

DIAMONDS

By Bram Janse

2001 was an eventful year for the world and also for the diamond industry. For most of the year the industry was in a buoyant mood with the new Ekati mine in Canada performing very well and at least three other Canadian projects, Diavik, Snap Lake and Jericho, well on track to become future diamond mines. It became easier to raise venture capital for new projects, and new exploration techniques such as BHP Billiton's Falcon airborne gravity gradiometer and De Beers' airborne multispectral scanner, proved their worth, finding new kimberlites in ground previously prospected by conventional methods.

Then, on September 11, 2001, the destruction of the World Trade Centre in New York put a great emotional and psychological strain on people, hindering any recovery from the existing recession in many markets. It was thought likely that the retail trade in luxury goods, including diamonds, would suffer particularly badly. In the event, the downturn in diamond sales was not as bad as had been feared, although sales of rough diamonds by De Beers' Diamond Trading Co. (DTC) were down 24% from the previous year.

The most important events of the past year included:

- The delisting of De Beers on June 7, 2001, after it became a wholly-owned subsidiary of De Beers SA (formerly DB Investments), a consortium held 45% by Central Investments DBI (Lux), itself owned 11% by the Government of Botswana (through Debswana Diamond Co. Ltd) and 89% by Central Holding Ltd (a company linked to the Oppenheimer Family trust). The other shareholders in De Beers SA are Anglo American plc with 45%, and Debswana, directly, with 10%. The consortium, which already owned 45% of De Beers, won control of the group with an offer of US\$18.7 billion.
- De Beers Canada's purchase from Aber Diamond Corp., for \$C173 million, of the remaining 32.24% interest in the Snap Lake diamond project that it did not already own (having acquired a 67.76% interest through its takeover of Winspear Diamonds Inc, for C\$305 million in August last year). Snap Lake is expected to become Canada's third diamond mine, with a projected start-up in 2005.
- De Beers' intention to forego its 'custodial' role of controlling the supply of rough diamonds to the market by maintaining a large buffer stock, choosing instead to become a 'supplier of choice' from producer to customer. At the time of writing, differences in legal opinion between De Beers and the EU (European Union) have not yet been resolved and the implementation of this process has been postponed until at least the middle of 2002.
- De Beers' move into the retail trade and the introduction of a brand name (the 'Forever' mark) in the Rapids World joint venture with the luxury goods chain MVLH (Louis Vuitton Moët Chandon). This move was approved by the EU and implemented in the middle of 2001.
- The merger of BHP and Billiton which caused a reshuffle of people and priorities. Contrary to some rumours, BHP Billiton said that it has no intention of selling the Ekati diamond mine (its ownership of this Canadian operation was lifted from 50.1% to 80% in May 2001 when BHP acquired Dia Met Minerals).
- The ongoing debate about 'conflict diamonds'. Estimates are that 15% to 20% of the world's annual production of diamonds are stolen and smuggled, of



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Corporate Strategies and Government Policies in the International Diamond Industry

By Chaim Even-Zohar



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which 4% to 5% are conflict (or 'blood') diamonds. The Kimberley Process has been set in motion which states that each parcel of diamonds offered for sale must have a certificate declaring that the diamonds are produced by legitimate operators and that the parcel is free of conflict diamonds. This certificate is supposed to stay with the sealed parcel all the way through the diamond pipeline.

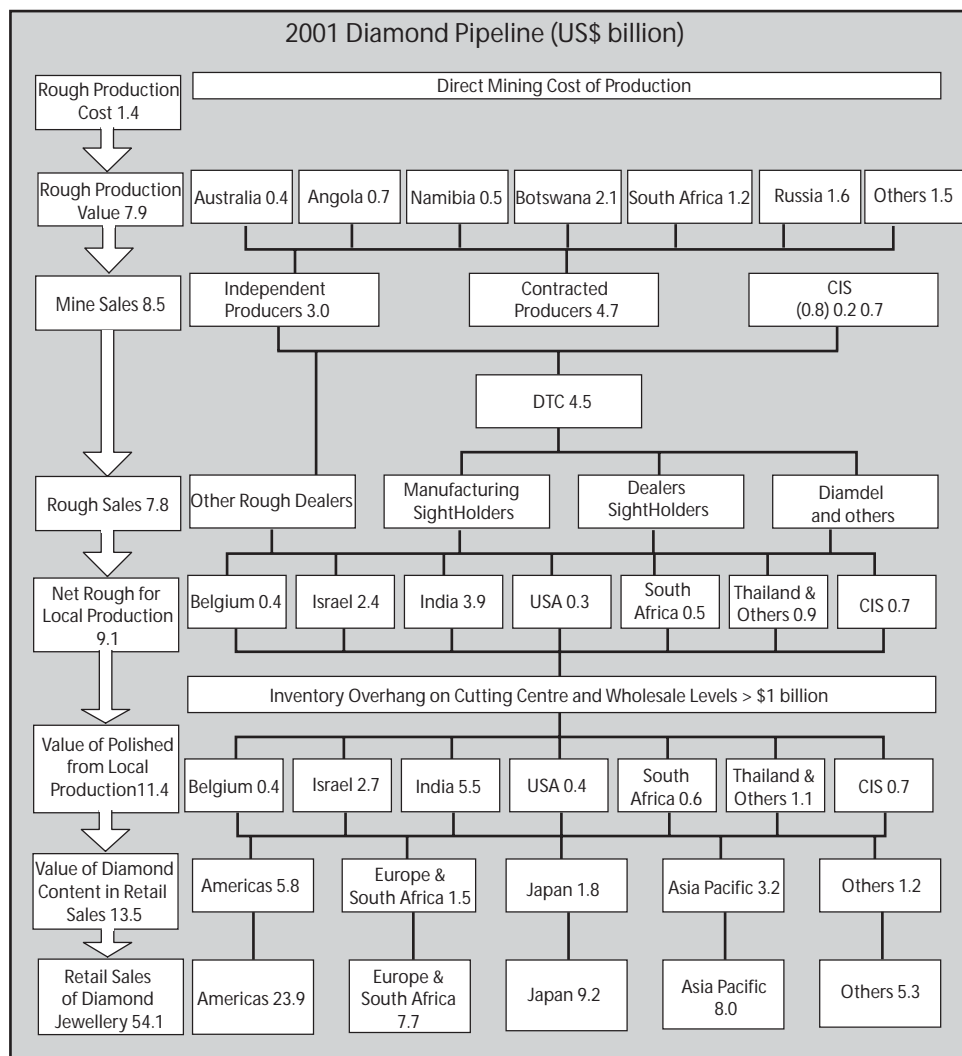
The results of the above developments are an increased concentration of the major primary production in only a few hands, hopefully a decrease in the trade in conflict diamonds and more transparency as to where diamonds are produced and how they travel through the pipeline.

Exploration Improves

Diamond exploration is on the rise again and junior companies are actively staking ground or acquiring properties. Canada is in the lead, with De Beers spending half of its US\$47 million global exploration budget there. BHP Billiton spends 25% of its global exploration budget on diamonds, and most of this in Canada, while Rio Tinto is believed to do likewise.

Canada

Canada includes two major cratonic regions (all the world's primary diamond deposits are associated with cratons) comprising the Slave Province in western Canada and the very large Superior Province in eastern Canada. Both contain Archaean rocks



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(mainly granites and gneisses older than 2,500 million years) which are exposed on surface, or only thinly covered by recent glacial deposits, over large areas of uplifted shield. Both cratons also include basins or platforms (large areas covered by Palaeozoic and younger sediments).

The surface or subsurface outcrops of kimberlite pipes tend to be small in diameter in exposed shields, such as in the Slave Province, and large in basin areas, such as in the Fort à la Corne area of the Saskatchewan basin, but there are many exceptions. Most diamond exploration activity at present is taking place in the northern part of the Slave Province in Nunavut and in the eastern part of the Superior Province in northern Quebec.

In the Northwest Territories/Nunavut, the shield area of the Slave Craton is Canada's main diamond region and a major staking rush started there in 1991 in the Lac de Gras area in the central part of the craton. Recently, staking has moved to the northern part of the craton in Nunavut, a few hundred kilometres south of Coronation Gulf. A dozen diamondiferous kimberlites have been found at various sites, including:

- the Tenacity property, in the Hood River area, a joint venture between Tahera and Rio Tinto (the latter has recently withdrawn but keeps a 1% royalty on any future diamond production);
- the Anuri, Anuri East, Qamutiik, Altair and Amuraq deposits on the Rockinghorse property, a joint venture between Tahera and Kennecott;
- Potentilla on the Kikerk Lake property, a joint venture between Ashton Canada and Caledonia Mining Corp./Northern Empire Minerals;
- Artemisia and Kikerk 1 on the Kim property, a joint venture between Ashton Canada and Pure Gold;

- Hydra, Perseus and Perseus Extension on the Ric property, a joint venture between Ashton and Pure Gold; and
- Knife, a 6 ha pipe on the Knife Lake property, a joint venture between Rhonda Corp. and De Beers.

Judging from their microdiamond content, Anuri, Potentilla and Artemisia appear to be the most promising targets.

Further south, but still in Nunavut, Kennecott (Rio Tinto) has farmed into the Jericho project of Tahera where, in addition to the Jericho pipe, at least four other diamondiferous kimberlites have been found. Several promising targets still await confirmation by drilling. A feasibility study has indicated that the Jericho pipe could be commercially developed by a shallow open-pit operation followed by underground mining. Reserves are estimated at 3 Mt at an average grade of 1.2 ct/t, with an average value of US\$80/ct. Thus, the pipe should yield some 3.5 Mct worth US\$280 million. A start-up in 2005 at an initial production rate of 300,000 t/y for an eight-year life is possible, but Kennecott and Tahera are hoping that the discovery of additional kimberlites will improve the commercial aspects.

South of the Nunavut border, BHP Billiton has farmed into Tahera's Ranch Lake and ICE claims area, where at least four diamondiferous kimberlites are known. The 12.4 ha Ranch Lake pipe is described as being "slightly diamondiferous", with a preliminary grade of 19 ct/100 t, based on a small sample of 28.45 t. BHP Billiton will use the Falcon airborne gravity technology that has proved its efficiency in finding more kimberlites on the BHP/Diamet property (and which were not found by conventional methods).

The Ekati mine, which opened in October 1998, has a projected life of 30 years. In May 1999, it reached full annual production of about 2.5 Mct of good quality diamonds worth around US\$170/ct. For the first year, ore was

drawn only from the Panda pipe but, during 2000, the Koala pit was opened up and the Misery pit, located 25 km to the south, will be developed later this year. Underground mining will start at the Koala North pipe in 2002. Ekati sells 58% of its output through its Antwerp office, 7% directly to cutters in Yellowknife and 35% by contract to De Beers.

Thus far, 138 diamondiferous kimberlites, of which eight are economic, have been found on the BHP-Diamet Ekati property since the first discovery in November 1991. BHP (since merged with Billiton) earned a 50.1% equity in the property by spending C\$150 million on exploration and evaluation, and C\$650 million on constructing the mine and its surrounding infrastructure. The remaining 29.9% was purchased by BHP in April 2001 (valuing Diamet at C\$687 million). Chuck Fipke and Stuart Blusson, the original prospectors, each retain a 10% equity interest in the project.

Canada's second diamond mine will be Diavik, a joint venture between Rio Tinto (60%) and Aber (40%). This C\$1.3 billion project is located in a shallow bay of Lac de Gras which necessitates the construction of water-retention dykes around four pipes, A145S, A154N, A418 and A21. The pipes are quite small - the largest, A154S, being less than 2 ha. This means that the deposit has a relatively small total tonnage, and high mining costs per tonne, but this is offset by very high grades (4-5 ct/t). Although the unit values (US\$65-79/ct) are moderate, the yield per tonne is excellent (US\$260-400/t). Open-pit mining will begin at A154S in mid-2003 at a rate of 500,000 t/y and a grade of 5.2 ct/t to yield 2.6 Mct/y (worth an estimated US\$79/ct). Full production is planned for mid-2005 at 1.5 Mt/y averaging 5.2 ct/t, which should yield 7.8 Mct/y (worth US\$6.6 million). The project's total reserves are estimated at nearly 26 Mt at an average 4.2 ct/t for a total of some 107 Mct worth US\$7.5 billion (based on an average value of US\$65/ct).

The third projected Canadian diamond mine is Snap Lake with reserves of 22.8 Mt at an

average grade of 1.6 ct/t and a value of US\$100/ct (36.5 Mct worth US\$365 million). De Beers acquired Snap Lake through a takeover of Winspear for C\$305 million in November, 2000, and purchased the remaining 32.4% equity from Aber Resources for C\$173 million in February, 2001. The name Winspear was changed to De Beers Canada Mining. Initial production is set for mid-2004 at 1.75 Mct/y. Snap Lake is not a pipe but a 2-3 m thick dyke. Because it dips at a shallow angle (4-15° to the northeast) a sufficient volume of ore is available for a commercial underground mining operation. SouthernEra and De Beers have intersected the northern extension of the dyke at a depth of over 1,000 m on their King property north of Snap Lake.

Because additional kimberlites are still being discovered at the Gahcho Kué (formerly Kennady Lake) project, a joint venture between De Beers Canada (51%), Mountain Province (44.1%) and Camphor Ventures (4.9%), the actual commercial prospects are still unknown. Several small pipes, dykes and sills, such as 5045, Tuzo, Hearne and Tesla have been discovered at Gahcho Kué, the latest discoveries being made near MZ Lake, where several sills have been intersected by drilling. Several large diamonds weighing up to 9.9 ct have been recovered from the Gahcho Kué prospect. Detailed prospecting and evaluation are still continuing.

More kimberlites are still being discovered by junior companies in other areas of the NWT and Nunavut, but no significant discoveries have been announced.

Further to the east in Nunavut, along the north shore of Baffin Island at Jackson Inlet, Twin Mining has found the Freightrain and Cargo 1, 2, 3 diamondiferous kimberlites. Grades of 1.87 ct/t of good quality diamonds, including a 1 carat clear, colourless diamond have been found, but no economic deposits have been outlined thus far.

In Alberta, Ashton Canada is still active on its Buffalo Hills property. Since 1997, Ashton,

with joint venture partners Alberta Energy and Pure Gold, has discovered 36 kimberlites, of which the large K252 pipe (with a grade of 0.55 ct/t) is the most promising (the small nearby K6 pipe has a grade of 0.76 ct/t). Although no definite economic kimberlites have been outlined, Ashton Canada believes that further exploration is warranted.

In Saskatchewan, the joint venture between De Beers (42.25%), Kensington Resources (42.25%), Cameco (5%) and Uranerz (10% free carried) is continuing with a substantial drilling programme (the 2001 budget was C\$4.8 million). About 72 kimberlites have been discovered in the Fort à la Corne area since the first discovery in 1989, 63 of them located in the jv area. The original kimberlite volcanoes erupted in a shallow sea and their structure, pediment debris and tuffs, are preserved by quick burial under mud (now shale). The resulting shapes - 'shallow bowls' and 'flat pancakes' - can be of considerable size, up to several hundreds of hectares in area, and can be as large as 400 - 1,000 Mt. In April 2001, Kensington released figures for testwork carried out on deposit 141, which had grades of 0.08-0.19 ct/t, at values ranging from US\$148 - US\$179/ct.

Junior company Shore Gold drilled 30 holes over a 4 km² area on its Star kimberlite. All holes intersected kimberlite, and one vertical hole was still in kimberlite at 539 m. Shore interprets this as having found the feeder pipe to its large 'pancake'. It estimates the tonnage at 400 Mt and the average grade at 0.25 ct/t.

In Manitoba, after the flurry of claim-staking in the Gods Lake area in the northeast, no further news has been released.

In Ontario, the main prospecting activity is located in the James Bay Lowland and the Wawa area. Several juniors, including Band Ore, Pele Mountain and Spider Resources, continue to prospect the unusual Archaean lamprophyres and breccia pipes, which contain high counts of microdiamonds

(several tens per 25 kg sample), and some macrodiamonds of up to 0.1 ct, or 2.65 mm, in diameter. No economic deposits have been outlined as yet.

The main focus of attention is the James Bay Lowland where De Beers Canada Prospecting continues to collect and evaluate bulk samples from the 16 ha Victor pipe in the Attawapiskat cluster. Victor is a complex pipe with at least three major intrusive phases. Initial results were said to indicate grades of 0.33-0.60 ct/t, valued at US\$154-165/ct, but these figures have not yet been confirmed or updated.

Canabrava/Navigator and other juniors are still active in the James Bay Lowland. De Beers has farmed in on properties and airborne magnetic data of Spider Resources' Area No.3 in the James Bay Lowland.

In Quebec, Ashton Canada with partner Soquem, and BHP Billiton with junior company Majescor, are continuing exploration on their large land holdings in the Otish Mountains/Eastmain/Caniapiscau areas. They are following trails of indicator minerals, including G10 garnets, and drilling promising magnetic targets. So far, Ashton has discovered two kimberlites, Renard 1 and 2. The area has become a focus of activity with several juniors staking ground along the periphery.

Another area of interest is the Wemindji area, east of James Bay where junior Majescor has recently discovered kimberlite dykes.

Twin Mining, meanwhile, continues prospecting diamondiferous kimberlite dykes in the Torngat area, located in the most northeastern tip of Quebec. Activity started in the latter part of 1999. The dyke swarm extends for 37 km and contains a 4.5 km section with grades of up to 0.88 ct/t. Twin Mining has had one of its diamonds (a 0.56 ct rough stone) cut into a 0.23 ct brilliant gem, and has thus produced the first cut-diamond found in Quebec.

Greenland

Exploration by joint venturers Citation Resources, De Beers and Cantex (a Chuck Fipke company) is still continuing in the Archaean craton along the southwest coast of Greenland. A target is an 8 km long, 20 m wide kimberlite dyke but so far no economic deposits have been outlined.

United States

The events of September 11, followed by the onset of winter in the northern hemisphere, delayed the reopening of the Kelsey Lake mine in Colorado. Modern equipment has made good secondary recoveries of previously treated stockpiles, and the evaluation of grades and diamonds is still continuing.

Australia

The giant Argyle mine in Western Australia, almost wholly-owned by Rio Tinto since it acquired Aston Mining in November 2000, produced about 26 Mct in 2000, compared with 30 Mct in 1999. The decrease in output reflected the focus of efforts on the stepback of the 400 m high west wall of the open pit which necessitated the removal of 100 Mt of sterile ground. This has now been completed and production for 2001 increased to the 30 Mct level once more. The life of the open pit will now extend to 2006 when a decision to go underground would extend the life to 2016.

Australia's second diamond mine is Merlin, now also a wholly-owned subsidiary of Rio Tinto. It is located in the Northern Territory and has an annual production of 200,000 ct (with a value of US\$113/ct). Ore is drawn from several small pipes, some of which coalesce at depth. During 2001, several large diamonds of 36 ct, 44 ct and 15 ct were recovered. Rio Tinto has put Merlin up for sale to invited tenders.

Australia's third diamond mine will be the Ellendale project of Kimberley Diamond Co. (KDC). The mine, which commenced production in May 2002, is located along the southwestern periphery of the Kimberley region of Western Australia. An initial annual production of 500,000 t for the first three years

(stage 1) is planned. Ore will be drawn from the enriched zones of lamproite pipes 4 and 9 which extend down to 3 m depth. The ore grade is 0.15 ct/t, which will generate 227,000 ct (valued at US\$100/ct) at a cost of A\$26 million. The revenue will be A\$41.9 million and an anticipated gross profit A\$18.2 million. Surface grades in pipe 4 are 0.43-0.52 ct/t (valued at US\$75-85/ct), whereas the figure for pipe 9 is 0.17-0.18 ct/t (US\$127-195/ct). Stage 2 will upgrade production to 715,000 t/y.

The total reserves of the enriched zones are estimated at 2.2 Mt grading an average of at 0.15 ct/t (for a total of 331,000 ct). Reserves for the deeper parts of the pipes (to 165 m in pipe 4, and to 90 m in pipe 9) are estimated at 50 Mt grading 0.07 ct/t (for 3.56 Mct) or, alternatively 34 Mt at 0.08 ct/t (yielding 2.6 Mct). During the evaluation stage in 2000/2001, several large diamonds (weighing 7.9 ct, 8.04 ct, 6.88 ct and 9.5 ct) were found. Additional reserves, not yet outlined, are expected in the enriched zones of other lamproite pipes and dykes found by KDC, and in alluvial deposits of the Blina palaeochannel located to the west of the pipes.

KDC finally purchased the Ellendale prospect from Rio Tinto for A\$23.25 million in October 2001 after a protracted legal action. Payments are to be made in four tranches over three years, the first, for A\$5 million, being due in April 2002. Feasibility studies have shown that this is well within the economic parameters of the project.

Striker Resources continues to evaluate its properties in the northern part of the Kimberley region. The Ashmore kimberlite prospect proved to be uneconomic, owing to low grade and a modest average value (US\$56/ct), although some large diamonds of up to 10.5 ct were found. Striker is still optimistic about the results for the Seppelt 1 kimberlite pipe, which has inferred reserves of 1.74 Mt at a grade of 0.4 ct/t. However, the value of US\$40/ct is not very robust, being based on a small parcel of 50 diamonds that were submitted by De Beers about ten years ago.

Thundelarra Resources continues to evaluate its Aries prospect in the central Kimberley region. A joint venture with BHP that conducted a Falcon airborne gravity survey in July 2001 found three small kimberlites (Persephone, Athena and Helena) to the south of the large 18 ha, three-lobed, Aries pipe. All three new pipes contain microdiamonds and many other Falcon targets need to be tested by drilling.

Tawara Resources recently found high concentrations of kimberlite indicator minerals on granite bedrock located on Flinders Island, a small island just off the west coast of the Eyre Peninsula of South Australia. Hopes were very high, but drilling in January 2002 by joint venture partner De Beers Australia did not intersect kimberlite.

Rimfire continues to seek the elusive origin of the alluvial diamonds near Bingara in New South Wales but has not yet succeeded in doing so. Meanwhile, junior diamond explorers, Elkedra Resources, and Flinders Diamonds were floated successfully and each raised between A\$3 and A\$3.5 million.

Brazil

Activity is concentrated in two areas, the Juina area of Mato Grosso and in southwestern Minas Gerais.

In the Juina area, Diagem is in joint venture with Rio Tinto for the examination of a number of kimberlite pipes and extensive alluvial deposits. Alluvial diamonds were valued at a modest US\$20-30/ct but grades were high (3-4 ct/m³). No economic deposits have been identified as yet. Diagem recently merged with EAG (Emerging African Gold) which gives it exposure to diamond properties in Guinea.

In southwestern Minas Gerais, Black Swan Resources is prospecting alluvial deposits in the Paranaíba River on the boundary of Minas Gerais and Goiás, in a major tributary of the Paranaíba (the Rio de San Antonio de Bonito) and in the Abaete River. In the past, many large diamonds (individually weighing well

over 100 ct) have been found in these rivers, but a primary source has not yet been found. One heavy minerals separation unit, and several jig plants, have been commissioned by Black Swan.

In August 2000, the Abaete prospect was joint ventured to AKD, an Australian junior company, which has identified one deposit containing some 1 Mm³ of diamondiferous gravels. Preliminary studies have outlined a possibility of an operation of 200,000 m³/y at a grade of 0.08 ct/m³ and a value of US\$206/ct. Detailed bulk sampling to confirm these figures will begin in the first half of 2002. In July 1999, a valuable pink diamond of 79 ct was found in the Abaete River. Rio Tinto recently discovered seven kimberlites in the Guarda Mor area, 200 km west of the Abaete prospect.

Another Black Swan project is located in the Serra da Canastra area that contains at least 50 kimberlite pipes and dykes, and some alluvial deposits. Some pipes are up to 25 ha in size and grades of 0.3 ct/t have been obtained. De Beers, through its subsidiary Mineração do Sul Ltda, has identified three significant diamondiferous kimberlites in this area and has invited tenders to purchase its property.

After spending US\$2 million on prospecting, Trans Hex International has withdrawn from its joint venture with Verena Minerals in the Barra Grande alluvial project, located on the Rio Grande River on the border of Minas Gerais and São Paulo. Verena recently made a deal with Rio Tinto in which Rio can earn up to an 80% equity interest in any primary deposit and 20% equity in alluvial deposits in this area.

A newcomer is Chapada Diamonds plc (listed on AIM in London) which has identified an alluvial deposit of 7.7 Mm³ at Quilombo and Peba Lagoinha, 15 km northeast of Chapada dos Guimarães in Mato Grosso. Initial bulk sampling of 21,010 m³ has produced a grade of 0.036 ct/m³ at a value of US\$515/ct.

South Africa

De Beers continues to operate six kimberlite mines; the three mines (and their tailings dumps) at the Kimberley complex (Bultfontein, Dutoitspan and Wesselton), plus the Finsch, Premier and Venetia operations. The company also has one small mine, The Oaks, plus a 50% equity interest in the Klipspringer mine, shared with SouthernEra. The small Marsfontein mine, also shared with SouthernEra, was mined out in 2001. The Kimberley Central Treatment Plant is scheduled to produce 1.7 Mct/y from 2002, while the Premier C-cut will be in full production at 3 Mct/y in 2008.

SouthernEra, with partner Vaaldiam, are prospecting several kimberlite pipes, dykes and alluvial prospects throughout South Africa. Trivalence continues to produce modest amounts of diamonds (about 25,000 ct/y worth US\$45/ct) from the Palmietgat kimberlite.

De Beers' alluvial operations are located along the Namaqualand coast, mainly at Kleinzee and Hondeklip-Koiingnaas, and on the Buffels River. Namaqualand offshore deposits are mined by small independent mining operators from small boats harboured in Port Nolloth. De Beers Marine has prospected the deeper offshore deposits along the Namaqualand coast in recent years, but has not yet embarked on actual mining operations. The Benguela-Moonstone joint venture to mine offshore deposits with their specially-equipped vessel Moonstar ended in bankruptcy.

Other successful alluvial operators are Trans Hex and Firestone Diamonds at Hondeklip and along the south bank of the lower Orange River at Baken and Oena, respectively. The Orange River deposits contain relatively large proportions of plus 10 ct diamonds. Trans Hex recently has had an injection of cash from Mvelaphanda Diamonds which thereby obtained an equity of 24%.

Recently floated Australian junior, Namakwa Diamonds, has outlined promising deposits onshore along the coast of Namaqualand in

raised beaches about 38 m above sea level, located between 12 km and 47 km north of the mouth of the Olifants River. A reserve of 10 Mt at an average grade of 0.1 ct/t has been identified. A dense media separation plant was commissioned in February 2002, and mining operations are scheduled to start in June 2002, with full production of 100,000 ct/y from December 2002. The average weight per stone is 0.3 ct (valued at US\$140-160/ct). The figures are very robust as operational costs are only US\$5-6/t, and the conservative value used in the feasibility studies is US\$10/t. For comparison, the average grade for the large volume of ore mined by De Beers in its coastal operations is 0.14 ct/t at a lower cost per tonne.

Several Australian junior companies are prospecting and mining alluvial deposits along the Vaal and Orange Rivers with varying success. Majestic Corp. had to withdraw from prospects at Pniël and Annex Sanddrift because of the low grade of the deposits although a few large diamonds, including the 30.6 ct Star of Pniël, were recovered. Moreover, Majestic's hostile takeover bid for Namakwa Diamonds failed. Majestic still operates the Riet River alluvial prospect where recently the 83 ct Riet River Royal diamond was found.

Majestic, with Canadian partner Diamcor, has secured leases over several long-known kimberlite pipes and dykes to mine hard rock and retreat tailings. These include the old Messina mine on the Sover kimberlite dyke, the Peiserton pipe and the Postmas pipe, all located from 65 to 190 km northwest of Kimberley. Dwyka Diamonds took over Diamix. This gave it major equity interests in several alluvial properties, including De Hoop and Nooitgedacht. Tawana Resources is looking at some kimberlite prospects at Perdevlei near Kimberley. In general, past and present annual production of all these prospects is low (at around 10,000-15,000 ct), and grades are also poor (generally 0.01 ct/t) but values are high (US\$300-600/ct). However, none of these companies has yet shown an operational profit.

Namibia

Namdeb, a 50-50 joint venture between De Beers and the Namibian Government, operates the onshore operations, while De Beers Marine Namibia, a jv of Namdeb (30%) and De Beers (70%) manages the major part of the offshore operations at about 110 m depth along the Namibian coast. The proportions of production from each sector are about even. Other offshore operators are the Trans Hex Marine/Diamond Fields International joint venture and Namco which mine submarine river channels near Lüderitz.

Namco nearly went bankrupt in January 2001 when its expensive state-of-the-art seabed crawler NamSSol failed, resulting in a drastic fall in production. Namco had to sell its vessel, Ivan Prinsep, to the Transhex/DFI jv in order to stay economically afloat, and was eventually saved after receiving an injection of US\$25 million from LL Diamonds, a Lev Leviev company, which ended up with a 31% equity interest in Namco. Namco's largest vessel, the US\$26 million Ya Toivo (which incorporates a seabed crawler and a 100 t/h plant), has been commissioned and is operating successfully. The latest offshore operator Afri-Can Marine Diamonds is still evaluating its licences.

Australian junior, Mt Burgess Mining, exploring at the Tsumkwe prospect in northern Namibia on the Botswana border, has intersected kimberlite during its 2001 winter-drilling programme.

Botswana

Debswana, a 50-50 joint venture between De Beers and the Botswana Government, is Botswana's sole diamond producer and operates the Orapa, Letlhakane and Jwaneng mines. In 2000, they produced about 22% by weight and 27% by value of the world's production. Recent improvements in treatment and recovery have doubled the production capacity of Orapa and Jwaneng and thus figures for 2001 are expected to be considerably higher. Debswana also announced that another mine will start in

October 2002, the US\$40 million Damtshaa project, a complex of four small pipes of the BK cluster, located 20 km east of Orapa. Ramping up to full production of 1.2 Mt/y (planned for June 2003) will generate 200,000 ct/y at a grade of 0.17 ct/t.

Several Australian, UK, Canadian and South African junior companies, including Botswana Diamond Fields, Cantex, Firestone Diamonds and Trivalence continue their prospecting efforts in various parts of Botswana, but no economic prospects have been identified so far.

Angola

In trying to prevent illicit mining and the trade in conflict diamonds, the Angolan Government formed Ascorp, a trading company to which all legal miners must sell their diamonds and which is the sole legal exporter. Ascorp affixes a certificate of origin and legitimacy to all parcels offered for sale. It appears that official Angolan production has dropped 21% (and the value per stone even more) below the level of 2000. Legally-operating miners say that Ascorp's monopoly has resulted in prices being offered that are below the market level, and therefore the most valuable diamonds are being smuggled out of Angola to the Democratic Republic of Congo (DRC), where they receive better prices and pay less taxes. Thus, Angola's illicit exports have actually increased, although this does not necessarily imply that the trade in conflict diamonds has increased as well. The Angolan government denies these allegations and says that export figures for 2001 have not yet been collated. By special arrangement with Ascorp, the production from Angola's major producer Catoca goes straight to Israeli buyers. The Catoca kimberlite mine, located in Angola's northeastern province of Lunda Norte, is the country's sole primary diamond producer. Sociedade Mineira de Catoca (SMC) is a joint venture between Angola's Endiama (82.8 %), Russia's Alrosa (32.8 %), Brazil's Odebrecht (16.4 %) and Diamond Finance Co. bv (18 %). Production in 2000 was 1.96 Mct, valued at US\$143 million.

In June 2001, De Beers announced that it had suspended all diamond buying and exploration activities in Angola (and so far this is still the case).

West Africa

After the recent takeovers, the main explorers in Mauritania are Rio Tinto and BHP Billiton which, respectively, inherited the Ashton and Dia Met licences, plus De Beers, which farmed in on some licences held by Rex Diamond Corp., which still has some licences in its own name. Altogether, up to two dozen kimberlite pipes and dykes have been found, some of which contain micro and macro diamonds. However, very little news has surfaced during the past year.

In Sierra Leone, Diamond Works is said to have started work again in the Tongo area, which includes a diamondiferous dyke complex containing several 'blows' (local dyke enlargements). Diamond Works announced that it has identified a reserve of 2.67 Mct.

Trivalence continues to produce good-quality diamonds from its lease in southeastern Guinea (40,000 ct valued at US\$400/ct in 2000 and probably similar amounts in 2001).

No further news has been forthcoming from Mano River Resources, which found four narrow, elongated, kimberlite pipes in the Kpo Range in western Liberia.

Newcomer African Mining and Petroleum Resources plc (quoted on London's Ofex), has secured the Bobi exploration permit in the Ivory Coast. The permit contains the Bobi dyke, the Toubabouko dyke and sill, and an alluvial deposit in the Legbo River. The permit is a joint venture between AMPR and Sodemi, a government mineral exploration agency. Production from 1948 until the present time, by a joint venture between Sodemi and Waston (Harry Winston-Selection Trust) for the first 30 years, and by artisanal mining since then, is estimated at 3 Mct. AMPR expects to identify reserves of at least a similar

volume and to start mining in 2003 at a rate of 25,000- 50,000 ct/y at an average value of US\$100/ct.

Other Africa

Owing to the unsettled conditions in Zimbabwe, diamond exploration activity is very low. Rio Tinto is reported to be still considering development of its Murowa prospect which contains three diamondiferous kimberlite pipes with an indicated reserve of 14.85 Mct. If plans proceed to schedule, start-up at Murowa can be as early as 2003, with an initial annual output of 400,000 ct.

Diamond production by artisanal and government agency operations still continues in the DRC, Central African Republic and Zambia, but production and export data are unreliable as many diamonds move across national borders. According to Antwerp import statistics, several other African countries export substantial amounts of diamonds but most of these countries have no known diamond-mining operations.

A De Beers' subsidiary in joint venture with the Tanzanian Government agency has redeveloped the Mwadui mine in western Tanzania. The operation is planned to have a modest production of 250,000 ct/y of good quality diamonds by 2003.

Russia

Russia's diamond mines are located in the Sakha Republic (formerly Yakutia) where presently the large open-pit mines on the Udachnaya and Jubilee kimberlite pipes are the major producers. The 35-year-old pit at Udachnaya is now 600 m deep with 90 m benches, while the 5-year-old pit at Jubilee is still relatively shallow. The open pits at Mir and Sytykanskaya are closed, while mining at Zarnitsa proceeds intermittently. Underground mining takes place at International and Aikhal. The new Nakyn field of two major kimberlite pipes is expected to start up in 2003.

The legal battle by Denver-based Archangel Diamond Corp. (ADC) to have the title over

World Natural Diamond Production 2001

| Country | Mines | Tonnes (‘000) | Carats (‘000) | US\$/ct | US\$ (‘000) | Operator |
|---------------------------------|---------------------------|------------------|------------------|------------|------------------|------------------------------|
| South Africa | Venetia | 4,602 | 4,977 | 85 | 423,045 | De Beers |
| | Premier | 3,102 | 1,637 | 75 | 122,775 | De Beers |
| | Koffiefontein | 2,299 | 145 | 225 | 32,625 | De Beers |
| | Kimberley | 3,766 | 550 | 110 | 60,500 | De Beers |
| | Namaqualand | 6,083 | 808 | 180 | 145,440 | De Beers |
| | Finsch | 4,768 | 2,465 | 70 | 172,550 | De Beers |
| | The Oaks | 203 | 124 | 180 | 22,320 | De Beers |
| | Baken | 5,835 | 65 | 400 | 26,000 | Transhex |
| | Others | | 230 | 280 | 64,400 | Various |
| | Independent diggers | | 300 | 250 | 75,000 | |
| | Total South Africa | 30,658 | 11,301 | 101 | 1,144,655 | |
| Botswana | Orapa | 15,779 | 13,056 | 50 | 652,800 | Debswana (De Beers) |
| | Lethlakane | 3,625 | 1,021 | 180 | 183,780 | Debswana (De Beers) |
| | Jwaneng | 8,920 | 12,339 | 110 | 1,357,290 | Debswana (De Beers) |
| | Total Botswana | 28,324 | 26,416 | 83 | 2,193,870 | |
| Namibia | Namdeb | 21,867 | 1,385 | 220 | 304,700 | Namdeb (De Beers) |
| | Namco | | 90 | 151 | 13,590 | Namco |
| | Diamond Fields | | 27 | 150 | 4,050 | DFI/Trans Hex |
| | Total Namibia | 21,867 | 1,502 | 215 | 322,340 | |
| Angola | | | | | | |
| | Catoca | 3,160 | 2,693 | 65 | 175,045 | Alrosa/Odebrecht/ Endiama |
| | Luzamba | 725 | 418 | 210 | 87,900 | SDM (Odebrecht/ Endiama |
| | Smaller operators | - | 760 | 237 | 180,200 | JV's with Endiama |
| | Artisans | | 2,000 | 180 | 360,000 | Various |
| | Total Angola | 3,885 | 5,871 | 137 | 803,145 | |
| D.R. Congo | | | | | | |
| | Mbuyi-Maji | | 5,800 | 14 | 81,200 | MIBA |
| | Small operators+artisans | | 13,837 | 30 | 415,110 | Various |
| | Total D.R.Congo | | 19,637 | 25 | 496,310 | |
| Central African Republic | Small operators+artisans | | 614 | 150 | 92,100 | Various |
| Ghana | Small operators+artisans | | 450 | 25 | 11,250 | Various |
| Tanzania | Williamson | 2,867 | 191 | 145 | 27,695 | De Beers/Tanzania state |
| Ivory Coast | Artisans | | 145 | 120 | 17,400 | Various |
| Liberia | Artisans | | 155 | 150 | 23,250 | Various |
| Sierra Leone | Artisans | | 375 | 180 | 67,500 | Various |
| Guinea | Small operators+artisans | | 754 | 170 | 128,180 | Various |

World Natural Diamond Production 2001 (continued)

| Country | Mines | Tonnes (‘000) | Carats (‘000) | US\$/ct | US\$ (‘000) | Operator |
|--------------------|-------------------------------|------------------|------------------|------------|------------------|-----------|
| Lesotho | Small operators+artisans | | 20 | 190 | 3,800 | Various |
| Brazil | Small operators+artisans | | 550 | 40 | 22,000 | Various |
| Venezuela | Small operators+artisans | | 325 | 125 | 40,625 | Various |
| Guyana | Small operators+artisans | | 20 | 80 | 1,600 | Various |
| China | Small operators | | 150 | 100 | 15,000 | Various |
| | Total lesser producers | 2,687 | 3,749 | 120 | 450,400 | |
| Australia | | | | | | |
| | Argyle | 15,100 | 26,000 | 11 | 286,000 | Rio Tinto |
| | Merlin | 270 | 70 | 110 | 7,700 | Rio Tinto |
| | Total Australia | 15,370 | 26,070 | 29 | 293,700 | |
| Canada | | | | | | |
| | Ekati | 3,685 | 3,685 | 144 | 530,640 | BHP |
| Russia | | | | | | |
| | Udachnaya | 9,000 | 11,500 | 85 | 977,500 | Alrosa |
| | Jubilee | 9,100 | 5,500 | 65 | 357,500 | Alrosa |
| | Others | 4,400 | 3,500 | 90 | 315,000 | Alrosa |
| | Total Russia | 22,500 | 20,500 | 80 | 1,650,000 | |
| World Total | | | 118,731 | 66 | 7,885,060 | |

Source: Luc Rombouts, Terraconsult.

the Verkhotina licence (which includes the economic Grib pipe) transferred to Almazny Bereg, a Russian company in which ADC holds 40% equity, is still continuing. The Verkhotina area is located in northwestern Russia, 150 km north of Archangel. The area contains numerous diamondiferous kimberlites, including the Lomonosov group, several of which could become mines if legal and environmental issues can be resolved.

Finland/Sweden

Several companies, including European Diamonds, are continuing diamond exploration in northern Finland. European Diamonds recently found a 1.5 x 1.0 mm clear diamond in surface samples near Lentiira.

Asia

No significant diamond exploration news has come out of China since Astro mining withdrew from China early in 2000.

However, several expatriate companies are active in India searching for gold, base metals and diamonds (a development stimulated by the government's decision in 1994 to open up the country for foreign exploration). De Beers, BHP Billiton, Rio Tinto and juniors, including Australian-based Oropa and Australian Indian Resources, are exploring for diamonds in several states, including Karnataka, Maharashtra, Madhya Pradesh, Andhra Pradesh, Chhattisgarh and Orissa. However, Oropa's evaluation of the Mainpur diamond field, located 150 km south of Raipur, capital of the new state of Chhattisgarh, has been put on hold because of legal complications.

India's sole diamond producer is the Mahjawan open-pit mine, located 20 km west of Panna in Madhya Pradesh. It is operated by a government agency and has a modest annual production of 25,000 ct of good quality diamonds.