BOTSWANA

By Roger Murray

Diamonds have continued to be the motor of the Botswana economy, contributing 83% of total export earnings in 2002 and just under half of total government revenues in the 2002/03 fiscal year, despite continued efforts to diversify economic activities. Botswana's position as the world's largest producer of rough diamonds by volume and value was additionally strengthened in 2002 with a further rise, of 7.5%, in diamond production (Table 1) to a new record level of 28.4 Mct.

The increased competitiveness of the global diamond market, caused by the expansion of production in Canada and Russia, has increased the strategic importance of Botswana as a source of diamonds to the De Beers group, which retains the excusive right to market all stones produced by Debswana Diamond Co. (Debswana), the 50:50 government/De Beers-owned joint venture, via the Diamond Trading Co. (DTC).

In 2002, recoveries by Debswana accounted for 71% of the total 40.2 Mct produced by De Beers-operated mines in Africa (Botswana, Namibia, South Africa and Tanzania). The mutual value of the partnership between the government and De Beers, cemented by the 15% direct and indirect interest held by Debswana Investments SA in DB Investments (Luxembourg), the holding company for De Beers SA, was underlined by the fact that due to the stronger demand on the global diamond market, part of the previous year's production that had been stockpiled was exported, alongside Debswana's entire output for 2002.

President Festus Mogae has also been an active participant in the Kimberley Process of diamond stakeholders. This is in view of the potentially severe adverse impact on Botswana's economy of any loss of consumer confidence in gemstones that might follow a failure to curb the circulation of 'conflict diamonds' within the legitimate international trade channels for rough stones.

During 2002, the Botswana Government also continued its 'Diamonds for Development' campaign, which aims to enlighten opinion-formers of the transparency of the country's diamond industry and usage of the profits generated for legitimate national development purposes.

Botswana stands to be one of the major beneficiaries from the agreement reached at the end of 2002 on a Kimberley Process certification scheme, which was due to come into effect at the beginning of July 2003, and under which national governments are required to ensure adequate documentation on the origin of all diamond exports and imports is provided. In a further boost to the legitimate diamond trade, the World Trade Organisation (WTO) granted a waiver in May 2003, to avoid any conflict between the Kimberley Process and WTO rules. The waiver allows the Kimberley participants to take necessary measures to prohibit the import and export of rough diamonds to non-participants in the process until December 31, 2006.

Mining continues to account for the biggest share of Botswana's GDP, at 34.5% in the 2001-02 (July 1 - June 30) national accounts year, down slightly from 36.5% in 2000-01. By far the biggest contribution is made by diamonds, followed at a considerable distance by copper-nickel (Table 2), soda ash, salt and coal. Real GDP growth (in 1993-94 prices) slowed to 2.3% in the 2001-02, less than half the 8.4% growth rate recorded in 2000-01, when the mining sector achieved exceptional growth of 17% largely owing to completion of Debswana's Orapa expansion project. In its 2002 annual report, the Bank of Botswana (central bank) stated the slowdown was caused by a 3% contraction in mining output, with diamond production value down by 4% (contrasting with a 5.5% growth in non-mining output). The discrepancy with the actual growth in diamond production volumes which took place in both the 2001 and 2002 calendar years is accounted for by the central bank's inclusion of the loss in real added value caused by the stockpiling of part of Debswana's output in 2001. However, the central bank predicted real GDP growth would recover to some 5% in 2002-03, based on 4.5% mining sector growth (diamonds, copper-nickel) and 7% for non-mining sectors. Total mining industry employment rose slightly in 2002 to 6,962, up from 6,812 in the preceding year. However, this was still well below the 8,090 employed in 2000, mainly reflecting the impact of job retrenchments at the BCL copper-nickel operation.

As a result of imports growing at a faster rate than exports, Botswana's merchandise trade surplus declined by 6% to P4.1 billion (US$651 million) in 2002, according to figures published by the central bank. Total exports rose by 11% to P15.0 billion, mainly owing to an increase by the same magnitude in diamond exports to P12.5 billion (including small quantities of locally-cut stones). Local currency export earnings were boosted by the pula's depreciation against the US dollar during 2002; however, in US dollar terms, using the average annual foreign exchange rate, total exports increased by only 2% to US$2.4 billion in 2002 and diamond exports by 1% to US$1.98 billion, indicating that despite a higher volume of sales during the year, there was a fall in the average diamond price received. The value of copper-nickel exports rose by 11% to US$79 million in 2002 and soda ash exports by 8% to US$42 million.

The foreign trade surplus remained sufficiently large in 2002 to ensure a continued healthy surplus of P3.2 billion (US$500 million) on the current account of the balance of payments. But the weakness in international diamond prices during 2001 and into 2002, and a consequent shortfall in mineral tax and royalty receipts, caused the government's budgetary situation to deteriorate (Table 3). In contrast to a substantial budget surplus in the 1999-2000 fiscal year, a budget deficit was recorded in the following year and this more than doubled to P2.2 billion in the revised budget for 2001-02; in contrast to past strong growth, mineral revenues were virtually unchanged on the preceding year at P7.0 billion. However, the budget was expected to be in balance once again in 2003-04 owing to a projected recovery in mineral revenues to P8.1 billion (46% of total revenue), expansion of tax coverage and a government effort to contain spending.

Diamonds

Rough diamond output from the four mines operated by Debswana totalled 28.4 Mct in 2002, including a small first time contribution from the new Damtshaa mine, an increase of 7.5% on the preceding year. This was due both to an increase in the tonnage of ore treated, up by 4% at 29.5 Mt, and a higher overall average recovery grade of 96.2 ct/100 t (93.3 ct/100 t in 2001).

The largest output increase took place at the Orapa mine where recoveries rose by 10% to 14.3 Mct and the average recovery grade rose by 6% to 87.4 ct/100 t. Recoveries from Jwaneng rose by 6% to 13.0 Mct while the average grade improved by 1% to 139.8 ct/100 t. At Letlhakane, production was virtually unchanged from the preceding year at 1.0 Mct, with a fractional decline in the average grade to 28.0 ct/100 t; however, the average per carat value of recoveries continues to be the highest of Debswana's mines. The Damtshaa mine, located 17 km east of Orapa, was commissioned in 2002 and contributed 7,000 ct with an average recovery grade of 5.7 ct/100 t. The plant was due to have reached full production by end-March 2003 and is expected to contribute some 250,000 ct to Debswana's overall production in 2003. Over the longer term, the mine is forecast to yield some 5-5.5 Mct from the mining of 39 Mt of ore over a 30-year life.

There was relatively little technical information provided about Debswana's performance in the De Beers SA 2002 annual review. Improved efficiencies were stated to have been achieved during the year, with the main gains comprising higher productivity at the completely automated recovery plant (CARP) and full-integrated sort house (FISH) facilities, the two main components of the Aquarium high-technology programme at the Jwaneng and Orapa mines. De Beers reported that a considerable effort put into removing bottlenecks at Debswana plants had achieved results with a 2003 target for Debswana production of 30 Mct, up 2 Mct on the preceding year, with most of the additional recoveries to be derived from Orapa and Jwaneng, along with smaller quantities from Damtshaa.

According to highlights from Debswana's 2002 financial results announced by the company's managing director, Louis Nchindo in March 2003, the total value of diamond sales rose to P11.2 billion from P10.7 billion in 2001, an increase of just under 5%. Mr Nchindo stated that the entire 2002 production of 28.4 Mct had been sold as Debswana's delivery entitlement to the DTC had been restored to 100%. He described this as a satisfactory performance at a time of continued uncertainty in diamond markets. However, Debswana's 2002 sales figure was considerably less than the P12.5 billion in diamond exports reported by the central bank for that year, even allowing for the latter's inclusion of small quantities of cut diamonds. The discrepancy was likely to be narrowed subsequently as the central bank figures were preliminary. In US dollar terms, the value of Debswana's sales was virtually unaltered compared with 2001 at US$1.8 billion, confirming a decline in the average per carat price.

The successful development of the Damtshaa mine, the first new diamond mine since Jwaneng in the early 1980s, is regarded by Debswana as opening the way for possible exploitation of other kimberlites in the vicinity of Orapa previously regarded as marginal. Damtshaa mines the BK cluster of kimberlites, long thought to be uneconomic but now regarded as sufficient to support a mining life of some 30 years. The main BK9 pit has a surface area of 14.5 ha and will be mined to a depth of 140 m. The initial processing plant is rated at 200 t/h but this may be doubled around 2005, with the effect of reducing mine life to some 19 years. The mine is managed as a satellite operation of Orapa, and costs were kept down and within the P225 million (then US$34 million) budget by using a relatively simple and inexpensive processing plant with limited automation, including sourcing plant and equipment from Orapa or Letlhakane wherever possible.

Debswana's wholly-owned subsidiary Teemane Manufacturing Co. (TMC) has continued its diamond cutting and polishing operation in Serowe district some 300 km north of Gaborone. The company polishes round brilliant cut goods up to 1.0 ct in size, although no operating results for 2002 are available. Following an evaluation by Debswana of the options for repositioning TMC at a more strategic point within the diamond-polishing and marketing chain it was announced in May 2003 that negotiations had been initiated with Diarough NV, with a view to the sale of TMC's entire issued share capital to the latter. Diarough is regarded as owning appropriate manufacturing facilities, together with a marketing and distribution network which would successfully reposition TMC in the downstream diamond sector.

Diamond exploration continued at a high level during 2002 with a number of junior mining companies continuing active prospecting programmes, although no major discoveries were reported. In an innovative development, in March 2003 the BHP Billiton (BHPB) group and other partners announced the establishment of a new diamond exploration company, Kalahari Diamonds Ltd (KDL), with the intention of using BHPB's Falcon™ airborne gravity system. The technology is viewed as especially appropriate for locating kimberlite indicator minerals in the large areas of Botswana overlain by Kalahari sand cover where the effectiveness of magnetic surveys is reduced by a high level of 'noise' from rocks beneath the sand. Kimberlites, being less dense than the typical surrounding rocks, are detectable by the Falcon system as lows on gravity surveys, according to BHPB's vice president exploration, Tom Whiting.

KDL was established with a capital of US$21 million, contributed by the initial shareholders, comprising BHPB (20%), International Finance Corp. (10%), institutional investors and several diamond downstream diamond firms including manufacturers and polishers. The company was initially unlisted, although the shareholders intend to list KDL on London's Alternative Investment Market (AIM) within two to three years. BHPB has contributed its exploration licences and existing data to Kalahari, which were stated to cover some 30% of all diamond-prospective terrain in Botswana. BHPB will also continue its joint venture prospecting with Motapa Diamonds Inc. over other extensive licence areas. BHPB was to make available 75% of the annual capacity of one of its Falcon systems to KDL for a three-year period at cost, with drilling anticipated to start at some targets by the fourth quarter of 2003. BHPB will have the right to buy back 51-60% of KDL's interest in any deposit discovered, by refunding to the latter four times the expenditure made on the title block containing the discovery, and would additionally carry its share of costs to the end of the pre-feasibilty study stage. Kalahari may also request BHPB to fund its share of the cost of a feasibility study and mine development, repayable from future earnings, in addition to transferring an additional 5% interest in the project.

Recent geological evidence that economic kimberlites are most often found in ancient cratons, because the mantle underlying these areas is cool relative to other parts of the earth's crust, has stimulated exploration interest in the Botswana section of the southern extension of the Congo-Angola craton. Current investigations are being carried out by Newdico, a Botswana-registered company in which TSX Venture Exchange-listed Tsodilo Resources (formerly Trans Hex International) and South Africa's Trans Hex hold interests of 75% and 25% respectively. The company holds exploration licences over some 16,000 km^2 in Botswana's far northwest, including Ngamiland, on ground previously held by Ashton Mining and Reunion Mining which discovered a cluster of 19 small kimberlites in the late 1990s.

Initial soil sampling has detected several previously unexplored coincident indicator mineral and magnetic anomalies in the Nxau Nxau and Guma zones. Two of the coincident kimberlitic ilmenite and magnetic anomalies at Nxau Nxau (an Archaean craton comparable to Orapa) are much larger than the kimberlites previously found by Ashton/Reunion. The Guma zone is characterised by a diffuse spread of kimberlitic garnet and ilmenite; detailed sampling and geophysical work was due to be carried out during 2003, with a drilling programme scheduled for early in 2004.

Copper-nickel

Production and sales by the Selebi-Phikwe copper-nickel mine operated by the BCL subsidiary of Botswana RST (BRST) increased in 2002, owing to improved base metal prices, especially for nickel. BCL reported sales worth P503 million in 2002, up 18% on the P426 million figure for the previous year and in US dollar terms an increase of 10% to US$80 million. This was slightly above the 2002 figure for copper-nickel (Table 1) exports of US$79 million recorded by the Bank of Botswana and the discrepancy probably reflected differences in calculation of the exchange rate. The volume of metal sales fell by 11% to 25,043 t in 2002 (13,171 t of copper, 11,678 t of nickel and 194 t of cobalt), confirming that increased sales revenue was entirely due to higher metals prices. During 2002 the London Metal Exchange (LME) cash nickel price averaged US$3.07/lb, up from US$2.70/lb in the preceding year.

Despite the reduced volume of metal sales, production of metal-in-matte by BCL rose slightly in 2002, reflecting a 6% increase in the production of concentrates to 552,552 t. Overall metal output rose by just over 1% to just under 28,000 t, with production of copper and nickel metal increasing by a similar magnitude, although cobalt metal recoveries fell by 11%. The BRST draft 2002 annual report (which had not itself been published as this review went to press) showed for the first time the volume of both BCL own-metal and toll-smelted material, the latter being mainly metal produced from concentrates supplied by Tati Nickel Mining Co. (TNMC). In 2002, toll-smelted metal increased by 38% to 17,800 t, just under 40% of the total volume of metal (45, 700 t) produced by the BCL smelter. The proportion of toll-smelted material is set to increase in coming years with ongoing capacity expansion at TNMC, which sends all its concentrates to the BCL smelter for processing and the two companies are increasingly operating as an integrated concern. The relationship between the two producers became even closer in 2002, due to Canada's LionOre Mining International Ltd becoming a major shareholder in BRST as part of the US$76 million transaction through which it acquired the 43% interest held by Anglo American in TNMC. Anglo also divested its interests in BRST and BCL, with LionOre obtaining direct interests of 7.5% in BCL and 25% in BRST, which in turn owns 85% of BCL. The other main BRST shareholders are the Botswana Government (33%) and other public investors (38%), but LionOre gained a 50:50 effective ownership of the company without liabilities, ie net of BRST's huge accumulated deficit and debt stocks.

The BCL smelter operated without any major technical problems during 2002, but in April of that year it was unexpectedly shut down for minor repairs, and again in February 2003 due to a failure of the uptake shaft on the flash furnace. During the latter off-line period of five weeks, BCL decided, in addition, to carrying out the necessary repairs, to bring forward improved efficiencies and availability of the smelter, originally scheduled to be realised after the smelter's planned 55-day shutdown in mid-2004. TNMC suspended production for two weeks of the period that the BCL smelter was out of commission to carry out several improvements to its mill and concentrator to maximise future utilisation and performance and minimise downtime for maintenance later in the year. The work on the concentrator focussed on improving its availability and utilisation with a view to increasing the production rate by up to 10% during the second half of 2003.

2002 was a momentous year for Tati Nickel Mining Co. (TNMC), with the successful completion of the Phoenix mine expansion project, a major restructuring of its ownership and the initiation of several projects designed to grow the business. As noted above, Toronto-based LionOre Mining International Ltd, which was also listed on the London Stock Exchange (LSE) in December 2002, purchased Anglo American's 43% shareholding in TNMC, thereby increasing its own interest to 85% and becoming the sole private shareholder, with the remaining 15% interest held by the Botswana Government. The increased shareholding took effect from September 30, 2002, following which, TNMC's financial results were consolidated with those of LionOre's other mining operations (nickel and gold) in Australia.

In its 2002 annual report, LionOre stated that TNMC sales were worth US$51 million in 2002, up from US$33 million in 2001, achieved primarily through the increased production of payable nickel (defined as attributable refined metal net of all items) and the firmer nickel price. TNMC operates the Selkirk underground mine and Phoenix open-pit mine at two copper-nickel sulphide deposits located some 50 km east of Francistown and about 15 km apart. The US$66 million expansion project at the Phoenix mine, involving the construction of a conventional flotation concentrator on site with a capacity of 3.6 Mt/y of ore, was completed during 2002 and fully commissioned in early 2003. At full capacity, the concentrator will double TNMC's payable nickel production to 12,500 t, along with increased amounts of copper metal and by-products, including platinum group metals (PGM) and small quantities of gold and silver. Production by TNMC in 2002 did not reach planned levels due to the unexpected shutdown in April of the BCL smelter and normal commissioning problems with the new concentrator. Phoenix produced 146,534 t of concentrate (averaging 6.4% Ni and 3.4% Cu) in 2002, an increase of 18% over the previous year. Production from the Selkirk mine was obtained mainly from partial pillar extraction and lower stope footwalling, yielding 25,000 t of ore (averaging 2.7% Ni and 1.7% Cu) but due to depletion of the mineable reserve it was placed on care and maintenance at the end of the third quarter of that year. At the outset of 2003, TNMC planned to deliver 304,000 t of concentrate to BCL in that year. But in consequence of its own two-week shutdown (see above), production for 2003 was revised down to the concentrator design capacity of 293,000 t, which BCL committed to treat. TNMC's current agreement with BCL allows for the treatment of up to 350,000 t/y of concentrate, offering the possibility that extra tonnnage could be treated if production by TNMC exceeded design capacity.

In 2002, 7,503 t of payable nickel were sold (19% higher than 2001) along with 4,550 t of payable copper (11% higher than 2001). The Phoenix deposit also hosts significant concentrations of PGM, particularly palladium, and in 2002 by-product metal production comprised 18,383 oz of palladium (up 61% on 2001), 2,793 oz of platinum (up 179%), 5,129 oz of silver (none in 2001) and 670 oz of gold (up 372%). TNMC's arrangements for processing its concentrates are with the same companies with whom BCL has long-established agreements for refining of metal-in-matte from its smelter. Nickel concentrate is sold by TNMC in the first instance to Switzerland-based Centermetall AG, which has a custom-smelting contract with BCL, together with custom refining contracts with Rio Tinto Zimbabwe's Empress nickel refinery and Falconbridge's Kristiansand refinery in Norway to toll convert the BCL matte into refined nickel and copper.

As part of its ongoing development programme for TNMC, LionOre is proceeding with the design and construction of a modular Activox demonstration plant at Phoenix, with the ultimate aim of installing a hydrometallurgical refinery at the mine. A definitive feasibility study on the viability of a refinery is due to be completed by the end of 2003. This is one of several strategies by LionOre to secure medium-term commercialisation of the proprietory Activox downstream hydrometallurgical process of Perth-based Western Minerals Technology Pty Ltd (WMT), in which LionOre owns an 80% interest, including a strategic alliance established in principle with Canada's Inco Ltd in mid-2003. The demonstration plant, costing a total US$10 million over a two-year period, is expected to provide valuable information on optimising and testing materials required for the design of a full-scale refinery, thereby greatly reducing the technical risks of the project.

The decision to proceed with a definitive study followed successful testwork on Phoenix concentrates at WMT's pilot plant in Perth during 2002.

As at December 31, 2002 the total indicated resource at Phoenix at a 0.25% cut-off was 144.8 Mt averaging 0.3% Ni and 0.17% Cu, with probable reserves of 40.4 Mt, at 0.56% Ni and 0.34% Cu. At current producton rates Phoenix has a proven mine life to 2014. However, existing exploration has confirmed continuing mineralisation and significant potential for additions to reserves along the north-south strike of a 4 km long geochemical anomaly. A US$2 million 15-month exploration programme was approved at the beginning of 2003 to prove up additional reserves, with the aim of increasing the viability of the proposed hydrometallurgical plant. Since the commissioning of the new Phoenix concentrator, higher nickel recoveries have been achieved at lower than anticipated nickel feed grades. This, in addition to possible future hydrometallurgical operations potentially allowing more flexibility regarding concentrate impurities, would provide the opportunity to lower the cut-off grade. The option is being examined along with potential use of the ore's polymetallic value to determine the cut-off grade, rather than as at present, the pure nickel value. Both initiatives are expected to yield additions to the reserves.

Other minerals

There was no change in the composition of other minerals produced in 2002, which continued to be soda ash, salt and bituminous coal, along with small quantities of gold, semi-precious stones and quarried aggregates. But gold production is set to increase substantially with the planned construction by the third quarter of 2004 of a new open-cast gold mine at Mupane with a production capacity of 100,000 oz/y (some 3,000 kg/y).

Output and sales by Botswana Ash (Botash) continued to improve in 2002, with record volumes of both soda ash and salt produced by the plant at the Sua Pan brine resource northwest of Francistown, reflecting strong demand for its products on the regional market. The financial situation of Botash, in which the government holds a 50% interest, Anglo American, De Beers SA and associated companies 42%, and a consortium of banks the remaining 8%, has steadily improved due to more favourable market conditions; the company has been profitable for the past three years and paid a dividend to its shareholders. In 2002, production of soda ash rose by 13% to 283,400 t, while salt production was up by 76% to 315,100 t. Soda ash exports, which provide some 80% of Botash's total revenue, increased in value by 19% to P268 million in 2002, and in US dollar terms by 8% to US$42 million. There was no available figure for the value of salt exports, but the estimated production value of salt was P65 million in 2002, up from P37 million in the preceding year, compared to an estimated production value for soda ash of P210 million.

Despite continued strong competition from American Natural Soda Ash Corp. (Ansac), a grouping of North American producers who jointly export soda ash, Botash has managed to gain an estimated 70% of the South African market for the product. The most important customers are the glass-making industry, chemical producers, metal refineries, and latterly, detergent manufacturers. Zimbabwe is Botash's second most important soda ash market but during the past two years sales have been adversely affected by the country's political and economic crisis. Nevetherless, Botash is currently optimistic that it may achieve its design capacity of 300,000 t/y of soda ash during 2003 or 2004, although salt production (with a 650,000 t/y design capacity) is not expected to exceed current levels for the foreseeable future due to inherent constraints in expanding sales. Salt is currently sold to South Africa, Zimbabwe and several central African countries, including Democratic Republic of Congo (DRC), Malawi and Zambia; Botswana is sub-Saharan Africa's second-largest salt exporter, after Namibia. As the entire southern African market for soda ash is estimated at no more than 350,000 t/y there are no current plans to expand plant capacity, which would require a substantial capital investment, although the brine reserves tapped by the present 360 km^2 wellfield are sufficiently big to support a larger operation.

Production of bituminous coal by Morupule Colliery, in which Debswana has replaced Anglo American as the sole private shareholder, rose by 2% to just over 953,000 t in 2002. Morupule retains close links with Anglo Coal, to tap into the latter's technical expertise. All production is solely for the domestic market, with the adjacent Morupule power station, the BCL mines and Botash plant as the major customers. In 2002, the estimated production value of Morupule's output was P30 million, slightly more than the P29 million figure for the previous year. There are large untapped reserves in both the Greater Morupule and Mmamabula coal fields of eastern Botswana and the potential for developing additional capacity for export to the global steam-coal market remains under active review.

Since a peak output of 234 kg nine years ago, primary gold production has virtually ceased in Botswana due to the closure of several mines, all in the northeast and in the vicinity of Francistown. Owing to depletion of reserves at the main primary producer, the Monarch mine, production declined to 2 kg in 2001 with no recorded production the following year, leaving the Metore mine as the only operational gold producer (excluding TNMC by-product gold) although only very small quantities were recovered in 2002. But Botswana is on course to become a medium-sized gold producer within the next year with the development by Australia's Gallery Gold of an open-pit mining operation at Mupane in the Tati greenstone belt some 40 km southeast of Francistown.

Following prefeasibility studies which estimated a total resource for the four identified ore bodies in the Mupane area of 914,000 oz, Gallery commissioned a bankable feasibility study (BFS) in April 2002, and in May 2003 the company announced it was proceeding with the development of a commercial mining operation based on the positive outcome of the BFS. Subject to the approval of a mining licence and securing the necessary financing from banks, Gallery's chairman, David Harley, anticipated that development would commence in the third quarter of 2003, with gold production starting approximately 12 months later. Two banking consortia, Macquarie Bank/Investec Bank and Standard Bank/Societe Generale, were shortlisted for the provision of loan finance, with a decision on the successful financial partner due to be decided in June 2003, with draw-down of funds expected the following August. A new subsidiary company, Mupane Gold Mining (Pty) Ltd, is being established and Gallery considered it unlikely that the government would opt to claim its entitlement to a 15% equity participation.

The major shareholders in Gallery, which is listed on the Australian and Botswana stock exchanges, are Lion Selection Group, African Lion and Resolute Mining. Following an agreement to merge with Spinifex Gold via a scheme of arrangement announced in February 2003, Gallery was also dual-listed on the Berlin stock exchange the next month, to accommodate a significant European shareholding in Spinifex. The latter company has undeveloped resources of approximately 1.9 Moz of gold located in Tanzania's Lake Victoria greenstone belt. The merged concern will continue to be known as Gallery, which will be the surviving entity. It is anticipated that timely cash flow from Mupane will provide a solid base for future growth of the merged concern with the aim of becoming a profitable mid-sized international gold producer.

The BFS confirmed the viability of a 1 Mt/y plant producing 100,000 oz/y of gold, based on a mineable reserve of 589,000 oz, derived from open-pit optimisations completed at US$320/oz, providing a five-year mine life. At higher gold prices the conversion of the present resource base of 983,000 oz to reserves should be increased and the mine life consequently extended, while Gallery also anticipates further expanding reserves through ongoing exploration. Mupane's total capital cost is an estimated US$32 million (based on an exchange rate of US$1=R7.4), with the bulk of new equipment and supplies to be sourced in South Africa; total cash operating costs are an estimated US$199/oz. At a gold price of US$350/oz, the project's internal rate of return (IRR) is estimated to be 24%, with a post-tax net present value (NPV) of A$23 million at an 8% discount rate. At higher gold prices of US$365 and US$380, the IRR would rise to an estimated 27% and 31% respectively, with corresponding NPVs of A$27 million and A$34 million. The Mupane plant will be a conventional facility incorporating single-stage crushing, SAG and ball mill primary grinding, flotation of primary ore and regrinding of flotation concentrate, followed by carbon-in-leach to recover the gold.

The bulk of Mupane's recoverable resource is contained in the Tau deposit, where the central portion of the ore shoot grades approximately 6g/t Au, and a 500x400 m open pit will be constructed. Tau is regarded as holding potential also for an underground ore reserve beneath the proposed 200 m depth of the open pit. The metallurgical testwork programme carried out as part of the BFS demonstrated an overall project recovery of approximately 90%, with in excess of 80% of the total reserve ore coming from Tau. Resultant average gold recoveries for each orebody were: Tau 90.9%, Tolo 86.7%, Kwena 90.3% and Signal Hill 81.3%. A two-hole programme of deep diamond drilling at Tau to assess underground ore potential beneath the proposed open pit was commenced at the beginning of 2003. Open-pit operations are also likely to be developed at Kwena, and the more recently discovered Tolo mineralised zone, where the potential is for about 1 Mt of ore averaging some 2 g/t Au. The undeveloped Signal Hill deposit, located on an already approved mining licence some 15 km from Mupane, contains an estimated recoverable reserve of 45,000 oz averaging 2 g/t Au. In mid-2002, Gallery exercised an option to purchase the prospect from Sigmor Mines, which had completed a feasibility study on developing the deposit via a heap leaching operation in the mid-1990s. The potential for expanding the present 146,000 oz total resource is viewed as promising, with drilling to test a western continuation of the main ore body due to start in the second quarter of 2003.

A review of all exploration data from past programmes at Mupane during the first quarter of 2003 led to the identification of some 18 localities where there is clear potential for open-pit gold resources of greater than 50,000 oz. All are located in the Mupane environment and geologically within or near the graphitic iron formation which hosts the Tau, Kwena and Tolo ore bodies, and a percussion drilling programme was scheduled to commence during the third quarter of 2003. Other prospects under investigation by Gallery include the Matsiloje area 25 km west of Mupane, where there are many old small-scale workings, the northern portion being wholly-owned while the southern portion, Jim's Luck, is jointly owned with Australia's Cardia Technologies (CNN) and Mineral Holdings Botswana (MHB), with Gallery earning an 80% interest.

A 2002 regional geological study also identified a new gold prospect at Vermaak's Kop some 14 km east of Mupane, where mapping and infill geochemical soil sampling revealed the presence of an anomaly with values of 2.2g/t Au. The prospect overlies an ironstone ridge which satellite imagery suggests may be a strike continuation of units hosting gold at Mupane. Gallery signed a farm-in agreement for Vermaak during 2002, allowing it to earn a 60% interest by spending P750,000 over a three-year period. Another prospect is the old Shashe (Map-Nora) gold mine 6km southeast of Francistown, which Phelps Dodge had planned to develop as an underground operation a decade ago. The deposit is 85% owned by Gallery and has a resource of just over 500,000 t at 10.4 g/t Au. Gallery is also continuing with exploration at its Tekwane platinum project, just to the north of Mupane and adjacent to the Selkirk mine of TNMC, which it acquired in 2000.

In January 2003, Gallery was granted a new 1,000 km^2 prospecting licence at Maitengwe some 150 km north of Mupane, adjoining the border with Zimbabwe. The licence covers a 15 km strike length of the Maitengwe greenstone belt, with aeromagnetics indicating a potential southwestern extension under sand cover. During the first quarter of 2003, a total of five new prospecting licences were approved, more than doubling Gallery's mineral tenements to 3,730 km^2, of which 97% are wholly owned. In addition to Matengwe, they comprised: Vumba, a new 1,000 km^2 licence over the Vumba greenstone belt between the Tati and Maitengwe belts, replacing a smaller licence; Pinagare, a new 517 km^2 area on the northern margin of Tati greenstone belt and surrounding Phoenix nickel mine's existing mining lease; and the renewal in full of two other licences within the Tati belt.

Gold exploration is also being conducted by Australia's Cardia Technologies (CNN) at its joint venture Magogaphate licence areas, and following encouraging results from soil sampling work, an initial drilling progamme was due to be launched in February 2003. The Magogaphate concessions are located south east of the Jims Luck prospect held in a joint venture with Gallery Gold (60%, with the right to earn 80%), with CNN and Mineral Holdings Botswana (MBH) owning 20% each. CNN owns a 50% interest in four Magogaphate licence areas in partnership with MHB, with an option to earn a larger stake should the latter not wish to contribute to the cost of expenditure. The drilling programme was planned to cover the Maggie area, where gold anomalies over a 2 km area had been identified; North Kalula, with gold and copper anomalies over a 1.2 km area; Crescent, where drilling was to focus on a gold-copper-lead-zinc anomoly; Sekgopye, where the aim was to extend an area previously drilled by Falconbridge Botswana that resulted in an estimated nickel resource of 400,000 t at 2.5% Ni and 0.5% Cu.

Table 1

Diamond production			
	2001	**2002**	**% change**
Diamonds recovered ('000 ct)	26,417	28,397	7.5
Orapa	13,056	14,329	9.8
Jwaneng	12,339	13,035	5.6
Letlhakane	1,021	1,026	0.5
Damtshaa	-	7	-
Ore treated ('000 t)	28,324	29,506	4.2
Orapa	15,779	16,390	3.9
Jwaneng	8,920	9,326	4.6
Letlhakana	3,625	3,666	1.1
Damtshaa	-	124	-
Grade (ct/100 t)	93.3	96.2	3.1
Orapa	82.7	87.4	5.7
Jwaneng	138.3	139.8	1.1
Letlhakane	28.2	28.0	-0.7
Damtshaa	-	5.7	-

Source: De Beers SA.

Table 2

Copper-Nickel Production (t, except where stated)			
	2001	**2002**	**% change**
Ore milled (Mt)	2,954	2,942	-0.4
Conc. (‘000 t)	523	553	5.7
BCL Metal	27,642	27,988	1.3
Copper	14,874	15,063	1.3
Nickel	12,587	12,764	1.4
Cobalt	181	161	-11.0
Toll Metal[1]	12,907	17,751	37.5
Copper	3,238	6,435	98.7
Nickel	9,528	11,208	17.6
Cobalt	141	108	-23.4

[1] Mainly concentrates from Tati Nickel Mining Co. (TNMC).

Table 3

Mineral Production (t, except where stated)		
	2001	**2002**
Diamonds (‘000 ct)	26,417	28,397
of which Orapa	13,056	14,329
Value (US$ million) [1,2]	1,960	1,983
Copper-nickel matte	40,459	45,739
Value (US$ million) [1]	71	79
Copper	18,112	21,498
Nickel	22,115	23,972
Cobalt	322	269
Gold (oz)	142	670
Silver (oz)	-	5,129
Palladium (oz)	11,400	18,383
Platinum (oz)	1,170	2,793
Soda ash	251,234	283,400
Value (US$ million) [1]	39	42
Salt	178,642	315,100
Coal	930,374	953,081

[1] Export values as published by the Bank of Botswana (Central Bank).
[2] As well as rough diamonds, the figures include small quantities of cut diamonds exported by Teemane Manufacturing Co. and Schachter/Namdar Botswana (formerly Lazare Kaplan).
Sources: Bank of Botswana; Department of Mines; De Beers SA; Botswana RST; LionOre Internatonal Ltd.