

## THE MINERAL INDUSTRY OF

# NAMIBIA

By George J. Coakley

The Namibia is located on the southwestern coast of Africa between South Africa and Angola. The 825,418-square-kilometer country had an estimated population of 1.8 million in 2001 and a gross domestic product (GDP) per capita of about \$4,500<sup>1</sup> based on purchasing power parity. In 2001, the mineral industry of Namibia provided about 69% of exports and 20% of the country's GDP. Namibia had a negative merchandise trade balance of \$185 million in 2001. Total exports were valued at \$1,047.7 million, of which diamonds accounted for \$530.4 million, gold for \$24.4 million, zinc for \$15.8 million, and other minerals, primarily uranium, for \$155 million. Total merchandise imports were valued at \$1,232.8 million, of which fuel and energy products accounted for \$95 million. Diamonds remained the most important sector of the mining industry, followed by uranium, for which Namibia ranked as the world's fourth largest producer. Namibia was also the second largest producer of salt in Africa. Other important mineral products included copper, dimension stone (granite and marble), fluorite, gold, lead, silver, and zinc (Bank of Namibia, 2002<sup>2</sup>; Central Intelligence Agency, 2002§).

### Commodity Review

#### Metals

**Copper.**—Ongopolo Mining and Processing Limited, a partnership between former managers of Tsumeb Copper Limited (TCL) and the National Union of Namibian Workers (NUMW) continued operations of the Tsumeb copper smelter and the Khusib Springs, the Kombat, and the Otjihase copper-lead-silver mines during 2001. Ongopolo ramped up to full production during its first full year of operations following the reopening of the old TCL properties in March 2000. Production of copper contained in concentrates increased 20% to 12,392 metric tons (t) in 2001 and that of blister copper by five-fold to 27,015 t, which includes blister copper production from imported toll concentrates. In June 2001, Ongopolo signed a new wage and benefit agreement with NUMW, including a new bonus system as part of an overall agreement to reduce "a serious absenteeism rate" at the company (Ongopolo Mining & Processing Limited, 2001§). In January 2002, Ongopolo signed an agreement with ZincOx Resources Plc of the United Kingdom to evaluate the potential for exploiting the old 2.9-million-metric-ton (Mt) Tsumeb slag dumps that contain 9.03% zinc, 2.05% lead, 183-263 parts per million (ppm) germanium,

approximately 200 ppm gallium, and approximately 170 ppm indium. The companies would use the existing Ausmelt furnace at Tsumeb to reduce the slag to a zinc-rich oxide dust. ZincOx can earn a 50.1% interest in the project over the next 18 months by providing metallurgical expertise, completing a feasibility study, and making a payment of \$2.2 million to Ongopolo. Ongopolo will earn its 49.9% interest in the new company by contributing the slag dumps, the Ausmelt furnace, and infrastructure development (Ongopolo Mining & Processing Limited, 2002a§; ZincOx Resources Plc, 2002§). Ongopolo reported remaining ore reserves at Khusib Springs at 105 Mt at a grade of 3.58% copper, at Kombat of 8.4 Mt at a grade of 2.49% copper, and at Otjihase of 10.3 Mt at a grade of 1.82% copper. In the mineral resource category, the company reported an additional 27 Mt of ore at Kombat, 30 Mt of ore at Otjihase, and 500,000 t of ore at Khusib Springs (Ongopolo Mining & Processing Limited, 2002b§).

**Lead and Zinc.**—Construction of Skorpion Zinc's (owned 100% by Anglo American plc) \$454 million zinc mine and refinery project progressed during 2001 with commissioning expected by yearend 2002. The deposit is located approximately 85 kilometers (km) northeast of Oranjemund and 25 km north of Rosh Pinah. The open pit mine will be based on proved reserves of 11.8 Mt at a grade of 11.33% zinc and probable reserves of 9.8 Mt at a grade of 9.66% zinc (Anglo American plc, 2002). The unusual zinc silicate and carbonate mineralogy will be treated by a direct acid leach of the ore, solid liquid separation, a unique zinc solvent extraction and electrowinning to produce special high-grade zinc. Skorpion was expected to produce 150,000 metric tons per year (t/yr) of zinc during a mine life of at least 15 years.

**Gold.**—AngloGold (Namibia) Pty. Ltd. held a 100% interest in the Navachab gold mine near Karibib. Navachab had the capacity to treat 1.32 million metric tons per year (Mt/yr) of ore. The Navachab deposit occurs within the Damara greenstone belt, hosted by green schist-amphibolite facies, marbles, and volcanoclastics. Gold mineralization is concentrated in a sheeted vein set and in a replacement skarn body. In 2001, production was 2,694 kilograms (kg), compared with 2,399 kg in 2000. The increase was attributed to a higher yield of gold of 2.04 g/t in 2001 from 1.82 g/t in 2000. As of yearend 2001, mineral reserves were reported at 4.5 Mt at a grade of 1.65 g/t of gold and mineral resources at 81.6 Mt at a grade of 1.06 g/t of gold. During 2001, AngloGold was reevaluating the potential of extending the mine life at current production levels from 2005 to 2013 (AngloGold Limited, 2002§).

**Tantalum.**—Reefton Mining N.L. of Australia held seven exploration licenses in what they referred to as the Sandamap-

<sup>1</sup>Where necessary, values have been converted from Namibian dollars (N\$) to U.S. dollars at the rate of N\$8.496=US\$1.00 for 2001, and N\$6.826=US\$1.00 for 2000.

<sup>2</sup>References that include a section twist (§) are found in the Internet References Cited section.

Erongo base metals, gold, tantalite project in northwest Namibia. The concessions included several pegmatite zones previously mined for tantalite, tin, and tungsten. Reefon conducted soil sampling and 60 reverse circulation exploration drill holes over several tantalum-bearing pegmatites during 2001 and was seeking a joint-venture partner to continue work in the area (Reefon Mining N.L., 2002§).

**Uranium.**—Rössing Uranium Ltd., which was owned by Rio Tinto plc of the United Kingdom (68.6%), was the fifth largest producing uranium mine in the world, contributing 2,643 t of uranium oxide or 6.3% of world supply in 2001 (Uranium Information Center, 2002§). Production declined by 17% in 2001 compared with that of 2000 as ore processed dropped to 9.08 Mt from 11.04 Mt. One of the largest open pit mines in the world, moving over 25 Mt/yr of ore and waste material, Rössing reported reserves in 2002 sufficient to maintain the mine life for an additional 16 years. The company completed its N\$267 million (\$31.4 million in 2000 U.S. dollars) 5-year investment to reduce cost and increase productivity, with annual of N\$150 million (\$17.6 million) realized in 2001. Cash incentive bonuses (\$2 million in 2001) for its 790 employees were built into the cost reduction program. Following a market study, Rössing mothballed its sulfuric acid plant in 2000 and began using cheaper acid imported through Walvis Bay (Rössing Uranium Ltd., 2002§).

### **Industrial Minerals**

**Diamond.**—Exploration and development of new diamond fields, particularly offshore, remained active in 2001 and demonstrated the potential to expand this \$0.5 billion sector of the Namibian mineral economy. Diamonds accounted for nearly 51% of total exports in 2001, while production of diamonds decreased by 4% to 1.49 million carats, which was slightly more than one-half from marine sources. Namdeb Diamond Corp. (Pty.) Ltd. (Namdeb), established in 1994 as a 50-50 joint venture between De Beers Centenary AG and the Namibian Government, was the largest diamond producer. During 2001, Namdeb produced 1,384,704 carats, of which 39% came from offshore marine mining. Production during 2001, came from four onshore and one marine operations. Mining Area 1, which was nearing the end of its economic life treated 17.8 Mt of materials yielding 618,108 carats; the Orange River mines at Daberas treated 2.7 Mt of materials yielding 30,731 carats; the Elizabeth Bay Mine treated 1.97 Mt of materials yielding 93,891 carats; beach and marine contractors, many of whom were Namibian empowerment groups recovered 99,057 carats; and marine mining operations in the Atlantic 1 license area, conducted by De Beers Marine Namibia (Debmarine), recovered 537,389 carats. Debmarine, which was controlled by De Beers (70%) and Namdeb (30%) maintained a fleet of four mining vessels and two prospecting vessels. As of yearend 2000, Namdeb reported remaining resources and reserves (land plus marine) as follows: probable reserves at 59.4 Mt at a grade of 1.5 carats per hundred metric tons (cpht), indicated total resources of 73.6 Mt at a grade of 2.3 cpht, and inferred total resources of 301.7 Mt at a grade of 1.5 cpht. During 2001, Namgen Diamond Manufacturing Co. (Pty.) Ltd.

(a subsidiary of Namdeb) produced approximately 30,000 polished stones, valued at \$5.59 million, at its cutting and polishing plant at Okahandja, about 70 km north of Windhoek, 95% of which was exported (Namdeb Diamond Corp. (Pty.) Ltd., 2002, undated§).

Namibian Minerals Corp. (Namco), a United Kingdom-based firm listed on the Toronto and Namibian stock exchanges, mined diamonds from its offshore Koichab prospect in Luderitz Bay. It owned three former Ocean Diamond Mining airlift mining vessels, the *Ivan Prinsep*, the *MV Namibian Gem* and the *Oceandia*, and two Namco mining vessels, *MV Kovambo* and *MV Ya Toivo*, supporting the Namco-developed underwater NamSSol I and NamSSol II (Nam 2) seabed mine-crawlers with a combined capacity of around 400,000 carats per year. Namco, the second largest diamond producer after Namdeb, struggled to continue operations during 2001 after its NamSSol I mining tool was damaged in an underwater landslide in January 2001 and its support vessel, *MV Kovambo* was placed on care and maintenance. The resulting loss of cash flow led to an overall loss of \$56 million for the year and defaults on its obligations to lenders. Several of Namco's Southern African subsidiaries were placed in provisional liquidation in February 2001. Despite efforts at debt rescheduling and a capital infusion by LL Mining Corp., a member of the Leviev Group of Israel, the company struggled to keep its mining fleet operating for only portions of the year. LL Mining invested \$15 million in return for exclusive marketing rights to Namco diamond production. Production for 2001 declined to 85,589 carats at an average sales value of \$140 per carat compared with 221,000 carats at an average sales value of \$176 per carat in 2000 (Namibian Minerals Corp., 2002§).

The third and only other major diamond producer Diamond Fields International Ltd. (DFI) of Canada received a 15-year mining license from the Government in February 2001 and began mining operations at its Marshall Fork and Diaz 12 marine deposits with its joint-venture partner the Trans Hex Group Ltd. in May. DFI contributed the mining license, and Trans Hex two air-lift mining vessels to the joint venture (Diamond Fields International Ltd., 2001§). For the financial year ending June 30, 2002, the joint venture mined 35,967 carats of diamonds, including one 17.42 carat stone. Sales of 35,436 carats earned \$2.9 million for an average of \$82 per carat. Based on DFI quarterly reports, production from the Marshall Fork area for the calendar year 2001, beginning with startup on May 24 was 16,470 carats. In July 2002, Trans Hex withdrew its support and mining vessels from the joint venture triggering a \$19 million litigation by DFI. DFI committed to operating the license areas alone and planned on buying, equipping, and commissioning one mining vessel by August 2003 and another in 2004 (Diamond Fields International Ltd. 2002§).

Other companies active in diamond exploration during 2000 included the Australian companies, Mount Burgess Gold Mining Co. NL and Kimberlite Resources Pty. Ltd. who continued their geophysical and heavy-mineral concentrate sampling exploration for diamond-bearing source rock kimberlites in the Tsumkwe region in northeast Namibia near the Botswana border. In December 2001, Mount Burgess announced discovery of the Gura 1 kimberlite and that it will

continue exploration in the area during 2002 (Mount Burgess Gold Mining Co. NL, 2002§). Reefion Mining also held three exploration licenses for diamonds covering 200 km of coastline beaches along the Skeleton Coast. During 2001, Afri-Can Marine Minerals Corp. of Canada continued geophysical exploration and initial sampling on 28 concessions measuring 26,500 square kilometers off the coast of Namibia in two main areas, the Northern Blocks, northwest of Hottentot Bay and Southern Concessions (Namibian Gemstones Block) southwest of Elizabeth Bay (Afri-Can Marine Minerals Corp., 2002§).

**Fluorspar.**—Okorusu Fluorspar (Pty.) Ltd. was operated as a captive mine to supply fluorspar to its parent company Solvay AG of Germany. Following completion of its major expansion project in 2000, production during 2001 increased by 23% to 81,245 t of fluorspar. The company continued exploration to define the resources at its Okorusu Mine and was negotiating to obtain exploration and development rights to the nearby Omburu fluorspar prospect (Chamber of Mines of Namibia, 2002).

### **Mineral Fuels**

Namibia was import dependent for most of its energy needs with no domestic production of coal, gas, or oil. The hydroelectric dam at Ruacana provides 249 megawatts of generating capacity and an additional 600 megawatt hours were imported from South Africa, under arrangements with Eskom and the South African Power Pool. The country's hopes for meeting future energy requirements rested on development of its hydroelectric potential and of extensive known offshore gas reserves. Shell Exploration and Production Namibia B.V. (75%), Texaco Namibia Resources (12.5%), and Energy Africa Ltd. (12.5%) held the rights to the offshore Kudu gasfield. The Government and Shell have been examining the possibility of developing this resource for over 6 years, but have been unable to work out a satisfactory combination of financing and supporting projects to justify the multibillion dollar investment required for its development. During 2001 and early 2002, Shell planned to drill up to four appraisal wells to try and establish recoverable reserves of 140 billion to 225 billion cubic meters of natural gas needed to justify a development project. It was also conducting a prefeasibility study on building the world's first floating liquified natural gas (FLNG) barge. The FLNG barge would be able to produce 4.8 Mt/yr of liquified natural gas and to store 240,000 cubic meters of liquid cargo. An investment decision was expected by late 2002 (The Namibia Economist, 2002§).

### **Outlook**

The long tradition of mining in Namibia is being given a substantial renewal, with the reopening of the Tsumeb mines and smelter in 2000, the opening of the new Skorpion zinc project in late 2002, and the continued success of offshore diamond exploration and development. These successes are encouraging further exploration for base metals and diamonds. Although offshore diamond production has experienced some setbacks in 2001 and early 2002 owing to technical or business

reasons, the diamond potential remains strong. Such new mine developments, along with the potential for new value-added manufacturing, metal-processing, and gemstone cutting and polishing industries, are expected to keep the mineral sector a central part of the economy of Namibia for the foreseeable future. The Government's ability to attract new investment to harness the natural gas and hydroelectric power potential of the Kunene River, will strongly influence future economic growth. In the longer run, greater development of regional transportation infrastructure in northern Namibia, stimulated by the completion of the recent Trans Kalahari and Trans Caprivi Highways, could see Walvis Bay become a significant export route for new mineral developments in Angola and in the landlocked countries of Botswana and Zambia. With a climate that is among the driest in the world, Namibia will continue to deal with the lack of water resources as a constraint on development.

### **References Cited**

- Anglo American plc, 2002, Reserves and resources, in Annual report 2001: London, England, Anglo American plc, p. 64.
- Chamber of Mines of Namibia, 2002, Annual report of the Chamber of Mines of Namibia for 2001: Chamber of Mines of Namibia, 36 p.
- Namdeb Diamond Corp. (Pty.) Ltd., 2002, Review of operations—Annual review 2001: Windhoek, Namibia, Namdeb Diamond Corp. (Pty.) Ltd., 36 p.

### **Internet References Cited**

- Afri-Can Marine Minerals Corp., 2002, Annual report 2002, accessed May 28, 2003, at URL <http://www.Afri-CanMarine.com/financials.shtml>.
- AngloGold Limited, 2002, East and West Africa—Navachab, Operational Review, accessed January 2, 2003, at URL <http://anglogold.co.za>.
- Bank of Namibia, 2002, Table V.1 Current account (a), Annual Report 2001, accessed January 22, 2003, at URL [http://www.bon.com.na/annual\\_report.htm](http://www.bon.com.na/annual_report.htm).
- Central Intelligence Agency, 2002, Namibia, World Factbook 2002, accessed December 5, 2002, at URL <http://www.odci.gov/cia/publications/Factbook/geos/wa.html#Econ>.
- Diamond Fields International Ltd., 2001 (March 6), Diamond Fields and Trans Hex sign joint venture agreement, Press Release, accessed August 8, 2001, at URL <http://www.diamondfields.com/s/NewsReleases.asp?ReportID=20327>.
- Diamond Fields International Ltd., 2002, Financial reports Auditors' report and consolidated financial statements—June 30, 2002 and 2001, June 30, 2002 annual report, accessed January 7, 2003, at URL <http://www.diamondfields.com/s/Default.asp>.
- Mount Burgess Gold Mining Co. NL, 2002, Projects—Namibia—Tsumkwe diamond exploration, accessed August 8, 2002, at URL <http://www.mountburgess.com/Tsumkwe.html>.
- Namdeb Diamond Corp. (Pty.) Ltd., [undated], Namdeb—Operations—Production information, accessed August 6, 2002, at URL <http://www.namdeb.com/operations/opsProdFigures2000.asp>.
- Namibia Economist, 2002 (February 8), FLNG barge to Kudu, accessed January 7, 2003, at URL <http://www.economist.com.na/2002/8feb/02-08-02.htm>.
- Namibian Minerals Corp., 2002 (March 28), Namibian Minerals Corporation announces fourth quarter and full year 2001 results, Press Release, accessed January 7, 2003, at URL <http://www.newswire.ca/releases/March2002/28/c5596.html>.
- Ongopolo Mining & Processing Limited, 2001 (June 20), Agreement lays foundation for the future, Press Release, accessed July 7, 2001, at URL [http://www.ongopolo.com.na/html/news/story\\_1.htm](http://www.ongopolo.com.na/html/news/story_1.htm).
- Ongopolo Mining & Processing Limited, 2002a (January 8), Slag heap bonanza for Ongopolo, press release, accessed February 9, 2002, at URL [http://www.ongopolo.com.na/html/news/story\\_5.htm](http://www.ongopolo.com.na/html/news/story_5.htm).
- Ongopolo Mining & Processing Limited, 2002b, About us—Reserves, accessed November 20, 2002, at URL <http://www.ongopolo.com.na/html/about/reserves.htm>.

Reefton Mining N.L., 2002, Annual report for the financial year ending June 30, 2002, accessed December 8, 2002, at URL <http://www.reeftonmining.com.au>.  
Rössing Uranium Ltd., 2002, Operations overview, accessed August 5, 2002, at URL <http://www.rossing.com/operate.htm>.  
Uranium Information Center, 2002 (July), World uranium mining, Nuclear Issues Briefing Paper 41, accessed August 1, 2002, at URL <http://www.uic.com.au/nip41.htm>.  
ZincOx Resources Plc, 2002, Projects—Tsumeb slags, Namibia, accessed December 22, 2002, at URL <http://www.zincox.com/Tsumeb.htm>.

### **Major Sources of Information**

Association of Prospectors and Miners of Namibia  
P.O. Box 5059  
Windhoek, Namibia  
Telephone: (264) 61 34978  
Fax: (264) 61 32809  
The Chamber of Mines of Namibia  
P.O. Box 2895  
Windhoek, Namibia  
Telephone: (264) 61 237-925/926  
Fax: (264) 61 222-638  
E-mail: [chammin@mweb.com.na](mailto:chammin@mweb.com.na)  
Geological Survey of Namibia  
Private Bag 2168  
1 Aviation Road  
Windhoek, Namibia  
Telephone: (264) 61 208-5111

Fax: (264) 61 249-146  
Internet: <http://www.gsn.gov.na>  
Ministry of Mines and Energy  
Private Bag 13297  
1 Aviation Road  
Windhoek, Namibia  
Telephone: (264) 61 226-571 or 284-8111  
Fax: (264) 61 238-643  
Ministry of Trade and Industry  
Private Bag 13340  
Windhoek, Namibia  
Telephone: (264) 61 229-933  
Fax: (264) 61 220-227  
Government Internet site: <http://www.republicofnamibia.com>  
Namibia National Small Miners Association  
P.O. Box 7289  
Windhoek, Namibia  
Telephone: (264) 61 31088  
Fax: (264) 61 31188

### **Major Publications**

Chamber of Mines of Namibia, Annual Report.  
Geological Survey of Namibia, 1992. The Mineral Resources of Namibia, 598 p.

TABLE 1  
NAMIBIA: PRODUCTION OF MINERAL COMMODITIES 1/

(METRIC TONS UNLESS OTHERWISE SPECIFIED)

Commodity	1997	1998	1999	2000	2001
<b>METALS</b>					
Arsenic, white, 99% arsenic trioxide	1,297	175	--	--	914
Cadmium metal, refined	2	--	--	--	--
<b>Copper:</b>					
Mine output, concentrate (26% to 30% Cu):					
Gross weight	66,879	22,819	--	19,099 r/	44,332
Cu content	17,879	7,500 r/	--	5,620 r/e/	12,392
Metal, blister 2/	24,997	8,014	--	5,082 r/	27,015
Gold kilograms	2,417	1,882	2,005	2,417 r/	2,851
<b>Lead:</b>					
Mine output, concentrate:					
Gross weight	32,378	24,273	18,653	20,665 r/	26,182
Pb content	13,577	13,568	9,885	11,114	13,025
Metal, refined, primary 2/	1,530	236	--	--	--
<b>Manganese, mine output, concentrate (44% Mn):</b>					
Gross weight	39,671	--	--	--	--
Mn content	17,455	--	--	--	--
Silver, mine output, Ag content of concentrate kilograms	41,000	22,670	9,670	9,287 r/	12,679
Uranium, U <sub>3</sub> O <sub>8</sub> content of concentrate	3,775	3,257	3,171	3,201	2,640
<b>Zinc, mine output, concentrate (49% to 54% Zn):</b>					
Gross weight	72,816	78,617	70,620	73,535 r/	70,610
Zn content	39,658	42,274	35,140	39,126 r/	31,803
<b>INDUSTRIAL MINERALS</b>					
Cement e/	100,000	150,000	150,000	-- r/	--
<b>Diamond:</b>					
Gem e/ thousand carats	1,345 e/	1,394 e/	1,633	1,552 r/	1,490
Industrial e/ do.	71 e/	73 e/	--	--	--
Total do.	1,416	1,467	1,633	1,542	1,490
Fluorspar, acid grade (97% CaF <sub>2</sub> ) 3/	23,160	42,139	71,011	66,128	81,245
Gypsum	--	2,596	1,250	588	600 e/
<b>Lithium minerals:</b>					
Amblygonite	75	--	--	--	--
Lepidolite	275	--	--	--	--
Petalite	669	--	--	--	--
Total	1,019	500	--	--	--
Salt	492,780	507,361	503,479	576,000 r/	523,000
<b>Semiprecious stones:</b>					
Agate	175	161	95	96	95 e/
Amethyst kilograms	23	--	--	4,850	4,000 e/
Chrysocolla do.	--	900	--	--	--
Garnet do.	5	429	--	134	130 e/
Quartz, crystal e/	--	--	--	--	--
Pietersite	--	--	--	20	20 e/
Rose quartz	220	454	--	74	70 e/
Sodalite	1,598	--	429	457	450 e/
Tourmaline kilograms	53	--	--	390	400 e/
<b>Stone:</b>					
Dolomite	7,635	7,940	8,000 e/	--	--
Granite	6,675	6,665	5,866 r/	7,222	7,000 e/
Marble	13,743	9,020	11,221 r/ e/	24,426	20,000 e/
<b>Sulfur, pyrite concentrate:</b>					
Gross weight (49% to 51% S)	94,585	28,174	--	11,967	56,994
S content	46,476	12,855	--	5,704	28,606
Wollastonite	194	267	347	441	440 e/

e/ Estimated. r/ Revised. -- Zero.

1/ Table includes data available through November 30, 2002.

2/ Includes products of imported concentrate.

3/ Fluorspar production shown in wet metric tons; approximately 9% moisture.