

# DIAMONDS

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The year 2000 was a record year for diamond supply and sales. It was also a year with important changes in project and company ownerships. The Argyle mine in Australia, the world's largest diamond mine in volume terms (26 Mct produced in 2000), was jointly owned until recently by Rio Tinto (60%) and Ashton (40%). During the year, Rio Tinto took over Ashton for A\$713 million. The Venetia mine in South Africa, producing 4.5 Mct/y worth more than US\$400 million, was held by De Beers, Anglovaal and ICH. De Beers bought out the other parties for US\$675 million.

## Production

In Canada, Snap project, an attractive new diamond project shortly to be developed and formerly owned by Winspear and Aber Resources, was taken over by De Beers for C\$478 million.

Trans Hex of South Africa merged with the offshore diamond operators Benguela Concessions, while in Namibia Namco took over Ocean Diamond Mining. Dia Met, partner in the successful Ekati project in Canada, has been offered for sale and BHP made an offer in March 2001, which seems likely to be accepted. De Beers has agreed to join Louis Vuitton Moët Hennessy in branding the De Beers name at the diamond retail level. De Beers itself is now the subject of a take-over bid from the Oppenheimer family (to earn 40%), Anglo American Corp. (also 45%) and the Botswana Government (15%).

The natural diamond mine supply in 2000 was 110 Mct, worth US\$7.86 billion, while in 1999 mine supply was 111 Mct worth US\$7.25 billion. Supply of rough diamonds to the market was, however, almost US\$9 billion, as De Beers sold an additional US\$1.1 billion worth of diamonds from its stockpile. Sales through the Diamond Trading Co.

(formerly known as Central Selling Organisation) reached a record US\$5.67 billion. All producers received higher prices, while the relative importance of the world's largest producer, Argyle in Australia, continued to decline. The decreasing production of Argyle has been compensated by an increase in the Orapa production in Botswana. The Orapa expansion, with the construction of the N° 2 treatment plant, was completed in 2000 at a cost of US\$350 million. Orapa is now treating 14.7 Mt/y. The Orapa kimberlite has a surface area of 111 ha and is the world's largest kimberlite being mined.

In Russia, Udachny remains the largest producer with the pit being expanded to 600 m depth. Development has started on the Zarnitsa pipe. The surface area of the Zarnitsa pipe is 21.5 ha. Zarnitsa was in fact the first kimberlite pipe discovered in Russia, but remained undeveloped up to now because of its lower grade. Zarnitsa should replace Udachny as Russia's largest diamond mine by the year 2010, when Udachny's open-pit reserves will be depleted.

The Ekati project in Canada remains on target with 2.6 Mct produced from the rich Panda pipe, with record sale prices obtained of US\$172.52/ct.

Offshore diamond production suffered a serious setback in Namibia in January 2001. Namco badly damaged its NamSSol diamond-mining vessel. The annual production rate had reached 200,000 ct/y, before the accident caused production to cease. Namco's smaller vessel, recently obtained through the acquisition of Ocean Diamond Mining, had to be sold to Trans Hex in order to avoid bankruptcy. In March 2001, the Israeli diamond dealer Lev Leviev, provided Namco with additional cash (US\$15

million) for shares (a 31% stake, to be increased to 38% if warrants are exercised). Mr Leviev's Ascorp diamond-buying company continued to buy exclusively the total diamond production marketed by the Angolan State enterprise Endiama. This led to a conflict with De Beers, who had the right to buy the Cuango diamonds as long as a US\$50 million loan paid to Endiama in the early 1990s for the Luzamba project remained in debt. Endiama now promises to pay back this loan, while De Beers prefers to withdraw entirely from buying diamonds from conflict areas.

The conflicts in Africa are a tragedy, but the issue of conflict diamonds seems to have little or no effect on production or sales. MIBA, the diamond producer at Mbuyi-Maji in the Democratic Republic of Congo (DRC), nearly doubled its production compared with 1999. Diamonds recovered from conflict areas in Sierra Leone, Liberia, DRC or Angola continue to reach Antwerp through transit countries such as the Central African Republic, Ivory Coast, Guinea or Congo-Brazzaville.

Countries such as Guinea and the Central African Republic have an important artisanal diamond-mining industry. Artisanal mining is legal in those countries and provides income to thousands of families. Their borders cannot be sealed off. Diamonds from neighbouring conflict areas can be mixed with the local production without experts being able to identify their suspect provenance.

### New Projects

After Ekati, the Diavik project in northern Canada is the next large diamond mining operation to come into production by the year 2003. Mine development is on schedule, with capital expenditure estimated at US\$870 million. Diavik is a joint venture between Rio Tinto (60%) and Aber Resources (40%). Diavik has a 20-year mine life with production planned at up to 6 Mct/y from 1.5 Mt. Proven and probable reserves are 25.7 Mt at 4.2 ct/t.

Next in line is the Snap Lake project, 220 km northeast of Yellowknife, and recently taken over by De Beers. Snap Lake is a shallow-dipping dyke, 2 m thick. Reserves are estimated at 21.3 Mt at a grade of 1.7 ct/t and an average value of US\$118/ct. Production should start in 2004 at a rate of 3,000 t/d. At this rate underground mining will last for twenty years.

Elsewhere in northern Canada, the Tahera Corporation is proceeding with the feasibility study on the Jericho project, in Nunavut. Jericho consists of three small pipes. The largest pipe measures 1.2 ha and has a grade of 0.93 ct/t with an average value of US\$60/ct. Total reserves stand at 1 Mct with grades ranging from 0.3 to 1 ct/t.

De Beers is still pondering the development of the Gope kimberlite, in central Botswana, in joint venture with Falconbridge. The feasibility of the C-cut project at the Premier mine in South Africa is under way and a decision to proceed should be taken in May 2001. The C-cut should extend underground mining from the present 630 and 732 m levels down to a depth of 1,100 m to add 13 years of production. In Botswana, De Beers decided to develop the BK9 project between Orapa and Lethlakane. BK9 comprises four small pipes. At a cost of US\$41 million, BK9 should yield 100,000 ct/y by 2002.

In Australia, Kimberley Diamond Co. took over the Ellendale project from Rio Tinto. Enriched surface layers exist on top of pipes 4 and 9. Reserves are estimated at 950,000 t at 0.33 ct/t down to 3 m depth. The average value of the diamonds is estimated at US\$100/ct. Kimberley Diamond plans to construct a 750,000 t/y plant. After mining the rich surface layers for 15 months, options would be to mine the leaner underlying kimberlite or to mine alluvials in the vicinity. Further north-west, drilling at Argyle yielded additional open-cast reserves of 21.6 Mt at 2.7 ct/t. This addition should extend the open cast mine life to the year 2006.

In Russia, the dispute between the shareholders of the Verkhovina project is now under arbitration in Stockholm. The Verkhovina project consists of the Grib pipe that contains 98 Mt of kimberlite at 0.69 ct/t with an average value estimated at US\$79/ct down to 500 m depth. The project should have moved from an exploration permit to a mining permit, owned by Almazny Bereg. The shareholding of the latter should have been Archangel Diamond Corp. of Canada 40%, Arkhangelskgeoldobycha 50% and IBME Ltd, a Russian private company, 10%. Arkhangelskgeoldobycha (Arkgeo), the local geological survey, was privatised in 1996. Apart from Verkhovina, Arkgeo is developing large oil reserves in the far north of European Russia. Arkgeo is owned 74.5% by Lukoil, Russia's largest oil company, and 25.5% by the state-owned Rosneft oil company.

Rio Tinto is planning to go ahead with the Murowa project near Zvishavane, in southern Zimbabwe. Murowa consists of three small kimberlite pipes. Reserves are estimated at 16.5 Mt at 0.9 ct/t. Rio Tinto plans a 500,000 t/y mining operation.

By taking over Ashton, Rio Tinto has acquired the Merlin project, in northern Australia, the Cuango River project, in Angola, and the Cempaka dredging operation in Kalimantan, Indonesia. Merlin produced about 200,000 ct in 2000 at US\$111/ct. Drilling revealed that the two Merlin pipes, Palomides and Sacramore, join at a depth of 120 m. Production on the Cuango River was down to about 100,000 ct, but at record prices of US\$327/ct. The Cempaka project has been put up for sale by Rio Tinto.

In South Africa, the De Beers/Southern Era Marsfontein project is nearing its end, and the Klipspringer dyke should be mined next. Klipspringer has 3.6 Mt of reserves at a grade of 0.47 ct/t with an average value of US\$100/ct. Plans are to mine Klipspringer at 28,000 t/mth.

Diamond Fields International entered into a seven-year joint-venture agreement with Trans Hex to mine Diamond Fields' offshore licence 111 near Lüderitz, in Namibia. The joint venture starts at 60% for Diamond Fields and 40% for Trans Hex, until Diamond Fields recovers all its previous expenses on the project, whereafter the joint venture will be 50/50. The licence contains the high-grade Marshall Fork and Diaz 12 features. Trans Hex will be the operator, while Diamond Fields will market the stones. Reserves are estimated at 675,000 to 1,350,000 ct in an area covering about 300 ha in total with average grades of the order of 0.3 ct/m<sup>2</sup> and an average value estimated at US\$175/ct. The first vessel acquired from Namco, starts mining in June 2001, while a second vessel should be in operation before the end of October 2002. In the first year 65,000 ct should be produced.

Along the Orange River in Namaqualand (South Africa), Trans Hex plans to increase production at the Baken mine to 60,000 ct/y by 2002 by constructing a new central treatment plant. Baken produced close to 46,000 ct in 2000.

### Exploration

Diamond exploration continues worldwide at an expenditure rate of US\$300 million. De Beers spends US\$145 million/y on diamond exploration.

In Canada, exploration continues in the Ekati project area. The core zone of the Ekati lease is held by BHP (51%), Dia Met (29%), Charles Fipke and Stuart Blusson (each 10%), while the surrounding buffer zone is held by BHP (51%), Archon Minerals (32.2%), Dia Met (7.8%) and Charles Fipke (10%). The core zone contains the Panda, Koala, Fox, Pigeon and Sable pipes, all part of the ten-year mine plan. The buffer zone contains the high-grade Misery pipe, where stones are of lower quality. Production from Misery should start by the end of 2001. New kimberlites are regularly found and tested. The best result was on the small (0.6 ha) Lynx pipe in the buffer zone, 3 km south-west

Diamond Production 2000						
Country	Mines	Ore ('000 t)	Stones ('000 ct)	Unit US\$/ct	Value (US\$'000)	Operator
<b>South Africa</b>	Venetia	3,686	4,498	90	404,820	De Beers
	Premier	2,846	1,782	80	142,560	De Beers
	Koffiefontein	2,199	151	250	37,750	De Beers
	Kimberley	3,508	569	110	62,590	De Beers
	Namaqualand	6,141	810	185	149,850	De Beers
	Finsch	4,204	1,925	75	144,375	De Beers
	Marsfontein	531	436	115	50,140	De Beers/Southern Era
	The Oaks	212	116	200	23,200	De Beers
	Baken	725	46	418	19,228	Transhex
	Others		250	300	75,000	Various
	<i>Total South Africa</i>	<i>24,052</i>	<i>10,583</i>	<i>105</i>	<i>1,109,513</i>	
<b>Botswana</b>	Orapa	14,682	12,172	50	608,600	Debswana (De Beers)
	Lethlakane	3,511	959	200	191,800	Debswana (De Beers)
	Jwaneng	9,237	11,520	115	1,324,800	Debswana (De Beers)
	<i>Total Botswana</i>	<i>27,430</i>	<i>24,651</i>	<i>86</i>	<i>2,125,200</i>	
<b>Namibia</b>	De Beers Marine	2,500	576	220	126,720	Namdeb (De Beers)
	Namco	250	200	160	32,000	Namco
	Namdeb contractors	1,800	91	350	31,850	
	Namdeb onshore	23,457	653	350	228,550	Namdeb (De Beers)
	<i>Total Namibia</i>	<i>28,007</i>	<i>1,520</i>	<i>276</i>	<i>419,120</i>	
<b>Angola</b>	Catoca	2,000	1,500	70	105,000	Alrosa/Odebrecht/Endiama
	Luzamba	185	106	327	34,662	Ashton/Odebrecht/Endiama
	Other		2,400	250	600,000	Various
	<i>Total Angola</i>		<i>4,006</i>	<i>185</i>	<i>739,662</i>	
<b>D.R. Congo</b>	Mbuyi-Maji		9,000	15	135,000	MIBA
	Others		7,500	60	450,000	Various
	<i>Total D.R. Congo</i>		<i>16,500</i>	<i>35</i>	<i>585,000</i>	
<b>CAR</b>	Others		450	160	72,000	Various
<b>Ghana</b>	Others		500	27	13,500	Various
<b>Tanzania</b>	Williamson	2,958	317	145	45,965	De Beers/Tanzania state
<b>Ivory Coast</b>	Artisans		150	145	21,750	Various
<b>Liberia</b>	Artisans		170	160	27,200	Various
<b>Sierra Leone</b>	Artisans		350	250	87,500	Various
<b>Guinea</b>	Others		450	230	103,500	Various
<b>Lesotho</b>	Others		20	250	5,000	Various
<b>Brazil</b>	Others		650	45	29,250	Various
<b>Venezuela</b>	Others		350	130	45,500	Various
<b>Guyana</b>	Others		20	85	1,700	Various
<b>China</b>	Small operators		160	103	16,480	Various
	<i>Total lesser producers</i>		<i>3,587</i>	<i>131</i>	<i>469,345</i>	
<b>Australia</b>	Argyle	11,500	26,000	13	338,000	Rio Tinto
	Merlin	800	200	113	22,600	Rio Tinto
	<i>Total Australia</i>	<i>12,300</i>	<i>26,200</i>	<i>14</i>	<i>360,600</i>	
<b>Canada</b>	Ekati	2,500	2,629	173	453,555	BHP / Dia Met
<b>Russia</b>	Udachnaya	9,000	12,500	80	1,000,000	Alrosa
	Jubilee	9,000	5,000	65	325,000	Alrosa
	Others	3,500	3,000	90	270,000	Alrosa-other
	<i>Total Russia</i>	<i>21,500</i>	<i>20,500</i>	<i>78</i>	<i>1,595,000</i>	
<b>World total</b>			<b>110,176</b>	<b>71</b>	<b>7,856,995</b>	

of the Misery pipe. A mini-bulk sample of 168.5 t in total yielded 140.74 ct. The average grade for the Lynx pipe is thus 0.83 ct/t with an average value of US\$139/ct.

Elsewhere in Canada, the joint venture led by Ashton found 35 kimberlites in the Buffalo Head Hills of north central Alberta. The most recent discovery, K252, yielded 0.66 ct/t from a mini-bulk sample. In Saskatchewan 70 large kimberlites were found near Fort à la Corne. With one exception, the kimberlites are rootless volcanic layers about 100 m thick. Despite their large size, the bodies are uneconomic because of the amount of overburden and the low grades. In Attawapiskat, Ontario, De Beers found the Victor pipe that yielded good initial results. Bulk sampling was planned for this winter. At Wawa, Ontario, east of the eastern extremity of Lake Superior, Band-Ore Resources is exploring lamprophyre dykes and breccias that are locally very rich in microdiamonds. The lamprophyres are 2.7 billion years old and are the oldest diamond source rock known. Petrographically the rock resembles a spessartite or a minette. In northern Quebec, Twin Mining has found several kimberlite dykes at Torngat in the Ungava Bay area. A mini-bulk sample of 341.6 t yielded a diamond grade of 0.04 ct/t.

In West Africa, new kimberlites were found in Mauritania, Liberia and Guinea. In Mauritania, the joint-venture partners Ashton and Dia Met found a diamond-bearing kimberlite under 50

m of overburden. Two samples from the bottom part of the drillhole revealed excellent grades, while most of the samples taken higher up along the drillhole were barren. With such enigmatic results, more drilling was planned. Rex found the most kimberlites, now 20 bodies in total. The kimberlites are a mixture of pipes, blows and dykes. Some are diamond-bearing, but of low grade. De Beers entered into a joint-venture agreement with Rex on its Akchar permit. Mano River Resources found a cluster of five kimberlite pipes in the Kpo Range, western Liberia. The largest, K3, has a surface area of almost 4 ha. K3 has excellent G10 garnet compositions and will shortly be tested. In Guinea, a 12,065 t bulk sample taken by Trivalence from the K23 pipe, just south of Banankoro, yielded an average grade of 0.07 ct/t with an average value of US\$80/ct.

In Brazil, Rio Tinto has found, over the past few years, several large diamond-bearing kimberlites near Juina, Mato Grosso. The diamonds are mainly of industrial quality and the kimberlites are considered uneconomic. Diagem of Vancouver has entered into an agreement with Rio Tinto to test the adjoining alluvial deposits and to re-evaluate five of the pipes. In the Juina area, occasionally large good quality stones are found, quite unlike the diamonds found so far in the kimberlite pipes. The source of the larger good quality stones of Juina remains an attractive exploration target.