondida, 5.7 additional workers are hired in the region once it is taken into account that the workers — whether working in the mine itself, subcontracted firms, or suppliers to the mine — will spend some of the money they earn and generate more jobs. This tends to overestimate the effects on employment, since not all salaries and wages are spent in the region.

This same calculation for the rest of the regional mining sector produces a multiplier of 1.76 workers for every worker hired in the sector. The difference between figures obtained for Escondida is due to the different management systems used by various companies in the sector. While Escondida subcontracts many activities associated with the project operations, other companies in the region subcontract few activities. As a result, they have more personnel directly working at the operation. In sum, total employment (direct and indirect) in the mining sector represents around 9 percent of the region's total employment, without considering those jobs at projects related to investment and construction.

By using the multiplier of 5.7 indirect jobs for each job in the mine, it is possible to estimate the indirect effect that the salaries received by the workers and management in the mine. In Table 3, the direct, indirect, and total expenditure in the region resulting from the mine is calculated. As noted earlier, it is assumed that all expenditures are made in the region, so these estimates can be considered upper-bound impacts.

In Table 3, the direct impact is the expenditure of the mine workers, while the indirect impact is the expenditure of those receiving employment indirectly due to the mine. The income multiplier is total income generated in the region divided by the income earned by the mine workers and management. Note that it is different from the employment multiplier as: it is

Table 3. Impacts generated by the incomes received by workers and management in Escondida (US \$; 1999).

| | Workers | Management | Total |
|-----------------------------|-------------|-------------|---------------|
| Income | 148 059 780 | 110 543 939 | 258 603 719 |
| Direct impact | 120 520 661 | 87 440 256 | 207 960 917 |
| Indirect impact | 686 967 769 | 498 409 457 | 1 185 377 227 |
| Direct plus indirect impact | 807 488 431 | 585 849 713 | 1 393 338 143 |
| Employment multiplier | 5.7 | 5.7 | 5.7 |
| Income multiplier | 5.45 | 5.30 | 5.39 |

lower because some money is saved and, hence, not recycled; it is higher as it includes the first round of expenditures (by the mine workers), while the employment multiplier is only the additional jobs and thus does not include the mine workers jobs; and it can move in either direction if non-mine workers earn on average different salaries than mine workers. In this case, (the usual one), it is lower because mine workers earn more, (i.e., the same expenditure will create more jobs resulting in a relatively greater effect on the employment multiplier).

Environmental variables

Company policy

Environmental concerns are prominent in the company's mission statement, which also includes aspects of the internal realm, such as safety, the workplace environment, human relations needs and worker well-being. Attention to these areas is considered as a fundamental part of its mission and corporate principals.

In the external realm, the company's mission statement establishes the responsibility to constantly inform local authorities, especially with regard to the environment. From our conversations with company representatives, we could detect a corporate attitude recognizing the need to anticipate possible environmental events, which are approached through the environmental impact studies conducted at each phase or step the company takes.

Another principal that characterizes Escondida's mission with regard to the external realm is the rapid response to any occurrence that could affect the company. For example, it hired an expert in a marine species that was supposedly at risk from activities performed in the port of Coloso, who conducted a thorough investigative study. Something similar happened in the case of Andean flamingos, which are found in the Punta Negra salt flats, which are the object of constant study. An element of this best practice with the external realm is the policy of company relations with the university and academic worlds, which admit the company into a scientific society dedicated to investigation.

Since the start of operations, Escondida has complied with all health and safety regulations in the country and with the corporate policies of the companies operating the mine. Escondida conducted an environmental impact study before this was required or regulated under Chilean law, and has introduced clean technologies to its productive processes.

To comply with its environmental programs, the company has signed cooperation agreements with different national public agencies, including SAG (Agriculture and Livestock Service) and CONAF (National Forestry Corporation). In addition, Escondida is a member of the National Oceanographic Committee, the Chilean Society of Sea Sciences, and other organizations having to do with environmental protection (Escondida Mining Company 1998).

Nevertheless, the local population frequently expressed concerns about possible problems stemming from company activities. For example, coastal residents as well as professors at the University of Antofagasta mentioned in interviews that the company is causing pollution problems in Coloso Bay. When we asked the company's environmental manager about this concern, he said the company was informed about the matter and had conducted the relevant studies in order to control possible contamination problems in the bay. Study results did not find contamination problems.

Water use is another issue that sparks a certain level of controversy. Since the mine is located in a desert region, water must be obtained from groundwater tables below the salt flats by way of 120-foot wells, on average. Again, academics from the University of Antofagasta expressed concern during the course of our interviews about groundwater extraction. They worry that since water table recharge takes years, over the long term, water levels in the salt flats could drop drastically, adversely affecting the area's flora and fauna.

Nevertheless, the results of studies conducted by the company do not anticipate the existence of adverse effects on local flora and fauna. In addition, the company is very conscious of the region's water scarcity and has taken all the necessary measures to maximize water recycling, such as reusing tailings water in the process. The tailings pond has a system to reduce surface area and therefore the loss of water through evaporation, which maximizes the amount of water recycled.³⁹ As part of its environmental program, Escondida controls groundwater levels to ensure there are no negative effects on the ecosystems surrounding the Punta Negra salt flats, where the company has its well field.

Given the project's long lifespan, closure studies have not yet been conducted, although in the future this will be an important issue in terms of restoring the environment to its normal conditions.

³⁹ The company's water recuperation system has allowed for a reduction in the operation's water needs such that 75% of the water needed for the milling process is recycled.

It is important to note that Escondida recently certified its Coloso port facilities under the ISO 14 000 system, which certifies the existence of an environmental management system.

Safety and quality standards

Escondida's environmental management system allows company personnel to conduct inspections and evaluations, as well as implement mitigation measures. The system provides for both internal and external audits. Some of the company's main environmental considerations include tailings management, dust control at the mine, hazardous waste management, and the continuous and permanent monitoring of the marine environment at the port facilities in Coloso.

Social and human capital

Health

Internal company health

Escondida has implemented an integral health plan, which includes a pre-employment exam and an annual preventative medical exam. The annual exams are voluntary and provide company employees with the means to discover potential pathologies. In addition, the company has a fully equipped first-aid center with qualified medical personnel to manage emergencies and health problems that can occur in camp. This allows for the timely diagnosis and effective treatment of common illnesses.

With regard to work-related stress, Escondida's work shifts are organized according to the "4x4 system," explained more fully later. The system avoids the adverse health effects of remaining at high altitude for prolonged periods of time.

Obesity problems stem from two main causes: the lack of healthy eating habits among rural workers or "old timers," and the over-consumption of products from the cafeteria, especially during the first days when new workers are getting used to their surroundings. Faced with this, the company has obesity prevention and control programs, which are complemented with sports and recreational facilities inside the camp comparable to the best and most complete in the region.

The company treats other, more sensitive health issues with special care. The introduction of drugs and alcohol to camp is controlled by an electronic detection system. If such substances are detected, the worker is

punished and could be subject to dismissal. The existence of sexually transmitted diseases, including AIDS, is verified by annual preventative medical exams, although the company does not yet have any specific policy in place to address the issue.

Work shift

As we mentioned earlier, Escondida has a “4x4” work shift system. In other words, workers spend four days at the mine and four days at home. During the mine stay, workers have 12-hour shifts, from 8 a.m. to 8 p.m., or from 8 p.m. to 8 a.m. The company maintains that its analysis shows this system is better for workers in terms of personal health and family relations. In the event that problems arise from the work scheme, the company consults and converses directly with the affected worker. According to the Labour Secretariat for Region II, the 4x4 work scheme does not constitute a problem.

Community health benefits

One of the areas in which Escondida has been very deeply involved is precisely in the area of health benefits for the community. However, all the actions related to this area have not been done directly by the company but through the Escondida Foundation which is described below. In fact, community health programs form the largest share of its budget. Among the programs financed by the foundation are: implementation of an emergency primary health service, contest for research projects on cancer in Region II, development of a children’s oncology unit at the regional hospital of Antofagasta, hospitality housing for oncology patients, and an early cancer detection program.

Education and training

Training

Due to the lack of training centers and qualified technicians in Region II, Escondida created a professional institute in Antofagasta to provide training and develop required skills. In January 1997, the company contracted the services of the British Columbia Institute of Technology (BCIT) to oversee technician training. The company built a 2 200 square meter facility to house the institute, which together with other necessary components required a total investment of US \$8 million.

Since training began in January 1997, 307 technicians have completed the first of four stages in the heavy machinery mechanic, plant mechanic, and electrician training programs. It is estimated that all 560 participants will

complete their training and aptitude evaluations in order to reach the level of master of trades (*maestro de oficios*) at the end of 2002.

In addition, Escondida implemented an extensive career development program for company personnel in April 1998. The company hired specialized personnel to conduct trainings and develop a resources system to support the respective activities. Moreover, utilizing the SENCE (National Training and Employment Service) Antofagasta facilities, Escondida places first (SENCE 1996) in terms of courses offered, personnel trained and amount invested. In addition to the courses authorized by SENCE, this effort involves training programs specific to each employee. In total, Escondida invested US \$2.105 million in diverse training programs through 1998, the equivalent of approximately US \$1 000 per person.

Education

Escondida created the Escondida Educational Foundation, which runs a four-year apprenticeship program in which 70 percent of the skills are learned within the company, according to standards set by Canadian specialists. Currently, the company is creating an educational establishment in the area north of Antofagasta.

Through the Escondida Foundation, the company has addressed the issue of high-school graduates' technical skills and work attitudes. The foundation uses tests and rigorous work orientation programs, which, in addition to providing training, strengthen personal attitudes regarding work. Certain basic values are addressed, such as punctuality, responsibility, and the ability to work as a team. The Escondida Foundation also seeks to address the gap between high-school level technical formation, which is characterized by a lack of direct experience in the company, few practical skills, and many lecture classes, and university or professional institute training, which bestows a professional title but also low skill levels in a given specialization.

The Escondida mine has also clearly contributed to an improvement in the capacities of local suppliers. These small- and medium-sized firms have benefited from training programs oriented at improving their service quality as suppliers to the mine.

With respect to the themes of education and its relation to the community, the opinions that we collected generally agree that there is a generalized demand for educational services starting from the arrival of the mining mega-projects such as Escondida. In particular, there is a demand for private schools (*colegios particulares pagados*), due to the arrival of workers

from outside the region who look for quality services. There is also a demand for these schools on the part of local mine workers whose high salaries allow them to access these services. In addition, these workers value higher education, which they desire for their children in order to consolidate their social status.

The Antofagasta International School is an Escondida school that initially offered correspondence courses through the home countries of the mine owners. The school had 20 students from Escondida and 20 from Zaldívar. Like the mine, the school is run by subcontractors and is currently administrated by ISS, a US company. The school offers levels 1 through 8 with curriculum similar to that in the United States. Mid-level students still study by correspondence. Almost all of the professors are from the United States and Canada, while there are only two Chilean instructors. The school offers an international bachelor's degree. Though the Ministry of Education (MINEDUC) does not recognize it, the school is trying to obtain certification in order to incorporate Chilean students. One of the biggest problems faced by Chilean executives moving to Antofagasta is the lack of quality schools.

Community-company relations

Community perceptions

The community's perception is heavily influenced by Antofagasta's current economic situation. The city's economy has grown explosively in recent years, primarily due to large mining-related investments. The population views Escondida as the milestone that marked the beginning of the growth period. Economic growth is evident in the increasing number of companies offering subsidiary mining-related services, the arrival of national and international hotel chains, commercial store chains and travel agents with high national and international demand, as well as population growth, the construction boom and an increase in consumption and debt.

There are two points of view regarding Escondida's impact. Local authorities and company directors consider the city's economic growth a result of the mining operation. But small- and mid-sized business owners feel excluded from the benefits of economic growth as a result of Escondida's high technological and environmental standards. The latter sector tends to feel that resources are not retained or obtained in the optimal manner, which obliges them to engage in productive re-engineering in order to satisfy the potential demand for services associated with mining and thus access the highest subcontractor links.

The region's over-dependence on mining, together with the temporary nature of a mining economy, result in moderate forecasts for the future. Residents have a strongly ingrained vision of the cyclical nature of the regional economy, while the past experience of the rise and fall of nitrate mining is ever-present to successfully contain excess enthusiasm.

Strategic communication with the community

Escondida's organizational structure consists of a Corporate Affairs division and, within this, a Communications and External Affairs department, which is in charge of community relations. This department develops the communications policy oriented toward processing information related to the mine's impact on national and regional development. The company has contracted local universities to measure the project's impact on the local community, especially in socioeconomic terms.

Initially, development of the cathodes plant in Coloso sparked fierce opposition by organized community groups, especially local environmental groups backed by national organizations. Faced with this pressure, Escondida adopted a strategy of informing the community through local media and organizing informational meetings with various groups. The meetings were used to inform participants about the company's safety measures and environmental risk and impact analyses. According to company officials, this strategy managed to reverse the situation and win over groups that originally opposed the project.

The company's communication strategy also includes project site visits open to the community.

Citizen participation

Company officials say that even before the Environmental Law regulations were published, they provided information concerning every new project in an official manner, first to the authorities and later to interest groups such as the Lion's Club, the Rotary Club, the Red Cross, local universities, small business groups, and the Businessperson's Association.

Insertion of workers and employees in the community

Escondida has a housing plan that builds new houses for workers and employees, available through a finance plan with low-interest loans. As part of the company's policy, the houses or apartments are built in different parts of Antofagasta in order to avoid the creation of a "miners' ghetto" and to promote the natural insertion of company employees in the community.

In the southern part of Antofagasta is an area known as the Southern Gardens, a modern gated community on the south side of the University of Antofagasta planned as a *barrio alto* with lawns, small plazas and gardens. Residents are business people, wealthy professionals and Escondida employees.

According to articles in the Antofagasta newspaper *El Mercurio*, in the last five years Antofagasta has become a real-estate paradise due to the region's economic boom. The arrival of mining companies and their subcontractors has generated a floating population that demands a large quantity of real estate.

Community benefits

Escondida Foundation

One of the company's primary strategies for establishing links with the local community was the creation of the Escondida Foundation. The idea was approved in 1994 and began operations in 1996. It represents the way the company chose to pursue the increased effectiveness of its community relations program as well as more effective social actions both for the poor and extremely poor sectors.

The foundation's principal objectives are centered on the areas of education, health, and technology. Projects presented to the foundation must comply with a series of requirements regarding formulation, programming, costs, and management before they are submitted to the board of directors for consideration. The board of directors consists of 11 people, five of whom are distinguished members of the community at the national and regional levels.

The foundation's programs focus on five principal areas, each of which has its own specific projects: micro-enterprise, labour insertion, educational support, health support, and development funds programs.

The foundation avoids assistentialism, aiming instead to train people to resolve their own problems, a clear indication of their long-term objective. The foundation's main strategy is to form teams or strategic alliances with other organizations in its program areas. From its founding as a non-profit institution, the majority of the foundation's resources have been oriented toward the poor and extremely poor sectors, as is evident in the list of current or completed projects that received support. The foundation's development programs are geared to job creation and access, as well as quality of life issues, which constitute the backbone of its objectives.

The fishermen of Coloso Bay (the copper concentrate port) constitute another community group that has benefited directly from the Escondida mining company. The company financed the construction of market stalls, public bathrooms, road improvement, drinking water tanks and the group's office headquarters. The company also finances school transportation for children and drinking water.

Escondida has collaborated with local universities and the Antofagasta Industrial School on cultural, educational, sports, and recreational activities. It has organized art and literary activities with secondary schools, and sponsors Antofagasta Day, the municipal orchestra's concert series, and the professional football (soccer) team, Deportes Antofagasta.

Productive Development Corporation

An interesting way in which the company builds relations with the local community is through the Productive Development Corporation, which began as a regional government initiative in accordance with its development strategy. One of the corporation's central objectives is to link the regional development strategy to large companies and universities, to foster joint public-private efforts.

The informed community (technicians, academics and local authorities) views this corporation as an important initiative for long-term regional development. The corporation seeks to strengthen the capacities of small- and medium-sized companies associated with the mining industry. Once installed, these capacities become part of the region's human capital. Incorporating the concept of a "productive association" and encourages measures to promote it are seen as important for strengthening the abilities of small businesses to compete and capture resources.

The regional government, the mining companies of Escondida and Codelco and other mid-sized firms participate in the Productive Development Corporation. Important electric and sanitary companies from the region are also involved, as well as the University of Antofagasta and Northern Catholic University. The corporation's composition is similar to that known as the "strategic peak," which brings together the principal regional actors involved in development. The corporation's associates consider Escondida's participation as very important, both in terms of start-up and subsequent maintenance. Escondida's support of the Productive Development Corporation is part of its policy for linking the company with the community.

The Case of the Candelaria Mining Company

Description of the project

The Candelaria mining project was inaugurated in March 1995. The Phelps Dodge Corporation, the main owner of the Candelaria mine, began explorations in 1983 and finished in 1987. The mine is located 9 kilometers south of Tierra Amarilla and 20 kilometers south of Copiapó in Region III, at approximately 650 meters above sea level. The operation extends over approximately 4 000 hectares that include the mine, the concentrator, the tailings dam and other facilities. The Candelaria Mining Company is owned by Phelps Dodge (80 percent) and a consortium made up of the Japanese companies Sumitomo Metal Mining and Sumitomo Corporation (20 percent). Estimated mineral reserves are 366 million tonnes with a grade of 1.29 percent, which at an extraction rate of 50 million tonnes per year should last 34 years.

The water needs of the mine are met by five wells in the town of Alcaparrosa. Each is between 60 and 100 meters deep, more than sufficient to reach the groundwater table that lies 30 meters below the surface, on average. The concentrator consumes approximately 95 percent of the water used in the mining operation, or some 2 800 cubic meters per hour. Eighty-five percent of the water is recuperated, meaning that fresh water consumption is about 130 liters per second.

The concentrate (with an approximately 9 percent humidity level) is transported by truck to the port of Padrones, located opposite Caldera Bay on Padrones Point about four kilometers south of the city center. This is where the company built the Clean Mechanized Port, where the concentrate is prepared for shipment. Construction began in August 1993 and the facility was inaugurated on 3 February 1995. Preparation capacity is 1 200 tonnes per hour, which means that it takes two or three days output to fill a 35 000-tonne capacity ship.

Economic variables

Mining is the principal economic activity in Region III, which has an estimated population of 269 100 inhabitants and a population density of 3.6 inhabitants per square kilometer. Production of copper, gold, silver and iron represent 41 percent of the gross regional product. Agriculture accounts for 17 percent, especially the production of table grapes for export in the Copiapó and Huasco valleys. Fishing and construction have emerged as

important activities in the last several years. During recent years the growth of Region III (Atacama) has been strongly influenced by the arrival of large-scale mining projects, principally the Candelaria project.

Production

During 1993–1995, Atacama's gross regional product grew at an annual average rate of 11.5 percent, which was significantly higher than the average national growth rate of 6.3 percent. Indeed, in 1995, when Candelaria began Phase 1 of production, Atacama's gross regional production grew at a rate of almost 24 percent. In the same year, mining accounted for 11.3 percent of the gross regional product.

Candelaria's production is presented in Table 4.

In 1997, national copper production was nearly 3.7 million metric tonnes. Candelaria's share of national copper production was 5.8 percent for that year. Between 1994 and 1998, Candelaria accounted for an average of 4.4 percent of national copper production.

Region III produced approximately 380 000 metric tonnes of copper in 1997, 41 percent of which was attributable to Candelaria. Its average contribution to regional production for the years 1994 to 1997 was 36 percent. Finally, copper mining in Region III accounted for 10.8 percent of national copper production.

Investment

With an investment of more than US \$565 million during Phase I, the Candelaria mining project is the largest investment in Atacama in the last several decades. The project represents 48 percent of the total foreign investment in the region's mining industry realized via DL 600 between 1974 and 1997 and 5 percent of the country's total foreign investment under the same system for the same period. In 1997, the company's accumulated

Table 4. Candelaria production: 1994–1998.

| Year | Concentrate (mt) | Silver (oz) | Gold (oz) |
|------|------------------|-------------|-----------|
| 1994 | 30 900 | 119.4 | 27.4 |
| 1995 | 150 300 | 981.2 | 97.8 |
| 1996 | 136 800 | 478.6 | 82.6 |
| 1997 | 155 700 | 527* | 76* |
| 1998 | 215 000 | 616* | 69* |

Source: Candelaria Mining Company.

* Estimated figures.

investment reached approximately US \$902 million through the end of Phase II of the project, which increased annual average production to 175 000 tonnes of high-grade copper. At these production rates, the project lifespan dropped to 17 years.

Total foreign investment in the region for the period 1990–1998 was approximately US \$1.3 billion, of which 68 percent came from the Candelaria project. At the national level, total foreign investment for the same period was nearly US \$27 billion, of which 3.4 percent was attributable to Candelaria. Finally, Candelaria's contribution to total foreign mining investments is 8 percent. Based on these indicators, we can conclude that Candelaria has a significant regional impact.

Exports

In 1998, Candelaria exported 206 000 metric tonnes of high grade copper, which represents approximately 39 percent of total regional exports and 6 percent of national mineral exports.

Employment

Originally, Candelaria employed 650 workers, which increased to about 900 workers as the project expanded. In 1997, in addition to the 791 workers employed by Candelaria, an additional 435 workers had permanent jobs at the company's subcontractors. Currently, there are 869 direct employees, of which approximately 82 percent hail from Region III. Meanwhile, there are 450 indirect workers, of which 95 percent come from Region III. These numbers represent approximately 4 percent of the work force in Region III.

In order to analyze the indirect effects on the local economy of the salaries received by the workers and management at Candelaria, we used the multiplier for the mining sector estimated by the Faculty of Economics and Administration of the Catholic University of the North. (See Table 5.) According to this study, for each worker employed by a mining firm in Chile, approximately 1.76 indirect jobs are generated on the assumption that all of the income is spent in the region. We will use this indicator to get an order of magnitude of the indirect employment and income effects of the mine, keeping in mind that it is a general multiplier and not specific to Candelaria.

Table 5. Direct and indirect impacts generated by the income received by the workers and management of Candelaria (US \$) 1999.

| | Workers | Management | Total |
|-----------------------------|-------------|------------|-------------|
| Income | 58 951 768 | 31 030 046 | 89 981 814 |
| Direct impact | 47 703 770 | 24 405 131 | 72 108 901 |
| Indirect impact | 83 958 636 | 42 953 031 | 126 911 667 |
| Direct plus indirect impact | 131 662 406 | 67 358 162 | 199 020 568 |
| Employment multiplier | 1.76 | 1.76 | 1.76 |
| Income multiplier | 2.23 | 2.17 | 2.21 |

As in the case of Escondida — see Table 3 — the direct impact is the expenditure of the mine workers, while the indirect impact is the expenditure of those receiving employment indirectly due to the mine. The income multiplier is total income generated in the region divided by the income earned by the mine workers and management.

Others

Including investments in the port facilities at Padrones Point, total infrastructure investment was approximately US \$62.5 million. In addition, the company has constructed 21.5 kilometers of new roads, 17 of which are in or around the town of Tierra Amarilla and 4.5 of which are in Caldera.

Between 1993 and 1996, Phelps Dodge paid approximately US \$30 million in taxes, including taxes on income, patents, concessions and others.

Candelaria has developed a housing assistance plan that aims to help workers find housing solutions in the communities of Copiapó, Tierra Amarilla or Caldera, depending on their work location. This has meant accumulated costs, through May 1997, of US \$3.3 million. In addition, Candelaria is constructing a modern sports facility in the town of Copiapó.

Environmental variables

Company policy

The issue of the environment has been fundamental in the development of the Candelaria mine. Environmental protection is a constant concern and priority in each of the company's institutions, a concern born in the directives and objectives of the Phelps Dodge Corporation. The company's mission statement declares that its central objective is to create value for its associates and workers within a context of responsibility, ethics, and safety.

The company aspires to be a good neighbor who protects the environment. In addition, the company expressly declares its commitment to and involvement with the local community where the company is located. The company pledges to use the cleanest and most advanced technology throughout the exploitation process. The company's primary objectives are to protect the natural environment, serve as an example of the best environmental practices in the industry and to be recognized as a responsible entity by the community, other companies and government authorities.

Candelaria was the first company in Region III to voluntarily conduct environmental impact studies before beginning operations. These studies allowed the company to obtain environmental authorizations starting in 1992. The company conducted a detailed study of solid waste management, which lead to the control and minimization of the operation's adverse environmental impacts. In addition, the company continuously monitors air, soil, and water quality. It also has signed agreements with schools and universities to realize investigations and joint seminars.

Safety and quality standards

Environmental protection measures at the mine and processing plant in Tierra Amarilla and the port facility in Caldera Bay include: an emissions control program in the area of the mine, environmental training programs, a fully enclosed concentrate transport system, and a system of water recovery and reuse that has made the company the lowest water consumer per tonne of processed mineral in the region. Between 82 percent and 85 percent of the water used at the mine is recycled, according to information provided by the company.

Nevertheless, some agricultural producers express doubts with respect to the water recycling figures reported by the company and feel the mine is taking water away from producers in the area. However, the company periodically sends regional and local environmental authorities all monitoring data and maintains it has not received a single complaint from any neighbor with respect to water use.

It would appear the company is doing everything in its power to comply with Chilean and international norms. Nevertheless, the population does not feel entirely sure about the solutions or studies presented by it. This could be due to a lack information or to the industry's historical legacy that has lead community residents to believe that mining is a polluting activity with little concern for the environment.

Starting in 1997, Candelaria began to design an environmental management system (EMS) based on strict international guidelines under the voluntary ISO 14001 standard. In December 1999, the company's EMS was certified under this system for all mine and port facilities, making it one of the first copper mining operations in the world to achieve full certification under the ISO standards.

Social and human capital

Health

Company's internal health

Candelaria's total health program provides for drug and alcohol testing. The Risk Prevention Department is in charge of testing under the Phelps Dodge philosophy known as "zero and lower," which refers to the company's goal of a workplace, home, school and community that is free of material damage, injuries and accidents.

The work shift is not a health problem for the workers at Candelaria. Since workers return home daily, there are no problems associated with prolonged stays at worker camps.

Benefits to community health

Candelaria has contributed significantly to the remodeling of emergency services at the Regional Pediatric Hospital in Copiapó and to the construction of the general clinic in Rosario.

Education and training

As the owner of Candelaria, Phelps Dodge's education strategy is oriented to strengthening relationship between the formation of new mining technicians and the company's needs in the context of a cleaner, more technologically advanced mining industry. Toward this end, the company collaborates with the Benjamín Teplinsky Center, which provides technical training for the mining industry.

A second area of focus is the implementation of student and teacher training programs at the region's technical and professional schools. The programs consist of internships at the mine, which provide participants with a realistic vision of the mining industry. In this way, the company seeks to

overcome the problem of a lack of articulation between technical training and company needs.

A third area of focus is an orientation program for the company's own workers and suppliers. The program's main objective is to introduce every worker, employee or supplier to Candelaria's corporate model, which has clear procedural guidelines regarding such considerations as technological management, worker safety, and environmental protection.

Between 1993 and 1996, the company invested US \$630 000 in employee training, the equivalent of 143 person-hours of training. According to the National Employment and Training Services (SENCE), the total of US \$1.9 million was invested in training programs for Region II in 1995. Phelps Dodge's training investment that year was US \$288 000, or 15 percent of the regional total. In addition, Phelps Dodge created the San Lorenzo School in conjunction with the Placer Dome Company. The two companies have set up a scholarship program for workers and their families. Candelaria's contribution to this program was US \$194 000 in the first semester of 1997.

Community-company relations

Community's perception

The region has numerous recognized comparative advantages for its development, including significant natural resources available for exploitation. This does not mean that region's advantages and possibilities are free of risks or threats. The community has a clear sense of the risks inherent in large mining projects. Residents make constant references to large projects of the past that extracted minerals and left behind nothing more than a hole in the ground. In this sense, Atacama is a region with mining experience. The community also has a clear vision of what contributions a mining project should make to regional development. In this case, references point to important projects that in the past left their mark on the region by constructing lasting public works.

The presence of companies such as Candelaria attracts banking institutions and large stores to the region. This is seen both as an opportunity for general employment and as a threat, since local businesses are displaced. Thus the arrival of a new mining project is viewed with a mixture of mistrust and enthusiasm. The negative experiences of the past are not enough to contain the enthusiasm generated by arrival of new projects, and people create expectations

that they pass on to family members in other parts of the country, causing migration to the region in search of jobs. Expectations center on jobs and increased business for local commerce and service providers, since mine employees receive higher salaries than the local average and thus have greater purchasing power.

Nevertheless, our interviews with members of the commercial sector revealed a different perception of mining in general. The perception is that mine employees tend to spend their wages on recreation and diversion in other parts of the region, since many of them live in other cities. Miners do not spend their income at local businesses, but rather spend it in other cities. This is attributed to the fact that there are important mining companies in the area that import workers from other regions who generally do not reside in Copiapó, or if they do, it is only temporary.

Local suppliers

With regard to input purchases, large companies generally purchase items needed immediately in Copiapó or locally, while big ticket items or larger orders are purchased in Santiago. Candelaria has made efforts to give priority to regional companies during bidding for goods and service provision. Nevertheless, there are various areas in which local businesses are not qualified to provide to the company. Some 56 percent of Candelaria's costs from the acquisition of goods and services are spent on companies outside of Region III.

The company's policy states that, all things being equal, it prefers to use local suppliers for the provision of goods and services. Above all, the company gives priority to local residents in the area of employment, in an attempt to capture all qualified human resources from people in the area. For example, the transport of mineral concentrate from the mine to the port is done by a local company, with which Candelaria has very close relations.

Since operations began, many companies from Santiago have opened branch offices in the area. There has also been significant growth in purchases from local businesses and the appearance of several small local subcontractors in areas such as shipping, welding, vehicle repair and facilities engineering. Instead of maintaining a long list of potential suppliers, which was the company's initial policy, Candelaria has chosen to concentrate on a few key suppliers. Suppliers can thus maintain their competitiveness and count on a certain volume of business, allowing them to maintain a stable work force and keep experienced workers. In addition, this allows the company to inculcate suppliers with its corporate values, such as safety and

environmental protection. The company has been extremely rigorous on this point and subcontractors have assimilated key corporate values.

Commerce

In the local commerce sector, there is the perception that benefits have not been as significant as those in nearby towns such as Antofagasta or Iquique, where large-scale mining has produced visible and explosive development. According to our interviews, public authorities have an important role to play in pressuring large companies to make significant and lasting investments, such as housing complexes, that ensure workers will live in the area and, in consequence, require local services. Our interviewees indicated that local commerce tends to benefit more from small- and medium-sized mining companies.

Infrastructure

In the community's view, the most important contribution that a mega-project can make is the construction of large public works. Candelaria has not built any large public works for the community, such as a highway or housing complex. While it is true that Candelaria built houses for its executives, the community does not view this as a contribution to the city. The area where Candelaria managers and upper executives live is perceived as an exclusive enclave that has not been incorporated into the city and does not contribute to the company's integration into the community.

The lack of a large housing complex for Candelaria employees and workers has been strongly criticized.⁴⁰ The company adopted a policy of letting all supervisors and worker choose their own housing in the region by way of its housing plan. Under this plan, 60 percent of workers have their own homes. This was an attempt to integrate workers into the community.

Employment

Our interviewees agree that Candelaria's impact on job creation has been significant. While the community's expectation is that it will be able to meet all of the company's labour needs, there is the perception that even though this is not the case, the project nevertheless represents an important boost to the regional economy. Interviewees refer to prior project phases, such as construction, during which there were 2 000 new jobs in the region.

⁴⁰ There are mechanisms for workers to buy housing through Serviu, where workers are obligated to stay at the company for 12 years.

However, not all jobs went to regional workers. According to the labour secretariat, the local work force covered approximately 20 percent of the demand, which from the local perspective is positive, since it meant 400 direct new jobs for the region. The remaining 80 percent went to outside workers who arrive in search of work. According to one informant, they are viewed as a contribution to the region, since they constitute a qualified work force that will be integrated into the community as a factor for change. As a result of this migratory flow, Copiapó's population has grown nearly 7 percent since 1990.

A negative aspect of this new source of employment stems from the distortions in the local job market caused by the relatively high salaries. Services tend to become more expensive, especially for the sector of the population that is not linked to the mining project.

Work shift

Candelaria does not use worker camps at the mine; instead, workers return home at the end of every shift. This situation directly benefits the community since it is able to capture a larger share of the work force's expenditures. The situation is very different for the employees of subcontractors. According to the region's labour authority, this is one of the greatest concerns generated by Candelaria. There are significant differences between Candelaria employees and subcontractor employees, in areas such as salary levels, the length of contracts, work conditions and internal relations. The Candelaria worker, for example, has access to a sports facility and many other advantages for building a family life that the subcontractor employee does not have.

Union

The appearance of a union at Candelaria has not been exempt from the general problems of unionism at the international level. Our interviewees indicate that the appearance of Candelaria's union was hidden and gradual. Issues such as medical leave and housing programs sparked workers' interest.

The union's objective is to be fully organized in time for the next collective bargaining round in 2001. Its strategy has been to establish alliances with similar entities and to participate in worker confederations, especially the metal mining confederation. Union leaders have initiated conversations with unions at the parent company's projects in the USA and Canada who are interested in supporting their Chilean counterparts. It is

worth noting that the union does not participate in the CUT (Unified Workers Central), which is seen as politicized entity that does not represent workers' interests.

Union leaders are concerned with the unequal working conditions between Candelaria and subcontractor employees. They are not indifferent to the situation and they consider it unjust. While the issue is not part of their demands, it is something that concerns them and is cause for solidarity.

Contributions to the community

The union is critical of the company's contributions to the community, which it considers insufficient and opportunistic. Union leaders note that many company donations appear to be part of a communications strategy to attract press coverage rather than a real contribution to the community. According to union leaders, the company should have a budget item specifically for contributions to the community. This situation prompted the union to generate its own funds to help the community, since they feel they are in a privileged situation.

From the company's perspective, Phelps Dodge's policy seeks to establish a strong commitment to the communities where its operations are located. The company has contributed US \$1.6 million to the regional community since it arrived in the area. Starting in 1994, when Candelaria began production, the company has concentrated on maximizing its contributions to the regional community, principally the towns of Tierra Amarilla, Copiapó and Caldera. Between 1995 and 1997, the company contributed US \$830 000 for various health, education and sports initiatives.

Community communication strategy

Candelaria's Public Affairs division is in charge of developing and maintaining community relations. At each of its operations throughout the world, Phelps Dodge has an "open door" policy, which translates into a strategy of integrating the company into the local community by openly explaining who the company is and what it does. The company's strategy includes consultation with local organizations such as neighborhood associations, environmental groups, and schools. The company also uses studies to gauge public opinion, such as studies on Candelaria's socioeconomic impact on the region or surveys of different social groups in the community.

Citizen participation

For the Candelaria Mining Company, the theme of citizen participation has followed all of the work rules established in its environmental impact studies. Nevertheless, Candelaria's environmental manager, Cristián Strickler, indicated that citizen participation during the exploration phase, "presents certain sensibilities in terms of strategic information. Once the project was consolidated, we made the information public through the presence of authorities, journalists and other organizations, in accordance with the obligations established under current legislation." He added, "Whenever we have prepared environmental impact studies for new projects or modifications to existing projects, we have presented them to the directly affected communities, with support from local authorities for their organization and development."

Community benefits

Candelaria's Donations Committee takes on the task of building community relations by creating a space for the discussion of urgent issues in areas such as health, culture and recreation. In addition, the company sponsors "ecological brigades" in Tierra Amarilla schools. Starting in 1994, when the mine began production, the two Phelps Dodge subsidiaries⁴¹ have concentrated on maximizing contributions to the regional community, principally the towns of Tierra Amarilla, Copiapó and Caldera. As detailed in Table 6, between 1994 and 1997, the company contributed US \$830 000 to finance various community support programs.

Table 6. Donations in Region III, 1994–1997.

| | Total (thousands of US \$) |
|----------------|-----------------------------------|
| Community | 442.7 |
| Health | 126.1 |
| Education | 69.9 |
| Sports | 127.6 |
| Other programs | 63.1 |
| Total | 829.4 |

Source: Phelps Dodge.

The company has also actively collaborated on community education programs and regional events. For example, the company supports area high schools and the University of Atacama. It has participated in the

⁴¹ The other company is Ojos del Salado.

Environmental Expo and the Mining Day exposition in Copiapó and Expomar in Caldera. In addition, Phelps Dodge financed a professorship of Mineral Processing in the Engineering School at the University of Chile.

The Case of the Fachinal Mining Company

Description of the project

The Fachinal Mining Company is a gold and silver mining project located in Region XI, about 25 kilometers from Chile Chico on the southern shore of General Carrera Lake. The project required an investment of US \$85 million, representing the biggest mining investment in this region, which is the largest and most sparsely populated in the country. According to INE, the region has a total of 93 600 inhabitants, of which 77.5 percent are concentrated in the towns of Coyhaique and Aysén. The region has a population density of 0.9 inhabitants per square kilometer.

Freeport Minerals first began exploration in December 1981. After two years of exploration and before minerals were discovered in the area, Freeport Mineral was acquired by Coeur D'Alene Mines Corp, which created CDE Chilean Mining Corporation. Construction began in late 1994 and the project was inaugurated in March 1996. The project is owned by the US company Coeur D'Alene Mines Corp.

The Fachinal operation consists of five underground mines and four open pit mines. Underground reserves are 894 000 tonnes of mineral with an average grade of 3.97 grams of gold and 193 grams of silver per tonne. The open pit mines will tap approximately 3.2 million tonnes with an average grade of 1.96 grams of gold and 87.4 grams of silver per tonne. With a production schedule of 1 500 tonnes of mineral per day, the project's lifespan is estimated at 8 years, by the end of which some 4.8 million tonnes of mineral will have been mined. Annual production is 1 400 kilos of gold and 78 000 kilos of silver, with an estimated value of US \$31.5 million. Mineral concentrate is transported by truck to Puerto Chacabuco for shipment to its final destination.

The operation requires 50 liters of water per second, provided by the La Tina estuary and General Carrera Lake. The rest of the requirements are provided by the recirculation of water from the tailings pond to the milling and floatation process.

Economic variables

There is significantly less information available for an evaluation of Fachinal's impacts on Chile Chico compared to the other companies in this study. This is because Fachinal has been operating for a shorter period of time and because the project is smaller in scope with a shorter lifespan. In this case, however, any significant impact can be directly associated with Fachinal, since it is the only large company operating in the area.

Production

There is little detailed information regarding production levels and Fachinal's impact on the region, although we can establish that the company accounts for almost all mineral production in the region. Table 7 shows regional gold and silver production, nearly 100 percent of which is attributable to Fachinal.

Table 7. Gold and silver production at Fachinal (1995–1997).

| Year | Silver (oz.) | Gold (oz.) |
|------|--------------|------------|
| 1995 | 18 884.3 | 473.4 |
| 1996 | 76 867.3 | 1 069.7 |
| 1997 | 75 256.7 | 1 206.8 |

Source: Cochilco (1999).

Employment

With respect to the mining sector, those who were trained by Fachinal were hired by the company. However, the principal productive activity in the region is agriculture and many believe that once the mine closes, agriculture regain its former predominance. The mine directly employs 265 people, while a similar number are employed in services and indirect jobs; 168 direct mine employees are members of two different unions.

According to the CAS 2 classification system⁴² 61 percent of Chile Chico's population is considered "poor." Poverty is worsening since the region's low population density has not attracted quality educational centers, especially institutions of higher education. However, Chile Chico has a kindergarten and a municipal high school. This situation led the company to develop a training program aimed at employing youth from Region XI.

⁴² The index system for the socioeconomic situation is used by the government to grant various subsidies.

Table 8. Direct and indirect impacts generated by the incomes received by the workers, management and contractors of Fachinal (US \$) 1999.

| | Workers | Management | Contractors | Total |
|-----------------------------|------------|------------|-------------|------------|
| Income | 8 246 310 | 5 080 115 | 4 505 200 | 17 831 626 |
| Direct impact | 6 300 181 | 3 690 704 | 3 730 306 | 13 721 190 |
| Indirect impact | 11 088 319 | 6 495 639 | 6 565 338 | 24 149 295 |
| Direct plus indirect impact | 17 388 500 | 10 186 343 | 10 295 643 | 37 870 486 |
| Employment multiplier | 1.76 | 1.76 | 1.76 | 1.76 |
| Income multiplier | 2.11 | 2.01 | 2.29 | 2.12 |

Source: Created by authors.

Under it, the company trained and hired 50 young people⁴³ in 1995 and 25 in 1996.

As in the case of Candelaria, in order to analyze the indirect effects of the salaries received by the workers and management at Fachinal on the local economy, we used the multiplier for the mining sector estimated by the Faculty of Economics and Administration of the Catholic University of the North. According to this study, for each worker employed by a mining firm in Chile, approximately 1.76 indirect jobs are generated, on the assumption that all income is spent in the region. We will use this indicator to get an order of magnitude of the indirect employment and income effects of the mine, keeping in mind that it is a general multiplier and not specific to Fachinal. Table 8 illustrates our findings.

As in the case of Escondida — see Table 3 — the direct impact is the expenditure of the mine workers, while the indirect impact is the expenditure of those receiving employment indirectly due to the mine. The income multiplier is total income generated in the region divided by the income earned by the mine workers and management.

Construction

One of the largest impacts in the region was in the area of housing and urbanization. Residential construction by the firm was limited to a hotel and several houses. It preferred to give credit to the workers so that they could rent existing houses in the area. This resulted in more than a doubling of rents in the nearby communities, causing severe difficulties for the former tenants. According to the INE Census, the town of Chile Chico had only

⁴³ From the province of Aysén.

1 325 houses in 1992. Consequently, the ability to house the new workers, most of who came from other areas, was very limited.

Commerce

Local commerce expanded significantly due to the expectations of the Chile Chico area residents, who anticipated a significant increase in demand as a result of the mining project. For example, supermarkets and other food provisioning sources doubled. Nevertheless, many owners are now deeply in debt. The anticipated demand did not materialize because mine workers usually obtain goods in other parts of the region, such as Coyhaique. In addition, the mine's food service concession was granted to a company that obtains provisions from other areas. A similar situation occurred in the housing sector, where more capacity was built than what was needed.

Meanwhile, the new affluence of residents has caused the number of passengers, and hence transportation services to proliferate, with the connection from Balmaceda to Chile Chico being served by small planes.

Environmental variables

Fachinal has a strong respect for environmental protection and safety measures and directs its activities in such a way as to protect the natural environment, company employees, and the public in general. This stems from the corporate vision of the project's owner, Coeur D'Alene Mine Corporation, and is reflected in Fachinal's mission statement. Fachinal's mission is to obtain value for the shareholder under safe working conditions for company personnel and with respect for the environment.

Another key aspect of the mission statement is the idea of mutual respect as an important component of company relations. Fachinal's mission highlights measures geared toward the internal realm, or in other words, responsibilities within the company. In contrast to the mission statements of Escondida and Candelaria, Fachinal makes no express reference to its relations with the community. While this does not mean that the company has no policy in place to address community relations, it has not undertaken efforts such as creating a company foundation, donations committee, or other initiatives specifically aimed at building relations with the host community, as the other two companies have done. Fachinal differs in terms of geographic location, but nevertheless, the standards and norms it employs are similar to the two previous companies. In Fachinal's case, obtaining water required for mine operations is not a problem, although the company must address other environmental aspects, such as flora and fauna, that were not

major considerations for the other companies due to the geographic conditions of the host regions.

Fachinal voluntarily submitted its environmental impact study to regional authorities for approval in 1994, before Chile's Environment Law was passed. The study considered the project's surrounding environment in detail and included sections on the climate, air quality, geomorphology, soils, hydrology, hydrogeology, and volcanism. A biological study included local vegetation, and terrestrial and aquatic fauna. In addition, the EIS considered the stages of exploration, construction, production, and closure⁴⁴ for the areas of Laguna Verde, Guanaco, Chile Chico, and Puerto Chacabuco.

The company has committed to complying with all laws applicable to the environment, safety, and regulations. It applies reasonable operating procedures, which ensure effectiveness when confronting environmental problems.

Quality and safety standards at the Fachinal mining project.

In order to comply with the objectives outlined its environmental policy, as well as with current laws and its commitments to local authorities and the community of Region XI, Fachinal uses what it calls management tools. These are a series of programs, procedures and actions that conform to its environmental management system. To evaluate this, the company conducts internal and external environmental audits.

Among the primary management tools are the environmental policy regulations, which establish all of the internal norms that each employee and subcontractor must assume. Another important tool is the environmental management plan, which is revised annually and which contains scientific aspects, such as a contingency plan that outlines the formula for the rapid resolution of emergency situations that can affect the environment. It also incorporates the monitoring plan, which is designed to immediately detect any alteration in various environmental variables. The most important areas monitored are ground and surface water quality, air quality, dust, soil and vegetation quality, and noise levels. In addition, the company conducts fauna censuses in important habitat areas and uses a waste management plan that establishes those measures necessary to minimize risks and ensure safe disposal.

⁴⁴ The study included the closure plan since the project's lifespan is only eight years.

Social and human capital

Health

Internal company health

The company addresses the issue of worker health by way of private institutions (ISAPRE) and FONASA, and its health insurance picks up any costs not covered by these programs.

Fachinal considers drug and alcohol use a public health issue and so it does not gather information regarding consumption among workers. Nevertheless, when the company detects workers under the influence of alcohol, they are not admitted onto the project site. Fachinal's drug policy states that if workers are discovered to possess or sell drugs, they are subject to immediate dismissal.

The influx of new workers is examined by the Chilean Safety Association, which administers a pre-employment exam to determine if an applicant is fit for employment. According to José San Francisco, human resources manager at CDE:

At first we had problems in Chile Chico, since many workers were declared unfit by the Association due to dental problems, which is a big problem in Chile Chico. We had to make an exception in the case of the subcontractor employees. There is only one dentist in Chile Chico. There are two in Coyhaique but their schedules are booked. With the salaries they receive now, the workers have gone in for treatment.

Mining culture and sexuality

Due to the absence of a traditional mining culture in Chile Chico, where the Fachinal project is located, the increase in sexual commerce in the town is especially visible. There has been explosive growth in nightclubs, due to demand generated by the floating population, primarily young males.

According to the general practitioner in the area, Chile Chico has seen a slight but significant increase in sexually transmitted diseases. The hospital conducts prevention and control activities specifically focused to sex workers. At one point, local radio stations spread a rumour about the presence of a female HIV carrier in town, unleashing a social psychosis that reached the mining company workers. According to an operations manager interviewed, there was a significant increase in work leaves to attend medical exams. According to the general practitioner in the area, this anecdote had

significant effects on awareness levels and sexually risky behaviour became a topic of everyday conversation.

Education and training

When operations began in 1995, the company's administration confronted a serious shortage of skilled labour in the region for mine and plant workers and equipment maintenance technicians. Faced with this situation, company executives and regional authorities began a training program, with participation from SENSEA, aimed at the integral formation of mine workers. The eight-month program was taught by instructors from the University of La Serena. Program participants were 75 young Ayesino residents who had graduated from the Industrial School. At the end of the course, they were hired as mine operators. The Fachinal experience can be characterized as an alternating apprenticeship model, meaning it combines theoretical classroom training with on-site workplace training. Region XI's mining authorities have applauded the high school-graduate training program as a way to ensure a skilled work force in the area.

A second area addressed by the Environmental Affairs Division is related to the insertion of new mining engineers contracted by the company. Without being an orientation program per se, this division invested time in defining what it means to work in a company that obeys clear guidelines, especially with regards to the environment, designed by the company's head office in the United States.

Work shift

Region XI's labour authority indicates that Fachinal's work shifts are structured in three 8-hour shifts, which means that most workers live in Chile Chico and arrive at the mine by vehicle. Some workers from more distant locales (La Junta, Cochrane) have special shifts.

Community-company relations

The community's perception

The senator from the region, Mr. Horvath, has a negative opinion of the mine's impact on Chile Chico and the surrounding region.

A portion of mining patent fees go to the municipality and that is the only part that stays in local or regional funds. But mining activity itself doesn't leave anything. This goes as taxes to the national treasury and doesn't return through federal programs or budget allocations. There is a structural flaw to the system because it tends to concentrate funds and all offices are in Santiago. There is a remote administration of the activity from Santiago.

For one supermarket owner, the arrival of the Fachinal mining project to Chile Chico had a significant impact on the community.

The publicity mounted by the company toward the community was really impressive. Everything became exaggerated. You began to see a lot of traffic, especially from the mine. People who got jobs at the mine began to compete to see who had the best car. People who before had no job or maybe only a temporary job earning 80 000 pesos, suddenly they're looking at a salary of 300, 400, 500 thousand pesos. The first thing they do is buy a car on a finance plan. Every finance company in Coyhaique was chasing the payroll lists, offering credit to anyone who had a salary above a certain level. It's created a new type of worker: a worker deeply in debt but with a new car, television set and whatever else. Right now these workers owe more than they earn.

The mine's importance for Chile Chico is such that the community is affected by ups and down in the international metals market. A typical conversation in the community has to do with constant rumours that the mine is on the verge of closing because a drop in the price of gold, creating a situation of constant tension.

A key factor in our interviewees' evaluations of company-community relations had to do with the expectations generated by Fachinal. People recall its efforts during the early stages to highlight the benefits the project would bring the community, which they consider was a public relations strategy aimed at winning community support.

The community, for its part, reacted with out-of-proportion enthusiasm to the possibilities the project would offer. Residents launched risky economic ventures and ran up significant debts. The first to react were the commercial and housing sectors. Although there was a period of economic growth, especially during the construction phase when important contingents of outside workers arrived to justify new investments, the shift to Fachinal's production phase saw a considerable drop in local incomes. The failed investments provided further support for the interpretation that the

company's initial communication campaign facilitated the community's overreaction.

The community developed a profound sense of frustration once it became evident that many promises were being forgotten as the project's production phase began. For example, people expected Fachinal to make good on its promise to purchase inputs locally. Instead, local goods and service providers in a number of areas were ignored.

In the commercial sector, for example, there are strong criticisms of Fachinal's contracts with Emasa. It is the state provisioning company for isolated regions that allows functionaries to obtain a payroll discount and subsidized prices. It is estimated that Emasa captures a large percentage of the miners' incomes. Meanwhile, local commerce distrusts the presence of finance companies. Both Emasa and the finance companies absorb resources that are not reinvested in the area; as such they are considered to conspire against local development.

A similar situation arose in the education sector, where unmet promises and expectations ended up deteriorating company-community relations. In this case, the opinions collected indicate that the company gave signals it was seeking a relation of mutual collaboration, which began with an important donation of computers. The school reoriented itself to technical professional education and students began entering the company as interns with the idea the company would offer them a profession with concrete opportunities for development. Nevertheless, the results did not fulfill community expectations, due to a drop in gold prices that caused the company to put an end to these types of collaborations.

Senator Horvath comments on this situation:

The school deserves some criticism on this point. We have talked with the teachers and the director. At about the same time the mining project was getting underway, the school began its transformation into a polytechnic school. Many students had expectations of jobs at the company, which have not come true. The situation began several years ago when the company donated computer equipment, things of that nature. However, at the moment the school does not feel a greater link with the company, nor has there been a linkage in the sense that the company proposes, which wouldn't cost them anything. The company has not taken advantage of tax breaks from donations to educational facilities. This is the criticism we've noticed in the educational sector.

The company's integration in the local community has been especially problematic, probably as a result of the community's lack of experience with large-scale projects, as well as the social dynamics specific to the small, isolated towns that present additional challenges to the integration process. The opinions consulted note the significant impact on local dynamics caused by the fact that certain people from the locality receive economic benefits. The resulting gap between those who benefit and those who do not creates a situation that does not go unnoticed.

The gradual deterioration of community-company relations ended up with parties' viewing each other as competitors. The company created a closed circuit of suppliers, such as the hotel the company created with its own cafeteria, administrated by the Central de Restaurantes (a food service company that operates on the national and international levels). Community members complain that food supply is a service that local companies could have provided due to the locale's excellent microclimate for the production of vegetables, livestock, and other necessities. Another criticism has to do with the fact that subcontracted services receive an indirect subsidy, since the Central de Restaurantes' cafeteria occupies company-owned space and thus does not pay for rent or basic services such as electricity, water and gas. Several local businesses went bankrupt and had no way to pay their debts. The initial enthusiasm became a catastrophe and contributed to a further deterioration in community-company relations, reaching extremes such as the case of one local business owner who prohibited miners from entering his locale and who made repeated complaints to local authorities and Fachinal.

Citizen participation

In terms of citizen participation, the case of Fachinal is different from the previous two cases. According to the company's environmental manager,

The project was not associated with citizen participation because the regulations for the environment law had not been passed yet. Nevertheless, we held meetings with the community and even environmental groups to explain the project.

Senator Horvath says of community participation:

Perhaps the activities leading up to the project's installation were carried out in conjunction with the community, but later after production began, this link began to weaken. There has been a general tendency of citizen pressure against mega-projects. The company does not create foundations or local development corporations, conduct

impact studies, out of the goodness of its heart. This has been more a result of local pressure.

Employees' integration in the community

Fachinal's owner CDE failed to implement an adequate housing plan. The company instead opted to repair houses in Chile Chico. The housing demand generated by the company produced a rent increase, which meant that certain sectors of the local community, such as the police and public officials, were forced to give up the houses they rented since owners preferred to rent to the mining company. This situation had positive elements in the sense that it served to develop the property rental sector, as well as negative elements such as the rent increase. Nevertheless the company feels its workers have successfully integrated in the community. Company credit is available to workers to buy houses.

But Fachinal's policy does not appear to have adequately addressed the issue of employee integration in the community. Indeed, local residents do not perceive a clear policy. According to local writer and Rotary Club member Danka Ivanov, mine workers and their families

should integrate themselves into the daily lives of small town residents, since a mining or fishing project can have a strong cultural impact on a small town. One has to have a lot of strength and understand one's own cultural values in order not to be lead astray by another culture. Because these companies leave and there is the constant threat that they are going to lay people off at the mine. Last month 40 people were let go — it's a constant threat. I wouldn't want to depend on a salary from the mine because it's too nerve-wracking. They can't guarantee your job, since neither the manager nor anyone else has a guaranteed job. If the whims of the metals market are like they are now, which is atrocious, people don't save and don't look toward the future.

With regards to the issue of employee integration in the community, Senator Horvath says,

The other point that one observes with some degree of concern is that in general, the people who work at the company come from outside the region. Administrators, accountants, and professionals: they have almost no link to the region. From somewhere else in Chile they fly to Balmaceda, then sometimes from Balmaceda they fly directly to Chile Chico and never even get to know Coyhaique or Puerto Aysén. They

don't have any idea what the region is really like, which reveals the enclave mentality that mega-projects generally have, to differing degrees.

Community benefits

The arrival of the Fachinal mining project has brought certain benefits to the community, such as:

- the arrival of television broadcasts to Chile Chico;
- the donation of a computer to the police force;
- improvement in the road between Chile Chico and the mine site (25 kilometers), to which the company contributed 60 percent of the costs; and
- improvement to the lawn at the Plaza de Armas in Chile Chico.

Nevertheless, Mrs. Ivanov has a different perception from that of the company:

They talked about so many things, they even mentioned the possibility of private schools...They talked about how they were going to make a significant contribution to the hospital in order to improve the healthcare quality, which is quite poor, and I don't know how that ever turned out. We still just have the local general practitioner, who come "right out of the oven" with no experience.

Mrs. Ivanov ends by referring to another impact of the mining company's arrival:

There was excessive growth in commerce and prostitution as well. Many people have businesses disguised as nightclubs, but everyone knows there's more going on there than dancing.

Conclusions and recommendations for best practice

The objective of this chapter is to present the principal conclusions and lessons obtained from the case studies. This will enable us to identify and propose a series of best practices in each of the areas analyzed, which will serve to design and recommend policies and strategies that can be applied in other contexts.

Context

There are a series of lessons and best practices that refer to the general context in which a project is developed. In the case of mining projects, one essential aspect has to do with the initial insertion of the project into the local context. A few best practices that arise are:

1. A company should know the country in which it is going to begin operations

This implies knowledge of applicable laws and regulations. Specifically, it requires knowledge of norms regarding declarations of intent and environmental impact studies.

2. A company should know the local community in which it is going to begin operations

It is considered a best practice to send an advance mission of experts in community relations or socio-cultural affairs, especially in cases of communities with no mining experience. This allows the company to be sensitive to local customs, cultures, and needs.

3. A company should establish positive relations with the community

Knowledge of a local community should be used to establish positive community relations as soon as exploration begins. This requires the ability to communicate in a context of uncertainty, which must be based on an open dialogue that establishes the basis of mutual trust.

Strategies in the internal realm

There are also a series of lessons and best practices that either stem from, or are applicable to, internal company relations, and which affect the benefits and costs of a project for the workers. Application of these lessons helps determine how the project is perceived by the local community, and helps the community understand the company's culture of "how things are done."

1. Declaration of a mission statement

One of the conclusions drawn from the case studies is that each project is carried out under a corporate model that corresponds to a shared mental model, understood as a series of corporate decisions that characterize the culture of a specific company. The corporate model implies the design of strategies, policies and the concept of best practices with regards to the company's activities as a way of responding to social, political and legal pressures from the local community and society in general.

The existence of a corporate model implies that the company defines guidelines regarding "how things are done." These generally originate in the corporate headquarters located in the company's home country. These guidelines can be based on the philosophic principals defined by the company's founders or be based on standards fixed by international organizations. They orient the company's activities at each of its projects throughout the world, and in many cases there are external reviews that verify their application. The guidelines that constitute the corporate model shape the way project activities are carried out (i.e., the internal realm), as well as relations with the community, local and national authorities, organizations, universities, and others (i.e., the external realm).

In general, the corporate model is presented in each company's mission statement, which is a declaration of the company's reason for being and as such, provides guidelines that are translated into policies and strategies toward the internal and external realms. In each of the three cases, we see the best practice of declaring a corporate mission that is known and assumed by all those who form part of the company. This requires an orientation process with each group inside the company, including management, professionals, technicians, workers, and suppliers, such that there is an appropriation of the declaration that establishes the fundamental components of the company's reason for being. For example, in one of the companies studied, the mission statement was printed out and each worker had to sign it. This was handed out by all company offices.

2. Declaration and application of safety and quality standards

The existence of safety standards allows for a safe and efficient work environment. Two of the companies studied assumed safety standards supervised by international institutions, based on incentive systems or prizes for meeting certain goals. According to our observations, the application of such incentive systems generates a positive environment for the compliance of safety regulations and provides a permanent source of information to all

workers about the goals that are met. This establishes a clear incentive to meet these goals. The third company adheres to its own standards developed by corporate headquarters that have been proven over time. In terms of quality standards, two of the companies have certified under ISO 14 000 and the third has its own corporate standards.

3. Design of an environmental management system

As we have shown in our analysis, the existence of an environmental management system (EMS) entails more than simply complying with all applicable laws, regulations, norms and standards. An EMS allows the company to ensure that all design, construction and operating procedures use the best available technology, keeping in mind economic and environmental factors. In addition, it opens the possibility of cooperating with the larger community in the identification of environmental goals and the development of effective control programs.

4. Efficient organizational design

Efficient organizational design requires clearly defined responsibilities. The creation of management divisions outlining their attributes and procedures is key for efficient management. Lack of clarity regarding responsibilities and procedures in one of the companies studied resulted in a duplication of functions that produced a minor conflict with the environmental authority.

5. Definition of a human resources policy

The cultivation of a company's human resources is crucial for the smooth functioning of internal processes. The clear definition of a human resources policy is a best practice that allows the company to establish a profile of new employees, as well as the promotion and demotion policy internal to the organization. It also provides for orientation, training, and improvement programs, allowing the company to cultivate a professionally and technically competitive work force. However, cultivating human resources is not sufficiently assumed by all mining companies. This is especially evident in times of financial crisis, during which companies are distinguished according to those who use personnel layoffs as a first or last resort.

6. Health systems

As indicated in the case studies, companies have greater control over worker health while they are at the project site or living at the mine camp. A company has far less control when workers make use of their time off in the

community, or during stays at towns and cities nearby. As such, a company's health strategy is geared toward having greater control over worker health inside the mining operation.

The issue of health is important for the three mining companies in the study. All designed clear strategies and invested important resources with respect to the health of workers and their families. Clearly, companies are concerned with the relationship between health and productivity. A worker with health problems is a risk — often a costly one — for meeting production goals.

For two of the three cases, it was impossible to accurately determine how the mine affected workers in a study of the community's health, because there were so many mining companies, both large and small, in the area. Nevertheless, certain strategies or characteristics allow a company to minimize possible effects of its workers on the general population's health. For example, a company should opt for a work shift system that allows workers to spend as much time as possible with their families. Daily shifts or brief stays at the project site should help minimize the negative effects on community health generally associated with life organized around mining camps.

Another strategy is the implementation of a health plan that permits monitoring of potential diseases. The existence of a total health system can be considered a best practice, since it allows the company to define preventative and curative health policies that can detect possible diseases and address the possible effects derived from the mining operation. Our analysis illustrates the benefits of a health system concerned with issues such as eating habits, sexually transmitted diseases, high altitude, and drug and alcohol use.

7. Information and communication system

The timely management of information is important for all organizations. The existence of an information system that was elevated to a management division in one of the cases studied is a best practice that encourages the processing of internal and external information by way of consultation with community groups.

Internal and external diffusion is fundamental to any information system. The ability to react promptly to conflicts by providing solid, objective, and transparent information constitutes a best practice, as does the capacity to anticipate and proactively inform about future events in an opportune manner.

Strategies in the external realm

In each of the cases studied, the issue of external community relations is relevant. This is evident because all three companies have developed some type of strategy to address this issue. Such strategies contrast with the historic model of an isolated mining project that provides little or no information to the community, which both prevents the community from expressing legitimate concerns and leads to false expectations.

1. Community information

Two of the companies studied have strong concern for informing the community about its activities. The third company is more concerned with informing the authorities (whether environmental, health, or labour) than the community.

To a greater or lesser degree, the strategies of the companies in the study indicate the need to establish fluid and permanent lines of communication with the community — however diverse — regarding company activities. These strategies create credibility within the community regarding mining activities and its benefits for local and national development, and help avoid the existence of unfounded rumours about the effects of the project.

2. Strategy for distributing community benefits

It is necessary to distinguish between long- and short-term strategies designed to channel the benefits to the community. Short-term responses are donations or benefits made directly to community groups and that last as long as the mineral deposits last. Long-term responses, on the other hand, are designed to contribute to the socioeconomic sustainability of the mining operation. In consequence, these imply strategies with a time frame beyond the lifespan of the mining operation. In the three cases studies presented, the community received direct benefits from the companies ranging from simple donations to the repair or construction of roads.

A comparative analysis of the three cases in the study reveals differences in the area of community benefits. Escondida Mining Company has both short- and long-term strategies for providing community benefits. The short-term strategies include the company's relations to the community directly through the Corporate Affairs Division, and the Communications and Corporate Affairs Department. The latter is concerned with the most direct aspects and emerging problems in terms of community relations. Escondida coalesced its long term strategy by creating its Foundation, a non-profit organization, as a response to long-term social problems. Its goal is to contribute to the long-term sustainability of the mining project by creating

social capital. The foundation was conceived of as a strategy that would last beyond the life cycle of the mine, which provides it with a degree of independence from the company. This implies that the foundation's role is to link the company to the community, and its emphasis is on involving other public and private institutions in the conception and development of programs and projects.

Candelaria Mining Company's Public Affairs Division is in charge of short-term community relations. In this sense, the company has not defined a policy that goes beyond the life cycle of the mine. Through this division, the company established mechanisms to receive the community's opinion, such as a process of consultation with social organizations, including environmental groups. In addition, the company makes donations to schools, finances mining professorships at the university, and supports the Teplinky Institute that trains mining technicians.

Finally, Fachinal Mining Company has the least evident strategy for establishing relations with the community. Its Human Resources Division has taken on an important role in this area, although the Environmental Division also acts as a mediator between the community and authorities. But there is no clearly defined strategy, whether short- or long-term, for building community relations and for providing benefits to the community.

In the first case, the model of the company pursuing a short-term strategy combined with a foundation oriented to long-term solutions can be considered a best practice, especially after having observed how it functions. Nevertheless, there are two important considerations: few mining projects are big enough, or have sufficient resources, to create a foundation that can effectively contribute to human capital, or that can capitalize on the resources contributed by the company in order to achieve long-term, institutional sustainability. One way of overcoming this obstacle is for a number of medium and large companies to jointly create the foundation. Our impression is that more could be accomplished in the region if there were more foundations that acted in coordination with the public sector on regional development initiatives.

The second consideration concerns the risks of completely externalizing community benefits through a foundation. The main risk is that the company is not responsible for its actions and community relations are solely the result of the foundation. For this reason, a best practice is the combination of short- and long-term strategies.

Meanwhile, a strategy of purely assistential, short-term contributions to the community will not contribute to its long-term sustainability or allow the community to feel that the company has made a positive and lasting contribution to the area.

3. Working with the local community

In the analysis of each case, we provided examples of community projects that offered direct benefits to diverse social groups, such as the fishermen in shipment ports or the community in general, in terms of investments in roads, public square improvements and other projects. This best practice allows companies to make investments to maintain strong community relations, which in the long term could be considered added value. A failure to adopt this practice would mean facing problematic relations or conflicts with the community, which can endanger the viability of the project, or require considerable investment so as to mitigate or reverse a negative situation.

4. Establishment of fluid and permanent relations with authorities

Developing positive, permanent relations with local and national authorities is recognized as a best practice by the companies in the study. Regional authorities tend to value a company's participation in discussions on issues that are relevant to the mining sector as well as in cooperative programs with the public sector. In such cases, the company contributes its knowledge and the authority contributes its organization and vision of regional development. One example of this is training programs offered by the mining companies.

5. Human resources in environmental impact studies

The case studies reveal the importance of human resources for mining companies. Nevertheless, because mining projects have an immense impact on people's quality of life and ensuing psychosocial and family relations, in our opinion human resources does not receive the necessary attention in environmental impact studies (EIS). One suggestion is that the EIS should contain a special chapter in which mining companies define their corporate strategy for human resources management and address issues such as work conditions, workplace stress management, workplace health, quality of family life and productivity, worker well-being, and education.

6. Closure plan and work force conversion policy

The image of a mine project that simply closes, "covers up the hole in the ground and leaves," leaving behind it a host of unemployed workers, still persists in the communities that have experienced the phenomenon. This is true in the case of the carbon industry in Chile and a few medium-sized mines that are shutting down production due to low copper and gold prices. To avoid this stressful situation for companies and workers alike, the closure plan should consider mechanisms for the conversion of the work force that

provide more flexibility and transferable multiple skills to workers. This will ensure that they can be absorbed into other productive areas. Conversion mechanisms include training workers as micro-entrepreneurs in services or products required by the mining interest, as the Canadians do. In the case of Chile, this is relevant because it will permit, in a not so distant future, the exportation of mining know-how to countries such as Argentina when they begin to exploit the large mineral deposits that exist there.

7. Participation in training

Chile has seen evident development and growth of its mining sector. Nevertheless, for modern mining to be efficient, productive, and successful within a framework of respect for the environment, the sector requires a multi-skilled and experienced work force that currently does not exist, especially with regards to machine operators. This is because technical professional education, at least in the area of mining, is still not geared toward the new occupations and specialties required by new mining. Given this reality, mining companies have studied development strategies for investing in education and training to form a work force that can meet their demands.

In such programs, companies contribute their technical knowledge, or their area of competitive advantage, and put it at the service of the regional work force, particularly young people. It is easy for the mining company to train an electrical technician or a machine operator, but is more difficult for it to offer other types of education, which it must subcontract.

The three mining companies comprising this study developed programs that prepare students from technical professional schools. This is accomplished through orientation programs that prepare students for the type of jobs available, or through apprenticeship programs for students and professors at the project site.

Such education and training strategies can generate clear benefits for the local communities. The relations established between mining companies and technical and professional educational establishments favour the formation of a "semi-technician." This position was created in response to the ever more demanding technical and organizational needs of the mining companies. In addition, the broader the technical formation (i.e., less specific to the mining sector), the greater the possible benefits to other sectors besides mining from a skilled work force prepared to make a positive contribution to society and less dependent on one specific economic sector.

The three companies studied consider participation in the educational area as a best practice that provides mutual benefits for the educational sector, the community, and the company. Examples of the social role that mining companies can assume include the Escondida Education Foundation, which establishes a clear investment in social aspects and promotes the human resources formation for the mining sector; the Candelaria Mining Company's collaboration with the technical training center Benjamin Teplinzky; and Fachinal's award-winning and recognized training program. These examples constitute a valuable investment in human capital that benefits the mining industry in general.

Finally, training for suppliers generates an improved local service capacity that is positive for the modern mining activity.

8. Association with universities and institutes

As the analysis of the case studies reveals, the valuable relationship between the companies and universities or research institutes can be considered a best practice. For the most part, the image of traditional mining as an environmentally destructive, contaminating industry is due to a failure to protect species affected by mining. The three companies studied are committed to clean mining and devote significant resources to investigate the effects of mining on the local flora and fauna. For the universities, this best practice constitutes a good source of funding for research, not only in the hard sciences, but also in the areas of archaeology or ethno-history, such as the case of the research financed by Escondida. This relationship allows the mining companies to design closure plans with clear concern for restoring the original landscape, as is the case with Fachinal, which has plans for reforestation with original species.

9. Productive development corporation

A best practice in terms of establishing positive community-company relations is the creation of a productive development corporation, which provides for public-private partnerships to address regional development. One initiative of this type that is important for long-term regional development reinforces the capabilities of small- and mid-sized businesses associated with the mining industry that remain in the area, and which go on to become part of the human capital of the region.

10. Supplier purchasing policy

One of the common complaints about mining mega-projects is that supplies and inputs come from outside the region or abroad, thus depriving local businesses of the benefits from subcontracts at the mine. In general, local community members want to be the principal suppliers. All things being equal, the companies studied here tend to favour local suppliers for the provision of goods and services. Nevertheless, the host communities have the general impression that local participation could be greater, although they recognize problems such as low quality and mining companies' lack of trust in local businesses as habitual suppliers.

In this sense, companies can make an important contribution by helping local businesses to meet their high standards. One proposal is that the mining company enters into a joint venture with local suppliers in order to teach them the way things are done and help them improve product quality.

These associations should begin with simple, low technology activities. Later the technology level can be increased as the necessary trust is built. The more general the locally produced good or service, the greater the contribution of such an initiative, since the good or service can be offered to economic sectors other than mining. In this way, the diffusion of benefits is maximized in local communities that cannot depend exclusively on mining. Such an initiative can generate a higher-quality local business capacity that supports the modern mining industry and other productive sectors.

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CHAPTER 4.

Peru: Learning by Doing

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Introduction

This section presents the principal conclusions of the project “Large-scale Mining and Local Communities” for Peru. The project’s main objective was to analyze the socioeconomic, cultural and environmental relations between large-scale mining companies and local communities, in order to identify practices that lead to sustainable local development. Our analysis, which began in June 1998, focuses on two large mining companies — Yanacocha Mining Company (Minera Yanacocha) and Antamina Mining Company (Minera Antamina) — chosen because of the size of their investments and scope of regional impacts.

The project applied specific research strategies for each area. In the case of Yanacocha, we collected secondary material and conducted interviews and focus groups in the city of Cajamarca. In the case of Antamina, we collected baseline data from directly affected communities and visited surrounding areas.

The section is divided into four subsections. The first outlines the principal ideas and concepts that have guided the investigation. The two following subsections present case studies of the Yanacocha and Antamina mining companies. The fourth subsection presents a summary of the best practices observed in the case studies.

Definitions and variables

In this section we present definitions, variables, and questions to be answered. First we discuss the possible dimensions of the mining company, the community and the state, as well as relations among the three actors. Then we address the following themes: land acquisition; community demands, expectations, and perceptions regarding the mining company; development options as well as company communication and information strategies; and possible community benefits from the mining companies’ presence.

Mining company

We can characterize a mining company according to three indicators: the size of the operation (large, medium or small); daily production volume in metric tonnes (MT) (less than 350, between 350 and 5 000, and more than 5 000); and the estimated lifespan of the operation. A priori, there appears to be no correlation between a company's size, the estimated lifecycle of its operation, and its interest regarding local communities.

Local communities

"Local community" is defined in the broad sense of the term as the entire local population directly or indirectly linked to the mining operation. Within the term, we distinguish three levels:

1. population directly linked to the operation (those who reside on lands acquired by the mining company);
2. population residing on lands adjacent to or near the mining operation (any area that will be affected by changes to the environment, infrastructure, population movements or commercial traffic); and
3. population residing in nearby towns (towns of more than 1 000 residents that will be affected by the construction of camps or access roads, or by becoming a provisioning, lodging, or recreation center for the mining company and its personnel).

Relations between the actors

In this scenario, we assume that interactions between the community, the mining company and the state take place on three different levels. At each level, actors have their own specific interests and expectations with regard to each other and within each sector:

1. in the area of the mine operation;
2. at the level of local and regional administrations; and
3. beyond the area of the mine operation (the country's capital city).

Land acquisition

The amount of land a mining company must buy depends on the scale and nature of its operations. The two mines in our study are open-pit mines, which require large quantities of land.

The purchase of lands directly or indirectly affects the families and localities originally situated in the area of the operation or on adjacent lands. Impacts vary from a slight alteration to a radical transformation of the means

The campesino community

The campesino community is the primary peasant organization in rural Peru, grouping together families that utilize communal lands in an organized manner. Campesino communities are subject to a specific law regarding land ownership, internal organization and the administration of communal resources. Most campesino communities possess various types of lands that they utilize in different ways: irrigated lands used according to family structure; non-irrigated lands used according to family structure but subject to certain collective controls; and grazing lands at the free disposition of community residents.

The political organization of the State is based on territorial divisions (villages, population centers, district capitals). Communal organization, which is also based on territorial divisions, does not correspond to the state classification of authorities, and as such, there is certain overlap between the two systems.

Currently, campesino communities are facing an organizational crisis. Nevertheless, the campesino community remains the principal institution for negotiations with agricultural producers throughout most of the country. The community as an institution is not questioned or considered transitory, as are the new rural associations. To differing degrees, depending on individual cases and regions, the campesino community retains control over certain communal resources, particularly grazing lands, irrigation water and lands for communal use.

One function of the campesino community of particular interest for this study is its role in the resolution or regulation of internal conflicts. In general, communal leaders are in charge of resolving small and medium disputes over land use or other issues that arise among community members.

of social and economic reproduction. The arrival of a mining operation obligates the local population to redefine its options and methods of production.

The first problem that arises during land acquisitions is to choose the way and conditions under which land is transferred. This depends on variables such as the nature of the lands themselves, the way the lands are utilized, ownership, type of transaction, type of contract, and mediation of the transfer process.

Lands acquired may be grazing lands, irrigated lands, or non-irrigated lands. They may be utilized on a permanent basis or according to season and climate. In addition, lands may contain water sources or other resources, serve as a right-of-way, or possess other characteristics that modify their value, such as trees, crops, houses, or fences. Land ownership may be communal or familial. In general, lands required by the mining company are high-altitude grasslands, used primarily for grazing and with low productivity. These are of seasonal use and ownership may be communal or familial.

Land transfers are sometimes coerced under threat of resorting to the Land Law, which provides for a process of land expropriation. Although this has rarely occurred and large mining operations normally do not resort to this strategy, smaller operations apply different pressures in order to obtain the

land they need. At the other extreme, the sale of land can be negotiated. Finally, the purchase and sale of land may be accompanied by an offer to relocate affected occupants.

In general, miners and campesinos have different understandings of land transfer negotiations. The company may view a document signed and approved by the community assembly as legally binding, while campesinos do not consider it an impediment to revising the negotiations. For campesinos, negotiations are a continuing process that exists latently as long as there is a relationship between the parties.

Community demands, expectations and perceptions

The affected population's fundamental demands center on jobs, support for certain activities or public works (primarily infrastructure), and a market for their traditional products. The population reacts according to its interests, its perception of the mining operation and the expectations that the operation generates.

Unfortunately, local workers and products generally do not meet mining company requirements, and this causes conflicts. For this reason, companies must provide opportunities for worker training, as well as technical assistance that will allow producers to diversify and improve product quality in accordance with company requirements. Nevertheless, for efforts to be sustainable over time, the company must avoid giving in to protectionism toward local producers. Although in the short term it is necessary to provide support to start-up local providers, local industry must be capable of competing over the long term with other producers throughout the country and of diversifying its client base.

Development options and communication strategies

A company may opt to play a limited or non-existent role in local development, or it can choose to be proactive. The main development models available to a company are the following: assistential (when the company is concerned with minimal tasks, principally the provision of minor social services), productive (when the company engages in capacity building or the promotion of the manufacture or cultivation of a new product) or sustainable (when the company chooses to establish the conditions necessary for benefits to continue beyond the mine's lifecycle).

The local population and its leaders have their own visions and may propose development alternatives, which may or may not coincide with

experts' technical criteria. For example, a local mayor may request a sports arena, while company officials prefer to provide drinking water systems or rotating credit for agricultural producers.

Community benefits

Assuming that basic environmental standards are met, a large mining operation can generate important benefits for local communities, especially when it comes to isolated communities with limited access and infrastructure.

There does not appear to be a consensus regarding the benefits produced by the presence of a mining operation and the limited literature on the topic classifies such benefits differently. We will focus on six main areas of impact: increased local and regional economic flow; infrastructure development; employment (direct and indirect) and related social impacts; basic service development; development of productive capabilities; and the formation of social capital.

The Case of Yanacocha Mining Company

Yanacocha Mining Company

The Yanacocha Mining Company (Minera Yanacocha) operates in the department of Cajamarca in northeastern Peru. Its operations involve daily interaction with the districts of Cajamarca and La Encañada and the Cajamarquino and Llaucano river basins (as well as the sub-basins of the Mashcon and Porcon rivers).

The mineral deposit is located 4 000 meters above sea level, some 20 kilometers north of the city of Cajamarca. The mine is connected to the city by way of a 45-kilometer highway. It is a sparsely inhabited region of high-altitude plains, situated at the source of several ravines that irrigate Cajamarca, Porcon and La Encañada. Currently, four deposits are being exploited: Carachugo (1993), Maqui Maqui (1994), San José (1996) and Yanacocha (1997). Exploitation of the La Quinoa deposit is currently under evaluation. The company operates open-pit mines, treating extracted ore in leach pits that do not require crushers or mills. The process produces ingots of 70 percent gold and 30 percent silver.

The project's two processing plants process approximately eight million tonnes per year. Production increased from 2 535 kilograms of high-grade gold in 1993 to 41 300 kilograms in 1998, representing 44 percent of national production. During 1999, Yanacocha increased production to 47 061

kilograms (a 14 percent increase). Reserves are estimated at 20 million ounces (equivalent to 15 years of production).

The company has management and representation offices in Lima, a management office in Cajamarca, and another in the area of the operation. The company also has Public Relations and Rural Development offices in Cajamarca. The company is owned by Newmont (51.35 percent), Minas Buenaventura (43.65 percent) and the World Bank's International Finance Corporation (5 percent).

Area of influence: Cajamarca, Baños del Inca and La Encañada

The Cajamarca region's economy revolves around small-scale agriculture, livestock production, the dairy industry and tourism. According to the 1993 census, 48.5 percent of the economically active population (EAP) works in the primary sector, 35.3 percent in the service industry, and 16.2 percent in manufacturing. Most of the region's agriculture is carried out on parcels of land smaller than 3 hectares. Livestock production consists primarily of dairy cows.

The region's center is the city of Cajamarca. According to the 1993 census, Cajamarca had 117 509 inhabitants (or 324.97 inhabitants per square kilometer); Baños del Inca had 24 864 inhabitants (or 95.21 inhabitants per square kilometer); and La Encañada had 22 117 inhabitants (or 36.86 inhabitants per square kilometer). The majority of Baños del Inca and La Encañada residents live in rural areas and work in agriculture and subsistence fishing (some 90 percent of the EAP for La Encañada). Indeed, Cajamarca is one of the country's most rural departments: only 10 percent of the population lives in urban areas. Nevertheless, recent years have seen accelerated internal migration and urban growth in the districts of Cajamarca, Baños del Inca and La Encañada. Table 1 shows the relationship between population and EAP in Cajamarca.

Campesinos living near the mine are primarily small landholders. The only exceptions are the campesino communities of Tual, La Encañada (which

Table 1. Population and local EAP in Cajamarca.

| Districts | Population | | | EAP | | |
|----------------|------------|--------|--------|--------|---------------|------------|
| | Total | Urban | Rural | Total | Agriculture % | Services % |
| Cajamarca | 117 509 | 87 390 | 30 119 | 35 650 | 19.40 | 58.50 |
| Baños del Inca | 24 864 | 5 057 | 19 807 | 6 369 | 65.50 | 18.90 |
| La Encañada | 22 117 | 804 | 21 313 | 5 296 | 90.60 | 5.00 |

Source: www.inei.gob.pe/.

was recently created and lacks strong organization), and the Atahualpa Jerusalen de Porcon Cooperative. In addition to the political authorities specific to rural areas — lieutenant governors in the case of small villages and mayors, governors, and justices of the peace in the district capitals — there are also various women's associations and, most importantly, peasant patrols (*rondas campesinas*). These are self-defense organizations. They appeared during the mid-1970s to combat cattle-rustling, though later expanded as an organizational form from northern Cajamarca to other parts of the country, simultaneously taking on added political functions and eventually promoting development.

Relations between the actors

In the case of Yanacocha, we see a clear separation between the spaces of interaction and the actors that dialogue in each space. At the macroeconomic level beyond the space of the operation, there is a fluid relationship between Yanacocha and the Peruvian government authorities such as the Ministry of Energy and Mines, the Labour Ministry, and the tax-collection agency SUNAT. The company is an important economic actor that deserves governmental attention in the areas of the environment, taxes, and foreign trade.

The area adjacent to the mine comprises 35 *caseríos* (tiny villages), most of which are located south of the operation. During the land acquisition phase, company-community relations were fraught with conflict and in several communities the company's negotiators were expelled by stone-throwing local residents. Relations have improved significantly, due in large part to the fact that village residents are now the beneficiaries of a range of development programs sponsored by the company's Rural Development office or its counterparts. There is direct interaction between company officials and local political authorities and community leaders, as well as the only two organized campesino communities in the area. Relations are even better with consolidated organizations, which has allowed the company to design a clear work plan. The state has not intervened in relations between the company and the communities adjacent to the mine.

The city of Cajamarca and the village of Baños del Inca constitute the space of local public interaction between the mining company, government officials and regional civil society. Local authorities are a strong presence, especially the mayor of Cajamarca, who continually requests support for infrastructure and other public works for the city. The company's Public

Relations office interacts with diverse institutions and local organizations (such as the provincial municipality, various schools, unions, and government entities). In addition, Yanacocha interacts on a corporate level with local businesses by way of the company's participation in the Cajamarca Chamber of Commerce. Nevertheless, at the level of local public opinion, relations remain troubled.

In general, we see a compartmentalization of dialogue. There are bilateral relations between Yanacocha and local and national governments, between Yanacocha and local rural communities, and between the government and local communities. The actors do not venture outside the boundaries of their established relationships, and there is no three-way dialogue between government, company, and community. There are only bilateral relations in which one of the actors is always absent.

Land acquisition

Most of the lands acquired by Yanacocha were grazing lands. What little agriculture was practiced was non-irrigated and of a marginal nature compared to production standards in the area. Many campesinos had sizeable extensions of land, some more than 100 hectares. Yanacocha dealt with large and mid-sized owners and with small landholders that ended up selling less than one hectare.

The lands were used for grazing based on seasonal movement of livestock. In the area of the mine, there were between 2 000 and 2 500 head of livestock, mostly sheep and, to a lesser degree, cattle, as well as horses and camelids. The livestock was largely of mixed strains and low productivity. The area has the lowest levels of milk production in the province.

Landowners' education levels are very low. Among the 41 Combayo area heads of household who sold land (31 men and 10 women), 21 are illiterate, 19 have a primary-school education and only one has incomplete secondary school education. All ten of the female landowners are illiterate and only two of the partners of male household heads have incomplete primary school education. This situation limits the possibilities for equal negotiation between campesinos and the mining company and must be taken into account during land negotiations or any other subsequent transaction.

Land acquisition began in August 1992 by way of direct negotiation. Separate transactions took place between specialized buyers from the mining

Table 2. Lands purchased by Yanacocha Mining Company
(by amount of land, number of sales and number of families selling).

| Year | Amount of land | | Number of sales | | Families selling | |
|-------|----------------|-------|-----------------|-----|------------------|-----|
| | Hectares | % | Number | % | Number | % |
| 1992 | 1 070 | 10.5 | 8 | 5 | 8 | 6 |
| 1993 | 2 047 | 20.0 | 15 | 10 | 10 | 8 |
| 1994 | 166 | 1.6 | 3 | 2 | 1 | 1 |
| 1995 | 1 374 | 13.5 | 13 | 8 | 8 | 6 |
| 1996 | 3 245 | 31.8 | 58 | 37 | 56 | 44 |
| 1997 | 1 116 | 10.9 | 38 | 24 | 32 | 25 |
| 1998 | 1 126 | 11.0 | 19 | 12 | 10 | 8 |
| 1999 | 65 | 0.6 | 3 | 2 | 1 | 1 |
| Total | 10 210 | 100.0 | 157 | 100 | 126 | 100 |

Source: Yanacocha S.A.

company and each campesino landowner. Between 1992 and 1999, Yanacocha purchased a total of 10 200 hectares of land. (Table 2.)

Initially, the company paid between US \$80 and US \$100 per hectare (between 100 and 200 *soles* at the time). These prices were greater than those paid by campesinos in their own internal transactions. In 1995 and 1996, prices increased significantly, in part because of a reappraisal of lands, but probably also because of protests and the actions of third-party agents. According to information from Yanacocha officials, an estimated 80 percent of the cases required the formalization of ownership documents prior to the sale, since many lands were not registered. This situation is common in many parts of the Peruvian Andes.

The bulk of Yanacocha's land acquisition took place during the years 1993 (20 percent) and 1996 (31.8 percent). In a total of eight years, the company realized 157 transactions with 126 families. Several families sold lands to the company on more than one occasion.

In Peruvian *soles*, the price paid by Yanacocha in Combayo increased annually, while the amount of land decreased. In 1996, the company paid six times as much money for less than two and a half times land than in 1992. (Table 3.) The presence of terrorism in the area in 1992 partially explains this trend. The increase in prices paid in dollars is less significant but nevertheless notable: the company paid six times more for the last plot purchased than for the first plots. Currently, there are few land purchases and prices are much higher than during the first years of the company's presence. Depending on land quality and location, the company now pays between US \$900 and US \$1 000 per hectare.

Table 3. Combayo area land sales by extension, price and year of sale.

| Year of sale | Hectares sold | | Number of families | Prices/hectare USD (soles) | Price/year USD (soles) |
|--------------|---------------|-------|--------------------|---|------------------------|
| | Amount | % | | | |
| 1992 | 1 505.74 | 38.5 | 18 | 80 (100) | 125 285 (156 606) |
| 1993 | 1 719.66 | 42.0 | 17 | 37 (73) 50 (100) 100 (200) | 114 987 (228 824) |
| 1995 | 62.00 | 1.5 | 3 | 400 (900) 444 (1 000) | 25 244 (56 800) |
| 1996 | 681.55 | 18.0 | 13 | 278 (681.8) 367 (900) 530 (1 300) 551 (1 350) 600 (1 471) | 374 492 (917 506) |
| Total | 4 068.95 | 100.0 | 51* | | 640 008 |

Source: Socioeconomic condition of campesino families who sold lands to Yanacocha Mining Company. August 1998.

* Several of the 41 families sold lands on more than one occasion.

The prices paid by Yanacocha were higher than those paid in the precarious internal land market. In 1992, campesinos paid between US \$36 and US \$48 per hectare of pasture (between 45 and 60 *soles*) in transactions between parties of similar socioeconomic level. In traditional societies, prices are fixed more according to the nature of the relationship between the two parties than according to the object being sold.

More than half of the sellers spent their money on non-productive consumption (primarily food and clothing), such that the money did not serve to replace the economic activity they had lost as a result of selling their lands. Nearly a fifth of the sellers used the money to buy other plots, usually smaller than the plots sold but nevertheless with water resources necessary to continue agricultural activities. The remaining families appear to have converted their money toward urban activities.

Therefore, we can distinguish between three groups of sellers: those who lacked sufficient lands for either agriculture or livestock production had to turn to other activities; those who, having lost their pasture lands, turned to agriculture or the production of improved livestock strains fed on irrigated grasslands; and those who still possess plots in the highlands or who graze their livestock in areas adjacent to the mining company. Each of these groups corresponds to a different model of productive transformation.

The first land acquisitions sparked a series of problems and complaints regarding land prices and the company's supposed failure to comply with promises made at the moment of sale. The first conflicts arose in 1993. With

support from the provincial mayor and church parish, sellers in the area of Porcon demanded a “fair price” for their lands, jobs at the mine, the declaration of intangible zones, and mining royalties. Yanacocha and the plaintiffs reached an agreement and signed a declaration of reconciliation that stipulated payment for activities or constructions not authorized by the owners or landholders.

In 1994, a similar conflict arose between Yanacocha and sellers in the Combayo area. After the company prevailed in court, the Bishopric of Cajamarca and the National Human Rights Coordinating Committee stepped in to mediate. The parties reached an agreement under which the company provided US \$150 000 (plus 10 percent for administrative costs) for an NGO to establish a rotating credit fund for livestock and equipment purchases, livestock improvement and various commercial activities.

In general, the greatest problems regarding land transfer arose during the initial purchases. Yanacocha corrected these problems in subsequent years by changing purchasing agents, formalizing and increasing transparency in the transactions, following up with families, and raising the price paid per hectare. Yanacocha has sought to maintain good relations with former landholding families, giving them priority attention in company-sponsored development projects, as well as the assignment of temporary jobs within the company and its subcontractors. Yanacocha has close to 550 members of the 126 former landholding families registered, who are then contracted on a rotating basis for the 250 unskilled jobs required by the mine and its subcontractors. In addition, the company has hired a small group of the sellers’ relatives on a permanent basis.

Cajamarca residents’ demands, expectations and perceptions

Regardless of the actual effect Yanacocha may have on the city of Cajamarca, it is worth noting the population’s demands and perceptions, since these will guide their opinions, attitudes and behaviour toward the mining company.

Development demands

In general, the population views Yanacocha as an opportunity, but one it is unsure of how to best exploit. Cajamarca residents believe the company must approach the city in a more integral manner. The population demands more job opportunities for Cajamarca locals and expects the company to provide infrastructure and a market for products both at the city and regional levels.

Cajamarca residents want to see their city become a development pole, though it is worth noting their lack of awareness regarding Yanacocha's rural development activities.

The population assumes that Yanacocha has a commitment to Cajamarca, both because the company extracts resources from the area and because the company uses the city as a "base camp." Starting from these premises, the population demands that Yanacocha "leave something behind," such as public works, and that the company contribute to the city's urban development.

The population demands that Yanacocha improve the services it uses, such as the airport, highways, hospital and sports, recreation, and educational centers (by assisting schools and libraries or building sporting arenas, for example). The population also looks to the company to contribute to regional development by supporting the university and encouraging it to create professionals that can later work in the mining sector.

Nevertheless, public opinion is ambiguous regarding the company's use of the city to house its employees, or its use of facilities such as the Inca Club or local schools. Most Yanacocha and subcontractor employees live in the city of Cajamarca or in the village of Baños del Inca. In addition, there are two small camps (for subcontractors) near the mine that provide temporary residence for workers. Under this system, there is a continual movement of workers from the city and base camps to the mine, which is viable given the reduced number of workers and Cajamarca's proximity.

The case of the Atahualpa Jerusalen de Porcon Alto Cooperative

The Porcon Farm is a unique model of agrarian organization in Cajamarca. The cooperative was created during the agrarian reform era of the 1970s and has managed to survive the crises and dissolution process that destroyed most other cooperatives. It has maintained its cooperative nature thanks to a semi-entrepreneurial management style that has converted the cooperative into a model for development in the areas of dairy production, forestry activities, and tourism. Two factors appear to have been key to the cooperative's success: the constant and sustained support of an NGO and a Belgian international cooperation agency (in the forestry program); and the religious convictions of cooperative members, which provide for group cohesion around the figure of a manager-minister who enjoys undisputed leadership.

The co-operative sold lands to Yanacocha on two occasions, both of which were negotiated directly with mining company managers. In addition to receiving a higher price than individual sellers (1 400 hectares at 600 soles per hectare on the first occasion; 715 hectares — valued between 800 and 1 000 soles depending on the quality — on the second occasion), cooperative members got the company to build a fish-farming facility and bungalows. In addition, the cooperative's contract included clauses on the reversion of lands once the mine closes, timber purchases, and environmental protection. Cooperative members plan to invest the money in the establishment of a sawmill in the city of Cajamarca.

This case seems to suggest that sales negotiated through a corporate intermediary, if well organized, offer greater possibilities for a successful transaction that benefits both parties.

Although the population views the mine as a potential market for its products, there is a gap between the nature and quality of locally offered products and the mining company's consumption needs. The population's expectations that the mine become a huge market for local production did not coincide with reality.

Since Cajamarca was ill prepared for the arrival of the mining boom, outsiders tended to benefit from the demand for goods and services generated by Yanacocha and other companies based in the region. Many suppliers are based in Lima or Trujillo, and have not even established offices in Cajamarca. Fuel, for example, is provided by Mobil. Most supplies come from Lima, which limits the possibility of generating added value that remains in the region.

Nevertheless, the few local purchases that Yanacocha made, together with those of other, smaller mining companies, have been sufficient to influence the development of commercial sectors and some services in Cajamarca. Several local businesses approached Yanacocha and now supply various products. The company has a list of local suppliers and has started a policy of rotation among them, in an attempt to give equal treatment.

In general, Cajamarca has benefited from increased availability of high-quality "imported" products and from an increase in the number of small stores open to the general public. According to city residents, these trends have been accompanied by an increase in the cost of living.

Meanwhile, the service sector has also grown: vehicle maintenance has improved and dropped in price and there is an increase in the number of transport companies operating, as well as an increase in the number of passengers. Public service infrastructure has increased, such as electricity — Yanacocha uses close to one-third of the energy consumed in Cajamarca — as a result of government-sponsored service and infrastructure development policies. With regards to the provision of goods and services, it is worth mentioning that Yanacocha experimented with the creation of a local service provider. The attempt failed, basically because of internal management problems. Contracted companies provide Yanacocha with the goods and services required for operations, personnel maintenance and related activities.

In summary, as much as possible Yanacocha tries to incorporate local suppliers into its product-acquisition network. Nevertheless, this intention is limited by the local production capacity's inability to meet company needs. This can be because local producers cannot meet necessary quality standards, or because required products are not produced locally and there is no capacity to do so.

Effects on the city of Cajamarca

According to the interviews and focus groups conducted for this study, the population sees a direct relationship between the progress experienced in recent years and the mine's presence. The population appears not to take into account the fact that Yanacocha's arrival coincided with the decrease of terrorism and the country's general economic upswing. The public believes that Yanacocha has brought economic growth to Cajamarca, as noted by the appearance of small commercial centers, improved services, an increase in the automotive fleet, and urban growth.

This development is viewed ambivalently, due to the rising cost of living and dollarization of prices, the arrival of outsiders, the deterioration of "decent customs" and an increase in crime.

The city's development has attracted people from the coast, whose customs clash with those of *Cajamarquinos*. Mine workers are viewed as nouveau riche who are disorderly, rough, and who are accused of reducing the social space of local residents.

Locals perceive the creation of a new elite, reflected, for example, in the creation of the Davy School (1995). The school is said to promote an unpatriotic, "foreign" style of teaching that does not respect national realities and culture. Locals accuse the school of charging high tuition rates and of favouring the children of mining company employees.

For Cajamarca residents, the most salient negative effect of the mine is the deterioration of decent customs, due to the appearance of nightclubs, and a supposed increase in prostitution. According to official figures, there are 14 nightclubs in Cajamarca (although the figure could be as high as 20 according to unofficial figures). Most of these are located on the outskirts of town; nearby residents blame them with upsetting the general order and creating instability.

The population also complains of a significant increase in crime. Residents feel that Cajamarca has gone from a safe, peaceful city to one where no one leaves the door to their house unlocked or their car unattended, even during the day. This situation is attributed to "unsavory characters" that have come to Cajamarca because of the illusion of prosperity created by the mining company.

Perception of the mine's environmental impacts⁴⁵

Although Yanacocha prides itself on not contaminating the environment, Cajamarca residents harbour doubts regarding the company's claims. Many believe that the mine does indeed contaminate the area. The population's view is based on general impressions and rumours regarding the mine's activities, as well as past experiences with other mining companies.

Residents accuse the company of general (unspecified) environmental contamination, water contamination (considered serious, since the mine operation is located at the headwaters of three ravines) and harm to animals and humans. There are rumours regarding workers afflicted with respiratory and gastrointestinal problems as a result of working at the mine.

Public officials, authorities, and NGO representatives recognize that there is currently no evidence of contamination, but add that it would probably only be measurable within ten or fifteen years.

Since people act according to the perception and not necessarily according to facts, it is worth noting the positions that currently exist in Cajamarca with regard to the issue of contamination. Radicals call for Yanacocha's expulsion, while moderates want to declare certain areas off-limits to mining activity. Others adopt a more conciliatory position, calling for increased access to information and improved communication on the part of the company, as well as the creation of an independent body that would conduct an independent environmental impact study (something that has not yet been done). A third group is not concerned with the problems of contamination so much as with the demand for employment.

Campesino "common sense" holds that a mine always contaminates (whether as a result of wastes, carbon monoxide, toxic fumes, or dust). Nevertheless, campesinos tend to feel that the mine's potential benefits outweigh its potential harm.

Although Yanacocha's daily operations do not seriously contaminate the environment, the population believes, for different reasons, that the company is responsible for a series of phenomena, imaginary or real. Three arguments explain this situation:

⁴⁵ After this study was completed, there was a mercury spill near Yanacocha that was quickly remedied by the mining personnel. Ignorance on the population regarding the toxicity of mercury played a great role in the few intoxication cases reported. People stored mercury in their houses thinking that it was a valuable commodity. In spite of the quick action taken by the company, the mining authority imposed a severe fine of almost US \$ 300 000. Education campaigns to prevent future accidents have been implemented in the area.

1. people lack information about mining industry advances in the area of environmental protection and so continue to believe that mines are always a source of contamination;
2. some local authorities “need to believe” that the mining industry contaminates in order to utilize the environmental issue as an excuse with which to obtain resources from the company; and
3. environmental issue can be used as a political banner with which to mobilize the population, not necessarily against the mining company, but against the government and its economic reforms. Obviously, these explanations are not mutually exclusive and it is likely that all three contribute to the population’s position.

Development options for Cajamarca and surrounding areas and Yanacocha’s communication strategies

Yanacocha responds to the population’s demands in accordance with its own criteria, possibilities, and priorities. The company actively participates in local development using a range of intervention strategies: an immediate-term strategy for rural communities adjacent to the mine, an urban strategy for the city of Cajamarca, and finally, a strategy of regional development. (See Table 4.)

Rural development strategy

For several years, Yanacocha has experimented with a range of social promotion activities in the areas adjacent to the mine. The first consisted primarily of direct assistance. Later, the company experimented with social promotion and productive activities via third-party mediators. Most recently the company has attempted to articulate third-party efforts around a single local development strategy. Each stage has been associated with a change in the way the company conceived its role in local development promotion. It is interesting to note how company efforts have evolved from immediate-term assistentialism to a project of long-term regional sustainable development.

During the first stage (1993–1995), company activities were monitored by the Yanacocha Association, the company’s foundation, in conjunction with the Yanacocha Women’s Association (ADAMINYA), an organization created by company management that groups the wives of company executives and professional personnel. The small work team concentrated on direct assistance in the areas of health and nutrition (a nursing program, first-aid courses, communal first-aid kits, the distribution of medicines, and the

Table 4. Yanacocha Association projects, 1994–1997.

| Project | Period | Beneficiaries (executor) | Amount programmed US \$ |
|---|---------------|---|------------------------------------|
| Community assistance program | | | |
| Support for education | 1994–1997 | Children, youth and teachers | 200 000 |
| Preventative health program | 1994–1997 | Surrounding population | 100 000 |
| School lunch program | 1994–1997 | Children and youth | 380 000 |
| Nutritional support program | 1995–1997 | Children and youth (Prosay) | 36 000 |
| Peasant patrol support program | 1994–1997 | Surrounding communities | 100 000 |
| Community rural development program | | | |
| Agricultural development program | 1995–1997 | Campesino producers (Prosay) | 300 000 |
| Community forestry program | 1995–1997 | Community residents (Adefor) | 180 000 |
| Improved grazing lands program | 1995–1997 | Former landowners | 180 000 |
| Grazing land and livestock research | 1996–1997 | Jalca breeders (Adefor, Incalac) | 30 000 |
| Technical training program | 1995–1997 | Campesinos and former landowners | 45 000 |
| Income generation program | 1996–1997 | Local women's organizations (Prosay) | 100 000 |
| Social and productive infrastructure program | | | |
| Productive infrastructure program | 1995–1997 | Surrounding communities | 360 000 |
| Rural highway construction program | 1994–1997 | Local communities | 5 000 000 |
| Social infrastructure program | 1994–1997 | Local communities | 280 000 |
| Rural clean-up program | 1995–1997 | Communities, schools and surrounding posts (Prosay) | 150 000 |
| Davy School | 1995–1997 | Children and youth from Cajamarca city | 750 000 |

Source: Yanacocha Association, (mimeograph).

construction of various health posts) and education (construction or rehabilitation of educational centers, distribution of educational materials, teacher training courses, subsidized transport for teachers and school breakfast programs). Little by little, these activities expanded to include some issues of productive development, with a total of 35 small villages participating.

During the second stage (1996–1998), three programs were given priority: community assistance, rural development, and support for the development of social and productive infrastructure. For project implementation, Yanacocha established agreements with diverse institutions specialized in various areas of rural development, as well as with government and international cooperation agencies. An alliance with CARE gave rise to the Yanacocha Food Security Project (Prosay), which focused on such areas as health and education, productive development, school nutrition, highway construction and rehabilitation, environmental clean-up, and rotating funds.

Thus the company's development promotion activities were taken on by specialized third parties. In addition to CARE, Yanacocha signed agreements with Adefor (for forestry programs and campesino training),

Cipder and Edac (for agricultural promotion and credit programs), the Ministry of Health (for programs targeting severe diarrheic disease and acute respiratory infections, as well as health promoter training), and others. In addition, the company has signed or hopes to sign agreements with the Inter-American Foundation, PMA (small projects with women), the Embassy of Holland and other institutions for a range of programs.

During the third (current) stage, the company is attempting to coordinate and better articulate efforts undertaken by diverse institutions. Toward this end, the company created a Rural Development Office as the coordinating entity for the institutions working in the area of the mine that receive total or partial funding from Yanacocha.

Thus we see that Yanacocha moved from a strategy of sporadic attention to specific beneficiaries to a strategy aimed at forming a development "belt" around the mine, and is now oriented to the design of a more integrated strategy. Although it is difficult to verify without rigorous evaluation, Yanacocha's actions to date appear to have been successful, both in terms of the expansion of basic services (hygiene, education and health) and the rural highway program.

Funding for Yanacocha's development activities comes from different sources, including from the company itself, the Yanacocha Women's Association (ADAMINYA), and the various organizations engaged in program implementation (primarily CARE). The Yanacocha Association was created to administer and raise funds related to the company's development programs.

The Yanacocha Food Security Project (Prosay), a joint project with CARE, was implemented between 1996 and 1998, after a six-month pilot project in 1995. In three years, the project managed a budget of US \$1 055 841, of which CARE provided US \$562 237 (or 53 percent) and Yanacocha provided US \$373 180 (35 percent). The remainder came from ADAMINYA (6 percent) and self-generated funds (6 percent). Although the project's central objective was to gradually eliminate food insecurity in the 28 small villages adjacent to the mine, the project also encompassed productive activities, basic infrastructure development, and training courses. The project's five components are agricultural development, income generation, health and nutrition, hygiene and potable water, and school breakfast programs. Table 5 shows Prosay beneficiaries.

Table 5. Number of Prosay beneficiaries, by project component.

| Project component | Beneficiaries | |
|-----------------------------|--------------------|-------------------------|
| | Number of villages | Number of beneficiaries |
| Agriculture | 13 | 146 families |
| Income generation | 13 | 216 families |
| Infant health and nutrition | 18 | 446 families |
| Hygiene and potable water | 4 | 264 families |
| School breakfast program | 21 | 2 031 school children |

Source: Prosay final evaluation. Cajamarca, May 1999.

Since it is not yet possible to thoroughly evaluate the diverse components of Yanacocha's rural development activities, we will concentrate on an evaluation of the Prosay project.

The project has benefited 650 families (36 percent of the 1 818 families estimated to live in the area around the mine), while several families have benefited from more than one project. In three villages, all five project components were implemented; in four villages, four project components were implemented; in five villages, three components were implemented; in six villages, two components were implemented; and in 12 villages, only one component was implemented (generally the school breakfast program).

Urban and regional development

One of Yanacocha's weakest points is its relations with the city of Cajamarca. In part, this is due to the fact that operations began at a time when terrorism was still present in the region, since the company had to worry about protecting personnel and keeping a low profile. But the failure is also due to a lack of understanding regarding the local context and an inadequate communication policy.

Yanacocha's urban strategy is implemented via the Chamber of Commerce, in which company managers and officials from its Public Relations office in Cajamarca participate. Yanacocha is re-evaluating its strategy for Cajamarca, which has not been as successful as its rural development programs. In addition, the company's urban strategy includes regional components that move beyond the city itself.

The strategy's main objective is to promote competitiveness in a series of areas considered central to the region's economic development. Toward this end, Yanacocha and the German Technical Cooperation Agency have created Pro-competir, a competitiveness center.

The three target areas (forestry, the dairy industry and tourism) were identified in a study conducted by the Advanced School for Business Administration (ESAN) students and professionals (Indacocha 1998). The idea is to consider capacity building an investment, and to train new entrepreneurs who can later collaborate on joint proposals and strategies.

In certain respects, Yanacocha's urban strategy competes with the "consensus roundtable" (*mesa de concertación*) initiative first proposed in 1993 by Asodel and the provincial municipality of Cajamarca. The roundtable initiative attempts to bring together NGOs and local, regional, and central government institutions to draw up a common development agenda for the province of Cajamarca.

Communication strategy

Information regarding Yanacocha and its activities is not distributed equally among Cajamarca residents. According to information gathered in interviews and focus groups⁴⁶, residents of outlying urban areas are generally better informed than those living closer to the city center. Municipal officials and NGO representatives are the best informed.

Yanacocha only began its public relations policy after operations had begun, and tended to direct the policy toward elites and regional authorities. In 1993, the company conducted an accelerated and selective campaign designed to familiarize national, regional and local authorities with the company's activities.

Community relations were still rather discreet and directed toward the most important regional institutions. In general, Yanacocha implemented a community relations policy that company officials characterize as "low profile." In addition to the official public relations policy, one must consider the effect of "unintentional relations";⁴⁷ that is, the population's perception of the company formed over the course of daily interaction with company officials and employees. The effects of these intentional and unintentional

⁴⁶ Four focus groups were conducted: two with primary and secondary school teachers, one with members of a mother's club from an outlying urban area, and one with students from the Cajamarca National University. The themes of discussion were participants' general attitudes and opinions regarding Yanacocha Mining Company and its effects on the city, Cajamarca's economy, and the environment.

⁴⁷ By "unintentional relations" we mean those relations or components thereof that originate in the population's perceptions (always subjective) regarding company agents. These perceptions are generally based on the population's emotions or subjective interpretation (often culturally based) regarding company employees.

relations taken together have not been positive: in general, the population perceives company employees as arrogant, authoritarian, contemptuous and not respectful of local customs and usage.

In the last few years, Yanacocha has experimented with a more open policy, but this change is not completely apparent to regional elites, while the majority of city residents maintain an image of the company formed during earlier years. In any event, there is no noticeable change in the company's "unintentional relations," which makes it difficult to improve the company's image with regards to regional society.

Yanacocha is viewed as a company that does not approach regional institutions and that behaves as if it were an enclave. This general impression does not necessarily correspond to reality, since Yanacocha has established relations — although in a limited manner at first — with regional society. This once again reveals that public opinion is not based solely on information, but rather on images built upon common sense and fragments of observations and overhead conversations among people or institutions linked to the company. For example, it is rumoured that Yanacocha lent support to one of the mayoral candidates during recent elections. Regardless of whether the rumour is true, people react and form opinions as if it were. As a result, the population has adopted a wary attitude toward Yanacocha, which contrasts with the attitude of most of the smaller institutions that are primarily concerned with obtaining whatever they can from the mine.

Benefits in the province of Cajamarca and the region

Yanacocha benefits the region in terms of activities linked directly to the operation itself (goods and services required by the company and its subcontractors), development and social promotion activities conducted by the company's Rural Promotion office, and the company's participation in Cajamarca business associations. Indirectly, Yanacocha contributes to regional, provincial and district level mining royalties. In addition, the company's presence has invigorated various other activities.

Direct and indirect employment

Yanacocha directly contracts few local personnel. According to company figures, in 1994 the company had 155 workers, 220 in 1995, 269 in 1997, 337 in 1998, and 466 workers through mid-1999. Nevertheless, these figures underestimate direct employment generated by the mine, since they do not

Table 6. Number of employees at Yanacocha Mining Company and principal sub-contractors.

| Employment at Yanacocha | Permanent | | | Temporary | | | Total |
|-----------------------------|-----------|------------|------------|-----------|-----------|------------|--------------|
| | Exec | Emp | Lab | Exec | Emp | Lab | |
| Yanacocha Mining Co. | 0 | 266 | 0 | 0 | 3 | 0 | 269 |
| Odebrecht JJC Asociados | 3 | 44 | 290 | 0 | 0 | 0 | 337 |
| Zublin Chile Suc. Perú | 0 | 0 | 0 | 0 | 60 | 325 | 385 |
| Constructora Odebrecht S.A. | 2 | 13 | 109 | 0 | 0 | 0 | 124 |
| Overseas Bechtel Inc. Perú | 0 | 0 | 0 | 0 | 30 | 0 | 30 |
| Total | 5 | 323 | 399 | 0 | 93 | 325 | 1 145 |

Exec = executives; Emp = white collar employees; Lab = Labourers (blue collar employees).

Source: MTPS, 1997.

incorporate workers at subcontracted companies that perform tasks central to the mining operation, such as demolition and mineral transportation.

According to figures from 1997 (see Table 6), direct employment generated by Yanacocha and its four primary subcontractors rose to 1 145 workers (both permanent and temporary), 63 percent of whom were labourers (blue collar employees) and 36 percent were white collar employees (36 percent).

60 percent of Yanacocha workers have been hired from within the region (45 percent of whom were born in Cajamarca), 35 percent hail from other parts of the country and 5 percent are foreigners. While the majority of unskilled workers have been contracted in Cajamarca, this does not necessarily mean they are *Cajamarquinos*.

Yanacocha gives priority in unskilled temporary jobs to former landowners and imposes this condition on its subcontractors as well. The company also aims to contract personnel from the area, and ads in this vein appear in local newspapers and on its office doors. Nevertheless, there are few local specialists capable of filling the positions available. Although unskilled workers receive minimal training, the company does not have an official policy of training the local population in order to incorporate them into the company's work force.

Nevertheless, Yanacocha indirectly generates important amounts of employment in the Cajamarca region. While precise figures do not exist, it is important to estimate this trend in order to evaluate the mine's impact. The 46 mid-sized Cajamarca companies that supply Yanacocha employ 1 119 people, while the 378 small suppliers employ 1 890 people, for a total of 3 009 people. Table 7 illustrates this relationship.

Table 7. Indirect employment in Cajamarca (Yanacocha suppliers).

| Companies | Permanent | | | Temporary | | | Total |
|--------------|-----------|-----|-----|-----------|-----|-----|--------------|
| | Exec | Emp | Lab | Exec | Emp | Lab | |
| Medium (46) | 33 | 283 | 329 | 3 | 46 | 425 | 1 119 |
| Small (378) | - | - | - | - | - | - | 1 890 |
| Total | - | - | - | - | - | - | 3 009 |

Exec = executives; Emp = Employees; Lab = Labourers.

Source: MTPS, 1997.

The wages and salaries paid by Yanacocha and its subcontractors are above average for the Cajamarca region, especially in the case of employees, who receive more than 200 percent more than they would working elsewhere in Cajamarca (Table 8). For these employees, pay rates are similar to those in Lima. In the case of labourers, the difference is not as great (between 111 and 158 percent).

Table 8. Yanacocha Mining Company: average monthly wages and salaries, US \$.

| Companies | Permanent workers | | | Temporary workers | | |
|---|-------------------|--------------|-------------|-------------------|-------------|-------------|
| | Exec | Emp | Lab | Exec | Emp | Lab |
| Minera Yanacocha S.A. | 0 | 1 155 | 0 | 0 | 2 258 | 0 |
| Odebrecht JJC Asociados | 3 015 | 641 | 282 | 0 | 0 | 0 |
| Zublin Chile Suc. Perú | 0 | 0 | 0 | 0 | 840 | 286 |
| Constructora Odebrecht S.A. | 3 469 | 728 | 155 | 0 | 0 | 0 |
| Overseas Bechtel Inc. Perú | 0 | 0 | 0 | 0 | 1 088 | 0 |
| Average Yanacocha and subcontractors | 3 197 | 1 067 | 247 | 0 | 966 | 286 |
| Average salary in Cajamarca* | 735 | 378 | 222 | 961 | 388 | 181 |
| Increase | 435% | 282% | 111% | n.a. | 249% | 158% |

Exec = executives; Emp = Employees; Lab = Labourers.

* Figures for medium-sized companies with more than 10 workers on the payroll.

Source: MTPS, 1997.

According to 1997 figures, Yanacocha created some 3 696 jobs at the provincial level, equivalent to 5.5 percent of the EAP. This figure could increase over time, as various suppliers registered in Lima, such as Ferreyros, are opening offices in Cajamarca in order to serve Yanacocha better. This would imply increased local employment.⁴⁸ The impact of the mine's employment on EAP is illustrated in Table 9.

⁴⁸ Indeed, the employment figure for Cajamarca suppliers could be augmented with part of the employment generated by companies that supply Yanacocha from other parts of the country, specifically Lima, whose total employment (though not entirely due to Yanacocha contracts) was 1 626 jobs in 1997.

Table 9. Impact of Yanacocha-generated employment on EAP of the Province of Cajamarca (1997).

| | Employment generated | Impact on EAP, Province of Cajamarca |
|------------------------|----------------------|--------------------------------------|
| <i>Direct impact</i> | | |
| Minera Yanacocha | 161 | 0.2% |
| Subcontractors | 526 | 0.8% |
| Subtotal | 687 | 1% |
| <i>Indirect impact</i> | | |
| Suppliers in Cajamarca | 3 009 | 4.5% |
| <i>Total</i> | 3 696 | 5.5% |

Source: MTPS, 1997.

Development of basic services

Yanacocha's presence contributes directly and indirectly to the provision of basic services in both the city of Cajamarca and rural areas. In Cajamarca, Yanacocha created and maintains the Davy School, which offers quality education for mine workers and the general population. Yanacocha also collaborates in the operations of various other schools. In addition, the company has helped reopen the Incas Club, a regional recreation center.

In rural areas, agreements with the health and education ministries as well the Prosay program (Yanacocha Food Security Program) have provided for the implementation of medical posts, schools, and drinking water systems.

The school breakfast program began in coordination with local teachers and parents' associations. In three years, the program provided 5 963 meals to 2 031 school children. The program reached 19 villages during its first year and 21 villages during its second and third years. Eleven community kitchens participated in meal preparation. Meals were distributed in exchange for parents' participation in the construction and repair of highways and roads, (although there are no figures regarding the current condition of such roads, nor number of kilometers affected).

According to a company evaluation, malnutrition among 5 year-olds decreased from 35.5 percent to 12.4 percent in ten villages during the program's first year (1996–1997), and from 21 percent to 15.7 percent in eleven villages during the second year (1997–1998).

The health project aims to improve women's awareness, attitudes and abilities regarding hygiene, nutrition, and illness detection. At the same time, Yanacocha sponsored a program to construct medical posts. Yanacocha organized health and nutrition training courses in 21 villages. These courses presented topics such as breast feeding, as well as how to recognize the symptoms of diarrhea and pneumonia — that is, the etiology of severe

diarrheic diseases (SDD) and severe respiratory infections (SRI). There has been a significant decrease in SDD (from 13 percent in 1996 to 3 percent in 1998), and SRI (from 46 percent in 1996 to 14 percent in 1998). While SDD rates are much lower than those in non-participating villages, SRI rates are much the same for participating and non-participating villages (16 percent).

Infrastructure and access

Yanacocha has benefited the region in terms of the extension, maintenance and improvements to the area's principal highways and smaller rural roads. Although Yanacocha has not undertaken large-scale highway construction projects, it repaired highways to the coast affected by heavy rains during the 1998 El Niño phenomenon. In addition, Yanacocha widened and improved the road leading from Cajamarca to the highland areas where the mining camp is located. In general, campesinos indicate that road construction saves them significant travelling time. In quantitative terms, between 1994 and 1997, the company built 79 kilometers of new roads, improved 53 kilometers and paved 15 kilometers. In addition, Yanacocha has conducted studies regarding the possible construction of 25 kilometers of additional roads.

The remainder of infrastructure activities focused primarily on hygienic works and the installation of drinking water systems.

Improvement in local and regional productive possibilities

In this section we analyze Yanacocha's goods and service providers, drawing upon the work of Kuramoto (1999). Although we distinguish between suppliers from Lima and those from Cajamarca, this is an artificial division that has disappeared over time as Lima based companies open offices or branches in Cajamarca, leading to increased local impact in terms of employment and purchases. This is a natural process that is expected to increase in the future: at first, all supplies come from Lima (or abroad), but gradually local capacity develops. Another effect we see over time is that certain products brought in from abroad begin to be produced locally or nationally. This result depends on developments in the mining sector at the national level, as well as adequate training and research policies.

Product suppliers

The number of product suppliers increased from 332 in 1993 to 566 in 1998. Most of these companies are based in Lima, although the number of Cajamarca-based suppliers has almost doubled since the mine began operations.

It is important to distinguish between product suppliers that manufacture mining equipment and inputs, and those that merely sell

imported products. With regards to the first category, Yanacocha's relations have been sporadic and fairly weak. In the case of mining equipment, Yanacocha has used few national suppliers, largely because the company utilizes relatively new technology as a result of the scale of its operations. Like most large-scale mining projects, Yanacocha's design and construction were assigned to a foreign engineering firm. These companies not only design the processing plants, but also identify equipment suppliers and effect purchases, at the same time as managing the entire project during the construction phase. In addition, national companies — with a few exceptions — are unable to compete with foreign suppliers, whose costs are lower and whose commercial distribution systems are more efficient.

Companies that import products have a greater capture of Yanacocha's purchases. This is true of companies that supply standard mining equipment such as trucks, front-end loaders, compressors and drill rigs (Ferreyros), as well as subsidiaries of foreign companies (Ingersoll Rand, Atlas Copco, Baker Hughes, etc.).

These companies' capture of mine purchases has increased, principally because new companies have opened and/or because the range of products imported by existing companies has increased. Ferreyros is opening a warehouse near Cajamarca in order to provide better service, which will undoubtedly have an impact on employment and the local economy. It is worth noting that one Cajamarca-based supplier is among Yanacocha's 20 principal suppliers.

Although non-manufacturing suppliers predominate, it is important to note that several national companies, such as FIMA (mechanical equipment), FAMESA and EXSA (explosives) were among Yanacocha's top ten suppliers during several years.

Finally, Yanacocha's purchases have increased substantially since operations first began. This is principally due to an increase in the mine's production volume, which requires an increase in inputs and materials. Table 10 illustrates this.

Table 10. Yanacocha: product purchases, 1993–1998.

| | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|-----------------|-----------|------------|------------|------------|------------|------------|
| Cajamarca | 6.2% | 12.0% | 6.4% | 7.0% | 6.2% | 3.0% |
| Provinces | 0.4% | 0.7% | 0.5% | 0.5% | 0.6% | 0.4% |
| Lima | 52.5% | 73.2% | 60.0% | 71.6% | 71.1% | 77.5% |
| International | 40.9% | 14.1% | 33.1% | 21.0% | 22.1% | 19.1% |
| Purchases US \$ | 7 677 496 | 15 600 168 | 26 618 054 | 30 304 296 | 37 592 148 | 68 285 359 |

Source: Evaluation based on data provided by Minera Yanacocha S.A.

Cajamarca product suppliers

For an idea of the scale of these companies' Yanacocha-related sales, we can divide them according to the schema shown in Table 11.

Table 11. Cajamarca suppliers according to level of sales.

| Sales amount (US \$) | 1993 | | 1998 | |
|----------------------------|----------------|-----|------------------|-----|
| | Companies | % | Companies | % |
| Less than 1 000 | 31 | 54% | 56 | 51% |
| 1 000 to 5 000 | 11 | 19% | 27 | 25% |
| 5 000 to 15 000 | 8 | 14% | 11 | 10% |
| 15 000 to 50 000 | 4 | 7% | 10 | 9% |
| More than 50 000 | 3 | 5% | 6 | 5% |
| Total number | 57 | | 110 | |
| Total value (US \$) | 476 976 | | 2 073 564 | |

Source: Evaluation based on data provided by Minera Yanacocha S.A.

As mentioned earlier, the number of local companies that supply Yanacocha has almost doubled since operations began, a trend that has led to a 300 percent increase in sales. Nevertheless, if we break down the companies according to sales, we see that most companies registered sales of less than US \$1 000 per year, and that only 5 percent registered sales of more than US \$50 000. This trend continued in 1998. Most of the Cajamarca supply companies are dedicated to vehicle sales and maintenance (25 percent), architecture and engineering activities (15 percent) or parts supply (15 percent).

Service providers

Local service providers outnumber product suppliers, largely because of Yanacocha's policy of subcontracting out activities that can be performed by third parties. Yanacocha is directly responsible only for exploration, drilling, leaching and processing, while subcontractors take on demolition, haulage and the transport of material to the leach pads. However, the company is reevaluating this system and will likely begin to assume activities previously assumed by subcontractors.

Yanacocha's total number of service providers has increased from 566 companies in 1993 to 980 companies in 1998. In this case, there is a greater participation of Cajamarca-based companies (whose numbers nearly doubled, from 174 to 336 companies), and several are among Yanacocha's principal service providers.

Between 1993 and 1998, Cajamarca firms' share of the service provision market increased from 2 percent to 15.5 percent, while Lima companies' share decreased from 89 percent to 72.6 percent. These changes are due principally to the fact that the nature of most of the services requires that providers be located close to the client.

Finally, as Table 12 demonstrates, Yanacocha's service-related expenses have increased in the last five years, from US \$36 million in 1993 to US \$175 million in 1998.

Table 12. Yanacocha: service expenses, 1993–1998.

| | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|---------------------|------------|------------|------------|-------------|-------------|-------------|
| Cajamarca | 2.0% | 3.2% | 10.3% | 11.5% | 14.5% | 15.6% |
| Provinces | 0.0% | 0.1% | 0.2% | 0.1% | 0.1% | 0.2% |
| Lima | 88.8% | 79.9% | 74.5% | 78.8% | 75.7% | 72.6% |
| International | 5.9% | 13.0% | 11.0% | 6.3% | 6.8% | 8.5% |
| Affiliates | 3.3% | 3.7% | 4.0% | 3.4% | 2.9% | 3.0% |
| Service costs US \$ | 36 351 326 | 51 805 439 | 75 912 551 | 101 144 394 | 166 831 588 | 174 775 748 |

Source: Evaluation based on data provided by Minera Yanacocha S.A.

Cajamarca service providers

As we see in Table 13, the number of Cajamarca firms that provide services to Yanacocha has increased considerably. Many of the firms register sales of more than US \$50 000, and total sales for these companies are approximately 50 times higher than when mine operations began.

Table 13. Cajamarca service providers.

| Sales amount (US \$) | Companies in 1993 | | Companies in 1998 | |
|----------------------------|-------------------|-----|-------------------|-----|
| | Number | % | Number | % |
| Less than 1 000 | 128 | 74% | 169 | 50% |
| 1 000 to 5 000 | 26 | 15% | 88 | 26% |
| 5 000 to 15 000 | 11 | 6% | 43 | 13% |
| 15 000 to 50 000 | 6 | 3% | 15 | 4% |
| More than 50 000 | 3 | 2% | 21 | 6% |
| Total number | 174 | | 336 | |
| Total value (US \$) | 476 976 | | 27 249 141 | |

Source: Evaluation based on data provided by Minera Yanacocha S.A.

Local development projects: agriculture and promotional credit

Yanacocha's rural development activities include productive programs and projects, rotating funds for agricultural inputs (seeds, fertilizers and pesticides), and the provision of productive credit. In addition, the company conducts forestry projects, experiments with agricultural and livestock possibilities, and constructs small infrastructure projects (warehouses and irrigation canals).

The company's productive and business-oriented programs are focused on two main areas: agricultural promotion aimed at small producer groups and income-generation loans aimed primarily at women. Work with the small producers includes the introduction of quality inputs (seeds, fertilizers and pesticides) and a technical assistance and training program. A total of 13 groups have participated in the programs, benefiting 146 families.

Inputs are introduced using rotating funds disbursed to producer groups. During the first year, seeds for four different species were distributed (potato, wheat, barley and chocho, a type of bean). Later, the fund concentrated on potato seeds, with a 100 percent recuperation rate during the first two years. The fertilizer and pesticide fund's recuperation rate is lower, though it is increasing — only two-thirds of the fund have been recovered to date.

In addition to the credit funds, Yanacocha conducted training sessions on pest control, marketing, and rotating fund basics. The company built seven warehouses in order to lower potato seed loss and renovated the La Shacsha irrigation canal (at a cost of US \$66 828 provided by Yanacocha, CARE and the beneficiaries themselves).

As a result, pest-control awareness increased, as did agricultural production. During the first year, participating plots registered outputs of 12 171 kilos/hectare, which dropped to 6 700 kilos/hectare during the second year and 6 858 kilos/hectare during the third year. The drop in production was due to adverse weather conditions that affected the entire region. Before project intervention, average output was 3 633 kilos/hectare. Between 1996 and 1998, total income from potato sales doubled.

Meanwhile, 216 families from 13 villages benefited from income-generation loans. The initial capital was US \$50 197, with US \$18 145 provided by Yanacocha and US \$32 053 by CARE. Loans were disbursed for commercial operations or livestock purchases. A total of US \$105 050 in loans was disbursed. Of that, US \$35 516 was for productive activities and US \$75 532 for commercial activities. The loan recuperation rate was 98 percent. Loans were complemented with a business administration course for

women. The sum of both activities together with increases in productivity, sales and loan-generated income have allowed 88 percent of participating families to develop their economic activities and increase their average monthly income from US \$61 to US \$155.

Capital injection and local/regional monetary circulation

The Cajamarca region benefits from the presence of Yanacocha in two ways: through an increase in local monetary circulation (as a result of local employee salaries and local sales of goods and services) and through potential mining royalty income. In the latter case, as the central government has not distributed mining royalties for several years, its potential impact can only be hypothesized.

It is difficult to calculate the impacts of the arrival of employees to Cajamarca, because there are no statistics regarding income increases from direct or indirect employment. There are no figures regarding the income of goods and service providers or how much of that income is spent in Cajamarca. Given these limitations, any calculation is a rough estimate.

As Table 14 shows, in 1997, the total amount of salaries paid by Yanacocha and its four main subcontractors was US \$8 989 683. Salaries paid by goods and service providers for the same year is estimated at US \$12 748 921 (Table 15). If we assume that 100 percent of the income from salaries is spent in Cajamarca and the region, then the mine would have injected a total of US \$21 738 604 into the economy Cajamarca during 1997. A similar calculation for salaries paid by supply companies from Lima would produce a total figure for wages and salaries of US \$15 701 988.

Table 14. Annual income generated by Yanacocha and subcontractors (US \$ for 1997).

| Total annual payments | Permanent workers | | | Temporary workers | | | Total |
|---------------------------|-------------------|------------------|------------------|-------------------|------------------|------------------|------------------|
| | Exec | Emp | Lab | Exec | Emp | Lab | |
| Minera Yanacocha S.A. | 0 | 4 299 468 | 0 | 0 | 94 842 | 0 | 4 394 311 |
| Odebrecht JJC Asoc. | 126 632 | 394 611 | 1 144 947 | 0 | 0 | 0 | 1 666 189 |
| Zublin Chile Suc Perú | 0 | 0 | 0 | 0 | 705 262 | 1 300 126 | 2 005 389 |
| Const. Odebrecht S.A. | 97 137 | 132 468 | 237 168 | 0 | 0 | 0 | 466 774 |
| Overseas Bechtel Inc Perú | 0 | 0 | 0 | 0 | 457 021 | 0 | 457 021 |
| Total | 223 768 | 4 826 547 | 1 382 116 | 0 | 1 257 125 | 1 300 126 | 8 989 683 |

Exec=Executives; Emp=Employees; Lab=Labourers

Source: Data provided by Minera Yanacocha S.A. and MTPS, 1997.

Table 15. Annual income from salaries and wages generated by goods and service providers in Cajamarca, 1997.

| | Permanent workers | | | Temporary workers | | | Total |
|---------------------|-------------------|-----------|-----------|-------------------|---------|-----------|------------|
| | Exec | Emp | Lab | Exec | Emp | Lab | |
| Mid-sized companies | 310 915 | 1 366 292 | 1 095 407 | 53 512 | 256 938 | 1 524 320 | 4 607 383 |
| Small companies* | — | — | — | — | — | — | 8 141 538 |
| Total | 310 915 | 1 366 292 | 1 095 407 | 53 512 | 256 938 | 1 524 320 | 12 748 921 |

Exec=Executives; Emp=Employees; Lab=Labourers

* Companies with an average monthly salary per worker of US \$300

Source: Data provided by Minera Yanacocha S.A. and MTPS, 1997.

In order to estimate Yanacocha's impact on the region, it is necessary to compare this figure with the region's total income. The department of Cajamarca's GDP for 1997 was US \$1.4 billion, with a per capita GDP on the order of US \$1 100. According to these figures, it is estimated that Yanacocha provided an added value on the order of US \$250 million, or 18 percent of the department's GDP. Yanacocha's impact on the city of Cajamarca is difficult to quantify because there are no statistics regarding production or income at the level of provinces or districts. Obviously, there is a big difference between the city of Cajamarca's income and that of the rest of the department, and it is likely that a large part of the department's total income is concentrated in the city. If we assume that 50 percent of the department's GDP comes from Cajamarca, but does not include the value added from Yanacocha, the city's annual income for 1997 would be on the order of US \$500 million, which indicates that income from the mine is on the order of 5 percent of the city's total income.

Nevertheless, income directly related to the mine is an approximation of the dynamic effects the company has on the local economy. Employees of the mine and its subcontractors spend their wages on local purchases, providing income to other people, who in turn spend it in the area, thus creating a multiplier effect. In order to estimate this effect, it is necessary to determine how much of the total income is put into savings and how much is spent locally. In addition, it is necessary to determine what percentage of local purchases stays in the local economy and how much goes to production outside the region.

For our analysis of the impact of worker spending, we have assumed certain consumption and investment levels on the part of workers. The consumption level is based on National Standard of Living Surveys for 1996 conducted for the urban Andes and for the corresponding occupational category (mining). The investment level was based on national accounts for 1997.

Table 16. Direct and indirect impacts of income on Cajamarca (US \$, 1997).

| | Yanacocha | Subcontractors | Providers | Total |
|---------------------|-----------|----------------|------------|------------|
| Income | 4 394 311 | 4 595 372 | 12 748 921 | 21 738 604 |
| Direct impact | 3 379 379 | 3 621 731 | 13 775 781 | 20 776 891 |
| Indirect impact | 5 560 778 | 5 959 567 | 22 668 085 | 34 188 430 |
| Direct and indirect | 8 940 157 | 9 581 298 | 36 443 866 | 54 965 321 |
| Multiplier | 2.03 | 2.08 | 2.86 | 2.53 |

Source: Previous tables in this study.

In order to determine the multiplier effect of direct worker spending (i.e., income created in subsequent cycles), we must determine what percentage of Cajamarca families' income is spent on purchases of locally produced goods and services. It is necessary to separate purchases of imported goods or goods and services produced elsewhere in the country, such that the net figure represents the amount converted into income for other Cajamarca families, and so on. This multiplier is estimated at 1.65. Table 16 compares indirect and direct incomes.

During 1997, total spending in Cajamarca due to Yanacocha workers' wages and salaries was approximately US \$20.8 million, which in turn generated US \$34.2 million in income for other Cajamarca families. The multiplier effect presented in the last line of the previous table is the result of dividing the total impact on Cajamarca (direct plus indirect) by total worker income (income for employees of Yanacocha, its subcontractors and providers).

For a better idea of the total impact generated in the department of Cajamarca, we must determine the number of families this income will maintain. The average family income for the department is US \$5 390.⁴⁹ Thus, the total mine-related income for 1997 would have maintained 10 200 families,⁵⁰ or 4 percent of the department's total population.

But Yanacocha's impact at the regional level is greater, since Peruvian law requires the distribution of 8 percent of company profits among workers equivalent to a maximum of 18 monthly salaries. During the last two years, Yanacocha has met this limit. Although these incomes are extraordinary and it is difficult to determine the amount spent locally, this would suggest that the total mine-related impact is actually greater than the estimate above.

⁴⁹ Estimate based on the department of Cajamarca's GDP for 1997. INEI-UNDP 1997.

⁵⁰ This figure is obtained by dividing the total direct and indirect impact by the average family income for the regional department.

Finally, Peruvian law provides that host regions receive a portion of mining royalties worth up to 20 percent of the value of taxes paid to the central government.⁵¹ However, regional income from mining royalties can only be estimated, since there are no statistics for taxes paid by Yanacocha or actual royalty distribution. If taxes paid on Yanacocha's earnings for the period 1993–1997 were US \$164.4 million, the total regional royalties would be US \$33.9 million. Regional distribution, according to law, would be as shown in Table 17.

Table 17. Distribution of mining royalties, according to law, for the region of Cajamarca.

| In the area of operation (40%): US \$13.2 million | | | In the department (60%): US \$19.7 million | | |
|--|---|--------------------------------------|--|---------------------------------------|--------------------------------------|
| Province of Cajamarca (20%): 2.6 million | Districts of Cajamarca and La Encañada (80%): 10.6 million | | 12 other provinces (20%): 3.9 million | Districts (80%): 15.8 million | |
| | Rural areas (67%): 7.1 million | Urban areas (33%): 3.5 million | | Rural areas (67%): 10.6 million | Urban areas (33%): 5.2 million |

According to a report by Apoyo Consultoría (1997), the municipality of Cajamarca has received just a fraction of the total royalties it is owed. Royalty distribution for the 1993–1996 period is still pending, which includes almost all royalties paid by Yanacocha. By the end of 1996, the municipality had received nearly US \$5.8 thousand, while by the end of 1997, it rose to US \$35.7 thousand, less than 1 percent of the municipality's total income.

La Encañada — in theory, the principal beneficiary of mining royalties — has not received much of the money it is due, either. Starting in September 1996, the municipality of La Encañada began to receive royalty payments of approximately US \$3 thousand per month. These funds have been partially earmarked for school construction.

In addition to the figures mentioned above, we must add the Yanacocha Association's contributions to development activities. Contributions for the association's initial projects were US \$747 thousand annually between 1995 and 1997 (a total of US \$2.241 million), in addition to the US \$5 million earmarked for highways and US \$750 thousand invested in the construction of Davy School.

⁵¹ On April 21, 1997, a new system of mining royalty distribution went into effect: 40% for the provincial and district municipalities of host regions and 60% for other municipalities. Within those divisions, royalties must be distributed among provincial municipalities (20%) and district municipalities (80%), with two-thirds of the total destined for rural areas and one-third for urban areas.

Development of social capital

Civil society has organized and reacted to Yanacocha's presence, and while this reaction has often been confrontational and not very fruitful, a space for discussion has been created that capitalizes on the Cajamarca tradition known as "consensus roundtables" established by the previous mayor.

In urban areas, Yanacocha's greatest potential impact comes from its participation in the Chamber of Commerce and its Pro-Competir project, which could improve conditions for business planning and administration, as well as the production of goods and services at the local level. The courses and workshops on business excellence and competitiveness oriented to small business owners, producers and especially youth could make a significant contribution whose effects last beyond the lifecycle of the mine. Unfortunately, the initiative has not managed to convoke Cajamarca's main actors and there is competition from other similar local initiatives.

In rural areas, Yanacocha's projects have had greater success in creating and strengthening local leadership and in generating a positive social dynamic with regard to mine-community relations. Company projects contributed to supporting mothers clubs and other local organizations participating in the Prosay project. Loans for livestock production and non-earmarked loans for women, in addition to generating small immediate benefits, contribute to the population's knowledge of credit systems, rotating fund management, and the development of management capabilities among beneficiaries. At the same time, areas that received drinking water infrastructure projects have created Water Administration Boards, augmenting the local institutional network.

The Case of Antamina Mining Company

Antamina Mining Company

The Antamina mining operation is located in the district of San Marcos, province of Huari, department of Ancash. The mine is situated in the Callejon de Conchucos, between the Cordillera Blanca and the Cordillera Huayhuash. The operation is 35 kilometers from the village of San Marcos (2 970 meters above sea level), 165 kilometers from Huaraz, 230 kilometers from the coast (Pativilca) and 430 kilometers from Lima.

The principal deposit is 4 300 meters above sea level. The construction phase began during the second half of 1998 and operations are expected to begin in 2001. Through August 1998, the deposit was estimated at 500 million tonnes of proven reserves, with grades of 1.2 percent copper, 1.1 percent zinc, 15 grams of silver per tonne and 0.03 percent molybdenum. The mine's lifespan is guaranteed for nearly 40 years. The operation will consist of an open pit mine and a 70 000 metric tonne concentrating plant that will produce 1.3 million tonnes of concentrate. Annual production is predicted to be 250 000 tonnes of metallic copper and 150 000 metric tonnes of zinc. Antamina is expected to become one of the largest exporters in the country, with exports worth approximately US \$950 million per year. The operation belongs to a consortium formed by Rio Algom Ltd (33.75 percent of shares), Noranda Inc. (33.75 percent), Teck Corporation (22.5 percent) and Mitsubishi (10 percent).

Antamina has administrative offices in Lima and Huaraz, as well as a Community Affairs office in San Marcos and one in Huallanca. These offices receive community complaints and suggestions, as well as channeling job opportunities. The San Marcos office is in charge of coordinating local development strategies.

In January 2000, Antamina and its subcontractors employed 8 000 workers, the highest figure since construction began. At least one-fourth are local workers and 96 percent are Peruvian. During the exploitation phase, Antamina will employ approximately 1 900 workers, of whom 500 will be unskilled.

The district of San Marcos and other affected localities

San Marcos and the Callejón de Conchucos

According to the 1993 census, the district of San Marcos had 11 660 residents, of whom only 2 784 (24 percent) reside in the district's capital. San Marcos has a population density of 22 residents per square kilometer. In contrast, 64 percent of the population of Huallanca lives in urban areas. (Table 18.) San Marcos has high poverty, illiteracy, and malnutrition levels. Much of the population lacks running water and electricity.

Table 18. Total population (urban and rural) and local EAP.

| | Population | | | Total | EAP | |
|------------|------------|-------|-------|-------|---------------|------------|
| | Census | Urban | Rural | | Agriculture % | Services % |
| San Marcos | 11 660 | 2 784 | 8 876 | 3 898 | 69.50 | 17.30 |
| Huallanca | 7 772 | 4 973 | 2 799 | 1 919 | 37.90 | 27.60 |

Source: www.inei.gob.pe/

Two-thirds of the population work in agriculture and subsistence fishing. Further up the valley, the principal productive activity is sheep and cattle production. These animals are grazed on natural grasslands with a low protein content, producing low quality livestock. In the middle and lower valley, residents grow potatoes, cereals for small-scale commercialization, and fruits and vegetables for personal consumption.

Most of the district's inhabitants are peasants who live far apart or grouped in tiny villages in the middle and upper valley. San Marcos, Huari, and Chavin, located in the lower valley, are the most important urban centers in the area.

The most important rural organizations in this context are the campesino communities, which group together a large part of the population and possess large quantities of land. There are also small landholders grouped together in *caseríos* beyond communal jurisdiction or living in urban centers. *Caseríos* are individual landholders who are not organized, and their only means of inscription for collective actions is their place of residence.

For the purposes of this study, we distinguish three geographic areas affected by the Antamina operation.

Areas of direct influence

Yanacancha, Juproq, Ayash Huaripampa, Centro Pichu and Cambio 90 are the villages and *caseríos* located adjacent to the mine. They are located more

than 3 900 meters above sea level, with populations between 15 and 60 families, dispersed over a wide area. Most have sold lands to Antamina. All economic activity is basically subsistence level. Residents from the first two villages raise livestock and let their lands for grazing to the communities of Carhuayoc and Yanacancha, as well as small landholders from Juproq and other *caserios* in the valley. The other three villages are located in the Ayash Ravine, where in addition to livestock production, residents grow root vegetables and cereals on non-irrigated farmlands. The economies of the highland and valley areas are linked through family subsistence strategies that require the ability to manage more than one ecological zone.

Affected communities

There are three communities affected by the mine: Santa Cruz de Pichu, Angoraju Carhuayoc and Huaripampa.

Carhuayoc was founded in 1972, after agrarian reform laws granted ex-colonists title to former estate lands. The community is in a privileged position with respect to its neighbors, as its urban center is the second most important in the area after San Marcos. The community is politically unstable due to economic differences between residents from the original estate — who possess productive agricultural plots and seek the definitive division of communal lands — and those residents who arrived after selling their plots in the higher areas — and therefore look for greater communal support.

Huaripampa is the oldest and most traditional community in the area. It was founded in 1914 and legally recognized in 1963. The community is comprised of hundreds of members, all involved in livestock production and cereal farming. Although most of the communal lands have been divided, the community retains two collective estates in the higher areas (Pajuscocha and Yanacancha) that are used to graze livestock and 120 alpacas managed by the communal company. Huaripampa's communal structure is solid and stable.

Indirectly affected urban centers

The area of indirect influence comprises several villages and urban centers. Closest to the mine are San Marcos and Huallanca. San Marcos is the capital of the district of the same name. Huallanca is located on the new access road connecting the mine with Lima highway.

San Marcos is the goods and service provision center for nearly all of the communities and villages in the district. Its economy is based on commerce and the exchange of agricultural products for items not produced

in the area. Its streets are filled with stores, *chicha* stands, pharmacies, et cetera, where campesinos arrive to sell their products and buy items such as pots, shoes, alcohol, medicine, and batteries.

Huallanca is located on the eastern slopes of the Cordillera de Huayhuash, in the province of Chiquián. It is situated along one of the commercial routes used to transport products such as fruit and coca from the jungle to the coast. Since 1968, the Santa Luisa mining company has operated within the district. Santa Luisa is a medium-sized company dedicated to traditional-style mining whose largest operation is known as Huanzalá⁵². Huallanca has electricity and a sewage system thanks to an agreement signed with Santa Luisa. The mining company's presence contributed to the town's development by providing various services and offering jobs to a large segment of the population. The mine also contaminated the river, which adversely affected livestock production, traditionally the main economic activity in the area.

Relations between the actors

Like the Yanacocha case, the Antamina case is marked by the lack of fluid dialogue between the government, the company and the community. Beyond the space of the operation, Antamina maintains fluid relations with the central government. Its principal relation with the central government centers on establishing macro-level conditions favourable to the mining operation, such as the tax stability contract granted to every large-scale investment. Antamina also coordinates with the Transportation Ministry regarding necessary infrastructure projects.

Antamina has begun a dialogue with community mayors from the project's vast area of influence. The company is working with a range of NGOs on the development planning process in many of these communities. Relations between Antamina and local actors are marked by the process of establishing the technical, social and infrastructure-related bases necessary to begin operations by 2001.

In the area of the mine itself, Antamina maintains relations with ex-landholders and with the communities and estates adjacent to the mine, with which future development projects must be coordinated. The central government does not participate in this dialogue.

⁵² During the 1970s, when production was on the rise, the Huanzalá camp housed approximately 2 500 workers and their family members. Currently, the total population has dropped to less than 1 000 residents.

In terms of local administration, Antamina negotiates with the municipality and other actors regarding the terms and areas of future development projects. Antamina has set up a community relations office to receive complaints and suggestions. Relations with authorities from Huaraz — the intermediate urban space similar to the city of Cajamarca for Yanacocha — are troubled.

The central government does not intervene to facilitate relations between Antamina and the city of Huaraz, nor has Antamina joined with local authorities to demand an infusion of potential mineral revenues generated by the operation from the central government.

Land acquisition

The local land market in the area near the mine is practically nonexistent. Property is distributed by heredity claims or appropriations dating from the Agrarian Reform era of the 1970s. Nevertheless, there are small transactions involving the sale or leasing of plots between small landholders and community members. This situation led Antamina to decide that it would be better to buy required lands in a single negotiation, using uniform prices determined according to plot characteristics. Table 19 illustrates this process.

Table 19. Lands acquired by Antamina.

| Owner | Jurisdiction | Property or estate | Pop. | Hectares |
|--|----------------------|--|------------|-----------------|
| Campesino Community Huaripampa | Yanacancha | Yanacancha Huaripampa Antamina | 72 | 2 337.00 |
| CC Carhuayoc | Yanacancha | Yanacancha Angoraju | 32 | 518.0 |
| | Negui | Negui | 35 | 611.86 |
| CC S. C. de Pichú | Ayash Pichú | Chocopampa | 0 | 24.00** |
| <i>Total, communal lands</i> | | | 139 | 3 490.86 |
| Individually owned lands | Yanacancha | Chocopampa; Acelgaspampa; Chalhuash | 72 | 454.45 |
| | Juproq | La Tranca Fundo Antamina | 59 | 1 038 |
| | Juproq | Shaguanga | 21 | 750.00* |
| | Yanacancha | Yanacancha | 33 | 487.02 |
| | Tucush | Tucush | 24 | 817.91 |
| | Tucush Yanacancha | Tucush Yanacancha | 0 | 103.00** |
| <i>Total, individually owned lands</i> | | | 209 | 3 650.38 |
| Total | | | 348 | 7 141.24 |

Source: B and R consultants, "Relocation Plan: An opportunity for family progress." Mimeo. Lima, 1998.

Information taken from the Environmental Impact Assessment.

Table 20. Land acquisition according to price.

| Lands acquired | Hectares | Price per hectare (US \$) | Total (US \$) |
|--------------------------------|-----------------|--------------------------------------|----------------------|
| Antamina and La Tranca Estates | 1 038.00 | 1 000 | 1 038 000 |
| Other lands | 6 103.24 | 400 | 2 441 296 |
| Total | 7 141.24 | | 3 479 296 |

Source: Antamina Community Relations Office.

The company's offer was set using an estimated value based on the price of the plot and its potential uses, as well as on the land acquisition experiences of other large mining companies in Peru. Later, negotiations were conducted at a meeting attended by landowners from the areas closest to the mine site. The price per hectare was established at this meeting. Since the plots in question were of poor agricultural quality or natural grasslands, the price was set at US \$400 per hectare, the base price for all transactions. Two exceptions were the estates of Antamina (where the mining concession is located) and La Tranca (as it consisted of agricultural lands): the company paid US \$1 000 per hectare in both cases. Table 20 shows a comparison of these comparable costs.

Since many landowners did not have titles to their plots, Antamina facilitated the titling process through the government's Special Program for Land Titling (PETT) in charge of ordering individual and communal lands.

Once the lands required for the mine operation were surveyed and boundaries drawn up, Antamina conducted a study of the resident population in order to plan their later relocation. A census was taken and residents were classified in different categories: members of the community possessing the lands, individual landowners, shepherds, or squatters. The relocation and compensation plan included not only displaced landowners, but also shepherds or tenants, who were equally affected by the mining operation. The plan called for the relocation of families to other plots near those they had sold.

The fact that Antamina set a fixed price did not prevent attempts to renegotiate it. The community of Angoraju Carhuayoc hired a legal advisor — at Antamina's suggestion — to assist with property titles, and then later used the advisor to try to raise land prices.

Cash payments injected an unusual amount of capital into the communities. Antamina's efforts to counsel community members regarding reinvestment were unsuccessful, and the money was spent according to community members' decisions and aspirations. Nearly US \$1.5 million was spent in less than one year. One of the communities invested their money

largely on infrastructure (two schools, a medical post, a parabolic antenna and two trucks) and the other bought trucks that they hoped to rent out to Antamina.

Since plots belonging to small landholders are actually part of an extensive familial system, the money had to be divided among residents. Included were some relatives who claimed rights to the land although they did not occupy it. As a result, displaced families received only a small percentage of money from the sale.

Relocation problems

Two problems arose in the relocation process that Antamina's plan had not anticipated. First, the lack of available lands in the area was not taken into account, since relocation to more distant areas would alter or break the system of goods and service exchange between families from the valley and the higher areas. Second, some former landholders preferred to move to urban centers in the valley and requested housing there.

Antamina's policy aimed to provide relocated families with new lands similar to those they had sold and with basic services they had previously lacked. In addition, the company made an effort to involve families in its development initiatives. In the end, relocation never occurred because there were no available lands (those that were available were far away and highly priced, and would have required another relocation process for the new sellers) and above all because mine operations had to begin quickly and there was no time for mid-range plans. As a result, the company agreed to pay US \$33 000 to each of the 52 resident (non-landowning) families, an attractive figure designed to convince them rapidly.

Currently, Antamina conducts follow-up with relocated families by advising them on reinvestment strategies and how to avoid squandering the money. The company has contracted the Collective Development Institute to work with families on investment strategies.

Demands, expectations and perception of the San Marcos population

Employment

Antamina plans to employ 4 000 workers during the three-year construction phase. Later the number will drop to 1 000 permanent employees. Antamina's official policy is to give priority to local hires, although it is difficult to calculate the number and origin of workers currently employed by subcontractors in charge of base-camp and highway construction.

Of course, subcontractors hire workers who are best suited to the job. Besides those in certain craft industries (masonry or carpentry, for example), most jobs tend to go to people from other parts of the country (Cajamarca, Puno, Junin, Pasco) or abroad (Chile, Brazil, Canada). While Antamina claims that nearly 5 percent of its workers are from the area, less than 100 people from San Marcos have been hired.

Meanwhile, the subcontractors involved in construction of the main access road to the highway that connects Lima with Huaraz have set up their base in Huallanca, which is where most of their local hires come from. As immigrants arrive seeking work, the town's population has increased, straining the existing service capacity.

Perspectives of the San Marcos population

The district of San Marcos has had little experience with mining companies. The small, traditional mining company of Contonga that operated until the early 1990s hired some Huaripampa residents (in exchange for use of their lands) and contaminated Pajuscocha Lake. As a result, the population initially did not understand the dimensions and characteristics of the Antamina operation and centered their expectations on access to jobs directly in the mine.

As the operation took shape and Antamina began to receive publicity, these expectations grew. The population was aware of the project's magnitude and many residents considered the mine as an opportunity for regional development. Expectations remained centered on access to jobs, but broadened to include possibilities for small business development, worker training, infrastructure assistance, sales of local products, roadway construction, and tourism development, in addition to other specific donations.

In spite of being fairly conscious of the possibilities, part of the population is unsatisfied. The development agreements Antamina signed with former landholder communities have been implemented extremely slowly. Job expectations did not pan out (although many people still harbour hopes of getting a job at the mine) leading urban residents to look for other forms of assistance, particularly local product sales, which have not yet come to pass.

Development options and communication strategies

Antamina has begun to coordinate a sustainable development plan for the area. The company initially focused on gathering baseline information and conducting a few propagandistic and cultural diffusion actions (such as dance

competitions and meals) via an NGO. Currently Antamina negotiates with three NGOs and the local population in the design of a development plan suitable for the area.

The chosen strategy combines participation by the Community Relations Office and agreements with NGOs for project implementation. As a result, in addition to the basic assistance strategy, Antamina is negotiating a productive development scheme in three areas: agriculture, livestock production, and micro-business creation. A different NGO will be in charge of each area: APROPO for basic assistance, CARE for agricultural development, the Andean Camelid Investigation Center at the Agrarian University (CICA) for livestock production and the Collective Development Institute (CID) for the micro-enterprise program (aimed primarily at resettled families). Nevertheless, to date Antamina has only signed an agreement with CID (for two years). Contracts with CARE and APROPO are pending, while there are disagreements with CICA. Currently, Antamina is promoting the creation of a Local Development Coordinating Committee, which it hopes will become a channel for communication between the company and the local community.

Antamina has opted for a relatively open communication strategy with regard to the population. After a few initial problems due to misinformation, Antamina organized a communication strategy that involved principal local actors within a network of periodic informational meetings where participants discussed the operation's components and the repercussions its involvement will have in the area.

On paper, Antamina's philosophy is based on respect for and cooperation with the local population. However, the company's internal balance of power (and as a result, decision-making powers) tends to marginalize social issues in favour of technical operations involving construction and extraction. The mine gives priority to operations and looks for stop-gap solutions to social problems after they arise. There is a lack of communication within the company, which is evident when affected parties learn *in situ* of company decisions that officials at the Community Relations Office know nothing about. This lack of internal communication affects the continuity, coherence and fluidity of external communication and has generated contradictory information, misunderstandings and rumours. Together, these trends diminish the company's credibility.

Potential community benefits.

Since operations have not begun, benefits from the mine are primarily potential at this point. A series of benefits is expected from mine-related operations and local development projects that Antamina is implementing.

Direct and indirect employment

During the three-year construction phase for base camps and processing plants, Antamina is generating 4 000 jobs, 1 000 of which will be filled with people from the department of Ancash. Once operations begin, Antamina will employ 1 250 full-time workers, of whom at least 50 percent will come from Ancash. In addition, subcontractors will require about 750 workers.

Indirect employment generated by the mine has been estimated at 5 000 jobs, including those created by independent contractors and local suppliers. Based on experiences at other mines, we can say that around 60 percent of these new jobs will be created within the department of Ancash. Antamina will pay workers and primary subcontractors an estimated average salary of US \$1 000 per month. Table 21 shows the direct and indirect employment from Antamina.

Table 21. Direct and indirect employment from Antamina.

| | Number of employees | % EAP, Ancash |
|---------------------|---------------------|---------------|
| Direct employment | | |
| Antamina | 625 | 0.2% |
| Subcontractors | 375 | 0.1% |
| Indirect employment | 3 000 | 1% |
| Total | 4 000 | 1.4% |

Source: Antamina's Environmental Impact Statement.

Increased local and regional economic flow

At the height of production, Antamina expects to produce US \$950 million worth of minerals annually, which would create nearly US \$700 million in foreign currency earnings per year and would boost total mineral exports by 25 percent.

According to information contained in the Environmental Impact Assessment, the total amount of income the mine expects to pay workers and principal contractors is US \$23 million per year. Of that figure, an estimated 40 percent would flow into the department's economy.

During the lifecycle of the mine, Antamina expects to acquire Peruvian goods and services worth approximately US \$163.4 million annually. Using

the National Input Product table, we can estimate that payments to Peruvian based companies represent, on average, 28 percent of the goods and services purchased. This means that the income from payments to Peruvian suppliers would be on the order of US \$45.8 million annually. It is estimated that approximately 15 percent of the demand for goods and services (US \$24.5 million annually) would be met within the department, which would result in a total of US \$6.8 million annually in wages and salaries for suppliers from the department of Ancash.

Indirect Impact

The total income from wages and salaries paid by Antamina, its subcontractors and local goods and service providers, is US \$29.8 million. Of the total income, 40 percent would be spent in the department of Ancash, according to Antamina's Environmental Impact Assessment.

Due to the proximity and similarity between the Antamina and Yanacocha cases, we will use the same spending multiplier to estimate income to be generated in subsequent cycles, estimated at 1.65. In Table 22, we estimate the total impact of mine-related workers' income on the department of Ancash.

Table 22. Direct and indirect impact of Antamina income on Ancash (US \$).

| | Antamina and subcontractors | Suppliers | Total |
|----------------------|-----------------------------|------------|------------|
| Income | 23 000 000 | 6 800 000 | 29 800 000 |
| Direct impact | 9 200 000 | 6 800 000 | 16 000 000 |
| Indirect impact | 15 180 000 | 11 220 000 | 26 400 000 |
| Direct plus indirect | 24 380 000 | 18 020 000 | 42 400 000 |
| Multiplier | 1.06 | 2.65 | 1.42 |

According to Table 22, mine-related workers spend approximately US \$16 million in Ancash, which in turn generates US \$26.4 million in income for other families in the department. The multiplier presented in the last column is the result of dividing the total impact on Ancash (direct plus indirect) by the direct impact on workers at Antamina, its subcontractors and suppliers.

For a closer approximation of the total impact generated in the department of Ancash, we can determine the number of families that this income maintains. The average family in Ancash has an annual income of

US \$5 675.⁵³ Thus the total impact would maintain 7 500 families,⁵⁴ or approximately 4 percent of the department's total population.

Antamina's production would generate close to US \$83 million annually in taxes.⁵⁵ Of this, Ancash should receive US \$16.6 million annually in mining royalties, which would be distributed as outlined in Table 23.

Table 23. Distribution of mining royalties, San Marcos area.

| Area of exploitation (40%): US \$6.64 million | | | General region (60%): US \$9.96 million | | |
|---|---|---|--|---|---|
| Province of Huari (20%): US \$1.33 million | District of San Marcos (80%): US \$5.31 million | | 19 other provinces (20%): US \$1.99 million | Districts (80%): US \$7.97 million | |
| | Rural areas (67%): US \$3.56 million | Urban areas (33%): US \$1.75 million | | Rural areas (67%): US \$5.34 million | Urban areas (33%): US \$2.63 million |

Infrastructure and access

In addition, the region will benefit from improvements to the highway to the coast (currently under construction) as well as other secondary roadways that will likely be built along the mineral pipeline route and that could become an alternative route to the coast. Antamina's presence has obliged the central government to invest in local highway maintenance, resulting in substantial improvement to the road between Huaraz and San Marcos.

Social capital development

Important progress has been made with regards to social capital development in the San Marcos area and other areas of mine influence. With the help of various NGOs, Antamina has prompted affected populations in the region to undertake strategic planning processes in order to identify economic potentials and design local development plans. Various documents have been produced by this participatory process in which mothers' clubs, peasant communities, and others have come together for the first time to discuss the region's potential, and to propose concrete development strategies. The reach of this process goes far beyond the area of direct mine influence. Ancash mayors have met to discuss an initiative called the Golden Corridor of the Andes, which would create, for example, a tourism corridor in the

⁵³ Based on the average GDP for Ancash in 1997. INEI.

⁵⁴ This figure is obtained by dividing the total direct and indirect impact by average family income for the department of Ancash.

⁵⁵ Total taxes paid during the project's lifecycle are estimated at US \$1.1 billion, of which 20% would go to mining royalties.

department. This process has only recently begun with the development of the mine operation.

Communities are organizing in order to interact in an orderly fashion with Antamina and request assistance in priority areas that have popular backing, and that do not necessarily respond to the individual interests of any certain political leader. Communities that have participated in strategic development planning exercises are looking for sustainable activities and not merely short-term assistance from Antamina. In large part, this process has been possible thanks to the participation of various NGOs.

Mining company best practices and benefits

Local mining-related benefits

This section describes the benefits generated by mining investments in local communities according to the evidence presented. It identifies the practices that produce these benefits, in order to later suggest actions that could have maximized benefits or achieved other benefits.

Increased local economic flow

Antamina's presence in San Marcos and Huallanca has perceptibly increased the towns' economic activity. Total impact is estimated at US \$42 million per year, which would maintain 7 500 families in the department. The total impact (direct and indirect) of the spending by Yanacocha workers is US \$55 million per year, which would maintain 10 200 families in the department of Cajamarca. The automotive fleet and number of local businesses have increased substantially. Nevertheless, it is difficult to determine how much of this is due to Yanacocha's presence and how much is the result of general economic reforms and the defeat of terrorism.

In addition, the purchase of lands has had an important effect on the economies of campesino villages. Yanacocha purchased close to 10 200 hectares of land between 1992 and 1999. In just 1992 and 1993, land acquisitions injected US \$640 000 in the area.

Infrastructure and access

Both Yanacocha and Antamina have contributed to improve access roads in the area of their operations. Yanacocha has built 79 kilometers of new roads, improved 53 kilometers and paved 15 kilometers. Area residents can now sell their milk to the Carnilac company and face substantially less

transportation time to the city. In addition, availability of electricity has increased as a result of high tension lines to the mine, and the city of Cajamarca now has cellular telephone service thanks to an agreement between Yanacocha and Telefónica del Peru.

In the case of Antamina, the company is building access roads through Huallanca and has reduced travel time to Lima by two to three hours. Meanwhile, the Peruvian government has invested in improving access to the Callejon de Conchucos from Huaraz. These improvements allow for the creation of a tourism corridor in the area and will facilitate the circulation of people and goods within the region, as well as connection with Lima. In this case, we have observed coordination between the company and the state.

Improvements in basic services

Yanacocha has equipped schools and local health posts and has coordinated with officials from the Health Ministry and teachers to increase the regularity with which such services are offered. In addition, the company has organized workshops for mothers participating in health and nutrition programs. Yanacocha sponsored programs have reduced diarrheic diseases by half in the participating villages. In addition, 264 rural families have benefited from hygiene projects and a drinking water system.

Local development programs and improvements in quality of life

Antamina and Yanacocha have implemented development programs in nearby rural communities that include: technical assistance programs for the introduction of quality inputs (seeds, fertilizers and pesticides) by way of rotating credit funds to groups of campesinos; training courses on pest management, rotating fund basics and agricultural marketing; construction of potato seed storehouses; and income-generation loans and business administration training courses for women. As a result of these programs, potato production doubled in the participating communities between 1996 and 1998, and 88 percent of families have boosted their monthly income from US \$61 to US \$155, on average.

Direct and indirect employment

Yanacocha and its four main subcontractors employ some 1 200 workers. 45 percent of Yanacocha's workers (515) are from Cajamarca and 60 percent were hired in the area. Cajamarca-based subcontractors hire around 3 000 additional workers in Cajamarca alone, which provides an initial

approximation of the scope of indirect employment. In the case of Antamina, some 4 500 people will be employed during the construction phase. Direct employment will drop during the production phase to 1 250 (50 percent of whom will be from Ancash) and 720 additional subcontractor employees. Antamina estimates that indirect employment will be on the order of 5 000 people.

Consensus, social capital for development and leadership

The presence of Antamina and Yanacocha in their respective areas has convinced rural populations to organize in order to negotiate with the companies and government entities regarding local development. In the area of Huallanca and San Marcos, Antamina and various NGOs have helped draw up development plans for the area that analyze regional productive potential and institutional viability.

In the case of Yanacocha, the results are equally important although they tend to be more rural and localized. The food security and school breakfast programs require the organization of mothers' clubs from different villages.

Community relations

In this section, we present several recommendations regarding best practices that generate benefits for local communities and for the company. Most of these recommendations are directed toward mining companies, to the extent that it is their presence that modifies the relations between pre-existing actors.

i) Recommendations for the intervention process

Social intelligence studies

The experience of Yanacocha shows that a mining operation requires detailed information about the social dynamics of the host region, especially politics and local organizations, before beginning operations. An anthropological analysis of the host society based on direct interaction with local residents is also required. Knowledge of local actors is essential for establishing good and effective relations with the local population, maintaining fluid lines of communication and minimizing possible conflicts.

Need to monitor social impacts: information gathering and initial social indicators

Unfortunately, mining companies generally do not document the evolution of social indicators in areas around the operation, even in the cases where companies sponsor special projects designed at improving local conditions. Companies must provide for the constant monitoring of various indicators that will allow for an evaluation of local communities' quality of life.

The problem begins with weak baseline data. Information currently required in the EIA is insufficient to evaluate the local communities' social conditions. (Canter 1996) The company must develop basic indicators regarding development and grade of service coverage, which will later allow for an evaluation of the positive effects of the mining company's presence or its local development activities.

The generation of baseline data is not solely the responsibility of the mining company. The central government shares some of the responsibility for the production of basic indicators regarding local communities. Companies and government agencies must coordinate in the provision of necessary basic information. Since this information is not only of use to the mining company but is also essential for local community development plans, part of the cost should be assumed by the state.

In addition, the state should suggest social indicators and parameters acceptable in areas of mining activity to guide the elaboration of the social baseline data section included in the EIA.

In the area of health these could include incidence levels for SDD, SRI, tuberculosis, and maternal and infant mortality rates. In the area of education, these could include schooling levels, repetition levels, and teachers' education levels.

ii) Recommendations for the process of land acquisition and population resettlement*Land acquisition*

Antamina's experience shows that it is necessary to distinguish between two related processes — the purchase of lands (which involves a process of establishing prices, clarifying land titles and ownership, and convincing the sellers) and evacuation of lands (which involves convincing former landholders, identifying productive alternatives and eventually, resettlement).

Mining companies think that paying a high price for the land will solve problems and that relations with campesinos end once the land is unoccupied. However, campesinos tend to consider the land sale as the

beginning of a long-term relationship, and so concentrate less on price than on other, more lasting benefits such as jobs and markets for local products. For this reason, before the land acquisition phase begins, the mining company should develop productive options for campesinos who will sell their lands and receive only money in exchange. In addition, social criteria should be incorporated into the established land prices. We would go so far as to say that campesinos are disposed to exchange their lands for a participatory program of integrated development for the area.

Yanacocha's land acquisition process and the conflicts generated show that transparent negotiations and objective criteria are essential for minimizing eventual conflicts. Yanacocha's experience also demonstrates that a land acquisition strategy should foresee the need to contract third parties who can give witness regarding the agreements and eventually act as mediators in future conflicts or complaints between parties.

iii) Recommendations for development strategies

Social assistance and development policies

According to the operation's scale and lifespan, the company must make an explicit commitment to the host area's development within a larger process of participatory regional development, while taking care to clearly define its role in the process. A company should be perceived as a new actor that will contribute to existing development initiatives. The Yanacocha experience shows that this is the base upon which harmonious and solid relations with the adjacent communities and area cities are built. The same experience reveals the necessity of implementing different strategies depending on the context: a local micro-level strategy for villages and communities close to the mine and a broader strategy, involving a more diverse range of actors, at the regional level.

Articulation with the local population via employment and services provision

It is necessary to reach a compromise between residents' demands and the needs of the mining company and its subcontractors. A large company, with years of production ahead of it, should be seen and understood as a member of local society. This presupposes certain agreements between the population and the mining company on issues such as employment, provision of goods and services, and infrastructure. These agreements help create a positive image of the company as an integral part of local society.

The company's commitment to the local community should be expressed through local development activities and agreements regarding the provision of goods and services, since modern mining operations in general cannot offer the massive creation of unskilled jobs.

Nevertheless, while its ability to generate jobs is limited, the mining company can implement an employment policy that gives priority to local hires. Since local workers' qualification levels are low, the company should assist with training programs for the area.⁵⁶ The employment policy should include offers of direct employment in the mining company and its subcontractors, and should establish long-term goals regarding local hires. For example, the goal could be to increase the percentage of local hires over time to reach at least 30 percent of the labour force in five years.

Mining companies should arrange with local communities for the provision of goods and services and should promote production in areas capable of accessing other markets besides the mine. The company must initiate technical training, capacity building, and product adaptation processes. The adaptation of local products should allow them to compete in terms of quality and price and to conform to company employees' tastes and consumption patterns, which are generally different to those of the local population.

Options for local community development

Some local actors may have their own development strategies, with differing objectives, activities and timeframes. For example, certain communities combine: immediate actions (in infrastructure projects that increase their importance as an urban center); works that provide regional prestige; and long-term income potential (such as obtaining the category of a district in order to receive budget allocations from the central government). In the first case, town leaders requests works such as stadiums, sports arenas, improvements to the main plaza, and other monuments that can be inaugurated for their short-term political interests. NGOs and the company itself prefer to invest in productive activities such as reforestation, improvements to livestock production, and irrigation projects with medium and long-term benefits. The chosen strategy should be the result of

⁵⁶ The Red Dog mine in Alaska is a good example of the convergence of interests and collaboration between a mining company and local population: the company offers preferential employment to Indians (at the technical and executive levels), who meet job requirements thanks to technical training programs and scholarships (Cooperacion 1990).

negotiations in which the entire community participates and not just elected leaders concerned with their short-term needs for political reelection.

Co-participation in the improvement of infrastructure and social services

Nearby towns and cities often become “bedroom communities” for mine workers. This can bring improvements to certain communal services (schools, hospitals, recreation centers) following negotiation with other local actors and the state. Government participation and local coordination are crucial to ensure that actions are sustainable and their impact is maximized.

In addition, the Antamina and Yanacocha cases demonstrate the benefits of working with specialized institutions (NGOs) in development promotion activities. This strategy functions better than simply assigning such activities to a department within the company.

iv) Recommendations for communication strategies

While various bilateral dialogues exist at different levels, there is currently no space that provides for simultaneous dialogue between the company, the central government and local communities.

Companies' communication strategies

Neither a low-profile strategy (equivalent to no communication at all) nor a strategy of over-communication is adequate. At the same time, potential information distribution channels are as diverse their contents. In Cajamarca, for example, information circulates differently in the countryside than it does in the city. Likewise, information circulates differently among authorities, government officials, NGOs and the population in general. These diverse levels and circuits should be taken into account.

The company must establish a clear and organized communication strategy with regards to local authorities, the central government and the population in general. Social programs and environmental protection efforts should be “public knowledge” at the local level.

Meanwhile, local authorities should take part in the process of information distribution. Since the company could be considered to have certain interests in specific themes or critical cases, it is necessary that the communication strategy provide for the participation of third parties (the state or local government, for example) where necessary.

v) Recommendations with respect to a participatory local development plan

The local population's institutional and organizational weakness is one of the principal limitations to development. In the past, mining companies took advantage of these limitations in order to impose their own conditions. Nevertheless, when the local population perceived agreements as unjust, various problems and complaints arose against the operation, which ended up being costly in the long term.

This requires a concerted effort to utilize agents and resources (including the mining investment) toward local sustainable development that generates permanent sources of wealth beyond the lifecycle of the mine. A participatory process that involves the entire local population (and not just political leaders) should produce a reasonable plan of action in which the company expresses its priorities for financial assistance but does not unilaterally decide what is "convenient" for the local community. In a participatory development plan, the mining company is merely an additional actor and a potential financial source together with international cooperation agencies and the central government. Antamina's experience in this area is very positive. In certain cases, Antamina directly financed development programs, while in other cases, the company allowed for various NGOs to facilitate the strategic planning process for villages located within the mine's area of influence.

In general this process must be assumed by the most stable actor with the greatest resources (at least in terms of cash flow), usually the mining company. Nevertheless, the company must avoid crowding out other actors in the process, and it must be clear to all parties that the company's leadership is temporary and only to get the process moving. Meanwhile, local communities must be strengthened in order to assume leadership of the development process beyond the lifecycle of the mine.

Building local capacities does not happen overnight and so the process should begin as soon as possible, preferably at same time as exploration activities. This is also the ideal moment to begin distributing information about the potential mining operation without generating false expectations. Nevertheless, few companies are disposed to invest in local development without knowing for certain whether they will be operating in the zone. Failure rates for mining explorations are very high, and it is likely that only large transnational companies will view local development as a valuable investment in spite of the uncertainty. If the exploration is successful, a participatory local development plan can greatly facilitate local relations and the operation's general progress. If the operation never gets off the ground,

the company's reputation of good performance will assist the development of operations elsewhere in the world. A good reputation is an important intangible asset for a company. This concept is understood with regards to environmental issues, but social issues are not yet viewed in the same way. A good social record also contributes to the company's success at the international level.

Since not all companies can be expected to behave identically (especially when it comes to medium and small companies), the process of building local consensus regarding development priorities and possibilities should begin prior to construction of the mine. This process can be implemented at the same time as an EIA for social issues is conducted. While this process may appear costly since it can delay operations and generate financial problems, we believe that in the medium term it significantly facilitates relations between the company and local populations in various areas such as land acquisition, resettlement, etc. This in turn reduces costs over the long term. Antamina's experience is illustrative in this regard. The accelerated resettlement process for some 30 families cost the company close to US \$1 million due to the operations team's need to access to certain lands as quickly as possible. A prior program of local development planning, at a cost of no more than US \$50 000, that had identified viable productive alternatives would have substantially reduced the cost of the transaction.

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CHAPTER 5.

Spain's Almadén Mine: 2 000 Years of Solitude⁵⁷

Enrique Ortega Gironés and Carlos Díez Viejobueno

Introduction

This study analyzes the history of mining in Almadén and the mining industry's impacts on the socioeconomic evolution of the region. The Almadén district, which has monopolized the world mercury market for centuries, is currently experiencing a severe economic crisis. Given the region's historical characteristics, Almadén represents an ideal example to use as a basis for posing several questions:

1. What are the positive impacts of mining activity?
2. What are its negative impacts?
3. What other economic activities could have been promoted as alternatives?
4. Have there been opportunities to promote sustainable development in the region?
5. What measures could have been taken to avoid the present situation?
6. When and how should these measures have been applied?

Clearly, the circumstances in Almadén are very different from those in the other mining areas (Bolivia, Chile and Peru) included in this project, especially with regards to the following issues:

- economic, social and cultural setting;
- historical context: The Almadén region has been mined for more than 2 000 years and the town of Almadén grew up around mining;
- Almadén is the only known deposit to contain 30 percent of the world's reserves of a mineral;
- its exploitation has always been controlled by the state; and
- for centuries, the region dominated the world mercury market.

Given these differences, Almadén serves as a counterpoint to emerging mining areas, illustrating problems that arise during the terminal phase of a

⁵⁷ This study was conducted by "International Institutional Consulting, S.L.," which would like to thank Minas de Almadén y Arrayanes S.A. (MAYASA) for providing access to their archives.

mining project. Identifying the problems that could have been avoided through timely and appropriate measures represents an important contribution to the integral analysis of the relations between a mining company and its surrounding community.

The Almadén mining district

The Almadén mining district, located in Ciudad Real, Spain (see Figure 1), occupies only 30 square kilometers and it is located within an area sparsely populated (population density of less than 25 inhabitants per square kilometer), where the average village has a population of about 2 000. Almadén's population of 7 000 is an anomaly in the region. The area's other traditional activities are agriculture and sheep farming. Hunting and incipient rural tourism are the only alternatives to traditional activities.

Figure 1. Almadén: geographic location.



In order to understand Almadén's current problems, one must have a working knowledge of the region's history. Analysis of the current situation is pointless if it does not consider the historical causes of the existing imbalance between the wealth generated by mining and the efforts made toward economic sustainability.

Abundant documentary information exists regarding Almadén's history over the last five centuries. Since the mine has always belonged to the state — the "Spanish crown" or the Economic Ministry — the existing information is very detailed in comparison to most other contemporary operations.

Almadén may have been mined as much as 6 000 years ago, although the first recorded references date to the year 490 B.C. During the Roman Empire, Almadén was systematically exploited (the mines were the property of the emperor). After the fall of the empire, there is no recorded reference to the Almadén mines until the year 711, when Spain fell under Arab domination and the deposit became the property of the Caliphs.

During the 12th century, the kingdom of Castilla re-conquered the terrain under Arab domination and the deposit came to be controlled by the Spanish State. The deposit's economic importance increased during the 16th century after the discovery of gold and silver deposits in the Americas. The amalgamation method of recovering those metals changed the market by dramatically increasing the demand for mercury. At the same time, labour requirements increased and the area became populated by Moors, convicts or others attracted by fiscal and social incentives (such as exemption from military service).

Demand outpaced production during the 16th, 17th, and 18th centuries. During the second half of the 18th century, the incorporation of foreign mining technology (from Freiberg, Germany) and the progressive mechanization of the mining process increased productive capacity. During the 19th century, the industrial revolution brought new uses for mercury and caused a further increase in demand. Social and political instability during the second half of the 19th century and the early 20th century impeded the Almadén district from meeting market demands, in spite of constant production increases.

The industrial and military uses of mercury (such as use in explosives) caused demand to increase again during the first half of the 20th century. Later, its gradual replacement by other metals in the chemical industry's production of such products as chlorine, alkaline batteries, fungicides, and anti-germinants as well as its disuse as a strategic metal for munitions production resulted in a sharp decline in demand. This was accentuated during the 1980s by pressure from environmentalists.

During the last three decades, the Almadén mining industry has suffered a deepening recession and during the 1980s posted losses for the first time in its long history. The consequent decline in the work force has had considerable social and economic effects on the region. MAYASA, the company exploiting the Almadén deposit, attempted to confront the new situation by designing a conversion plan and diversifying its activities. But in general, the plan has had unsatisfactory results.

Socioeconomic legacy of the Almadén mining district

Almadén's historical legacy has given rise to certain attitudes and socioeconomic relations that appreciably affect on its current situation, and which must be kept in mind for an appropriate analysis of the region. These include:

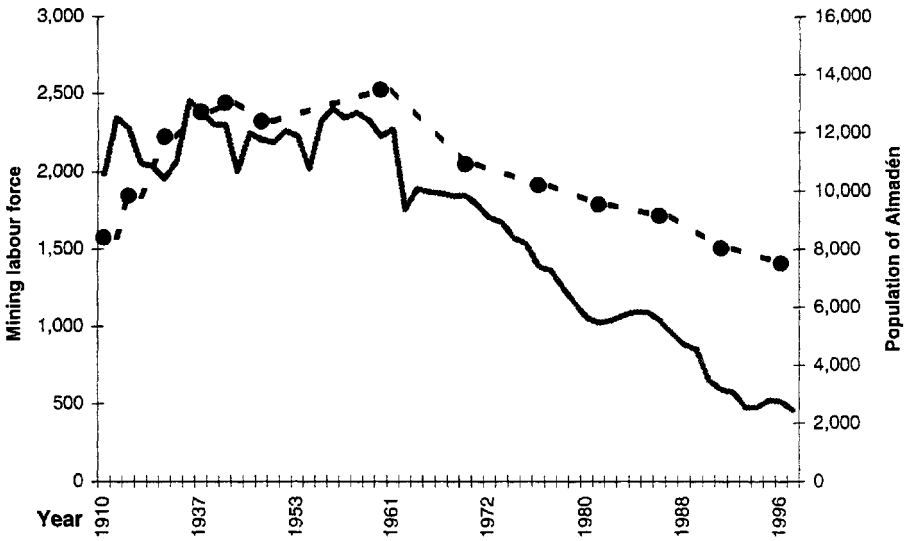
1. A significant percentage of the active population "has worked for the state" over the centuries, in conditions of geographic isolation and without an alternative source of economic development. A close relationship has developed between the company and the social setting, producing distortions in labour relations. A prevalent attitude in the region is that "the mine has the obligation to provide jobs to local residents," regardless of market conditions and the industry's economic parameters. The ongoing labour relation with the state (which pays little but which provides stable employment) has fomented "functionary" labour habits (such as low productivity and a low innovative capacity). In addition, the state is frequently accused of deliberately inhibiting alternative development in Almadén, in order to ensure cheap labour and obtain greater profits.

Such attitudes are still present and local miners often express the view that "the company can trick them when it comes to a salary, but not when it comes to a job." In other words, a distorted labour climate has existed latently.

2. The population has followed a trajectory similar to that of Almadén's mining industry, experiencing nearly uninterrupted growth from the 16th to the mid-20th century. The 1960 census recorded Almadén's highest population (13 443 inhabitants) and in 1956, Almadén Mines had 2 400 workers on the payroll. Since then, in just 30 years the mine work force has shrunk to its lowest levels in history, while the area's population has decreased to late 19th century levels, largely due to migration away from the area. Figure 2 illustrates this decline.

Currently, while Spain is generally enjoying a period of development, Almadén is one of the most economically depressed areas in the country, having the lowest population density and per capita income. In 1997, the region registered 34.6 percent unemployment, far above the national average of 20.3 percent. Moreover, the population is aged, with some 56.3 percent inactive compared to a national average of 49.6 percent.

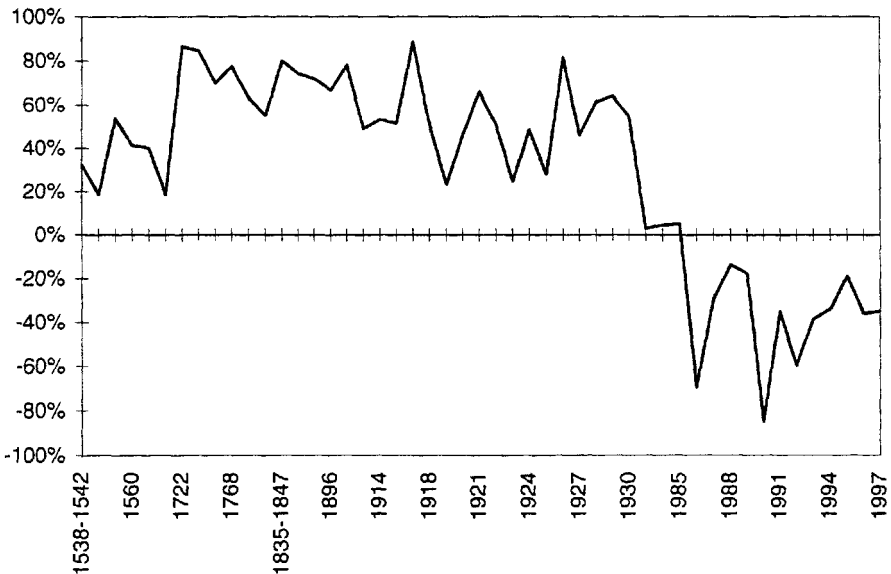
Figure 2. Evolution of Almadén's population (dashed) and mining work force (solid).



Source: Matilla (1958), Matilla (1987), Almadén annual reports, Zarraquí (1934).

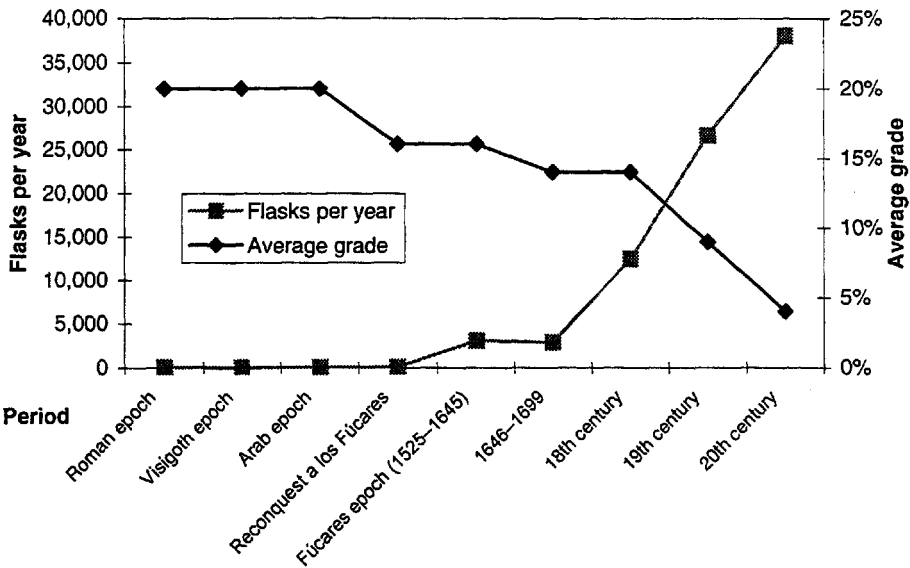
3. Compared to other deposits, Almadén has never needed to develop productive efficiency or competitiveness since it has always benefited from captive markets, due either to state monopolies or because it was very rich compared to other deposits. Figures 3 and 4 represent the

Figure 3. Profit history of the Almadén mining district (%).



Source: Matilla (1958), Matilla (1987), Almadén annual reports, Martínez (1934).

Figure 4. Almadén's production (flasks/year in green and average grade in red).



Source: Matilla (1958), Matilla (1987), Almadén annual reports, Martínez (1934).

benefits obtained, the average grades exploited, and Almadén's production levels over time. As an example, during the early 1980s, the average grade of mercury worldwide was 0.5 percent, while Almadén was producing grades six times higher. The centuries-old imbalance of demand outpacing supply created a management attitude directed to simply producing greater quantities, thus inhibiting the need to produce mercury at competitive prices. Meanwhile, the prices were always "under control."

4. The economic value of the mercury extracted from Almadén is impressive, especially considering its scarce dimensions. Adjusting for current values, the deposit has produced US \$30 billion worth of mercury since the 16th century. Its strategic value has been even more important. During the 16th through 18th centuries, gold and silver mining in the Americas became the Spanish Empire's economic base, and their extraction was highly dependent on mercury production. The Almadén deposit alone was a sufficient guarantee to underwrite credit requests by the Spanish state to lenders such as the Fuggers of Germany during the 16th and 17th centuries, as well as the Rothschilds during the 19th and 20th centuries.

Balance of mining activity in Almadén

Positive impacts

Thanks to the Almadén deposit's dominant role and economic importance during the 17th and 18th centuries, the majority of positive impacts occurred during this period. As a result of mining activity, Almadén achieved higher growth than the surrounding areas, as well as facilities and infrastructure advanced for the time. Among the most important positive impacts of this period are:

- tax exemptions and other social advantages in place to attract labour and increase productive capacity;
- construction of a hexagonal bullring during the 17th century, which might seem anecdotal from a modern perspective but which had significant impact in the social context of the era;
- construction of the Miners' Hospital in 1752, offering the most advanced health care in that time period; and
- founding of the Academy of Mine Overseers in 1777, a precursor to the Advanced School for Mining Engineers, which was established later in Madrid.

The aforementioned examples demonstrate that Almadén inhabitants of this era had access to a privileged social life, technology and health care, as well as advantageous fiscal exemptions. By comparing Almadén to the surrounding area, there is no doubt that these privileges were directly related to the mining industry.

Unfortunately, the government's favourable attitude toward the wealth-producing region of Almadén was not maintained during the entire 19th century and most of the 20th century, in spite of the fact that the mercury mines continued to provide important resources for the state. During the last 175 years — with the exception of the PRECA plan, which will be described later — Almadén has not benefited from a single specific initiative that could be considered different from those in any other locality of a similar size in Spain.

Negative impacts

In contrast to the positive benefits mentioned above, the high levels of mercury production required the adoption of a series of measures. From the modern perspective, these had negative consequences, such as:

- significant deforestation of a considerable part of the surrounding area, because underground stabilization of the mine and the metallurgical processes of cinnabar processing require enormous quantities of wood;
- arrival of marginalized peoples such as prisoners or others who were subjected to forced labour, and who negatively influenced the social fabric of the area; and
- the industrial activity related to mercury production and processing over several centuries gave Almadén the reputation of being a highly contaminated area.

In practical terms, the negative consequences derived from mining are affecting the region's future. During the last two decades, there have been attempts to promote agricultural activities in the region. But although the region produced quality products that complied with all health requirements, because they were produced in Almadén, it created either enormous marketing difficulties or else outright rejection. At the same time, attempts to retrain mining personnel for agricultural projects ran up against numerous problems of adaptation and resistance against new jobs.

The current situation

Over the centuries, mining activity has been incapable of acting as a motor for economic development or sustainable growth, in spite of its hegemonic position throughout the world. Almadén is currently situated in one of the most economically depressed regions in Spain. All social and economic indicators point to the fact that the region — which was born and grew up around mining — is declining as inexorably as its mining industry.

In spite of the existence of a strong industrial tradition and trained personnel from the School of Technical Engineers, the region's organizational and infrastructure deficiencies have impeded the introduction of alternative industrial activities. The most glaring deficiency is the lack of adequate transportation infrastructure (railway or roadway) that would allow the development of other economic activities.

During the period 1985–1995, considerable efforts were made to improve the road network, which is currently on par with the national average. This implies an important qualitative advance with respect to previous years. But improvement has been slow in coming. The region would have greatly benefited from completed infrastructure during the mid-20th century, when industrializing processes were first introduced.

Finally, it is worth mentioning that an industrial park outside Almadén — a recent local government project — has attracted small businesses, mostly from the service industry. Likewise, recent years' increase in the demand for rural tourism, as well as the region's excellent resources for hunting activities, are beginning to provide alternative sources of income. However, these activities are still insufficient to maintain the population levels of recent decades.

Environmental assessment

One of Almadén's most surprising aspects is its environmental situation. At first, one would suppose that a region that has been the world's principal producer of a highly contaminating substance such as mercury would be profoundly polluted. Nevertheless, mercury mining has had negligible environmental effects in the region, which has no degraded or unproductive lands as a result of mercury content.

Although the region is not at the level of a "natural reserve", Almadén's flora and fauna are well preserved (or even extremely well preserved, considering the European average) and tourism dedicated to boar and deer hunting is one of the region's principal economic activities. Deforestation caused by the use of wood as fuel for mercury metallurgy is the only appreciable environmental effect, and even this is concentrated in a few specific areas. Moreover, deforestation is not directly attributable to the contaminating effects of mercury, since any other type of mining or metallurgy would have had the same consequences.

Almadén's geological history indicates that the deposits (formed by submarine volcanic eruptions more than 350 million years ago) have been close to the surface and in direct contact with subterranean aquifers during the last 250 million years. Most of the mineral ore is present as mercuric sulfide (cinnabar), but a significant percentage (5-10 percent) is present as metallic mercury distributed in droplets throughout the porous rock. Although inorganic mercury has a low solubility, it is surprising that such high quantities of mercury over such a prolonged time period have caused insignificant environmental effects.

The environmental impacts of mercury contamination in tropical climates are well known and generally attributed to the inappropriate use of mercury to recover gold by artisanal miners. Many authors maintain that under certain physico-chemical circumstances, metallic mercury can change

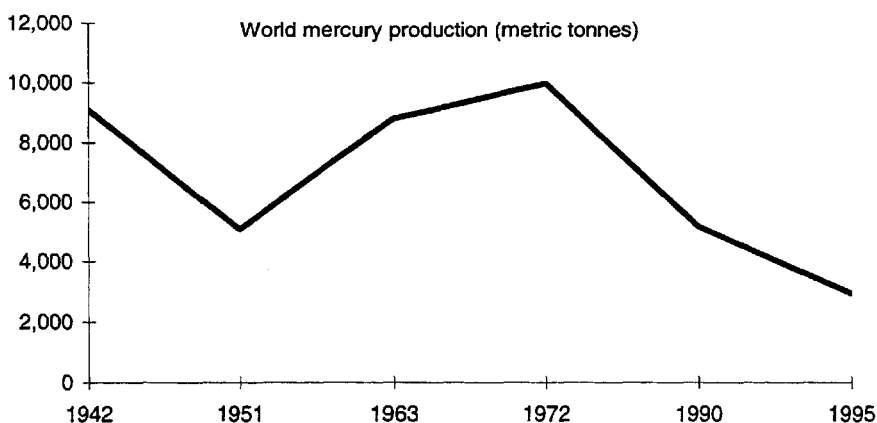
to organic compounds with greater solubility and contaminating capacity (such as methyl mercury).

The Almadén region has a semi-arid climate where the average annual rainfall is 600 mm. The area has poor soils of scarce organic material and Mediterranean vegetation. Thus, the physico-chemical conditions are very different from those of the tropics. Even so, it is important to note that the region's abundant mercury — which has been exposed to atmospheric conditions for prolonged time periods — has produced such negligible negative effects that inhabitants can regularly consume fish from local rivers without a single recorded case of poisoning. This situation suggests that the mechanisms of methyl mercury generation and the cause-effect relationships attributed to poisoning linked to small-scale gold mining are more complex than previously thought. Thus, Almadén provides an excellent natural analog for the verification of mercury's natural cycles.

Analysis of corrective measures taken: Almadén's conversion plan

At the end of the 1970s, it became apparent there were problems for the future of mercury mining. In Figure 5, we see how the market began to reflect the imminent crisis, due to growing environmental pressure and shifts in demand.

Figure 5. Recent evolution of world mercury production.



Source: Blanco Piña et al (1974); Minerals Handbook (1994/95); Van Wambeke (1974).

In addition, at that time the Almadén deposit had reserves to guarantee production for an estimated six years. The negative consequences for the Almadén region of an eventual closure of the mine and a recession in the

mercury market were evident. For those reasons, a plan was developed that proposed two areas of action:

1. continue investments in mercury production as the only way of avoiding mine closure in the short term, while maintaining the region's productivity level; and
2. conduct a detailed analysis of the Almadén region and prepare a diversification plan to identify alternatives to the mine's inevitable closure, directed principally toward the development of the region's agricultural, livestock and forestry sectors.

This plan was officially called PRECA (Conversion Plan for the Almadén Region), and the required investments — direct government subsidies to the mining company — were included in the general state budget published by order on 10 June 1978. The arguments used to justify these investments were based on the social and economic peculiarities of the region:

- the region is isolated, economically depressed, and far from industrial or consumption centers;
- the region lacks a sufficient communications system;
- the region lacks energy and raw materials; and
- the local economy depends on a single industry (mercury production, the only raw material abundant in the region).

The project's objective was the development of the region through the promotion of other natural resources. Five priority action-areas were identified for 1979–1984.

1. Develop the exploitation of the mercury deposits, as well as deposits of lead, zinc, and other minerals under exploration.
2. Develop Dehesa de Castilseras, a 9 000-hectare rural estate that is property of MAYASA, in order to implement agricultural and livestock production as well as reforestation programs. This would absorb excess labour capacity and serve as a model for the development of a new local agricultural industry.
3. Promote the commercialization and distribution of local agricultural products.
4. Increase the production and marketing of mercury by-products with greater added value than the raw material.
5. Install a slaughterhouse and feed factory to provide incentives for the development of extensive livestock production.

According to the original plan, 2/3 of PRECA's budget was to come from government contributions and 1/3 from funds generated by the mining company itself. In order to improve management capacity, the mining company exploiting the Almadén deposit changed its juridical and administrative status. In 1982 it became a limited liability company (MAYASA).

Nevertheless, in spite of good intentions, from the outset the plan had two severe flaws:

1. Lack of participation by the private sector. The plan's design and implementation were the sole responsibility of the public sector.
2. Lack of community participation in the design and implementation of the plan.

As a result, the plan was unable to fulfill expectations. The new company's financial situation was problematic from the beginning. As MAYASA's 100 percent shareholder, the government was forced to make capital contributions through enlargements of social capital to offset losses. Table 1 depicts the evolution of MAYASA's social capital, indicating those government contributions that had to be made to compensate for the aforementioned losses.

Table 1. Evolution of MAYASA's social capital.

| Year | Social capital (US \$) | Year | Social capital (US \$) |
|------|------------------------|------|------------------------|
| 1982 | 6 666 667 | 1990 | 75 286 667 |
| 1983 | 6 666 667 | 1991 | 88 933 333 |
| 1984 | 6 666 667 | 1992 | 92 453 333 |
| 1985 | 6 666 667 | 1993 | 92 500 000 |
| 1986 | 6 666 667 | 1994 | 92 500 000 |
| 1987 | 12 600 000 | 1995 | 99 166 667 |
| 1988 | 65 286 667 | 1996 | 99 166 667 |
| 1989 | 69 953 333 | 1997 | 101 266 667 |

Source: Almadén Mine Annual Reports.

Leaving aside the economic results, from an operational point of view the new company reached a considerable level of diversification and surpassed PRECA's initial forecasts in some cases. The most relevant areas of action are the following:

Mining sector: New mercury deposits were exploited. In addition, explorations for other substances, such as phosphates, wolfram, lead, and zinc, were conducted in order to decrease dependence on mercury. Several viable deposits were discovered, although the drop in metals prices during the 1980s impeded production.

Agricultural activities: Several projects identified by PRECA were carried out, including the construction of a livestock feed factory, development of irrigation systems, reforestation, and the construction of a cheese factory supplied by the company's rural estate.

Mercury by-products: Installation of production facilities for mercury by-products (red oxide, yellow oxide, and mercuric chloride) destined for components of greater added value than the mere raw material.

Technical Services: Commercialization of the company's knowledge, technology, and experience in outside consulting services. These activities had very satisfactory economic results and captured a large share of the domestic market. Nevertheless, relative to the company's overall economic balance, the sales registered and profits generated never reached significant values. Due to the negligible impact on the region's economy and the limited ability to create jobs, these activities could never be considered a social and economic alternative to mining.

Mining and public works services: Like the previous point, this entails using the company's means and capacities to provide external services such as mine excavation and exploitation for other companies and excavation works for new roads. Though it generated a lower profit percentage level than technical services, this activity did register a considerable sales volume within the company's overall balance and maintained considerable employment levels.

As a result of these activities, MAYASA was transformed from a company dedicated to the single activity of mercury mining to a diversified company in which mercury mining accounted for just 12 percent of sales, as we can appreciate in Table 2 for the years 1994, 1995 and 1996.

Another very different question is how to evaluate PRECA's effectiveness in terms of the region's sustainable economic development, as well as its profitability.

Table 2. Breakdown of MAYASA's annual sales.

| | 1983 | 1985 | 1986 | 1987 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|-----------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Mercury and by-products (%) | 87.8 | 80.2 | 69.5 | 69.2 | 41.8 | 30.5 | 28.5 | 24.6 | 11.9 | 12.8 | 11.5 | 25.7 |
| Technical and mining services (%) | | 8.1 | 14.0 | 12.1 | 18.5 | 33.7 | 31.7 | 29.1 | 20.5 | 27.4 | 38.9 | 40.9 |
| Public works (%) | | | | 6.5 | 12.7 | 11.6 | 12.3 | 19.2 | 48.4 | 44.2 | 33.9 | 9.2 |
| Agricultural activities (%) | 12.2 | 11.7 | 16.5 | 12.2 | 27.0 | 24.2 | 27.5 | 27.1 | 19.2 | 15.6 | 15.7 | 24.2 |
| Total (%) | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| Total (millions US \$) | 16.8 | 16.6 | 12.8 | 15.4 | 13.4 | 14.3 | 15.62 | 21.46 | 32.7 | 43.3 | 34.24 | 22.58 |

Source: Almadén Mine Annual Reports.

Assessment of the conversion plan for the Almadén region

Considering PRECA's activities as a whole, it would be unfair to say that the government has not tried to find solutions to Almadén's problems. However, the current situation makes it clear that the results obtained have been insufficient to satisfy both social and economic demands. Although the plan's technical contents are sound, PRECA lacked consensus regarding both its design and the strategies used for its implementation. In addition, it is impossible to expect homogenous results from such a complex plan. What follows is a brief evaluation of a few of the most relevant activities.

Individualized analysis

Mining activities: This is the company's specialty, although attempts to produce other minerals have not been successful. However, these results cannot be attributed to poor planning or lack of foresight, because the sharp drop in the prices for raw materials during the 1980s took many mining companies by surprise.

Sheep farming: This activity is perfectly suited to the region's natural setting and was carried out correctly from a scientific standpoint, as evident by the various prizes won at livestock and commercial cheese fairs. Unfortunately, technical achievements were not accompanied by encouraging economic results. Livestock production never provided satisfactory income levels, nor did it serve as a model to foster the development of a commercial agriculture and livestock industry.

Technical services: This activity included the areas of geology, remote sensing, laboratory analysis and drilling. Although the activity reached a high level of efficiency and an acceptable market share with high profitability, it had little significance in terms of volume of business within the company.

Mining and public works services: This activity "apparently" produced the most favourable results, both economically and socially. But such results were indeed just an appearance: though it registered relatively high sales, it actually suffered low profitability. The comparison between Tables 3 and 4 allows us to see how an increase in sales did not necessarily entail a decrease in losses.

Meanwhile, almost all the services were provided outside of Almadén, sometimes displacing workers to very distant areas. The only economic impact felt directly in the region came from wages derived from a "temporary forced migration."

Mercury by-products: the production of substances derived from mercury is well suited to the company's technical knowledge and commercial experience, since the distribution chain for mercury by-products is almost identical to that used for mercury itself. The new industrial plants fit in well with Almadén's productive capacity and the dimensions of the market. Unfortunately, the same environmental pressures that affected the mercury market also took their toll on demand for mercury by-products, forcing the recently inaugurated factories to close.

Agricultural activities: Agricultural activities in general and other specific projects such as fish farming, honey production, mushroom cultivation, animal feed production, and bio-mass were a resounding failure. These activities did not reach expected production volume or sales, nor did they absorb a significant portion of excess labour.

Overall analysis

Table 4 presents economic data for the entire PRECA period. From this information, we can establish that the state contributed US \$150.8 million to sustain the company's activities, of which US \$59.7 million correspond to direct subsidies for mineral exploitation. The remainder corresponds to company losses assumed by the state.

Table 4. Annual economic data for the Almadén Mines.

| Year | Income (US \$) | Results (US \$) | Subsidies |
|-------|----------------|-----------------|------------|
| 1983 | 16 806 667 | 480 000 | |
| 1984 | 18 733 333 | 833 333 | |
| 1985 | 16 600 000 | 840 000 | |
| 1986 | 12 866 667 | -8 960 000 | 53 333 |
| 1987 | 15 400 000 | -4 473 333 | 226 667 |
| 1988 | 22 140 000 | -3 020 000 | 166 667 |
| 1989 | 19 613 333 | -3 473 333 | 5 566 667 |
| 1990 | 13 440 000 | -11 413 333 | 11 413 333 |
| 1991 | 14 346 667 | -4 986 667 | 6 880 000 |
| 1992 | 15 626 667 | -9 326 667 | 8 006 667 |
| 1993 | 21 460 000 | -8 280 000 | 6 420 000 |
| 1994 | 32 753 333 | -11 113 333 | 6 020 000 |
| 1995 | 43 306 667 | -8.153.333 | 5 913 333 |
| 1996 | 34 240 000 | -12 260 000 | 4 613 333 |
| 1997 | 22 580 000 | -7 846 667 | 4 426 667 |
| Total | 319 913 333 | -91 153 333 | 59 706 667 |

Source: Almadén Mine Annual Reports.

In spite of such contributions, social and economic parameters clearly indicate that the region is suffering economic decline, and accomplishments achieved can only be evaluated negatively. From the social point of view as well as in terms of employment levels, the implementation of alternative activities has not lead to sustainable development. However, although figures indicate MAYASA has posted losses during the last two decades, exploitation of the Almadén deposits has nevertheless — on balance — been a tremendously profitable business for the state.

Relative assessment

Any analysis of such a long-term economic processes as mining cannot obtain correct results if incomplete data is used for short time periods. In such cases, the global perspective of its evolution is lost. The data in Table 4 is incontestable and the only possible interpretation is one of absolute failure. In contrast, Table 5 shows contributions to the public treasury made by mining exploitation in Almadén during the period 1960–1970.

Table 5. Income provided to national treasury by MAYASA: 1960–1970.

| Year | US \$ (current value) | US \$ (1999 constant) |
|-------|-----------------------|-----------------------|
| 1960 | 1 833 333 | 45 186 667 |
| 1961 | 2 000 000 | 48 900 000 |
| 1962 | 2 166 667 | 50 113 333 |
| 1963 | — | — |
| 1964 | 3 566 667 | 70 900 000 |
| 1965 | 9 333 333 | 163 893 333 |
| 1966 | 7 333 333 | 121 220 000 |
| 1967 | 6 666 667 | 103 600 000 |
| 1968 | 8 000 000 | 118 400 000 |
| 1969 | 8 200 000 | 118 813 333 |
| 1970 | 4 666 667 | 63 866 667 |
| Total | 53 766 667 | 904 893 333 |

Source: Almadén Mine Annual Reports.

Considering the decade prior to PRECA's conception, Almadén's contribution to state funds was more than six times higher than the investments for the maintenance of MAYASA — and also higher than the direct investments entailed by the PRECA project. The existing imbalance between Almadén's contributions to state funds and the government contributions that were received by the district during the last two decades takes on truly disproportionate dimensions when considering these two factors.

The tremendous value of the mercury extracted from Almadén is equivalent to the current value of a gold deposit with an average grade of 800 grams/tonne and total reserves of 3 581 228 kilos.

Throughout its entire history the mining industry distinguished itself with an almost total lack of reinvestments. This is despite its historical earnings and capital gains generated by mercury mining in the region of Almadén.

Historically, all investments made in Almadén — such as the School of Mining Overseers, Miners' Hospital, and metallurgical installations — have always been related in some way to attempts to improve mercury production. No diversification toward other potential activities has been undertaken. Meanwhile, recent investments in transportation infrastructure cannot be considered a specific initiative for the Almadén region, since they are part of the highway modernization plan that has affected the entire country. In other words, with the exception of PRECA, the region has not received any other specific assistance.

It is difficult to precisely compare Almadén area investments with those made in other regions. We have made a rough comparison with investments in the conversion of coal producing regions, both in terms of national initiatives and those agreed upon because of the European Union. The total investments made coupled with those pending for the near future for the conversion of coal producing regions, reach US \$3.5 billion. These investments are expected to assist 35 508 workers, by which we can establish a ratio of US \$99 114 per worker. In the case of mercury mining, keeping in mind the economic information in Table 4, the total amount invested in the Almadén region during the last 14 years is US \$59 706 667. This amount has retrained 635 workers, by which we can establish a ratio of US \$94 026 per worker.

Although simplistic, this comparison would seem to indicate that Almadén has received government treatment on par with other mining regions. However, the equality suggested by the figures is misleading and in reality there are noticeable practical differences. One should keep in mind that production in Almadén only began to suffer losses during the 1980s, having been very profitable in previous decades. In contrast, coal mining had suffered losses for several decades that were always paid for by the state, such that total subsidies (not just direct subsidies) have been much greater in the case of coal.

Meanwhile, the socioeconomic and political parameters of both cases are very different, which has without doubt favoured a greater injection of

funds toward coal-producing regions. Among those parameters the following stand out:

- the coal industry implies several thousands of workers distributed in several regions, while mercury affects a few hundred workers concentrated in just one district;
- the coal industry constitutes a national social, economic and political problem of the first order, while the mercury problem is currently just a regional issue; and
- the mercury problem only affects Spain, while the coal problem affects several European countries.

These factors have given rise to different proposals for solutions to the problems. The magnitude of the coal issue has lent its protagonists a greater political weight at both the national and European levels. This translates into active participation in worker conversion plans by local political classes and, above all, unions. This participation has meant that resources are directed to the desired investments, including the creation of infrastructure, specific training plans and stimuli directed toward attracting private-sector projects that will create jobs.

In contrast, in the case of Almadén, any investments realized have been used to artificially sustain uneconomic activities and subsidize anticipated retirements. The investments have not stimulated private investment that would provide economic alternatives and thus have not created any hope whatsoever of sustainable development.

Finally, beyond the strictly economic quantification of the investments made and an evaluation of their results obtained, one question remains unanswered: Should Almadén's treatment by the state be considered fair and proportional considering the contributions the region has made to the public treasury throughout its entire history?

Conclusions

Achieving “sustainable development” in a region is a complicated task that should integrate technical, environmental, political, legal, economic, financial, and social aspects in a holistic model. The simple injection of technical and economic resources, without considering the problem’s social dimensions, cannot guarantee sustainability. Ideally, a process of integrated management in any mining district whose goal is sustainable development should include:

- modernization, amplification and diversification of existing economic activities to compensate for the mining districts’ inability to attract ongoing alternative industries;
- improvement to regional infrastructure to improve the attraction to business and promote alternative development;
- promotion of professional development to correspond with the introduction of alternative industrial activities; and
- environmental improvement that allows for the development of sustainable recreational or tourist activities.

In addition, the development of a mining district should include mechanisms for reaching consensus regarding the changes being considered. Without consensus, the technical and economic contributions are completely insufficient. To draw conclusions regarding what measures, if applied correctly and opportunely, might have avoided the negative situation in Almadén, we must attempt to respond to questions 3, 5 and 6 as posed in the introduction.

What other economic activities could have been promoted as alternatives?

The Almadén region has excellent mineral resources besides mercury, as well as limited agricultural and forestry resources, and excellent (though also limited) hunting resources. For these reasons, the initiatives were conceived correctly, because they correspond to the region’s real potential. Their lack of success is due the methodology used for their implementation.

What measures could have been taken to avoid the present situation?

The promotion of private-sector participation would have allowed greater realism and dynamism, and would have avoided some of the failures in the implementation of the plan. The lack of private-sector participation and entrepreneurial dynamism can be considered a historic legacy of the mining district, which from its privileged commercial position should have

participated in the technological developments of the industrial uses of mercury. This would have allowed an increase in benefits, commercial stability and technological development that would have provided a greater level of sustainability.

When and how should these measures have been applied?

The corrective measures that PRECA attempted came too late to solve the problems that had been brewing for centuries in the face of government passivity. Attempts to solve the problems only began during the terminal phase of the mining cycle, which is precisely when solutions are most complex and difficult to find. It is true that unforeseen factors and the drop in the mineral prices during the 1980s contributed to the failure. Nevertheless, beginning a diversification plan when mineral reserves would only last another six years, after several centuries of mining activity, can hardly be considered far-sighted.

As well, the methodology used to implement the Almadén conversion plan had grave defects.

Lack of social consensus, both in the design and the development of the plan. For centuries, the government unilaterally decided how to exploit the mercury deposits and similarly planned how to convert the region, without incorporating the opinions and efforts of affected social actors. Under these conditions, it is difficult to create a social climate favourable to change, especially in the context of a distorted labour market that generated illogical proposals and no objectivity while evaluating the proposals. For centuries, the community's climate has been unreceptive to company-sponsored proposals, and in this sense it must assume its own share of responsibility. Meanwhile, for its part, the company never made efforts to improve this situation until it was too late.

Lack of communications policy has exacerbated the negative social climate. Company management has rarely concerned itself with local public opinion regarding its activities or projects. This lack of concern has historic roots in the mine's connection to the state, which allowed the company to exercise its will indiscriminately under the protection of official power. The existence of an adequate communications policy between the company and its surroundings would have avoided the circulation of rumours, gradually corrected the distorted relations, and facilitated the acceptance of new projects.

Lack of private-sector participation. New investments have depended exclusively on public capital, whether from the central Treasury Department or from the regional government. In addition to weakening social consensus and competitiveness, a direct consequence of no private-sector participation was an excessive politicization, resulting in:

- utilization of the company and its projects as tools for political management, giving priority to political accomplishments over business or economic accomplishments;
- technical decapitalization of the company's upper level management so that projects were managed by political appointees;
- loss of economic rigour in the business analysis, both in terms of economic feasibility and the design of commercial policies; and
- no continuity in the project's management team. Instead, management was subject to political whims, which has impeded the implementation of a uniform business strategy.

These problems could have been avoided through the participation of experienced private companies who had control over marketing channels, as well as having strictly business and economic objectives.

Glossary of "best practices"

From the outset of a mining project, once the "initial impact" — which is the focus of the studies on Bolivia, Chile and Peru — has been overcome, attempts must be made to reach an equilibrium in which the mining operation interacts with other economic and social factors in the region. When mineral resources are depleted, the mining operation will cease and a new impact (or "de-impact") will be felt within the area. The impact's intensity can vary widely according to various criteria. Thus, it is not easy to provide general conduct guidelines that will be applicable in all cases. But, it is evident that when a mine closes there will be differing degrees of social and economic impacts. There is no question that these form part of the relationship between the mining company and the local community. Thus it is necessary to propose solutions to this inherent problem. These 8 points illustrate potential solutions.

In cases where the "in situ" transformation of exploited minerals is possible, their implementation should be promoted in the early stages of the mining project, in order to promote parallel industries that can outlast the closure of the mine.

Implementation of administrative measures must be established. These allow a significant part of the mining profits to return to the region in the form of improvements to infrastructure and the socioeconomic situation.

International experiences indicate that the state is not a good mining entrepreneur; moreover, it is incapable of developing profitable and sustainable economic enterprises. It is essential to attract the participation of private-sector companies to create stable employment possibilities in alternative industries.

The implementation of non-traditional economic activities requires a participatory consensus among the social and/or economic actors involved.

Creating a social climate favourable to the implementation of new activities requires a flexible and transparent communications policy, with the following objectives:

- distribution of information about the projects in a clear, reasonable manner;
- circulation of rumours must be avoided; and
- participatory consensus among all levels of players must be facilitated.

Because it is the entity responsible for planning and coordinating economic plans, the state should abstain from playing the role of entrepreneur. It must act only as a regulator with the following functions:

- pass appropriate legislation;
- promote fiscal exemptions that favour the participation of the private sector;
- act as arbitrator and inter-mediator in company-community relations; and
- control and ensure the correct use of public funds.

Each mining project is finite and its final impacts should be evaluated with anticipation. The correct evaluation of these impacts and the foresight to implement appropriate measures during the project's initial phases are essential so as to minimize negative effects.

The mining company is not solely responsible for planning and promoting alternative activities. The state and the community share these responsibilities and should participate in identifying the mechanisms and incentives sufficient to attract the private sector. The mining company should be a privileged collaborating agent — but its responsibilities must not exceed its commercial and business functions.

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CHAPTER 6.

Canada: From Fly-In, Fly-Out to Mining Metropolis

Archibald R. M. Ritter

Introduction

Mining has been a major economic activity in Canada for the last century. It has made a valuable contribution to the development of the Canadian economy and to the standard of living of Canadians. The benefits include jobs and incomes, tax revenues and the social programs they finance, foreign exchange earnings and all that they purchase for Canadians, frontier development, support for the national infrastructure, and economic diversification into a broad range of economic activities centred on mining.

At the same time, mining continues to be controversial because it has generated costs of an environmental, social, and financial nature, especially at the level of local communities. The benefits, which could accrue to the local communities, have the potential to be more substantial than they have sometimes been in the past. Indeed, the principal objective of the new generation of mine enterprise and community relationships is to improve the net benefits of mining activity for the benefit of the local communities which were often overlooked in the past. Such new relationships have been in process during the last decade.

The objective of this study is to analyze some Canadian experiences with respect to the economic, social, and environmental implications of mineral-sector activity on local communities close to the mine sites. From this analysis, some perspectives, insights, and ideas are distilled, which may be useful for those countries of the Latin American region currently experiencing rapid growth of mining, notably Bolivia, Chile and Peru.

There are various types of mining communities and their associated mines. Therefore, it is difficult to generalize concerning the impacts of mining on the community and about how the net benefits could be improved, and negative impacts reduced or eliminated. The range of mining communities includes:

- long-established but isolated mining towns which rely solely on the single enterprise;

- a variant of the above: long-established company towns developed by the mining enterprises themselves;
- long-established communities with diversified economic bases, which then become homes to new mines;
- “fly- in, fly-out” mining, or mines without adjacent communities;
- temporary, tented encampments in areas of intense mineral exploration and possible mine development; and
- major long-established mining cities in which it has been possible to develop a broad range of mineral related economic activities over time.

This study begins with a general discussion of mining and its interactions with communities in the Canadian setting. Then the economic and social effects are examined in the Canadian context. The particular issues arising from the expanding mining activities in regions populated by indigenous peoples are then examined briefly. A number of case studies of mining and the community in Canada are analyzed. The first is the Voisey’s Bay nickel project and the attempt to negotiate an equitable economic, social, and environmental agreement among two indigenous groups, the provincial government, the federal government, and the International Nickel Company of Canada (INCO). The second case is the Diavik diamond mine, in the Northwest Territories. This is important as it represents another attempt to negotiate a fair agreement, prior to start-up, between indigenous groups, governments, and the enterprise. Thirdly, a mature potash mine in an established region of the country, Sussex, New Brunswick, is examined as an example of a highly successful mine and community relationship. The case of Sudbury, a potential “mining metropolis,” is then examined. Finally, some insights emerging from the Canadian case studies are summarized.

Mining, the community and public policy in Canada

The most widely-accepted vision for the development of Canada’s mineral sector, agreed upon by Mines Ministers of all levels of government, industry, labour, Aboriginal groups and environmentalists is that outlined in the Whitehorse Mining Initiative of 1994 (Government of Canada, 1996, p.1):

... a socially, economically, environmentally sustainable and prosperous mining industry, underpinned by political and community consensus.

More specifically, the objectives of mineral policy at the federal level have been defined in the same resource (Ibid, p.5) as follows:

1. *To integrate the concept of sustainable development in federal decision-making affecting the minerals and metals industry;*
2. *To ensure the international competitiveness of Canada's minerals and metals industry in the context of an open and global trade and investment framework;*
3. *To advance the cause of sustainable development of minerals and metals at the international level through partnerships with other countries, stakeholders and multilateral institutions and organizations;*
4. *To establish Canada as a global leader in promoting the safe use of minerals and metals related products;*
5. *Aboriginal involvement in minerals- and metals-related activities; and*
6. *To provide a framework for the development and application of science and technology to enhance the industry's competitiveness and environmental stewardship.*

The above objectives emphasize environmental sustainability, community orientation, and Aboriginal Peoples as well as technology and economic competitiveness. Although not spelled out in detail, the competitiveness dimension presumably would include sub-objectives of a more traditional character, such as employment and income-generation into the distant future.

However, this statement of objectives is surprising in its omissions. It does not include the strengthening of the whole cluster of economic activities which surround mining, which generate a large proportion of the economic and social benefits to local communities and the nation, and which influence the long-term economic sustainability of the whole mineral sector.

Economic impacts of mineral activities on communities

There are many possible impacts of mineral sector activity on the local community. These depend on the size of the mine, its longevity, whether a number of mines are being developed in a region, the development of other related mineral activities, and the initial size and degree of economic diversification in the mining towns. Of special importance is "remoteness" — or the location of the mine relative to communities. The most direct and important impact of a mine is employment and income generation. The subsequent stimulation of other economic activities, serving consumer needs, and servicing the mine, all further these purposes.

Whether a small community or town is able to capture some of these economic activities in order to diversify its economic base and employment structure, depends on a variety of factors. Among these are:

- the size, duration, and degree of diversity of the local mining activities;
- size and the range of economic activities already undertaken in the pre-existing community; and
- remoteness of the mine location and relevant communities.

The establishment of a mine and the community employment it generates expands the demand for a wide variety of consumer goods and services. Some of these will tend to locate near the new and/or expanding consumer market that accompanies a mine. They could include retail outlets of many sorts, hotels, restaurants and bars, automotive sales and repair, recreational services, innumerable personal service ventures, medical services, financial services, and other business services. Manufacturing industries for the local market might include bake shops, soft-drink bottling and other lines of food processing, as well as more sophisticated products requiring larger local markets.

Usually there are relatively few inputs into the mining process which are provided within a small isolated mining community. More complex equipment, especially that requiring major economies of scale in its production, usually cannot be produced in small remote towns. However, various services can be provided at the local community level. For example, local enterprises might provide housing, maintenance services, roadways, construction of sheds and simple mine buildings, inputs such as sand and gravel, and food for mine personnel.

As a mine community matures and expands, other types of inputs can be provided to the mine, such as vehicle repair, machine shop services, welding, sheet metal work, plumbing, and electrical services. These may be followed by complex construction projects, and perhaps the repair and assembly of basic steel-work such as vats, bins and hoppers. Ultimately, when a mine community expands greatly, a growing variety of enterprises may locate there to provide inputs for the mine's activities in the region, perhaps for other regions, and eventually for other countries. In major mine cities, some more complex mine equipment may be produced, especially the high-bulk, lower-value products which are relatively simple to produce, of a custom-designed character, and/or relatively expensive to transport long distances. Examples include some underground equipment such as shaft furniture or roofing bolts, some infrastructural equipment, steel pipe, wire products, hose products, ventilation ducting, metal structural products, drill

steel and bits, and even explosives and chemical products. Many services are provided in such mining cities: exploration, mining and processing consulting, repair and maintenance services, mine decommissioning services, machinery rental, sales, repair and re-building, cast-metal products, plus legal and financial services — especially for mine activities.

As the local community expands, there will also be a steady expansion of the provision of public goods and social services. These include education (including universities); health facilities (including hospitals); infrastructural services (including sewage systems, paved roads, parks, squares and sidewalks); water systems; electrical systems; recreational facilities; and the local government bureaucracy to administer these. If the mine community eventually develops into a mining metropolis, the range of these activities will probably expand further.

In sum, the development of mining activities can lead to the expansion of a wide variety of linked economic activities. In some cases, they may contribute to the development of major urban centres. However, small remote mining communities whose fate is tied to a single mine may lose their *raison d'être* when the ore body is depleted. When the mine shuts down, they may become ghost towns, a phenomenon that is well known in most major mining countries.

Indigenous peoples and mineral development

The development of mineral activities increasingly occurs in areas occupied by indigenous peoples, because mineral exploration and mine development are being pushed ever further into frontier areas of the north of Canada. In these areas, the Indian and Inuit peoples are often a majority of the population, and in many cases they are owners of the mineral resources.

The introduction of mining in indigenous areas creates important potential benefits but also a number of challenges. Some of the benefits are the same as the general benefits of mining, namely employment, income generation, tax payments for local and regional governments and everything that can be done with public revenues in terms of social expenditures, infrastructure and community development. But indigenous communities also have the possibility of capturing some spin-off benefits from the expenditures of mining enterprises on locally purchased inputs.

The First Nations peoples may benefit enormously in future decades by systematically developing the relevant mining skills so that they can dominate mining activities in the North. Ultimately, this should include partial or complete ownership of some mine enterprises. Their proximity to

northern mine sites and the distance commuting system should facilitate this trend.

There may also be social problems for indigenous peoples. Mining activities and the relocation of outsiders into these areas may introduce transient mining personnel who may bring with them alcohol, different patterns of consumption and foreign life-styles. These disrupt community life and traditional ways of living, with adverse impacts on indigenous societies generally. However, in most but not all parts of Canada, these negative effects occurred well before the advent of mining. But secondly, there may also be negative effects upon the economic activities of indigenous peoples. For instance, hunting, herding, or foraging areas risk being disturbed or destroyed. Rivers may be polluted and fishing activities damaged. Third, the environmental impacts of mining may affect the health of indigenous peoples directly through air and water pollution, and indirectly through their impact on fishing or other economic activities.

If there are significant net benefits for indigenous communities, it is likely that they would support and participate in environmentally sound mineral development activities in their territories or else those territories adjacent to their communities. However, the key concepts for willing support by indigenous peoples for mining projects in Canada are: net benefits; participation; and respect for the environment. In the words of Dr. Billy Diamond, Grand Chief of the Cree (Diamond 1999):

The more experienced mining companies realize that, for the most part, Indigenous Peoples and the Cree in particular are NOT anti-developmental. We welcome the economic benefits, training and technological transfer that are associated with large resource projects. But we do insist on one criteria First and foremost, all aspects of the partnership must be co-authored and co-managed by all the partners.

Historically, indigenous communities were regarded as non-participants in negotiations with governments and/or private corporate ventures concerning the terms and conditions under which natural resources would be extracted. Thus, for many years, their claims were ignored and they were excluded from such deliberations. But during the 1960s and 1970s, after recognition that there was legitimacy to Aboriginal land claims, governments adopted other forms of "pseudo-participation," which were essentially "non-participatory."

During the 1990s, there has been a change in the position of the First Nations peoples. The Supreme Court of Canada has recognized native land

claims based on treaties that have not extinguished title to land or resources in many areas of Canada. This means that the process of allocating natural resources or laying claim to land titles often must be a tripartite process, where indigenous communities sit at the negotiating table and are empowered to make decisions which help shape the projects. They exercise "citizen power," involving various forms of "partnership," and some forms of "delegated power," such as the transportation of goods to the site. Finally, they may be allocated "citizen control" over certain stages of the project or areas of the resource for the use of their own people, as is indicated the Supreme Court decision in the Marshall case of the Mic'mac rights to the eel fishery in Nova Scotia (September 1999). The direction of the Supreme Court on these matters is toward the allocation of greater native voice in the allocation of natural resources.

Ultimately, the indigenous communities may assume full control over some territories or natural resources. Recently, the Nisga'a band in Northern BC has been granted a land claim which fully recognizes its territorial claim. By virtue of granting it, their distinctive rights as natives have been extinguished but they gain control over all the lands and natural resources in their historic territory. This claim was approved by Parliament in October 1999, and the legislation supporting the claim was approved in December 1999. Many land claims are either currently before the courts or in process. It is likely that many will be recognized as legitimate. This will have important consequences for the bands involved — and for the larger non-native community. The establishment of Nunavut as a self-governing territory in the Eastern Arctic is also a step in this direction.

There are a number of ways in which indigenous peoples can obtain larger shares of the economic benefits from mine projects.

If they are the owners of the resources — i.e. if their ownership of territory has never been "extinguished" — they can claim the royalties which otherwise would have gone to provincial governments. For Nunavut, the initial Land Claims Agreement recognized Inuit-owned lands, with the remainder in the jurisdiction of Nunavut itself. In time, Nunavut presumably can impose its own corporate income tax as well. If there are not accepted ownership rights, local indigenous communities might be able to impose property taxes, if the mine site is within town or regional limits. Another possibility is to have funds from a mine invested in a community-owned and controlled Endowment or Foundation.

Indigenous peoples can negotiate contractual obligations on the part of the mine enterprise to employ them. If they were not already trained for such employment, the enterprise can make commitments to establish the necessary training programs.

Local communities could try to obtain the assurance that the mine enterprise would source some purchases of inputs for mining activities or for consumption by the mine-workers in the local indigenous economy. If there were little relevant business experience, the community could establish an organization to promote small businesses with support from the mining enterprise, or the territorial and federal governments.

As well, there are now two mechanisms in operation in Canada that try to ensure a fair and equitable distribution of the net benefits from mine enterprises.

"Comprehensive environmental reports," prepared by the Canadian Environmental Assessment Agency, are the sort discussed in the analysis of the Diavik and Voisey's Bay projects. In practice, these reports devote much attention to the social and economic impacts of projects as well as to environmental concerns. The procedure for constructing these reports is outlined in the Diavik and Voisey's Bay case studies.

The so-called "Impact and Benefit Agreement" or "socioeconomic agreement," are mechanisms that the company must negotiate with the indigenous communities. These include many of the same items incorporated in the comprehensive environmental agreements regarding economic issues. One important aspect of the agreements is that their conclusion may or may not be necessary prior to the start-up of a mine. If such an agreement must be reached prior to this, the most recalcitrant negotiator can effectively block the project even though everyone else has reached agreement. This may produce long delays, unfair treatment of different groups or it may even kill a project. On the other hand, if it is not necessary to reach an acceptable negotiated agreement prior to start-up, the enterprise may be in a strong position to ignore the concerns or demands of some of the partners.

Long-distance commuting, or "fly-in, fly-out mining"

In the last two decades, there have been virtually no new mining communities constructed to accompany new mine projects in Canada. Every new project has involved transporting or flying the workers into the site for shifts of varying periods. This arrangement is referred to as "long distance commuting," or "fly-in mining" (Shrimpton and Storey 1992, p.190).

Long distance commuting avoids many of the difficulties of single-sector mining towns (Ibid., p.195):

First, the cost of constructing accommodations of a barracks/hotel nature is low compared to that of a full community. Such accommodation is not considered "home" so that the range of services required is also smaller than a full dedicated mine community. Moreover schools and family facilities are unnecessary. Second, the risk of major loss of the investment in the community for the enterprise and the public sector should the mine fail prematurely is also avoided. Third, the mining company has greater flexibility in deployment of workers over the course of the mineral market cycle. Indeed the workers and their spouses may have greater opportunity to find full or part time employment when they are located in a larger town or city rather than dwelling permanently in the mining town. Fourth, the human and economic costs of community closure, which would accompany a mine shut-down are avoided by long distance commuting. Fifth, because this arrangement seems to be reasonably satisfactory to the workers, job turnover and perhaps absenteeism are lower for the long distance commuting option as well.

There are a variety of consequences of this pattern of mining, both for the development of local communities and regions, as well as for families. On the positive side, the long distance commuting option provides employment for workers from older established mining towns, thereby helping maintain such communities. On the negative side, employment opportunities may be lost to residents of communities somewhat closer to the mine site. Furthermore, the stimuli to small businesses provided by the consumer demand on the part of the mine workers may migrate to the towns of origin of the commuting miners. This may be desirable or undesirable depending on the circumstances.

It is likely that mining will continue to move further and further into the northern areas of most provinces, Labrador, Nunavut and the western Arctic. Indeed, because of the occurrences of diamonds, a growing mining boom in Nunavut and the western Arctic looks increasingly possible. As this occurs, fly-in mining may be of increasing benefit to northern communities and to the indigenous peoples of the North. Established indigenous communities could serve as the major labour sources for the future mines in these areas. Workers would commute from their communities to the dispersed mine sites. A number of factors are in place to make this happen:

- all of the communities are now equipped with air transport facilities;
- there is an obvious advantage in its location in terms of commuting within the region;
- there are indigenously owned airlines serving the region; and
- the new types of “Impact and Benefit Agreements” stipulate that large and growing proportions of the employment opportunities must go to the First Nations and Inuit peoples.

Voisey’s Bay Nickel Project: can harmony and equity be negotiated prior to start-up?

The Voisey’s Bay nickel project, one of the largest mining projects in Canada in the post-war period, is of special interest because a variety of major issues have emerged in the relationships between the mine enterprise, the Aboriginal Peoples of the area, and various levels of government. This project may generate large and much-needed benefits for the Innu and the Inuit of the area, for Labrador, and Newfoundland, as well as for INCO. To ensure that there is an equitable and viable sharing of benefits, a process of negotiation has been undertaken between the Aboriginal Peoples, the enterprise, and offices of the federal and provincial governments. An important part of this is the Environmental Assessment Report (EAP) produced by the Canadian Environmental Assessment Agency (CEAA), designed to evaluate the environmental effects of the project proposal, to undertake public hearings for the evaluation, and to recommend changes to the proposal. This assessment also includes an analysis and evaluation of the economic and social consequences of the project. A more detailed “Impact and Benefit Agreement” between the company and the Innu and Inuit remains to be negotiated, however. On this basis, the Government of Canada in consultation with the other parties gave the project a “go-ahead” from an environmental standpoint on 3 August 1999.

The context

In 1994, two geologists were searching for diamonds for Diamond Fields Resources Inc., but discovered the Voisey Bay nickel deposit instead. In August 1996, the site was acquired by the International Nickel Company of Canada for US \$3 billion. A separate enterprise, Voisey’s Bay Nickel Company (VBNC,) was created for the project. Delineation drilling in 1997 indicated a resource of about 32 million tonnes with grades of 2.83 percent nickel, 1.68 percent copper, and 0.12 percent cobalt. It is relatively close to

the surface and about 10 kilometres from the ocean. Some US \$55 million had been invested in exploration by mid-1999 (INCO 1999).

The VBNC is planning to begin mining the shallow "ovoid" or egg-shaped ore body with an open pit mine to access 32 million tonnes of ore, and later, an underground mine accessing an estimated 118 million tonnes. It would employ about 420 persons in the open pit phase and perhaps 950 in the underground phase. The ore would be converted into a concentrate at the mine site and shipped to a nearby ocean port for transport to the smelter and refinery, either in Sudbury Ontario or possibly in Newfoundland.

The main environmental impact of the mine would be the finely ground solid tailings remaining after the concentration process, and some waste rock. According to the CEAA Panel (1999a, p.1) they were to be *stored under water in two tailings basins made from existing lakes... to prevent them from being in contact with both air and water simultaneously which would cause them to release acid.*

The Voisey's Bay mine site is in a general area claimed by the Inuit and also the Innu Peoples. The Inuit, numbering about 5 000 persons, occupy the areas to the north, with a community at Nain, about 35 kilometres from Voisey's Bay. The Innu, numbering about 1 500 are centred at Utshimassits or Davis Inlet, some 80 kilometres south of Voisey's Bay. They have occupied the general region of Northern Labrador and parts of Northern Quebec.

The lands were never ceded by the Innu to any other government. In the words of Peter Penashue, President of the Innu Nation (Penashue 1995, p.1):

Innu have never recognized the jurisdictions that now claim us. We have never signed a treaty, nor ceded a square inch of our land. In the past these things were not necessary, as it was possible for Innu and Akenishau people to share the land and its resources.

Land Claims negotiations with the federal government have been underway for some time and are not close to completion as of early 2000.

The Innu and Inuit have limited economic opportunities in the absence of the mine. Incomes are low. Unemployment is high. Social and health problems are particularly serious. Population growth rates are also high. Economic self-reliance has been increasingly difficult given population growth and the limitations of traditional economic activities. At present, there is little generation of community financial resources, causing a continuing financial dependence on the higher levels of government. In this

context, the prospects of new economic activities generating jobs, personal incomes, tax revenues, and community self-financing of social expenditures are economically, socially, and politically attractive.

Mineral development is a provincial responsibility, so that the government of Newfoundland and Labrador is involved as well. Because previous resource agreements negotiated by Newfoundland in the past have proven to be unfavourable, the provincial government has been anxious to defend its interests in the Voisey's Bay project negotiations as effectively as possible. As part of its negotiation process, it passed legislation requiring that all minerals extracted in the province also must be smelted and refined in Newfoundland as well. But INCO argued that the forced location of the smelting and refining in the province was economically unviable. The provincial government did not change its position and insisted that the processing occur in the province or else the project would not proceed. Unwilling to make an investment considered unviable, INCO proposed an alternative hydrometallurgical process which was cheaper but also unproven for the types of sulphide ores of the Voisey's Bay mine, with the option of dropping the approach if it proved unviable. The premier of Newfoundland and Labrador, Brian Tobin, also refused to budge. The negotiations broke down and INCO ceased further investment in its exploration program.

A number of risks arise from this impasse. There is no guarantee that the hydro-metallurgical process will work. If it does not, all parties will lose immeasurably if the company is pressured to try. Another risk is that other nickel projects elsewhere in the world come on stream, forcing nickel prices lower, and perhaps delaying Voisey's Bay for many years and conceivably permanently. The loss for the Innu and Inuit would be devastating in the long-run as they would lose their advantage in the future development of mining in the Canadian North.

The environmental (and community benefits) review

An environmental review was begun by the CEAA in January 1997, with INCO, the provincial and federal governments, and the Aboriginal organizations participating. It was completed in November 1999. The Environmental Assessment Panel Report included a community benefits analysis.

The panel conducted hearings in Labrador and Newfoundland and consulted with the Aboriginal organizations and with INCO. It sought and obtained detailed information concerning VBNC's mining plan, its proposed

methods for managing the anticipated environmental problems, as well as the social and economic benefits for the local communities. It examined issues of air quality; shipping and its impacts on aquatic life; tailings management; freshwater fish and their habitat; wildlife, including seals, whales, polar bears, birds, Caribou and black bears; and general contaminants. It explored the impacts of the mine operation on the traditional economy of the Innu and Inuit including: the disturbance of wildlife; loss of habitat for animals traditionally hunted; contamination of country foods; plus the disruption of travel across and reduced access to traditionally-utilized resources. The panel also focused on economic concerns such as employment, the effects on local business, training, families, and communities. A number of additional issues were also addressed, namely the size and viability of the relevant ore bodies, the anticipated lifetime of the mine, and the rate of ore extraction. These are the key determinants of the sustainability of those benefits which would flow from the mine. Its report was made public on 1 April 1999.

The panel recommended that the project proceed. However, this was subject to the terms and conditions spelled out in a large number of specific recommendations. In CEEA's report (1999a p.7) the panel remarked:

... the Project could contribute significantly to sustainable social and economic development on the North Coast and in the rest of Labrador, without harming vital ecosystem functions and habitats or the ability of Inuit and Innu to keep using the lands in traditional ways.

The rest of the document delineated the conditions that would have to be fulfilled by the Company if it was to proceed with the project.

While negotiations between the Company and the Innu Nation and the Labrador Inuit Association on a formal "Impact and Benefit Agreement" had not been completed by early 2000, the Panel set out numerous recommendations designed to confirm that the economic benefits for the Aboriginal communities are significant and sustained. The panel recognized that when the title to the land is held by Aboriginal peoples, governments must ensure that, if projects such as this take place, the Aboriginal peoples must receive fair compensation, be properly consulted, and participate in the resource development. The panel argued that these could best be assured if the land claims issue were settled. However, because numerous other factors influence these negotiations, it would not be wise to halt the project until such time as a settlement was reached. Therefore, interim measures were necessary.

The compensation and participation dimensions would be incorporated in the Impact and Benefits Agreement (IBA) being negotiated between the Innu Nation, the Labrador Inuit Association and VBNC. The Panel recommended that reaching this agreement be a *precondition* for the implementation of the project.

In its submission to the panel, the VBNC prepared an Economic Impact Study (EIS) outlining the economic benefits that would flow to the people of the region. These were queried by the panel, further elaborated by the company and then became the focus of some of the panel's recommendations.

The VBNC agreed to give first preference to members of LIA and the Innu Nation, second to citizens of the rest of Labrador, and then to Newfoundlanders. It estimated that 29 percent of the total number of jobs in the open-pit phase of the mine would go to Innu and Inuit, with 21 percent of the total in the technically more complex underground phase of the mining. The VBNC and the Innu Nation also put forward some of the features of the IBA which they were in the process of negotiating. These included education and training, quantified employment objectives, measures to ensure that the lack of formal education requirements not be a barrier to employment, the hiring of an Innu Employment coordinator, a workplace respectful of traditional Innu values, and an anti-discrimination program. The Inuit had similar concerns but had not yet reached a preliminary level of agreement on the design of their IBA with VBNC.

Responding to some of the concerns raised at the hearings, the panel recommended that additional measures were necessary to overcome some of the barriers to such employment faced by the peoples of the region, and to help with the adjustments which such employment would require. Among the recommendations were (CEAA 1999a, pp.10-11):

- *Improving the existing "Multi-Party Training Program" to increase access to training for Aboriginal People and for Women;*
- *Implementing a second chance policy for employees who run into difficulties adjusting to their jobs;*
- *Setting up anti-racism and cross-cultural programs;*
- *Designating Cartwright as a pick-up point for employees (to facilitate access to mine employment for inhabitants of the south coast of Labrador);*
- *Establishing a process to ensure that women's concerns and perspectives are built into all decision-making in the workplace;*

- *Implementing measures to improve child-care services in the home community.*

In its Economic Impact Statement, the VBNC estimated the effects of its activities for the businesses of the area, for Labrador and the Province. It estimated that Labrador and Newfoundland businesses would capture 16 percent of the expenditures on goods and services. Labrador firms would supply nearly 43 percent of the purchases made within the province, amounting to US \$1.4 billion. It also estimated that indirect employment would generate incomes of US \$1 billion for the whole of Newfoundland and Labrador, US \$296 million for Labrador alone, and US \$50 million for northern Labrador. According to an "Industrial Benefits Monitoring Plan" in operation at this time, US \$37.5 million of a total US \$86 million spent in the Province has gone to Labrador.

To improve the capability of Labrador and especially Northern Labrador to increase their capture of the input purchases of the mine, the panel recommended that the VBNC, in consultation with the Aboriginal and Labrador businesses, and the federal and provincial governments, "...establish a comprehensive supplier development strategy to make it easier for local suppliers to put in competitive bids." (CEAA 1999a, pp.11-16) This would include supplier development initiatives, objectives for Aboriginal and Labrador procurement, and clarified procurement procedures. All of this should be in harmony with the still-to-be negotiated IBAs.

The mine is conceived as a fly-in, fly-out operation. This means that while a type of temporary accommodation will be constructed adjacent to the mine site, most employees will commute from their respective communities. (Nain, 35 kilometres to the north, is accessible by aircraft, boat, or snow vehicle, depending on the season.) This means that benefits should flow to the communities without the influx of large numbers of new inhabitants. Nain and Davis Inlet would provide significant amounts of labour, and would likely experience increased housing, commercial and community construction, and an expansion of business activity.

The panel foresaw major disruption to the town of Nain and called for a variety of specific measures to facilitate its adjustment. Perhaps most significant, it recommended that the VBNC pay the community to cover some of the additional costs imposed by the mine, for the use of community facilities and infrastructure by the VBMC during the construction. This is appropriate especially as the mine site is outside of Nain's current

jurisdiction, and it would have difficulty imposing property taxes on the mine (CEAA 1999a, pp.12-16).

Compensation payment in the form of a royalty will also be made to the Labrador Inuit Association, but the detail of this is included in the IBA and is not yet known. In any case, there is no guarantee that the LIA would support Nain appropriately. An independent payment in the form of some type of taxation for Nain is probably unavoidable. Further recommendations were made regarding the development of transportation infrastructure, health facilities, and community economic development. Only when the IBA is public will we know of the full agreement reached between the Innu, Inuit, and VBMC.

One hopes that the Indigenous Communities will have been able to obtain a fair share of the economic benefits from the VBNC, and that simultaneously, the mine remains commercially viable. If the sharing is reasonable and equitable for the Innu, for the Inuit and also for Labrador generally, a major break-through in mine-community relations will have been achieved. We should have a good idea of this in the next few years.

Much of the panel's report was devoted to environmental issues and a majority of the recommendations deal with the details of the environmental effects of the project. Of critical concern was the issue of managing the solid tailings from the mill operation so as to prevent acid generation and leakage. Various alternative arrangements were considered, and the panel proposed that the possibility of "back-filling" the open pit cavity with tailings be explored.

Diamonds in the Northwest Territories: the Diavik Mine

The development of diamond mining in Canada's Northwest Territories is opening a new chapter in Canadian mineral development and perhaps in the relationships between the mining enterprises and the Indigenous Peoples. The vast endowment of diamond occurrences only became clear with the extensive exploration that took place in the decade of the 1990s. One mine, Ekati, is in production; a second, Diavik, is in the construction phase; while others are in the assessment stage. The mines provide a major opportunity for the indigenous communities in the areas. It is important that the first agreements between the companies and the communities are equitable and fair.

The context

In 1991, diamond-bearing kimberlites were discovered in the Lac de Gras region in the Northwest Territories, sparking an exploration rush of epic magnitude, especially in the Northwest Territories. Approximately US \$510 million was invested in exploration from 1989 to 1998 (Canadian Intergovernmental Working Group 1996, p.25). Numerous kimberlites were discovered, including over 100 on the Ekati property, around 50 on the Diavik area, and many others at sites in the North. The ore grades are of internationally competitive quality. The first mine to come into production was Ekati, a joint venture between Dia Met of Kelowna, BC (this Canadian partner owns 29 percent), Broken Hill Properties of Australia (BHP; 51 percent), and the two geologists who discovered the ore-body (20 percent).

The second mine site is that of Diavik Diamond Corporation Ltd, 60 percent owned by Rio Tinto PLC of Britain and 40 percent by the Canadian partner Aber Diamond Mines of Vancouver. The mine is located on an island in Lac de Gras, which is about 200 kilometres south of the Arctic Circle. It is estimated that some 104 million carats of the identified diamond resource are of quality available to mine (Canadian Intergovernmental Working Group 1996, p.29). The mine is to include four kimberlite "pipes" on, or adjacent to, the island in Lac de Gras. Diavik proposes to construct dykes around three of the pipes, which lie in 12 and 26 metres of water. The areas inside the dykes would be drained, thereby permitting open-pit mining in the pipes, reaching depths of to 300 metres. Subsequently, underground mining would be initiated at two of the pipes, reaching depths of 400 metres. Underground mining would be more expensive but would extend the mine's life by six years. This mine is scheduled to come on-stream in 2003. It is estimated that US \$884 million will be spent by the partners in its development (Kennedy 1999). The estimated mine life is 16 to 22 years. However, intense exploration is continuing in the region, and it would be surprising if additional economically viable pipes were not located and "proved up," thereby significantly extending the life of the mine. The diamonds will be extracted from the ore in a conventional diamond recovery plant.

Four groups of First Nations peoples have traditionally used the territories in the region of the Diavik mine site: the Yellowknife Dene First Nation (YDFN), the Lutsel K'e Dene First Nation (LKDFN), the North Slave Métis Alliance (NSMA), and the Kitikmeot Inuit Association (KIA). The Diavik mine lies within the traditional and proposed settlement areas of the Treaty 11 Dogrib, the Akaitcho Territory Dene, and the NSMA. Land

settlement negotiations or pre-negotiations have been underway for some time. All of these groups are participating in the negotiations with Diavik and other relevant organizations. All expect to reach formal IBAs with the company as well.

The social and economic situation of the Indigenous Peoples is generally viewed as inadequate. Unemployment has been high, in the area of 20 percent. Incomes are relatively low. Reliance on welfare is significant. The tax base of the communities is weak. The communities continue in a quite dependent relationship with the Department of Indian Affairs and Northern Development. Traditional economic activities continue but do not provide sufficient incomes for many people.

The “comprehensive study report”

The CEAA required that Diavik undertake a comprehensive study of the impact of the mine on the environment of the area as well as on the socioeconomic well-being of the people in the region. Diavik’s report was based on geo-technical, environmental, and socioeconomic research, as well as public consultation and discussions, which took place between 1994 and 1998. The CEAA, in turn, received the report, undertook further consultations with the aboriginal associations, the territorial government, and the federal agencies responsible for the project, (namely the Departments of Indian Affairs and Northern Development, Natural Resources, and Fisheries and Oceans). It presented its Comprehensive Study Report to the public in June 1999. After some time for public debate of the project, the federal government announced that the project would not have to proceed to a more extensive public panel study. On 4 November 1999, then federal minister of the environment, David Anderson, announced that the project could proceed to development. This would enable the company to begin construction that winter season as the winter road to the site is open only January to March. But further delays in obtaining environmental permits may have postponed the mine opening to 2004 (Shuster 2000, p.1.).

In its report, the CEAA summarized the position taken by Diavik in its submission to the agency, presented the critiques of the aboriginal organizations, of the responsible (federal) agencies or “RAs,” and of the governments of the Northwest Territories and Nunavut, and then presented its own recommendations. No formal IBAs between Diavik and the aboriginal organizations had been reached by the beginning of 2000. Many

of the expected effects were spelled out by Diavik and were included in the CEAA Report. These are outlined in Table 1.

The policy of Diavik is to increase employment of Northerners, including First Nations peoples, to 100 percent of the total, with first priority in hiring accorded to aboriginal people from the near-by communities, and second priority to people from other Inuit, Dene and Métis communities. Diavik also committed itself to buy as much from the North as possible. (CEAA 1999b, p.200) It also proposed to undertake special training programs for the local labour force, to support business development activities, to increase business capacities in the area, to communicate procurement needs clearly, to support the local businesses in obtaining

Table 1. Anticipated benefits, 2000 onwards.

| | |
|---|--|
| Employment | |
| Construction phase, 2000 to 2001 | |
| Total work force | 600-800 per year on average |
| Employment for Northerners | about 280 per year on average |
| Operations phase, 2002 to about 2020 | |
| Total work force | 411 jobs per year |
| Annual northern work force | 66% or 271 jobs at first, rising later to 100% of employment later |
| Aboriginal employment | 40% or 164 jobs |
| Wage payments | |
| Construction phase, total | US \$104.7 million |
| Operations phase, per annum | |
| Total | US \$20.5 million |
| Northern employees | US \$13.6 million |
| Purchases of goods and services from the North | |
| Construction phase, 2000 to 2001 | |
| Total capital cost | US \$884 million |
| Operations phase, 2002 onwards | |
| Average total annual cost of inputs | US \$61.2 million |
| Average purchases from the NWT businesses | US \$19.0 million |
| Tax payments | |
| Construction phase, total | |
| Federal government | US \$28.6 million |
| Territorial governments | US \$10.9 million |
| Operations phase | |
| Federal government | US \$4.1 million per year |
| Territorial governments | US \$1.2 million per year |

commercial credits, and to design and communicate business strategies for affected groups. It also proposed a business development tracking system.

Diavik also discussed cultural impacts and well-being, the social impacts on communities, training programs, and opportunities for women.

The NWT government and indigenous associations made a variety of critiques and additional proposals. The indigenous groups emphasized the following:

- the need for a “value added” agreement with Diavik to ensure that significant economic spin-offs to the area occur;
- special mitigation efforts and measures to deal with maintaining cultural well-being, overcoming sociological barriers to employment; and
- ensuring fair access to employment opportunities for women, and problems of “fly-in, fly-out” rotation systems.

An important recommendation accepted in the Report was for the establishment of a formal “Socioeconomic Monitoring Agreement” to be implemented by the mine, the relevant Indigenous organizations, and the territorial governments. This mechanism, among other things, would identify objectives; design mitigation and monitoring programs; specify the responsibilities of the various parties for finance, implementation and final decision-making; resolve disputes; and involve public participation.

One problem associated with social and economic issues is that the mine enterprises negotiate the IBAs individually with each indigenous organization or community. But this could weaken the indigenous organizations’ bargaining strength. These negotiated agreements cover such things as job opportunities, training, and preferential hiring programs; financial transfer payments, royalties, and equity participation; new business development and contractual arrangements; and compensation for declines in harvests of wildlife and fish. Many of these agreements are not in the public domain and cannot be closely scrutinized. The character and fairness of the agreements probably depends upon the capabilities of the aboriginal negotiators and the quality of information at their disposal. It has been argued that all companies should be forced to sign IBAs with a consolidated group of all aboriginal communities that are affected, rather than with one community at a time which possess widely varying access to knowledge. This appears to critics as being a “divide and conquer” strategy on the part of the mine enterprises (Keith 1999).

The asymmetry of information between the enterprises and the indigenous organizations may be a serious obstacle in the construction of fair agreements between the bargaining parties. In the past, indigenous groups and communities have had little opportunity to acquire relevant geological, technical, commercial, and organizational information. Moreover, these groups and communities usually are inexperienced at undertaking such negotiations. In contrast, the companies have the technical knowledge as well as the bargaining expertise. They have employees to conduct the negotiations who are experienced in the arts of negotiation and who have access to all the relevant information available on the project.

To remedy this asymmetry, it is vital that publicly financed support be made available to those indigenous organizations and communities that are beginning negotiations with mine enterprises on such critical matters as IBAs. Such assistance could be provided by staff of relevant NGOs, such as the Canadian Arctic Resources Committee (CARC), by consultants in mineral development, negotiation techniques, financial analysts — or perhaps by specialized personnel from the territorial governments or the federal government.

The CEAA's Comprehensive Study Report: Diavik Diamonds Project attempted to include a range of environmental issues. It included possible impacts on air quality, global climate change, vegetation and terrain, wildlife of all varieties in the areas, biodiversity, water quality, fish, and the impacts of the environment on the project itself, and finally, reviewed the possibility of accidents and malfunctions of various sorts and the impacts these could have.

The Comprehensive Report concluded that the Diavik Mine would have:

- no significant adverse effect on air quality provided that the required mitigation measures are applied;
- no significant contribution to national or global air particulate emissions;
- no significant adverse effects on vegetation or biodiversity on a regional scale; and
- no significant effects on the Bathurst Caribou herd, grizzly bears, or other carnivores, raptors, waterfowl, small game, or on the biodiversity of the area.

However, in some cases, mitigation measures were prescribed, and a follow-up program was proposed to monitor the possible effects. The report

considered that Diavik had adequately addressed the environmental requirements related to hydrology and surface water quality, surface water runoff, dyke construction and sediment management, as well as the isolation of the North Inlet and the effluent discharge. Again, monitoring and follow-up mitigation programs were required in some cases. It was also concluded that the project would have negligible impact upon groundwater quality, but a follow-up monitoring program was also proposed with mitigation measures if necessary.

Diavik agreed to the various follow-up programs and monitoring of a number of areas such as ambient air quality, wildlife numbers, water quality, fish and fish habitat; as well as a number of socioeconomic measures of health, heritage resources, and traditional fisheries; and, finally, checks to monitor cumulative effects.

The review process has been criticized on a number of grounds. First, the Company had four years to prepare its environmental assessment submission. The Department of the Environment and other interested departments had from September 1998 to June 1999, to study the submission, undertake consultations, conduct their own analysis and research, and prepare their Comprehensive Report. The CARC argued that the time was insufficient to enable all the affected voices to be effectively heard (CARC 1999b, p. 1). It should be noted that both CARC and the Dogrib Nation had refused to participate in the final phases of the environmental evaluation. (Zoe 1999, A17).

CARC (1999a) also argued that the process is flawed because the various projects in the region are considered only case by case, without an analysis of the cumulative and long-term effects of infrastructural construction and development on the region as a whole. With more mining projects on the horizon, with a major pipeline project in the works, and with the probability that transportation infrastructure and perhaps electrical energy infrastructure will be introduced to service the mining and pipeline activities, their aggregated environmental effects may well be significant, even though the impacts of each individual project may be small or subject to mitigation.

The major environmental risks in the project appear to be the "tailings mountains" which will be built up over the life of the mine as the open pit is excavated. This could result in the leaching of heavy metals such as cadmium into the lake and the Coppermine River system, with harmful effects of animals and fish as well as human health. Accidents could also occur with serious damages to the environment. In view of these possibilities, there is

discussion regarding a requirement for the company to contribute up to US \$120 million over time to manage possible environmental problems and to undertake long-term stewardship over the mine site after its decommissioning. The company apparently has proposed a fund of \$46 million (*Globe and Mail*, 6 January 2000). In either case, this is an interesting and important precedent.

Perhaps all mines should establish such environmental funds or endowments in order to cover the costs of environmental damage and care after the mine has shut down. In economists terms, this would “internalize the negative externalities” that at other times were shifted to local communities, citizens, taxpayers, and governments. This would avoid the traditional but still common pattern of the mine enterprise walking away after the shutdown of the mine, leaving the rest of society to manage the environmental problems they created.

A mature mine in an established region: potash mining in New Brunswick⁵⁸

The mining of potash (with a salt co-product) near Sussex, New Brunswick commenced in 1983. It is an example of a mature, well-established mine in an already populated area. It has had a variety of positive economic and social impacts on the immediate communities and the adjacent areas, with few significant negative effects. Indeed, it is difficult to imagine a mine with more positive net impacts for the local communities.

The context: potash mining in New Brunswick

In January 1971, occurrences of potash were discovered at a site in Plumweseep, near Sussex, New Brunswick. Mine construction was completed in 1980, with the first shipment of potash in 1984. The mine was subsequently transferred from the Potash Corporation of America to Rio Algom of Toronto, and subsequently in 1993 to the Potash Corporation of Saskatchewan (PCS).

The potash deposits are located at a rather shallow depth of 400 to 700 metres and take the form of layers, originally horizontal but now up-thrust towards the vertical. The mineral extraction is done by continuous mining machines, in “cut-and-fill stopes,” with the ore extracted via step-by-step

⁵⁸ This section draws on field-work undertaken by Professor Allan Steeves, Sociology, Carleton University in 1987–1988 and again in 1999. The papers prepared by Steeves on the potash enterprise and the community in New Brunswick are listed with the references.

cutting from successive layers. This is important, because the tailings are then returned to the mine and serve as the new floors for subsequent extraction in an "integrated closed-loop system." Rock salt is also extracted in a different part of the mine, using a "room-and-pillar" method. The ore is then treated in the surface refinery and the potash converted to pellets of various sizes ready for use as fertilizers. This mine has a capacity of 780 000 tonnes per year for potash, and about 650 000 for rock salt.

There are probable potash reserves of 25 years at current mining rates (R. Gauthier, Interview, July 1999) although possible reserves may last much longer. There is a current problem with water seepage into the mine. To control the seepage requires continuous and expensive action, which raises mine costs. If the problem were to escalate severely, the costs of extraction might become excessive and the mine might shut down well before the exhaustion of high-quality reserves.

In 1999, some 344 persons were employed at the mine, underground, in the refinery, the administration and ancillary activities. The employees of the mine operation are drawn from adjacent communities. No special "company town," no new townsite, and no special barracks are necessary, as the employees continue to live in existing communities or nearby rural areas. The employees commute to the mine using their own means of transportation.

By coincidence, the mine is located about 100 metres from the Trans-Canada Highway, and is close to a main rail line. These facilitate the transport of people, finished products, inputs, and equipment. The original infrastructure costs and the continuing operational costs have been reduced significantly by the ease with which the mine was able to settle into the established communities and the region, as well as the existence of the national transport grid so close to the mine-site. Moreover, access to convenient rail transport provides low-cost transportation to the Port of Saint John and thence competitive access to potash markets in the Atlantic area of the Western Hemisphere and Europe.

A second potash mine site, located about 20 kilometres south-west of Sussex at Cassidy Lake, was opened for intensive exploration in 1979. A mine owned by Denison Mines of Toronto was constructed and in operation by 1985. But it experienced flooding problems and was shut down in 1997. This property was also acquired by PCS in 1998. The refinery at this site is currently used to upgrade standard potash ore transported from Saskatchewan, and now employs about 30 persons.

The Potash Corporation of Saskatchewan is a large integrated fertilizer producer initially established as a provincial enterprise by the Saskatchewan government in 1975. It expanded rapidly during the 1980s and became one of the largest potash producers in the world. In 1993 PCS was privatized and since this time it has diversified by acquiring large phosphorous and nitrogen producers with the acquisition of Texasgulf in early 1995, and Arcadian Corporation in 1997. PCS is now the largest integrated enterprise producing the three fertilizer components in the world.

Historically, the population of the Sussex area relied primarily on farming, logging and pulp-wood industry. Since World War II, employment in these has declined due to mechanization. Small farm operators have been leaving agriculture in the area during the past 50 years. As a result of the decline in these industries, the economy of the region was quite stagnant outside Sussex and St. John. Thus it was with relief and optimism that the provincial officials and the local population welcomed the potash industry and the prospect of jobs for local workers at the beginning of the 1980s. Both mines promised, where possible, to hire and train local personnel for work at the mines both underground and in the mill phases of the operation. This has been rigorously implemented.

Economic, social and environmental on the local communities⁵⁹

The most important direct economic impact of the mine enterprise in the region is the employment and the income it generates. As noted, the two mine operations employ some 374 persons, and generates about US \$18.5 million per year in income payments at wage rates well above the average for the area (author's estimate). Besides the direct wage and income payments, the mine also acquired a substantial proportion of its inputs locally. A large proportion of the direct purchases of the mine for supplies, services, and energy — about 48.6 percent of total costs — were spent in the region. All of the electricity is provided by the provincial electrical utility. The company estimated that 52.6 percent of all purchases of supplies and services (excluding fuels and electricity) is purchased from New Brunswick. This would include such things as contract labour, such as tradesmen, truck and auto parts, and some basic types of machinery and equipment. A variety of new industries that supply the mines were established in the area, especially

⁵⁹ Unfortunately, detailed financial information on the potash mine in New Brunswick is not available because the accounts of the Potash Corporation of Saskatchewan are consolidated for their entire international operations. The detailed information for the Sussex mine were not provided by the company.

in Sussex (Steeves 1988a). A major trucking cooperative, Kingsco Transport, has also been a beneficiary. Thus the economic base of Sussex has broadened somewhat with light manufacturing and supply and distribution businesses.

PCS estimated crudely that on average, about 3 to 4 percent of purchases of supplies and services were from outside of Canada. However, this may not provide an accurate idea of domestic Canadian Value Added relative to foreign Value Added, because a large, though unknown, proportion of the items purchased domestically would have been purchased from abroad or else would contain imported inputs. No taxes were paid directly to the local communities, though the employees paid property taxes. A significant but unknown proportion of the profits of the whole PCS enterprise in Canada would also be paid to the Federal and provincial governments in the form of corporate income tax. Employees also paid personal income taxes to the higher levels of government. An undisclosed amount of royalties were also paid to the provincial government.

Social impacts of the mine

The entry of mining into the Sussex region had a variety of impacts of a social character.

1. The first impact is the greater security of livelihood for individuals, their families and their communities as a result of the incomes generated from the mines. This social impact is of obvious importance and should not be forgotten.
2. The entry of potash mining into the social settings of King's County has generated a number of changes in communal dynamics. The mining enterprises introduced relatively high rates of pay, recruitment policies based upon achievement and formal training, a work setting of an "industrial" character (including shift work,) and a global rather than a local or regional enterprise orientation. This meant that the "mining community" was quite distinct from the local community. The mining enterprises wisely recruited qualified local personnel as much as possible.

Another feature of potash mining in Kings County was the large size of the operations, relative to the scale of earlier economic activity. Moreover, they were also continuous process operations, working 24 hours, seven days a week. The mines therefore required "shift work" for both their mine and mill employees. This had a number of implications for the community. It meant that other agendas had to be altered to accommodate the loss of weekends and evenings at home. It also had the effect of isolating the miners from community activity, which up to this point had been organized to take

place either in the evenings or during the weekend. However, the shift-work arrangement also has some attractions. At the PCS mine, the bulk of the production personnel work four 12-hour days on and then take four days off with rotations on day and night shifts. Workers preferred this shift arrangement because during the "four days off" they are able to engage in other activities such as farming, logging, mechanical work, or auto body repair enterprises (Steeves, Interviews, 7–8 October 1999).

Third, judging from the views of many of the miners themselves, they had little difficulty adapting to mine production even where it involved underground work. The personnel managers considered that the local workers had excellent mechanical and electrical skills, and proved to be good mechanical operators.

Although one might think that the establishment of the potash mines might have contributed to a process of population concentration in small cities and towns in the area, in fact this has not occurred. Indeed, there has been a process of "ruralization" in operation, as many miners and their families have chosen to locate outside the municipalities in the area, thus becoming part of the rural non-farm population. In analyzing the detailed population data for the region, Steeves (1988b) found that the rural areas grew at twice the rate of the urban areas over the course of the decade 1976–1986, at 2.4 percent per year in comparison with 1.2 percent for the urban areas. Approximately 80 percent of the mine labour force lived in the unincorporated areas of the county, in their home communities (Steeves, Interviews, 8 October 1999).

The PCS Plumweseep mine has had a surprisingly small environmental impact. Indeed, it must be one of the more ecologically benign mine operations in the world. The reason for this is that the solid tailings and the liquid brine wastes remaining after the refining process are both put back into the mine. As a result, there is neither a tailings mountain beside the mine-site, nor a discharge of noxious brines into nearby rivers or tailings ponds. There is an aerial discharge of vapours and smoke but it is almost insignificant, judging by appearances. The inhabitants of the area seemed to show little concern for the discharge. It seems to have no negative consequences in terms of damage to plant life, to farming (which continues up to the mine site gates and fences), or to tourism in the area — a Bed and Breakfast lodging facility exists next to the mine. There were no noticeable smells caused by the smoke or the refining process apparent outside the mine site.

Sudbury: the emergence of a mining metropolis?

Over the last 120 years, Sudbury Ontario has evolved from a frontier railway and mining town to a significant “mining metropolis” and an important regional economic centre in Northern Ontario. It has developed both a substantial degree of economic diversification around a mineral-extraction base, as well as a broad range of economic activities of a governmental, business service, health, and educational character. It may now have reached a stage where it is as sustainable as a mining community could expect to be, given its dependence upon difficult and volatile international mineral markets.

What factors have permitted the emergence of a significant cluster of economic activities around mining converting Sudbury from a mine town to a large and complex regional centre servicing the mining industry? Can Sudbury become a centre for the global mining economy?

Historical development of the Sudbury mineral economy and region

The Sudbury Basin is a unique geological formation measuring about 60 by 27 kilometres in an oval or elliptical shape. The foundation of the basin is about 10 kilometres deep. It is likely that the basin is the result of the impact of an asteroid that collided with the earth and caused a deep fracture in the earth's crust, permitting the magma or molten rock from deep inside the planet to rise to the surface. Nickel mineralization was detected by surveyors in 1856, but it was not until the construction of the transcontinental Canadian Pacific Railway (CPR) in 1883 that an outcropping of copper was revealed in construction blasting and in the ballast used for the rail bed. This sparked a prospecting rush. In time, with the development of processing technologies for extraction and for separation of nickel from copper, both extraction and smelting expanded. By 1902, INCO had been created from a merger of two earlier companies, and by 1918, it had become an integrated mining, smelting and refining firm, with a refinery in Port Colbourne (Saarinen 1992).

Although Sudbury began as a CPR company town, the early development of mining then made it a significant mining community. During this period, the major mine enterprises operating in the area — INCO and Falconbridge — developed their own company towns at the mine-sites. Sudbury emerged as a type of fringe of settlement for the whole area. Its development was stunted, because most of the managerial and labour personnel from the mines lived in the company towns, while only those who

were less-integrated into the main mining economy settled in Sudbury. Moreover, the mine enterprises, unlike other industrial enterprises, did not pay local property taxes until after 1945. Even in 1945, the companies did not pay local taxes; instead, the provincial government provided a compensating revenue, though this amounted only to roughly one-half of the business revenues received in other non-mining communities (Saarinen 1992, p.167.) This lack of an effective tax base limited community action for urban development, infrastructure, and beautification. In this era, Sudbury was famous for its the nickel industry, but also infamous for the environmental destruction caused by the sulphur emissions from the metal smelters, which killed much of the vegetation. The area bore an uncanny resemblance to the lunar landscape.

After World War II, Sudbury expanded as nickel demand grew in response to military and consumer demands. The population in the area increased from about 115 000 in 1951 to around 170 000 in 1971. This population expansion, based ultimately on mineral exports from the region, was caused and, in turn, contributed to, a continuing process of economic diversification mainly of business, educational, health, and government services. Of particular note was the establishment of Laurentian University in 1960, which began to play an important role in the intellectual life and, in time, the technological leadership in the region. The Sudbury economy was further strengthened with the development of mining in Elliot Lake, which fell within Sudbury's sphere of influence. The construction of a direct highway link with Southern Ontario via Parry Sound and Gravenhurst gave Sudbury a "gateway" location. This allowed it to evolve as the major transportation centre of Northern Ontario, in competition with North Bay. Trans-Canada Airlines flights were introduced in 1952-1954, further consolidating Sudbury's status as a central transportation node.

During the 1970s, the Sudbury economy went into a process of contraction caused mainly by reduced mining employment as a result of lower mineral prices. Paradoxically, the groundwork for a subsequent turnaround was also laid in this period. Competitive pressures on nickel production in the area led INCO and Falconbridge to rationalize their production and initiate major processes of technological improvement designed to lower production costs, improve productivity, and sustain international competitiveness. The upshot of this was that employment in mining in the Sudbury region declined from a high of 25 700 in 1971, to

17 700 in 1981, and to 9 146 in 1991. One result was population loss for the region, from 170 000 in 1971 to 152 440 in 1986.

The positive feature of this era was that mining and mineral processing became steadily more technologically sophisticated and capital-intensive. The Sudbury Basin maintained its competitiveness in an ever-tougher international nickel market. The Sudbury area became a technological leader in high productivity and environmentally friendly technologies.

At the same time, the municipal government of the region was reorganized on 1 January 1973, so that the entire Sudbury Basin became part of the Regional Municipality of Sudbury, an area of 2 600 square kilometres, approximately four times the size of Toronto. This has meant that the effectiveness of regional planning for infrastructure along with the promotion of economic development have improved. In 1974, a Sudbury Regional Development Corporation was established to promote economic development of the area. Further improvements in transportation, such as the highway to Timmins and Cochrane, also enhanced the "central-place" functions of the city.

During the 1990s, the Sudbury area appears to have reversed the decline of the previous decade and to have consolidated its position as the major mining centre of the region. This strengthening of its position is the result of a variety of factors:

1. INCO and Falconbridge have maintained and improved their competitive position in the Sudbury Basin.
2. The commercial sphere of influence of Sudbury expanded due in part to improved transportation. Mine-related goods and services enterprises now have access to approximately 90 mines within a 500 kilometre radius.
3. Effective civic leadership was important in improving the natural environment, beautifying the region, promoting economic development, supporting technological diversification, and promoting the location of regional health, educational, and governmental functions in the region.
4. Support from government at the provincial and federal levels was important because they relocated some of their administrative apparatuses to Sudbury: the Ministry of Northern Development and Mines (with 250 jobs) from Toronto, and the Sudbury Taxation Centre from Ottawa (with 750 full-time and 1 500 part-time jobs).

5. Strengthening of the roles of Laurentian University and Cambrian College in their support for research and training, both generally and specifically for the mineral economy.
6. The dynamism of the newly emerging enterprises surrounding mining is a final factor of significance.

Sudbury as a mining metropolis in the international arena

By the year 2000, Sudbury has become an attractive and reasonably dynamic city. The Sudbury area has begun to establish itself as a centre for technological innovation in hard-rock mining with a consolidating range of minerals-oriented enterprises. The economy has become more dynamic with a series of other positive contributors. The landscape is returning to its natural state, and the city has become attractive in its healthy natural setting. Could Sudbury also participate more successfully in a hemispheric and global arena and beyond its regional base?.

One encouraging feature of the Sudbury economy at this time is the emphasis being placed on innovation. The roles of Laurentian University and Cambrian College in geological and mining areas are of special significance in the future promotion of a stronger mineral "cluster." Laurentian University has offered full programs in Mining and Extractive Metallurgical Engineering since 1978, as well as general Civil, Mechanical, and Chemical Engineering. Laurentian also has a strong Earth Sciences Program. There are a number of research centres such as the Laurentian University Mining Automation Laboratory (LUMAL), and the Mineral Exploration Research Centre (MERC). LUMAL focuses on areas such as the analysis and system architecture of tele-remote/automated mining systems, 3-D animation, and simulation of mining operations and control systems for vehicle-based transport systems. MERC focuses on support for mineral exploration not only in the Sudbury region but also in Canada and the world. A \$75 million Centre of Excellence in Mines and Mineral Research at Laurentian University is a multi-partner co-operative program with private and public participation. A commercial applied research park is being established by Laurentian University, in collaboration with the Government of Ontario and the Sudbury Regional Development Corporation. The offices of the Ontario Geological Survey and the Ontario Geo-science Laboratories have also been located at Laurentian University, and should provide support for the scientific infrastructure, which strengthens the mineral cluster in the Sudbury area.

Another important initiative is the establishment of NORCAT, the Northern Centre for Advanced Technology Inc. This centre is a co-operative venture between Cambrian College of Applied Arts and Technology and private businesses. Its objective is to support enterprises with product development, technological transfer, and training in resource industries generally, as well in as construction. In 1997, it acquired its own mine from Falconbridge for testing and training purposes. It has been involved in the development of 43 prototypes in mining and construction, and has programs in ten countries.

A variety of enterprises relating to the primary mining activity have become established in the Sudbury area. Areas include manufacturing business services; geological and management consulting; export consulting and services; mine automation and communication; equipment maintenance and repair; machine shops; electrical, plumbing and ventilation contractors; and manufacturers of various sorts. According to CAMESE (1999/2000), by 1999, some 20 of these enterprises had joined the Canadian Association of Mining Equipment and Services for Export (CAMESE), indicating that they considered themselves ready for competition in a global market.

Since 1978, Sudbury has made a major effort to restore its environment. About 17 400 hectares of land were barren, requiring revegetation and reforestation. A co-operative effort including the public, private, and the volunteer sectors, restored some 3 200 hectares by 1997, with about 3 500 000 trees planted in the area. There is still a long way to go, but the main residential areas of the region are again realms of natural beauty. This environmental restoration is important if Sudbury is to be an attractive place to live for the skilled personnel who constitute the basic human foundation for a thriving and self-sustaining urban centre.

By 2000, Sudbury achieved a diversified service economy, which not only serves its immediate population. In addition, it has become the region's major educational centre; health-care centre (with approximately 2 700 employed in the Sudbury hospital system); a thriving transportation and wholesaling hub, with strong transport links to the national economy; and manufacturing sector (with almost 5 000 employed in 1996). With this degree of economic diversification around the central economic catalyst of mining, the economy of the Sudbury region should be self-sustaining to a significant degree, as long as the fundamental mining and transportation activities remain vibrant.

Risks and vulnerabilities

As with any region in a larger national or “globalized” economy, there are risks and vulnerabilities which will have to be faced in the future.

1. One such challenge relates to the health and competitiveness of nickel mining and processing. If some of the new or expansion projects coming on-stream elsewhere increase supplies well-ahead of demand, thereby reducing price substantially, and if these are significantly lower-cost producers than those of the Sudbury Basin, then there could be a contraction of nickel mining in the region. The dilemma for the Sudbury region is that for the mines to remain competitive, further reductions in the labour force may be required, as automation and remote-controlled mining techniques are extended. But it is also imperative that the mines themselves remain competitive in the global nickel economy.
2. Another challenge relates to the relationship of the region to INCO and Falconbridge, the two mining pillars of the regional economy. These companies are headquartered in Toronto, not Sudbury, and do not necessarily have any primordial loyalty to the Sudbury region simply because that was the initial source of their existence and expansion.
3. Yet another vulnerability arises because open-pit mining is steadily increasing its relative role in the global mining economy, largely because it is simpler and therefore lower-cost than underground mining which is both technologically and logistically complex. The machinery and equipment producers of the Sudbury region specifically and Central Canada generally are geared to produce highly specialized products for underground hard-rock mining, rather than the distinct machinery and equipment designed for open-pit mining. This means that the international market for the products of Central Canadian manufacturers on mining equipment may not be particularly expansive in the near future.

In sum, a transition from a successful mineral cluster for the regional mining economy to one which participates effectively in the international economy, may not be easy. One suggestion would be for the clusters centred in Sudbury, North Bay, and Toronto areas to organize themselves as a “cluster of mineral clusters.” This would be useful in view of the very important range of mining related activities in the Toronto area including mine company headquarters, machinery and equipment producers, mine finance, geological, mining, and metallurgical consultants, and geophysical surveying.

Conclusion:

Perspectives from Canadian cases on mine/community relations

A variety of insights, perspectives and ideas from Canada's experiences regarding the relationships of mining activities and local communities may be of interest for the mineral-rich countries of Latin America. The following is a summary of the general, socioeconomic, and environmental impacts of mining activities on local communities from the previous Canadian cases.

General insights

1. Mining can promote the socioeconomic well-being of local communities and can also be environmentally benign.

Despite some cases of environmental damage of legendary magnitude as occurred in the first 50 or 60 years of nickel mining in the Sudbury Basin, mining can be managed so as to be benign in environmental terms. Some disastrously serious environmental damages can also be reversed. The Sudbury case illustrates this. The Potash Corporation of Saskatchewan's mine in Sussex New Brunswick is one which is astonishingly benign from an ecological perspective.

From a socioeconomic standpoint, mining can also be particularly positive, and can contribute to local level community development and economic diversification. This was the case of Sussex, New Brunswick, and also of Sudbury, Ontario.

2. The implications of "remoteness" for mine/community relations

The difficulties of the Diavik and Voisey's Bay cases arise from their remoteness as well as issues of their relations with First Nations' communities. The New Brunswick and Sudbury cases demonstrated positive and productive inter-relationships with the local communities. In part this is because the mines in these areas fitted in easily to the mainstream socioeconomic systems in the more populated, established, and diversified regions of the country. In contrast, the Diavik and Voisey's Bay cases differ. Because of their magnitude and their technical, social, and economic novelty to the local communities, it will be more difficult for them to fit into the local societies without major disruption. This necessitates special public policy approaches, in order to ensure that the local communities benefit as much as possible.

3. Long distance commuting” or “fly-in, fly-out” mining may be the wave of the future for more remote mine sites throughout the world

There have been no new mining towns established in Canada since approximately 1970. Instead, mines fly or transport their workers to the mine site from nearby communities, often by air, for varying periods of time. Shifts may comprise four days on, followed by three days off (4/3), or other arrangements, often depending on the length of travel. Mining systems which avoid the construction of dedicated mining towns and which transport the workers to the mine site from their homes in other communities, have a number of major advantages for more remote locations. Therefore, they will likely be used increasingly in future.

Mining and the local environment

1. Use an “environmental stewardship fund or foundation” mechanism for those noxious mine and mill wastes which have to be stored in perpetuity

The solid tailings or liquid wastes from mine or milling operations, which are noxious and which must be stored and neutralized forever, should be financed by the mine enterprise, not by the local, regional, or national communities. This can be done by requiring that the company contribute some monies, over the life of the mine, into a “Fund” or “Foundation” designed to manage the wastes *in perpetuity*. The interest from the capital of the Fund would be used for the maintenance or stewardship of the tailings mountains, the solid tailings ponds, or liquid tailings ponds. If the mine operation turns out to be cleaner than expected, and the wastes less costly to manage than expected, some funds could be returned to the mine enterprise. This serves as a powerful incentive for the enterprise to manage the wastes carefully over the life of the mine.

2. The value of comprehensive environmental reviews for new mine projects

The comprehensive environmental reports prepared by the CEEA provide examples of the type of analysis of the probable impacts of mines on all aspects of the environment which could be useful in other national contexts.

The process involved in constructing the reports seems useful. The mine enterprise first prepares an analysis of the mine and of its environmental consequences, together with a socioeconomic assessment. It does this on the basis of its technical, geological and organizational knowledge of the project, together with knowledge of the communities and

the natural environment and public meetings. The local communities, the regional governments, the Indigenous organizations, and other relevant federal ministries then make commentaries, criticisms, and elaborations. Interested NGOs have an opportunity to participate in the process as well. The mine enterprise then responds to these comments and criticisms. Finally, the CEAA synthesizes and rationalizes the various analyses and perspectives, producing a summary and a detailed set of recommendations for modification of the project, if it is accepted. Otherwise, the CEAA can halt a project.

3. Co-operative monitoring of an environmental management program

Monitoring an environmental management program on a co-operative basis between the local communities, indigenous organizations, and the mine enterprise is desirable in order to ensure that the program is implemented carefully and completely.

Socioeconomic benefits

1. "Socioeconomic agreements" between mine enterprises and local communities or indigenous organizations

Prior to the receipt of permission to open a mine, the enterprise and the relevant local communities and/or Indigenous Organizations should be required to construct a mutually acceptable "Socioeconomic Agreement," or an "Impact and Benefit Agreement." These could include provisions for:

- employment quotas or targets;
- special training programs appropriate for local people;
- targets for local procurement of goods and services;
- support for local business development;
- support for women's employment and training; and
- a supportive work environment for distinctive local cultures;

Because of asymmetric knowledge between the mine enterprises and the indigenous organizations or local communities, particular types of support must be provided to the latter, in order to "level the playing field." This could be done by the public financing of NGOs or consultants services, or perhaps with public officials from other levels of government, who can provide some of the relevant technical, geological, marketing, and organizational knowledge as well as techniques of negotiation.

2. Promotion of genuine participation of indigenous peoples in mineral development

Increasing numbers of mine projects are located in areas occupied by indigenous peoples in both Latin America and Canada. In many cases, these peoples have occupied the relevant lands since time immemorial and believe themselves to be the true owners of the mineral resources. Mineral projects can succeed in winning the support of local communities of Indigenous Peoples and in producing real benefits for their human development if they are genuinely integrated into the process of design, implementation and functioning. This means that the original project proposals must fully incorporate the particular environmental concerns and knowledge of the Aboriginal peoples as well as their economic activities in the affected areas into the planning process.

3. Development of the clusters of economic activities around mining

For mineral-rich countries, development of the “mineral cluster,” or of those activities related to mining is an important means of developing some degree of economic diversification, and of capturing increased value added within the national economy. The case of Sudbury Ontario is a case of partial but incomplete development of the mineral “cluster.”

Promotion of such diversification around mining is difficult. However, some relevant public policies would include:

- promoting the “culture” and elaboration of the cluster by supporting the relevant professional organizations, publications, and communications;
- encouraging procurement within the country, and export of goods and services from the “cluster” abroad.
- promoting the development of specialized human resources in the cluster through education at all levels;
- supporting the provision of “public goods” for the cluster, including the development of relevant knowledge, physical and institutional infrastructure; and geological mapping; and
- constructing a fair inter-sectoral tax system, which neither provides implicit subsidies nor heavy “cash cow” treatment of mining.

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CHAPTER 7.

Uranium Mining in Northern Saskatchewan: A Public-Private Transition

Graham F. Parsons and Ron Barsi⁶⁰

Introduction

Uranium development in Saskatchewan dates to the 1930s when the first discoveries were made in the far north — a very large, sparsely populated and very poor region of the province. Since that time, uranium exploitation has undergone several waves of investment and mining activity under changing regulatory frameworks. Two distinct approaches have been adopted in Saskatchewan towards uranium mining.

With the first approach, the federal and provincial governments both mined uranium and regulated the industry through crown corporations. Regulation from the distant national capital in Ottawa and the provincial capital in Regina focused primarily on the health and safety of workers. Social and economic benefits to the region were limited primarily to tax and royalty revenues plus short-term employment benefits outside the North. Few community benefits were experienced beyond the life of the mines.

The second approach followed several years of public inquiry into three key issues: the environmental safety of the industry; the levels of social, economic and community benefits available to the North; and, in particular, how mining affects the province's remote Indian and Métis communities. These inquiries were undertaken with extensive consultations throughout the North, and by the 1990s, resulted in a tripartite framework involving government, industry, and communities. While the state remained responsible for a more open, transparent, cooperative, and consultative regulatory process, governments withdrew from production, being replaced by the private sector. The new framework led to increased:

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- consultation with northern communities;
- environmental regulation directly involving communities;
- social, economic, community, and regional development benefits; and
- community participation in the industry and its regulation.

Throughout the 1990s, the uranium mining industry had a major impact on the regional and community development of northern Saskatchewan. Benefits included:

- employment from mining and procurement for the mines;
- enterprise development with the growth of community and native-owned businesses;
- institutional strengthening of the community planning frameworks; and
- environmental protection.

Skills, procedures, and practices initially obtained from an increased involvement in uranium mining are now being applied to other sectors of the economy and society, including forestry, tourism, health care, and education. To some extent, mining companies have been catalysts for community development in the North. Company involvement with community issues and problems extends well beyond the requirements of the statutory obligations under the new expanded regulatory framework for uranium mining. Today mining companies are involved in nearly all aspects of community and regional development including education, health care, basic infrastructure, and economic development. As a result of these changes, public attitudes towards uranium mining have shifted, particularly in the North, from opposition and distrust towards cautious, and at times strong support.

Uranium in Saskatchewan

Saskatchewan

Saskatchewan is located in the Canadian prairies in Western Canada. The province is known as a breadbasket for the world with its production of wheat and barley from the southern grasslands. Under the prairie soil exist the world's largest potash mines. The south is home for over 96 percent of the million people who live in the province.

The North is a land of lakes and forests, inhabited by First Nation Indian and Métis peoples whose first language is Cree and Dene/Chipewyan. Nearly 40 000 people live in the North, and in 1997, as Table 1 shows, 87 percent were indigenous peoples.

Table 1. Northern Saskatchewan population by ethnic origin, 1997.

| Ethnic origin | Population | % Share |
|----------------------|-------------------|----------------|
| Registered Indian | 21 847 | 58% |
| Métis | 10 135 | 27% |
| Other aboriginal | 751 | 2% |
| Non-aboriginal | 4 805 | 13% |
| Total | 37 538 | 100% |

Source: Painter, M., and Lendsay, K., University of Saskatchewan, Saskatoon, 1999, Tables 1.1 and 1.2.

In size, Saskatchewan is a little larger than France. Through most of the 20th century the North's 320 000 square kilometers has been home to extensive levels of uranium exploration, development, processing, and decommissioning. Most of the land and all of the mineral rights are owned by the Crown.

The majority of the high-grade deposits that have been discovered have been found at the unconformity of the sandstone, Precambrian shield, and overlying Athabasca sandstone. Higher grades of ore involve open pit and underground mining techniques, and due to radiological protection considerations, often need technologically sophisticated mining procedures.

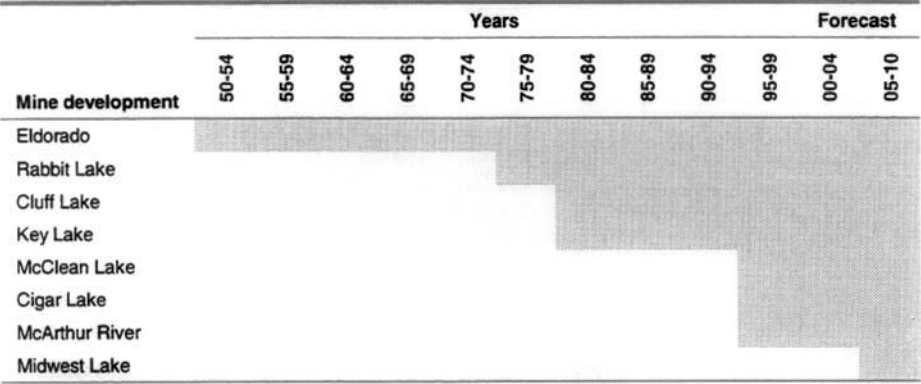
Recovering uranium from these high-grade ore reserves in a manner that protects the workers, the environment, and the long-term well being of the public, required the development and implementation of state-of-the-art mining and milling techniques. This necessitated a highly skilled work force to support the industry.

Uranium development and investment

Active uranium exploration, development, and processing have been underway in northern Saskatchewan since the late 1940s. Valuable low-grade uranium ore was found in the Beaverlodge area on the north shore of Lake Athabasca. In the late 1960s uranium was discovered at Rabbit Lake and Collins Bay near Wollaston Lake, and in higher grades in the Carswell formation near Cluff Lake.

In 1975 higher grade discoveries were made as Key Lake and Rabbit Lake began production, and in 1983, high-grade discoveries were made near Cigar Lake. In 1985, Eldorado Nuclear Limited completed the reclamation and decommissioning of their Beaverlodge operations. In the 1990s projects involving new, very high-grade discoveries and expansions were proposed, reviewed, and started at Cigar Lake, Midwest Lake, McArthur River,

Figure 1. Uranium mining, processing, decommissioning and monitoring activities in Northern Saskatchewan, 1948–2000, forecast to 2010.



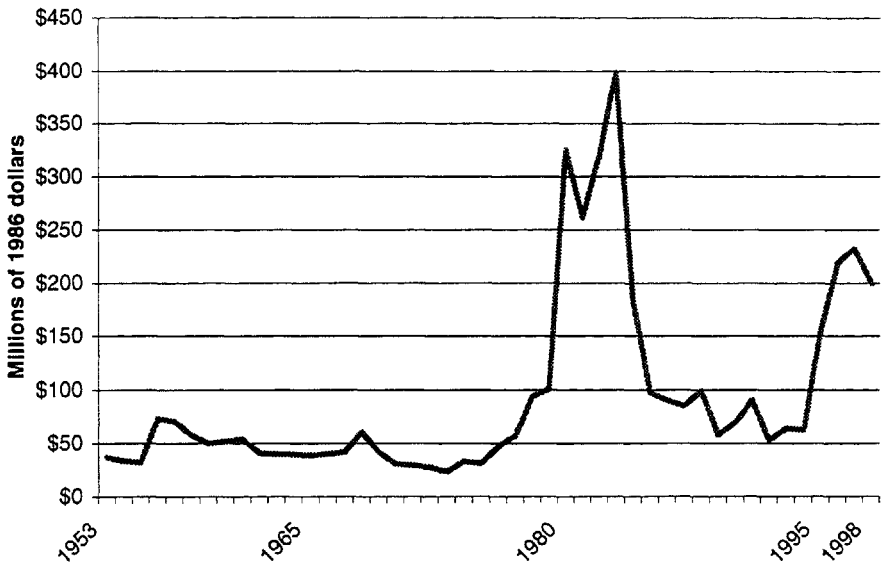
Source: Post Secondary Education and Skills Training, La Ronge, 2000.

McClean Lake, Rabbit Lake, and Cluff Lake. Decommissioning activities extended the periods of activity beyond the dates of mines actually closing.

A process of uranium exploration, mine construction and operation, infrastructure development, mill construction and operation, environmental management, decommissioning, and monitoring emerged. As Figure 1 shows, this led to a nearly continuous period of investment and employment activity through the 20th century that is predicted to continue well into the 21st century. By this time, the region will have been mined for over a century.

The uranium industry invested at least C \$3.5 billion during the 20th century, with capital investment in mines of C \$2.5 billion, and exploration and predevelopment expenditures exceeding C \$1 billion. Adjusting for inflation, there have been three investment booms. The first small one came with the initial developments in the Beaverlodge area in the 1950s. The second and largest boom was in the 1970s, with the opening of the Cluff and Rabbit lake mines, and the third was in the 1990s with the development of the higher grade ores on the east side, as shown by Figure 2.

Uranium development in Saskatchewan has been highly controversial and politically contentious. During the early phases of its development in and following World War II, the resource was classified by the federal government as being of strategic military importance. The highly toxic nature of the mineral and its by-products led to further concerns over the health of mine workers as well as individuals and adjacent natural resources. Initially there was substantial opposition to uranium development from northern residents, communities, and Indian bands. However, through a lengthy

Figure 2. Uranium investment in Northern Saskatchewan, 1953–1998 (in constant 1986 C \$).

Note: Total investment consists of exploration and pre-development expenditures plus capital investment expenditures. Deflated by index for gross fixed capital formation. 1986 = 100; Saskatchewan Bureau of Statistics, 1953–1998.

Source: Saskatchewan Mining Development Corporation and Eldorado Nuclear Ltd.

process of consultation, discussion and negotiation, coupled with improved methods of public regulation and enlightened attitudes by companies (public and private), the public views towards the industry have shifted from opposition to guarded and even strong support.

The regional ecology and aboriginal values

The Bible we were given is nature itself, but the white man was given a book. When it rains, their Bible is spoiled; it becomes wet and is destroyed, but our Bible is here forever: the earth, hills, lakes, all of nature and growth itself. (Chief Robert Bear)⁶¹

Northern Saskatchewan is a land of lakes and low relief that has been shaped by several glaciations. The water in rivers and lakes shows few of the chemicals associated with development. The climate is harsh and cold winters can last eight months. Drainage from the region moves into both Hudson's Bay to the Northeast and the Arctic Ocean to the Northwest.

Soils in northern Saskatchewan are thin and dominated by low-value jack-pine forests. Low lying areas contain muskegs, peat bogs, and black

⁶¹ Philips 1976. p.104.

spruce. To the west of the Athabasca Basin is a large, unique area of sand dunes. Clean water and land has provided the home for a wide range of northern fish and animals that were the sustaining social and economic foundation for aboriginal peoples of the area.

There remains considerable concern that development of uranium mining and its toxic waste by-products creates a severe environmental threat towards the natural ecology as well as the basic values and lives of the people who live on the land. This issue goes to the heart of northern and indigenous people's culture where respect for the land and natural resources is central not only to the native system of beliefs, but also to Indian Treaties made with the Crown. It is also the theme of many of the submissions inquiries into the development of the industry and was a central theme in Thomas Berger's 1978 paper, (p.93):

The native people of Canada, and indeed indigenous people throughout the world, have what they regard as a special relationship with their environment. Native people of the North have told this Inquiry that they regard themselves as inseparable from the land, the waters and the animals with which they share the world. They regard themselves as custodians of the land, which is for their use during their lifetime, and which they must pass on to their children and their children's children after them. In their languages, there are no words for wilderness.

On July 5th, 1993, Acting Chief Jean Marie Tsannie spoke in her native language of Dene, at Wollaston Lake, to the Rabbit Lake Uranium Mine Assessment Panel on the Collins Bay A-Zone, D-Zone and Eagle Point proposals, noting:

To understand our concerns, you first have to understand something about our lifestyle. Our way of making a living from the land has evolved over many thousands of years. It is only within the last thirty years that we have been significantly affected by outside influences. Even today it is still possible to adapt new technologies and live from the land as our ancestors did. There are very, very few places in the world where this is still possible. (Government of Canada, Rabbit Lake Uranium Mine Environmental Assessment Panel Transcript 1993)

Over time, some native bands recognized the importance of integrating their traditional beliefs with access to emerging opportunities. In his submission to the 1993 Rabbit Lake Environmental Assessment Hearings, Joe Roberts, Director of Resource and Development for the Kitsaki Development Corporation of the Lac La Ronge Indian Band wrote:

Kitsaki Development Corporation and its owner, the Lac La Ronge Indian Band are always concerned first and foremost with the environment. Indian people remain very close to the land in the North and need to see it protected. That is why we continue to emphasize now as we have in the past submissions that the existing high standards of environmental monitoring be maintained by appropriate agencies. Given sound environmental protections we therefore believe economic impacts should be an important part of the decision regarding whether or not Northern mining projects proceed. We have experienced increasing economic benefits from the mining industry over past years and with cooperation from your panel, we expect these benefits to continue to increase in the future. Consequently, we have no hesitation in giving our full support to the proposed further development at Rabbit Lake.

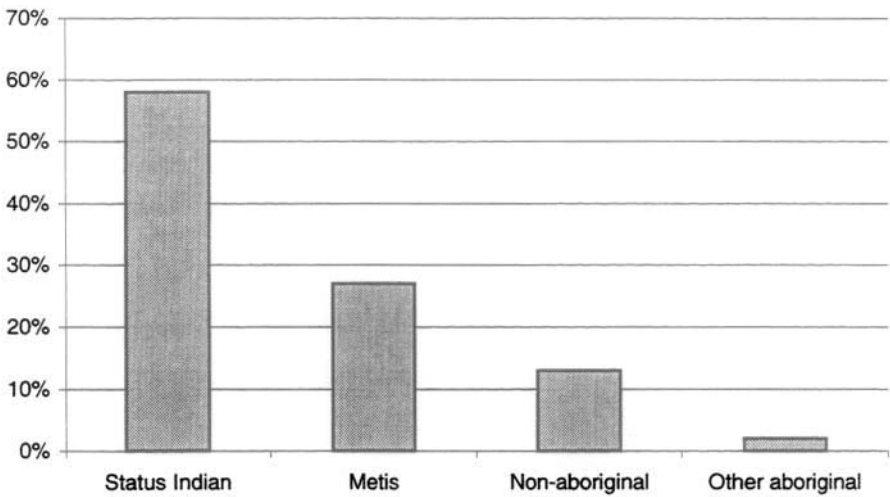
These factors all emerged as being central to understanding and developing improved relationships, communications and business relationships with communities and indigenous peoples in northern Saskatchewan.

Social, economic and community structure

Northern Saskatchewan did not participate in most of the social and economic developments that occurred in the south where there were higher incomes; broad employment opportunities; universally available access to health, social, and educational services; modern community infrastructure; high-speed, low-cost transportation; and political power.

The vast majority of the Northern population is of native ancestry, either status Indians or Métis. (See Figure 3). Traditionally the aboriginal peoples (mainly Cree and Denesulene) supported themselves by working the Northern lands and lakes — fishing, forestry, and trapping. Increasingly, however, welfare and more recently mining and local business have become important sources of First Nations and Métis income in the North.

Figure 3. Distribution of Northern Saskatchewan, population by ethnic group, 1997.



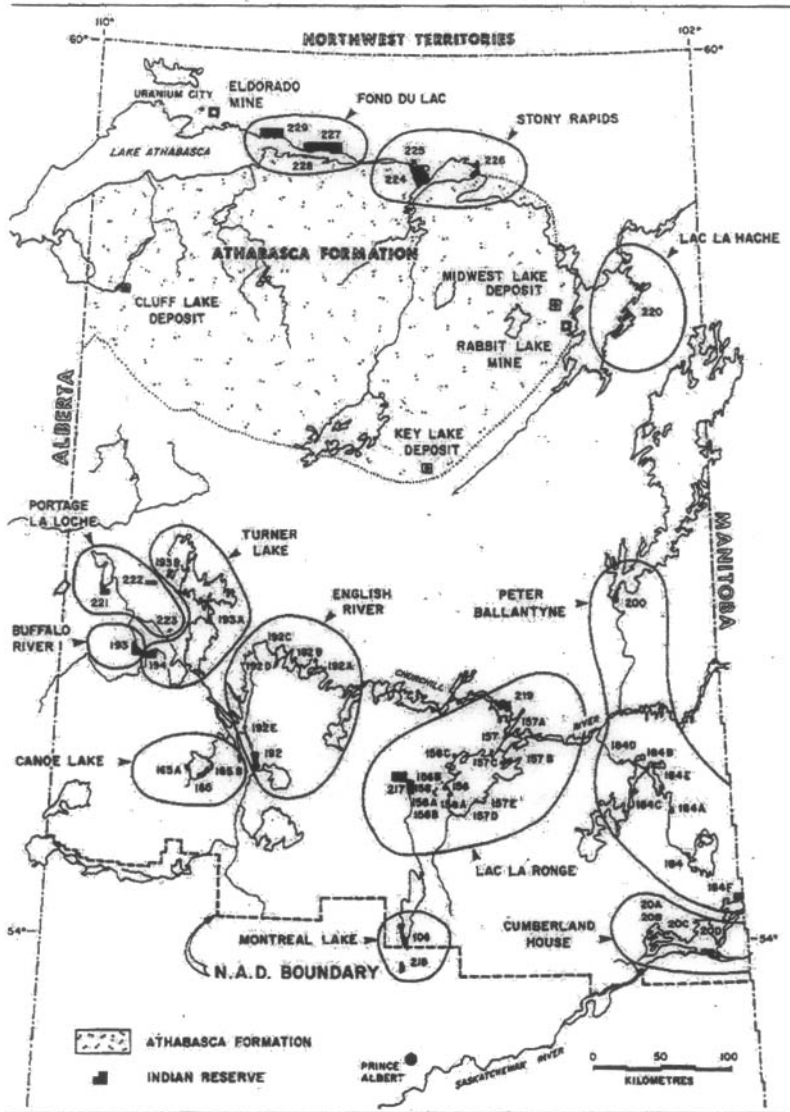
Source: Statistics Canada, 1995.

There are two distinct legal categories of Indian in northern Saskatchewan — Status or Treaty Indians and Métis. The Status Indians belong to Indian Bands, where First Nation’s chiefs negotiated with the Government of Canada in right of the Queen or King of England to establish Treaties with the Crown. The treaties provided land in the form of reserves along with other hunting, fishing, and development rights to Treaty Indians. At the same time members of each band became the responsibility of the federal government of Canada for such matters as health, education, and basic income. As Map 1 shows, there are eleven Status Indian Bands in northern Saskatchewan operating under Treaties No. 8 (signed in 1899) and No. 10 (signed in 1906/7).

Significantly, the Treaty Indian Status enshrined the traditional forms of Indian government put into practice through the chief and the elders system, which involves collective decision-making through extended consultation. Native culture places great importance on the basic elements of the universe — the land, water, fauna and flora. This has been reflected historically in native land entitlements under the Treaties, and is central to Indian approaches to development and change.

Métis account for over one quarter of the Northern population. They are also of native ancestry, but do not have treaty status for many historical and ethnic reasons. Métis face similar social, economic and community conditions of life as many Status Indians, although they hold the same legal

Map 1. Indian Reserves, treaty areas, and traditional hunting and trapping regions in Northern Saskatchewan.



Source: Bone, 1979. p.35.

status as other Canadian citizens. Accordingly, their health, education, and welfare are the responsibility of the provincial government in Saskatchewan.

The rest of the Northern population is primarily comprised of people of European heritage engaged in mining, natural resource development, business and public administration. This group has traditionally held many of the positions of power in the region, mostly working for the larger industries and government.

A growing population

Before World War II, northern Saskatchewan retained a low density, small population. But between the 1920s and the 1950s the population nearly trebled; from a little over 4 000 people in 1921, to 11 000 in 1951. However, with the advent of improved health care and a rapidly expanding mining economy in the 1950s, the population increased dramatically, reaching nearly 18 000 people by 1961. By 1997 the population more than doubled, to over 37 000.

The northern population lives in four distinct regions. One third live in and around La Ronge, the region's administrative centre. Thirty percent live in the west side communities, stretching from Green Lake in the south, through Île à la Crosse to La Loche. Another 27 percent live in and around the east side communities from Southend at the centre of the region, through Sandy Bay and Pelican Narrows, to Cumberland House in the south. In 1997, each area had between ten and twelve thousand people living in them. Finally, a smaller population of nearly four thousand live in the isolated northern communities of the Athabasca region, which includes Fond du Lac, Stony Rapids and Black Lake on the Athabasca river and lake system.

Social and economic disparities

Indian and Métis peoples have not had access to the full range of employment opportunities available in the North. Jobs were largely filled by white immigrants to the region, from either southern Saskatchewan or other parts of Canada and the world. At the core of the social and economic disparities of northern Saskatchewan lay a labour gap — too few paid jobs to meet the needs and skills of the local population. By the 1960s, the traditional trapping and fish economy could no longer support the growing population.

The lack of northern employment opportunities and related low incomes brought other social and economic disparities. A lack of housing and funds to purchase housing led to overcrowding. Northern food prices were much higher due to the extra transportation costs incurred in overcoming geographic isolation. Accordingly, less and lower-quality foods have been consumed creating nutrition and health problems.

Through the 20th century, social and economic conditions in the North trailed the South, in spite of improved health care facilities and a steadily increasing welfare bill. Population growth far exceeded the rate of new northern job-creation and earned-income opportunities, particularly in the

Table 2. Comparison of social and economic conditions, Northern Saskatchewan and Saskatchewan, 1995.

| Indicator | Saskatchewan | North | North as % Saskatchewan |
|---|----------------|---------------|-------------------------|
| Increase in population and labour force | 0.04% per year | 2.0% per year | +5 000% |
| Participation rate | 65%–70% | 50% | -0.74% |
| Unemployment rate | Under 7% | 25%+ | +357% |
| % Population <\$20 000 | 20% | 44% | +220% |
| % Single parent families | 12% | 21% | +175% |
| Av. no. of people per dwelling | 2.7 | 4.0 | +148% |
| Alcohol/drug abuse per 10 000 | 75 | 370 | +493% |
| Youth (15-24) suicide rate per 1 000 | 23 | 42 | +183% |
| % children born to mothers <19 year old | 10.0% | 26.8% | +268% |
| Tuberculosis rate per 100 000 | 17 | 253 | +1 488% |
| Criminal code offenses per 1 000 | 133.4 | 568.2 | +426% |

Source: Saskatchewan Saskatchewan Department of Municipal Government, 1995.

low-skill areas for which northerners had been educated and trained. As Table 2 indicates, a 1995 survey of northern conditions by the Saskatchewan Department of Municipal Government, a provincial government agency, showed that the North still trailed the provincial averages for most key social and economic indicators.

Today, for many communities and some aboriginal people, the social and economic indicators for northern Saskatchewan remain only marginally above some of the world's poorest regions. The average aboriginal earned personal income (for individuals actively in the labour force) for the North was estimated by the University of Saskatchewan to be C \$9 716 in 1995 or US \$1 285 per capita (Federation of Saskatchewan Indian Nations 1997, p.139). Of this amount, about 40 percent was earned income and 60 percent was received in transfers, mainly from government in the form of social service and welfare payments. Other social and economic indicators for the North remain at levels that would be considered unacceptable in lesser-developed countries. Forty-four percent of the Northern population lives below the Canadian poverty line.

Fundamental to the problem of regional inequity is a growth in population and labour force that has consistently exceeded the rate of regional employment. This has been referred to as an "Aboriginal Employment Gap," defined as "the number of jobs required to bring the aboriginal employment rate up to the average level of employment." (Painter et al. 2000, p.35) Therefore, estimates and monitoring of population, labour force, and employment growth is critical to understanding the magnitude of

the employment response required to address these issues, and has become central to public policy solutions.

The Saskatchewan Federation of Indian Nations and the University of Saskatchewan estimated the employment gap for northern Saskatchewan, and tracked the problem as the Northern aboriginal population increased. The regional aboriginal employment gap rose from 7 400 in 1995 to 46 400 by 2045, as Table 3 shows.

Table 3. Current and estimated labour gap in Northern Saskatchewan, 1995, and as forecast for 2005–2045.

| | 1995 | 2005 | 2015 | 2025 | 2035 | 2045 |
|--|------------|-------------|-------------|-------------|-------------|-------------|
| Aboriginal employment required to reach provincial employment rates (000s) | 14.1 | 20.4 | 26.5 | 34.0 | 43.7 | 56.0 |
| Status quo aboriginal employment (000s) | 6.8 | 7.5 | 7.8 | 8.2 | 8.9 | 9.6 |
| Aboriginal employment gap (000s) | 7.4 | 12.9 | 18.7 | 25.8 | 34.9 | 46.4 |

Source: Saskatchewan Federation of Indian Nations, 1997, p.140.

Uranium mining and milling has been the largest single source of employment and economic opportunity in northern Saskatchewan since the 1950s. Developing the industry required sustained and high levels of investment and employment, as well as a continuing supply of goods and services for the mine, mill, and community support infrastructure.

Increasing the level of native and community participation in the Northern uranium economy became a primary policy objective for government. Different regulatory models for mining development were used by both federal and provincial governments with remarkably different results in the levels of participation by northerners, natives, and communities in the uranium mining sector.

Uranium mine development through the state

The regulatory framework for uranium development

Canada is a federation. Federal and provincial governments have responsibility for different functions of government. In a federal state like Canada, the powers of government are distributed between a central authority (the federal or national government) and regional authorities (the provincial governments). Canadian mining exploration, development, and regulation became the responsibility of the provincial governments in the 1930 Constitution Act. In addition, provincial governments already had responsibility for many policy areas related to the development of the

uranium industry including fiscal regimes, occupational health and safety, labour, employment and training, education, municipal affairs, the environment, and public health. This led to a regulatory process for uranium mineral development within Saskatchewan consisting of:

- mineral exploration permits to allow individuals and companies to explore for mineral deposits;
- surface lease agreements between the province and a mining company to allow access to the lands for development purposes and to agree with the prevailing provincial legislation; and
- royalty agreements between the company and the province to provide a share of mineral revenues to government after deductions were made for mine construction and operation.

Prior to World War II, the federal government also had jurisdiction over a number of policy areas of significance to the mining industry. These included federal fiscal matters, Treaty Indians living in mining regions, international trade, the environment, and all public policy functions on federal territories, such as the Northwest Territories.

Moreover, uranium had “strategic and potential military applications.” During the Second World War, uranium was deemed a “strategic national resource” and placed under the control of the Atomic Energy Control Act (Queen’s Printer 1946). The exploration, production, refining and treatment of uranium were to be for the “general advantage of Canada,” placing the mineral under federal jurisdiction. The Atomic Energy Control Board was established to regulate the industry and at the same time a crown corporation, Eldorado Mining and Refining Ltd., was created to develop and manage the resource. Both agencies were located in Ottawa. Some of the first mine developments regulated by the new process were the Beaverlodge mining operations on Lake Athabasca in northern Saskatchewan.

The changing regulatory framework towards uranium mining in Northern Saskatchewan

Initial federal regulation towards uranium was quite narrow during the first rounds of development in the Beaverlodge area on Lake Athabasca. Limited attention was paid to workers’ occupational health and safety, less to environmental protection, and no attention at all to reclamation, communities, or socioeconomic performance. Over time, levels of mine regulation increased as the provincial government became more involved in attempting to extract community, local, regional, and native benefits from the

uranium developments. The increasing scope of regulation occurred in response to public hearings and government priorities.

Local community and native demands were expressed through public hearings. The hearings, as shown by Table 4, expanded the scope of "environmental impact" beyond ecological and health issues to employment, housing, sanitation, education, and training. They increased local and community participation in the process of uranium mine development.

One of the provincial government's public-policy goals was to meet the increasing social and economic disparities of the residents — native and non-native — of northern Saskatchewan. In part, the growing public-policy priority was a direct result of changing public opinion which became more supportive of mining development. This change happened because new regulations resulted in tangible benefits to northerners.

Saskatchewan used two distinct approaches towards the development of its northern uranium resources through federal and provincial crown

Table 4. Public hearings on uranium mine development in Northern Saskatchewan

| Date | Name of hearing | Comment |
|-----------|--|--|
| 1974–1978 | Berger Inquiry into the Mackenzie Valley Pipeline in the Northwest Territories | A field inquiry. Listened to local communities and First Nations and factored their interests into the decision not to proceed with the pipeline at that time. Extended the scope of environmental hearings to include socioeconomic, community and native interests. |
| 1977–1978 | Bayda Commission Cluff Lake Board of Inquiry | Extended the scope of mine assessments to include biological effects; environmental considerations; worker health and safety; federal and provincial regulation; social, economic, community and northern benefits; disposal of nuclear wastes; proliferation and terrorism; and moral and ethical issues. Public hearings held in the North. Approved development subject to increased regulation, and recommendations made to clarify the federal and provincial jurisdictions over the environment. |
| 1979 | Key Lake Board of Inquiry | Comprehensive hearing process in many northern communities, large and small, into proposals by the provincial crown corporation to mine high-grade uranium. Approved the Key Lake Project with the addition of stronger socioeconomic performance targets in the form of quotas and reclamation requirements. |
| 1993–1994 | Rabbit Lake Panel | Environmental Assessment into the expansion of the Rabbit Lake mine to underground operations at Eagle Point and open pit operations in the A and D Zones. |
| 1991–1997 | Joint Federal Provincial Panel on Uranium Mining Developments in Northern Saskatchewan | Joint federal and provincial panel examined mining development proposals from private companies for McArthur River, Cigar Lake, Deilman Pit (Key Lake), McClean Lake and Mid-West Projects. In addition, the panel examined the cumulative effects of the developments. Comprehensive public northern hearings. Recommended proceeding with cooperative tripartite process to achieve social and economic benefits, plus increased environmental protection and monitoring by communities. |

corporations. Examples of this are the 1950s to 1980s development in the Beaverlodge and Uranium City areas by the federal crown corporation Eldorado Mining and Refining Limited; and the 1970s and 1980s development by Saskatchewan Mining Development Corporation — a provincial crown corporation.

In the 1990s, private-sector delivery occurred in a cooperative, transparent, state regulatory framework via the private uranium companies operating in Saskatchewan. This was a tripartite regulatory framework involving governments (federal and provincial), the mining industry, and the local communities, including northern and native residents and related organizations.

State regulation and delivery

Beaverlodge area of Northern Saskatchewan, 1944–1981

Uranium deposits were first found in the Beaverlodge area north of Lake Athabasca in 1935. This region is in the northwest corner of Saskatchewan, 450 miles by air from Edmonton, or 450 miles south to Prince Albert. This was a period of state-owned uranium mine development in northern Saskatchewan. A federal crown corporation, Eldorado Mining and Refining Ltd. and its successor companies, developed the region under regulation by the federal government.

In 1943 the federal government created Eldorado Mining and Refining Limited as a crown corporation with a national monopoly on prospecting, mining, and processing uranium. The Crown monopoly excluded any private prospecting for uranium. In 1944 Eldorado staked mineral claims in the region. In 1946 the Atomic Energy Control Act was passed in the House of Commons to regulate all operations of the industry. Regulation was administered from Ottawa by the Atomic Energy Control Board. By March 1951 and after further exploration in the area, sufficient ore deposits had been identified to warrant a mine and mill. Production commenced in May 1953 and exploration activity increased, resulting in further finds and the establishment of as many as 12 uranium mines and three mills in the Beaverlodge area by 1958. Eldorado operated the Beaverlodge mine and mill continuously for 29 years, only closing in 1982.

Uranium production

Between 1953 and 1982 Eldorado mines in the Beaverlodge area produced some 45 million lbs of uranium concentrate (U_3O_8). Production of ore and yellowcake peaked in 1959/60 and 1967/8. In 1961 the Beaverlodge camp shipped some 2 160 tonnes of U_3O_8 valued at about \$45 million, representing about 22 percent of Canadian production, as shown in Figure 4.

Figure 4. Eldorado production from Beaverlodge Operations, 1953–1982.



Source: Neil, A.E., Statistical Graphs of Beaverlodge Operations, 1953–1981, Eldorado Resources Ltd., Saskatchewan, 1982.

Decisions on a town site — Uranium City

Early decisions were required to secure a local labour force. Many workers would have to be skilled workers — and they were not present in the remote northwest of the province. This led to a protracted negotiation between the company based in Ottawa and the provincial government in Regina, both being remote from the mine site. Two options were discussed by the socialist Cooperative Commonwealth Federation (CCF) provincial government of the day and the company: either create many single mine towns or one planned town to service the region.

There was a mood in Canada at the time to end the development of shanty towns that had grown up around the mines in Ontario's north, with their problems of drink, unruly behaviour, criminal activity and urban blight. The government in Regina wished to avoid these problems and offer a higher

Figure 5. Eldorado town site, Beaverlodge District, Northern Saskatchewan, 1952.



Source: Dougall, G., *The History of Uranium City and District*, Uranium City, 1982.

level of northern services and quality of life. At the time, it was felt both in the company and in the government that a single town site with comprehensive modern amenities would be preferable to a proliferation of shanty towns. Also, there would be savings in infrastructure costs. However, neither party wished to pay for the town.

Mine development proceeded faster than the community. It became necessary to start the seasonal construction schedule and get material to the mine site. During 1951 the company built its own facilities to get supplies to the mine site. The federal Department of Transport built an airstrip. A port, Bushell, was established at Black Bay, about 15 miles distant, replacing the time-consuming portage between Lake Athabasca and Beaverlodge Lake. The provincial government immediately made land available for warehouses and port installations and squatter communities emerged in Goldfields and elsewhere in the Beaverlodge area. Problems of alcoholism soon started and it seemed that Saskatchewan was reproducing the standard mining model of Ontario shanty towns. The company acted, designating the area a liquor-free zone under the Atomic Energy Act on grounds that national defense and security of a strategic uranium resource took priority over local interests.

These developments prompted Saskatchewan to design a model town which would be called Uranium City based on the company town of Arvida, Quebec. The issue of who was to pay then resurfaced. One senior

Saskatchewan civil servant noted that the public was not “*prepared to allow speculators and industrialists to harmfully, and for their own selfish pecuniary interest, to exploit the renewable and non-renewable wealth of Saskatchewan*” (Bothwell 1984, p.296). At this time, Saskatchewan Renewable Resources became the defender of local interests against the federal crown corporation.

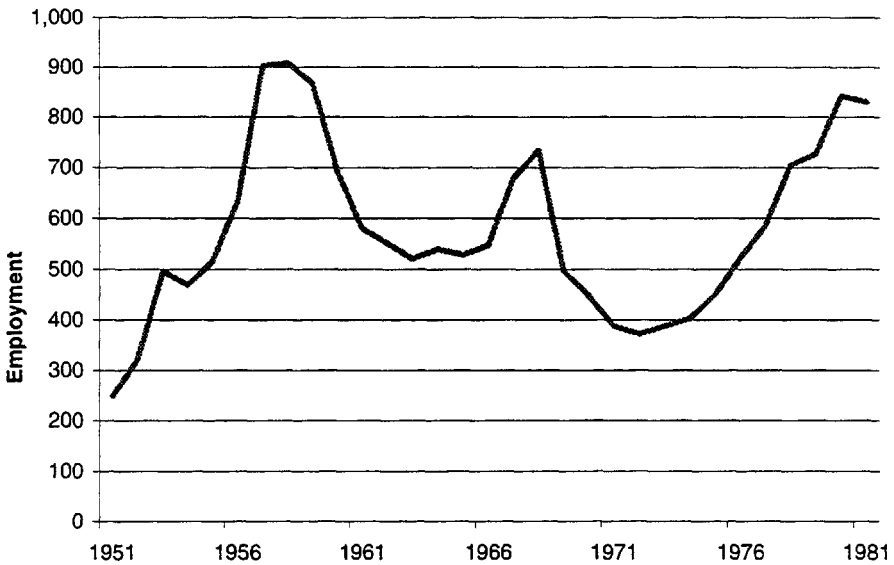
Saskatchewan suggested that the federal crown corporation, Eldorado Mining and Refining Ltd., pay for the town but not own or control it. This was unacceptable to Eldorado, who announced a delay in the project and started building company housing closer to the mine site. This left a huge problem for the provincial government, since it led to squatter settlements in the bush around Beaverlodge of exactly the kind they had been trying to avoid. Furthermore, all the social problems of the squatter communities became a provincial responsibility and cost. The province backed down and, in July 1952, began to survey a townsite which became Uranium City.

As the city grew, both the federal and provincial governments provided services. Saskatchewan installed a local administrator and created an office for a mining recorder. The federal government opened two stores, a garage, and a restaurant. A school was opened for 60 children — and the province opened its liquor store before its hospital. By 1958 the Uranium City/Beaverlodge area had over 5 000 residents — some living outside the town at the mine sites.

Employment and accommodation

The mine and related operations employed 17 886 person years between 1951 and 1982. The Eldorado Beaverlodge mines averaged an annual employment of 575 persons over its thirty-year lifespan. There was a steady build-up of employment over the first seven years — from 250 to 900 in 1960 as shown in Figure 6. In following years, there was a steady decline with intermittent peaks in 1964 and 1981.

Initially, most mine employees lived in company camps at the mine site. The company proceeded much faster in getting the mine under construction and into production than did the province in preparing the new town site for accommodation and services. Much of the early infrastructure construction at Uranium City was undertaken with company equipment and crews.

Figure 6. Eldorado employment, 1951–1981.

Source: I.C.B. Price, Eldorado Resources Limited, Annual Reports, 1951–1981.

Between 1951 and 1955 only a little over 20 percent of the mine employees were living in the town. In fact, as Table 5 illustrates, it was not until the company developed an aggressive program of company housing in Uranium City that there was a significant increase in mine accommodation in the town.

Table 5. Sources of accommodation for Eldorado employees, 1953–1981.

| Year | Eldorado campsite | Uranium City | | | Offsite in Edmonton/Saskatoon |
|-------|-------------------|--------------|-----------------|---------------|-------------------------------|
| | | Townsite | Company housing | Other housing | |
| 51–55 | 78% | 8% | 4% | 9% | Less than 1% |
| 56–60 | 80% | 8% | 3% | 9% | Less than 1% |
| 61–65 | 56% | 6% | 10% | 28% | Less than 1% |
| 66–70 | 30% | 3% | 20% | 47% | Less than 1% |
| 71–75 | 31% | 3% | 21% | 44% | Less than 1% |
| 76–80 | 38% | 5% | 20% | 37% | 0% |
| 81 | 22% | 7% | 50% | 17% | 5% |

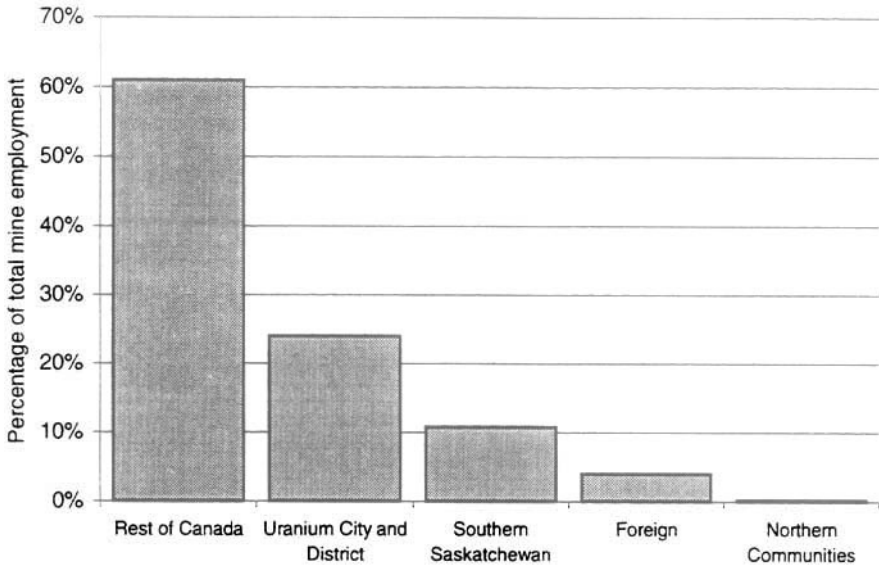
Source: I.C.B. Price, Eldorado Resources Limited, Annual Reports, 1951–1981.

Northern, native, and community participation in mine employment

In the early 1950s there were very few trained mine employees available in northwestern Saskatchewan. The closest communities to the new mine site at Camsell Portage, Fond du Lac, Black Lake, and Stony Rapids were still primarily engaged in traditional hunting and gathering pursuits. In a detailed

review of the sources of employees in 1974 the mine personnel manager found that nearly two-thirds of his employees came from the rest of Canada, as Figure 7 demonstrates.

Figure 7. Sources of mine employees, Eldorado Beaverlodge Operations 1974, % of total employment.



Source: I.C.B. Price, Eldorado Resources Limited, Annual Reports, 1951–1981.

Only two people were hired from the Northern communities outside Uranium City. For the most part, most of the quarter of employees sourced from the town itself initially came from outside northern Saskatchewan. At the time, corporate personnel policy focused exclusively on securing the mine labour supply. Throughout the life of the mine, turnover rates had been high, averaging 67 percent a year. These fell slowly throughout the life of the mine, but still imposed a very high corporate cost in terms of training, staffing, and meeting the rigorous safety requirements associated with mining uranium.

The company adopted a policy of “out-of-region” recruiting. A personnel review of Beaverlodge Operations suggested that recruiting out-of-province as well as internationally should become a priority for hiring trained miners and technicians (Price 1984, p. 17). A related personnel policy (Ibid, p.9) involved flying employees to the mine. “Morale among the families of married personnel is an important factor to be taken into account. A modified ‘trips out’ policy, put into effect in May for staff and salaried employees and their families, was well received.”

While training programs were employed so mine workers could upgrade their skills, there was little outreach to train northern residents living in distant communities and often in poverty. An underlying factor in training northern residents for mines was their overall level of education. In the 1960s while nearly half of the children entered into the school system, only two percent stayed in school for grades 10, 11 and 12. Only 12 percent were completing grades 7, 8 and 9.

Native training for employment was not a priority for Eldorado until twenty years after the start of the first mine. A formal training program for the employment and training of Athabasca Basin Indians was started in 1976. Numbers in the program were small, but seen as effective in terms of the retention and job performance of the new trainees. In 1977 there were nine candidates in the company program, of whom seven were still employed at year end — 1 percent of that year's mine employees. However, by 1980 — after thirty years of mine operations in the Beaverlodge — area nearly ten percent of the mine employment was native.

By 1979, near the end of the life of the mine Eldorado introduced a commuting program for residents of Black Lake, Stony Rapids, and Fond du Lac to improve the employee retention rates of residents of these communities. A total of 32 commuters were hired between August and December of 1979, 14 of whom remained on payroll at year end. According to Price (*ibid*, p.36), the personnel manager of the day noted: "The present work schedule does not favour a commuting program and results have been disappointing. Off the job problems contribute the major factor for this turnover."

Procurement of essential mine and community services for the mine were usually obtained from southern mining suppliers. While Eldorado looked towards Uranium City as a local source of northern employment, there were few specialized services developed in the town to supply the mine. Most mine purchasing and inventory requirements were flown in from Edmonton. When local supply was considered, it had a short lifespan. For example, originally the company had supplied laundry services, but in 1961 the service was transferred, under contract, to a Uranium City firm. In May 1962 the Uranium City laundry went bankrupt and Eldorado made arrangements with an Edmonton firm to handle their Beaverlodge needs on a fly-out, fly-in basis.

Decline of Uranium City

Fourteen years after closure of the mine in 1982, the population of Uranium City had fallen to 201 with 66 occupied dwellings. During its operating life, the Beaverlodge mining complex developed and accumulated:

1. an underground mining complex, plus assorted underground and surface satellite mines with 35 shafts;
2. mill, process chemicals, and support facilities;
3. waste management systems with 10.1 million tonnes of tailings;
4. tailings lines and spills;
5. approximately 40 million tonnes of waste rock;
6. site infrastructure such as roads, electrical distribution, sewage system;
7. townsite; and
8. hazardous wastes such as transformers with polychlorinated biphenyls (PCBs).

The Beaverlodge operation was the first uranium site in Canada to have a planned decommissioning with regulatory approval. Previously, mining operations that closed conducted salvage operations wherever economically feasible and abandoned their property. There was no further consideration of environmental or public safety concerns. Remote mine sites like Beaverlodge often were abandoned, just as if everyone had left the site after the last shift, leaving the site "as is."

There were no lack of regulatory requirements specific to mine closure. A corporate report (Eldorado Nuclear Ltd. 1982, p.1) summarizing the Beaverlodge decommissioning, allocated approximately \$370 000 for closure in 1981 to meet federal regulatory requirements. Subsequently, the company established four rules:

1. A corporate policy for the Beaverlodge: "Upon the permanent cessation of operations, the site will be abandoned in a safe, stable and aesthetically pleasing state. Stabilization procedures will be undertaken to prevent and/or reduce the migration or erosion of waste materials and reduce the potential for inadvertent exposure to members of the general public."
2. Decommissioning principles for closing operation that included environmental protection, occupational health and safety, radiation protection for the public, the application of good engineering practice, and ALARA (as low as reasonably achievable);
3. An organization in the company to expedite decommissioning that included orderly shut-down of the mine/mill operations, equipment

- salvage, and development of acceptable and reasonable decommissioning and reclamation plans in consultation with the regulatory authorities; and
4. Careful documentation of all closure works to document the final condition of the remediated site.

Neither the local communities nor the public were consulted or invited to participate in the closure planning or implementation by either the Company or the government agencies. The decline of Uranium City left a long-term legacy of very high social, economic, and human costs in the form of unsafe and derelict abandoned buildings, as well as education facilities, without any provision of either policing or medical support. They remain a public safety hazard to this day.

Key Lake Mining, and Saskatchewan Mining Development corporations

Saskatchewan Mining and Development Corporation (SMDC) was created as a provincial crown corporation in 1974 to explore for, develop, mine, store and sell uranium and other minerals. The company intended to increase the employment and income benefits from mining for Saskatchewan residents. Provincial legislation provided the company with the right to take a share in any private-sector mine development or property. The provincial crown corporation took equity positions in both Cluff Lake and Key Lake Mining operations.

Saskatchewan crown corporations were historically established to become agents of social and economic change. Earlier in the century, the province used them to provide rural telephone and power services. After World War II the scope of crown corporations was extended throughout the economy. The province, therefore, expected the new mining crown corporation to meet its public policy goals of improving the conditions of life for northern people and their communities.

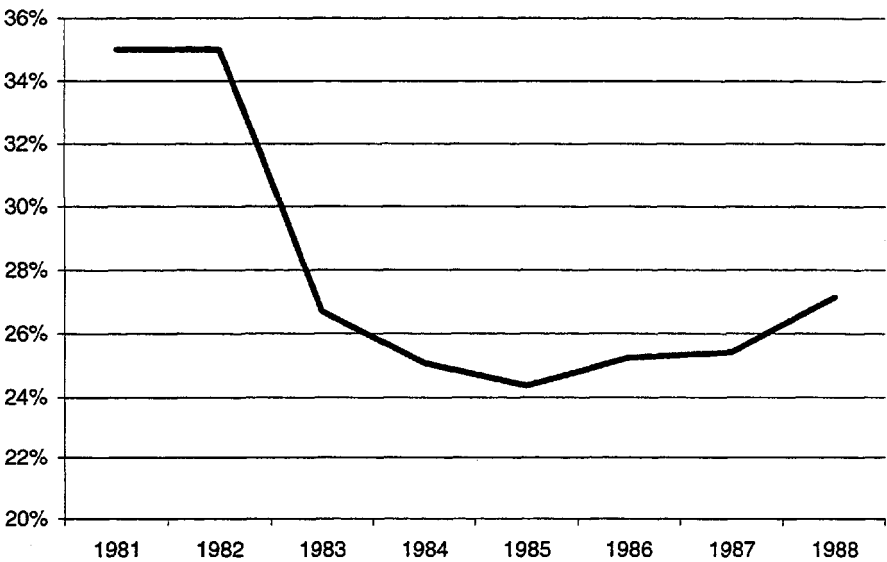
The company was regulated through both the federal Atomic Energy Control Board and provincial legislation. However, both the legal structure and operations of provincial Crown corporations left them exempt from both federal and provincial regulation.

In 1974 SMDC entered into a partnership with Uranerz Exploration to explore for uranium and in 1975 and 1976 major ore bodies were discovered in the Key Lake area. The Key Lake Mining Corporation was established to develop the properties and open pit production began in 1983. An annual production rate of 5.0 million kg U made the mine the world's largest uranium producer at the time. Decisions to proceed on high quality ores at

Key Lake made the closure of the low grade, uneconomic mines in the Beaverlodge area inevitable.

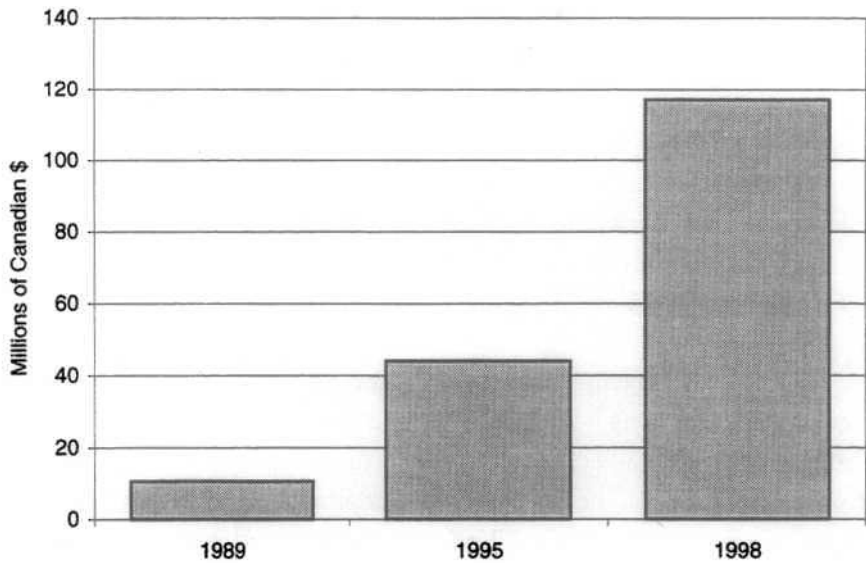
The Key Lake mining operations increased northern and native employment over that achieved during the Eldorado years in Beaverlodge. Uranium mine employment rose from 84 in 1981, to over 400 in 1987. During this period of public ownership, northern employment at the mine averaged 26 percent of the total work force. Numerical targets were introduced in attempts to increase northern participation at Key Lake. However, as can be seen in Figure 8, the share that northerners held of total mine employment actually declined between 1981 and 1988.

Figure 8. Northern mine employment as % of total mine employment, Key Lake Mine 1981–1988.



Source: Cameco Corporation 2000.

Related procurement employment in communities was less developed. While initial attempts to develop local, community and Indian companies had been started, these had yet to have a major effect on local communities or the Northern economy. Cameco was created from the 1988 merger of the federal crown corporation Eldorado Nuclear Ltd., and its provincial counterpart Saskatchewan Mining Development Corporation. Procurement from northern suppliers then stood at \$10.6 million — or 10.8 percent of total company northern mine procurement. By 1995 this had risen to \$44 million and by 1998 to \$117 million, as shown in Figure 9.

Figure 9. Procurement spending at Cameco in 1989, 1995, 1998.

Source: Cameco Corporation 2000.

Uranium mining in Northern Saskatchewan in the 1990s

Private-sector delivery under state regulation

Cameco Corporation was formed in 1988 from a merger of the federal crown corporation, Eldorado Resources Ltd.,⁶² and the provincial crown corporation, Saskatchewan Mining Development Corporation. Provincial and federal governments created a single large uranium company and then privatized the ownership in 1991. This led to a period of private-sector uranium mine development and operation. The private industry was now regulated largely by the provincial government. The federal regulator, the Atomic Energy Control Board, had a smaller role in the process.

During the early 1980s the Saskatchewan provincial government introduced a comprehensive environmental assessment and regulatory/enforcement program to deal with the environmental and human health concerns associated with uranium development. The changes required the development and implementation of laws, regulations, and policies to provide clear and reasonable boundary conditions for the uranium operators.

⁶² Eldorado Resources Limited was the successor company to Eldorado Nuclear Limited that in turn succeeded Eldorado Mining and Refining Ltd.

The provincial environmental assessment review (EAR) process led to increased community consultation and involvement in northern development. Proponents were required to prepare an environmental impact statement (EIS) which must include, but was not limited to:

- a project description;
- baseline environmental data;
- predicted physical, biological, socioeconomic, and community impacts of the proposed project; and
- assessment of the potential for negative cumulative environmental effects.

The environmental impact statement (EIS) required conceptual plans for decommissioning, reclamation, and abandonment, and specifically outlined the methods to be used to mitigate any environmental disturbances — ecological, social, or economic. Approval of the EIS led to the negotiation of the Surface Lease Agreement and commencement of the regulatory licensing process.

The Joint Panel

In the late 1980s and early 1990s a large number of potential uranium development projects were identified by private companies, including Cameco, Cogema and others. These included proposals for Cigar Lake, McArthur River, Eagle Point, South Mahon Lake (Midwest), McClean Lake and Rabbit Lake/Eagle Point Expansion. Table 6 further identifies these.

In response to the new uranium mine proposals, federal and provincial governments combined under the authority of their environmental legislation

Table 6. Uranium development projects identified for review by the joint federal provincial uranium panel in 1991.

| Projects for review with completed environmental impact statements | | Projects for review with completed environmental impact statements in preparation and expected | |
|--|---|--|--|
| Project | Company | Project | Company |
| Dominique-Janine Extension | Amok Ltd. | McArthur River | Joint venture between Cameco, Uranerz and Cogema. |
| South Mahon (Midwest) | Midwest joint venture between Minatco, Uranerz, Tenwest and OURD. | Cigar Lake | Joint venture between Cameco, Cogema, Idemitsu and Korea Electric Power. |
| McClean Lake Project | Minatco Ltd. led by Cogema | | |

Source: Saskatchewan Environment and Resource Management, Schedule A, Terms of Reference for the Environmental Assessment Review of Uranium Mining Development, Regina, August, 1991.

to establish a Joint Federal-Provincial Panel on Uranium Mining Developments in Northern Saskatchewan (hereafter referred to as the Joint Panel) in August of 1991. The Joint Panel reviewed the environmental, health, safety, and socioeconomic impacts of three projects for which EIS had been submitted, and two more for which EIS were still in preparation. The goal was twofold, as stated in the Joint Panel's release of 1991:

1. determine whether the project is acceptable or unacceptable; and,
2. provide full opportunities for public consultation and review.

Commencing in 1991, the Joint Panel worked for seven years and examined the cumulative effects of all of the projects on the Northern Saskatchewan environment, communities, and peoples. Consultations were held in the smallest northern communities to identify concerns and issues. Funding was provided to allow local people, communities, and Indian bands to fully participate in the process. The final report was issued in 1998.

Most public consultations were concerned with matters of social, economic, and community benefits. Many northerners, communities, and Indian bands wanted to participate in — and to receive the benefits from — mining. This concern for regional and community benefits plus northern involvement in development led the Joint Panel to make major recommendations in their final Cumulative Effects Report (Lee 1997) on procurement, education, protection, waste disposal, decommissioning, monitoring, roads, and worker safety. The Joint Panel notes (Lee 1997, Recommendations 3, p.1): "Protection of northern communities and the people in them is as important as protection of the biota."

The recommendations from the Joint Panel led government to make major changes in its regulatory framework for uranium mining. The existing environmental protection program was inadequate to deal with the issues raised and the emerging scope of development. Improvements had to be made with respect to:

- public consultation;
- transparency;
- ecosystem based monitoring utilizing valued ecosystem components (VECs);
- community participation in environmental monitoring through environmental quality committees;
- cumulative effects of mines on the environment and communities;
- increased emphasis on site decommissioning to ensure proper closeout and environmental mitigation;

- provision of the principle of “user pay” — and future control and financing of abandoned sites;
- coordination of federal/provincial regulatory effort; and
- inclusion of aboriginal employees from the impact areas in government regulatory agencies.

A common thread throughout the tripartite consultations on the environmental management of uranium mining was the long-term health of the land and the protection of future generations from the environmental implications of present-day development. The major factor that played a key role in the successful development of the uranium industry in northern Saskatchewan was early recognition that development must be “driven by decommissioning.” This was a major shift in thinking for governments and corporations from more traditional approaches to mining. Under northern Saskatchewan’s tripartite consultative process, decommissioning of any uranium operation becomes a well-designed project from the very outset of development planning.

A central issue in decommissioning is “Who pays?” Financial assurances address some community concerns about the long-term effect of mining. Specific issues were raised over long-term environmental degradation from abandoned sites to the failure of tailings-containment facilities — and who pays for remedial action. New environmental regulations required companies to post a financial assurance equal to the estimated cost of site decommissioning at any given time. This ensured satisfactory decommissioning of mine/mill sites and guaranteed that local taxpayers would not pay for clean-up. Financial assurances in 1997/8 for northern uranium mines exceeded C \$100 million as noted in Table 7.

Table 7. Financial assurances held by the province of Saskatchewan on uranium mines, 1997/8.

| Mine | Stage of development | Value of assurance C \$ millions |
|-------------------------|----------------------|-------------------------------------|
| Cigar Lake | Early | \$4.21M |
| McArthur River | Early | \$0.55M |
| Rabbit Lake | Mature | \$25.90M |
| Cluff Lake | Mature | \$20.00M |
| McClellan Lake | Early | \$ 5.40M |
| Key Lake | Mature | \$45.60M |
| Midwest | Early | \$0.75M |
| Total assurances | | \$102.41M |

Source: Environmental Quality Committees, Report to Communities, 1997/98, Saskatchewan Northern Affairs, La Ronge, 1998. p.17.

Tripartite planning

Following the recommendations of the Bayda Commission and the Joint Panel, more cooperative approaches were adopted towards planning. Most regulation on regional, community, and aboriginal impacts fell to the provincial government. Even areas of federal jurisdiction were delivered by the province, with the exception of matters of Status Indians who are still managed by the Government of Canada. The main components and agencies of the provincial government regulatory framework for uranium development in northern Saskatchewan are outlined in Figure 10.

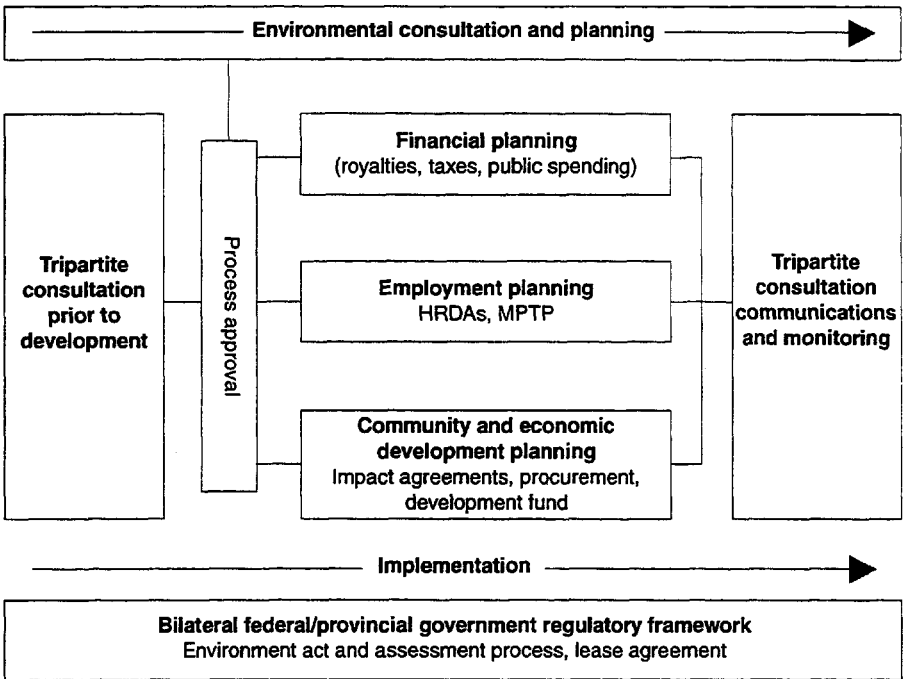
A tripartite planning framework was now in place for uranium mine development as governments, companies, and communities (including Indian Bands) worked cooperatively to increase local, native and community participation in the benefits of uranium development. Figure 11 shows these groups.

Figure 10. Regulatory framework for uranium development in Northern Saskatchewan, 1999.

| Item | Government | Company | Community |
|---|--|---------|-----------|
| Royalty agreement | Administered by Provincial Department of Energy & Mines in Regina. | | |
| Lease agreement | Administered by the Provincial Department of Northern Affairs in La Ronge, requiring compliance with provincial laws and agreement on human resource planning. | | |
| Environmental assessment, management, and decommissioning | Administered by the Department of Environment and Resource Management from Regina, following community consultations. | | |
| Labour market planning | Tripartite framework for labour planning involving: The Northern Labour Market Committee, Mineral Sector Steering Committee, Multi-Party Training Plan, and the Cameco Human Resource Training Plan. Participants include Provincial Department of Post Secondary Education and Training, Provincial Office of Northern Affairs, uranium companies, Indian bands, Northlands College. | | |
| Procurement planning | Negotiated between northern companies, Indian bands and communities. | | |
| Community planning | Community Impact Agreements. | | |
| Regional development financing | Northern Development Fund administered through the Department of Northern Affairs in La Ronge. | | |
| Communications | Environmental Quality Committees to create two-way communications between communities, Indian bands and the companies, and government. | | |
| Taxation | Federal and provincial departments of finance | | |

Source: Developed by the authors from a review of legislation, regulations, policies and practices developed by the Saskatchewan mining industry and the governments of Canada and Saskatchewan.

Figure 11. Saskatchewan's tripartite planning framework for uranium development.



Surface lease agreements (SLAs)

Most land in northern Saskatchewan is owned by the provincial government and anyone occupying crown land in Saskatchewan requires authority from the province. The province allows many uses including commercial businesses, community use, recreational dwellings, plus traditional hunting and gathering activities. Resource extraction requires an SLA, a two-party agreement between the provincial government and the land user. Its primary function is land rental. The SLA obligates owners to obtain and comply with all necessary licences and permits, and includes provisions requiring that federal and provincial regulation are met. In the 1990s the SLA was expanded to include many social, economic and community concerns — the very issues that prompted lease agreements to be applied to other industries such as forestry. The SLA remains:

1. the central legal regulatory authority to realize the social, economic and community benefits from uranium mining development, and
2. the instrument to ensure that the process under which development takes places follows northern consultation and participation.

The SLA approach was based on “best efforts,” cooperation, open dialogue and a tripartite partnership between industry, government, and a

wide northern community including Indian Bands, other northern residents, and communities. SLAs are founded on an intent (stated in Section 10 of the Agreements) to adopt cooperative practices in enhancing a positive economic climate in northern communities. In particular, they contain a clause requiring companies to negotiate a separate, long-term Human Resource Development Agreement for the life of the mine.

The SLA ensures that mining companies work in a broad northern development policy framework and cooperative consultative process for mining, community, and regional development. This requires corporate participation in the long-term Business Participation and Opportunity Forecast, a Multi-Party Training Plan, a Northern Development Fund and Environmental Quality Committees. The scope of the modern SLA is outlined in Figure 12.

According to the Department of Northern Affairs (1999, Section 12), SLAs require companies to use “best efforts to cause all contractors working on site to adopt similar policies of employment, recruitment and reporting that will contribute to the achievement of the intent as stated in Article 10.0.”

Figure 12. Major elements in uranium surface lease agreements, 1999.

| | |
|--|--|
| Part I. Land Tenure | Part V. Miscellaneous Provisions |
| Lease of Land | Compliance with Relevant Statutes |
| Rental Charges | Termination of Agreement |
| Use of Lands | Arbitration |
| Payment of Taxes | Assignments |
| Improvements and Roadways | Indemnity |
| Access to Lease Lands | Force Majeure |
| Part II. Occupational Health and Safety | Notices |
| Occupational Health and Safety | Term of Agreement |
| Part III | Place of Business |
| Environmental Considerations | Confidentiality |
| Environmental Protection | Binding Effects |
| Part IV | Other Leases |
| Direct Employment & Economic Benefits | Scope of Covenant |
| Intent | Continuing Obligations |
| Employment Policies and Practices | Part VI. Construction of Agreement |
| Training and Development Program | Definitions |
| Commercial Opportunities | Interpretation |
| Monitoring | Entire Agreement |
| Compensation | Appendices |
| Other Commitments | A. Occupational Health and Safety of Workers |
| | B. Guidelines for Environmental Protection |
| | During Road Development |
| | C. Guidelines for Environmental Protection |
| | During Development and Restoration of Sand |
| | and Gravel Pits |
| | D. Surface Lease Maps |
| | E. Financial Security for Decommissioning |

Source: Saskatchewan Department of Northern Affairs, Sample Uranium Surface Lease Agreement, June 8, La Ronge, 1999.

This intent replaced the previous 10 percent northern preference in the previous SLAs and has significantly increased northern benefits. The SLAs have included increased monitoring provisions to oblige mining companies and supplying contractors to provide corporate information on the numbers, types, origins, and skills of their employees.

SLAs are standard agreements, periodically modified to incorporate the new public policy priorities of the day. This occurs about once a decade. Surface lease negotiating procedures increase in complexity with the size of mine and the perceived environmental and health risks.

Uranium royalties and other fiscal flows — revenue sharing

Royalties are payments to the crown in return for access to crown resources and land. The revenues that flow from the uranium companies to the provincial government in Regina are the financial foundation for many aspects of community and northern development. The disposition of these royalties, once collected, is at the core of many northern grievances, recognized early on in public inquiries under the topic of revenue sharing. That is, communities assert that revenues obtained from the natural resource revenues in their area should be returned to their community.

An assessment of the regional fiscal balance for northern Saskatchewan was provided in a provincial review of their spending in the North between the years 1986–1987 and 1995–1996. This revealed a net benefit to Saskatchewan of \$386 million as shown in Table 8. This assessment incorporates a full range of provincial revenues in the form of royalties, lease fees, property taxes, surcharges, as well as income and sales taxes. Royalties formed about one half of these revenues. Government costs of all forms were allocated to the delivering departments, with the highest spending found in highways, accounting for 40 percent of all provincial spending.

Overall, the real net fiscal benefit to the government of Saskatchewan in 1995 is C \$7.57 for every dollar of government expenditures — representing over 80 percent of the fiscal benefit leaving the North. The issue of revenue sharing again emerged in the 1990s under the Joint Panel's consideration of further mine developments. The Joint Panel noted (Lee 1997, p.53.) that "It is evident from their words and actions that northern leaders wish to have the issue of revenue sharing resolved in a political forum rather than as part of an environmental review process. We agree with that approach and encourage the participation of both levels of government in

a multipartite discussion of revenue sharing with northern leaders.” It is important to note that the panels final report highlighted the importance of having revenue-sharing arrangements in place that would be acceptable to the Northern residents. Lee continues (ibid, p.53, 54) that *“To be effective, any program of revenue sharing should be implemented before the resource is further depleted.”*

Table 8. Government of Saskatchewan estimated revenues and expenditures from uranium mining development in Northern Saskatchewan, 1986/7–1995/6.

| Revenues | 1985/6–1995/6 000s current C \$ | % of total revenues & expenditures |
|--|------------------------------------|---------------------------------------|
| Royalties | \$203 672 | 49% |
| Surface lease fees | \$1 289 | 0% |
| Property taxes | \$11 609 | 3% |
| Mineral properties | \$5 420 | 1% |
| CCT + CCT surcharge ¹ | \$79 382 | 19% |
| Taxes | \$101 277 | 24% |
| Total revenues | \$414 210 | 100% |
| Spending | | |
| Environment | \$8 685 | 16% |
| Energy and mines | \$5 513 | 10% |
| Labour | \$1 245 | 2% |
| Education | \$1 771 | 3% |
| Economic development | \$1 612 | 3% |
| Highways | \$20 997 | 39% |
| Other departments ² | \$6 926 | 13% |
| Other expenditures | \$7 574 | 14% |
| Total spending | \$54 324 | 100% |
| Revenue/expenditure analysis | | 1985/6–1995/6 Current C \$ |
| Total revenues in constant (1995) C \$ | | \$444 757 |
| Total expenditures in constant (1995) C \$ | | \$58 743 |
| Net benefits in constant (1995) C \$ | | +\$386 014 |
| Ratio of revenues to expenditures | | 7.57 |

Notes: n.a. = not available and/or confidential.

¹ CCT = Corporate Capital Taxes.

² Other department includes Justice, Health, Finance, Indian and Métis Affairs, Northern Affairs, Public Service Commission, SaskWater and Executive Council.

Source: Saskatchewan Environment and Resource Management, Final Report, Information from the Government of Saskatchewan requested by the Federal Provincial Panel on Uranium Mining in Northern Saskatchewan for the Cigar Lake and McArthur River Projects, Regina, May 1996, Table 1.4.15.

Labour market planning

Human resource planning provides benefits for both the mining companies and northern residents and communities. The mining companies benefit in four ways, by:

1. hiring a trained, motivated, local labour force which is often "pre-screened" by pre-employment training;
2. reducing their on-site training costs through training programs paid for by companies and government;
3. publicly demonstrating their commitment to maximizing the employment of local people; and
4. reducing employee-turnover rates and related hiring, rehiring, and training costs.

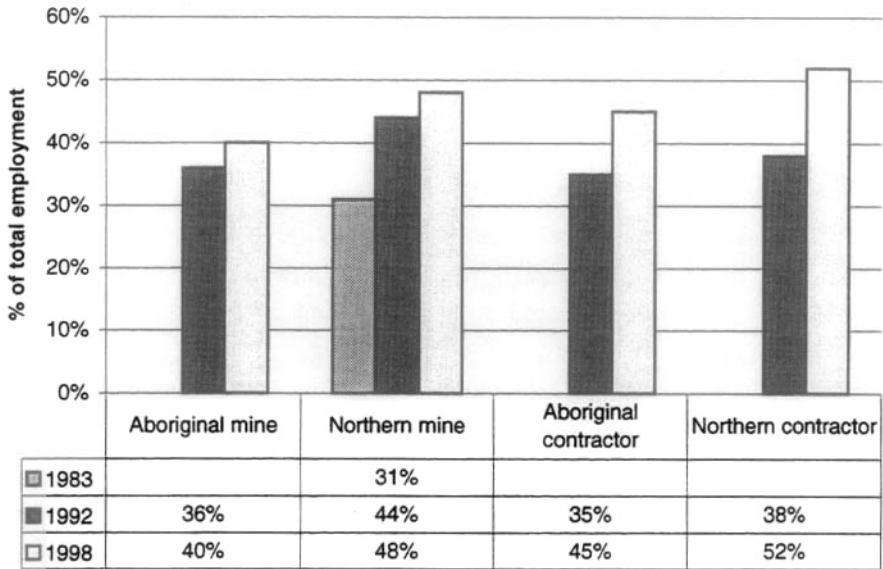
Northern peoples benefit by:

1. receiving employment priority upon completing their training;
2. developing transferable skills which can help maintain more constant employment in a long-term industry; and
3. developing the economy of northern communities and lowering local unemployment rates.

The Human Resource Development Agreement (HRDA) was introduced into the SLA in 1986. It was a co-operative approach between the mining companies and government to make specific long-term commitments to maximize their recruitment, hiring, and training, as well as the advancement of northern people at all skill levels in the mine operations. Company commitments are detailed in an annual Human Resource Development Plan that identifies job categories in which the company will give northern people preference during hiring or advancement. The plan also identifies northern communities whose residents will be given priority when jobs are to be filled. For the purposes of the HRDA, northerners are defined as residents of northern Saskatchewan who have lived in the Northern Administration District for ten years, or at least half their lifetime, and whose primary residence was in the North at the time of application.

This approach replaced regulated targets with a cooperative process of planning and training. It provided a long-term commitment by governments, the community, and the companies to increasing the numbers of northerners hired. Significantly, the approach included not only the mine employment base, but also the companies of which they were a part, plus the suppliers who provide the goods and services to the mines.

Figure 12. Northern and aboriginal mine employment and contractor employment as a percentage of total work force, 1983, 1992, and 1998.



Source: Cameco Corporation 2000.

The HRDA cover all stages of a mine's life, including construction, production, closure, and decommissioning. The HRDAs are based on the principle of securing the largest benefits from the mining operations for those people most directly affected by the operations. The result has been that northern participation in uranium mine company employment rose from 31 percent in 1983 to 48 percent in 1998, having peaked at 50 percent in 1996. Significantly, the HRDA program also addresses contractor employment, whose figures rose from 38 percent in 1992 when the contractor programs commenced to 52 percent in 1998 (see Figure 12). Significantly, Indian employment comprises most hiring undertaken at both mines as well as with the contractors. In most years this accounts for 80 percent of northern employment in the mines, and almost 90 percent of the Northern employment with the contractors as Table 9 shows.

Table 9. Northern aboriginal mine and contractor employees as % of total northern mine and contractor employment, 1992–1998.

| Year | Mine employment | | | Mine contractor employment | | |
|------|------------------------------------|-------------------------------|--|--------------------------------|---------------------------|--|
| | Aboriginal northern employment (#) | Total northern employment (#) | Northern aboriginal employment as % of total northern employment | Aboriginal northern employment | Total northern employment | Northern aboriginal employment as % of total northern employment |
| 1992 | 296 | 364 | 81% | 152 | 165 | 92% |
| 1998 | 498 | 600 | 83% | 421 | 484 | 87% |

Source: Saskatchewan Post Secondary Education and Training, La Ronge, 2000.

Mining companies included northern development principles into their union agreements. The collective agreement between Cameco Corporation and United Steelworkers of America Local 8914 that governs the Northern uranium operations addresses northern affirmative action and employment equity.

The multi-party training plan (MPTP)

Effective human resource planning extends beyond any single mine or company. In 1993 the first MPTP was signed between:

1. Saskatchewan represented by its Department of Education, Training and Development;
2. Canada represented by the Human Resources Development Department;
3. The Prince Albert Grand Council of Status Indians; and
4. The northern mining industry comprising Cameco Corporation, Cogema Resources Inc. and the Cigar Lake Mining Corporation.

The MPTP is a co-operative training-to-employment initiative and provided for \$10.5 million of training over five years, shared between the partners. Program expenditures and the shares paid by each partner are shown in Table 10. Governments picked up 60 percent of the training costs and the mining companies 40 percent. Government training accounted for a little under half of the costs, student allowances 11 percent, and in-kind allowances to the mining companies over 40 percent.

Table 10. Distribution of expenditures and revenues for the first multi-party training plan, 1993–1998

| Revenues provided by | % of total | Expenditures made by | % of total |
|-------------------------|------------|--------------------------------------|------------|
| Saskatchewan government | 30% | Government training programs | 46% |
| Canadian government | 27% | Allowances to students | 11% |
| Mining companies | 43% | In kind spending by mining companies | 43% |

Source: Painter, M., and Lendsay, K., Summative Evaluation of the Multi-Party Training Plan, 1993–1998, College of Commerce, University of Saskatchewan, 1998.

The MPTP had five phases, as illustrated in Figure 13. Individuals were assessed for basic education, pre-employment training, skills training in companies, job training, and employment. Mining companies delivered many of these programs on their mine sites and at other northern locations, in contrast to previous industry training undertaken in vocational schools, usually located outside the North.

Three goals were set in the first MPTP agreement, to:

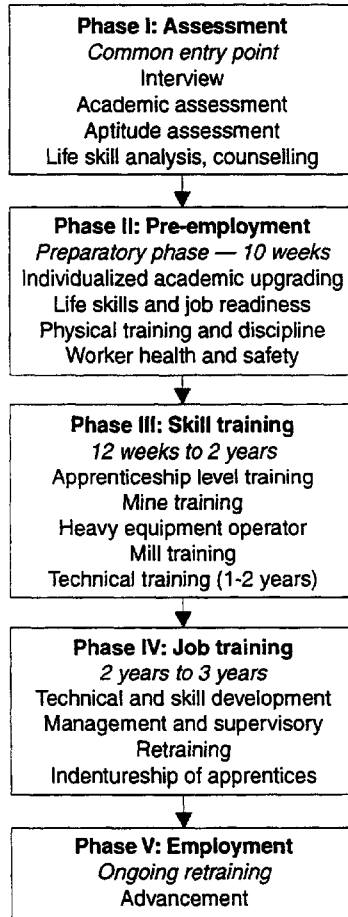
1. generate 716 new jobs in the mineral sector between 1993 and 1998;
2. fill 60 percent (430) of the new positions over the five years with northern residents; and

3. establish employment projections in the northern mining industry.

The performance of the MPTP was evaluated by the College of Commerce at the University of Saskatchewan. They found the industry had exceeded the public policy employment goals by several years and was roughly 30 percent over the job targets (Painter 1998).

In 1999, a \$13 million MPTP II came into effect, with more government departments, Métis and Indian Bands and all of the mining companies in the North. The program had expanded beyond uranium to include other mining activities. Program contributions for the five-year program (with their respective contributing agencies) are shown in Table 11. Overall, the costs of the programs are equally shared between governments and industry.

Figure 13. Training phases in the multi-party training program.



Source: Painter, M., and Lendsay, K., Summative Evaluation of the Multi-Party Training Plan, 1993–1998, College of Commerce, University of Saskatchewan, 1998., p. xiii.

Table 11. Multi-party training program II funding contributors

| Funding contributor | Agency | Total \$ | % of total |
|--|--|---------------------|-------------|
| Government of Canada | Human Resource Development Canada | \$300 000 | 2% |
| | PSEST(1) | \$1 200 000 | 9% |
| | Prince Albert Grand Council | \$312 500 | 2% |
| | Meadow Lake Tribal Council | \$312 500 | 2% |
| | Jim Brady Development Corporation | \$156 250 | 1% |
| | Methy Pathways Board Inc. | \$156 250 | 1% |
| | Northern Region III | \$156 250 | 1% |
| | Métis Employment and Training Board Inc. | \$156 250 | 1% |
| Government of Saskatchewan | PSEST (NTP) | \$1 250 000 | 10% |
| | PSEST (Northlands College) | \$2 000 000 | 15% |
| | Office of Northern Affairs | \$250 000 | 2% |
| Canada-Saskatchewan Western Economic Partnership Agreement | Federal Western Economic Diversification and provincial Economic & Cooperative Development | \$250 000 | 2% |
| Total government funding | | \$6 500 000 | 50% |
| Mining industry | All mining companies (Cameco Corporation, Cogema Resources Inc. Cigar Lake Mining Corporation and Claude Resources Inc.) | \$6 500 000 | 50% |
| Total funding | | \$13 000 000 | 100% |

Source: Multi-Party Training Plan II Agreement, November 5, 1998., Attachment VIII.

The economic and fiscal benefits of training have been substantial. The University of Saskatchewan evaluation of the first H RTP (Painter 1998) found:

- The average total cost per MPTP training seat was \$11 639, of which the federal and provincial governments paid \$6 668, a figure that is comparable with costs elsewhere in the education system. (K-12 cost per student per year in northern Saskatchewan is \$8 000, University of Saskatchewan cost is \$12 000 per student and industrial/technical training seats are \$9 600 per year.)
- The payback period to the province is low, at between 8 and 11 months.
- Only 5 percent of all MPTP students need to be fully employed at \$20 000 annual income each year over the next 30 years for governments to fully recover all costs of education and training. Any achievement beyond this represents a gain for government.
- The net financial benefits to governments are the reduced costs of social assistance and the collection of taxes.

During the first four years of the MPTP, 413 students worked at 663 different jobs. With an average duration of 8.5 months and a monthly income of \$1 700 in wages, governments had already recovered their investment in MPTP.

Welfare payments into northern Saskatchewan are about \$48 million per year, shared between the provincial government the the federal government which makes payments to Status Indians. The annual average welfare cost per individual in the North is \$8 000. The cooperative training model reduced fiscal costs in the North, increased returns to government from mining through the savings in welfare. Taking into account only income taxes, it suggests that the government saves \$938 per person each month courtesy of the MPTP as Table 12 illustrates.

Table 12. Fiscal returns to government from the MPTP.

| Net gain to the government for every month that a student works | | | |
|--|-------------------------|-----------------------|-----------------------------|
| | Welfare cost | Income taxes | Total benefit/person |
| Provincial government | \$667 | \$113 | \$779 |
| Federal government | \$667 | \$158 | \$825 |
| Total government | \$667 | \$271 | \$938 |
| Net after tax government payback period | | | |
| | MPTP cost/person | Benefit/person | Net payback period |
| Provincial government | \$3 862 | \$779 per month | 5.0 months |
| Federal government | \$3 585 | \$825 per month | 4.3 months |
| Total government | \$7 447 | \$938 per month | 7.9 months |

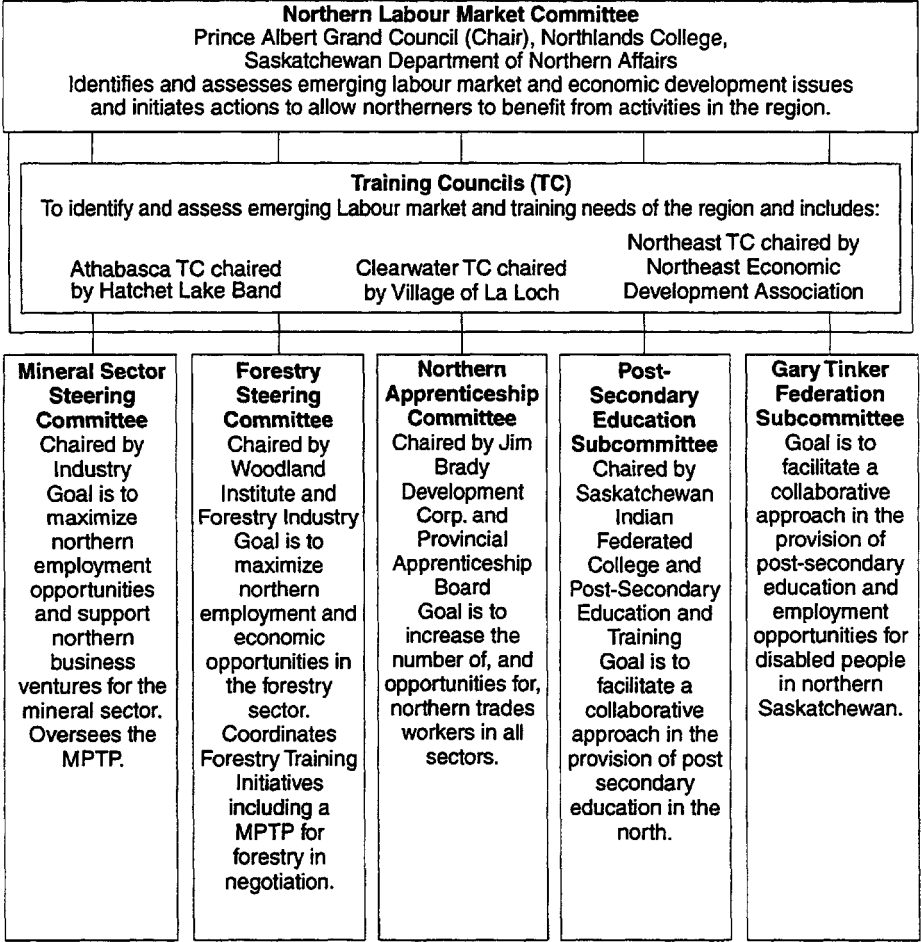
Source: Painter, M and Lendsay, K, Summative Evaluation of the Multi-Party Training Plan 1993–1998, Business Advisory Services, College of Commerce, University of Saskatchewan, Saskatoon, 1998.

Public and private planning frameworks

The HRDAs and both MPTP I and II are undertaken in a human resource planning framework that developed over the years around the Northern Labour Market Committee (NLMC). The committee identifies and assesses emerging labour-market and economic-development issues and takes actions that enable northerners to benefit from activities in their region. The committee is chaired by the Prince Albert Grand Council of Status Indians and includes the Northlands College and the Provincial Department of Northern Affairs. As shown by Figure 14, the structure of the NLMC has evolved over the years to address industry, regional groups and communities and other groups.

For the most part, the labour-market planning infrastructure developed around the uranium mines as the leading industry in the North. Approaches used in mining were applied to other sectors, and now a forest industry multi-party training program is being developed. Discussions have also been held on other areas of long-term growth opportunity, including tourism. This labour market planning process is founded in both sectors and communities and the training councils are grounded in the local needs of specific communities and Indian Bands.

Figure 14. Northern labour market committee and subcommittees.



Source: Saskatchewan Department of Post Secondary Education and Training.

Uranium mining industry effects on regional and community development

In the 1990s uranium mining in northern Saskatchewan was undertaken by a number of Canadian and international mining companies. The largest of these was Cameco Corporation with mines, resources, employment and supplying companies throughout the North. Cameco accounts for a little over half of uranium mining activity (employment, procurement, and capital investment) in northern Saskatchewan. Throughout the decade, most mining companies adopted corporate procedures and practices to both meet the evolving regulatory framework and to incorporate the approaches into day-to-day corporate operations.

Cameco Corporation

Cameco is the world's largest uranium mining company, with a head office in Saskatoon, Saskatchewan. The majority of its uranium production is undertaken in northern Saskatchewan where the company and its joint venture partners have reserves and operations at Key Lake, Rabbit Lake, McArthur River and Cigar Lake (see Table 13). The company also has

Table 13. Cameco Northern Saskatchewan uranium reserves and resources.

| Reserves | Mining method** | Tonnes (thousands) | Grade (% U₃O₈) | Total (millions lbs (% U₃O₈)) |
|---|------------------------|---------------------------|---|--|
| Proven | | | | |
| Cigar Lake* | UG | 345 | 22.51 | 171.2 |
| Key Lake* | OP | 221 | 0.46 | 2.2 |
| McArthur River* | UG | 505 | 22.51 | 246.5 |
| Rabbit Lake | OP/UG | 908 | 1.33 | 26.7 |
| Total | | 1 979 | | 446.6 |
| Probable and possible | | | | |
| Cigar Lake* | UG | 801 | 9.08 | 160.0 |
| McArthur River* | UG | 163 | 2.42 | 8.7 |
| Rabbit Lake | UG | 174 | 0.85 | 3.3 |
| Total | | 1 138 | | 172 |
| Total reserves | | 3 478 | | 654.4 |
| Resources (indicated and inferred) | | | | |
| Dawn Lake* | OP/UG | 601 | 1.69 | 22.3 |
| McArthur River* | UG | 859 | 12.02 | 227.8 |
| Rabbit Lake | UG | 57 | 1.20 | 1.5 |
| Total resources | | 1 517 | | 251.6 |

Notes: * Joint ownership with other mining companies

** UG = underground mining; OP = open pit mining

Source: Cameco Corporation, Annual Report, Saskatoon, 1998, p.20

further northern Saskatchewan uranium resources at McArthur River, Dawn and Rabbit lakes. In addition, Cameco produces a small amount of uranium in the USA and has gold properties in northern Saskatchewan and Kyrgyzstan.

Corporate philosophy and corporate practice

Cameco Corporation has a corporate philosophy that stresses its community and environmental responsibilities. President Bernard Michel has been committed to earning the support of the communities with which the company interacts. "Cameco's policy is to maximize the employment of local people and the benefits flowing to communities nearest its operations, particularly when such operations are located in remote regions." (Cameco Corporation, Annual Report 1996, Saskatoon, p. 25.)

The corporate statement of values notes: "Cameco seeks to earn the respect of all people with whom it interacts. We inspire trust based on honest, fair and ethical behaviour. Cameco's operations provide a safe human and physical environment. We are committed to exemplary practices that promote the health of employees, safeguard the environment and allow us to return the sites of our operations to their natural conditions."⁶³

Jamie McIntyre, Cameco Manager of Human Resources, has explained some of the benefits for the company of increased local, native and community involvement in their operations stating:

We gained legal compliance — we are meeting our obligations as set out in our surface lease agreements. We gained some high moral ground — we are extending opportunities to the people and communities most impacted by our operations. We gained an extremely valuable relationship with a very important constituent group of people. We also gained a close working relationship with government — we have been able to demonstrate to governments at all levels that cooperation is the key. And finally, we have gained a very important strategic advantage in what is a highly competitive global business — we are now using our experiences with aboriginal people in northern Saskatchewan to secure development opportunities in other parts of the world. ...This proved to be a key in Cameco's negotiations with the central Asian republic of Kyrgyzstan. As a result of these negotiations and the partnership that resulted, Cameco secured the

⁶³ Extract from Cameco Values Statement, Human Resources Department, Cameco, Saskatoon, December 1999, p.1.

*right to development of the Kumtor gold project. This project is one of the world's largest gold mines and we have implemented many of the same employment and business development strategies there, as we have in northern Saskatchewan. This project employs 1 300 people, of which 1 150 are Kyrgyz nationals.*⁶⁴

On average, Cameco spent about C \$100 million each year on various aspects of uranium mining development through the 1990s. In the later years of the decade, the spending exceeded C \$200 million. The company was operating, evaluating, and decommissioning projects at Cigar Lake, Midwest, Key Lake, Rabbit Lake and McArthur River, mainly in the northwest of the province. (See Map 2). Cameco worked directly with over twenty small communities and Indian bands located in three broad areas:

- the northwest, such as Fond du Lac and Stony Rapids;
- the west side, such as La Loche, Pine House, Île à la Crosse; and
- the east-central side, from Southend through La Ronge to Cumberland House.

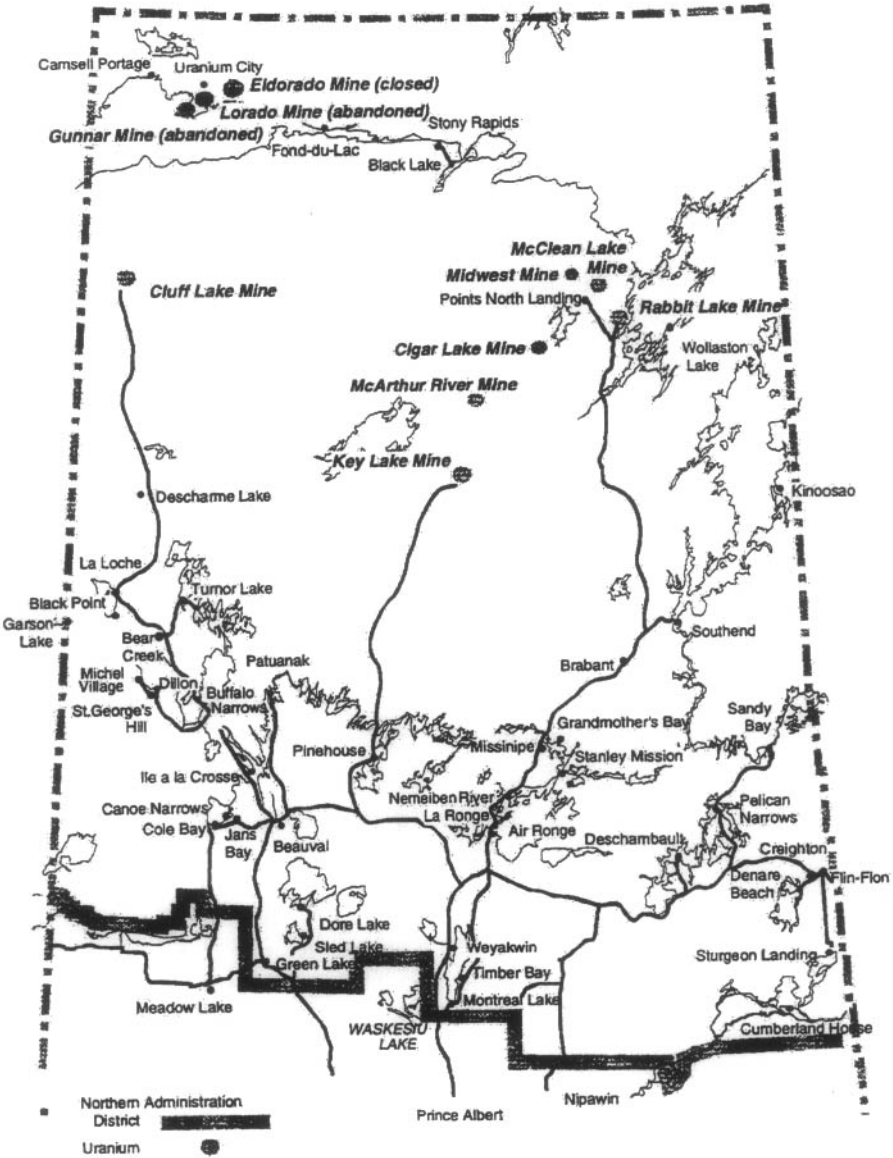
At present rates of extraction for Cameco's approved projects, production will last for more than thirty years. This will include more than eighty years of continuous uranium mining exploration, development, operations and decommissioning activity in northern Saskatchewan. Corporate connections with communities in the form of employment, training, procurement, community development, plus leadership and philanthropy made uranium players central to the social, economic, corporate, and community development of the region. The scope of the mining industry's involvement in the regional and community development of the North can best be understood through the details of specific uranium industry experiences in the mining company's commercial as well as developmental relationships with northern communities.

Cameco's employment performance

Cameco is a leader in employment planning and development in northern Saskatchewan. Its corporate employment statistics demonstrate an increasing level of northern and aboriginal employment at all stages of its operations. Through the 1990s the company directly employed over 6 000 person years in its northern mine and administrative operations. Northern employees, most of whom are native, account for over 40 percent of total mining employment

⁶⁴ McIntyre, J., Presentation to the Saskatchewan Human Resources Association Symposium, Saskatoon, 1998, p.5.

Map 2. Cameco Uranium Mine activities and northern communities, Northern Saskatchewan, 1990s.



Source: Post Secondary Education and Skills Training, La Ronge, 2 March 1988.

in most years of the decade and approached half in 1996. As shown in Table 14, 85 percent of Cameco's northern employees were of native ancestry.

The corporate commitment to northern and native employment is not limited to the North. Chief Harry Cook of the Lac La Ronge Indian Band sits on Cameco's Board of Directors in Saskatoon. Analysis of corporate employment records show that 4 percent of corporate staff in 1999 were of

native and/or northern origin, up from 0 percent in 1991. Overall nearly one fifth of Cameco's total corporate employment in December 1999 was of northern or native ancestry.

Table 14. Cameco employment in Northern Saskatchewan
1991 and 1998, by northern and native ancestry.

| Year | Cameco employment | | | % distribution | | |
|-------------|-----------------------|------------------------------------|---------------------------|---|--|--|
| | Total number employed | Residents of Northern Saskatchewan | Northern native employees | Northern employees as % of total employed | Northern native employees as % of total employed | Northern native employees as % of northerners employed |
| 1991 | 607 | 237 | 204 | 39% | 34% | 86% |
| 1999 | 585 | 256 | 224 | 44% | 38% | 88% |
| Total 91-99 | 6 064 | 2 728 | 2 314 | 45% | 38% | 85% |

Source: Cameco, Special Tabulation, December 2000.

The extent of community involvement by Cameco results from sustained training and retraining programs undertaken as part of the MPTP as well as inside the company. Northern and native employees of Cameco's northern mines are today represented in all skill levels. Relatively few — less than 10 percent — were employed in the lesser skilled support areas. Highly skilled trade and technical positions accounted for 36 percent and 33 percent of northern and native employment respectively. These levels of native participation approached the company average of 47 percent. A small number of both northern and native employees (6 percent and 3 percent respectively) had advanced to supervisory positions. This high level of native involvement, particularly in the higher paying skilled and supervisory groups, has been important in changing native attitudes towards the benefits of uranium mining activity. It has also been the result of the training programs that have been sustained over the decade.

The community origins of uranium mine employment

With the development of fly-in commuting for mine workers, pick-up points were established in local communities across northern Saskatchewan. This transformed the geographic origins of mine workers.

Fly-in commuting works on the basis of a seven-day in, seven-day out rotation involving live-in shifts at the mine site and a one week return to the community. Commuting retained the traditional community pattern of northern Saskatchewan, rather than forcing northerners to move to a new mining town near the mine site for employment, or to introduce a competitive new urban centre into the region. Wage income in mine employment reverts to the community when mine workers return home.

Leadership skills developed in employment — particularly in the higher employment and supervisory occupations — direct have application in the local communities in the form of local government, economic development, and improvement of infrastructure and services.

Between 1981 and 1991, northern resident (NR) employment growth concentrated in major northern centres of La Ronge and Air Ronge, where mine employment grew by 46 persons. There was little NR mine employment growth in most smaller, remote northern communities. Most mine employment growth between 1981 and 1991 came from southern communities outside the North that accounted for 58 percent of the employment growth as an increasing number of northerners migrated south. (Table 15.)

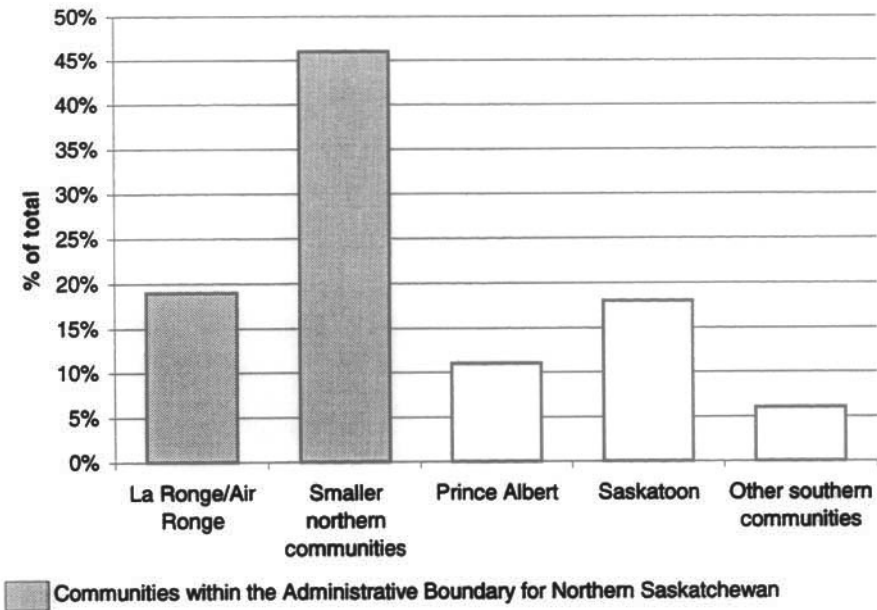
Table 15. Northern commuting mine employment by origin 1981, 1991, and 1999.

| Origin of Northern Region employees | Year (number) | | | Absolute increase (number) | | Share of growth | |
|---|---------------|------------|------------|-------------------------------|------------|-----------------|-------------|
| | 1981 | 1991 | 1999 | 91/81 | 99/91 | 91/81 | 99/91 |
| La Ronge/Air Ronge | 5 | 51 | 97 | 46 | 46 | 40% | 18% |
| Smaller northern communities | 172 | 174 | 322 | 2 | 148 | 2% | 56% |
| Total North | 177 | 225 | 419 | 48 | 194 | 42% | 74% |
| Total South | 45 | 111 | 181 | 66 | 70 | 58% | 26% |
| Total | 222 | 336 | 600 | 114 | 264 | 100% | 100% |

Source: Derived from *Employment Statistics*, Saskatchewan Post-Secondary Education and Skills Training, La Ronge, 2000.

NR employment supply from the smaller northern communities increased dramatically through the 1990s with the expansion in the number of new uranium mines, the private-sector handling all mining employment, and after the effects of fly-in commuting, education and training took hold. Between 1999 and 1991 three-quarters of NR mine employment growth originated from the North, over half of the growth in northern mine employment came from the smaller northern communities, and southern locations accounted for only a quarter of the employment growth.

In the 1990s, over 46 percent of Cameco's northern mine employment lived in smaller, often remote communities accessed through the fly-in weekly rotations. As Figure 15 illustrates, another 19 percent lived in the largest northern centres of La Ronge and Air Ronge.

Figure 15. Geographic origins of Cameco's northern employees 1991–1999.

Source: Cameco Corporation, Special Tabulation, 2000.

Uranium mine procurement

Involvement in mine procurement is as important as direct mine employment. Environmental Impact (EI) submissions for Cigar Lake show that spending on the purchase of goods and services in northern Saskatchewan exceeds the direct salaries paid by the joint venture to its northern employees (Table 16). A large share of the contractor services is in the form of wages and salaries for contractor employees.

Between 1992 and 1998 the Northern Saskatchewan mining industry had over 12 000 person years of employment, an average of 1 760 person years each year. Of this annual total, 654 or 37 percent were directly employed by contractors. Most of the Northern employment created at both mines and through contractor activity was native. As shown in Table 17, employment grew through the decade, as did the share of northern and native contractor business, reaching 45 percent for the North in 1998. Native employment accounted for over 80 percent of the Northern employment by 1998.

Table 16. Direct economic benefits of Cigar Lake Project in 1995 C \$.^a

| Item | Person years of work | | Salaries paid (b) | | Purchase of goods and services (b) | |
|-----------------------|----------------------|-------|-------------------|---------|------------------------------------|---------|
| | Total | North | Total | North | Total | North |
| Test phase | 565 | 193 | \$30.0M | \$7.1M | \$107.7M | \$8.9M |
| Approval phase | 74 | 23 | \$3.4M | \$0.8M | \$15.7M | \$2.0M |
| Construction phase | | | | | | |
| Mine and mill site | 770 | 302 | \$57.7M | \$18.1M | \$193.8M | \$14.9M |
| Road (c) | 30 | 18 | \$1.8M | \$1.1M | \$2.1M | \$2.1M |
| Production phase | | | | | | |
| Mine and mill site | 11 050 | 6 133 | \$541.8M | \$247.M | (d) | (d) |
| Decommissioning phase | | | | | | |
| Mine and mill site | 85 | 43 | \$3.9M | \$1.9M | \$2.0M | \$0.6M |
| Total | 12 665 | 6 712 | \$638.6M | \$276.4 | (d) | (d) |

Notes:

a) In this table, Northern Saskatchewan businesses are projected to supply from 15% to 20% of total goods & services purchased during production.

b) Expenditures beyond 1995 in 1995 C \$. Salary figures are inclusive of wages, benefits, and associated payroll burden.

c) Upgrade of temporary access road from Cigar Lake to Provincial Road 905.

c) Commercially confidential.

Source: Cameco Corporation, Cigar Lake Environmental Impact Statement, 1995. Table 19.5.6.1

Historically, supply of goods and services to mines in northern Saskatchewan was undertaken by national and international companies who came into the region with their own, usually non-resident, employees, undertook the contract and left. This left little benefit for the region or its communities which instead saw many benefits from mining activities transferred away from the North to other regions.

In the 1990s, Saskatchewan's mining companies increased the number of northern suppliers, using (often Indian-owned) local companies, joint ventures, and preferential procurement policies. Public meetings were held across the North in advance of projects to explain the kinds of goods and

Table 17. Average annual direct mine and contractor mine employment, annual average for 1992/98 and 1998.

| Employment group | Annual average 1992–1998 | | | 1998 | | |
|--------------------------|--------------------------|----------------|-----------------|-------|----------------|-----------------|
| | Total | Northern total | Northern native | Total | Northern total | Northern native |
| Direct mine | 1 106 | 524 | 432 | 1 254 | 600 | 498 |
| Contractor | 654 | 307 | 267 | 937 | 484 | 421 |
| Total | 1 760 | 831 | 69 | 2 194 | 1 084 | 919 |
| Contractor as % of total | 37% | 37% | 38% | 43% | 45% | 46% |

Source: Saskatchewan Post-Secondary Education and Skills Training, Mine Employment Statistics. La Ronge, 2000.

services required in the development of mines, their operations and decommissioning. Cameco, Cogema and other companies published documents to explain how individuals, companies and communities could do business with them (Cameco Corporation 1999). The results of these efforts were seen in the growth of northern and native employment for the supplier industry that grew by 293 percent between 1992 and 1998 compared to the 151 percent increase in direct mine employment (Table 18). The fast growth reflected the large number of business ventures created by Indian Bands, capturing many of the benefits of the Northern mining activity and commercially practicing revenue sharing.

Table 18. Northern mine and mine procurement employment by total, northern native and non-native employment groups, 1992–1998.

| Year | Direct northern mine employment | | | | Northern mine contractor procurement employment | | | |
|--------------------|---------------------------------|----------------|-----------------|-------|---|----------------|-----------------|-------|
| | Total | Northern total | Northern native | Other | Total | Northern total | Northern native | Other |
| 1992 | 832 | 364 | 296 | 468 | 439 | 165 | 152 | 274 |
| Total 1998–1992 | 7 740 | 3 670 | 3 022 | 4 070 | 4 580 | 2 147 | 1 866 | 2 433 |
| 1998–1992 average | 1 106 | 524 | 432 | 581 | 654 | 307 | 267 | 348 |
| % change 1992–1998 | 151% | 165% | 168% | 140% | 213% | 293% | 277% | 165% |

Source: Saskatchewan Post-Secondary Education and Skills Training, Mine Employment Statistics. La Ronge, 2000.

The importance of northern and native procurement extends well beyond the direct employment effects. These days, the procurement companies are capturing a significant portion of the economic activity accruing from the mines. This spending and its effects can be understood from its application to the construction phase of the McArthur River joint venture between Cameco, Uranerz, and Cogema mining companies. Between 1997–1999, \$363.7 million was spent on the project and 326 person years of employment were created for construction contractors for the project (see Table 19).

During the environmental review and hearings on the McArthur River Project, the joint-venture companies committed to a high level of northern participation for the construction phase of the work. The project was expected to achieve a 35 percent level of northern business participation and 40 percent northern employment. In practice, the project exceeded these targets by over 50 percent. In 1998, Cameco made over C \$117 million of contractor awards, which employed more than 400 people and used 26 Indian owned companies.

Table 19. Business procurement expenditures and employment construction contractors, McArthur River Joint Venture, 1997–1999.

| Year | Procurement expenditures | | | Construction employment | | |
|---|--------------------------|-----------------------|------------------|-------------------------------|----------------------------------|------------------|
| | Total (\$M) | Northern supply (\$M) | North as % total | Total average annual (number) | Average annual northern (number) | North as % total |
| 1997 | 84.5 | 31 | 37 | 365 | 233 | 64 |
| 1998 | 145.7 | 74 | 51 | 290 | 171 | 59 |
| 1999 | 133.5 | 87 | 65 | 322 | 193 | 60 |
| 3-year total | 363.7 | 192 | 53 | 326 | 199 | 61 |
| EIS review target | | | 35% | | | 40% |
| % difference performance against target | | | 51% | | | 53% |

Source: Cameco Corporation, Special Tabulation, Saskatoon, 2000.

Table 20 is an illustrative list of suppliers to Cameco's northern operations showing the share that northern and native employment holds of their total employment. For the most part, these are companies that have been created or bought by Indian organizations over the past decade. They address almost all aspects of mine supply and development activities from servicing mining camps, food supply, transportation, maintenance, and repair.

Table 20. Characteristics of companies undertaking northern procurement activity with Cameco, December 1998.

| Contractor | Ownership | Employment distribution | |
|-----------------------------|-------------------------------|-------------------------|----------|
| | | % northern | % native |
| Regular contractors | | | |
| Athabasca Catering | Indian | 81% | 72% |
| Mudjatik Thiessen | Indian/community/southern JV* | 43% | 36% |
| Prince Albert Grand Council | Indian | 33% | 83% |
| Snake Lake Construction | Indian | 88% | 88% |
| Indirect contractors | | | |
| Northern Resource Trucking | Indian | 47% | 35% |
| C. Gibson Holdings | Northern | 100% | 0% |
| Athabaska Airways | Southern | 14% | 8% |
| AirSask | Northern | 14% | 3% |
| Job-specific contractors | | | |
| Tron Power | Indian | 50% | 46% |
| Points North | Northern | 23% | 23% |
| Snake Lake Construction | Indian | 54% | 54% |
| Snake Lake Contracting | Indian | 80% | 60% |
| Snake Lake Ventures | Indian | 26% | 22% |
| English River | Indian | 33% | 33% |

*JV = Joint Venture

Source: Cameco Corporation Special Tabulation, Saskatoon, 2000.

Local northern companies did not emerge as suppliers for Cameco overnight. The company had to work at ensuring that the goods and services purchased met the quality required to meet the corporate and regulatory standards. At times this was frustrating for both the contractor and the company. Problems of cost, quality, and timing were frequently encountered during the start-up periods. With time, cooperative management, and patience, a new northern supply chain has been created that uses many local northern companies to supply the northern mining industry.

Since the beginning of the 1990s when Cameco and other mining companies made their interest in northern and native suppliers public, there have been two additional developments. Existing southern suppliers have increased their share of northern and native employment, and southern suppliers have increasingly looked towards joint ventures in undertaking their northern work. Powerful financial incentives through the private sector have developed, to increase the level of northern, community, and native development associated with the uranium mines. The growth and diversification of the Lac La Ronge Indian Band illustrates the scope of these activities.

Lac La Ronge Indian Band and the Kitsaki Development Corporation (KDC)

In 1981 the Lac La Ronge Indian Band created KDC to create local jobs, income and opportunities for existing and future members of the band. In the words of Otuyumow, the official KDC newsletter, *"In the late 1970s, the bands Chief and Council were beginning to recognize that economic development was a concern they needed to address. They noticed that unless the band was involved in a project, band members seldom got jobs."* (Otuyumow 1996, p.1)

In its first fifteen years of business, KDC has evolved from a small supplier of crushed aggregate to a diversified holding company with operations in many sectors, which also conducts joint ventures with the leaders of the Canadian industrial establishment. Today, KDC employs over 500 people, mostly Indians, who are involved in catering, professional and financial services, hotels, transportation, forest products, and infrastructure (Table 21). The corporation provided \$50 million of procurement goods and services in 1999.

Table 21. Employment and business activities, Kitsaki Development Corporation, January 2000.

| Name of business | Type of business | Employees by category | | | |
|-------------------------------|-----------------------|-----------------------------|-------------------|--------------|--------------|
| | | Lac La Ronge Indian Band | Aboriginal (1) | Other | Total |
| Athabasca Catering | Service | 46 | 111 | 124 | 235 |
| Canada Northern Environmental | Professional services | 0 | 0 | 0.5 | 0.5 |
| Dakota Winds Kitsaki | Gas | 2 | 9 | 15 | 24 |
| First Nations Insurance | Financial services | 0 | 5 | 1 | 6 |
| Kitsaki Management | Management | 10 | 10 | 1 | 11 |
| Kitsaki Meats | Food | 3 | 6 | 6 | 12 |
| Keewatin/Procon | Mining/pipeline | 0 | 0 | 0 | 0 |
| La Ronge Industries | Wild rice | 2 | 2 | 0 | 2 |
| La Ronge Motor Hotel | Service | 29 | 49 | 27 | 76 |
| Northern Resource Trucking | Transport | 14 | 45 | 60 | 105 |
| PANS Joint Venture | Professional services | 1 | 1 | 1 | 2 |
| Wapawekka Lumber | Forest products | 6 | 31 | 15 | 46 |
| Woodland Cree Resources Inc. | Forest products | 1 | 9 | 1 | 10 |
| Total | | 114 | 280 | 251.5 | 529.5 |

Notes: (1) Includes Lac La Ronge Band. (2) PANS is an acronym for Pinkan Askiy/Nih-Soreldhen based on the Cree/Denesuline language and meaning "clean earth."

Source: Kitsaki Development Corporation, La Ronge, January 12, 2000.

KDC has developed an increasingly sophisticated capacity so as to participate in a much wider variety of mining ventures. Shaft sinking and construction, mine fuel and materials supply, environmental analysis and management, are all evolving into the business mix of the company.

The professional skills, capital accumulation and management developed in mining have now been applied to other sectors of the Northern economy. These include tourism with the purchase of the La Ronge Motor Hotel, forestry with Woodland Cree Resources Inc. and Wapawekka Lumber, foods with Kitsaki Meats and La Ronge Industries, and financial services. These are interests that extend well beyond mining, which are developing a basis of sustainable activity beyond the extractive mining industry. KDC has, therefore, developed both financial and leadership skills that earned the company several Canadian and Provincial Awards of Business Excellence.

KDC is not the only example of native and northern development in northern Saskatchewan. The English River Band took a similar leadership role with the creation and development of Tron Power. Rene Rediron built Snake River Contracting from a small contracting venture based in Pinehouse, whose population in 1991 was 820.

Uranium companies played important roles in the development of native enterprise by entering into early and constructive discussions so as to

secure their future supply needs locally. Contract tenders were developed for skill sets and amounts that were achievable for northern companies in their early years. Lengthy planning and training procedures were put in place to ensure quality control at start-up, and financial guarantees were offered.

Community- and native-based joint-venture initiatives

Joint ventures between northern community, native, and private-sector companies — often from outside the region — have been important commercial vehicles allowing for native and community organizations to increase their share of the benefits from mining. These have involved regional groupings of communities, individual Indian bands such as the Lac La Ronge or English River Bands that comprise Kitsaki Meats and Tron Power, or individual communities.

Initial joint ventures focused on construction and service requirements of the mines. One of the first ventures was Northern Resource Trucking, a joint venture between Trimac (a major international trucking company based in Calgary) and the La Ronge Indian Band. This evolved into a regional venture with other northern bands as partners, and now achieves annual revenues of \$13 million.

Later joint ventures included sophisticated engineering such as shaft construction and environmental services. The PANS⁶⁵ joint venture is one recent example between three community based organizations, the Athabasca Economic Development and Training Corporation, Keewatin/Procon Joint Venture, and Canada North Environmental Services Ltd., plus one environmental and engineering company from the south, Clifton Associates Ltd.

Community development

Private mining company commitments to their northern operating environment extended well beyond the workplace into communities. Through programs of targeted donations, infrastructure support, economic development, consultations, and impact management, the mining companies advanced regional socioeconomic policy in the North. Corporate donations towards communities focused on strengthening the educational infrastructure and low skill levels in many of the Northern communities. Related awards and scholarships encourage positive role models for the youth of the region. Corporations have addressed drug and alcohol prevention in the North. In

⁶⁵ PANS is an acronym for Pihkan Askiy/Nih-Soreldhen based on the Cree/Denesuline language and meaning “*clean earth*.”

total, donations for Cameco alone amounted to nearly one million dollars between 1 July 1998 and 30 June 1999.

By the 1991 Canadian Census, the population of northern Saskatchewan had not met provincial levels of education, but in the course of a relatively few years during which uranium mine development occurred, northern educational standards approached the provincial average (see Table 22).

Table 22. Retention rates, provincial northern schools;
% of students by grade level completed, 1971, 1995.

| Year | Grades 1 & 2 | Grades 4, 5 & 6 | Grades 7, 8 & 9 | Grades 10, 11 & 12 |
|----------|--------------|-----------------|-----------------|--------------------|
| 1971 | 47 | 27 | 12 | 1 |
| 1995 | 32 | 25 | 23 | 16 |
| % change | -32% | -7% | 92% | 1 500% |

Source: Northern Lights School Division, Special tabulation for author. La Ronge, 2000.

Northern education had clearly made major improvements. By the start of the 1990s, northern education levels approached provincial averages in several areas. In particular, levels for the trades, grades 9 through 12, and some post-secondary training all rose and are now closely associated with the training and educational requirements of the mining companies and the activities of the Multi Party Training Plans between governments, the mining industry, Indian bands, and community organizations. (Table 23)

Table 23. Educational levels in Saskatchewan and the North, 1991 by % of all students.

| Education level completed | Northern Saskatchewan | Province of Saskatchewan | North as % of Saskatchewan |
|---------------------------|-----------------------|--------------------------|----------------------------|
| Less than grade 9 | 36 | 16 | 125% |
| Grade 9–12 | 30 | 41 | -27% |
| Trades | 4 | 3 | 33% |
| Some post secondary | 26 | 31 | -16% |
| University degree | 4 | 9 | -56% |
| Total | 100 | 100 | |

Source: Population Census of Canada, Statistics Canada, 1991 and Aboriginal Census of Canada, 1996.

Community consultations

Saskatchewan's environmental assessment process required mining companies to actively participate in community consultation regarding both their proposals for development and their ongoing operations. Northern communities are active in the review process and are the source of a significant share of the Northern mining industry's regional labour supply. Therefore, uranium companies have a real interest in understanding, participating in, and nurturing community relations. Over time, communities

Table 24. Summary of major public concerns identified in connection with the Cigar Lake uranium mine proposals.

| Environmental concerns | Social and economic concerns |
|--|---|
| <p>Project impacts on resources that are important to northern communities, including:</p> <ul style="list-style-type: none"> • Water • Soil • Fish that are harvested • Animals that are trapped • Animals and birds that are hunted • Plants that animals eat • Plants that people use • Direct human health and safety <p>Anxiety and stress about risk uncertainty and possible harmful impacts on the above components. Call for more recognition of this concern.</p> <p>Comments about a need for commitments to deal with risk uncertainties about harmful impacts, including:</p> <ul style="list-style-type: none"> • Public information on risks • Monitoring of risks • Mitigation/compensation if risks result <p>Questions about the role of the companies, the communities and the governments</p> | <p>Project impacts on social, economic, and cultural components of northern communities including:</p> <ul style="list-style-type: none"> • Employment • Education and training • Local business • Roads and infrastructure • Aboriginal culture and lifestyle • Community cohesion • Aboriginal rights • Family stability <p>Mine jobs are sought. However, concerns about adverse impacts on Aboriginal families and communities that may result from mine employment continue.</p> <p>Comments about the need for benefits to Aboriginal communities beyond the provision of employment including:</p> <ul style="list-style-type: none"> • Options to enhance economic impacts • Support for community health activities • Issues related to Aboriginal rights <p>Questions about the role of the companies, the communities and the governments</p> |

Source: Cigar Lake Mining Corporation, Cigar Lake Environmental Impact Statement, Socioeconomic Assessment, supporting document No. 8, Appendix A, p.11.

have recognized that mining corporations can often be more effective in rapidly addressing community issues and problems than can government.

Community consultations are rarely confined to narrow technical issues or the environmental concerns of residents. Table 24 summarizes the results of community consultations held in 1993 and 1995 in connection with the Cigar Lake Uranium Mine Development Proposal by the Cigar Lake Mining Corporation. Clearly, there are as many socioeconomic issues raised as environmental ones, even for the highly environmentally and health-sensitive uranium developments.

Athabasca Region: mining company impact management agreement (IMA)

In June 1999, the Cameco Corporation, Cigar Lake Mining Corporations, and COGEMA entered into an Impact Management Agreement (IMA) with the communities of the Athabasca Region in the far north of the province. The IMA is a community-company agreement, which addresses many of the communication, environmental, social, and economic issues raised by

Table 25. Benefit sharing initiatives, in the Athabasca Community Impact Management Agreement.

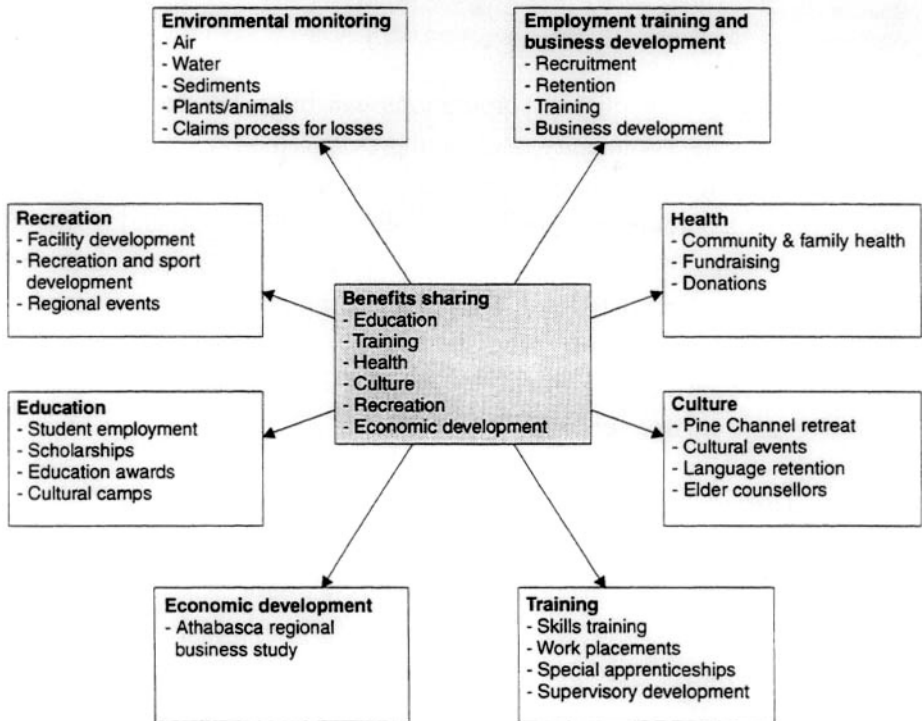
| Benefit sharing area | Item | Benefit sharing area | Item |
|----------------------|---|----------------------|---|
| Education | Student employment Scholarships Education awards Cultural camps | Culture | Pine Channel retreat Cultural events Language retention Elder counselors |
| Training | Skills training Work placements Special apprenticeships Supervisory development | Recreation | Facility development Recreation and sport development Regional sporting and recreational events |
| Health | Community and family health Fundraising for the new Stony Rapids health care facility Donations to the new Stony Rapids health care facility | Economic Development | Athabasca regional business study |

Source: Cameco-Communities Impact Management Agreement, June 11, 1999, Part IV.

communities during the hearings. Initiatives that the IMA support are shown in Table 25 and Figure 16.

The IMA does not involve government but has been structured

Figure 16. Athabasca Region Communities Impact Management Agreement.



Source: Cameco-Communities, 1999.

between the community and the mining companies to address compensation in the event of losses caused by emissions from the projects, employment, training and business development opportunities, and benefit sharing.

Benefit sharing — or the lack of it — has been a traditional northern grievance that provincial governments have failed to directly address. On the other hand, mining companies have adopted a direct approach toward this issue. Companies have supported communities in developing skills and resources so that the North can benefit from mining. Benefit sharing is, therefore, identified in the Athabasca Working Group, as summer students, post-secondary scholarships, Athabasca Awards from Mining companies, training, work placement, apprenticeship, supervisory development, donations, sponsorships, and junior achievement (Athabasca Working Group 2000). (Table 26). The IMA has moved mining companies well beyond any of the legal requirements in Saskatchewan for mine development or the related environmental, economic, or mineral regulations.

Table 26. Community development effects from uranium mine development in the Athabasca Region identified in the Athabasca Working Report Annual Report, 1999.

| Development area | Effects (\$ and/or comment) | Development area | Effects (\$ and/or comment) |
|---|--|----------------------------|-----------------------------------|
| Environmental monitoring | Community-based environmental monitoring | Benefits sharing | |
| Employment, training and business development | | Summer students | 2 students (\$6 500) |
| Employment | 208 permanent employees (122 direct mine employees; 86 contractor employees); \$10.4 million direct wages and benefits | Athabasca Education Awards | \$16 100 |
| | | On-site training | 31 students (estimated \$20 000+) |
| | | Work placement | 5 weeks (\$4 750) |
| | | Apprenticeships | 5 apprentices (\$89 000) |
| Training | 93 participants in the MPTP II; estimated at \$1.0M | Supervisory training | \$1 090 |
| | | Donations and sponsorships | 24 organizations (\$50 000) |
| Business development | Participating in 10 northern companies and/or joint ventures | Career symposium | 350 students (\$28 350) |
| | | Junior achievement | 12 schools (\$18 000) |

Source: Athabasca Working Group, Annual Report, 1999. Wollaston Lake, March, 2000.

Regional and community development

The provincial government framework

Cameco's uranium operations in northern Saskatchewan work within a larger government framework of northern regional development. The key agencies

are the northern offices of the provincial departments of Northern Affairs, Health, Education, Post Secondary Education and Training, Highways and Transport, Energy and Mines, Environment and Resource Management, Social Services, Executive Council, Municipal Affairs. The Department of Northern Affairs plays a central coordinating role between them all, and works with them to develop a strategic policy framework for the regional development of the area. The northern regional development program was funded in large part from uranium revenues into the Northern Development Fund (NDF) to provide core funding so that businesses can take advantage of increasing activity in the resource sector, led by uranium. The fund has spent about \$2.5 million each year offering loans for new business, assistance to primary producers, marketing finance, and grants for business and skills training.

The NDF also oversees provincial grants to Community-based Regional Economic Development Organizations (CREDOs), to assist communities in supporting local business development and job creation. Community development corporations are a local institutional structure for economic development supported and funded by the provincial government. In 1997/8, the provincial government provided some \$320 000 in core funding to assist CREDOs to become operational. Seven have been created in northern Saskatchewan.

Mining company regional development activities

Today's mining companies are active agents of regional and community development. As Table 27 shows, by 1999 Cameco had a comprehensive regional and community development program valued at approximately \$140 million. This is a true regional development program that incorporates many aspects of community development, including extensive consultation and planning, and the provision of improved health care, training, infrastructure, and economic development. It should not be confused with company programs for mineral development, research, or exploration.

Table 27. Regional and community development activities, Cameco Corporation in Northern Saskatchewan, 1999 unless stated otherwise.

| Program | Annual value |
|--|---|
| Procurement | Targets 35% total purchases |
| Northern business development | \$117M (1998) |
| Employment | |
| Northern and/or native employment | 44% of mining division wage bill @\$24M |
| Northern summer student program | \$521 192 (1998) |
| Capacity development | |
| Multi party training plan | \$1.2 M (1998-89) |
| Junior achievement — staying in school | \$0.02 M (1998) |
| Access to engineering and science | \$0.2M (\$1M over five years) |
| Northern scholarship program | \$28 776 |
| Athabasca education awards | \$10 000 |
| Cooperative education | \$285 920 |
| Community development | |
| Community planning initiatives | \$160 000 |
| Environmental quality committees | n.a. |
| Northern liaison committee | \$35 000 |
| School and community tours | \$24 768 |
| Corporate donations and sponsorships | \$25 000 |
| Health | \$20 900 |
| Total | \$143.55M |

Source: Cameco Corporation, special tabulation. Saskatoon, 2000.

While the strength of Cameco's program lies in its employment, wage income, and procurement activities, the company is also engaged in capacity building in communities, the school system, and in a wide range of community development activities. In addition, they make an equally important contribution by assisting in the development and start up of both northern community and Indian companies to provide goods and services to the mines.

Environmental quality committees (EQCs)

A central issue in uranium mine development has been an initial lack of trust between the three central parties involved in the process — the communities, companies, and governments. A steadily increasing level of community consultation and communication increased both the information flows and levels of trust between the parties.

The EQCs consist of trusted and knowledgeable northerners nominated by the community and are seen as a bridge, based upon the respect these individuals hold in their communities. The committees provide a forum for informed three-way communication between their communities, government,

and mining companies. The EQCs are composed of 29 active municipal and First Nation communities in northern Saskatchewan. Their activities include:

- reviewing EIS documents for the joint panel;
- reviewing SLAs and making recommendations for their improvements;
- making recommendations to the Northern Affairs Minister on uranium mine development proposals;
- making site visits to uranium mines;
- reviewing technical documents;
- attending provincial mine licence-renewal hearings;
- participating in technical seminars;
- working as technical assistants in monitoring activities;
- reporting back to their communities; and
- bringing community concerns forward to industry and government.

EQCs have evolved well beyond simple monitoring of environmental conditions. They have addressed an unrestricted range of community issues, including social and economic development problems. They provide a continuing program of technical education and information exchange to allow for direct participation by communities in the monitoring process throughout the life cycle of the mine, just as the Joint Panel (1979, p.39) had recommended: *"Because of the proximity of the mine site to northern communities, this involvement should extend beyond consultation, to participation."*

A comprehensive framework for mining development

The comprehensive framework for uranium mine development in Saskatchewan in the 1990s had six central elements:

1. communications and consultation;
2. environmental planning;
3. financial planning framework;
4. employment planning framework;
5. community and economic development framework; and
6. regulatory framework.

Achieving balance between these is perhaps as much of an art form as a science. In Saskatchewan it took several failed public policy experiments before it achieved its current levels of success. This balance will also be a moving target because the fundamental social and economic characteristics of the community change in such areas as:

- market conditions and the world price of uranium;

- education and skill levels of the population;
- community social infrastructure (health care, social services and recreational facilities);
- regional economic infrastructure (highways and airstrips);
- financial services (access to credit, banking, development funds and revenue sharing); and
- institutional conditions (Band organization, community development corporations, local government).

In northern Saskatchewan a stable, comprehensive planning and commercial framework, including the provisions of the SLAs, removed land issues as a barrier to development.

Communications, consultation and public opinion

Improvements to the consultation and communications process, coupled with the increasing economic and social benefits associated with the Northern mining activity, have resulted in major changes in the levels of public and community support for developments. Review of those positions held by the Bayda Commission in the 1970s showed that over 80 percent of northern Aboriginal men supported a moratorium on mine development (Harding 1986). Specific reasons identified at the time for not supporting the mines included views that government regulation could not control risks, technology could not prevent damage to the environment, and uranium projects would harm the Northern economy. In the ten years following the report, with the development of the mine and increased employment, opposition from Aboriginal men dropped by 50 percent. Since that time, as they achieved a larger share of the social and economic benefits from mining, First Nation bands and their companies became strong supporters of environmentally safe development of the uranium industry. In 1999, 80 percent of the northern population approved of uranium mining under the conditions set by the communities and governments.

Northern, native, and community support for northern development increased dramatically along with the growth in Indian and community business. Once the communities started to participate in the employment, income, and procurement benefits from the mines, they become more supportive of development. Key issues such as environmental protection, health, and safety of uranium mining had been addressed through both the consultative process and the improved regulatory framework. Matters of social and economic disparities were now being addressed directly through

both government and business action. Also, community and Band leadership roles and organization that had been developed for mining activities were then applied to other areas of social and economic activity in the communities. Under these conditions, it became much easier for northerners to support uranium mining development.

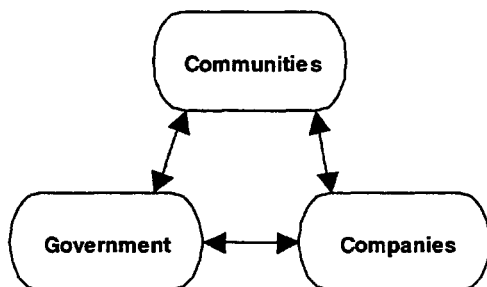
Environmental planning

The environmental planning set the foundation for high levels of community involvement in the uranium mining planning process. It identified the concerns of the Northern residents. Consultation established a set of community and local development issues extending well beyond the scope of the environmental legislation or the initial scope of mine regulation. Central were matters of social and economic development, as well as direct participation in the entire process of environmental monitoring. These have guided both the development of mines regulations and the regional and community development initiatives of the mining companies.

Financial planning

Fiscal and financial balancing between the three central partners in uranium development — governments, mining companies, and communities — is a delicate task of maintaining incentives for all three to sustain the process through both strong and weak uranium markets (see Figure 17). The three-way financial relationships between governments, mining companies and communities are continually changed by market conditions, the fiscal health of government, and the aspirations and capabilities of communities that want to participate in development.

Figure 17. Fiscal Balancing in Uranium Development.



For example, when royalty rates are too high and there is too little money left for communities or companies, there is less incentive to participate in local development. As well, mining companies' abilities to

retain funds for community development is reduced. When governments do not return sufficient resource rents to a region, then communities complain about obtaining their “fair” shares from the developments.

Employment planning

A comprehensive approach to employment planning goes well beyond the normal structures of the educational infrastructure. Employment training has benefited from the direct links to jobs created by having mining companies be part of the education and training planning process, in addition to actually delivering such training.

Traditional training programs in companies and government — including technical colleges — could not meet the challenges of the North. Basic education facilities and qualities of education in the North have been weak. Too few children remain in school. Those who do graduate too often do so without adequate skills. This reality demanded the introduction of education and training procedures for mine employment that extended from basic life skills, through technical education, to on-the-job training. The broad MPTP program is a cooperative and comprehensive planning approach that includes communities, Indian organizations, governments, and companies. It was only with this breadth of interest that an effective supply of mine employees could be developed — and met.

Traditionally, higher levels of education and technical training in northern Saskatchewan have been undertaken outside the region. Native schools, technical colleges, and universities were located in the south. This led to continuing problems associated with loss of community. Too many students never returned. Under MPTP, much of the training was offered in the North, very often in smaller communities. A major part of the training was undertaken inside the companies and at the mine sites. Another key factor in the success of the Northern programs has been the companies’ willingness to combine training with work in the form of summer students, on-the-job training, and job placements for program graduates.

Community economic development planning

Community development has been a central theme of community consultation on mine development since the very start of mining in northern Saskatchewan. Smaller northern communities did not want to see their traditional way of life threatened by environmental pollution, nor were they happy to remain with the status quo that continued severe social and

economic disparities. The solution to both issues seems to lie in the structured and sensitive participation in new developments either directly as mine employees after the introduction of fly-in commuting, or indirectly through procurement, or else by the provision of other services to the mines. These activities have moved millions of dollars directly into many of these smaller communities and transformed the economic base for the community.

One early uranium mining decision that provided the link between uranium mining and community development was the policy of fly-in commuting to replace single-industry towns. Some of the positive effects of fly-in commuting include:

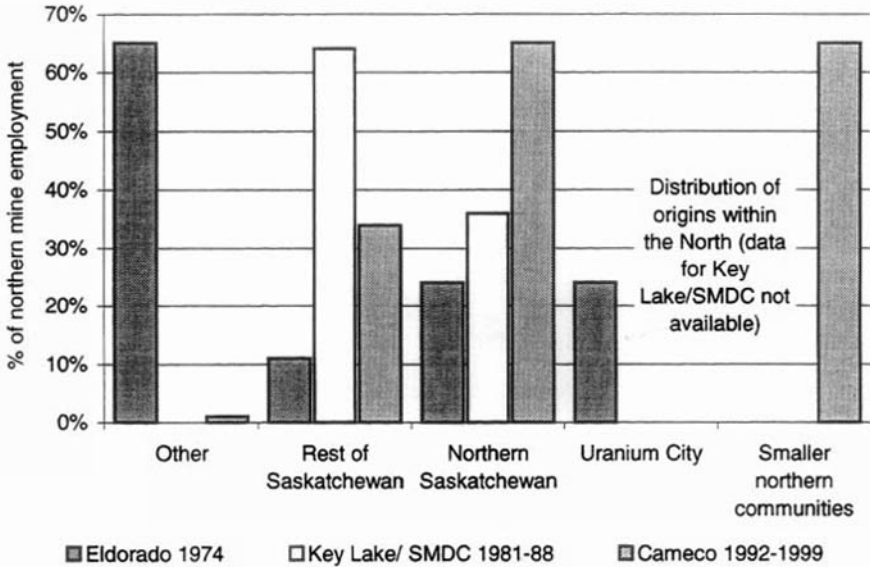
1. The existing community structure was strengthened and local resources were employed.
2. The threat of competition from single industry towns was removed, along with increased migration into the region and the overnight creation of large internal social and economic disparities within it. Social conflict between "rich southern miners" and "poor local folks" was removed.
3. Companies were required to develop positive relations with communities in order to secure and maintain their labour supply.
4. Communities were offered real income and employment benefits.
5. Skills from the organizational and planning experience gained in mine work were transferable to the demands from the community and other sectors of the economy.
6. Smaller communities obtained a new entrepreneurial class with the development of capital and through the establishment of local mine-procurement companies.
7. The substantial financial and human resources of large corporations were applied to the problems of smaller communities.

The private sector is now actively engaged in community development planning. Company discussions with communities have led to many economic and social development projects, not all of which are closely related to mining or required by regulation. These include health facilities, a native healing lodge, and a fish farm.

Regulation: public and private sector delivery

Public-sector delivery through a distant, federal crown corporation (Eldorado) never provided significant employment opportunities for the smaller northern communities. Yet after the mine closed in 1982, Uranium City became a small community (population 202 in 1996). Figure 18

Figure 18. Sources of employment from northern mining communities, Eldorado, 1974; Key Lake/SMDC 1981–1988; and Cameco 1992–1999.



Source: Cameco Corporation, special tabulations, Saskatoon, 2000.

compares the sources of workers for northern mine employment in northern Saskatchewan for Eldorado to 1981, Key Lake/SMDC during the 1980s, and Cameco in the 1990s.

Through the two previous periods of state delivery, only about one quarter of northern mine employees originated from the North. While all of Eldorado's workers lived in Uranium City and were defined as northerners, in practice most had migrated to the city from outside of the region. There was little impact on the smaller communities. Most workers at Key Lake/SMDC also originated from outside the North, particularly from Saskatoon and Prince Albert. By the 1990s, most employees (65 percent) originated from the North. Nineteen percent came from the largest centres of La Ronge/Air Ronge and 46 percent from smaller, often remote communities.

Private sector delivery led to much quicker responses to the public issues raised by mining development. The capital financing requirements of a new mine have led to early attention to many of the regional development, as well as social and economic disparity issues of the region. Private-sector training for opportunities in uranium far exceeded any of the public-sector efforts of either Eldorado or SMDC.

Mining and sustainable regional and community development

*After the mines are closed and shut down in the future, we the Dene people of Fond du Lac will still be here. In fact, all the communities will still be here.*⁶⁶

A continuing concern with mining investment is the extractive nature of the activity. Questions are raised whether the industry can be a continual and sustainable source of community and regional development. The uranium mining industry experience in northern Saskatchewan provides some insights into these questions.

Mining sustainability within the sector

On a regional basis, mining development is rarely limited to one mine within a region. When the regulatory framework is supportive, there is a continuity of mining to sustain northern Saskatchewan for a century. Mining development is more sustainable in a regional context when the end of one mine is replaced by the opening of another. It is not uncommon for several generations of a family to work in the mines. It is critical to consider mining from the perspective of both the individual mine and the regional mining prospect. The successes in Saskatchewan were a result of considering the long term regional opportunity.

In northern Saskatchewan, communities have developed their relationships with the mining companies over many years. It is this continuity that created the communication, trust and sustainable relationships from which improvements in education and working skills have been achieved. In many respects, the relationship with the mining companies has been more stable than community relations with government. This is because, once approved, the developments normally proceed over the thirty-year life of most mines. This contrasts to the more dramatic changes that have accompanied governments over the same period as a result of elections, fiscal priorities, or changing political priorities.

Sustainability can only be maintained with public and community support for the social and economic activities of a region. Initially this was not present for uranium mining. However by the 1990s the increased levels of native and community involvement in the sector have shifted public opinion to strongly support the new partnership in community development.

⁶⁶ Isadore, C., Transcript of McArthur River Public Hearing, La Ronge, Saskatchewan Environment and Resource Management, Regina, Saskatchewan. 1 October 1996, p.32.

Mining and sustainable regional development

Uranium mining in northern Saskatchewan developed many of the essential requirements for sustainable regional development. For instance, leadership skills develop from participation in mining; experience learned through mine employment or procurement business are being applied to other areas, including diversified business investments, municipal and band government, community economic development, and improved community infrastructure. The consultative, regulatory, training, and organizational lessons from the uranium development process have been applied to the forestry sector. A Forest Management Training Plan for the forest industry is now in development.

The prospect of being able to transfer those skills and capital developed in mining to other sectors of the community was enhanced in the 1970s and 1980s when it was decided that mining towns would not be created. Instead, mining infrastructure was built on the existing community structure. Fly-in commuting schedules and related work rotations allowed mining income and infrastructure to support the community base. Today, the scope of mining influence extends throughout the region into communities both large and small across the North.

Capital accumulation from profits generated from mining business is making its way into a more diversified northern economy, including tourism, transportation and service-industry investments, and community infrastructure for power, transportation, and health facilities.

Uranium mining companies have become catalysts for community and regional development in the North. It is apparent that the economic, social, human, and institutional capital that has been developed for uranium mining is now being used to open many new opportunities for both new and traditional ways of life in northern Saskatchewan.

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