

# ARGENTINA

*By George Sanders and Nivaldo Rojas*

**A**rgentina got caught in the post September 11 world change when its fiscal crisis just did not seem that important anymore to the US, the International Monetary Fund or the World Bank. The country was left hanging out to dry with no fresh loans to keep it going, thus precipitating history's largest government default followed by an abrupt and messy devaluation of the Argentine peso.

The one-to-one peso-dollar parity is no more - a victim of the US dollar's strength over the past few years. During this time, Argentina's government spending kept increasing, and government borrowing finally became unsustainable. The IMF continued to loan money to the country, but Argentina had not been meeting the IMF's spending reduction goals for well over a year. The strong dollar kept interest rates rising and choked small businesses to death, and while Argentina's high dollar-denominated prices fell, there were no jobs being created. The gross national product, shrinking since 1998, is forecast to go into free fall at a minus 4.9% or more this year.

The 'Alliance', which won power by a wide margin in 1999, did not hold together, and President Fernando De La Rúa, from the Unión Civica Radical party, was forced out of office in late 2001 as his government, first, openly contemplated devaluation, and then had to defend the country's banking system by freezing the dollar assets in peoples' savings accounts. This was the last straw, and the middle class joined the unemployed poor in massive street protests that toppled the government.

The President's chair was occupied by three separate officials before the runner-up in the 1999 elections, former Buenos Aires Province governor Eduardo Duhalde, assumed the presidency in February 2002, as the last hope

to hold civil order together in the country. Duhalde, a bitter rival of former President Carlos Menem within the Peronist party, had campaigned on a populist platform that included a call to stop payment on Argentina's public foreign debt, and it was Argentina's historic default that led to De La Rúa's downfall. President Duhalde's first move was a devaluation of the Argentine peso, formerly tied one-to-one to the US dollar, with a two-tiered exchange rate that quickly collapsed into a free-floating peso. The public, weary of so many changes, seems willing to let President Duhalde try to get the country's economic house in order by mobilising the well-organised Peronist political machine to push legislation that will try, yet again, to cut the bloated provincial budgets as a condition for more IMF loans.

President Duhalde still faces a crisis of historic proportions as he is forced to play off the foreign financial institutions and multinational companies, who've seen their Argentine assets shrink, against the everyday people who have had their dollar savings first frozen, and then forcibly converted into floating pesos. All this is happening against a backdrop of almost constant Buenos Aires street protests and provincial highway closures by common people disaffected by the lack of jobs and the seizure of their formerly secure savings dollars. Unemployment is very high, and nearly half of the population now lives below the poverty line — defined by a family's ability to pay for essential goods and services such as food, rent and electricity.

As far as mining goes, 2002 will have a silver lining, as three mid-level silver producers have entered Argentina's mining scene and Anglo's Cerro Vanguardia mine processed its millionth tonne of ore from its high-grade silver-gold quartz veins. Silver Standard Resources acquired the Diablillos project in northern

Argentina and purchased the Manantial Espejo project, and brought in Pan American Silver as a partner to develop that property. Yamana Resources has repaid its debt to Northgate exploration by selling its bonanza-grade Martha silver mine, which produces direct-shipping ore, to Coeur d'Alene Mines. The Pirquitas silver-tin project is now in the hands of Sunshine Mining's creditors, and sale of this property is likely soon.

Far overshadowing all the above projects combined is Barrick's giant Pascua-Lama-Veladero project, which has been consolidated into one with the acquisition of Homestake Mining. Although development of the project has been deferred until gold prices improve, studies are continuing on the Veladero portion in efforts to find the most economic mining plan for an integrated gold mine that also has the potential, at its full scope, to be the world's largest silver producer. Meridian Gold Inc. has acquired Brancote Holdings plc and has announced its intention to fast-track the Esquel gold-silver project to commercial production by 2004.

On the copper side, a long awaited mill expansion to boost production 30% is under way at the Bajo de la Alumbrera mine. Cambior's El Pachón project has ended up not in the hands of its neighbour, the Luksic Group at Los Pelambres, but instead has been purchased by Noranda. BHP Billiton, which holds the Agua Rica project in joint venture with junior Northern Orion, is forming an Argentine company, Agua Rica SA, and is rumoured to be preparing a feasibility stage drilling campaign, while MIM Holdings has recently reviewed the property's potential.

Common wisdom argues that mining exploration and development will now be affordable in Argentina with the floating peso, but there are still significant hurdles to be overcome in regard to security of tenure and there will always be pressure to increase taxes on mining. Almost immediately after devaluation, the nation's petroleum exports were assessed a new 20% tax. The Mining

Secretariat is assuring the world that the country will respect its law giving 30 years of tax stability to new mining projects, and it is to be hoped that this will be the case.

The government has been busy with other concerns, and reform of the mining investment law passed by both houses of the national legislature is waiting for the executive branch of government to write the regulatory portion of the law before it is fully implemented. Chief among the promised reforms is the long awaited yearly reimbursement of VAT on exploration expenditures, but the refunds are still only 'credits' and not cash. The new reforms also offer a choice between formerly obligatory accelerated amortisation and regular amortisation for tax purposes, and will now permit mining companies to lease properties.

Thirty-year tax stability, part of the original mining investment act passed over ten years ago, has been infringed upon by subsequent governments, and the new legislation further defines which taxes will be covered by the stable tax regime guaranteed in the original legislation. Tax stability is a fact for existing mines in Argentina, but locking in a stable 30-year 'tax stability' for a new mining project will be a challenge in the Argentina of today. Exporters are now required to deposit their foreign currency earnings with the central bank, and new taxes and duties on exports and other financial transactions have been enacted and are subject to change with the unstable political and economic situation.

#### Value of Argentina's Mineral Exports (US\$ million)

1998	659
1999	775
2000	711
2001 <sup>p</sup>	786
2002 <sup>e</sup>	810

*Data from Argentina's Energy and Mining Secretariat*

<sup>p</sup> Provisional; <sup>e</sup> estimated

The World Bank's PASMA assistance programme ended in 2001. PASMA provided some of the key mining provinces in the northern and central Cordilleran portions of Argentina with the beginnings of modern tenure-tracking systems. Regional mining environmental baseline studies were also initiated under the programme, but since the PASMA monies were loans from the World Bank, they have become part of the public debt default, and any extension of the program is unlikely in the short term. Foreign assistance programmes by universities and the governments of Canada, Australia, the US, Germany and Japan are continuing, but airborne geophysical data acquisition by Segemar, the federal geological survey, has been severely curtailed by the economic crisis.

Exploration expenditures have dipped from a record US\$140 million in 2000 to only US\$40 million in 2002, and metres drilled have fallen from a record high of 240,000 m in 1998 to an estimated 150,000 m this year. The yearly value of Argentina's mineral exports has reached a plateau of approximately US\$800 million, far behind the oil and gas sector, and represents less than 1% of the country's GDP and approximately 3% of its exports.

Argentina's copper production, mostly from the Bajo de la Alumbrera mine, is approximately 200,000 t/y. Gold production, mostly from Bajo de la Alumbrera and the Cerro Vanguardia mine, totals about 1.0 Moz/y. Silver production, mostly from Cerro Vanguardia and Mina Aguilar, got a boost from Mina Martha's direct shipping ore, and is now about 4 Moz/y.

#### Exploration Expenditures and Drilling

Year	Expenditures (US\$ million)	Metres
1998	100	240,000
1999	80	235,000
2000	140	230,000
2001 <sup>p</sup>	50	165,000
2002 <sup>e</sup>	40	150,000

*Data from Argentina's Energy and Mining Secretariat*

<sup>p</sup> Provisional; <sup>e</sup> estimated

#### Bajo de la Alumbrera

Following a review of long-term planning options early in 2001, a low-cost plant expansion at the Bajo de la Alumbrera mine is under way and is expected to be commissioned in the June quarter of 2002. The expansion includes the installation of additional grinding capacity and a pebble crushing circuit, at an estimated capital cost of US\$37 million.

Commercial production from the US\$1.2 billion project began in February, 1998 and has been averaging 610,000 t/y of concentrate, containing approximately 166,000 t of copper-in-concentrate and 510,000 oz of gold contained in concentrate and doré. Processing capacity will now be increased by 30%, boosting annual average production levels to 190,000 t of copper-in-concentrate and 600,000 oz of total gold over eight years before declining as low grade stockpiled ore is processed. Ore reserves will be depleted more quickly and, as of 2002, the remaining mine life is projected to be 9.5 years. The ore reserves were revised in June 2001 and stood at 385 Mt in the proven and probable category, averaging 0.53% to 0.57% Cu and 0.63 g/t to 0.67 g/t Au. Current total mining rates from the open-pit mine are approximately 120 Mt/y. A slump in production during the year 2000 has been completely reversed, with ore grades, mill throughputs and availabilities, and metallurgical recoveries all having significantly improved.

The company established to operate the mine and associated facilities is Minera Alumbrera Ltd (MAA), which is controlled 50% by MIM Holdings and 25% each by Río Tinto and BHP Billiton. MAA pays a 3% after-cost royalty to Catamarca Province as per federal guidelines, now fully adhered to by the provincial government. Mining takes place under a joint-venture agreement with the owner of the mineral rights, Yacimientos Mineros de Aguas de Dionisio (YMAD), a statutory corporation with representatives from the provincial government of Catamarca, the University of Tucumán and the national government of

Argentina. The mining agreement gives YMAD 20% of the net (before tax) proceeds once the project capital plus interest has been repaid on the US\$1.2 billion mine project. A five-year agreement, whereby YMAD has been receiving US\$2 million annually in advance payments on its net proceeds share, is set to expire this year.

In the 2001 financial year, BHP Billiton took an approximately US\$21 million write-off on its investment in its 70%-owned Agua Rica copper deposit lying 35 km west of the Bajo de la Alumbrera mine in Catamarca Province, which it shares with Northern Orion (30%). The discovery is on privately staked ground with no provincial ownership to burden project economics. Unlike Bajo de la Alumbrera, Agua Rica contains a copper enrichment blanket, but it is perched on rugged desert hillside terrain that presents engineering challenges. Positive metallurgical tests from drill holes and three bulk sampling adits were obtained before the project was shut down in 1998 prior to a full feasibility study.

The deposit is huge, and the latest global resource, at a 0.4% Cu cutoff, is 750 Mt averaging 0.62% Cu, 0.23 g/t Au, 3.2 g/t Ag and 0.037% Mo. The high-grade part of the deposit at a 1% Cu cut-off contains a resource of 60 Mt at 1.3% Cu and at 1.74% Cu equivalent when Au and Mo credits are included. Despite these grades and tonnages, BHP, and later BHP Billiton, has been trying to sell its portion of Agua Rica since exploration activity ceased. The joint venture partners are forming a separate holding company, Agua Rica SA, to administer the project, and are rumoured to be preparing a new drilling campaign to complete a feasibility study. MIM Holdings, the logical company to develop Agua Rica, recently undertook a detailed review of the project.

Mina Aguilar (Comsur) in northwest Argentina has constructed a US\$5 million natural gas pipeline connecting the mine with the Gasoducto Nor-Andino at Tres Cruces. The existing generator is being converted to

natural gas to power a brand new US\$5.5 million processing plant. The upgrades are scheduled to be on line by July, 2002 and while mine production will remain the same, there will be major improvements in efficiencies. Total investment in the pipeline, plant and generator will be approximately US\$12 million. The mine produces approximately 2,000 t/d of combined 11% Pb-Zn ore grading approximately 3.2% Pb, 7% Zn and 85 g/t Ag from two underground ore bodies, Cerro Aguilar and Esperanza. A new processing plant, expected to cost US\$5.5 million, has been planned. The mine has a reserve-plus-resource base of approximately 11 years. Jujuy Province allows a 1% deduction of exploration expenses from the 3% after-cost royalty.

Noranda recently purchased El Pachón, a porphyry copper deposit in San Juan Province, from the owners Cambior and Comsur, and has indicated that it will begin exploring new targets on the property from its new exploration office in San Juan. El Pachón is part of a huge porphyry copper system lying

#### **Selected Argentine Mineral Production (t except where stated)**

<b>Commodity</b>	<b>1999</b>	<b>2000</b>	<b>2001<sup>p</sup></b>	<b>2002<sup>e</sup></b>
Gold (kg)	38,515	25,954	30,630	33,145
Copper	210,126	145,197	191,566	218,100
Silver (kg)	73,788	78,271	152,802	113,027
Zinc	34,192	34,858	39,703	36,358
Lead	14,256	14,115	12,334	12,931
Borate	565,647	512,624	673,320	650,000
Bentonite	128,810	125,686	130,000	128,000
Gypsum	492,870 <sup>p</sup>	560,000	425,600	400,000
Lithium Carbonate	1,575	2,161	0	900
Lithium Chloride	2,794	5,182	4,512	4,500

*Data from Argentina's Energy and Mining Secretariat*

<sup>p</sup> Provisional; <sup>e</sup> estimated



along the Chile-Argentina border and was the first 'straddle' project envisaged by the Argentina-Chile Mining Integration treaty. Mining began at Los Pelambres on the Chilean side in 1999, and the US\$1.36 billion project owned by London-registered Antofagasta plc (60%) and a consortium of Japanese smelting companies (40%) is now mining 114,000 t/d of copper ore to produce well in excess of 300,000 t/y of copper.

This is one of the world's largest porphyry copper systems. Cambior conducted a feasibility study in 1997 and established reserves of 880 Mt, at a cut-off of 0.4% Cu containing 0.62% Cu, 0.015% Mo, 0.02 g/t Au and 2.4g/t Ag. Last year, it was rumoured that the Luksic group would purchase El Pachón, since the mineral would have to pass through Luksic property. Noranda is believed to have come to an access agreement with the Luksic group as part of the legal and financial due diligence requirement, and the purchase of El Pachón has now been completed.

### **Pascua-Lama-Veladero**

Following the acquisition of Homestake and its 60% share of the Veladero project in San Juan Province, Barrick is concentrating all its design engineering and feasibility efforts on Veladero, where the volcanic-hosted mineralisation is oxidised and of higher grade than the metallurgically more complex gold-silver mineralisation lying in the basement granites in the Pascua-Lama portion of this huge district, which is now completely controlled by Barrick. The Pascua-Lama project looked as though it was going ahead in the year 2000, but by year's end Barrick had made the decision to stop development work, take a US\$790 million write off, and wait until gold and silver prices improved.

At least US\$39 million will be spent at Veladero this year, mostly for metallurgical test work including a bulk- sampling adit and pilot heap-leach testing on site, plus continued work for environmental permits. An updated feasibility study is expected to be completed soon, bringing Veladero into compliance with

US reserve reporting standards. No results have been released on plans to integrate the separate projects into one, but the Pascua-Lama project alone was projected to cost US\$1.25 billion while Veladero was to cost at least US\$608 million. It is likely that production will now begin from heap leaching at Veladero at a considerably reduced initial project cost.

At the end of 2001, Pascua-Lama had reserves of 17.5 Moz of gold and 594 Moz of silver, and Veladero had reserves of 8.0 Moz of gold and 130 Moz of silver.

As of January 1 2001, the Veladero project's measured open-pit reserves at a cut-off grade of 0.5 g/t Au totalled 194.3 Mt averaging 1.46 g/t Au and approximately 21 g/t Ag. There is a high-grade portion of the deposit that contains 18.5Mt at 4.97 g/t Au and 47.9 g/t Ag. As of December 31, 2000, the main Pascua-Lama deposit had 269 Mt of proven and probable reserves grading 1.95 g/t Au and approximately 66 g/t Ag at a 1.1 g/t Au cut-off grade. The separate Filo Norte area, near the limit with the adjacent Veladero project, contains an additional 16.3 Mt of proven and probable reserves averaging 1.2 g/t Au and approximately 23 g/t Ag.

On the Chilean side, the Pascua project is the northernmost altered area in El Indio District of Chile's Fourth Region. It was called the 'Nevada' prospect by its discoverer, St Joe Minerals, and it was part of El Indio mine package that Barrick obtained by taking over Lac Minerals in the early 1980s. St Joe also staked the Lama prospect on the Argentine side of the border during El Indio district exploration in the early 1980s. In 1996, Barrick bought the contiguous Lama property in San Juan Province on the Argentine side of the international border from St Joe's successor company in Argentina, Minera Aguilar, controlled by Comsur.

The Veladero project lies entirely within Argentina at the eastern end of the mineralised trend, and is a Provincial Reserve Area. During

the mid-1990s Barrick successfully negotiated exploration rights directly with the San Juan provincial government for a number of these Reserve Areas. Concurrently, however, the San Juan provincial mining company, Instituto Provincial de Exploración y Explotación Minero (IPEEM), made a separate deal with junior explorer Argentina Gold Corp. for the same properties. After the dust settled, Barrick was left with a 40% stake in the Veladero Reserve Area, Argentina Gold had 60%, and exploration proceeded under a joint venture arrangement with IPEEM, which holds the mineral rights. Following discovery of significant gold-silver mineralisation, Argentina Gold sold its 60% share of Veladero to Homestake in 1999, and Barrick's recent takeover of Homestake completes the consolidation of this huge district.

Following federal guidelines, production from both the Lama and Veladero portions of the project will pay a 3% after-cost royalty to the San Juan provincial government. In addition, the provincial mining company, IPEEM, will have an undisclosed percentage stake of the Veladero net (before tax) proceeds once the project capital plus interest is repaid.

The Pascua-Lama part of the district straddles the Chile-Argentina border and was declared a single mining operation area under the Pascua-Lama Protocol, signed in 1998 as a precursor to the full Mining Treaty that has now been fully ratified by both countries. Border checkpoints are located on either side of the operations area, and Barrick can freely move people and equipment across the border without having to undergo immigration or customs proceedings. Barrick explored the area underground via a 1 km tunnel from the Pascua project on the Chilean side to the Lama project on the Argentine side, a unique occurrence in the world of mining. Veladero lies entirely within Argentina, and the heap leaching, mine infrastructure and future mill will all be located on the Argentine side. The Chile Argentina Mining Treaty allows for the accounting of ore produced within the respective sovereign territories for tax purposes.

Meridian Gold Inc. has made an offer worth US\$229 million to acquire Brancote Holdings plc and its principal asset, the Esquel gold project in west-central Patagonia. Brancote's directors have recommended the offer and it awaits the decision of the shareholders. The project is now in the feasibility stage, and commissioning could begin early in 2004.

Minera El Desquite is the local Argentine company that holds the mineral rights to the Esquel project which is located in rugged terrain near the town of Esquel in Chubut Province. Through granting of stock to Australian entrepreneur Kerry Packer, Brancote increased its ownership of El Desquite earlier this year from 60% to 76.4%, and Mr Packer became Brancote's largest single shareholder. The remaining interest in Minera El Desquite lies with Argentina's Miguens-Bemberg family, principal owners of the large industrial Bemberg Group. Should the merger with Meridian go ahead, Brancote has announced that it has reached an agreement with the Miguens-Bemberg family to acquire their share.

Engineering consultants Pincock, Allen and Holt of Denver, Colorado, completed a pre-feasibility study for the Esquel gold project in November, 2001, based upon measured and indicated reserves (open pit) converted into mineable reserves of 10.4 Mt, (at a cutoff grade of 1 g/t), averaging 8.5 g/t Au and 15 g/t Ag. These reserves will come from three pits, which will encompass all of the Galadriel, Galadriel Sur, and Julia and Elena Norte systems. In the pre-feasibility study, mining was projected to last five to six years at a mining rate of 1.8 Mt/y to produce 500,000 oz/y of gold equivalent, with an additional four to five years of mine life based on inferred resources. Meridian Gold is said to favour a lower mining rate, of the order of 300,000 oz/y Au-equivalent. The total capital cost of the project has been estimated at US\$131.5 million. The pre-feasibility study stated that there is a high degree of probability that the reserves will increase substantially with continued exploration drilling. Phase five

feasibility drilling is nearly complete, and by April 2002, a total of about 72,000 m had been drilled on the Esquel Gold Project, 60% being diamond core drilling. This includes ongoing geotechnical and metallurgical drilling for the feasibility study.

Empresa Argentina de Cementos Armados (EACA) held claims close to Esquel in the 1980s, and devoted its efforts to underground exploration and minor gold production at the Huemules mine, some 35 kms to the east. It was assisted by a UN-sponsored mining development programme and still holds the Huemeles claims.

Sunshine Mining optioned the EACA properties in the early 1990s, and late in its exploration programme, following an unsuccessful drilling programme at the higher profile Huemules property, made an initial discovery on the Estancia El Siberia (first called the Natasha prospect and later the La Joya del Sol project). Sunshine drilled out an estimated resource of 209,000 oz of gold and 1.4 Moz of silver at 5.8 g/t Au and 39.5 g/t Ag. Minera El Desquite subsequently optioned the property in the mid-90s, and additional exploration led to the discovery of the Galadriel - Julia vein system, 6 kms to the south. The pre-feasibility study was based on this vein system and it forms the nucleus of the Esquel feasibility study.

The Galadriel-Julia vein system is hosted in volcanics and comprises a structure extending for 2.4 km and containing a number of separate shoots. The structure lies within a 1 km wide by 20 km long mineralised corridor at an altitude of some 1,500 m, immediately to the east of the main southern Andean Cordillera. The gold and silver ores are amenable to conventional methods of beneficiation with high recoveries. Minera El Desquite recently returned to the original discovery area to carry out further diamond drilling to define and upgrade the resource. In the course of this work the highest grade intercept to date on the project was obtained - 10 m at 28.1 g/t Au, including 3 m at 71.1 g/t Au.

A joint venture between Golden Peaks Ltd and Mitsubishi Materials Corp. continues to drill mineralised quartz veins within the 2.5 km long Vallecito structure within the Precambrian rocks of the Sierra de las Minas in the eastern portion of La Rioja Province. Former partner Primo Resources International elected not to participate in the project and has been diluted to a 3% net smelter royalty.

Development work by Mauricio Hochschild & Cia of Lima, Peru, is scheduled to begin soon on two 45° decline shafts into the Huevos Verde high grade Au-Ag vein on Minera Andes' El Pluma/Cerro Saavedra property in northwestern Santa Cruz Province, another of the epithermal vein systems in the volcanic plateau called Deseado Massif. Drilling during 2001 confirmed potential to develop a significant mineral resource in the vein. Hochschild is a privately held polymetallic and precious metals mining company specialising in mining vein-hosted metal deposits. The Huevos Verde structure is at least 2.2 km long, and Hochschild is also exploring other mineralised structures on the property.

### **Cerro Vanguardia**

The Cerro Vanguardia open-pit silver-gold mine in southern Patagonia's Santa Cruz Province is now in its fourth full year of production, and reached the millionth tonne milestone of high-grade ore mined during 2002. Ownership of the US\$270 million mine lies with AngloGold (46.25%), Argentine company Perez Companc (46.25%) and the Santa Cruz Provincial company Fomicruz (7.5%). In addition to the direct provincial participation, the Cerro Vanguardia mine pays an after-cost royalty to Santa Cruz Province of 1% of the value of mine production minus all production costs following federal guidelines. Production was approximately 285,000 oz gold and 1.58 Moz silver in 2000 but output has dropped since. Reserves as of December 31, 2000, stand at 8.5 Mt averaging 9.4 g/t Au and 130 g/t Ag at a cut-off grade of 4.0 g/t Au. These figures do not reflect the approximately 1 Mt of additional reserves at a grade of 8 g/t Au and 120 g/t Ag

that were discovered in 2001 by a combination of diamond and reverse circulation drilling.

The mine draws ore from six separate pits on distinct epithermal, low-sulphidation quartz veins hosting bonanza-type silver-gold mineralisation in the largest mineralised vein-swarm discovered to date in the Deseado Massif. The metallurgy is simple, and the doré produced is 9:1 silver:gold. Cerro Vanguardia's mining method has become the model for development projects in the region at Manantial Espejo, Mina Martha, Martinetas, Cerro Saavedra-El Pluma and other, less advanced, prospects.

Since Argentina's mining law reforms in the early 1990s, the provincial mining company Fomicruz has been prevented from acquiring any new mineral rights, although it continues to tie up many thousands of hectares of prospective ground in the province. None of the other important projects under development in Santa Cruz have direct provincial participation, and will only pay 1% of the value of mine production minus all production costs following federal guidelines.

Silver Standard Resources has consolidated ownership of the Manantial Espejo Project in southern Patagonia by, first, acquiring Barrick's 20% direct interest for shares plus certain royalties, and then purchasing the rest of the project from Black Hawk Mining. Silver Standard, in turn, has now agreed to sell 50% of the project to Pan American Silver Corp. This will be Pan American's first project in Argentina. The project covers the entire Manantial Espejo district, discovered over a decade ago by St. Joe Minerals (now Barrick) with no intervening claims and no involvement by the Santa Cruz provincial mining company. These factors combine to enhance the already attractive 'bonanza' type silver and gold grades discovered in multiple vein systems on the project located about 100 km west and south of the region's biggest mine, Cerro Vanguardia.

Silver Standard will continue to operate the project, one of a handful of prospects in Argentina that were drilled every year during the downturn in mining exploration activity. A recently completed resource audit by Pincock, Allen and Holt reports measured and indicated reserves of 4.39 Mt at a grade of 264 g/t Ag and 4.5 g/t Au, plus inferred reserves of 1.59 Mt at 258 g/t Ag and 3.6 g/t Au, all amenable to combined open-pit and underground mining on distinct veins similar to the Cerro Vanguardia camp.

Yamana Resources, which operated the small underground, direct-shipping bonanza-grade silver Martha mine immediately northwest of the Manantial Espejo project and to the west of the Cerro Vanguardia mine in the southern Patagonia province of Santa Cruz, has satisfied its indebtedness to Northgate Exploration Ltd by selling the Martha mine to Coeur d'Alene Mines Corp. Coeur will acquire Yamana's silver properties in the western portion of the Deseado Massif and Yamana will retain its gold-rich prospects in the eastern portion of the region near the Atlantic coast.

Yamana will receive a carried 10% net proceeds interest in the silver properties outside the immediate Mina Martha area in the Bacon District and at the Lejano prospect. Coeur will, in addition, take a 10% equity position in Yamana, which will enable Yamana to fund further exploration of the Coyote and T-1 high-grade bonanza-type gold ore shoots on the Martinetas prospect and other prospects it holds in the eastern and central portion of the Deseado Massif. Instead of being shipped all the way to the Horne Smelter in Quebec, direct shipping ore from Mina Martha will now be processed at Coeur d'Alene's Cerro Bayo mine, approximately 450 Kms to the west, in the Chilean portion of Patagonia. Royal Gold holds a 2% net smelter royalty on all mineral production from Yamana's properties in Santa Cruz, which was not part of the deal with Coeur.

Unusually heavy snowfall in Patagonia during the 2001 austral winter caused the evacuation



of the Mina Martha camp. Subsequent dewatering delayed resumption of mining until September 2001. Grade control issues with the contract miner have combined with the weather delay to cause Yamana to miss its 2001 production goals. The average of the first ten ore shipments from Mina Martha was between 9.4 and 32.5 kg/t Ag-equivalent. This production was from the first of four identified bonanza-type ore shoots on the Martha Vein, and Coeur reports the mine's reserves as 27,000 t grading 4.7 kg/t Ag-equivalent.

Sunshine Mining and Refining Co. sole remaining asset, after bankruptcy and closure of the Sunshine mine in Idaho, was the Pirquitas mine in Jujuy Province of northwest Argentina. The company's strategy was to hold Pirquitas with the lowest level of possible expenditures pending an improvement in silver prices, while keeping all permits up to date and maintaining the project ready for future development. Two of Sunshine's creditors, private hedge funds Elliott Associates LP and Stonehill Capital Management LLC, have exercised call options to acquire Sunshine Argentina and the Pirquitas mine as of March 2002, and a disposition of the Pirquitas project is likely soon.

Pirquitas is an old, established underground tin-silver mine in the Puna (Altiplano) region of northwest Argentina and was operated from 1935 until the 1980s. It is the southernmost of the 'Bolivian tin belt' type deposits and has a supergene silver enrichment blanket. Sunshine's plan, after five years of exploration and a full feasibility study and two optimisation studies costing US\$24.75 million, was to mine and process 9,600 t/d of ore via modern open-pit methods to produce silver concentrate, tin concentrate and zinc concentrate. This fully permitted project will require at least US\$133 million to develop and has 30.4 Mt of proven and probable reserves grading 128 g/t Ag, 0.17% Sn and 0.81% Zn with demonstrated upside potential to substantially increase reserves once mining begins and currently inaccessible areas can be reached for exploration drilling.

Pirquitas has been issued a full mining permit and the 3% mine-mouth (after-cost) royalty to Jujuy Province following federal guidelines is defined in detail and will be in force for a 30-year period under existing provincial law. Recent acquisition of silver projects in Argentina by mid-level silver mining companies suggests that the Pirquitas project will soon see some positive moves towards becoming a mine again.

Silver Standard Resources has acquired the Diablillos project in the Puna region of northwest Argentina. Discovered by BHP in the late 1980s, the silver-gold epithermal Diablillos deposit was picked up by Pacific Rim in 1992 and joint ventured for five years with Barrick until it dropped the property last year. The Oculito zone at Diablillos has an inferred open pit resource of 42 Mt at 70 g/t Ag at a cut-off grade of 42 g/t Ag-equivalent. Within this lies an inferred resource of 25 Mt at 1.02 g/t Au at a cutoff grade of 0.7 g/t Au-equivalent.

Junior explorers Consolidated JABA and Southwest Resources have staked additional ground around the Tecka ultramafic complex in Chubut province and have continued to explore for platinum group metals. The total area under claim is now 277,000 ha, representing the largest land play in Argentina's history, and the fee, under the new mining rules, was paid for upfront to Chubut Province. Results from the initial April to June, 2001 field season and an abbreviated follow-up field campaign at the end of year 2001 were disappointing, but anomalous Pt-Pd values were found in rock and soil samples. It is believed that the Tecka ultramafic complex, which intrudes Jurassic rocks, should possess an as yet undiscovered ultramafic lower stratigraphic horizon, and further mapping and sampling efforts will be necessary to find such favourable stratigraphy in this large claim block.

Rio Tinto has pulled out of joint ventures with Tenke Mining on the Vicuña prospect and with IMA Resources on the adjacent Mogote prospect, which are both located approximately 70 km north of the Pascua-

Lama-Veladero district. Vicuña, which straddles the Chile-Argentina border, was drilled during the 2000-2001 exploration season and significant anomalous Cu-Au-Ag was discovered at the Filo del Sol target. There were also significant surface Cu-Au anomalies found at Mogote, although the prospect was not drilled. In Rio Negro Province of northern Patagonia, Rio Tinto has dropped its joint venture with Arminex at the Cuya prospect in the Los Menucos district. IAMGOLD remains active at Los Menucos and farther south, but Rio Tinto also has dropped its participation in IAMGOLD's Las Mellizas prospect in Santa Cruz.

The world-wide economic slowdown has cancelled plans for most of the proposed developments in the non-metallics sector in Argentina. FMC Lithium continues to produce lithium chloride from its US\$137 million Fénix Project located at the Salar del Hombre Muerto in Catamarca Province, but full scale production of lithium carbonate has been suspended since 2000 due to price pressures by Chilean producers. The high-tech brine plant produces a lithium chloride concentrate that is further processed in Salta Province to produce lithium chloride, which so far has not been subjected to the same competitive pressure. A proposed natural gas pipeline to Pocitos in Salta province has yet to be built, and when it is, FMC has a US\$6 million project on the drawing board to extend a branch southward to its mine in hopes of resuming lithium carbonate production.

Rio Tinto Borax continues to produce borates from Tincalayu in northern Argentina and for years has maintained an annual level of approximately US\$2 million investment in machinery, labour and infrastructure. Borax recently acquired Norquímica SA, which produces ulexite from the Maggie mine. A US\$2 million expenditure is planned to build an ISO 14000 compliant boric acid plant to process ulexite from the Porvenir mine, implementing new extraction methods for the

borates in the salar deposits at Porvenir. A number of small borate mineral and boric acid producers also continue working in the region.

Rio Tinto has long been interested in the large Rio Colorado potash deposit in the Neuquén Basin of Mendoza Province, and CRA conducted a feasibility study on the deposit in 1994. It is likely that Rio Tinto will announce plans to acquire and reactivate the project this year.

Companies that are currently actively exploring in Argentina are: Barrick, Río Tinto, MIM Holdings, Teck-Cominco, Anglo Gold, Anglo Base Metals, BHP Billiton, Yamana, IMA Resources, IAMGOLD, Noranda, Pan American Silver, Silver Standard, Mauricio Hochschild, Tenke Mining, Brancote Holdings, Meridian Gold, JABA - Southwestern Resources, Oro-Plata Resources and Golden Peaks.

This year Argentina is seeing significant entry by serious, small to mid-size silver and gold producers who are taking the high-grade veins of southern Patagonia to the next level of risk. The now long-gone exploration boom of the early to mid 1990s was never really consummated owing to the high cost of doing business in Argentina and doubts over tenure. Almost every major mining house in the world has had experience in Argentina by now, and as this next natural resource cycle takes off, Argentina will again present unique opportunities as an advanced country with an abundance of defined but undeveloped prospects, a new exploration and mining infrastructure, and a cross-border mining treaty with neighbouring Chile. A floating currency will bring exploration and development costs in line with Argentina's neighbours, and it is hoped that the many tax advantages granted to miners will be honoured and enhanced as the new government leads the country out of its current economic and political crisis.