
WORLDWIDE DIAMOND UPDATE

This update on the status of proposed new kimberlite diamond projects includes two that started up during the past year, a further nine projects that we feel are advanced enough to have a chance of coming into production in the next few years, and four more that are moving forward with substantial bulk-sampling programs. All of these projects would be new standalone operations and are listed in Table 1 roughly in order of when they might be expected to come onstream. We are not including expansions, the development of satellite orebodies at existing operations, or reopenings of mines that halted production in the recent past. In addition to the kimberlite projects discussed here, there are at least 11 placer projects that are in advanced stages of feasibility or are starting up with limited production. Most of the new output from these placer deposits is being used to verify tonnage, grades, and diamond values.

Although two projects in Russia-based Alrosa's pipeline are included in this review, the company is also proceeding with major mine developments in its traditional producing area of Sakha (Yakutia) in eastern Siberia. These projects mainly involve replacing Alrosa's exhausted open pit operations with new underground mines, but some are part of the continuing production buildup within the recently developed Nakyn field of orebodies. Alrosa's reported expenditures for construction of new Siberian mining facilities during 2002 and 2003 include \$335.7 million for the Nakynskoye deposits, \$119.5 million for development of an underground mine at Mir (which is expected to cost \$800-\$850 million in total), \$65.9 million for the International underground mine, \$32.5 million for the Aikhal underground mine, \$17.8 million for the Komsomolskoye pipe, and \$7 million at the Gornoye deposit. Alrosa is also developing an underground mine at Udachny to replace an open pit operation that is currently producing about 65% of the company's current output but is nearing the end of its life. Alrosa spent \$4.53 million at Udachny in 2002 and 2003, but the entire development is expected to cost about \$1.2 billion.

One of the projects covered in our update last year (May/June 2003) has been dropped from the active list. The *Verkhovina* project in the Arkhangelsk region of northwestern Russia (Archangel Diamond 40%, local interests 60%) remains mired in a legal battle over ownership considerations. The *Murowa* project in Zimbabwe (Rio Tinto 50%, Rio Tinto Zimbabwe 50%) and the *Gope* project in Botswana (De Beers 50%, Falconbridge 50%) also remain on hold, but the Gahcho Kue and Liqobong projects that were on hold last year have been reactivated.

Two startups occurred during the past year

At the new **Diavik** mine in Canada's Northwest Territories (Rio Tinto 60%, Aber Diamond 40%), initial production began in January 2003 and was ramped up to full commercial status by August. Capital costs were within budget and totaled \$896 million, including expensive items such as a 1.5-million-mt/y processing plant, construction of a large water-retention dike, and removal of about 3.2 million cubic meters of overburden ranging up to 30 meters deep. About 1.2 million mt of ore was processed at Diavik during 2003 to produce 3.8 million ct of diamonds. The waste-to-ore ratio for this initial production averaged about 22:1, with operating costs reported at \$30/ct. In November 2003, the partners announced that they would be spending about \$26 million (C\$38 million) to expand the processing plant's capacity to 1.7 million mt/y to produce 8.2 million ct in 2004 under a revised mine plan. Rio Tinto funded its share of the initial capital costs from internal sources, while Aber secured its share of funding through stock sales, a \$230 million loan facility, and the sale of its 32.2% interest in the Snap Lake project to De Beers for \$121 million in February 2001. Aber is planning to use C\$71.6 million in net proceeds from a February 2004 equity financing and a new \$100 million secured term bank loan to refinance its existing project loan facility. Tiffany & Co, which acquired 14.3% of Aber's stock for C\$104 million in September 1999, has the right to purchase a minimum of \$50 million in rough diamonds annually from Aber's 40% share of Diavik's production over ten years.

In September 2003, Diavik's total proven and probable mineable reserves contained in four kimberlite deposits that lie beneath the waters of a large lake were reported at 27.1 million mt grading 3.946 ct/mt (containing 107 million ct) at an average expected value of about \$62/ct. About 68% of the value of this reserve is contained in the A154-South deposit (11.7 million mt grading 5.2 ct/mt at \$79/ct), which will be mined first. During the initial ten years of the project's 20-year life, one open pit will access both the A-154 South and A-154 North pipes, which are surrounded by a water-retention dike. The A-418 pit is currently scheduled to come onstream in 2010 and continue operating to 2022, and the A-21 pit is expected to operate between 2013 and 2019. Underground mine development is expected for sections of the A-154 South and A-418 deposits in the later years of the project. Additional capital expenditures estimated at about \$206.4 million will be necessary to construct dikes around the A-418 and A-21 deposits and to access underground mining reserves.

Official production at the **Koidu** mine in Sierra Leone began in January 2004 after a 50-mt/hour processing plant was commissioned in December. Vancouver-based DiamondWorks is the

Table 1: Recent Startups And Late-Stage Diamond Development Projects

Project Location	Owner(s)	Projected Startup	Reserves* or Resources** Grade Average Value (US\$)	Contained Ct In-Situ Value	Initial Capital Costs (US\$) Estimated Annual Production
RECENT STARTUPS					
DIAVIK Northwest Territories, Canada	Rio Tinto 60% Aber Diamond 40%	2003	27.1 million mt* 3.946 ct/mt \$62/ct	107 million ct \$6.3 billion	\$896 million 8.2 million ct/y
KOIDU Kono, Sierra Leone	DiamondWorks 40% Magma Diamond 40% Gov't of Sierra Leone 10% Local Investors 10%	2004	7.6 million mt* 0.352 ct/mt \$223/ct	2.7 million ct \$602 million	\$14.5 million N/A
LATE-STAGE DEVELOPMENT PROJECTS					
LOMONOSOV Arkhangelsk, Russia	Arosa 92.48% Arkhangelsk 7.52%	2004	280 million mt** N/A N/A	N/A \$12 billion	\$76 million (Initial) \$425 million (Total) N/A
LIQHOBONG Satellite Pipe, Lesotho	Minegem 65% Industrial Development 35%	2004	1.4 million mt* 0.68 ct/mt \$41/ct	942,000 ct \$38.6 million	\$7.5 million 290,000 ct/y
LUO Lunda Norte, Angola	Arosa 20% Espirito Santo 25% Endiama Odebrcht Ascorp Daumonty Financing	2005	N/A N/A N/A	N/A N/A	\$30 million N/A
CAMAFUCA Lunda Norte, Angola	SouthernEra 18% Welox 33% Endiama 20% Mineira do Lucapa 15%	2005	6.1 million cu m* 0.18 ct/cu m \$117/ct	1.1 million ct \$128.7 million	\$16 million 220,000 ct/y
GUANIAMO Bolivar, Venezuela	Canteras El Toco (30% Teck Cominco) 100%	2005	45 million mt** 1.5 ct/mt N/A	67.5 million ct N/A	\$150 million 2.5 million ct/y
JERICHO Nunavut, Canada	Tahera 100%	2005-06	2.6 million mt* 1.198 ct/mt \$92/ct	3.1 million ct \$285 million	\$45.8 million 375,000 ct/y
SNAP LAKE Northwest Territories, Canada	De Beers 100%	2006-07	22.8 million mt** 1.46 ct/mt \$76/ct	33.3 million ct \$2.5 billion	\$320 million 1.5 million ct/y
VICTOR Ontario, Canada	De Beers 100%	2007	25 million mt** 0.38 ct/mt \$66/ct	9.5 million ct \$627 million	N/A N/A
GAHCHO KUE Northwest Territories, Canada	De Beers 60% Mountain Province 36% Camphor Ventures 4%	N/A	25 million mt** 1.67 ct/mt \$56/ct	41.7 million ct \$2.3 billion N/A	\$350 million N/A

Table 1: Recent Startups And Late-Stage Diamond Development Projects (cont'd)

Project Location	Owner(s)	Projected Startup	Reserves* or Resources** Average Value (US\$)	Contained Ct In-Situ Value	Initial Capital Costs (US\$) Estimated Annual Production
SEPPELT Western Australia, Australia	Striker Resources 100%	N/A	N/A	N/A	N/A
COPETON New South Wales, Australia	Cluff Resources Pacific 100%	N/A	N/A	N/A	N/A
FORT A LA CORNE Saskatchewan, Canada	De Beers 42.25% Kensington 42.25% Cameco 5.5% UEM 10%	N/A	N/A	N/A	N/A
STAR KIMBERLITE Saskatchewan, Canada	Shore Gold 100%	N/A	N/A	N/A	N/A

* Proven and probable mineable reserves.

** Resource status only.

operator of the mine and currently holds a 40% interest, with Magma Diamond Resources holding 40% and the government of Sierra Leone retaining a 10% carried interest. Later this year, local investors will be encouraged to purchase the remaining 10% stake. Capital costs to revive the Koidu project (which had been shut down for several years by civil warfare in Sierra Leone) were estimated at \$14.5 million, including repairing the damaged processing plant, replacing most of the mining and earthmoving equipment, and dewatering the Number 2 kimberlite pipe, which was flooded to surface. The smaller Number 1 pipe was not flooded to the same extent, nor was the fissure that runs between the pipes. Proven and probable reserves are reported at 7.6 million mt grading 0.352 ct/mt (about 2.7 million contained ct). A drilling program completed in October 2003 indicated two main types of kimberlite breccia—macrocrystic, which is associated with dike zones, and tuffistic, which forms the main body of the two pipes. January production from the Number 1 pipe totaled 8,099 ct from 12,480 mt of ore treated, giving a recovered grade of 0.65 ct/mt. The average stone size was 0.31 ct, and the average price received for the first diamonds sale was \$223/ct.

Nine projects expected to come onstream in the next few years

Preproduction work is under way at the *Lomonosov* open pit project in the Arkhangelsk region of northwestern Russia, where prestripping began at the most southerly of the property's six

kimberlite pipes (Arkhangelskaya) in September 2003. Russia-based Alrosa, which holds 92.48% of Lomonosov after a series of stock purchases in the operating company Severalmaz, is now looking for a foreign partner to help fund the \$400-\$450 million in capital costs necessary to place the field fully onstream, with BHP Billiton and Rio Tinto reportedly expressing preliminary interest. The Arkhangelsk Regional Administration will retain a 7.52% stake. Severalmaz has announced plans to float at least 5% of its shares on the London Stock Exchange in April 2004 and is also obtaining a \$100 million loan to finance first-phase construction. Alrosa, which spent \$23 million for development activities at Lomonosov in 2003, has increased this year's budget to \$53 million and plans to begin commercial diamond production from a 1-million-mt/y processing plant in late 2004, with large-scale production scheduled to begin in 2006. At full output, the Lomonosov field is expected to yield about \$200 million worth of rough diamonds annually by processing 5.6 million mt/y of ore. Tonnage and grade figures have not been released, but the six kimberlite pipes at Lomonosov are believed to contain a recoverable \$12 billion in diamonds, with about 60% gem or near-gem quality. Mine life is estimated at about 50 years.

In early November 2003, European Diamonds, which holds 93.2% of operator Minegem, reported that it intends to move forward to develop the *Liqhobong Satellite Pipe* in Lesotho (Minegem 65%, South Africa's Industrial Development Corp 35%) using a \$10 million credit facility from London-based Rowland Capital. Bateman Engineering and SRK Consulting completed a feasibility study at the project in August 2001 that confirmed the viability of building a new open pit mine to access the Satellite Pipe. Possible mining of the Main Pipe would need further study and a larger capital investment. Probable Liqhobong Satellite reserves covered by the mine plan total about 1.4 million mt grading 0.68 ct/mt (containing 942,000 ct), with values averaging \$41/ct. The proposed mining rate is 420,000 mt/y to produce about 290,000 ct annually. Capital costs are estimated at \$7.5 million, including \$3.17 million for a 60-mt/hour processing plant. Construction is expected to take seven months to complete.

At the *Luo* project in Angola's Lunda Norte province, a feasibility study of the Camachia and Camajicu kimberlite pipes was completed in December 2003. Alrosa holds 20% of the project, and the Portuguese financial-industrial group Espirito Santo holds 25%. Other stakeholders (percent unspecified) include state-owned Endiama, Brazil-based Odebrecht Mining Services, Ascorp, and Daumonty Financing, most of which are already partners with Alrosa at the successful Catoca diamond mine in Angola's Lunda Sul province, where a major expansion is currently under way. Alrosa's partners have agreed to provide the financing for Luo's \$30

million capital cost. The initial processing rate is expected to be about 1 million mt/y, with either an expansion or another mill also planned for the site. Reserve figures have not been reported.

Another kimberlite project in Angola, *Camafuca* in Lunda Norte province, has been held up for more than 18 months as the project operator SouthernEra Resources (18% carried interest) and the project's financier and member of the Leviev group, Hong Kong-based Welox (33%), wait to receive final authorization from the government for the formation of the proposed operating company. Other stakeholders include state-owned Endiama (20%) and Mineira do Lucapa (15%). SouthernEra expected to be able to begin mining nine months after receiving all necessary regulatory approvals; its original target was to start production in 2003. Capital costs for phase-one development are estimated at \$16 million and will be financed by Welox. Although Camafuca is a kimberlite pipe deposit, the mining method will have alluvial characteristics because the Chicapa River runs across the pipe's surface. Initial plans call for one marine-type cutting-head dredge to mine the higher grade, higher value southeastern portion of the pipe, which hosts 6.1 million cubic m of mineable resources averaging 0.18 ct/cubic m (containing 1.1 million ct) valued at \$117/ct. Kimberlite material is expected to be transported by a slurry pipeline from the dredge to a land-based DMS plant. If phase one is successful, up to three additional dredges may be added, with each dredge capable of producing at least 220,000 ct/y. Operating costs are expected to be about \$55/ct.

At the *Guaniamo* project in Venezuela's Bolivar state, operating company Canteras El Toco (held 30% by Teck Cominco) expected to start test mining of kimberlite in mid-February 2004. The material will be coming from the project's San Antonio concession as part of a \$2 million pilot study to confirm the grade and quality of the diamonds, with about 50,000 ct expected to be recovered at the project over four months. San Antonio kimberlite resources are estimated at 45 million mt grading 1.5 ct/mt (containing 67.5 million ct). In September 2003, the Venezuelan Ministry of Energy and Mines revoked the mining titles to two other concessions representing about 25% of the project area, citing failure to comply with required terms. Canteras is contesting the decision. In the meantime, a Teck Cominco spokesman said that the disputed concessions are on the fringe of the known deposit and would not affect mine development. A feasibility study completed in January 2002 placed capital costs at about \$150 million and envisioned both open pit and underground mining, a 2-million-mt/y processing rate, and diamond production of between 2 and 3 million ct/y. Canteras plans a staged development and is targeting a 150,000-ct/y initial production rate to be built up to full production over two to three years.

Alluvial diamonds are present on the property, but the mining operation is targeting a group of 1-to-5-meter-thick horizontal sills.

Vancouver-based Tahera Corp is moving forward with the permitting process at its wholly owned **Jericho** project in Canada's Nunavut Territory. In February 2004, the company reported that the EIS, which was completed in early 2003, had been approved by the Nunavut Impact Review Board and is now being put forward for federal approval. Tahera hopes to complete the permitting and financing phases for Jericho in 2004, with production to follow as early as 2005. The feasibility study for the relatively small, land-based Jericho pipe was updated by WWW International Diamond Consultants in June 2003. Capital costs are estimated at about \$45.8 million (C\$65.4 million), including C\$52.7 million for open pit development and a 330,000-mt/y processing plant, C\$8.7 million for subsequent underground development, sustaining capital of C\$2.8 million, and a C\$1.15 million contingency fund. The mine plan entails seasonal open pit mining of 2 million mt of kimberlite grading 1.23 ct/mt for the first four years, followed by two years of underground mining of about 615,000 mt grading 1.09 ct/mt from the central lobe. A final two years of operation would involve only stockpiled ore. Updated proven and probable mineable reserves are 2.6 million mt grading 1.198 ct/mt (containing 3.1 million ct), with an average value of \$92/ct. Tahera continues to explore the property for additional kimberlites, and its 2003 program discovered a diamondiferous kimberlite dike 9 km south of the Jericho pipe. The extent of this dike will be the main target of the 2004 exploration program.

De Beers is encountering regulatory frustrations at its wholly owned **Snap Lake** project in Canada's Northwest Territories, where land, water, and operating permits are now expected to be received during the March 2004 quarter. The delay will push back the start of construction to 2005 instead of this year, as the winter ice-road window will close too soon for De Beers to bring in supplies and equipment. Final environmental approvals were granted in July 2003. De Beers is planning to spend \$320 million to develop a 1.1-million-mt/y underground diamond mine that will have ramp access and a 22-year life. The project is expected to yield 1.5 million ct annually, with full production targeted for 2007. By opting for an underground-only operation using room-and-pillar mining, De Beers has limited the surface footprint of the mine to 2.5 sq km on the northwestern peninsula of Snap Lake. Surface facilities will include a kimberlite processing plant, materials and ore storage areas, water and sewage treatment plants, water management pond, fuel storage, power-generating plant, airstrip, and a camp complex for up to 350 people.

De Beers acquired the Snap Lake project at the feasibility stage between November 2000 and April 2001 for a total of \$323.8 million in three separate transactions, including a royalty buyout. The project is based on a hypabyssal kimberlite dike that subcrops on a narrow peninsula and gently dips subhorizontally beneath the lake over a confirmed distance greater than 3.2 km north-south and 3.1 km east-west. The dike is generally 2-3 meters thick but narrows to 1.3 meters at its eastern margin. Indicated resources included in the mine plan total 22.8 million mt grading 1.46 ct/mt (containing 33.3 million ct), with a value of about \$76/ct as of August 2003, down from earlier estimates of 42 million ct valued at \$90/ct. Snap Lake will be De Beers's first mine development outside southern Africa.

In February 2004, De Beers announced that it might also start construction in 2005 at what will be its second Canadian mine, the wholly owned *Victor* project located along the Attawapiskat River in the James Bay Lowlands of northern Ontario. De Beers discovered kimberlites on the Victor property in 1988 after identifying the prospective area by stream-sediment sampling. At least 18 kimberlite bodies were discovered, and after a three-year bulk-sampling program, the company focused on the Victor Main and Victor SW kimberlites as the most promising candidates for open pit mine development. Technical challenges associated with the project include the remoteness of the site, difficult bog and muskeg terrain, and a significant groundwater component in the surrounding country rock and overburden. As of August 2003, mineable resources stood at 25 million mt grading 0.38 ct/mt (containing 9.5 million ct), with an average value of \$66/ct. The resource is calculated to a depth of 200 m, and there is potential for an additional 3 million mt. A full feasibility study was conducted in 2003, and De Beers has been working with the Attawapiskat First Nation and with provincial and federal authorities on the permitting process for more than 18 months.

In June 2003, De Beers decided to postpone a prefeasibility decision at the *Gahcho Kue* project in Canada's Northwest Territories (De Beers 60%, Mountain Province Diamonds 36%, Camphor Ventures 4%), stating that it would wait until 2004 to update its desktop study again as the expected internal rate of return for the project was still well below De Beers's hurdle rate. Work resumed this year after De Beers approved a C\$25 million budget for an in-depth study of the Hearne, 5034, and Tuzo kimberlites on Gahcho Kue's AK claims. The process plant, recovery, and infrastructure designs will not be taken to the full feasibility level until the project is closer to receiving permits. To date, the most favored option for Gahcho Kue's development would be open pit mining of the Hearne and 5034 pipes, along with a high-grade zone within the top 140 m of the Tuzo pipe. This scenario would involve mining about 25 million mt of indicated and

inferred resources mainly grading 1.67 ct/mt (containing 41.7 million ct), with values averaging about \$56/ct. The resources are calculated to a depth of 290 m below the surface of Kennady Lake. Preliminary estimates suggest that capital costs would be at least \$350 million.

Exploration work is also continuing, and Mountain Province reports that recent kimberlite discoveries in the Kelvin-Faraday area of the property have yielded a “large number” of micro and macro diamonds.

At least four earlier stage kimberlite projects conducting advanced bulk sampling

At Perth-based Striker Resources’s wholly owned *Seppelt* property in the Kimberley district of Western Australia, drilling, surface excavation, and bulk sampling of the Seppelt 2 pipe had provided sufficient information by the end of January 2004 to allow the decision to progress to a trial-mining stage. This work is expected to start as soon as regulatory approvals are received. A 30-mt/hour pilot plant will treat about 20,000 mt of kimberlite and infill material and is expected to recover more than 15,000 ct of diamonds, which should cover the cost of the program. In 2003, a bulk sample consisting of 800 mt of kimberlite and 3,124 mt of gravel and infill resulted in the recovery of 3,114 ct, and in November 2003, Striker reported an inferred resource at Seppelt 2 containing 400,000 ct. Striker has also been drilling and bulk sampling at the Seppelt 1 and Seppelt 5 pipes. In October 2003, Seppelt 1 resources were reported at 1.7 million mt grading 0.43 ct/mt (containing 731,000 ct) to a depth of 140 m for the North lobe and 110 m for the South lobe. A 330-kg sample of weathered kimberlite from Seppelt 5 returned 89 macro and 549 micro diamonds, implying a grade of more than 2 ct/mt. November 2003 trenching at Seppelt 5 exposed a kimberlite dike over a distance of about 600 m, and a 50-mt bulk sample of mixed kimberlite and infill gravel was collected for evaluation.

Sydney-based Cluff Resources Pacific is sinking an exploration and trial mining shaft at its wholly owned *Copeton* diamond project in northern New South Wales. The 2-x-2.5-m shaft is expected to reach a depth of 50 m to provide access to a 200,000-mt inferred resource grading 2.5 ct/mt in the Davis block of the project’s Mount Ross area. Cluff has been recovering diamonds from bulk sampling at various locations on the Copeton property during the past several years. In December 1999, inferred resources at Mount Ross were reported at 1 million mt grading 0.5 ct/mt.

Although no resource figures have ever been published, De Beers (42.25%) and its partners Kensington Resources (42.25%), Cameco (5.5%), and UEM Inc (a carried 10% interest) have been drilling and bulk sampling the most prospective of about 150 kimberlite bodies found at

their *Fort a la Corne* property in Saskatchewan, Canada, since 1988. Ongoing work includes a C\$3 million 45-hole drilling program approved in September 2003 for the 140/141, 150, 148, and 122 kimberlites, with large-scale bulk sampling to follow. In late October 2003, Kensington reported that five geological subdivisions had been identified in the 140/141 kimberlite (perhaps the most promising to date), including a significantly higher grade enriched zone. Further delineation will be necessary to estimate potential tonnage.

In late January 2004, Saskatoon-based Shore Gold was commissioning a 10-mt/hour pilot processing plant at its wholly owned *Star Kimberlite* project in the Fort a la Corne district of Saskatchewan. Ore for the C\$8 million bulk-sampling program is being accessed by a 4.5-m-diameter vertical shaft and by horizontal drifting currently at 175 m below surface. The shaft is expected to end 250 m below surface, allowing Shore to recover an expected 3,000 to 5,000 ct of diamonds from up to 25,000 mt of kimberlite. Preliminary estimates of continuous diamond-bearing kimberlite at Star total about 400 million mt. ♦