



1998

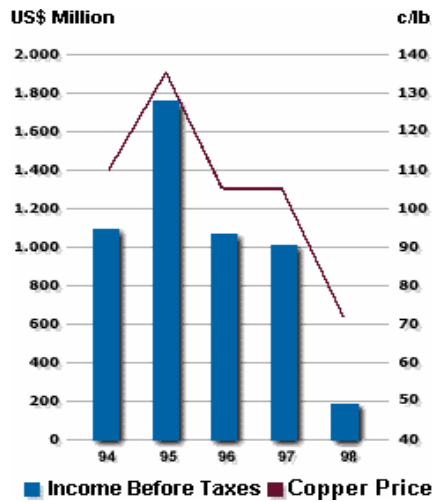
C O D E L C O

# ANNUAL REPORT

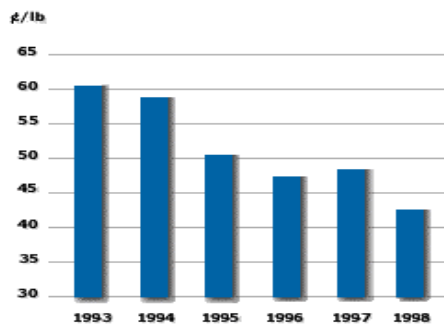
*Codelco's mission is to maximize the long-term generation of profits and its contribution to the national treasury.*

*Its goal is to remain an attractive company for its owners -all Chileans - and its workers, clients, suppliers, contractors and all those who establish a relationship with it.*

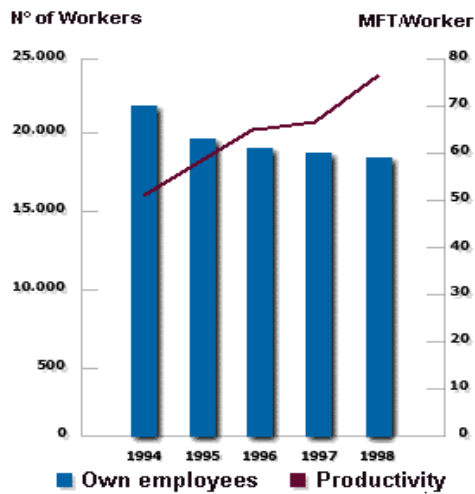
C O D E L C O  
**HIGHLIGHTS**  
 Income Before Taxes and The Copper Price



**Cash Cost**



**Productivity**



C O D E L C O  
**HIGHLIGHTS**

<b>Financial Performance</b> (US\$ Millions)	<b>1998</b>	<b>1997</b>	<b>1996</b>	<b>1995</b>	<b>1994</b>
Sales	2,730.2	3,426.1	2,940.2	3,926.0	2,993.2
Income Before-Taxes	355.3	1,010.8	1,103.3	1,763.6	1,102.2
Treasure contributions	354.6	1,173.3	1,044.2	1,735.0	857.9
Total assets	5,823.3	5,172.1	4,952.9	4,743.6	4,574.3
Total liabilities	3,127.1	2,489.6	2,190.7	2,293.7	2,103.7
Equity	2,696.2	2,682.5	2,762.2	2,449.9	2,443.6
Investment	674.9	872.8	712.4	375.7	358.8
<b>Copper Production (*)</b>					
Thousand of metric fine tons	1,500.5	1,326.4	1,237.0	1,164.7	1,134.1
<b>Personnel (December 31st)</b>					
Company personnel	18,258	18,496	18,879	19,753	20,267
Operating contractors	9,206	9,686	7,998	8,913	9,447
Investments contractors	6,307	11,350	8,421	4,720	6,224
<b>Average Copper Price (cents/pounds, London Metal Exchange)</b>					
LME Grade A cathodes	75.0	103.2	103.9	133.2	104.9

C O D E L C O

## **BOARD OF DIRECTORS**

**PRESIDENT**

*Minister of Mining*

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**DIRECTOR**

*Minister of Finance*

**Eduardo Aninat Ureta**

**DIRECTOR**

*Representative of H.E. the President of the Republic*

**Jorge Awad Mehech**

**DIRECTOR**

*Representative of H.E.*

*the President of the Republic*

**Nicolás Majluf Sapag**

**DIRECTOR**

*Representative of H.E. the President of the Republic*

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**DIRECTOR**

*Representative of the National Association of Cooper Supervisors*

**Luis Castelli Sandoval**

**DIRECTOR**

*Representative of the Cooper Workers Federation*

**Raimundo Espinoza Concha**

C O D E L C O  
**OFFICERS**

**PRESIDENT AND CHIEF EXECUTIVE OFFICER**

*Marcos Lima Aravena*

**CHIEF MARKETING OFFICER**

*Juan Eduardo Herrera Correa*

**CHIEF DEVELOPMENT OFFICER**

*Juan Enrique Morales Jaramillo*

**CHIEF ADMINISTRATIVE AND FINANCIAL OFFICER**

*Albert Cussen Mackenna*

**CHIEF OF HUMAN RESOURCES**

*Eduardo Loyola Osorio*

**CHIEF OF EXPLORATION AND MINING PARTNERSHIPS**

*Iván Valenzuela Rabi*

**CHIEF OF LEGAL AFFAIRS**

*Waldo Fortín Cabezas*

**GENERAL AUDITOR**

*Marcelo Mobarec Asfura*

**GENERAL MANAGER CHUQUICAMATA DIVISION**

*Rafael González Amaral*

**GENERAL MANAGER RADOMIRO TOMIC DIVISION**

*Luis Farías Lasarte*

**GENERAL MANAGER SALVADOR DIVISION**

*Fidel Báez Núñez*

**GENERAL MANAGER ANDINA DIVISION**

*Carlos Rubilar Ottone*

**GENERAL MANAGER EL TENIENTE DIVISION**

*Patricio Guajardo Ahumada*

**GENERAL MANAGER TALLERES DIVISION**

*Alex Acosta Maluenda*

## CODELCO IN TIME OF CRISIS

One year ago, the early effects of the Asian crisis were beginning to influence the price of copper, which, by the end of 1997, had dropped below 80 cents. Thus began a period of low prices generated by the sharp brake to the world's economy - in 1998 growth dropped to half that of previous years - and the start-up of low-cost projects, which, encouraged by expectations that they would continue to receive the benefits of the world bonanza that characterized most of the nineties, increased copper production.

Altogether, these factors have meant that the average price is only 75 cents/pound, a far cry from historical levels of the past twenty years (US\$ 1.06 per pound), and have led to a world stock increase of over 300,000 metric fine tons (mft) on world metal exchanges, for a total of 3.5 weeks of consumption.

### **1998 RESULTS**

In 1998, Codelco's income before taxes reached US\$ 355 million, its lowest level since 1993, although if we factor out the effect of low prices for both copper and molybdenum this would be the highest in the company's history. The paradox stems in part from increased copper production, which totaled over one and a half million tons, most of it high-quality cathodes, and in part from the low costs that Codelco has achieved, having come very close to recovering its ranking in the industry's lowest cost quartile.

Treasury contributions reached US\$ 355 million, what with dividends, taxes and other transfer payments, a clear indication that Codelco contributed all its income before taxes to its owner, all Chileans. While this figure is substantially less than in previous years, the annual average for our contributions to the State over the past five years exceeds US\$ 1 billion.

For 1998, total copper sales reached 1,546,129 tons, an increase of more than 8% over the previous year and a clear demonstration of the strength of our commercial network, which even in times of crisis is capable of achieving significant sales.

Compared to 1997, investment dropped, reflecting primarily the end of two large projects, Radomiro Tomic and the Andina expansion, to US\$ 675 million. Nonetheless, total investment for the 1994-1998 period reached almost US\$ 3 billion, 64% of this in developing projects, thus surpassing the amount committed at the start of President Eduardo Frei Ruiz-Tagle's government.

Average productivity grew significantly, reaching 76.2 mft of copper per worker, a 15% increase, with all divisions showing improvement.

Finally, cash costs broke the 45-cent barrier, reaching 44.7 cents/pound, which amounts to a 15.4 cent drop over 1993, nothing less than 25%, and well beyond the goal that we established in 1994 of dropping 10 cents by the end of the decade.

## **THE YEAR OF CONSOLIDATION**

No one can be forced to achieve the impossible. Everyone knows that no single actor is able to influence the price of copper in his favor and Codelco is no exception to this rule. With this in mind, it is legitimate to highlight the year's achievements, in spite of the fact that financial results don't reflect the enormous efforts made and the expectations based on them.

### **The First World-Class Chilean Mine**

The start-up of our new Radomiro Tomic division marks a historic breakthrough in national mining, as it is the first world-class mine - over 100,000 mft of production at costs below 40 cents/pound - that has been developed completely by Chilean workers, professionals and executives, from the initial exploration phase, through studies and construction, to mining of the deposit and product sales.

The final result could not be more encouraging for Codelco, as it has achieved such major successes as: early completion of construction, under-budget costs, and, above all, in its short period in operation far better production levels and lower costs than initially planned.

All this means that in spite of the year's low price, the Radomiro Tomic division contributed over US\$ 75 million to the corporation's total results for 1998.

### **Codelco: A Single Company**

As part of its modernizing process, some time ago Codelco began to introduce a change in its organizational focus based on the idea that, with each division having the same product, technology and portfolio of clients, these should operate as a single, large company, even though they originally began as different firms. This focus incorporates global trends in management and has been facilitated by the use of leading-edge technologies.

From this perspective, in March 1998, the SWING (Integrated Management Software) project was fully implemented, thus providing a new, shared computer platform that integrates the latest advances in both hardware and software, resolving most of the Year 2000 problem along the way. This system has become an essential tool to enable us to take advantage of economies of scale, modernization and homogenization of management information and to reinforce corporate culture.

Within this same perspective, the company created a subsidiary, the Institute for Innovation in Mining and Metallurgy (IM2), which should provide answers not available on the market to the main technological challenges that Codelco faces. We have concentrated the company's most specialized human resources in this institute, along with a distinguished group of scientists and professionals of vast experience in their respective areas of research.

Finally, during the year, we continued a process of bringing our divisional development plans more and more into line with our corporate vision, advanced in the health services project, breaking away from our historical attitude of self-sufficiency and focusing more and more on our core business. We also achieved greater advances and improved coordination between our head office and our divisions in our overall communications strategy.

### **The Industry's Changing Paradigm**

We have continued our efforts to change the behavior of the copper industry, which historically has never concerned itself much with the defense and development of new products and markets.

However, during 1998 we can point to significant advances, developed in conjunction with other major producers: the reorganization of the International Copper Association (ICA) to incorporate a new marketing-oriented focus; pilot projects to promote copper consumption in China and India, with special financing; and studies that aim to create a company focused on developing new copper products.

It is also important to highlight the industry's openness to efforts to defend copper markets, threatened by restrictive environmental regulations in both the US and Europe. In these efforts, the government of Chile, through its External Affairs Ministry and specialized organizations, has played an important role.

At the same time, Codelco, in its efforts to reach end-consumers, has signed an agreement with Alcatel to develop new copper-intensive products and plans to sign further agreements with other major international firms.

At current prices, almost 60% of the industry's production experienced losses in 1998 and over 30% of these were also in the red in terms of cash costs. Closure costs have also risen due to environmental impact mitigation requirements. Because of this, the strategy summarized here offers a high rate of return and constitutes an excellent business opportunity for all producers.

## **THE CHALLENGES OF OUR TIMES**

Whenever we face a price cycle that drops as low and lasts as long as this one, the copper industry goes into an adjustment phase that includes temporary or permanent closures, technological changes, mergers, and so on. At the same time, globalization has taken mining companies around the world, seeking opportunities for their business, all of which has led to substantial improvements in productivity. Any company unable to face these challenges will lose its competitiveness and in the worst case simply disappear.

Fortunately, from 1993 on, Codelco has successfully reversed a very dangerous situation in terms of its costs. If it had not done this, the corporation would have showed losses for 1998. In fact, at current production levels, every cent saved on costs represents US\$ 31 million in income before taxes.

Also in these years, the company has developed business opportunities with major international companies and has intensified its contacts with these both in Chile and abroad, in order to strengthen potential opportunities of common interest.

Nevertheless, current price levels require an additional effort from Codelco that will be crucial to defining the company's future.

### **The Contingency Plan and Its Meaning**

Although the 1999 budget, prepared in October 1998, proposed a drop in costs of over two cents per pound and an increase in productivity of more than 9% over the already extraordinary results of 1994-1998, faced with the seriousness of the current price situation, the corporation has developed a contingency plan that will generate a US\$ 250 million, in extraordinary income and a cost reduction of four cents/pound, regardless of what happens with prices.

It is not easy to meet these kinds of goals, especially when we must do so without affecting the corporation's long-term development, seeking to avoid selling off assets at artificially depressed prices or destroying the consensus achieved by our strategic alliance between the company and its workers, a key factor in our results.

This is why the said plan includes a detailed set of measures, based 25% upon automatic adjustments and the current price situation, 70% on management decisions, and just 5% on labor costs.

We have said over and over that if the company has proven capable of modernizing and progressing in a favorable price scenario with the support of its workers, then we should be well prepared to face the pressure on the copper industry today.

### **Internationalization: Our Next Challenge**

One of the debates currently going on in our country is about the degree of internationalization of the business carried out by its main company, Codelco. There's no doubt that in spite of the high degree of Chile's economic integration into the world's, our corporation is one of the few that qualifies as a global company. Even though its assets are located primarily in Chile, Codelco buys and sells with every significant country active on the world stage.

Is the strategy that we've followed correct or should we be looking to other countries and other continents?

In our opinion, over the coming years, Codelco's greatest challenge will be to make the most of its vast experience and intimate knowledge of every link in copper's productive chain, accumulated over the years, combined with the company's superior financial position and its excellent image within the industry, to move beyond our borders.

If the world's main mining companies chose Chile in recent decades as the place to invest, it would have been absurd for the world's largest producer to focus its efforts on distant latitudes, instead of doing so in its place of origin.

Nonetheless, now that these mining deposits, most of them well-known for years, have been successfully developed, there are other places attracting the attention of world mining and Codelco should be looking toward these new prospects.

In our letter of last year we spoke of misfortune and the fortitude that individuals and institutions can show in dealing with it successfully; without knowing all that the future would hold, I never imagined how far that fight would take us. Nevertheless, I have never doubted the company's ability to come through with flying colors; its technological and productive potential; the strength of the shared project on which we have worked so hard for all these years.

We will come through this crisis, turning it into yet another opportunity. To reflect on our mistakes and our lacks, our conservatism. To force us to be humbler, more willing to learn, more open to change. To demonstrate yet again - as executives, professionals, workers - how deeply we believe in the ethical imperative that calls upon us to give our best to Codelco, a company that belongs to all Chileans.

As we did in 1998, so we will do in 1999. That is our commitment.

**Marcos Lima Aravena**  
President and Chief Executive Officer

C O D E L C O

# THE MARKET AND EXPANDING DEMAND

- *In a market scenario marked by high uncertainty about the future of the world economy, combined with low prices, Codelco, along with other major producers, is leading efforts to defend and expand copper markets.*

## **GLOBAL OUTLOOK**

**1**998 was a year of low prices and a bad year for copper producers. Throughout, the world economy slowed noticeably. After growing at rates of over 4% in both 1996 and 1997, growth for 1998 reached about 2%.

Although the main industrialized countries (except Japan and the United Kingdom) continued to enjoy a growth phase, the economic situation in Asia was negative and marked by a sharp drop in the economies of those countries most affected by the crisis. In Latin America, average economic growth was less than half that of 1997.

As a result, in 1998 the western world's consumption of refined copper grew only 2%, compared to 4.5% annually between 1994 and 1997. Slower growth of global consumption for 1998 was due to the sharp drop in demand from Asia, which was more than compensated for by growth in consumption in the US, Europe and to a lesser degree, Latin America.

On the other hand, the supply of refined copper (considering production of refined plus net imports from the Eastern bloc countries) grew at a relatively slow rate, less than consumption. Nonetheless, the high level reached by supply in 1997, when this increased almost 9%, meant that in 1998 the situation of over-supply continued and stocks rose.

For this period, low copper prices led to temporary and some permanent closures of high-cost operations, causing production to drop by about 250,000 mft.

In spite of the above, the western world's copper mine production rose about 6%, as the result of expansion in Chile, Indonesia, Argentina and Australia.

In contrast with these increases, mine production in the US dropped significantly, as did production in Zambia, because of worsening technical and economic conditions at operations there, and in Peru, due to technical, operational and climatic factors.

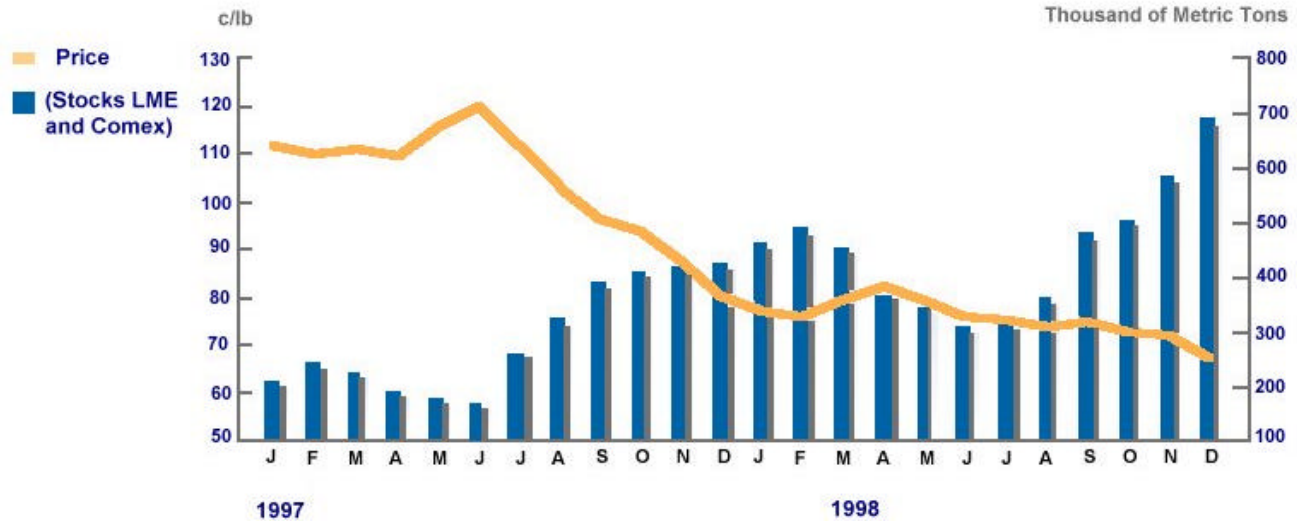
The drop in price also led to an 11% reduction in the production of secondary refined copper (scrap), a variable that is very sensitive to price variations, especially in the short term.

## **PRICE TRENDS**

In 1998, the average copper price on the London Metals Exchange reached 75 cents per pound of copper, 27% lower than in 1997, when prices averaged 103.2 cents per pound.

The price's sharp drop, especially late in the year can be explained in part by the increase in market stocks. Total market stocks measured in weeks of consumption went from 4.7 weeks in 1997 to 6.0 weeks in 1998.

## Price of Copper and Stocks on Metals Exchanges



Nonetheless, the increase in inventories was nowhere near as high as peaks reached at other times of market depression. However, the drop in the price went far beyond anything that can be explained by the relationship between production, consumption and stocks. Further evidence of this is the fact that between January and June 1998, stocks on metal exchanges dropped by almost 150,000 mft and yet this caused virtually no shift in prices.

A similar price trend is affecting other metals and commodities, among them aluminum, lead, zinc, nickel, molybdenum and oil, where we can see similar downward spirals in prices, at times, even more pronounced.

Thus, internal market factors are only part of the explanation for falling copper prices. Another, perhaps more important reason lies in speculative factors beyond the market, associated with uncertainty and negative expectations generated by the Asian crisis and its impact on the world economy. This is because perceptions of depressed consumption and an oversupplied market discourage demand for stocks by different market agents, who believe that in the future the product may be bought even more cheaply.

Given current prices, the shift in industry production through temporary or permanent closures of high-cost operations and the drop in the amount of copper recovered from scrap, should continue and deepen in the future. At price levels like those we saw at the end of 1998, almost 60% of the industry's producers were experiencing losses and over 30% of these same suffered from cash costs greater than the price of copper.

In the medium term, therefore, we can see that the forces necessary to market recovery and some increase in price are gaining strength. This trend could be enhanced by normalization of the world economy, which would in turn stimulate increased demand for copper.

## **CODELCO'S STRATEGY AND ITS ADVANCES**

The recent severe drop in copper prices highlights the importance and urgency of the industry making a commitment to the defense and development of the market.

A strategy of developing and defending markets offers a high rate of return and represents an excellent business opportunity for producers. This is clear from the high potential for consumption detected in China, India, Latin America, Eastern Europe and other developing countries, where metal consumption is substantially lower than that of industrialized countries.

An increase in the intensity of copper use in recent years in sectors like construction and transport reinforces this argument. In the case of the former, greater use of copper wire and cables is directly linked to greater consumption due to increased availability of electrical and electronic appliances for residential and commercial use. In the case of transport, the greater weight of copper cables used in the average American passenger vehicle, which has more than doubled in the past fifteen years, is a good example of this situation.

Copper is the metal of the future because it is essential to the efficient generation and transmission of energy and to communications, where the networks available are already capable of transmitting enormous amounts of information. It is also relevant in environmental protection, if we look at trends like that of installing underground cables or new products like the electric car. A basic model would eventually consume up to 50 kg of copper, double the average used by cars in the US today.

Nevertheless, given these opportunities, copper also faces some challenges, among them the danger of substitution by other materials, the distorted image of metals, possible environmental threats and the industry's own inertia.

Codelco, as it has consistently in recent years, continues to lead efforts to stimulate change within the industry, to break through this inertia and overcome the apathy that has historically hindered the promotion and development of new copper products.

This leadership can be seen in Codelco's work, along with other major producers, to reorganize the International Copper Association (ICA), and to include a new marketing focus that aims to stimulate demand. We've made great strides in correctly focusing efforts to promote large projects, favoring electrical applications and emerging markets where we can foresee the greatest potential for growth in consumption. The organization also increased its resources for facing threats to copper use in the area of health and the environment. The instruments used to select and evaluate project results have improved. More communicational work has been laid out, coordination and cooperation with other groups that defend copper and non-ferrous metals has increased and, finally, the association has continued its campaign to recruit new members.

Throughout this period we began to develop two projects promoting the use of copper wire in China and India, costing about US\$ 5 million apiece, with an initial commitment from six of the industry's major producers.

We can also highlight Codelco's contract with Alcatel, for US\$ 7.5 million, to develop High Voltage Underground Cable and LAN Premises Copper Cable products.

At the same time, Codelco established the foundation for other agreements with major copper consumers in matters of mutual interest. Among these we can highlight the development of a copper-nickel tube market for brake linings used by the car industry, the analysis of copper's life-cycle, the energy efficient use of motors and compressors, and the recycling potential of the copper content of these products.

Throughout this period, four major copper producers decided to finance the evaluation of a company oriented to developing new copper products. An initial evaluation phase of the ICA's current programs culminated mid-year and a long-term evaluation then started, in order to identify a technological platform that could generate a set of new copper products. A third phase contemplates creating a business model to determine what kind of organization is best suited to the opportunities generated by the previous phases and existing relationships and links with the rest of the industry.

In another area, Codelco has made an enormous effort to defend the copper industry from unjustified environmental regulations being applied in the USA. Finally, Codelco, along with the government of Chile, actively participated in facing the threat of drinking water standards under consideration by the European Union and the World Health Organization.

## **EVOLUTION OF COPPER SALES**

The Corporation carried on a commercialization policy oriented to improving the direct relationship with regular clients through the delivery of top-quality products and excellent commercial service.

In 1998, copper sales totaled 1,546,129 tons, up more than 8% over the previous year. This increase was due primarily to the increased availability of our own copper, thanks to the company's increased production during the year. This increase is largely due to the coming on-stream of the Radomiro Tomic division and Andina's higher production.

Throughout this period, Codelco maintained its base premium on cathode sales of US\$ 30 per metric ton, CIF Rotterdam, at the same time as it sought to optimize the commercial conditions of its product portfolio.

Within a context of a highly diversified set of clients, by continent and country, the distribution of sales among different markets and changes over previous years reflected the shifting demand for copper from different geographical areas.

In effect, we can see a drop in sales in Asia, where consumption was affected by the economic crisis that hit several of that region's countries. That drop was more than compensated for by increased sales to North America and Europe, where demand was very active throughout the year. In the case of Latin America, sales remained virtually steady at the previous year's level.

One noteworthy case is that of South Korea where, in spite of the fact that overall consumption in 1998 went down, its purchases from Codelco rose significantly. This could reflect consumers' preference for buying high-quality copper primarily from a single reliable supplier like Codelco.

**COPPER SALES BY COUNTRY AND REGION**  
(Thousands of metric fine tons)

<b>País / Región</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>
China	64	80	55
Corea del Sur	159	199	235
Hong -Kong	18	52	28
India	38	35	18
Indonesia	48	33	1
Japan	88	93	62
Malaysia	25	48	27
Singapore	19	8	9
South Korea	159	199	235
Taiwan	171	167	132
Thailand	3	19	2
<b>Subtotal Asia</b>	<b>633</b>	<b>734</b>	<b>570</b>
Germany	63	120	121
Belgium	1	-	4
Bulgaria	4	3	-
Spain	6	34	77
Finland	9	3	-
France	101	120	147
United Kingdom	43	38	29
Greece	11	23	34
Netherlands	4	4	-
Italy	83	89	141
Romania	6	8	3
Sweeden	-	-	30
Turkey	-	6	3
<b>Subtotal Europe</b>	<b>331</b>	<b>448</b>	<b>585</b>
Argentina	16	19	20
Brazil	51	58	56
Chile	132	99	104
Colombia	-	-	1
Perú	8	3	-
Venezuela	2	3	2
<b>Subtotal South America</b>	<b>209</b>	<b>182</b>	<b>183</b>
México	-	6	52
EE.UU	66	52	156
Canadá	-	2	-
<b>Subtotal North America</b>	<b>66</b>	<b>60</b>	<b>207</b>
South Africa	-	3	-
<b>Subtotal Africa</b>	<b>-</b>	<b>3</b>	<b>-</b>
<b>Total</b>	<b>1,248</b>	<b>1,427</b>	<b>1,546</b>

C O D E L C O

# A NEW WORLD CLASS MINE

- *The entry into operations of the Radomiro Tomic division is a major landmark in the history of Codelco. With a capacity of 180,000 mft of very low-cost, highly profitable copper, this mine is in the vanguard of world copper mining*

## **A HISTORICAL LANDMARK**

**T**hroughout the year, Codelco continued to register substantial advances in its US\$ 3.5 billion investment plan for the five-year period 1994-1999.

One goal of this plan is to develop and bring into production a series of mining projects to replace those areas that have run out or to increase existing productive capacity, using the best ore processing technology available, thus reducing the corporation's average production costs.

Among the plan's projects coming into production in 1998 was the Radomiro Tomic mine.

The start-up of ongoing operations at the Radomiro Tomic division in March 1998 represents a historical landmark, both because it is the first division developed from start to finish by Codelco and because of the management model used. The division stands out for the leading-edge technology applied, its modern and dynamic organization, its productivity and its low cost production. This can be seen in the small staff, the flattened hierarchy, the application of multi-tasking, the functioning work teams, the efficient use of corporate synergies, the use of the market to supply goods and services, and the enormous concern for the workers' quality of life.

## **THE RADOMIRO TOMIC DIVISION**

To develop the project we used the EPCM (Engineering, Procurement, Construction and Management) Fast Track contract model, which was based on the following criteria:

- Application of the highest standards of productivity, efficiency, security and quality of the work to be carried out.
- Maximization of the value of the business by shortening the construction period.
- Working with one contractor made decision-making much faster and more flexible.

The project, which was Codelco's first EPCM Fast Track contract, included an initial investment of US\$ 725 million (in 1998 currency) and a completion deadline of 27 months, plus two for start-up, to reach full production of 150,000 tons of electro-won copper cathodes.

**COMPARISON OF ECONOMIC INDICATORS**  
(Copper price US\$ 1/lb, 10% discount rate, 1998 currency)

		<b>RT Project Budgeted</b>	<b>RT Real</b>
Investment	US\$ mn	725	683
Nominal Production	Mft/year	150,000	180,000
<b>Economic Indicators :</b>			
Net Present Value	US\$ mn	709	850
Internal Rate of Return	%	23.9	28.5

The success of the early development of the project reduced the estimated construction time to 22.5 months, a world record for a project this size. The final amount invested was US\$ 683 million and optimization of the facilities allowed us to raise projected production capacity to 180,000 tons of cathodes per year.

The project required an enormous amount of labor, with a total of 3,000 people working directly on the project, along with another 700 workers involved indirectly. To complete the project, the EPCM contractor used 8.5 million person-hours through direct and indirect contracts. The corporation played an active role in managing human resources, achieving fluid relations with union leaders, which allowed us to develop the project in total normalcy and with no labor conflicts.

In addition, during this same period security measures were tightened to the maximum to reduce the risk of accidents, as can be seen in the low accident rates achieved during the implementation of the project. Unfortunately, while bringing the project on-stream in September 1997, there was a very serious accident involving the ore stock-piling equipment.

Given its success in developing this project, the Radomiro Tomic division won the Raúl Sáez award, from the Mining Ministry, the National Mining Society (Sonami) and other institutions for its use of Chilean engineering designs; and the José Tomás Urmeneta award, from the Mining Engineers' Institute, for having made a genuine contribution to technological development and business management.

**LEADING-EDGE TECHNOLOGY**

- Optimized mining fleet with high tonnage trucks
- 7,000-ton per hour primary crusher
- Use of VSF technology for solvent extraction
- 1,000 m x 300 m leaching pads
- Automated overhead cranes for harvesting cathodes
- Back to back cells
- Double-contact intercell rods
- Cross-flow acid spray extraction system

## **RESULTS**

Once the division's project team officially finished construction in January 1998, getting the complex up and running began, culminating, in March 1998, with the start-up of normal operation. As of December 1998, the division had completed its 432-person staff, of which about 60% are from the Second Region where the mine is located.

Production for this period reached 161,896 tons of cathodes. Total aggregate cathode cost per cathode to date reached 47.9 cents/pound, while cash costs reached 36.7 cents/pound. These results are based on the treatment of 28.3 million tons of ore, with an average grade of 0.71%.

For this period, in spite of the low price of copper, the division generated US\$ 262 million and the operating income were US\$ 78 million.

With regard to accident indicators for 1998, the frequency rate for the division was 6, while the rate of severity of work-related mishaps reached 235.

In December 1997, the division's first union was formed with the first collective bargaining occurring in May 1998 and culminating in the peaceful signing of a three-year contract.

Policy governing housing and workshops for workers and their families has encouraged them to establish the family residence in the city of Calama and in the Second Region. Some 85% of workers have or are in the process of acquiring their homes in this region.

As part of the consolidation of the administrative model implemented by the division, its management has generated the conditions necessary to develop a business-centered culture, founded on participatory management, all within the framework of a modernizing project designed by the corporation for all its divisions.

C O D E L C O

# ENVIRONMENT AND COMMUNITIES

- *The goal of being an environmentally - responsible company is becoming reality through advances in the investment plan, the development of an ISO 14,001-compliant management system, the integrated protection of resources and the good neighbor policy adopted by the company.*

## SMELTER DE-CONTAMINATION PLAN

Between 1994-1999, Codelco implemented a US\$ 764 million environmental investment program, of which US\$ 215 million was spent in 1998.

The Chuquicamata division completed work that has ensured the capture of over 80% of sulfur and 90% of arsenic emissions. In addition, a US\$ 78 million complementary plan is under study that could raise capture rates to 95% for sulfur and 97% for arsenic. This includes a second stage in capturing and treating gases using the Pierce Smith converters and the arsenic reduction plan.

The Salvador division's Potrerillos Smelter completed its US\$56 million MALIGAS project for managing and filtering gases. This project significantly reduced gas leaks and particle emissions. To complement this, process gases will be treated at the new sulfuric acid plant, begun this year and expected to come into operation toward the end of 1999. The project investment totals US\$ 97 million, of which we spent US\$ 67 million in 1998.

In August 1998, the El Teniente division's Caletones smelter began operating its first sulfuric acid plant, thus meeting plan objectives established with the authorities. Total investment in the plant reached US\$ 71million. A second, larger acid plant to treat process gases is currently undergoing environmental assessment and is scheduled to start up in 2000.

## ENVIRONMENTAL MANAGEMENT SYSTEM

In 1998, the corporation, aware of the strategic importance of its environmental commitment, of the need to respond efficiently to regulations and of its responsibility to the community, its workers and the environment, continued to implement an environmental management system, for which it hopes to receive ISO 14,001 certification within five years.

### ENVIRONMENTAL INVESTMENT PLAN (US\$ millions)

	Division	1998	94-99
5 <sup>th</sup> Module Acid Plan and CPS Connections N° and 5	Chuquicamata	0.4	57.7
Gas Capture and Treatment CPS N° 6 and 7	Chuquicamata	6.4	22.1
Handling and Filtering of Potrerillos Smelter Gases	Salvador	2.8	55.8
8 Potrerillos Acid Plant	Salvador	67.2	97.2
Banking Los Leones Dam	Andina	3.4	41.5
Ovejerias Dam Deposit	Andina	91.4	246.7
El Teniente Acid Plant	El Teniente	15.2	70.6
Third Stage Caren Dam	El Teniente	9.1	23.2
Other Projects		18.7	149.4
<b>Total</b>		<b>214.6</b>	<b>764.2</b>

To do this, we have a Corporate Environmental Policy whose principles are in keeping with the ISO standards; divisional policies are consistent with this and each divisional management unit has made specific commitments. In 1998, we prepared a set of corporation-wide technical guidelines that define principles, requirements and recommendations for the system's implementation within the sphere of each division. Based

on these, the divisions reinforced their work to identify and evaluate environmental issues within their operations, establishing clear goals for their environmental management programs.

At the same time, we began the process of an internal audit of the system, using the El Teniente division as a pilot, in order to confirm that the work is being done according to ISO 14,001 standards and the corporation's technical guidelines. To carry out this work, we have trained 107 environmental auditors to date.

## **WASTE MANAGEMENT AND CONTROL**

Throughout 1998, we perfected our inventories of divisional effluents and programs for monitoring, managing and controlling events, including contingency plans for the latter. These efforts have helped to eliminate or minimize pollution and to carry out integrated management at the divisional level.

The Andina division continued work on the new Ovejería's tailings dam and the expansion of the Los Leones dam, involving a US\$ 288 million investment. At the same time, El Teniente advanced in the building of the US\$ 23 million Caren dam.

Strict monitoring of the River Loa, carried out by the Chuquicamata division, has provided us with more information about its characteristics and also confirmed that division activities have no impact on the quality of its waters.

## **EFFICIENT USE OF WATER AND ENERGY**

In harmony with corporate guidelines for the efficient use of water resources, divisions reduced the amount of fresh water used in different processes by recycling more industrial water and improving management at extraction points. They also carried out educational programs on the rational use of water amongst the communities near our industrial facilities. We will evaluate the impact of these programs in 1999.

Throughout 1998, we also carried out preliminary negotiations with the USIJI (United States Initiative for Joint Implementation) to carry out a project for replacing thermoelectric energy with wind energy in the Second Region. The project would attempt to reduce gas emissions that contribute to the greenhouse effect, within a context of a more efficient use of the energy sources available in the region.

## **CODELCO: A GOOD NEIGHBOR**

Mining, more than any other economic activity, has a powerful impact on its surroundings, at the physical, economic, social and cultural levels. As an activity, it can't be moved, due to the decisive role that the location of the ore deposit plays. As a result, a cooperative relationship with the surrounding community is mutually beneficial.

In recent years, from the public's point of view, the environmental demand for clean production has joined social demands as an important issue. This view insists that growth must be compatible with quality of life in the area where people and their families live. In response, the company has adopted several strategies with regard to its operations and their relationship with their surroundings.

Codelco has set itself the strategic goal of becoming a pro-active company in terms of its relationship with the environment in the regions where its deposits are located and, on the basis of its mission and its specific activities, integrating itself into regional development in such a way as to favor living conditions in these communities.

With the end of mining camps we need to evolve toward a culture of worker, supervisor and executive participation in the local area, where they join programs and establish life-styles that are open to the community and not just restricted to the company environment.

Codelco's new vision is evident in the strategy being used to eliminate the camp at Chuquicamata as the center where workers and their families live, and to encourage their eventual integration into life in the city of Calama.

One of the special characteristics of this city is that the company has two operations nearby - Chuquicamata and Radomiro Tomic - as well as being partners in the El Abra mine and relying on local contractors. Thus we hope that Calama will become a city attractive to workers and their families, not only in terms of infrastructure and urban quality, but also into terms of education, cultural activities and entertainment, and health care. We refer to this set of specific programs for the divisions to develop and win the participation of the local community and authorities in building the city's future, the "Calama Plan".

Other Codelco initiatives in 1998 included the creation of two Developmental Corporations in the Second and Sixth Regions: Pro-Loa and Pro-O'Higgins, respectively. In both of these non-profit institutions, Codelco joins private companies and public sector institutions to promote local development on issues that favor productive activity.

C O D E L C O

# STRATEGIC ALLIANCE : A SHARED PROJECT

- *With a model of participative management, we have achieved new advances in the company's strategic alliance with workers, in their training and development, and management changes that could have an enormous impact on the future.*

## **STRATEGIC ALLIANCE**

The consolidation of the strategic alliance between Codelco and its employees has been a process whose benefits are clearly perceived by all players, the authorities and the country. The strategic alliance was formed on the basis of a commitment to action made by executives, supervisors, workers and union leaders, to develop a shared project and to comply with Codelco's mission, that is, to maximize the long-term generation of profits and the company's contribution to the national treasury.

This commitment is expressed in the development of labor relations based on cooperation among the different corporate players; an openness to change in order to better face the challenges of both the copper market and the industry; and the willingness to reach agreements in order to increase the company's competitiveness and profitability.

On the basis of this corporate agenda and its implementation at the division level, in 1998, the administration, the workers and their leaders continued to implement agreements that overlap diverse areas. Among the most important were:

- Agreements signed by management and the central leadership and unions belonging to the Copper Workers Federation to reaffirm the ground rules for the process of strategic alliance and the commitment to consolidate Codelco as a profitable, efficient and competitive state enterprise.
- The successful completion of three collective bargaining processes with workers unions at the Radomiro Tomic and El Teniente divisions and the Head Office, along with bargaining with supervisors union at the Salvador division.
- The agreement with unions at the El Teniente division to implement an early retirement plan for supervisors; the extension of the special early retirement plan for workers affected by organizational changes or technological innovation, and a special retirement plan for workers affected by a partial handicap. At the Salvador division, an early retirement plan for workers. Finally, at Chuquicamata an early retirement plan for workers.
- The implementation of housing programs for workers.
- The consolidation of a 12-hour working day at the Andina pit mine and the modification of workdays and shifts at the Salvador division.
- The movement of workers and their families from Potrerillos to El Salvador, La Serena and Copiapo.
- The development of organized and concerted efforts to generate labor conditions that ensure the healthy, integrated development of workers in their family and social lives.

## **PARTICIPATIVE MANAGEMENT**

As part of modernization, the corporation has implemented a participative management model that seeks to involve workers and professionals more in the challenges that the company faces if it is to consolidate its leadership position in the world copper industry.

At Chuquicamata, business plans for each autonomous management unit were widely distributed and we promoted team work and the formation of working groups to ensure the commitment of both supervisors and workers in improving their areas.

The Salvador division held its first annual strategic planning meeting with the participation of union leaders. Within the framework of a "Dialogue with Management", the division also carried out meetings between management, union leaders, workers and supervisors to analyze goals, objectives and the division's future.

Along with already existing joint safety and occupational health committees and a bipartite commission to design a new development model for labor education and job evaluations, the El Teniente division set up 23 task forces to look for ways of optimizing processes and define standard ranges and indicators, in order to monitor advances in ongoing improvement plans.

At Andina, participative management has involved bringing union leaders into strategic planning, the future development project and management's coordinating committee; developing ongoing improvement groups, with significant results in terms of cost reduction; and creating a mixed work-team, made up of line-workers, union leaders, joint committees and the human resources area, to develop a quality of life project.

## **TRAINING AND DEVELOPMENT**

An essential component of the corporation's human resources development policy is skill improvement through training, an activity that seeks to enhance management abilities and thus improve workers' employability.

Throughout this period, the company invested US\$5.8 million in training and development programs that aim to increase the company's competitiveness. These resources went to holding 3,064 courses, with the participation of 29,471 workers and a total of 641,539 hours/worker of instruction per year.

In 1998, we continued with corporate plans for developing human resources. As of December 31st, we had finished two programs for Professional Development in Business Management begun in 1997, which were attended by 60 professionals and first and second-level supervisors. Currently, another 57 participants are attending additional courses. We also carried out an Executive Development Program, attended by 29 executives from different divisions.

At the same time, during the second half of 1998, we carried out a Workers Development Program as a pilot project that began in August, for 35 workers and union leaders from the divisions and the Head Office, which has now been completed.

## **COMPETENCE MANAGEMENT**

One change tending to deepen the strategic alliance between workers and the company is a special effort to focus on knowledge management associated with Codelco's development needs, thus ushering in a new phase of human capital management.

As part of our model based on management by individual competences, through new work practices designed to fulfill productive and administrative processes. To such effect, during the year a catalogue of skills was prepared, broken down by professional skills, knowledge and expertise of a pilot group of professionals belonging to the engineering and projects sections of the Chuquicamata, Salvador and El Teniente divisions.

In addition, in 1998 the new SAP software for human resource management became fully operative, allowing us to manage the corporation's human resources information in an integrated fashion. Based on this, in November we began to apply a new salary system, which has improved management efficiency in this area.

C O D E L C O

# INNOVATION FOR TECHNOLOGICAL LEADERSHIP

- *By developing our own technological programs in areas key to mining and processes, with the creation of IM2 and through technological alliances with other industry players, Codelco is consolidating its technological leadership*

## **TECHNOLOGICAL RESEARCH AND DEVELOPMENT**

**T**he fact that we face our own scientific and technological challenges – unique in the world because of the nature of Codelco’s ores and the size of its operations – has created the need to carry out our own research and process of technological innovation, on a systematic, ongoing basis. This initiative has made the most of corporate synergy, optimizing inter-divisional technological integration and the opportunities available on the market.

In recent years, Codelco’s research and technological innovation activities have undergone significant changes. We have sought ongoing improvement, adapting technologies available on the market and venturing into developing our own technologies as well, to generate the significant breakthroughs necessary to ensure the company’s long-term leadership in key process areas.

In terms of ongoing improvement, outstanding examples include the Chuquicamata division’s modification of pit-mining from open to closed benches, thus guaranteeing greater productivity of mining equipment and changes to blasting patterns to ensure better distribution of the size of particles entering the mill process, thus increasing processing capacity. More recently, the use of lighter bins on pit-trucks improved the transport capacity. At El Teniente, the automation of dumping from 25-ton trucks and production control using the LHD (load, haul, dump) system stand out.

Other recent examples of ongoing improvements include: improved mine planning, an area that has benefited from the introduction of technical-economic criteria, which are constantly being improved at a global level. The purpose is to reduce the areas of uncertainty that affect mine operations, reduce mining’s inherent risks, and select the production alternative that maximizes long-term net income, all of which has had a very positive impact on Codelco’s economic worth.

Our technological adaptations have focused primarily on the company’s investment projects, where we can mention: integrated modernization processes of concentrator plants at Salvador and Andina, and the plan to reduce arsenic emissions and improve equipment capacity and availability at Chuquicamata’s smelter. New extraction technologies relying on solvents and electro-winning, incorporated into hydrometallurgic projects carried out recently by the company, also stand out.

## **DEVELOPMENT OF OUR OWN TECHNOLOGY**

In terms of the development of our own technology, we must mention the LR process for removing copper from molybdenum concentrates at the Andina division; the design, building and operation of a semi-robot to handle replacing steel liners in the SAG mills at the Chuquicamata division; and the process for dissolving copper from concentrates using concentrated sulfuric acid, via microwaves, at the El Teniente division.

One example of challenges that our mining operations faced during this period was the completion of studies and pre-operational tests to bring Level 6 of El Teniente into operation, an experience unique in the world, requiring the development of our own technology.

As you may recall, in March 1992, after some rockbursts and fatal accidents, Codelco decided to paralyze extraction from El Teniente’s Level 6.

By studying new concepts, between June 1994 and August 1997, we carried out experimental mining in a pilot area of 12,000 m<sup>2</sup>. This process was monitored, which allowed us to collect information that served as the basis for a geomechanical study.

From September 1997 to August 1998, during the pre-operational phase, having first checked on changes in the general geo-mechanics of Teniente's Level 6, due to the connection with higher levels, we decided it was necessary to research the relationship between seismic potential, undercutting speed and the mining of new areas. Because of this, and for the first time since the 1992 freeze, we carried out preparatory work in a 6,000 m<sup>2</sup> area using simultaneous production techniques. The test succeeded, with no significant rockbursts, thus proving the relationship between seismicity and caving speed.

From the end of 1998 on, we've been removing 6500 tons/day of ore from Teniente's Level 6 and we're preparing to extend operations to new deposits in 1999.

We would like to underline the fact that thanks to the know-how and experience accumulated during this period in Codelco, we can now use extraction and undercutting techniques that minimize the risks associated with mining the primary ore that constitutes a large part of the future reserves of this deposit, making its exploitation viable and providing knowledge that can be applied to the corporation's other underground deposits.

## **CORPORATE TECHNOLOGICAL PROGRAMS**

Throughout this period, the corporation moved ahead on two corporate technological programs: improvements to the Teniente Converter (TC) and underground mining. We also worked on two additional programs in the area of ore processing and hydrometallurgy.

The TC program consists of 19 three-year research projects that began in 1997, costing US\$8.5 million, the goal of which is to optimize the capture of sulfur and arsenic and significantly raise productivity, along with reducing fusion plant cash costs.

In 1998, this program's most significant advances included: the completion of the industrial evaluation of the continuous conversion process, of lance smelting and in the preventative predictive maintenance of equipment. Still in the industrial evaluation phase is the development of a higher-capacity (2000 tons per day of concentrates) TC, and a more productive (40%) slag-cleaning furnace.

The underground mining program, begun in 1998, includes 47 four-year projects, for a total cost of US\$ 15.3 million. Its main purpose is to optimize methods and technologies currently in use in our operations; develop and adapt new technologies to current processes; and create technology for long-distance and depth mining.

This period's most significant achievements included the development, at the conceptual engineering level, of a method for mining primary rock, called "macrozanja" or macro-ditching, at El Teniente, and the industry-level evaluation of a material-management system that includes the use of a jaw-crusher inside the Salvador division's Inca mine.

## **THE INSTITUTE FOR INNOVATION IN MINING AND METALLURGY**

The size, diversity and complexity of the technological challenges facing Codelco have led the corporation to create a subsidiary, structured as a limited company, called IM2 (Institute for Innovation in Mining and Metallurgy SA) which started up in September 1998.

Its main purpose is to develop technologies necessary to Codelco, where the market offers no solutions; improve the effectiveness of technological transfers; encourage and consolidate a climate favorable to innovation; strengthen the development of human resources; and establish alliances with suppliers and scientific research centers, both in Chile and abroad.

Its activities center on formulating and carrying out technological projects and programs with long-term applications, suggested by situations occurring at our divisions. The IM2 contributes skills and synergy that complement those existing at Codelco's divisions, serving as an expert meeting place out of which can grow networks for better use of internal and external capacities.

The Institute has a flexible structure and organizational style and is located in three places: Santiago, the North, the South. At the end of 1998, IM2 activities focused primarily on projects included in divisional portfolios, TC technology and underground mining programs, and in the preparation of an ore processing program.

## **TECHNOLOGICAL ALLIANCES**

Along with strengthening internal skills with regards to technological development, in recent years Codelco began an aggressive plan for alliances with companies and research centers to carry out activities of common interest, sharing costs, risks and benefits.

In 1998, two agreements were signed, one with the Larox firm on filter technologies and the other with the Commonwealth Scientific & Industrial Research Organization to apply modern ore-processing technology developed in this Australian center within Codelco. We also made significant advances in activities agreed upon the previous year with the South African company Billiton, on joint development of bacteria-use to extract copper from complex mines with high impurity levels.

C O D E L C O

# EXPLORATION AND NEW BUSINESS OPPORTUNITIES FOR THE FUTURE



*With a complete program for exploration and joint ventures with other major producers, we continued to enrich our mining base as well as broaden our international exploration activities*

## **MINING EXPLORATION**

In 1998, the Corporation consolidated its exploration activity. The strategy used, which focused on Chile at the same time as we examined other Latin American countries, along with the use of innovative geological concepts and leading-edge technology, has proven very promising.

Spending on exploration reached US\$ 25 million. Among the more important areas explored was the Cordillera de Domeyko and the Chuquicamata and El Salvador areas. For basic exploration, we developed geological models for choosing locations with potential; primarily these were areas covered with materials containing no ore. Of the prospect portfolio, we completed more detailed studies of 33 and we carried out exploration drilling on a total of 22 sites, reaching 29,000 meters.

Geological modeling for the Gaby project –copper porphyry discovered by the corporation in 1996 – was completed, along with an ore estimate and preliminary metallurgical profile based on a 100-meter deep drilling network, for a total to date of 50,000 meters drilled.

## **MINING JOINT VENTURES**

Among the joint ventures that Codelco maintains with third parties, the main one is with the Sociedad Contractual Minera El Abra, in which Codelco holds 49% of the property, while its partner, the Cyprus Amax consortium from the US, holds the remaining 51%.

In 1998, its second year of operations, El Abra sold a total of 226,637 tons of its own and third party copper, generating income of US\$ 392.3 million. The result of these sales, minus cash and operating costs, produced net operating income of US\$ 60.5 million.

Non-operating results were negative in US\$ 70.5 million, due mainly to US\$ 68.1 million in financial charges. Overall, net operating results showed a US\$ 8.7 million loss.

Improvements to efficiency reduced costs from 46.1 cents/pound in 1997 to 43.1 cents/pound in 1998. This cost level makes El Abra one of the world's most competitive copper producers.

Although 1998 production reached 200,000 tons of cathodes, more than the 194,000 tons produced the previous year, this is still 10% below design capacity. For 1999, management is working to resolve technical problems and boost production to closer to the 220,000 ton level. This would also lower costs and thus increase the company's competitiveness and profitability.

In terms of the gold company, Agua de la Falda S.A., of which Codelco holds 49% of shares and Minera Homestake the remaining 51%, both exploration and operations of the Manto project have achieved significant advances. After drilling some 20,000 meters, the known ore reserves increased significantly. Manto operations produced 47.292 ounces with a cash cost of US\$ 189 per ounce. The Jeronimo project is at the pre-feasibility study stage and a pilot project to test its metallurgical qualities is underway.

While 1998 has been a difficult year for carrying out mining joint ventures due to industry-wide trends to undervalue mining assets, because of the low price of copper, this activity has not stopped. We have continued to increase our portfolio of possible business opportunities and thanks to better information about resources through exploration, we have increased the value of the company's different mining assets.

For the San Antonio project, in which the bidding closed with no partner selected, on the basis of new information we decided to divide it into two projects, one for copper and the other gold.

In terms of joint explorations, we would like to single out our agreements with Cominco and Billiton. With the former we set up the Sociedad Minera Yabricoya to explore and operate the prospect by the same name. We reached an agreement with Billiton for exploring the Anillo prospect.

In addition, under Law 19,137 we signed contracts with Río Algom (Inca de Oro), Orvana/Helmo (Quebrada Valiente) and Cyprus Amax (Manto Rojo), thus getting these partnerships up and running.

In another area of operations, at the end of 1997, and after an open tender process conducted nationally and internationally, the corporation decided to sell the Cemento Melón SA company the rights to 99% of the Las Leñas limestone deposit, through an option or promise to set up a mining contractual company for US\$ 11.2 million.

In 1998, Cemento Melón paid for 20% of the option and signed the corresponding option contract or promise to establish a company. In 1999, we will make the decision on whether this agreement should become a joint venture, as provided for by Law 19,137.

Internationally speaking, of special importance was the creation of Codelco's new strategy and business plan. In this area, we continued to seek new mining opportunities in Argentina, Brazil and Mexico. In the last two countries, we completed the necessary steps to evaluate and carry out joint ventures for copper prospects.

#### MINING JOINT VENTURES

	<b>Partner</b>	<b>Type</b>	<b>Status</b>
<b>Operating Projects</b>			
El Abra	Cyprus Amax (EE.UU.)	Copper	
Agua de la Falda	Homestake (EE.UU.)	Gold	
<b>Proyectos de exploración</b>			
Los Andes	AMP (Australia)	Copper	In effect
Pastos Largos	M.M.A.J. (Japan)	Copper	In effect
El Loa	Asarco (USA)	Copper	In effect
Yabricoya	Cominco (Canada)	Copper	In effect
Inca de Oro	Río Algom (Canada)	Copper	In effect
Quebrada Valiente	Orvana/Helmo (Canada)	Gold	In effect
Manto Rojo	Cyprus Amax (USA)	Copper	In effect
Sierra Mariposa	Outokumpu (Finland)	Copper	Being Processed
Anillo	Billiton (South Africa)	Copper	Being Processed
San Antonio	Several interested	Copper/Gold	Under negotiation

## **ELECTROANDINA S.A.**

During the 1998 fiscal year, Electroandina SA showed an after-tax profit of US\$ 27.7 million, of which US \$ 11.9 million corresponded to Codelco, through its directly-owned (34.8%) and indirectly-owned (it holds 49% of the controlling company, Inversiones Tocopilla Ltda) shares.

During this period the SING (Interconnected System of the Norte Grande) generated 6,866 Gwh, 15.3% more than the 5,956 Gwh produced in 1997. Electroandina contributed 38.7% of the power generated in 1998 (2,658 Gwh), down from 48.9% the previous year (2,911 Gwh).

The 253 Gwh drop in generation reflected the impact of the start-up of Edelnor's second coal-steam unit in Mejillones, which began normal commercial operations, and the start-up of Endesa's coal-steam unit belonging to its Celta subsidiary in Patache.

In spite of the above, increased efficiency of Electroandina's generating units allowed it to generate 19.5% more than estimated at the beginning of the year.

At the end of 1997, the company's board of directors approved a development plan to hold its position in the Norte Grande's electrical market, for an investment involving some US\$ 480 million. The plan includes investments in a combined cycle-unit at Tocopilla, to start up at the end of 1999, a combined cycle unit at Coloso, to start up at the end of 2000 or beginning of 2001, and a transmission line to connect the SING with the SIC (Central Interconnected System) in 2002.

During the second half of 1998, the company implemented its development plan, by starting work on its first combined cycle unit (Tocopilla), a contract that was awarded to the Swiss-Swedish firm ABB. The purpose of these investments is to counteract the impact of investment by the competition, both in steam-coal and combined cycle units.

Over the long-term, the new power stations using natural gas will reduce generating costs, giving Electroandina a competitive edge in servicing the new energy demand that results.

C O D E L C O

# MANAGEMENT CHANGES FOR INTEGRATION

- *The start-up of our new, integrated management system, Swing, reflects the changing management and attitudes of Codelco, and constitutes a powerful instrument for competitive consolidation and integration.*

## **SWING PROJECT : A REALITY**

In March 1998, the SWING (Integrated Management Software) project ceased to be an abstract plan and became a new management information system, installed in every division and the Head Office of the corporation. Project design was a major engineering task that included using 230,000 hours to train 5000 Codelco workers.

The tool used by the SWING project was SAP R/3, which demanded a complex effort involving Codelco as a whole, since it requires managing and matching functional, technical and cultural aspects, in both internal and external contexts. This tool affects business-related processes, workers' daily routines and the company's relationship with its suppliers, clients, partner companies and related organizations.

The system integrates all functions, business exchanges and areas in an enormous on-line data base that provides a computer platform to any user with access, facilitating re-engineering of business and the incorporation of the best management practices at every function and process level.

The SWING project was divided into six main modules: finances accounting and controlling; service and material management; investment project management; sales and distribution; equipment and plant maintenance; and human resources. As well, SWING implementation required the development of other projects, covering communications, training, management of change, security, auditing, technology and organizational development.

From a business perspective, the purpose of the project was to modernize management practices within the corporation and along the way to modernize information technology. This meant that we replaced 60% of the software, which had been used by huge computers whose access was restricted to specialists, with a client-server technology, that is, a system based on personal computers connected in a network. This way, we facilitated users' direct and rapid access to information, allowing a better use of corporate synergies as well.

Integrated management software contributes to building a common culture, as it reaffirms both corporate philosophy and the sense of the corporation as a shared project, along with strengthening the company-worker alliance. This goal is achieved by a system that empowers people through training and strengthening their work, thus contributing to workers' professional excellence and encouraging them to participate more and share more responsibility for the business management process.

Among the other benefits of the system: information retrieval and the existence of tools to control losses, a preventative approach, up-to-date inventories, and an information-sharing environment that ensures that the knowledge of a few can be used to benefit the whole, thus creating a common foundation that avoids multiple solutions.

SAP was implemented in stages, starting with the establishment of the parameters to be used, that is, adjusting the tool to the corporation's own particular needs. Then, the massive training of direct users and the implementation of the different modules followed.

In the next phase we worked out solutions for the new needs that came up during the daily running of the system.

Eventually, we will go through an optimization phase covering business processes and organization, to discover and explore new sources and opportunities for improvement. For example, we can mention competence management, corporate administrative of service contracts and relevant investment and the use of shared services. Finally, there will be an SAP/R3 consolidation stage throughout the organization.

## COMPETITIVENESS AND SUPPLIES MANAGEMENT

Throughout the fiscal year, Supplies and Contract management became one of the main pillars of our effort to increase the corporation's competitiveness. These functions were evaluated from a strategic, business-oriented perspective, and led to important breakthroughs in the reduction of costs for purchasing goods and services, in improving relations with partner companies and in modernizing the management of this area.

Among the actions taken to reduce purchasing costs, expansion of the supplies market was particularly important, as we added over 200 new foreign suppliers, many of them in Asia and Latin America, as well as developing corporate supply agreements that have allowed economies of scale and the reduction of purchasing management costs for materials and much-used spare parts by reducing stocks by 8.6%. We also reviewed service contracts to restrict their use to the necessary minimum, seeking rather to get the most out of synergies enhanced by horizontal integration, consolidating packages of equipment for joint negotiation and forming multi-disciplinary groups to evaluate the relevant tender offers. In terms of goods tendered on a corporate level, dropping prices suggested we shorten supply tender deadlines to take greater advantage of market dynamics.

Trends in The Codelco Supply Price Index (CPSI)  
(1998)



In the area of relations with partner companies, in 1998, we invited almost 500 executives, representing 400 companies and business organizations in Chile, to a new meeting with suppliers and contractors, where we encouraged them to contribute to Codelco's competitiveness. For their part the divisions held similar local-level meetings.

Along with companies participating in tenders, we reviewed the relevant regulations in order to reduce any requirements adding no value and making goods and services more expensive.

To improve interaction with supply companies, we created a single corporate registry, with up-to-date information accessible to all divisions. The Head Office's contracts department, which was created during this period, became an instance for communications and support in solving any potential disagreements, thus contributing to the ratification of standard rules and practices for contracting services and establishing our own corporate "style" for handling relations with outside companies.

Management modernization took significant strides forward with the implementation of the SAP R/3 logistics module, the inauguration of our own Internet web site, the use of electronic document exchange with the Customs Service and the development of other logistical support software.

SAP has also allowed us to automate inventory, purchasing and contract management systems, thus bringing significant savings in management costs. In addition, the amount and quality of information that can be obtained through this system, both at the divisional and the general corporate level, has enhanced the development of ever more efficient commercial management.

C O D E L C O

# RESULTS

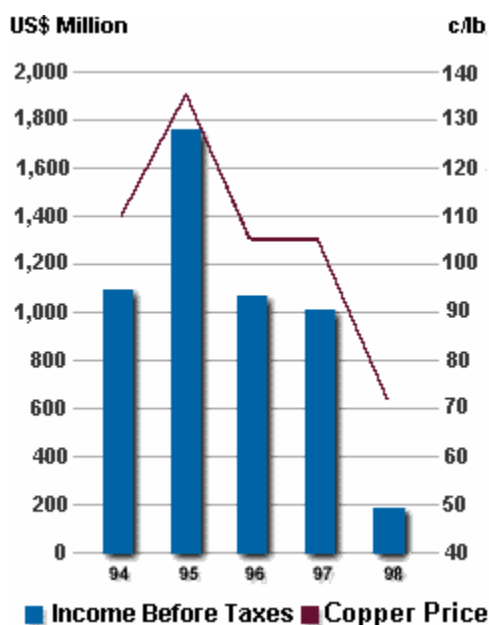
- *Between 1993 and 1998, Codelco increased productivity by 63% and reduced costs by 15.4 cents/pound. If copper and molybdenum prices had been constant, income before taxes for the year would have been the highest for the whole period*

## INCOME BEFORE TAXES

Income before taxes for 1998 reached US\$ 355 million, down US\$ 656 million from US\$ 1 billion in 1997, due to low copper prices. In 1998, the average price of copper on the London Metals Exchange was 75 cents/pound, compared to US\$ 1.03/pound in 1997, a drop that reduced corporate income by US\$ 780 million.

We managed to cushion this somewhat by compensating for US\$ 124 million caused by low prices with management improvements that reduced unit production costs, along with increased exports of copper due, primarily, to the start-up of the Radomiro Tomic division.

### Income Before Taxes and Copper Price



The 1998 price is the lowest for the 1994-1998 period, almost half the maximum, as the graph indicates. Prices and income before taxes have been adjusted using the US Wholesale Price Index (WPI).

In terms of earnings, we achieved a record in 1995, with US\$ 1.8 billion, thanks to the high price of copper and an exceptional price for molybdenum, 2.5 times the amount obtained in 1998. Income before taxes for 1994 and 1996 included extraordinary non-operating income as well: in 1994, the sale of part of the El Abra deposit for US\$ 341 million and in 1996, the sale of the former Tocopilla generating station for US\$ 175 million, both expressed in 1998 currency.

Operating income for 1998 reached US\$ 448 million, US\$ 540 million less than the previous year, due to low copper prices.

Non-operating income showed a loss of US\$ 92 million, down US\$ 116 million from the previous year. This drop was due mainly to higher financing costs, the result of greater indebtedness, less income from subsidiaries and lower recovery of the losses on future market operations suffered in 1993.

In terms of profitability indicators, the operating margin (operating income over total sales) reached 16%, while profitability over assets (income before taxes over total property, plants and equipment) reached 9%.

## TREASURY CONTRIBUTIONS

In 1998, contributions to the Chilean Treasury reached US\$ 355 million, compared to US\$ 1.2 billion the previous year, which breaks down as follow:

### TREASURY CONTRIBUTIONS (US\$ millions)

	1998	1997
Income Taxes	58	424
Law N° 13,196	215	281
Profit Contributions	43	410
Others	39	58
<b>Total</b>	<b>335</b>	<b>1,173</b>

The drop in contribution reflected lower profits, due to depressed prices for copper and by-products. As well, in 1997 we paid more income tax and dividends than required, with part of these sums being recovered in 1998.

In spite of the drop, contributions to the Treasury for the past five years average over US\$ 1 billion annually.

## COSTS

During 1998, corporate costs dropped as compared to previous years.

Total production costs reached 69 cents per pound of copper, compared to 73.5 cents per pound in 1997. Cathode costs, in turn, amounted to 70.7 cents/pound, compared to 75.4 cents/pound the previous fiscal year. These costs don't consider credit obtained from the sales of by-products, which for this period reached 7.8 cents/pound.

In terms of cash costs, these dropped 7.8%, from 48.5 cents per pound in 1997 to 44.7 cents/pound in 1998. Reduced costs and total spending, combined with a 171,580 metric fine ton increase in copper production, and lower operating costs had a favorable effect.

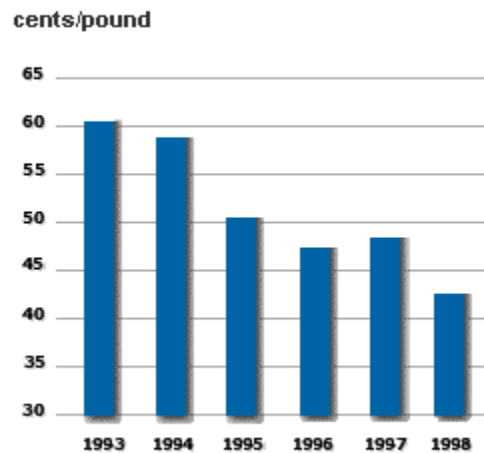
Reduced spending was thanks to: fewer salaries due to staff reductions and lower costs for the Swing project, implemented in 1997, with the main expenditures occurring in that fiscal year. Along with the above, fewer collective bargaining contracts came up for renegotiation, which reduced the bonus payments that mark the completion of process.

In contrast with the drop in total expenditures, some expenses increased, among them depreciation, mainly due to the activation of investment in the Radomiro Tomic project. Other relevant costs are the result of more interest expenses due to higher indebtedness and a drop in interest income, caused by lower balances in the financial assets that generate them.

On the copper market, with prices as depressed as they are today there's no doubt that efforts to maintain the company's competitiveness have focused on cost-efficiency.

Readers may recall that in 1994 the corporation set itself the goal of reducing its cash costs by 10 cents, in constant currency, by the end of the decade, using 1993 costs as our point of reference.

## Cash Cost



We are delighted to have met this goal and surpassed it in 1996, and have since made it even more demanding, that is: to position Codelco in the industry's lowest-cost quartile.

To show this, we have presented our historic cash costs in constant 1998 currency, using the US Wholesale Price Index (WPI) as our reference. Also, to avoid distortions, by-product credit estimates use the 1998 price for molybdenum.

In accordance with the above, cash costs for 1993 were 60.1 cents per pound of copper, while in 1998 they were 44.7 cents/pound, 15.4 cents less than the reference price. Every cent represents a savings of US\$ 31 million.

### **Peso Revaluation**

Between 1993 and 1998, the Chilean Consumer Price Index (CPI) rose 44.4%, while for the same period the peso rose 13.9% against the US dollar. The impact of these variations on the company's spending in pesos amounted to about 26.8%.

If Codelco's expenditures in pesos for 1993 are adjusted to account for the rise in the CPI and the exchange rate, on one hand, and on the other hand, while other outlays are corrected using the US-WPI, the cash cost of 60.1 cents/pound for 1993 rises to 67 cents/pound, compared to 44.7 cents/pound in 1998. In this sense, the 22.3 cent drop in costs really adds up to a 33% reduction.

## PRODUCTION AND SALES

### Production

For 1998, copper production reached 1,500,481 metric fine tons, 174,130 tons, or 13%, more than was produced in 1997. This increase is due mainly to the start-up of the Radomiro Tomic mine. Copper production for 1998 and 1997 includes a 49% share corresponding to Codelco's ownership of that portion of El Abra's production.

### PRODUCTION BY DIVISION

	Copper		Molybdenum	
	1998	1997	1998	1997
Chuquicamata	650,154	650,210	14,861	12,564
Radomiro Tomic	161,896	4,049	-	-
Salvador	88,143	88,297	1,740	1,352
Andina	163,998	145,495	1,622	1,751
El Teniente	338,574	343,134	3,385	3,181
El Abra (Codelco's share)	97,716	95,166	-	-
<b>Total</b>	<b>1,500,481</b>	<b>1,326,351</b>	<b>21,608</b>	<b>18,848</b>

The Radomiro Tomic division stands out for the level reached during its first year of production: 161,896 tons. Chuquicamata and Salvador each maintained their 1997 production levels during 1998.

The 18,503 ton increase at the Andina division (12.7%) is the result of the expansion project, which started up in November, the goal of which is to double the mine's ore-treatment capacity. The 4,560 ton drop experienced at El Teniente is the result of a drop in average ore-grades, cushioned by improved treatment.

#### copper production and ore-grades

In 1998, the ore-grade was 1.07%, down from 1.14% of the previous year. This significant drop in average ore-grade is due to the fact that the Radomiro Tomic has a lower grade than the deposits belonging to other divisions.

In terms of molybdenum, 1998 production rose 14.6%, 2,760 tons, over 1997.

From 1994 to 1998, the corporation's copper production rose from 1,134,055 mft to the above-mentioned 1,500,481 mft. Of this increase, Radomiro Tomic contributed 161,896 mft, El Abra (Codelco's share) 97,716 mft, Chuquicamata 43,943 mft, El Teniente 29,724 mft, Andina 27,632 mft, and Salvador 5,515 mft.

To counteract the effect of the natural decline in ore-grades, we have invested in highly profitable projects to improve treatment recovery rates. The production increase is partly due to this, along with contributions from new technologies applied to deposits and improvements in operating management.

New technological applications have improved our knowledge of deposits and our ability to plan our mines, allowing us to operate low-cost projects that help to increase production. In terms of operating management, a significant increase in recovery levels at concentrators and smelters stands out.

### Sales

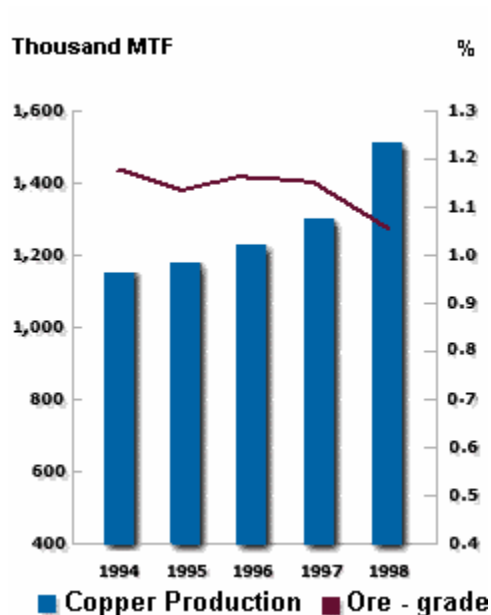
In 1998, we dispatched 1,546,129 mft of our own and third-party copper, 8.3% more than the previous year.

Sales of our own copper reached 1,338,687 mft, 112,700 mft more than 1997 (1,225,987 mft). Income from these sales, due to low prices, was lower, at US\$ 2.1 billion, as compared to US\$ 2.7 billion the previous year.

Third-party copper sales totaled US\$ 325 million, with 207,442 mft shipped, compared to US\$ 444 million, or 201,500 mft the previous year.

Sales of by-products, that is, molybdenum, metal doré, sulfuric acid, Talleres division products and others, reached

US\$ 289 million, down US\$ 40 million from 1997. Our main by-product, molybdenum, generated income of US\$ 138 million, with 20,123 mft shipped. The amount shipped rose 1,518 mft over the previous year, but market prices were lower at US\$ 6.8/kilogram, down from US\$ 9/kg in 1997.



**SALES OF COPPER BY TYPE**  
(Thousands of mft)

	<b>1994</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>
Cathodes	862	915	950	1,141	1,268
Fire Refined	121	120	119	126	130
Blister	82	51	67	49	46
Concetrates	99	130	113	111	102
<b>Total</b>	<b>1,164</b>	<b>1,216</b>	<b>1,248</b>	<b>1,427</b>	<b>1,546</b>

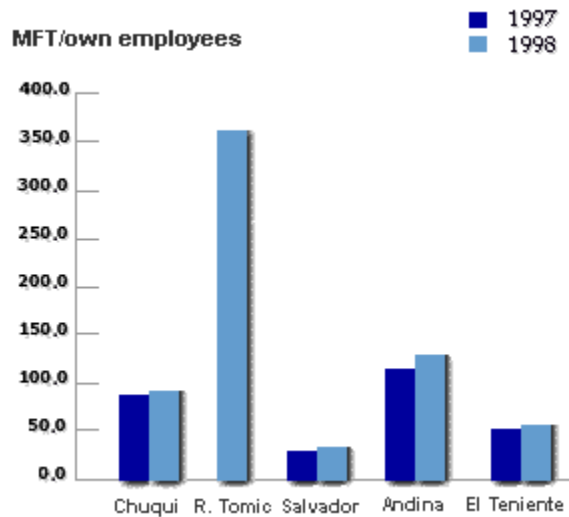
Between 1994 and 1998, the composition of copper sold has shifted toward higher value-added products. In 1994, cathodes represented 74% of total copper shipped and concentrates 9%. In 1998, cathodes were 82% of sales, while concentrates dropped to 7%. To achieve this improvement, we increased our electro-refinery capacity and expanded SX and refinery plants.

## PRODUCTIVITY

### Workforce Productivity

Productivity estimates refer to the ratio between copper production for a period and the number of staff at the same time. There are two relevant ratios: Corporation alone and total. The first covers the Corporation's own employees, while total productivity includes that of its own employees and those working for operation contractors.

### Productivity by Division



### Productivity by division

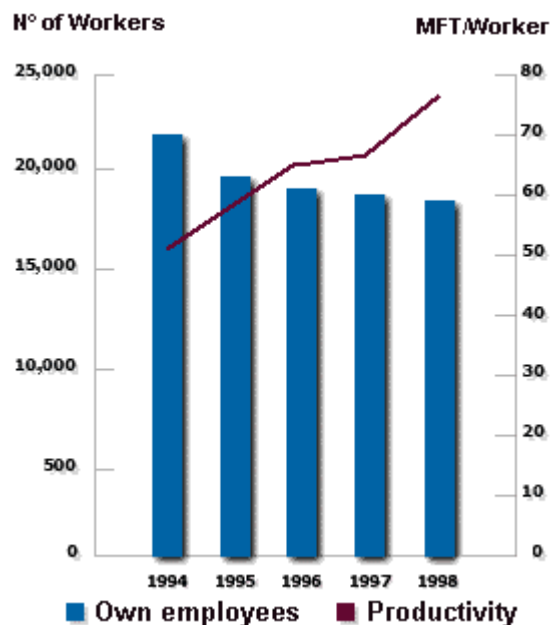
The company's average staff for 1998 was 18,418 people, that is, 166 people fewer than the 18,584 employed in 1997. By the end of 1998, the corporation's own employees numbered 18,258, compared to 18,496 in 1997. The divisions reduced their staff, except for those that increased their activity, that is, Radomiro Tomic and Andina.

Considering the above and excluding El Abra's share of copper production in 1998, the corporation's own productivity rate reached 76.2 mft per worker, a 15% increase over the 66.2 mft/worker rate for the previous

year. Every division showed an improvement for this period. We should note that this figure should not be used to compare different divisions, given the different forms of operation and product portfolios.

With regards to total productivity, this ratio improved by 10.6%, from 45.3 mft/worker in 1997 to 50.1 mft/worker in 1998.

### Productivity



Given the evolution of these indicators in the corporation as a whole, we can see that productivity of our own employees rose over 47% between 1994 and 1998, going from 51.8 mft/worker to 76.2 mft/worker, as mentioned. Total productivity for the same period rose 42%.

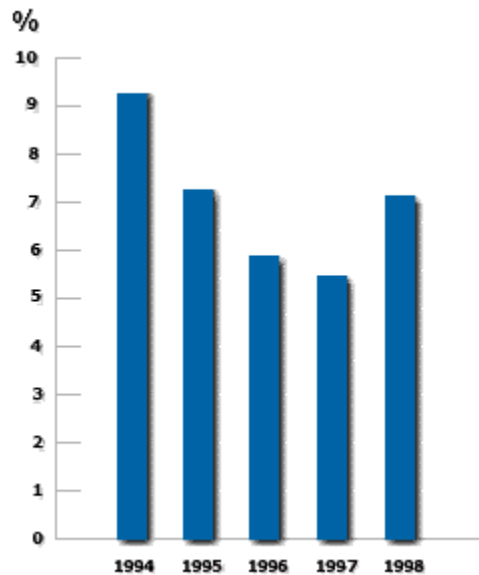
### Risk Prevention

From a safety point of view, 1998 was not a good year for the company. Fatal accidents affecting our own and contractors' staff affected our accident rates.

The accident frequency rate reached 7, up from 5.4 in 1997. In terms of the severity of work-related mishaps rate, in 1998 it rose to 1,152, compared to 664 in 1997.

As a result, we have made occupational safety plans a high priority, given their direct impact on physical integrity and life.

## Work - Related Accidents



Between 1994-1998, we can see some advances in terms of occupational safety, with the frequency rate moving from 9.2 in 1994 to 5.4 in 1997. In terms of seriousness, the lowest rate for this period was that mentioned above for 1997, 664.

## INVESTMENT

In 1998, the company invested US\$ 675 million. Of this total, US\$ 291 million went to the Andina division, whose main project was its own expansion.

As compared to 1997, investment dropped US\$ 198 million, due to completion of the Radomiro Tomic, where the main investment occurred the previous year.

Between 1994-1998, the corporation invested a total of almost US\$ 3 billion (in 1998 currency). Most of this investment, about 64%, went to developing projects. The Radomiro Tomic, Andina expansion, both mentioned above, and El Teniente's Esmeralda mine project all fall within this category.

**INVESTMENTS BY GOALS**  
(US\$ millions, 1998 currency)

	<b>1994-1998</b>
Geological exploration	87
Developing Projects	1,903
Environment	610
Equipment replacement and renovations	234
Others	158
<b>Total</b>	<b>2,992</b>

The Chuquicamata division increased its electro-refinery capacity by 20,000 tons per year, as well as developing a low-grade sulfur project, using solvent extraction technology, allowing the delivery of 15,000 tons of SX-EW cathodes per year.

At the Salvador division we can mention the heapleaching production line, capable of producing 25,000 tons per year of grade A electro-won cathodes and the complete modernization of the concentrator plant, among other projects.

Environmental investments were the second most important, with the largest project being the Ovejerías tailing dam at the Andina division, developed by the mining waste management and control department of the expansion project.

In terms of controlling atmospheric pollution emissions from smelters, at the Chuquicamata division its Pierce-Smith converters for capturing and treating primarily arsenic and SO<sub>2</sub> gases stand out, while at the Salvador division, the MALIGAS (gas management and filtering) project at the Potrerillos smelter has dramatically reduced its gas escapes. At the El Teniente division, investment went into building and starting up its first sulfuric acid plant.

## **FINANCING**

In 1998, the corporation obtained credits for US\$ 500 million, mainly to finance the investment plan. One of these was a syndicated loan for US\$ 300 million, over five years, and another was a US\$ 200 million bridge loan, over two years. These loans achieved interest rates of Libor plus 0.30% and favorable conditions, above all considering the impact of the Asian crisis on the world's financial system.

In 1996, the corporation obtained a syndicated loan of US\$ 500 million over five years. This loan received the lowest rate afforded any company in Latin America, Libor plus 0.225%. These resources went to restructuring short and long-term debt.

At the end of the 1998 fiscal year, income before interest, taxes, depreciation and amortization (EBITDA) reached US\$ 801 million, while bank debt over net worth reached 58%.

The characteristics of these credits obtained by the company are the direct result of its stability and prestige within the world's banking system, which was ratified by its 1997 risk rating and maintained throughout 1998.

Standard & Poor's gave Codelco an AA- risk rating for local currency and A- for foreign currency, while Moody's classified Codelco Baa1. The corporation's risk ratings in foreign currency are directly tied to Chile's country-risk. Both ratings rank Codelco among the best-rated mining companies in the world.