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Objet : Mining Journal Interactive
Date : vendredi 26 février 1999 13 :21

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MINING WEEK

Rio Tinto waits for casualties

Rio Tinto plc continued to demonstrate the resilience of its earnings to lower commodity prices in 1998, posting a net profit (before exceptionals) of US\$1.1 billion, just 10% less than in 1997. Indeed, if the US\$129 million in gains on disposals (principally Century Zinc) contained in the 1997 result is ignored, Rio Tinto's 1998 net earnings would show a very slight increase. Despite higher volumes, the low commodity prices did succeed in trimming sales revenue by 2%, to US\$9.2 billion, and net profit was reduced to US\$700 million by an exceptional, non-cash charge produced by a UK accounting change.

The key factor in the stability of the group's earnings was a US\$251 million (post tax) reduction in costs. The chairman of Rio Tinto, Robert Wilson, presenting the group's results in London this Thursday, said that although the unusually high level of cost reduction in 1998 is not sustainable on an annual basis, the process is a continuous one, and the group is « not close to the end of (that) road ».

The cost savings were eclipsed by a reduction of US\$402 million in net profit compared with 1997 from lower prices, particularly copper. Higher sales volumes added US\$66 million, and weakness in operating currencies, particularly those providing natural hedges such as the Australian dollar, helped by US\$216 million.

The increase in sales volumes came principally from Rio Tinto's 40% joint -venture interest in the expansion of the Grasberg copper-gold mine in Indonesia (MJ, February 5, p.88). Group net capital expenditure totalled US\$1.2 billion in 1998, 28% less than in 1997, and exploration expenditure was reduced by 24% to US\$180 million.

Mr Wilson expects 1999 to be « another difficult year », noting that the current price levels of many commodities traded on terminal markets are now lower than their 1998 averages, and that they are being joined by those sold under long-term contract, such as iron ore (MJ, February 19, p.113). Rio Tinto predicts growth of only 1-2% worldwide in 1999, and most is likely to be in sectors with low intensity of commodity consumption. This is most graphically illustrated by the rise of the service sector in the US. Immediate prospects thus lie not with consumers, but with producers. Mr Wilson believes that many are now incurring cash losses, singling out copper as an acute example, and thus he expects capacity reductions. This is the basis for his assessment that many markets « may be close to the bottom », the question now being one of time.

MINING WEEK

Tenke force majeure

Tenke Mining Corp. has declared force majeure on its US\$475 million Tenke Fungurume copper-cobalt project in the Democratic Republic of Congo (DRC)'s Katanga Province. The declaration, which concerns agreements with state-owned Gecamines and the DRC Government, invokes a form of legal protection, and has been forced upon the Vancouver-based company because the continuing military turmoil and political events in the DRC since last August « materially affect (its) ability to carry out the project ».

The situation is affecting critical elements such as power-supply, transportation and construction resources, making it impossible to produce a final bankable feasibility study for the project. Commenting on the decision this week, Tenke's president, Adolf Lundin, said that the company had had no alternative, but he said that the company remains dedicated to bringing the project to fruition, and intends to take « whatever action is necessary to ensure our eventual success ».

By taking into account the extension and delays that the project has experienced, the force majeure has the effect of adjusting all time periods and dates under the agreements with the government and Gecamines. It does not affect Tenke's reported option agreement with BHP (MJ, December 25, 1998, p.506).

Tenke Fungurume has an estimated resource of 500 Mt averaging 3.5% Cu and 0.27% Co. Production is forecast at 100,000 t/y of copper over the first four years of operation rising to 200,000 t/y in year five, with an annual cobalt output of 2,700 t. By the end of last year, Tenke had spent about US\$90 million on the project.

MINING WEEK

Pat Hughes

It is with sadness that we record the death, last month, of Pat Hughes, a leading figure in Irish mineral exploration and development. Born in Middletown, Co. Armagh in 1924, Pat Hughes spent his early years in Newry, Co. Down. He qualified as a bricklayer and in 1945 went to Canada to apply his trade with three other Irishmen, Michael McCarthy, Joe McParland and Matthew Gilroy. Working first in Edmonton, the team then moved north on the advice that pay was better, spending some time in the uranium-mining district of the Great Bear Lake region and then at Uranium City in Saskatchewan.

It was soon realised that prospecting could be more remunerative than the building trade. Pat Hughes learned the rudiments from geologist Gordon Moore at Uranium City and carried out independent prospecting in the late 1940s/early 1950s, eventually setting up Tara Exploration and Development Co. Ltd. The venture proved profitable and in 1955, with money to spend, Hughes came back to Ireland, aiming to explore in Ulster but no prospecting licences were made available. He persisted with his quest by going to Dublin where he perceived, sooner than most, that the government in the Republic was keen to encourage exploration, and prospecting licences were acquired, initially in Monaghan, Meath, Kerry and Clare. (It was at this time that he first met Murrogh O'Brien, then director of the Irish Geological Survey, who nine years later was to join Tara as a director and general manager).

Tara was listed in Toronto and the company's first significant Irish discovery was in late 1961 at Tynagh in Co. Galway. There were numerous clues to mineralisation in the geological literature but the key to Tara's success was the choice of a well-selected site and the use of soil sampling, an inexpensive geochemical technique not previously tried in Ireland. Meanwhile, exploration by Tara continued in Canada and elsewhere, including Parys Mountain on Anglesey in north Wales. Those working with Pat Hughes at this time included such luminaries as Thayer Lindsley and Duncan Derry (who was later to compile the 'World Atlas of Geology and Mineral Deposits' published by Mining Journal).

In Canada, Northgate Exploration was established, with an Irish subsidiary, Irish Base Metals, to develop Tynagh. Tara's exploration activities were revived in 1963 and the company made what is perhaps the most important Irish base metals discovery in 1970, at Navan. The deposit was developed as a major underground mine, now the largest zinc producer in Europe. (In 1986, Tara Exploration sold its majority shareholding to Outokumpu, and the Finnish company acquired 100% ownership in 1989.)

Pat Hughes did not have the benefit of a professional education but he had a fast mind and a great aptitude to judge people and get them to trust him. He was prepared to give them plenty of autonomy and many stayed with his companies for much of their careers. There were always new projects on the boil and, as Murrogh O'Brien observes, every day was a 'constructive adventure'. In recent years, Pat Hughes eased out of the industry, and lived on his farm in Co. Armagh. Few will disagree that his influence on mineral exploration and development in Ireland has been profound.

MINING WEEK

Into Africa for Barrick

Barrick Gold Corp. of Canada has made an all-share offer for Toronto-listed Sutton Resources Ltd, developer of the Bulyanhulu underground gold mining project in Tanzania. The offer, announced at the end of last week, consists of 0.463 shares in Barrick for each share in Sutton. Based on Barrick's closing price of C\$28.60/share last Tuesday (February 16), the offer represents an 89% premium over Sutton's closing share price that day and values the company at about C\$525 million. The directors of Sutton have unanimously agreed to recommend that shareholders accept Barrick's offer, and the directors and senior executives of the company have also agreed to tender their own shares, together representing about 15% of the total.

Sutton is also in a joint venture with Anglo American Corp. of South Africa Ltd with respect to the Kabanga nickel-copper-cobalt project in western Tanzania. However, as a pure gold producer, Barrick's target is clearly Bulyanhulu. The project, near Lake Victoria, has mineable reserves totalling 10 Mt at a grade of 11.7 g/t, within total resources recently increased to an

estimated 8.8 Moz. The Lake Victoria goldfield is currently one of the busiest areas for gold exploration in Africa, attracting a number of international gold producers (MJ, February 19, p.122).

The chief operating officer of Barrick, John Carrington, in London this week to present the company's 1998 results (this issue, p.143), noted that in the current market, Sutton had faced some difficulty in raising the necessary equity portion of the finance for Bulyanhulu. Barrick has considerable financial resources, and Mr Carrington indicated that the company would be able to develop the project, along with the rest of its planned new mines, from internal resources. Mr Carrington said that a decision has yet to be made regarding Kabanga, but he was clear that as a base metals project, it does not fit in Barrick's strategy. He also pointed out that the Sutton offer, put together in the past eight days, demonstrates Barrick's ability to function normally in the short term, despite the sudden departure of its chief executive two weeks ago (MJ, February 12, p.95).

Barrick's offer for Sutton will be posted to the latter's shareholders as soon as Barrick receives the relevant list. The offer is subject to the condition that acceptances representing at least 75% of Sutton's shares must be received. The friendly nature of the bid is in contrast to Barrick's recent abortive attempt to acquire Argentina Gold Corp. (MJ, February 12, p.109).

Another point of comparison between the bids lies in the geography. Argentina Gold's Veladero project, in which Barrick holds a 40% interest in its own right, lies just across the border from Barrick's Chilean operations, where much of the group's development efforts are now concentrated. The bid for Sutton represents something of a return to Africa, as Barrick reduced its operational effort on the continent last year by injecting the bulk of its African gold exploration assets, including projects in Mali, Senegal and the Democratic Republic of Congo, into a joint venture with AngloGold Ltd of South Africa, in which the latter is the operator (MJ, May 15, 1998, p.381).

Mr Carrington explained that the establishment of the joint venture with AngloGold was part of a worldwide move away from 'grass-roots' exploration to concentrate on more advanced development, and did not reflect a lack of interest in Africa in general. Bulyanhulu fits into this strategy as an advanced project, although Barrick acknowledges that successful acquisition and development would result in production for the company from « a new continent ».

MINING WEEK

Dent in Australian export earnings

In the fiscal year to June 1998, total Australian coal and iron ore exports were worth A\$13.3 billion. Commonwealth Bank of Australia economists estimate that the recent price cuts that the country's coal and iron ore miners have had to accept could reduce Australia's GDP this year by as much as 0.5%. Not all economists are as pessimistic, however, and at Dresdner Kleinwort Benson, chief economist Rob Henderson expects the reduction to be nearer 0.1%. He points out that the price cuts for both commodities have largely fallen within an expected band, and he believes that there will be a degree of economic recovery in Japan this year.

Nevertheless, no individual Australian coal or iron-ore producer is expected to escape unscathed. The latest settlements are for price cuts of 13% for thermal coal exports to the Japanese power industry, with a benchmark price around US\$29.95/t compared with US\$34.50/t previously, and for cuts of 15% for semi-soft coking coal exports to Japanese steel

mills, giving a benchmark price around US\$32.25/t (US\$37.90/t). These reductions follow the 18% price reduction in December for hard coking coal and last week's average 11% reduction in iron-ore prices (MJ, February, 19, p.113).

PricewaterhouseCoopers estimates that much of the coal industry in New South Wales is already operating at a loss, with 74% of producers there failing to make a profit during the 1997/98 financial year. Reuters reports that job losses and mine closures have already begun in the Illawarra region south of Sydney, and in the Hunter Valley. There is some slight consolation for thermal coal producers, it says, in that the tonnage contracts negotiated have been left « fairly well intact ».

Meanwhile, at an iron and steel forum held this week in Sydney, BHP's general manager for iron-ore marketing, Doug Bissell, voiced concern at the 11% price cut for iron ore imposed by the Japanese on their Australian suppliers. He doubted that market fundamentals determined the size of the price reduction, and said that a strong correlation could be drawn between iron-ore prices and profits earned by the Japanese steel mills in the 12 months before the ore prices were set.

Mr Bissell suggested that there appeared to be a philosophy that if the customers were losing money the suppliers should also lose money. He believes that the latest price reduction could set a precedent and lead to greater price volatility for iron ore in the future. In terms of shipment volumes, BHP has agreed to ship at least 13.6 Mt of Mt Newman fine and lump ore to Japanese steel mills in the 12 months beginning April 1, 1999. This is a 1.7 Mt reduction on forecast deliveries for the preceding 12 months.

Japan's steel industry is expected to remain unprofitable for a further three to four years, with the implication that iron-ore producers could remain under pressure for some time.

However, speaking in Sydney, Western Australia's Resources Development Minister, Colin Barnett, was confident that the sector will pick up from its current downturn. He believes that export shipments could rise to 200 Mt by 2010. WA's iron ore shipments peaked at 152 Mt in 1997 from 100 Mt in 1990. Last year, shipments were 140 Mt and are expected to be lower this year.

MINING WEEK

Senegal confusion

Considerable confusion surrounds the ownership and future of the Sabodala gold deposit in Senegal. A junior Australian exploration company claiming rights in the area has initiated legal proceedings in the international courts in two actions : one against the French state-owned mining organisation Bureau des Recherches Géologiques et Minières (BRGM) concerns an option on the property, the other action seeks damages against the Republic of Senegal.

Late last year, a local company that had been exploiting the deposit since 1995, and which claimed that it had received official authorisation to do so, was instructed by the government to halt its activities (MJ, November 27, 1998, p.430) and, most recently, Senegal's Director of Mines has announced that the government is seeking a new technical partner with the technical and financial capabilities of developing Sabodala into a world-class mine (MJ, December 25, 1998, p.506).

The deposit is located within a greenstone belt in the far east of Senegal, not far from the 500,000 oz/y Sadiola gold mine in Mali. Sabodala possesses measured, indicated and inferred resources containing an estimated 0.9 Moz of gold within the main deposit, plus a further 0.95 Moz of indicated and inferred resources in a southerly extension.

The holder of the 400 km² exploration title to Sabodala is Soc. Minière de Sabodala (SMS), a company incorporated in Senegal and originally owned 50.64% by BRGM and 49.36% by the Republic of Senegal. In September 1994, BRGM entered into a 40 :60 partnership with Normandy Mining Ltd of Australia to form LaSource, a subsidiary of which was to hold most of BRGM's gold assets.

Earlier in the same year, the Australian junior, Paget Mining NL, entered into an option agreement with BRGM under which it was entitled to acquire BRGM's 50.6% stake in SMS by carrying out a feasibility study by September 1994, the expiry date of the option agreement. BRGM, however, claimed that Paget had failed to fulfil all of its obligations under the option agreement and refused to transfer its shares to Paget.

Separately, Paget says it entered into an agreement to acquire a 25.2% equity interest in the project from the Republic of Senegal. The combined acquisitions from BRGM and the government would have given Paget a 75.8% majority stake in SMS. Paget contends, in addition, that in October 1995 it was verbally advised by the Senegalese Government that it had won title to the Sabodala concession although no formal settlement appears to have been reached. Matters were further complicated because BRGM's partner in LaSource, Normandy Mining, considered that LaSource was entitled to the area through BRGM's majority stake in SMS.

According to the Australian publication, Gold Gazette, in 1997 SMS applied for a 200 km² exploitation permit for the Sabodala deposit and surrounding area. Once in possession of an exploitation permit, LaSource would be in a position to dispose of its equity stake in SMS, should it so wish. In mid-1997 it decided to do this, selling its stake to the local Senegalese company, Soc. d'Etudes et d'Exploitation Industrielles de l'Or en Afrique (Eeximcor), for the sum of US\$4.5 million. Despite this transaction, Paget maintains that it has title and says that in March last year it was advised by the Senegalese Government that the dispute would be resolved prior to the West African country's parliamentary elections in May 1998. No resolution ensued and Paget has now lodged a claim against BRGM with the International Court of Arbitration in Paris. It has also lodged a separate claim against the Republic of Senegal in the International Court for Settlement of Investment Disputes in Washington, concerning the agreement between the government and Paget for the latter to acquire the government's 25.2% equity interest in Sabodala.

Meanwhile, local Senegalese newspapers have been critical of the government's treatment of Eeximcor, arguing that an indigenous, entirely African-owned company has been unfairly treated. Eeximcor established a gold processing plant at Sabodala in 1995. According to the Ministry of Mines, the management contract for the mine expired in 1997, and Eeximcor received notification to halt its activities last November. Eeximcor's president, Mouhamed Ousman Ahn, says that the company is not contesting the decision but claims that Eeximcor has invested US\$36 million in the operation, and he points out that the agreement with LaSource was undertaken with the full knowledge and approval of Senegal's Prime Minister.

Two weeks ago, Senegal's State Director of Mines, Abdoulaye Dia, said that Eeximcor commenced its activities at Sabodala in the full knowledge that it had a non-renewable permit for three years.

Mr Dia also said that the Senegalese State « has no link whatsoever with Paget Mining ». He said that the government is seeking a technical partner to help explore Sabodala and that no particular operator would be disqualified from submitting a bid, adding that the technical partner could be a mining company or a consortium of investors. Mr Dia noted that letters of interest had already been received from several major international mining companies.

Senegal is without doubt an attractive target for gold exploration - the gold-bearing greenstone belts of western Mali extend into eastern Senegal, and Sabodala is likely to prove to be only one of several deposits that will be discovered in the region. However, despite the geological potential, would-be investors need to be convinced that the country's mining code is clear and unambiguous and that the attendant legislation is administered in a consistent and impartial fashion. The Sabodala affair does not generate an excess of confidence in this regard.

MINING WEEK

LEADING INDICATORS

		Change on week	High- Low	Year's Max/Min
Share Indices	Feb 24	(%)	(%)	
FT Ordinary	3,793	2.5	87	3,925-2,913
US Dow Jones	9,400	2.2	92	9,545-7,742
FT Gold Mines	884	-2.5	28	1,352-702
Australian All Mining	578	-0.1	34	692-520
South African Gold	858	-3.9	29	1,311-673
Toronto Met/Min	2,888	0.9	17	4,356-2,596
Nikkei Dow	14,355	1.4	32	17,096-13,071
Hang Seng	9,678	N/A	57	11,811-6,859
James Capel Indices	Feb 24			
(100 on 1/1/89 except*)				
Global Base Metal	107	2.4	30	141-93
Global Diversified Mining	112	1.8	36	144-94
Global Gold Ex S Africa	70	-1.5	30	102-56
Global Gold	61	-2.1	26	89-51
Global Mining	92	1.1	33	121-78
Smaller Mining Companies	43	-0.4	13	61-40
ÅNorth American Base Metal	142	3.8	36	177-122
North American Gold	78	-2.0	26	118-64
Latin American Mining*	135	-2.6	13	237-120
Latin American (Ex CVRD)*	106	1.3	20	170-90
ÅOther Metals/Minerals	106	1.4	36	133-91
ÅGlobal Coal Mining	141	-1.0	66	153-116
*100 on 1.1.90				
ÅRebased by Mining Journal				
Commodity Prices	Feb 24			
Gold (London)	\$287.95	1.0	24	\$315-279.65
Copper (LME)	\$1,380.00	-0.3	0	\$1,878.50-1,379.50
Aluminium (U.S. prod.)	61.50c	5.2	36	73-55
Brent Blend (dated)	\$10.63	5.8	22	\$14.78-9.44

INDUSTRY IN ACTION

Exploration - Itetemia results confirm mineralisation

The RAB drilling programme under way at Tan Range's Itetemia gold property in Tanzania is 75% complete, and the company believes that the results confirm geological interpretation of fault displacement in the area. The fault throw affecting the Golden Horseshoe Reef (GHR) was predicted by geophysical surveys, and sulphide-rich mineralisation, predominantly pyrite and pyrrhotite, was intersected by drill-holes completed about 1.5 km northwest of the known

position of the GHR. The mineralisation is located within rocks similar in character to those comprising the GHR host rocks (porphyries, crystal tuffs and argillites).

The Itetemia property is adjacent to the Bulyanhulu gold deposit currently owned by Sutton Resources Ltd. Barrick Gold Corp. last week made an offer for Sutton that valued the company at about US\$350 million, and which the board of directors at Sutton are recommending to shareholders (this issue, p.130).

INDUSTRY IN ACTION

Exploration - Don Mario assays

A five-hole diamond-drilling programme at Orvana Minerals Corp.'s Don Mario gold-copper property in Bolivia has returned positive results from two of the holes. The programme was designed to intercept a down-plunge extension of the known Lower Mineralised Zone (LMZ), and better results are as follows :

Hole	Interval (m)	True thickness (m)	Au (g/t)
DM 171	287.1-290.0	1.5	15.32
DM 175	243.8-246.7	1.5	18.66

The drill holes were collared 75 m away from a previously-defined resource limit. The remaining holes in the programme were located a further 75 m away from DM 171 and 175. These holes intersected « low gold values » in similar rocks to those hosting the LMZ mineralisation, but the mineralisation found is similar to that in the Don Mario Norte area. Orvana geologists have recognised one or more faults between the two borehole groups, and believe that the fault(s) represent « the main focus of displacement » between the Don Mario and Don Mario Norte mineralisation styles.

INDUSTRY IN ACTION

Exploration - Oman exploration

A first-phase drilling programme is under way on the Washihi copper-gold prospect in the northern mountains of Oman. The programme is being conducted by National Mining Company LLC (NMC), an Oman-based company, which reports that the 227 km² exploration licence it holds is the first to be granted to a private company by the Government of Oman for more than 25 years.

The company's geologists began mapping the Washihi gossan in 1998, and reviewed geophysical data. This led to the interpretation that the gossan is the surface expression of volcanic massive sulphide mineralisation. The area is underlain by extrusive volcanics of the Oman ophiolite. NMC plans to drill at least 11 holes, targeting geophysical anomalies generated by 1997 surveys conducted by World Geosciences Corp. for the Government of Oman.

INDUSTRY IN ACTION

Exploration - SoG's Axehandle update

Australian gold producer Sons of Gwalia Ltd (SoG) has assessed further results from drilling at its Axehandle gold prospect, located 12 km southeast of its Southern Cross operation in

Western Australia (MJ, October 30, 1998, p.342). The assays returned better values of 28 m at a grade of 2.55 g/t Au from 67 m, 10 m at 3.89 g/t Au from 134 m, 7 m at 8.23 g/t Au from 104 m and 18.1 g/t Au from 52 m. An inferred and indicated resource estimate of 3.1 Mt at a grade of 2.6 g/t Au has been calculated, giving 259,000 oz of contained gold.

The company reports further « encouraging » results from a rotary air blast drilling programme at its Admiral Hill prospect, 8 km north of its Laverton mine, also in Western Australia, where intersections of 12 m at 3.55 g/t Au from 57 m and 6 m at 5.17 g/t Au from 6 m were recorded.

INDUSTRY IN ACTION

Exploration - Open zones at Bowdens

The final assays from Silver Standard Resources Inc.'s drilling programme at its Bowdens silver property in New South Wales have indicated that three zones of mineralisation remain open. Previous results from the recent programme intersected silver and base metals mineralisation, and all the last boreholes also intersected mineralisation in both infill and step-out drilling at the Main Zone South, Bundarra North and Bundarra South Zones. Better results are as follows :

Hole	Interval (m)	Ag (g/t)
BGR 132 57-88		187
BGR 133 82-147 incl.	82-101	116
BGR 137 12-107		33
		241

The company is drilling the deposit as part of a continuing feasibility study (MJ, January 15, p.20). At Bundarra North, the mineralisation intercepted remains open in two directions, and at Bundarra South, a « relatively untested new area », outcropping mineralisation was tested with one borehole which found 23 m of 55 g/t Ag from surface. The company believes that potential also exists for resource expansion in the Main Zone South area, but drilling in the area was interrupted by heavy rainfall.

INDUSTRY IN ACTION

Exploration - Inco-Dowa exploration partnership

An exploration partnership has been struck between Inco Ltd of Canada and Japan's Dowa Mining Co. Ltd, relating to Inco's properties in Turkey and Indonesia. The Japanese company has agreed to fund exploration for the next two years on Inco's Turkish prospects, in return for a 49% interest in Inco's Turkish subsidiary, which holds them. Similarly, Dowa can earn a 49% interest in Inco's Indonesian unit by covering exploration costs over the next three years.

Inco's Turkish unit, Dardanel Mining Industry and Commerce Co., holds properties in northeast Turkey, considered prospective for Kuroko-style polymetallic mineralisation, and for gold. The main prospect, Murgul, surrounds an active open-pit copper mine operated by Black Sea Copper Works Inc.

In Indonesia, Inco's Ingold Holdings Indonesia Inc. and Maluku Holdings Inc. hold an 85% interest in the rights to about 1,000 km² on Haruku, Ambon, Nusa Laut and Saparua islands, located 2,400 km northeast of Jakarta. The properties are considered by Inco to have « excellent potential ». The remaining 15% is held by PT Aneka Tambang. Mineralisation is

similar to the Wai Ira deposit on Haruku, where a local Inco subsidiary has drilled mineralisation at an average grade of 1.5% Cu, 4.7% Pb, 6.9% Zn and 110 g/t Ag.

INDUSTRY IN ACTION

Exploration - Aurora to buy into Sampanahan

Canadian-listed explorer Scorpion Minerals Inc. has agreed to allow Australian-based Aurora Gold Ltd the right to earn a 63.75% interest in Scorpion's Sampanahan gold property in Indonesia. Sampanahan is located in South Kalimantan, and diamond drilling on the Dewi prospect at Sampanahan last year found copper and gold mineralisation in eight of nine holes (MJ, February 27, 1998, p.165).

Aurora must spend US\$6 million on exploration at Sampanahan, as well as paying Scorpion US\$1 million. In return, Aurora will earn a 75% interest in Scorpion's 85% -owned Indonesian subsidiary, PT Scorpion Sampanahan Mineral, the 100%-owner of the 1,700 km² Sampanahan property.

INDUSTRY IN ACTION

Exploration - Cream options Crystal Lake

Vancouver-based Cream Minerals Ltd has entered into an option agreement to acquire the rights to the Crystal Lake silver-zinc-copper-gold property near Kaslo, British Columbia. The property covers 19 km², comprising 17 mineral units, located about 25 km southeast of Cream's Kaslo silver property (MJ, December 4, 1998, p.450). The agreement is with a private individual, and provides for Cream to earn a 100% interest in the property by paying C\$100,000 in cash and 200,000 shares to the individual, and spending C\$550,000 on exploration over a four-year period. The vendor will retain a 2.5% net smelter return royalty, 1.5% of which Cream can buy by paying C\$1.5 million prior to commercial production from any operation.

INDUSTRY IN ACTION

Exploration - Dunkwa released by Battle Mountain

Battle Mountain Gold Co. (BMG) has decided not to continue with its option to acquire a 65% interest in Birim Goldfields Inc.'s Dunkwa gold property in Ghana. Birim reports that the agreement signed in 1995 by Hemlo, and taken on by BMG after Hemlo and BMG merged in 1996 (MJ, July 26, 1996, p.74), called for an investment of US\$5 million over a four-year period. The period expires on May 31, 1999, and BMG has spent about US\$4.5 million on the property to date, as well as buying over 1.25 million Birim shares.

The 230 km² Dunkwa property covers a 45km-long stretch of the Ashanti Gold Belt, and contains more than a dozen gold prospects, according to Birim. The most advanced, the Mampon deposit, contains a currently-estimated 600,000 oz of gold. The exploration work completed to date includes more than 13,000 m of reverse-circulation drilling, and 12,200 m of diamond drilling, as well as 24,000 geochemical soil samples.

Birim management is now looking to enter into association with other gold producers on the property.

INDUSTRY IN ACTION

Exploration - Canarc options more Mexican properties

Vancouver-based Canarc Resource Corp. has reached an agreement with fellow Canadian junior Far West Mining Ltd concerning nine properties in central Zacatecas State, Mexico. The properties, Lobos 4, 9, 10 and 14-19 inclusive, cover about 4,900 km². Far West must spend US\$5.5 million on them, and issue Canarc 1 million shares over a three-year period in order to earn a 50% interest in the properties. The targets being explored by Far West and Canarc are skarn, manto, chimney and vein systems associated with felsic intrusions emplaced into limestones and shales, as well as volcanogenic massive sulphide mineralisation in volcanic rocks.

Canarc reached the agreement through its Mexican subsidiary, Aztec Silver, and has previous joint-venture agreements with Noranda's Mexican unit on Lobos 6 and 8 (MJ, October 9, 1998, p.274).

INDUSTRY IN ACTION

Exploration - Yamana buys out Barrick's back-in rights

Spokane-based Yamana Resources Inc. has agreed to acquire the 'back-in rights' held by Barrick Gold Corp. on Yamana's properties in Kalimantan, Indonesia. The deal is subject to receipt of all necessary regulatory approval, and will cost Yamana 750,000 shares, to be issued to Barrick.

Yamana's chief financial officer, Victor Bradley, hopes to find « potential partners who have an appetite to initiate drilling ».

INDUSTRY IN ACTION

Development - Los Frailes gets local government support

Boliden's hope to restart the Los Frailes zinc mine in southern Spain received a boost recently when the Director of Industry for the Andalusia region, where the mine is located, said his department would recommend granting a mining permit for the operation. Guillermo Gutierrez said that he is waiting for two environmental reports, scheduled to be completed within the next two months, and which he expects to be favourable to Boliden. Earlier this year, Spain's Environment Minister, Isabel Tocino, in her capacity as a director of the Doñana National Park, recommended that the mine remain shut (MJ, January 15, p.22).

The Doñana Park is downstream from Los Frailes mine, where a tailings-dam failure last year allowed 5 million m³ of tailings to escape into local rivers, and surrounding farmland (MJ, May 1, 1998, p.333). The park was protected after dykes were swiftly erected to divert the tailings flow into the nearby, fast-flowing Guadalquivir River.

Boliden intends to store the tailings from a renewed operation in the worked-out Aznalcollar open pit at the mine site. This solution has been approved by Spain's Technical and Geomining Institute, but only for a three-year period, as this would bring the surface of the tailings to sea-level. Boliden had wanted to use the pit for up to ten years.

INDUSTRY IN ACTION

Development - Erongo retains Skorpion share

Reunion Mining plc reports that Erongo, a 66.7%-owned subsidiary of Anglo American Corp. of South Africa, has decided to retain its 40% interest in Reunion's Skorpion zinc project in Namibia. The joint-venture agreement between Reunion and Erongo allows for an appropriate further agreement and structure to be put in place, reflecting the respective interests of the parties.

Reunion has reported that it is investigating possible options regarding financing of the Skorpion project, including the possibility of the sale of the entire issued capital of Reunion, or of all or part of Reunion's interest in Skorpion (MJ, February 12, p.95).

INDUSTRY IN ACTION

Development - Aragarças yields 13-ct diamond

An artisanal miner at the Gustavo Pit, within the Janio Matos property, located centrally within the Aragarças alluvial diamond property in Brazil, has recovered a 13 ct, clear yellow diamond with no inclusions. The property is held in joint venture by Vancouver-based Highgrade Ventures Ltd and Tapajos Gold Inc. The diamond was sold for US\$1,550/ct and, according to the companies, its find coincides with their decision to conduct bulk test-mining in the vicinity of the Janio Matos property. The test-mining operation will take a 20,000 m³ sample of gravel from an area 100-200 m² in size.

INDUSTRY IN ACTION

Development - Crown Jewel supported

The development of the Crown Jewel gold project in Washington State has been supported by the rulings made by the state's Pollution Control Hearings Board. The Crown Jewel deposit is located in Okanogan County, and contains an estimated 1.6 Moz of gold. Its development is being undertaken by Battle Mountain Gold Co., which is earning a 54% interest in the property from Crown Resources Corp. by placing Crown Jewel into production.

The Pollution Control Board was ruling on eight legal issues raised by groups challenging the project's water rights, and sided with Battle Mountain and the Department of Ecology. This means that the project has prevailed in disputes to date reviewed by the board, according to Crown Resources. The mine is expected to produce 185,000 oz/y of gold.

INDUSTRY IN ACTION

Development - Yatela resource

Sadex, the 50 :50 joint venture between IAMGOLD and AngloGold, has calculated an estimated resource figure for the Yatela gold deposit in Mali. The initial estimate puts the amount of gold present at Yatela at 1.9 Moz, corresponding to 20.5 Mt at a grade of 2.9 g/t Au, at a 1 g/t Au cut-off. The resource calculation has been made by AngloGold's Mineral Resource Management Department, based on 455 drill holes, of which 254 are diamond-drill holes. The balance are reverse-circulation drill holes, with diamond-drilled bottom sections. The diamond-drill holes have been completed as part of the continuing feasibility study,

started last year (MJ, March 20, 1998, p.222). The initial resource figure indicates that the resource is « effectively contained within the preliminary open-pit mining shell that has been applied to the deposit ».

Metallurgical testwork indicates that gold at Yatela will be recoverable at 95% recovery rates, using either an expanded plant at the Sadiola mine, 25 km south of Yatela, or a CIP/CIL plant at Yatela. AngloGold's feasibility study is scheduled to be completed towards the middle of this year.

INDUSTRY IN ACTION

Development - Lobo-Marte on hold

Gary Jones, business development vice-president at Teck Corp., says that the development of the Lobo-Marte gold deposit in northern Chile will be stopped until the price of gold improves. Teck is a 60%-shareholder in the project, which has estimated reserves containing 4.3 Moz of gold, and Mr Jones says that the proposed 275,000-350,000 oz/y operation requires a higher gold price. Capital expenditure on the proposed mine is forecast at US\$300-350 million. The remainder of the deposit is held by Minera Anglo American Chile Ltda, Empresa Minera de Mantos Blancos SA (also part of the Anglo American group) and Inversiones Sudamericana SA.

INDUSTRY IN ACTION

Development - Sleeper deal reviewed

The agreement between Kappes, Cassiday and Associates, and X-Cal Resources Ltd, relating to the closed Sleeper gold and silver mine in Nevada (MJ, January 22, p.39), has been expanded, according to X-Cal. X-Cal previously agreed to pay KCA up to 350,000 X-Cal shares for design cost studies of the Sleeper mine. The new deal provides for KCA to receive a total of 565,000 shares and cash payments of US\$110,000 for a complete feasibility study of the property.

INDUSTRY IN ACTION

Development - Friguia sale off

The planned sale of the Friguia bauxite-alumina complex in Guinea (MJ, October 23, 1998, p.316) has been abandoned as a result of the poor metals market, according to the Guinean Government. The government will now have to find another way to dispose of the components of the operation, namely the Kimbo bauxite mine and the Fria refinery. The refinery has a capacity of 640,000 t/y of alumina, and would have potentially been of interest to major aluminium producers. Other parties variously rumoured to have been interested include Anglo American Corp. and Glencore.

INDUSTRY IN ACTION

Development - Quicay offers evaporate

After attracting potential bidders in pre-auction discussions, the sale of Peru's Quicay gold deposit has failed to garner any actual commitments to buy, according to an official statement

from the government. The statement, issued by the privatisation committee, indicated that the minimum price for the deposit, US\$10 million, plus another US\$10 million in investment over five years, may be reduced for a second auction by about 15%. Quicay was dropped by Barrick Gold Corp. last year, after a US\$3 million exploration programme failed to identify resources big enough to justify the US\$202 million buy-option outstanding on the property (MJ, August 14, 1998, p.121).

The Peruvian Government believes that the deposit contains enough mineable gold to support a 70,000 oz/y gold operation.

INDUSTRY IN ACTION

Development - Sukhoi Log bidders gather

Russia's Interfax news service reports that three major mining companies are due to submit reports on their exploration of the Sukhoi Log gold deposit in Irkutsk to the Russian Ministry of Natural Resources, and the Irkutsk regional administration, by March 1. The head of the Irkutsk subsurface resource department, Gennady Nizamov, says that Rio Tinto, Barrick and Placer Dome have investigated the deposit. Soviet geologists assessed the Sukhoi Log deposit 20 years ago, and estimated that it contains 33.7 Moz of gold, at an average 3 g/t Au, with platinum credits.

Interfax also reports that Russia has altered the terms of the Sukhoi Log tender. The original terms demanded a US\$50 million payment to Lenzoloto, a locally-registered mining company, in return for early development costs, as well as a bonus payment. This is now perceived to be a potential discouragement to foreign companies, and Mr Nizarov now expects that a developer would be able to buy or lease Lenzoloto's assets at Sukhoi Log.

INDUSTRY IN ACTION

Development - Sayansk sale

An 8.5% stake in Russia's Sayansk aluminium plant is scheduled to be offered for sale, according to the organisers, Russia's Federal Property Fund and the Federal Stock Corp. The auction is to take place between February 26 and March 21, 1999, and bids will be accepted for 1.06 million shares, with a starting price of Rb140/share (US\$1=Rb23.10). The face value of the share is Rb0.25. The Sayansk plant produced 330,000 t of aluminium in 1998.

INDUSTRY IN ACTION

Development - BHP signs big rail contract

BHP and Australia's National Rail have signed a A\$1.5 billion contract for steel transportation which will extend over eight years, until the end of 2007. The steel will be carried from BHP's Whyalla steelworks to its other manufacturing and distribution centres across Australia.

INDUSTRY IN ACTION

Development - Cerro Crucitas' three-year output plan

Lyon Lake Mines Ltd has received a report on its Cerro Crucitas gold-silver deposit in Costa Rica which predicts production of 200,000 oz/y of gold at US\$158/oz cash cost in the first three years of production. The report, completed by Cambior Inc. Projects and Construction, was started in November last year, and examined the internal prefeasibility study completed by Placer Dome, a previous owner of the property, with a view to recommending preparations for a full feasibility study. Cambior recommends a US\$1 million feasibility study to examine an open-pit operation, processing 27.9 Mt at a grade of 1.69 g/t Au and 2.25 g/t Ag over an eight-year mine life.

Lyon Lake notes that the study does not examine the exploration potential at Cerro Crucitas, in particular at the Conchudita concession, where drill intersections of 3.98 g/t Au over 32 m, and 2.91 g/t Au over 46.9 m have been recovered (15 g/t Au cut). Placer Dome estimated a gold resource of 3.21 Mt at a grade of 4.56 g/t at a 1.75 g/t Au cut-off for Conchudita.

INDUSTRY IN ACTION

Production - WMC's Kalgoorlie smelter restarted

The damaged furnace hearth at WMC's Kalgoorlie nickel smelter has been repaired, ahead of schedule and under budget, according to the company. The repair had been expected to require at least 70 days to complete (MJ, January 22, p.39), but United Group Ltd, the contractor, experienced no delays in the work. WMC's nickel and gold general manager, Peter Johnson, says that heat was returned to the furnace on February 23, and a ten-day period is needed to bring it to operating temperature. He also said that the early return to production would not affect the planned output figures for 1999 of 89,000 t of nickel.

INDUSTRY IN ACTION

Production - Sterlite's Tuticorin experiment extended

The controversial copper smelter at Tuticorin in southern India has been allowed a further period of experimentation. The new smelter, owned by Sterlite Industries, was shut down after environmental groups protested that it was damaging the surrounding area with airborne pollution. A court ordered that the plant could reopen late last year (MJ, January 1/8, p.6), for a trial two-month period until February 26, and has recently extended the period until April 28.

The court had also asked for a detailed report on all aspects of the pollution from the National Environment Engineering Research Institute. The parties involved asked for a copy of the report, and Judge N.K. Jain ruled that the interim order allowing the smelter to continue should stand until April 28, the date of the next hearing of the case.

INDUSTRY IN ACTION

Production - Tambang's nickel plant reopens

PT Aneka Tambang's Ferronickel I plant in southeast Sulawesi has reopened, after a six month closure, and about a month ahead of schedule. The company had said that the 5,500 t/y

nickel-in-ferronickel plant would be reopening in April (MJ, December 11, 1998, p.470). The facility was shut down in August last year as part of the company's modernisation programme, worth Rp180 billion (US\$20.3 million).

INDUSTRY IN ACTION

Production - Mexican silver output set to jump

Quilloga Villareal, the president of the Mexican Mining Chamber, says that the output from silver mines in the country for 1998 is expected to increase by 11.1% over the 2,701 t produced in 1997, to 3,000 t. The country's gold production is also expected to show an increase, but by only 2%, to 26.5 t from 26 t in 1997. Mr Villareal expects foreign investment by mining companies in Mexico for 1999 to reach US\$1.7 billion, with 70% predicted to come from local companies, and the remaining 30% from foreign investors.

INDUSTRY IN ACTION

Production - Gympie floods recede

Heavy rains in Queensland caused a ten-day shutdown of operations at Gympie Gold Ltd's Gympie mine recently. The mine reopened on February 18, after the water levels dropped sufficiently to allow normal operations to resume. The company stressed that no release of process waters occurred from the site's tailings dam during the flooding.

Gympie's general manager, Ian Levy, estimates that between 300 oz and 500 oz of gold production were lost during the shutdown, but he expects that the shortfall will be made up later this year.

INDUSTRY IN ACTION

Production - BHP increases copper output

Normal resumption of operations at Ok Tedi in Papua New Guinea (MJ, April 24, 1998, p.318) was the main driver behind BHP's 27% increase in copper output in January, relative to January 1998, and a corresponding 13% production increase for the eight months from June 1, 1998 to date over the same period in 1997/98. In Chile, Escondida's output also rose in January, owing to increased throughput and higher recoveries following the completion of the 'phase 3.5 expansion' (MJ, June 12, 1998, p.459).

INDUSTRY IN ACTION

Production - Chuqui output to drop

Chile's copper producer Codelco reports that its Chuquicamata unit will close its oxide-waste operation at Mina Sur. Codelco's executive and president Marcos Lima says that the shutdown will lead to a decrease in copper output of at least 20,000 t and as much as 40,000 t. The operation, close to the Chuquicamata sulphide mine, experienced problems last year with the amount of water and clay present in the material being processed (MJ, May 15, 1998, p.382). A landslide in the waste dumps also caused problems. Mina Sur has a 40,000 t/y output capacity of copper cathodes.

Meanwhile. Codelco expects Asian refined copper consumption to increase in 1999 by 4.54% compared with 1998 demand. The Chilean company forecasts the region will need 3.57 Mt of copper to satisfy requirements.

INDUSTRY IN ACTION

Production - Port Hedland's first HBI . . .

BHP reports that the Port Hedland hot briquetted iron (HBI) plant in Western Australia produced its first batch of briquettes on February 18. BHP's head of iron ore marketing, Doug Bissell, says that the plant's commissioning phase is on schedule for completion in the next few weeks, and that continuous production will commence within the first quarter of this year. A shipment is planned for April of between 25,000 t and 40,000 t. The construction of the Port Hedland plant is 96% complete, says Mr Bissell, but he cautions that the market for seaborne iron ore might not be as robust as first thought, as the prospects for iron ore prices have changed significantly over the past 20 months.

Cost overruns at Port Hedland and lower forecast prices for its product led to a A\$590 million write-down for the project last year (MJ, July 3, 1998, p.15).

INDUSTRY IN ACTION

Production - . . . Lebedinsky HBI plant progress

Interfax reports that the new hot-briquetted iron (HBI) plant at Russia's biggest iron ore mine, Lebedinsky GOK, is expected to have achieved full production capacity of 1 Mt/y by the end of this month. The completion will be exactly three years after work on the facility began. A second stage of work will begin after the first 50,000 t of briquettes have been produced.

In total, four stages, each with 1 Mt/y capacity, are planned at Lebedinsky GOK.

INDUSTRY IN ACTION

Production - Australian gold output

Gold industry consultant Surbiton Associates Pty reports that Australia produced nearly record amounts of gold in 1998. Surbiton's managing director, Sandra Close, reports that December quarter production of 81 t was the « second highest quarterly production ever achieved », reversing the downward trend of the preceding three quarters. Final 1998 output was 314.5 t of gold, with Sunrise Dam achieving the lowest cash cost, at A\$157/oz.

Ms Close says that there is no prospect of any significant change in overall gold output for 1999, as depleted mines would be compensated by new and expanding mines.

INDUSTRY IN ACTION

Production - Chinese aluminium output increases . . .

China's official Non-Ferrous Metals News reports that three Chinese aluminium plants increased output in January, with Pingguo Aluminium Co. producing 35,000 t of alumina and 8,975 t of aluminium ingots. Another producer, Langzhou Aluminium Co., located in western Gansu Province, achieved output of 7,307 t of aluminium, an increase of 109 t from the same

time last year. Meanwhile, in central Hunan Province, Great Wall Aluminium Co. reported 69,000 t of aluminium produced.

INDUSTRY IN ACTION

Production - . . . Huludao zinc output

China's largest zinc producer, the 300,000 t/y capacity Huludao zinc smelter, produced 23,000 t of zinc in January. The plant suffered a shutdown late last year, attributed to poor market conditions (MJ, September 4, 1998, p.181), and produced 278,000 t of zinc and 45,000 t of copper in the 12 months to December 31, 1998.

TECHNOLOGY TODAY

Kvaerner wins Peru contract

Kvaerner's Engineering and Construction business sector has won the contract for the Ilo copper smelter modernisation project in Peru. Kvaerner will provide basic and detailed engineering, procurement and construction services, and start-up assistance for the smelter. The project will involve the complete modernisation of the existing smelter, including the replacement of reverberatory furnaces and convertors, the installation of a new oxygen plant, acid plant and effluent treatment plant, as well as the provision of new utility services. Upon completion, the modernised smelter will initially have the capacity to process 1.13 Mt/y of dry copper concentrates.

Designed to meet all Peruvian and international environmental standards, Kvaerner says that the new smelter is expected to be a benchmark for the copper smelting industry and that when complete it will be one of the world's largest modern smelters to incorporate full environmental controls.

Last month, Outokumpu announced that it will be supplying Ilo's smelting and converting technologies (MJ, January 29, p.60).

Kvaerner, 20 Eastbourne Terrace, London W2 6LE, UK.

Tel : (+44 171) 262 8080.

Fax : 402 0702.

TECHNOLOGY TODAY

Caterpillar improves trucks

Caterpillar has updated the popular 769D, 771D, 773D and 775D off-highway trucks to improve serviceability, operator comfort and efficiency. New body designs allow the user to optimise productivity and durability. The 769D, carrying a maximum payload of 37.4 t, the 771D (40.7 t), the 773D (52.9 t) and the 775D (63.4 t) continue to offer the power trains, structures and electronics that have proven successful since the D-Series' introduction in 1996.

Enhancements to the new trucks include hydraulic system changes that reduce complexity and increase torque converter life. A new steering system reduces power demands and steering effort while improving steering response. Electrohydraulic hoist control and other hoist circuit changes reduce dump time. Several controls have been redesigned for greater operator comfort. The low-effort hoist control is easy and precise.

Caterpillar, PO Box 10097, Peoria, IL 61612-0097, US.

TECHNOLOGY TODAY

Bateman marketing agreement

Newmont Gold and Bateman have entered into a confidentiality agreement that allows Bateman to market Newmont's ammonium thio sulphate leach (ATS) technology. Newmont developed ATS to treat low-grade refractory ores by heap leaching. Normally if cyanide is used with refractory ores, rather than remaining in solution, gold cyanide complexes are deposited on carbon in the host rock. This leads to reduced recovery and increased costs. One response to this has been roasting of carbonaceous refractory ores, to remove the carbon, but owing to its high cost (over US\$20/t) this is only suitable for high-grade ores.

The development of ATS now allows for the treatment of ores with grades as low as 1 g/t Au. As the dissolution of gold in the presence of air or oxygen is very slow, ATS utilises cupric ions in the presence of ammonium as a catalytic oxidant. Once in solution, the gold cannot be recovered by traditional means, and a variant of the Merrill-Crowe process is required, with copper dust being used instead of zinc dust.

According to Bateman, recovery rates by ATS are comparable to those achieved by cyanide, as are the costs. In addition, it has the advantage that it is non-toxic (ammonia is used in industry as a base for fertilisers) and would be more acceptable in environmentally sensitive areas than a cyanide process.

Rick Moritz, Bateman.

Tel : (+1 303) 987 6489.

Fax : 989 1327.

E-mail : richard.moritz@bateman-am.com

TECHNOLOGY TODAY

Geoval and SRK merge

After co-operating on several projects, Australian geostatistical specialist Geoval has agreed to merge with international mining consultant SRK Consulting. According to Geoval's general manager John Vann, the company was interested in expanding and had identified the integration of geology, geostatistics and mining engineering as a key objective. SRK's expertise in assessing the geological controls on ore deposits and its mine design skills and geotechnical abilities made it an obvious choice, according to Geoval.

SRK Consulting's general manager, David Adams, says : « the mining industry faces major challenges in improving processes to combat falling metal prices . . . in developing new technologies to meet these challenges, clearly ore deposit models that represent the distribution of grade in the ground, and the mine designs based upon them, are key elements to target for improvement. »

SRK (Australasia).

Tel : (+61 8) 9322 2993.

Fax : 932 2994.

TECHNOLOGY TODAY

Ensival wins prize

One of the world's largest producers and exporters of phosphates, Morocco's Office Chérifien des Phosphates (OCP), has awarded Belgium-based Ensival as its 'supplier of the year'. The award was earned in connection with the construction of a new phosphoric acid treatment plant for which the Ensival group has designed and supplied about 50 pumps of various types and sizes, including standardised chemical centrifugal pumps, axial-flow pumps, liquid-ring vacuum pumps and vertical pumps with or without bearings in the medium.

According to Ensival, the award reflects the total quality management programme that it mounted in the wake of receiving ISO 9001 certification in June 1996,

Ateliers de Construction d'Ensival, 44, rue Hodister, 4860 Pepinster, Wegnez, Belgium.

Tel : (+ 32 87) 468 111.

Fax : 468 100.

E-mail : info@ensival.com

Web : www.ensival.com

TECHNOLOGY TODAY

Komatsu takes control

Komatsu has agreed to acquire the 50% interest held by Mannesmann Demag AG in the Demag Komatsu joint venture, which manufactures large hydraulic excavators for use in the mining industry.

The joint venture was originally formed in 1996 to develop, manufacture and market large excavators that would complement Komatsu's range of haul trucks, dozers and wheel loaders. Komatsu says that the acquisition strengthens its mining equipment business, and that its Komatsu Mining Systems Inc. unit will provide customers with a one-stop-shop for marketing and product support. As a result of the acquisition, Demag Komatsu will be named Komatsu Mining Germany.

Komatsu Mining Systems Inc., 568 Atrium Drive, PO Box 8131, Vernon Hills, IL 60061-8131, US.

Web : www.komatsu-mining.com

TECHNOLOGY TODAY

Industrial lights

UK-based Sea & Sea Ltd now offers a powerful light designed specifically for industrial use. The 133 mm long UK4AA flashlight is manufactured from ABS plastic and is fully waterproof, and features a powerful xenon beam which, says Sea & Sea, outperforms torches of similar size.

The flashlight is available with a choice of seven helmet clips for different types of hard hat and safety helmet. These enable users to fix a steady beam of light which can be quickly swivelled to adjust to the right direction. Additional accessories include a neoprene sleeve and

nylon belt pouch. In addition the UK4AA features a unique vent that allows any battery gas to disperse.

Sea & Sea Ltd, Philip House, Paignton TQ4 7QR, UK.

Tel : (+44 1803) 663 012.

Fax : 663 003.

E-mail : sea-and-sea-ltd@demon.co.uk

FOCUS AND COMMENT

Hard choices for India

At the SMI conference on 'Investment Opportunities in Indian Mining', held in London a fortnight ago, Arvind Varma, Secretary to the Government of India, Ministry of Steel and Mines, said that India is undergoing a quiet but nonetheless significant transformation, with new opportunities developing for private investment, both domestic and foreign, in the mining sector. The continent is under-explored and Mr Varma pointed out that, given India's size and geology, it should attract something like 4.5% of the world's total expenditure on mineral exploration. In point of fact, its share of global expenditure is only 0.25%. The gap underscores the potential for investment, he said.

Moreover, as pointed out by S.K. Acharyya, the Director General of the Geological Survey of India (GSI), the country possesses 2% of the land area of the globe but sustains 16% of the world's population, and has one of the world's lowest levels of per capita consumption. Demand for raw materials is growing rapidly, and intensive efforts are needed to sustain the resource base.

No entry barriers

Under such conditions, private sector capital, both domestic and foreign, will be vital. Mr Varma said that there are currently no entry barriers for private, including foreign investment, adding that 100%-owned subsidiaries of foreign companies can apply for prospecting or mining leases. Furthermore, in January this year, an 'automatic route' for foreign equity participation of up to 50% was introduced for mining all minerals except gold, silver, diamonds and precious stones. Under this system, foreign investors can bring in their investment through the Reserve Bank of India without the need for government approvals.

Referring to earlier restrictions imposed on the size of prospecting areas (25 km²), Mr Varma said that in 1996 new guidelines were set which permit aerial prospecting of areas up to 5,000 km² for a single licence and a total area of 10,000 km² throughout the country for a single party, subject to a scheme of relinquishment, and stipulation of physical and financial targets over a period of three years.

Highlighting advantages of investing in India, Mr Varma referred to the availability of a geological database ; metallogenic settings similar to South Africa, Canada and Australia ; the strong support available from government agencies such as the GSI and the Indian Bureau of Mines ; a pool of highly educated geoscientists and engineers, and other skilled manpower ; a well-regulated stock market ; English as the technical language ; and the availability of basic infrastructure, including modern communications, power, financial sector, etc.

The new policy initiatives and legislative changes, Mr Varma said, have evoked a good response from the international mining industry, with over 50 proposals for foreign

investment totalling about US\$750 million approved by the Foreign Investment Promotion Board, and 44 proposals covering more than 62,500 km² for aerial prospecting granted to the Indian subsidiaries of companies such as BHP Minerals, Phelps Dodge and Rio Tinto.

Commenting on government divestment, Mr Varma said it is now widely accepted that the government's chief role should be to establish and maintain an enabling environment that will allow private companies to be competitive. The government should act as regulator, rather than as operator or employer. He acknowledged that there is vociferous opposition in some quarters, but insisted that the policy, begun in 1991, is still on course.

Divestments planned

In the metals sector, the government's Divestment Commission has made recommendations in respect of Bharat Aluminium Co. (Balco), National Aluminium Co. (Nalco), Hindustan Zinc (HZL) and Hindustan Copper (HCL). For Balco, it is recommended that a majority stake is given to a strategic partner, and the balance of equity sold off over time. For Nalco, in which the government holds 87.15%, it is recommended that a further 30% of the government's equity be disinvested. Mr Varma said that the government's stake is to be restructured in order to make it more attractive to investors (MJ, October 30, 1998, p.348).

A source of frustration to would-be private investors in Indian mining projects is the ability of state governments to appoint public sector organisations in the state to undertake mining projects and to select their own private partners. Mr Varma said that, as from January 4 this year, state governments are no longer able to appoint an agent to undertake mining operations. State governments may continue to reserve areas for the granting of mineral concessions in favour of public-sector undertakings but the applications by the latter for mineral concessions will come under the same governance as private-sector operators. Mr Varma believes this will « substantially level the playing field for all (participants) in the minerals sector ».

Meanwhile, according to Mr Varma, the federal government is continuing to examine ways of simplifying procedures, delegating greater authority to the state governments and providing greater comfort to investors in terms of security of tenure, revision of royalties, etc.

Although India's rapid economic growth increases the likelihood that it will become increasingly dependent on a range of mineral imports (this issue, p.139), in some sectors it has a generous endowment. In particular, bauxite-alumina and iron ore are two sectors offering export opportunities.

Alumina for export

Speaking at the conference, P.G. Nayak, general manager (alumina) for Madras Aluminium Co. (Malco), summarised current development for bauxite-alumina. India possesses bauxite reserves estimated at 3,000 Mt, equivalent to 10% of the world total, and annual production capacity is around 5.26 Mt/y, including about 0.5 Mt/y of non-metallurgical bauxite. The main producers of metallurgical-grade bauxite are state-owned Nalco (2.4 Mt/y) and Balco (0.5 Mt/y), Indal (1.0 Mt/y), owned by Alcan of Canada and Indian private investors, privately-owned Hindalco (0.7 Mt/y) and Malco (0.15 Mt/y), a private company controlled by Sterlite Industries. Sterlite is also attempting to secure a 20% stake in Indal where Alcan has been seeking to raise its own interest from 35% to 55%.

India's annual alumina refining capacity is about 1.7 Mt but this is expected to rise to 4 Mt within a few years, with a number of new, low-cost projects being considered. In the 1970s, large new bauxite deposits were discovered in the Eastern Ghats hill-range running through

India's eastern states. The bauxites are deemed to have ample potential for alumina production for export, and the deposits are mainly gibbsitic, with 42%-45% Al_2O_3 and a silica content of less than 3%. At least 12 substantial deposits have been identified as suitable for setting up greenfield bauxite-alumina projects but as yet only one deposit, Panchapatmali in southern Orissa, is under commercial exploitation, by Nalco.

The deposit forms the cap of a narrow plateau measuring up to 1.5 km wide and 20 km long. Mining operations began in 1986 and at current rates of production reserves are sufficient for at least 100 years. Nominal annual capacity is 2.4 Mt/y but output in 1997/98 reached 2.66 Mt and there are plans to double nominal capacity to 4.8 Mt. The bauxite provides the feed for Nalco's nearby 0.8 Mt/y capacity Damanjodi alumina refinery. The refinery is reported to have production costs amongst the lowest in the world, at around US\$81/t. Approximately 50% of the alumina is consumed at Nalco's 230,000 t/y Angul smelter. Some provides feed for Balco's 0.8 Mt/y Korba refinery in Madhya Pradesh, the remainder is exported.

Cost competitive

In the early years, the first alumina refineries in India were based on numerous small, scattered bauxite deposits in Madhya Pradesh, Bihar, Maharashtra and Uttar Pradesh. Selected high-grade ore was mined and transported to refineries by a variety of methods (rail, truck and ropeway). Refineries were comparatively modest in size (less than 0.2 Mt/y capacity) and the distances from the mines to the refineries were often considerable. Mr Nayak cited examples of 35-250 km (truck haulage) for Balco's Korba refinery, 130 km (ropeway/railway) for Indal's Muri operation and 150 km (truck) for Hindalco's Renukoot refinery. Since the 1970s, however, there has been a marked shift to much larger alumina refineries located far closer to the bauxite-mining operations. For example, Nalco's Damanjodi refinery is 15 km distant from the mine and ore is transported via a single-flight conveyor.

Environmental degradation caused by mining is of mounting public concern in India and is another reason for a growing preference for conveyor systems rather than truck haulage in the current generation of bauxite-mining projects. Similarly, ripping and dozing is being increasingly preferred to drilling and blasting. The disposal of red-mud residues is also assuming greater environmental importance and Mr Nayak said that the dry-stacking method is now being rapidly adopted by Indian refineries.

The most recent bauxite-alumina project, Utkal, is a US\$1 billion integrated mine-refinery under construction at a greenfield site based on the Baphlimali deposits in the Rayagada district of Orissa where there are estimated bauxite reserves of almost 200 Mt. Utkal is a joint venture between Indal, Alcan and Norsk Hydro. Tata Industries was involved originally but withdrew last month, citing environmental factors as one of the reasons. The other partners are understood to be taking up Tata's share (MJ, January 22, p.38). During the first phase, Utkal will produce 1 Mt/y of alumina, and a second phase envisages production increasing to 2.5 Mt/y. Construction of a port facility is under way at Vizag. Utkal alumina is destined entirely for export, and it is anticipated that production costs will be very low, estimated initially to be around US\$87/t, reducing eventually to nearer US\$80/t.

Energy accounts for around 30% of total production costs at Indian alumina refineries but Mr Nayak said that the introduction of stationary calciners to replace conventional rotary kilns has reduced the energy costs in calcination by 20-25%. In addition, there is a move towards refineries building their own captive power plants, rather than purchasing electricity from the national grid. This could reduce energy costs by as much as 30%.

Apart from Utkal, Larsen & Toubro have plans for a 1 Mt/y refinery and co-generation power plant at Kusumsila, based on deposits with reserves of at least 270 Mt at Sijimali and Kutrumali in Orissa. All alumina production will be exported. Elsewhere, Hindalco is planning a 1 Mt/y refinery, plus a 0.25 Mt/y aluminium smelter by 2001. According to Metals and Minerals Annual Review, Gujarat Mineral Development Co. and Gujarat Alkalies and Chemicals, in conjunction with Raytheon, plan to go ahead with a US\$600 million, 0.75 Mt/y refinery during 1999.

Iron ore demand to soar

India possesses huge reserves of iron ore, estimated at some 12,000 Mt, mainly haematite but also including an estimated 3,140 Mt of magnetite. Both ore types are mined but magnetite ore-mining is far more recent, having begun about 20 years ago at Kudremukh in Karnataka. In the financial year to March 31, 1998, India produced 70 Mt of iron ore (including ore mined by captive mines of integrated steel plants), and exports amounted to 31 Mt valued at US\$420 million.

The country's iron ore deposits are widespread, and logistics dictate that only ore from certain regions can be exported. National Mineral Development Corp. (NMDC) is the largest public sector exporter, and has a production capacity of 15.5 Mt/y, mainly from Bailadila in Madhya Pradesh. The Steel Authority of India Ltd (SAIL) has the capacity to produce 23.7 Mt from operations in Bihar, Orissa and Madhya Pradesh, and Kudremukh Iron Ore Co. Ltd (KIOCL) can produce 7 Mt/y (magnetite concentrate and pellets). In the private sector, operators in Goa have the capacity to produce 18 Mt/y, whilst TISCO and other operators in Bihar, Orissa and Karnataka can produce 19.3 Mt/y. Hence, India's total current capacity is around 83.5 Mt/y.

In a presentation prepared for the conference by P.R. Trepahi, the chairman and managing director of NMDC, it was forecast that domestic demand for iron ore could reach 119 Mt in 2002 and perhaps 125 Mt in 2006. On its own behalf, the company is developing a new 5 Mt/y capacity mine at Bailadila based on reserves of 189 Mt (65% Fe), due to be operational by 2002. It is also investing in a mine at Kumaraswamy based on 179 Mt of reserves (64% Fe), with an initial capacity of 3 Mt, rising eventually to 7 Mt/y. NMDC expects India to maintain its position as a net exporter, with shipments to the international market expected to remain in the 30-35 Mt/y range.

Kudremukh keeps pace

T.R. Ramachandra Rao presented an overview of iron ore mining at the conference, with specific reference to the performance of KIOCL, where he is an executive director. The company, a wholly-owned government enterprise, was established in 1976 and production is entirely for export. Last year, Kudremukh exported 6.1 Mt worth US\$140 million, which contributed roughly one third of iron ore export earnings. The mine produces high-grade iron ore concentrates (67-68% Fe) as sinter feed, plus blast furnace-grade and direct reduction-grade pellets. The deposits are low grade at 35-37% Fe and are beneficiated to 65-67% Fe.

The Kudremukh project, costing US\$630 million, was originally designed to provide ore to steel mills in Iran. Concentrates are transported 67 km via slurry pipeline from the mine to a filtration plant and ship-loading facilities at Mangalore. In 1981, a 3 Mt/y capacity pellet plant was built at Mangalore. This went into production in 1987 and today, KIOCL is exporting its products to more than seven countries. In the 1998 financial year, Iran received 1 Mt/y of concentrates, Japan 1.5 Mt and China 0.5 Mt.

China also received 1 Mt of pellets, with the balance of pellet production going to Taiwan, Indonesia, Iran and Turkey, and the domestic market. An estimated 0.4 Mt of pellets were exported to Australia to steel plants operated by BHP, which evidently finds it cheaper to import Indian pellets for its east coast plants rather than ship them from its own mines in Western Australia.

Mr Rao emphasised that mechanised mining is the key to current practice for increasing capacity and reducing costs but the adoption of the latest technology in most Indian iron ore mines, he said, has yet to occur. At Kudremukh, however, computerisation has gone ahead and is now integral, for example, to geo-modelling, mine planning and the truck despatch system, where GPS is used to co-ordinate shovel output, haulage and ore blending. In the pit, the introduction of air-decking techniques for blasting ore benches has reduced explosives costs by 20%, as well as improving fragmentation, and reducing air and noise pollution.

In the concentrator, Floatex density classifiers were introduced in 1996 to produce a pre-concentrate with a higher iron content and reduced iron loss in the tailings. After successful trials, it is planned, shortly, to treat the entire magnetic concentrate by column flotation. Recent modifications to the pellet operation include the use of organic binders, the introduction of solid carbon to reduce pellet abrasion, and the installation of double-deck roller screens, a burner control system and a high-pressure roll press to improve the blend of the pellet feed. These have increased the capacity of the existing plant to 3.5 Mt/y, and new shaft-pelletising technology will shortly be introduced, which will raise annual capacity to 4 Mt.

Mr Rao said that KIOCL has a master plan in place in respect of ecological and environmental safeguards. The mine is located in a forested area with extremely high rainfall (7,000 mm over a four-month period). Stabilisation of hill slopes to avoid scouring and soil wash-off is important, and there is a major ongoing reforestation programme. To prevent river pollution, the company has spent US\$50 million on a 100 m-high earthen dam and two mini-dams to store plant tailings and mine waste.

KIOCL is a profitable enterprise and, like Balco and Nalco, is being considered for early disinvestment. The federal government has yet to decide on the form that privatisation will take, and has appointed Dresdner Kleinwort Benson and State Bank of India Capital as its advisers.

FOCUS AND COMMENT

Indian enigma

At the beginning of this month, a conference held in Cape Town devoted to mining investment opportunities in Africa attracted over 1,000 delegates. Without doubt, Cape Town is a very attractive venue at this time of year but the large number of people attending the conference, whilst very gratifying for the organiser, is still somewhat surprising when one considers the degree of political uncertainty and instability within the African continent, highlighted by the force majeure declared this week for the Tenke project in the Congo (this issue, p.129). Evidently, the perceived rewards that Africa has to offer far outweigh the risks.

Two weeks ago, in London, a two-day conference was devoted to investment opportunities in India. Speakers included senior federal and state mining officials, the head of India's geological survey, a number of executives from the Indian mining sector (both public and private) and, from outside India, representatives from the World Bank and multinational

mining companies such as Phelps Dodge and Rio Tinto. An all-star line-up one might say. Disappointingly, however, the number of delegates numbered two or three dozen. Why so few ?

India is a democracy, politically stable, and relatively unscathed by the economic problems in the rest of Asia. It is probably the world's fifth -largest economy and, although industrial growth last year slowed from the 10% achieved in recent years, it was still a respectable 5%. Similarly, GDP growth eased back, from 7% to 5%. Mineral production contributes about 3.5% of GDP and constitutes an important sector of the economy, with export turnover from minerals and mineral-based products making up more than 20% of the total value of all exported merchandise. Nevertheless, of India's total mineral production, 84% by value derives from fuel minerals, and by global standards India remains a relatively insignificant mineral producer for its size and geological potential.

The country supports almost 16% of the world's population but its per capita consumption is one of the lowest. Hence, if rapid economic growth is sustained, it seems likely that demand for raw materials will quickly outstrip domestic production capabilities. India is already a net importer of many commodities such as diamonds (mainly for re-export), phosphate, potash, oil and coking coal, and several base metals, and its dependence on imports can only intensify unless there is a major injection of fresh investment in the minerals sector. In terms of exploration alone, India's size and geology warrants a quantum leap in spending (this issue, p.137).

It must be doubtful that the country can realise its ambitions without recourse to major foreign investment in mineral exploration and mine development. Since 1991, the country has embarked on a policy of economic liberalisation, with hitherto reserved sectors such as mining opened up to private investment (both domestic and foreign). However, foreign equity participation of more than 50% has to be negotiated case-by-case, mining continues to be dominated by state-controlled companies, and the government's commitment to disinvestment and the role of the private sector remains uncertain.

Mistakenly or otherwise, many outside India view the government attitude towards foreign investment as ambivalent - toleration rather than active encouragement. Add to this a pervasive and intractable bureaucracy which thwarts efforts to expedite projects, rivalry between federal and state governments and the lack of any 'one-stop shop' for companies seeking to embark on new mineral projects in India, and it can be seen that the government's stated wish to create an enabling environment is not entirely convincing. Open for business maybe, but the terms need to be more attractive.

By contrast, the majority of African countries are bending over backwards to attract foreign investors. It is, therefore, perhaps not such a great surprise, after all, that the Cape Town Indaba proved so much more popular.

MINERAL MARKETS

Backwardation limits to be lifted

The London Metal Exchange has decided to lift all existing backwardation limits from its contracts. The LME says that its decision follows an earlier warning in its paper *Market Aberrations : The Way Forward* (MJ, October 16, 1998, p.304) that gave notice that once all new procedures relating to market aberrations were in place all the current backwardation limits would be reconsidered and withdrawn where appropriate. The withdrawal of limits will

be effective as of March 1, 1999. At present the LME has a number of various limits on the daily backwardations of all LME contracts with the exception of nickel which is limitless.

In its statement, the LME notes that it has issued guidance on dominant positions and that the LME is now publishing, daily, the new market open interest figures and information on large warrant holdings on the statistics page of its website (<http://www.lme.co.uk>).

The LME emphasises that, if an undesirable market situation emerges, it will not hesitate to take appropriate action to maintain proper markets.

MINERAL MARKETS

Platinum tightness . . .

Since last week, one-month lease rates for platinum have risen from around 2% to about 11% as market users rush to ensure that they are not caught out by the metal's explosive price rise. The surge in prices has been attributed to renewed concerns over when Russian supplies of the metal might reach the markets and, much the same as last year, most analysts expect Russia to dominate PGM prices for much of 1999.

This sentiment was echoed this week at Standard Bank's launch of its 'Platinum Yearbook', by Trevor Pitts. The report's author warns that the situation in Russia remains uncertain and beset with potential dangers.

Speaking more generally on platinum, Mr Pitts noted that in 1998 prices ranged from a high of US\$429/oz to a low of US\$334.25/oz with the average price US\$372.14/oz, some US\$23 lower than the 1997 average. The weakness of the price during 1998 was attributed to three main factors : the continuing increase in palladium usage in autocatalysts largely at the expense of platinum ; the continued uncertainty surrounding the global economy ; and increased supplies from producers. As the economic outlook continues to remain uncertain and the situation in Russia unclear, Standard Bank expects the platinum price to trade in a range of US\$330-415/oz in 1999.

Commenting on palladium's price performance over the past year, Mr Pitts noted that the 1998 average price was over US\$100/oz higher than that in 1997. This surge reflected the continuing increase in demand from the autocatalyst sectors. This resulted in a 1 Moz shortfall in supplies which had to be met from stocks. Even when supplies of the metal became more freely available in the latter part of the year, the price maintained its strength and users took the opportunity to rebuild depleted stocks in anticipation of further supply shortfalls this year. Standard Bank expects delays in supplies in 1999 to stimulate further rallies in the price, and expects palladium to trade in the range US\$240-380/oz.

MINERAL MARKETS

. . . Russian problems

Speaking in more detail on Russia, Standard Bank's Kenneth Axsell, who has recently returned from a visit to Norilsk, notes that the uncertainty around Russian exports of PGM reflects the complex political and bureaucratic inter-relationships and conflicts between the various agencies involved in Russian PGM. Of these, only Almazjuvelirexport (independent but reporting to the Russian Ministry of Finance) is officially allowed to export PGM. However, because of the direct and indirect involvement of a number of other agencies and government departments PGM exports are erratic and likely to continue to be so in future.

As well as exports there is considerable uncertainty surrounding Russian output of PGM. Mr Axsel noted that the country's largest producer, Norilsk, faces many problems, all of which impact on production output. Chief amongst them is the poor condition of processing, smelting and refining operations, many of which are antiquated, run down or unfinished. Therefore, despite significant reserves and the well equipped Otkabirski mine, Mr Axsel does not expect Norilsk to be able to achieve its planned production targets for 1999 of 308,000 t of copper and 100,000 t of nickel. He feels that 220,000 t of copper and 70-80,000 t of nickel are more likely, which equates to by-product production of 350,000-400,000 oz of platinum and 1.4-1.8 Moz of palladium.

In addition to exports and Norilsk, the final element of uncertainty with regard to Russian PGM is the stockpiles of the metal held there, which in recent years have played a significant role in supplying global markets. Standard estimates that these now stand at around 1 Moz of platinum and 10-15 Moz of palladium.

Export quotas, Norilsk's production problems and the status of the Russian stockpiles, says Mr Axsel, will ensure that Russia will remain the wildcard in the PGM industry and assure price volatility and speculation.

MINERAL MARKETS

Nickel probes upwards

Having shown resilience in the face of the recent declines in copper and aluminium prices, zinc, and most notably nickel, rallied strongly this week.

The nickel market has been boosted by delays in shipments of Russian metal to Europe, which has in turn forced European merchants to draw down LME stocks of the metal. The effect of this on prices has been amplified by speculative activity, thought to be trying to push three-month prices towards US\$5,200/t. Zinc has shown some strength with the price touching US\$1,063/t earlier in the week before weakening slightly.

While nickel and zinc prices have remained strong this week, copper and aluminium have not. Copper has visited a 12-year low of US\$1,378/t against a background of rising stocks and bearish sentiment expressed during the Copper Club week in New York. Negative sentiment has also weighed heavily on aluminium which dipped to fresh five-year lows of US\$1,172/t.

MINERAL MARKETS

SWORD agreement

Another important development on the LME relates to warehousing. After some acrimony, it is now understood that 18 metal warehousing firms will adopt the LME's new electronic warrant trading system - SWORD (MJ, May 29, 1998, p.420). The companies are all members of the International Metal Warehouses Association (IMWA) which had originally opposed signing the SWORD agreement because it had included changes in the LME's warehousing contract that they felt were unacceptable. IMWA's members signed up for SWORD after the LME agreed to conduct negotiations on the new contract rather than consult.

The LME's ultimatum still stands, that after May 17, only warehouses that have signed up to SWORD will be allowed to issue warrants (bearer documents that give holders title to metal

stored in LME warehouses that are physically transferred when ownership changes). When SWORD is fully implemented later this year, warrants will be stored in secure vaults and ownership changes will be carried out electronically.

MINING FINANCE

AngloGold bales out of Driefontein

The vexed issue of the ownership of the Driefontein gold mine in South Africa, contested by the country's two main gold producers, Gold Fields Ltd (GFL) and AngloGold Ltd, moved forward at the end of last week, with the announcement of a three-phase deal, including a reverse takeover of GFL by Driefontein. The newly-enlarged Driefontein (to be renamed Gold Fields Ltd in due course) will hold all of the Driefontein mine, plus GFL's other assets, most importantly Beatrix, Kloof and a 70% interest in Tarkwa in Ghana, giving total output of 4 Moz/y at a total operating cost of about US\$190/oz. This will take the company past Barrick Gold Corp. of Canada to make it the world's third -largest producer, behind AngloGold and Newmont Mining of the US. Total reserves will hold 96 Moz.

The main surprise is the sale by AngloGold to GFL of its 21.5% equity interest in Driefontein Consolidated Ltd for R1.3 billion in cash (R30/share). AngloGold recently spent much of its cash buying the gold assets of Minorco, and the company's chief financial officer, Jonathan Best, said that the sale of the Driefontein shares will help to replenish the 'war chest'.

Driefontein produces about 1.5 Moz/y of gold, and its high grades (the yield in the December quarter was 9.3 g/t) make the mine potentially the most attractive in the country. However, under the management of the Gold Fields of South Africa (GFSa) group, Driefontein has generally failed to achieve the productivity improvements made elsewhere in the South African gold mining industry (ironically, its rich grades have arguably contributed indirectly to the poor efficiency levels).

AngloGold was formed in early 1998 by the merger of the gold interests of the Anglo American group, and these assets included shares in Driefontein. Meanwhile, the gold assets of the Gencor group and GFSa were similarly being merged to form GFL, which included an equity interest in Driefontein now representing 37.8% of the company.

Both groups wanted to acquire 100% of Driefontein, each arguing that it offered better management of the asset. The squabble was resolved in the middle of last year, with the announcement of plans to form a 60 :40 joint venture along international lines, by acquiring the minority interests in Driefontein in return for GFL shares (MJ, May 22, 1998, p.405). AngloGold was to pay for its portion of the offer with GFL shares held by its parent, Anglo American Corp. (AAC) (and AAC's subsidiary Amgold), which would be reimbursed with new AngloGold shares. AAC and Amgold hold 18.3% of GFL, acquired through the group's original holding in GFSa when the latter was dismantled. Meanwhile, AngloGold and GFL set up a joint management system to run Driefontein.

The plans ran into the problems as the view spread that minority interests in Driefontein, holding 40.7% of the company, were likely to be disadvantaged by the takeover, particularly if the terms were based on prevailing share prices, as the mine stood on the verge of a significant turnaround in performance. The takeover plan would have needed approval from 75% of minority interests, under South African regulations, and this began to look doubtful. Accordingly, at the end of last year, GFL put forward the idea of reversing the deal, with Driefontein acquiring GFL instead. This would require only a 50% approval among

Driefontein minorities. The means by which a joint venture with AngloGold over the mine itself might be formed was not outlined (MJ, December 25, 1998, p.515).

The key to AngloGold's withdrawal from the Driefontein ownership joint venture, according to Mr Best, is the degree of co-operation between AngloGold and GFL that has stemmed from the interim joint management. Mr Best said that AngloGold is now confident that the operational synergies that might be gained from the proximities of the properties of the two groups in the West Wits area can still be achieved without the need for co-ownership. AngloGold is particularly interested in the development of its Western Ultra Deep Levels orebody, to the south of its Western Deep Levels operations and neighbouring Driefontein. However, the company is confident that this 4,000 m deep orebody can be developed in co-operation with GFL, and the formal agreement between the two regarding Ultra Deeps is retained in their latest agreement.

In a separate transaction, part of AAC's 18.3% interest in GFL will be used to remove GFL's cross-holding of 2 million shares in AngloGold. These will be exchanged for the cancellation of 10.8 million GFL shares held by AAC, reducing AAC's shareholding in GFL to 14.5% and raising its interest in AngloGold slightly, to 53.7%.

GFL will pay for AngloGold's 21.5% interest in Driefontein with R714 million from its own cash resources and R600 million from a loan to be extended by AngloGold. The loan, on commercial terms, will be repaid in nine months (or earlier if GFL chooses). GFL will then hold 59.3% of Driefontein, which it will distribute to its own shareholders in the ratio 51.41 shares for every 100 held in GFL. This is purely an interim mechanism for tax reasons, as Driefontein will make an immediate offer for GFL on the basis of 103.59 new shares for every 100, bringing the overall takeover offer to 155 shares in Driefontein for every 100 in GFL.

The new GFL will have a market capitalisation (based on recent share prices) of about R12 billion. Driefontein is currently listed in Johannesburg, and the new GFL will seek to list additionally on some or all of the stock exchanges where the current company is listed : London, Paris, Brussels and NASDAQ in the US. The chairman of GFL, Chris Thompson, said that other exchanges under consideration include Toronto and New York. The original owners of GFL will hold about 81% of the new GFL (including AAC with 11.8%) and the original minority shareholders in Driefontein will own about 19%.

Mindful of the issue of minority rights, GFL is stressing its attention to good corporate governance. The company formed an independent committee comprising South African businessman Dave Brink, chairman of Murray and Roberts ; Rory Knight, Dean of the Business School of Templeton College, Oxford ; and Rick Menell, executive chairman of Avgold Ltd (incidentally, a competitor). The committee concluded the terms of the planned offer by Driefontein for GFL to be « fair and reasonable ». Furthermore, the chairman of Driefontein, Tom Dale, said last week that the terms are based not on recent share-price levels, but on fundamental values. The verdict lies with Driefontein's minority shareholders, as AngloGold and GFL cannot vote on this part of the plan. A simple 50% majority is required

MINING FINANCE

Barrick maintains its ability to impress

Barrick Gold Corp. of Canada continued to defy low spot gold prices in the year to December 31, 1998, posting record earnings and cash flow. Net income was US\$301 million, compared

with a loss of US\$123 million (profit of US\$262 million before write-downs and other provisions) in 1997, and operating cash flow rose by 15% to US\$539 million. Dilution to shareholders was minimal, as common shares outstanding rose by only 1%, to finish the year at 377 million.

The chief financial officer of Barrick, Randall Oliphant, attributes the performance to three main factors : strong production, which rose by 5% to 3.2 Moz ; efforts at cost reduction, which resulted in a 13% fall in overall cash operating costs to US\$180/oz (including royalties and direct taxes of US\$20/oz) ; and Barrick's hedging programme (now referred to as its 'premium gold sales programme'), which delivered an average received price of US\$400/oz, compared with an average spot price of US\$294/oz.

Barrick intends to continue to build on each of these cornerstones in the current year. Production is forecast at 3.6 Moz in 1999, at a basic cash cost of US\$125/oz (plus US\$15/oz in royalties and direct taxes). Total costs will be about US\$240/oz. The engine room for this production will continue to be the Goldstrike complex in Nevada, with planned production of 2.1 Moz at a cash cost of US\$135/oz. The underground Meikle mine is of increasing importance, with a planned contribution of 1 Moz, at US\$75/oz, to Goldstrike's 1999 total. Even Meikle's impressively low cash operating cost is set to be eclipsed by Pierina, Barrick's latest mine. Pierina produced 56,000 oz in 1998, after commissioning in November, at a cost of US\$260 million, and is expected to produce 835,000 oz in 1999 at a cash cost of US\$45/oz.

Barrick's hedging programme, with a total of 11.5 Moz sold forward, is set to deliver a minimum average realized gold price of US\$385/oz until at least the end of 2001. Should the spot price rise, forward contracts can be deferred for up to 15 years, according to Mr Oliphant, as Barrick's balance-sheet strength allows it access to long hedging lines. Barrick clearly regards hedging as more than price protection : Mr Oliphant describes the programme as earning « interest on our gold in the ground ».

The reduction in the spot price caused Barrick to recalculate its (ore) reserves at the end of 1998 at a gold price of US\$325/oz, resulting in a contained total of 51.5 Moz, compared with 50.3 Moz (at US\$350/oz) at the end of 1997. The chief operating officer of Barrick, John Carrington, notes that these reserves are relatively insensitive to a lower gold price, falling only to 48.0 Moz at US\$300/oz.

Capital expenditure is forecast at US\$500 million in 1999, virtually unchanged from the US\$507 million spent last year, with the major items of expenditure being US\$250 million in further work on the US\$330 million roaster at Goldstrike, for treating refractory ore from mid-2000. Barrick plans to spend US\$80 million on exploration, half of which will be treated as an operating expense and half as capital expenditure.

Further ahead, development of the Pascua project, on the border between Chile and Argentina, will cost US\$950 million, for annual production of 675,000 oz and 20 Moz/y of silver at a cash operating cost of US\$125/oz. These parameters are based on a contained reserve of 14 Moz of gold and 440 Moz of silver. Resources total 20 Moz of gold. At the end of last week, the company bid to acquire the Bulyanhulu project in Tanzania (this issue, p.130). Mr Carrington is confident that the company has both the technical and financial resources to bring these projects to fruition. Barrick had cash of US\$416 million at the end of 1998, plus available credit facilities to give access to a total of up to US\$2 billion.

MINING FINANCE

LME PRICES & STOCKS

Prices (a.m.) Tonne basis	Buyers	Feb 25 Sellers	Buyers	Feb 18 Sellers
COPPER Grade A				
Cash	\$1,371	\$1,372	\$1,379.5	\$1,380
Three months	\$1,394.5	\$1,395.5	\$1,407	\$1,407.5
TIN				
Cash	\$5,400	\$5,405	\$5,345	\$5,355
Three months	\$5,345	\$5,350	\$5,245	\$5,250
LEAD				
Cash	\$515.5	\$516	\$528	\$529
Three months	\$518	\$519	\$533	\$534
ZINC Special high grade				
Cash	1,021.5	1,022	1,043	1,044
Three months	\$1,031	\$1,031.5	\$1,056.5	\$1,057
ALUMINIUM Higher grade				
Cash	\$1,166	\$1,167	\$1,173	\$1,174
Three months	\$1,187	\$1,188	\$1,197	\$1,198
Alloy				
Cash	\$1,005	\$1,007	\$1,010	\$1,015
Three months	\$1,034	\$1,034.5	\$1,036	\$1,040
NICKEL				
Cash	\$4,910	\$4,920	\$4,570	\$4,575
Three months	\$4,975	\$4,980	\$4,650	\$4,655

LME warehouse stocks on February 24

	Stocks (t)	Stocks (Feb 17)
COPPER		
Grade A cathodes	694,700	685,575
TIN	7,700	7,045
LEAD	107,300	107,075
ZINC SHG	310,075	310,175
ALUMINIUM HG	811,375	810,575
Alloy	90,060	91,120
NICKEL	60,750	64,932

MINING FINANCE

LONDON PRICES

Metals		Feb 25
Aluminium	(US producer)	61.00-62.00 c/lb d/d
Antimony		\$1,350-\$1,450/t cif
Arsenic	(Rotterdam 99%)	\$0.40-\$0.50/lb
Bismuth	Bismuth	\$3.10-\$3.30/lb cif
Cadmium	(99.99%)	\$0.20-\$0.25/lb cif
..	(99.95%)	\$0.18-\$0.23/lb cif
Chrome	(UK 99%)	\$9.00-\$10.00/lb
Cobalt	(99.8%)	\$19.00-\$21.00/lb net
..	(99.3%)	\$17.50-\$19.50/lb net
Germanium		\$800-\$840/kg
Gold		£179.21 (\$287.10)/oz
Indium		\$190-\$210/kg
Iridium	(J Matthey price)	\$415/oz
Magnesium	(Norsk Hydro Euro. prod.)	e2.94/kg*
..	(US Free mkt, 99.8%)	\$1,850-\$2,400/t*

Manganese

metal	(99.7%)	\$1,080-\$1,140/t
Mercury	(99.99%)	\$135-\$148/flask
Nickel		\$2.23-\$2.24/lb
Osmium		\$400-\$450/oz
Palladium	(J Matthey price)	\$360.00/oz
..	(Free market)	\$354.00-\$359.00/oz
Platinum	(J Matthey price)	\$384.00/oz
..	(Free market)	\$380.00-\$382.00/oz
Rhodium	(J Matthey price)	\$890/oz
Ruthenium	(J Matthey price)	\$41/oz
Selenium		\$1.40-\$1.80/lb cif
Silver		\$5.53/oz
Tellurium	(UK lump & powder 99.95%)	\$5.00-\$7.00/lb net
Tin	(Kuala Lumpur)	RM19.90/kg
Ore & Oxides		Feb 25
Antimony	(60%)	\$8.50-\$9.00/t unit, cif nom*
Beryl	(10% BeO)	\$75-\$80/s ton unit BeO cif*
Chrome	(Transvaal, Friable 40%)	\$60-\$64/t, fob*
..	(Turkish, concs 48%)	\$75-\$85/t fob*
Columbite	(min. 65% comb. oxides)	\$2.80-\$3.20/lb cif*
Ilmenite	(54% TiO2)	A\$95-A\$110/t fob
Lithium ores	(Petalite 4.2% Li2O)	\$250/t fob*
	(Spodumene>7.25% Li2O)	\$ 385-\$395/t fob*
Manganese ore	(48-50% Mn, max. 0.1% P)	\$1.99-\$2.08/t unit fob*

Molybdenum

oxide	(conc 55-57%)	\$3.00-\$3.30/lb
Rutile	(Aust. 95-97% TiO2)	A\$725-A\$775/t fob (bulk)
Tantalum oxide	(60% cif N. Euro port)	\$26-\$32/lb
Uranium	(Nuexco unrestricted/restricted U3O8)	\$8.85/\$9.20/lb
Vanadium	(98% V2O5)	\$2.40-\$2.60/lb cif
Wolframite	(65%)	\$40-\$45/t unit
Zircon sand	(std 66-67% ZrO2)	A\$500-A\$600/t fob (bulk)

- Source : Metal Bulletin

MINING FINANCE

Noranda's second-class proposal

Following the divestiture of its non-mining businesses (MJ, December 11, 1998, p.481), the Canadian mining and metals group Noranda Inc. has revealed plans to create two classes of common shares. Shareholders will be asked to vote on the proposal at the company's annual general meeting on April 22. Noranda's largest shareholder, EdperBrascan Corp., with 40%, has indicated its support for the plan.

Each share currently held would be replaced with 0.5 class 'A' shares and 0.5 class 'B' shares. The two classes would have equal voting rights and dividend participation. Crucially, each class would elect half the board of directors and any matter requiring the approval of shareholders would require the appropriate majority in both classes. However, new equity issues for fund raising or for use in takeovers would be made exclusively in class 'A' shares, preventing the dilution of existing shareholding proportions in class 'B'.

The Canadian-based stockbroker RBC Dominion Securities notes that the positive side of the proposal is that under the mechanism, EdperBrascan is likely to permit Noranda to grow by acquisition (for example by making an offer for the 51.1% of Falconbridge Ltd that it does not already hold), as EdperBrascan would be able to maintain its dominant 40% position. The

negative side would be the reluctance of other existing and future shareholders to invest in a company in which one or more parties has a control position disproportionate to its equity.

MINING FINANCE

Western Metals backs away from Padaeng

The Australian-based zinc and copper producer Western Metals Ltd has notified Padaeng Industry plc of Thailand, in which it holds a 13% interest, that it has rescinded the subscription agreement between the two companies. Under this agreement, Western Metals was to have subscribed for a further 75 million shares in Padaeng, for about A\$46 million (MJ, October 16, 1998, p.308). The development prompted Padaeng to announce that it would hold discussions with its creditors regarding the US\$30.8 million portion of its debt that was to have been refinanced from the Western Metals subscription proceeds.

The managing director of Western Metals, Rod Webster, said that the decision was based on « information provided late last week » that raised serious concerns regarding Padaeng's application for a mining lease over the Mae Sot zinc deposit. Padaeng operates Thailand's only zinc smelter, in Tak Province (MJ, February 19, p.119). Mr Webster said that Padaeng was thus « unable to meet the essential conditions and, therefore, Western Metals will make no further payments ». He said that Western Metals remains keen to support its existing investment in Padaeng, and obligations regarding the company's management, raw materials supply and export sales.

Earlier this week, Western Metals announced preliminary plans to make a placement of shares representing up to 15% of the company's share capital and/or a rights issue. The company is in discussion with potential underwriters. The funds would be used to bolster working capital, which is being squeezed between reduced cash flow from operations as a result of weak metal prices, and capital commitments that include the recent commissioning of two new mines. The new mines include the Gordon copper project in Queensland (acquired as part of Aberfoyle Ltd), where the company now reports that the production build-up has been slower than planned.

Last week, Western Metals reported that its interim results for the six months to December 31, 1998 will be delayed by the need to consolidate Aberfoyle Ltd. The company did forecast, however, a pre-tax profit for the period of A\$2.3 million. The sale of non-core assets, particularly those acquired in Aberfoyle, has raised about A\$22 million in cash, shares and deferred payments. At the end of last week, the Perth-based stockbroker CIBC Wood Gundy Australia calculated that the company had A\$1.0 million in cash, and A\$237.4 million in debt.

MINING FINANCE

Market news

The South African gold producer Durban Roodepoort Deep Ltd has finally launched its threatened takeover bid for Australian-listed Emperor Mines Ltd, owner of the Vatukoula gold operation in Fiji. The possibility of a bid first emerged last November, and Emperor has meanwhile taken some defensive measures, including a planned move of its domicile from the Isle of Man to Australia (MJ, January 15, p.30). The offer, comprising one new share in DRD for every five held in Emperor, represents a hostile bid, as DRD notes that it follows unsuccessful negotiations for an agreed acquisition. DRD expects approval to list its shares on

the Australian Stock Exchange within a week. Consolidated African Mines Ltd (the holding company for the main mining investments of DRD's chairman, Roger Kebble) and its associates have agreed to tender their collective 17.4% interest in Emperor to DRD. The move represents something of a departure for DRD, which owns a number of relatively mature, low-grade operations in South Africa, but is part of a deliberate plan to spread internationally while concentrating on mines with marginal grades. South Africa has exchange controls regarding foreign acquisitions, but DRD noted in a statement that the South African Reserve Bank has given the necessary approval.

South African mining companies, meanwhile, received a fillip in the South African budget, released last week, through lower tax rates designed to stimulate the economy and reduce the country's chronic unemployment. Non-gold companies will benefit from a reduction in the general corporation tax rate from 35% to 30%. Gold mining companies have special formulae to determine their tax, and this has also been adjusted to lower the rate. Gold mining companies are also different in that they were allowed to elect not to pay STC, a secondary tax equivalent now to 12.5% of any dividends distributed to shareholders, when it was introduced in 1994. Most elected to stay exempt from STC but, among currently listed companies, Harmony, Durban Roodepoort Deep and Avgold, historically low dividend payers in recent years, logically elected to pay STC, which entitled them to the lower primary tax formula. The new formulae are $37 - (185/X)$ for those that elected to pay STC, and $46 - (230/X)$ for those that elected not to pay STC (X is the ratio of profit to revenue (after deducting capital expenditure) from mining operations only). The Johannesburg-based stockbroker Fleming Martin calculates that the effective tax bill for companies that elected not to pay STC, such as the large producers AngloGold Ltd and Gold Fields Ltd, will be reduced by 10%, and by 14% for the others.

Dominion Mining Ltd is to seek shareholder approval to buy back and cancel the 12.9 million of its shares, representing 16.1% of the total issued, held by North Ltd for A\$5.8 million. North built up the equity interest a few years ago, when it became interested in Dominion's Yakabindie nickel project in Western Australia. However, North has since acquired Yakabindie outright (MJ, May 15, 1998, p.381), helping Dominion increase its cash reserves to their current level of about A\$34 million.

The tender offer announced last month by Mercury World Mining Trust plc (MWMT) to buy back its own shares was accepted by about 44% of its shareholders, according to the Financial Times. MWMT is one of the world's largest mining-share funds, having raised £426 million when it was floated at £1.00/share in 1993. The tender offer comprised 97% of MWMT's net asset value per share calculated on February 18 (MJ, January 22, p.47). MWMT will pay £104.3 million to repurchase the shares, reducing its net asset value to £139 million, but remaining equivalent to about £0.65/share based on the reduced total. The shares stood at around £0.565 each after the tender result.

MINING FINANCE

People

The World Gold Council, a promotional body funded by gold producers, has appointed Haruko Fukuda as its chief executive with effect from March 22, 1999. Miss Fukuda, based in London, has had a long career in the City. She is currently a senior adviser to Lazard Brothers & Co. and a director of Foreign and Colonial Investment Trust. Miss Fukuda replaces E.M. (Chick) Hood who stepped down last year (MJ, October 30, 1998, p.355).

Philippe Varin has been promoted to lead the aluminium division of Pechiney of France, replacing Bernard Legrand, who has been assigned to work for the chairman's office.

Chris Pearson has joined the South African financial services group Investec as research director, with particular responsibility for mining. He is based in Investec's newly-established London office. Mr Pearson was formerly a mining equities analyst with the London-based investment bank Robert Fleming.

The industrial minerals specialist Brian Coope has formally joined St Barbara Consultancy Services, based in the latter's London office, after many years of close co-operation. The activities of B.M. Coope & Partners are being integrated into those of St Barbara.

The exploration team from Rio Algom Ltd of Toronto that discovered the Spence copper deposit in Chile has been named 'Prospector of the Year' for 1998 by the Prospectors and Developers Association of Canada (PDAC). The award will be made at the PDAC conference in Toronto next month.

END.