

2008 Minerals Yearbook

TANZANIA

THE MINERAL INDUSTRY OF TANZANIA

By Thomas R. Yager

In 2008, Tanzania was the world's only producer of tanzanite. The country also played a significant role in the global production of gold, accounting for nearly 2% of the world's gold mine output. Other domestically significant mining and mineral processing operations included cement and diamond. Tanzania was not a globally significant consumer of minerals or mineral fuels (George, 2009).

Minerals in the National Economy

In 2007 (the latest year for which data were available), the manufacturing sector accounted for 7.8% of the gross domestic product, and mining and quarrying, 3.5%. The value of output in the mining sector grew by 10.7% in 2007 after increasing by 15.6% in 2006. Formal employment in the mining sector amounted to about 8,000; an estimated 500,000 artisanal miners produced colored gemstones, diamond, gold, and other commodities (Ministry of Finance and Economic Affairs, 2008, p. 11, 15).

Government Policies and Programs

The mining sector is regulated by the Mining Act of 1998, which, when enacted, simplified previous laws on mining and mineral trading. Tanzania is a signatory to the Kimberley Process Certification Scheme, which is a certification system established to reduce the trade in conflict diamond.

In November 2007, the Government appointed the Mining Review Contracts Committee to review all mining contracts. In July 2008, the Committee recommended that the Government own 10% of the shares of all mining companies in Tanzania and eliminate tax relief for fuel imports by gold mining companies. The Committee also recommended that mining royalties on metals be increased to 5% from 3%; rough diamond and colored gemstones, to 7% from 5%; and cut diamond and colored gemstones, to 3% from 0% (Mining Journal, 2008b).

The Government reported that an average of about 500 exploration licenses per month were issued in fiscal year 2007-08 compared with about 240 per month in fiscal year 2006-07. The increase was partially attributable to reforms in the licensing process (Mining Journal, 2008b).

Production

In 2008, the production of semimanufactured steel increased by 68%. Diamond production decreased by an estimated 36%; tanzanite and other colored gemstones, by an estimated 25%; copper, by an estimated 18%; and gold, by an estimated 10%.

Structure of the Mineral Industry

Tanzania's gold mines were privately owned; the Minjingu phosphate mines and the Nyanza salt mines were also owned by

private investors. The Government held minority interests in the privately owned Kiwira coal mine and the Williamson diamond mine. Artisanal miners accounted for most of the country's colored gemstone production; crushed stone, diamond, and gold were also produced by artisanal miners.

Mineral Trade

Gold exports increased in value to \$899 million in 2008 from \$788 million in 2007. In 2008, the share of gold in total exports was 34%; diamond, 1%; and colored gemstones, copper, silver, and other minerals combined, 2%. The Bank of Tanzania reported that imports of petroleum products increased in value to nearly \$1.8 billion in 2008 from \$1.46 billion in 2007. Petroleum products accounted for 26% of the value of total imports, and fertilizers, 2% (Bank of Tanzania, 2009, p. 26).

Commodity Review

Metals

Cobalt, Copper, and Nickel.—Barrick Gold Corp. of Canada produced copper as a coproduct at the Bulyanhulu gold mine. Reserves at Bulyanhulu were estimated to be about 200,000 metric tons (t) of contained copper (Barrick Gold Corp., 2009a, p. 146).

Barrick (50%) and Xstrata plc of Switzerland (50%) had a joint venture for the exploration and development of the Kabanga nickel sulfide deposit in northwestern Tanzania. Resources at Kabanga were estimated to be 50.7 million metric tons (Mt) at a grade of 2.38% nickel; the deposit also contained cobalt, copper, and platinum. Barrick and Xstrata planned to complete a feasibility study of the development of Kabanga in 2009 (Barrick Gold Corp., 2009a, p. 46, 147).

African Eagle Resources plc (AER) of the United Kingdom conducted a drilling program at the Dutwa nickel-cobalt deposit. In November 2008, AER estimated that resources at Dutwa were 31 Mt at a grade of 1.1% nickel and 0.034% cobalt. The company also explored for nickel at its Zanzui project (Mining Journal, 2008a).

IMX Resources Ltd. of Australia (formerly Goldstream Mining NL) and Albidon Ltd. of Australia engaged in chip sampling and mapping at the Luwumbu platinum-group-metal-nickel project near Lake Malawi in the third quarter of 2008. In March, Lonmin plc of the United Kingdom withdrew from its joint-venture agreement with IMX and Albidon to explore at Luwumbu. Lonmin explored for nickel and copper at the Mibango project near Lake Tanganyika, which was a joint venture with IMX. Resources at Mibango were estimated to be 113 Mt at a grade of 0.82% nickel and 0.05% cobalt. Lonmin planned to spend \$4.9 million on exploration in 2008; the company was required to complete a feasibility study by March 2015 to earn a 60% interest in the project (IMX Resources Ltd., 2008, p. 30-34).

Continental Nickel Ltd. of Canada and its joint-venture partner IMX started a drilling program at Nachingwea in southeast Tanzania in July. The cost of the program was estimated to be \$6.6 million (Mining Journal, 2008c).

Obtala Resources plc of the United Kingdom engaged in soil sampling at the Ruhenge property in 2008; Ruhenge is located near the Kabanga deposit. The company planned further exploration in the third quarter of 2009. Gulf Resources Ltd. of Australia initiated a pre-scoping study at Pare in northeast Tanzania (Mining Journal, 2008c; Obtala Resources plc, 2009, p. 6-7).

Gold.—Tanzania's gold production declined to an estimated 36,000 kilograms (kg) in 2008 from an estimated 40,193 kg in 2007. The Bulyanhulu, the Geita, the Golden Pride, the North Mara, and the Tulawaka Mines had a combined capacity to produce about 44,700 kilograms per year (kg/yr) of gold. Tanzania's resources amounted to about 1,500 t of contained gold, of which about 740 t was reserves (tables 1, 2, and 3).

Barrick operated the Bulyanhulu underground gold mine, which produced copper and silver as coproducts. In 2008, the Bulyanhulu Mine produced about 6,200 kg of gold compared with nearly 7,600 kg in 2007. Lower volumes of ore mined because of labor disputes in the fourth quarter of 2007 and lower ore grades more than offset higher recovery rates. Barrick planned to increase production at Bulyanhulu in 2009. The remaining life of the Bulyanhulu Mine was expected to be nearly 25 years (Mining Review Africa, 2007; Barrick Gold Corp., 2009a, p. 45; 2009b).

In 2008, production at the North Mara open pit mine amounted to about 6,100 kg of gold compared with 7,400 kg in 2007. Lower volumes of ore were mined, and ore grades and recovery rates declined in 2008. Production was constrained by equipment problems and local civil unrest (Barrick Gold Corp., 2009a, p. 45; 2009b).

Barrick and its joint-venture partner Explorations Minières du Nord Ltée (MDN) of Canada produced gold at the Tulawaka open pit mine. Production at Tulawaka increased to about 6,600 kg in 2008 from nearly 5,600 kg in 2007. Higher ore grades and recovery rates more than offset lower volumes of ore mined. In September 2008, underground mining started as near-surface reserves were depleted; production was expected to decline in 2009 as a result of the cessation of surface mining (Barrick Gold Corp., 2009a, p. 45; 2009b).

At the end of 2008, Barrick had completed 90% of the construction of a new open pit mine at the Buzwagi deposit. The mine was expected to start production in the second quarter of 2009; output for 2009 was likely to be about 6,200 kg. Starting in 2010, Barrick planned to produce nearly 7,800 kg/yr of gold and 4,100 metric tons per year (t/yr) of copper; the life of the mine was expected to be 10 years. Capital costs for the project were estimated to be \$400 million (Mining Review Africa, 2007; Barrick Gold Corp., 2009a, p. 13, 46).

In 2008, Geita Gold Mining Ltd. (a subsidiary of AngloGold Ashanti Ltd. of South Africa) produced 8,203 kg of gold at the Geita Mine compared with 10,166 kg in 2007. Production was constrained by the collapse of the Nyankanga pit wall in February 2007, which restricted access to deeper high-grade ore, and breakdowns in processing operations in the second and third quarters of 2008. Production at Geita was expected

to increase to 9,800 kg in 2009 because of higher ore grades. AngloGold Ashanti also engaged in exploration at Geita in 2008 (AngloGold Ashanti Ltd., 2009, p. 17, 78-79, 95, 225).

Resolute Mining Ltd. of Australia owned the Golden Pride open pit mine. In fiscal year 2007-08, the Golden Pride Mine produced 4,672 kg of gold compared with 4,305 kg in fiscal year 2006-07. Higher production was attributable to increased ore grades and recovery rates (Resolute Mining Ltd., 2008, p. 9).

In February 2008, Resolute purchased the share of the Nyakafuru joint-venture project held by IAMGOLD Corp. of Canada. Resolute recommenced exploration at Nyakafuru in July. In the third quarter of 2008, the company conducted drilling at the Kahama project, which was a joint venture with Sub-Sahara Resources NL of Australia. Resolute also explored at Kavsav and at the Golden Pride East joint-venture project with Barrick (Resolute Mining Ltd., 2008, p. 23-24; Sub-Sahara Resources NL, 2008).

IAMGOLD spent \$4.6 million on exploration at the Buckreef deposit in north-central Tanzania in 2008. At yearend, resources at Buckreef were estimated to be 27.8 Mt at a grade of 2.1 grams per metric ton (g/t) gold (IAMGOLD Corp., 2009, p. 62, 147).

Currie Rose Resources Inc. of Canada and Sub-Sahara explored at the Mabale Hills and the Nyamirembe properties in 2008. The companies completed a drilling program at Mabale Hills in June. Sub-Sahara curtailed its exploration activities in Tanzania by the fourth quarter of 2008 because of the world financial crisis (Mining Journal, 2008c; Sub-Sahara Resources NL, 2008).

United Kingdom companies AER and Randgold Resources Ltd. engaged in exploration at Miyabi in the first half of 2008. Randgold planned to fund further exploration and a prefeasibility study. Resources at Miyabi were estimated to be 12.4 Mt at a grade of 1.3 g/t gold (Mining Journal, 2008c).

In 2008, MDN carried out exploration at the Simba project, which is located north of the Tulawaka Mine, and the Viyonza project, which is located near the Tulawaka Mine. MDN planned an exploration budget of about \$5 million for Tanzania in 2008, most of which was expected to be spent on Simba and Viyonza (Saywell, 2008).

In July, Lake Victoria Mining Co. of the United States commenced exploration at its Kalemela project. Obtala Resources engaged in sampling at its Buckreef and Shinyanga properties, which are located near the closed Buckreef gold mine and the Williamson diamond mine, respectively. In December, Lakota Resources completed a drilling program at the Tembo project west of the Bulyanhulu Mine. In July, Helio Resource Corp. of Namibia started a drilling program at the SMP property in the Lupa Goldfield in southwest Tanzania. Peak Resources Ltd. of Australia started exploration at its Geita project (located near the Geita Mine), at Igunga (located southwest of the Golden Pride Mine), and in the Lupa Goldfield. Great Basin Gold Ltd. of South Africa also explored in the Lupa Goldfield in 2008 (Mining Journal, 2008c; Alexander, 2009; Obtala Resources plc, 2009, p. 5-7).

Industrial Minerals

Cement.—In 2008, cement production increased to 1.76 Mt from 1.65 Mt in 2007. Tanga Cement Company Ltd. planned to

increase its capacity to 1.25 million metric tons per year (Mt/yr) from 750,000 t/yr. The expansion was to be completed by the third quarter of 2009. Tanzania Portland Cement Company Ltd. (TPCC) planned to increase its capacity to more than 1.4 Mt/yr from 670,000 t/yr. The expansion was expected to be completed in the second quarter of 2009 at a cost of about \$100 million. In the fourth quarter of 2008, Athi River Mining Ltd. of Kenya (ARM) started construction on its new cement plant, which had a planned capacity of 1.5 Mt/yr. ARM expected to start production at the plant in 2011 (Andrew, 2008; Guardian, The, 2008; Athi River Mining Ltd., 2009, p. 6).

Diamond.—Diamond recovery at the Williamson Mine declined to 134,000 carats in 2008 from 220,000 carats in 2007. Lower output was primarily attributable to decreased volumes of ore mined. In November 2008, Petra Diamonds Ltd. purchased the De Beers Group's 75% share in the mine. Petra planned to increase production to more than 280,000 carats per year. The company was also studying the construction of a new ore treatment plant that would increase capacity to 7.5 Mt/yr from 4 Mt/yr. Depending on the results of the study, diamond production could increase to about 500,000 carats per year. Resources at Williamson were estimated to be about 40 million carats (African Mining, 2009; De Beers Group, 2009, p. 16).

More than 300 kimberlites had been identified in the Mbeya, the Ngeza, the Shinyanga, and the Singida-Iramba Provinces, of which 20% were diamondiferous. KimCor Diamonds plc of Australia and De Beers engaged in exploration for diamond at the Itanana and the Mahene kimberlite pipes in the first quarter of 2008. In December, KimCor agreed to sell its diamond operations to Belmont Mining Ltd. of the United Kingdom (KimCor Diamonds plc, 2008; Mining Journal, 2008c).

Gemstones.—Tanzania produced a variety of gemstones that included amethyst, aquamarine, cordierite, emerald, garnet, ruby, sapphire, spinel, tanzanite, and tourmaline. Tanzanite accounted for a majority of the value of domestic gemstone mining.

Merelani, which is located near Arusha, was the world's only source of tanzanite. Artisanal and small-scale miners operating in Blocks B and D of the Merelani deposit accounted for most of the country's tanzanite production. Kilimanjaro Mines Ltd. and Tanzanite Africa Ltd. operated medium-scale mines in Block A and the Block D Extension, respectively. In the fourth quarter of 2008, nearly 200 mining operations in Blocks B and D suspended production because of the decline in tanzanite prices resulting from the world economic crisis (Ihucha, 2009).

TanzaniteOne Ltd. of South Africa mined tanzanite in Block C; the company also cut high-quality tanzanite at its lapidaries in Tanzania. In 2008, TanzaniteOne produced 441 kg of rough tanzanite compared with 340 kg in 2007 and 246 kg in 2006; increased volumes of ore processed more than offset lower ore grades. The company planned to cut its production to about 320 kg in 2009 because of the world economic crisis; output was expected to increase to more than 600 kg by 2012. TanzaniteOne also engaged in exploration on properties near Block C in 2008 (TanzaniteOne Ltd., 2009, p. 8-9, 13).

Tsavorite, which is a green grossular garnet that obtains its color from trace amounts of chromium and vanadium, was produced at Ruangwa by about 300 artisanal miners. Gemini

Exploration and Mining Co. also operated a mechanized mine at Ruangwa. Tsavorite was mined in small amounts at Tunduru. Swala Gem Traders operated a mechanized tsavorite mining operation at Lemshuku. In 2008, TanzaniteOne set up a pilot plant and conducted bulk sampling at the Lemshuku-Shamberai tsavorite project, which was located about 20 kilometers southwest of the tanzanite mines. The company planned to continue with bulk sampling in the second half of 2009 (Pardieu and Hughes, 2009; TanzaniteOne Ltd., 2009, p. 17).

Spessartine, which is an orange garnet that obtains its color from manganese that is part of its chemical structure, was produced by small-scale miners near Lolindo in northern Tanzania. The mine produced at a rate of about 3 kilograms per month of gem-quality spessartine (Chadwick and others, 2008).

In December 2007, a ruby and sapphire rush started at Winza in central Tanzania. Artisanal miners started producing high-quality ruby and blue, pink, and purple sapphire from eluvial deposits. Mining from the primary deposit started in March 2008. The number of miners working at Winza increased to 6,000 in July 2008 from 600 in December 2007. By October 2008, the eluvial deposits were reportedly depleted; mining continued on a reduced scale from the primary deposit (Schwarz and others, 2008, p. 322-326).

Ruby and sapphire were also mined at Matombo and Mahenge in the Morogoro District and at Songea and Tunduru in southern Tanzania. In 2007, about 1,000 workers were involved in gemstone mining and trading at Tunduru compared with tens of thousands from 1995 to 1999. The decline was attributable to a lack of investment in the mines and the discovery of the Ilakaka sapphire deposits, which drew gemstone dealers to Madagascar and left the miners at Tunduru without a market for their gemstones. World Gem Supply Ltd. of Australia operated a mechanized ruby and sapphire mine at Masuguro, which is located near Songea. In July 2008, Obtala Resources was awarded a mining license for ruby in the Morogoro District (Schwarz and others, 2008, p. 323; Obtala Resources plc, 2009, p. 2; Pardieu and Hughes, 2009).

Artisanal and small-scale miners produced alexandrite and emerald from four mines near Lake Manyara in the Mbulu District in north-central Tanzania. Alexandrite was also produced at Tunduru, and emerald, in the Sumbawanga District. In April, Obtala Resources was awarded six mining licenses for emerald near Lake Manyara (Obtala Resources plc, 2009, p. 2).

Lime.—ARM of Kenya produced lime for consumption in gold mining, sugar refining, and water treatment at its plant in Tanga. Production declined in 2007 because of shutdowns to replace refractory bricks. ARM planned to double its capacity to 40,000 t/yr (Ondari, 2008).

Phosphate Rock.—Small amounts of phosphate rock were mined at Minjingu by Minjingu Mines and Fertilizers Ltd. In September, Peak Resources formed a joint venture with Minergy Tanzania Ltd. of Mauritius to explore for phosphates at the Ngualla carbonatite in southwest Tanzania (Alexander, 2009).

Soda Ash.—Tata Chemicals Ltd. (TCL) of India planned to mine soda ash from Lake Natron in northeast Tanzania. The company planned to build a processing plant with a capacity of 500,000 t/yr. In November 2008, TCL suspended development because of environmental concerns about habitat destruction.

Resumption of the project depended on approval of the Government's wetlands management plan and the results of studies on the environmental effects of mining at Lake Natron (Industrial Minerals, 2008).

Mineral Fuels and Related Materials

Coal.—In the fourth quarter of 2008, Atomic Resources Ltd. of Australia and its joint-venture partner National Development Corp. (owned by the Government of Tanzania) completed a scoping study on the Ngaka coal deposit. The companies planned to complete a new resource assessment and to start a feasibility study of a new mine and a coal-fired powerplant at Ngaka in the first quarter of 2009 (Atomic Minerals Ltd., 2009).

Natural Gas.—Orca Exploration Group Inc. produced natural gas from Songo Songo Island. The company produced 561 million cubic meters in 2008 compared with 544 million cubic meters in 2007. In the fourth quarter of 2008, Orca increased the capacity of the processing plant to 930 million cubic meters per year from 720 million cubic meters per year. Orca expected local natural gas demand to increase to between 1.45 billion and 1.65 billion cubic meters by 2012; the company planned to expand the capacity of the pipeline and the gas processing plant to nearly 2.1 billion cubic meters per year. The leading local consumers of natural gas were powerplants and TPCC's cement plant (Orca Exploration Group Inc., 2009, p. 9, 18-19).

Artumas Group Inc. of Canada supplied a 12-megawatt (MW) gas-fired powerplant at Mtwara from its production facilities in Mnazi Bay. The company planned to build a new gas-fired powerplant at Mtwara with a capacity of 300 MW by 2012 and to export compressed natural gas to Kenya by 2010. The new powerplant was expected to consume 650 million cubic meters per year of natural gas. Kenya was likely to consume 360 million cubic meters per year starting in 2010 and 520 million cubic meters per year starting in 2013. The powerplant and compressed natural gas projects received Government approval in July and August 2008, respectively (Artumas Group Inc., 2008, p. 10).

Aminex plc of the United Kingdom and its joint-venture partners drilled an exploration well at its Nyuni/East Songo Songo property in 2008. In July, Aminex and Key Petroleum Ltd. of Australia acquired the Songo Songo West property (Petroleum Economist, 2008a).

Petroleum.—Maurel & Prom of France and Dominion Petroleum Ltd. of Bermuda planned to drill at the onshore Mandawa license by the end of 2008. Aminex planned to drill a well at Ruvuma in southern Tanzania in early 2009. Heritage Oil Corp. of Canada started a seismic acquisition program at the Kimbiji and the Kisangire Blocks in September; the company planned to start drilling in the second half of 2009. In May, the Government granted the South Block, which covered the southern half of Lake Tanganyika and the adjacent shore, to Beach Petroleum Ltd. of Australia (Petroleum Economist, 2008b; Watkins, 2008).

Uranium.—In November 2008, Mantra Resources Ltd. of Australia completed a drilling program at the Mkuju River property. Mantra planned to complete a resource estimate in

early February 2009 and a scoping study in the second quarter of 2009. The company also explored for uranium at Mbabmba Bay in southwest Tanzania (Mantra Resources Ltd., 2009, p. 1, 7).

Uranex NL of Australia (IMX Resources NL Ltd., 39.5%) explored for uranium at its Bahi, Mkuju, and Songea properties in 2008. In June, Uranex announced that resources at Bahi were estimated to be 14 Mt at a grade of 0.0218% uranium oxide (Mining Journal, 2008c).

In mid-2008, Uranium Resources plc of the United Kingdom and Western Metals Ltd. of Australia engaged in a drilling program at the Mtonya project in southern Tanzania. Uranium Hunter Corp. of Canada explored at Ruhuhu in the second half of 2008. Obtala Resources planned to start exploration for uranium in the third quarter of 2009 (Mining Journal, 2008c; Obtala Resources plc, 2009, p. 7).

Outlook

Tanzania's production of cement, copper, diamond, gold, lime, and natural gas is expected to increase in the near future. In 2009 and 2010, increased gold output from the Bulyanhulu and the Geita Mines and the opening of the Buzwagi Mine are likely to more than offset the shutdown of the Tulawaka Mine. Gold production is expected to decline after 2012 because of the shutdown of the Golden Pride Mine. Colored gemstone production is likely to decrease in 2009 because of the world economic crisis. Artisanal tanzanite production could decline because of resource depletion; it is unclear to what extent increased production by TanzaniteOne by 2012 would offset the decline.

References Cited

African Mining, 2009, Project update—Tanzania: African Mining, v. 14, no. 2, March/April, p. 29.

Alexander, Jason, 2009, Tanzania reaches Peak: Australia's Paydirt, December/ January, v. 1, no. 157, p. 45-47.

Andrew, Felix, 2008, Tanga Cement aims to consolidate investment: The Guardian [Dar Es Salaam, Tanzania], February 21, unpaginated.

AngloGold Ashanti Ltd., 2009, Annual financial statements 2008: Johannesburg, South Africa, AngloGold Ashanti Ltd., 348 p.

Artumas Group Inc., 2008, Exploring new basins with innovative solutions: Pareto Conference, Oslo, Norway, September 10-11, 2008, Presentation, 28 p. Athi River Mining Ltd., 2009, Annual report Athi River Mining Ltd. 2008:

Nairobi, Kenya, Athi River Mining Ltd., 50 p.

Atomic Minerals Ltd., 2009, Quarterly report December 2008: West Perth, Australia, Atomic Minerals Ltd., 4 p.

Bank of Tanzania, 2009, Monthly economic review: Dar es Salaam, Tanzania, Bank of Tanzania, January, 28 p.

Barrick Gold Corp., 2009a, 2008 annual report: Toronto, Ontario, Canada, Barrick Gold Corp., 152 p.

Barrick Gold Corp., 2009b, Mine statistics (gold): Toronto, Ontario, Canada, Barrick Gold Corp., 7 p.

Chadwick, K.M., Koivula, J.I., Laurs, B.M., Attard, John, Simmons, W.B., and Falster, A.U., 2008, Spessartine from Longido, Tanzania: Gems & Gemology, Spring, v. 44, no. 1, p. 76-78.

De Beers Group, 2009, Operating and financial review 2008: Southdale, South Africa, De Beers Group, 32 p.

George, M.W., 2009, Gold: U.S. Geological Survey Mineral Commodity Summaries 2009, p. 68-69.

Guardian, The, 2008, TPCC expansion fine if cement prices drop: The Guardian [Dar Es Salaam, Tanzania], June 24, unpaginated.

IAMGOLD Corp., 2009, Annual report 2008: Toronto, Ontario, Canada, IAMGOLD Corp., 152 p.

- Ihucha, Adam, 2009, Tanzanite price falls by 80 pc: Sunday Observer [Dar es Salaam, Tanzania], January 11, unpaginated.
- IMX Resources Ltd., 2008, 2008 annual report: Subiaco, Australia, IMX Resources Ltd., 88 p.
- Industrial Minerals, 2008, TCL's double soda ash expansion: Industrial Minerals, December, no. 495, p. 19.
- KimCor Diamonds plc, 2008, Operations update: West Perth, Australia, KimCor Diamonds plc press release, April 1, 5 p.
- Mantra Resources Ltd., 2009, December 2008 quarterly report: Mantra Resources Ltd., Perth, Australia, 22 p.
- Mining Journal, 2008a, Dutwa resource, Zanzui find: Mining Journal, November 28, p. 11.
- Mining Journal, 2008b, Political debate, *in* Tanzania—A supplement to Mining Journal: Mining Journal, August, p. 5.
- Mining Journal, 2008c, Precious potential, *in* Tanzania—A supplement to Mining Journal: Mining Journal, August, p. 7-8.
- Mining Review Africa, 2007, Two new mines—Exciting future for gold: Mining Review Africa, no. 4, p. 22-23.
- Ministry of Finance and Economic Affairs, 2008, The economic survey 2007: Dar Es Salaam, Tanzania, Ministry of Finance and Economic Affairs, 208 p.
- Obtala Resources plc, 2009, Financial statements for the period ended 31 December 2008: London, United Kingdom, 43 p.
- Ondari, Justus, 2008, Multi-pronged strategy pays off for cement manufacturer: Daily Nation [Nairobi, Kenya], April 8, unpaginated.

- Orca Exploration Group Inc., 2009, 2008 annual report: Tortola, Virgin Islands, British, Orca Exploration Group Inc., 73 p.
- Pardieu, Vincent, and Hughes, R.W., 2009, Tsavorite—The untamed beauty: InColor, Fall/Winter 2008-2009, no. 9, p. 12-19.
- Petroleum Economist, 2008a, News in brief—Tanzania: Petroleum Economist, v. 75, no. 7, July, p. 34.
- Petroleum Economist, 2008b, News in brief—Tanzania: Petroleum Economist, v. 75, no. 10, October, p. 34.
- Resolute Mining Ltd., 2008, Annual report 08: Perth, Australia, Resolute Mining Ltd., 108 p.
- Saywell, Trish, 2008, Investors say Tanzania a safe bet on gold: The Northern Miner, February 4-10, p. B1, B8.
- Schwarz, Dietmar, Pardieu, Vincent, Saul, J.M., Schmetzer, Karl, Laurs,
 B.M., Giuliani, Gaston, Klemm, Leo, Malsy, Anna-Kathrin, Erel, Eric,
 Hauzenberger, Christoph, Du Toit, Garry, Fallick, A.E., and Ohnenstetter,
 Daniel, 2008, Rubies and sapphires from central Tanzania: Gems &
 Gemology, v. 44, no. 4, Winter, p. 322-347.
- Sub-Sahara Resources NL, 2008, Sub-Sahara Resources quarterly activities report for the quarter ended 30 September 2008: Perth, Australia, Sub-Sahara Resources NL, 8 p.
- TanzaniteOne Ltd., 2009, Annual report 2008: Hamilton, Bermuda, TanzaniteOne Ltd., 94 p.
- Watkins, Eric, 2008, Exploration & development—Tanzania: Oil & Gas Journal, v. 106, no. 34, September 8, p. 33-34.

 $\label{eq:table1} TANZANIA: PRODUCTION OF MINERAL COMMODITIES^{1}$

(Metric tons unless otherwise specified)

| Commodity ² | | 2004 | 2005 | 2006 | 2007 | 2008 ^e |
|-----------------------------------------------|----------------------|------------------------|------------------------|------------------------|---------------------------|---------------------|
| Bauxite | | | 1,640 | 5,373 | 5,003 | 5,000 |
| Calcite ^e | | 40 | 40 | 100 3 | 1,500 r, 3 | 1,500 |
| Cement, hydraulic | thousand metric tons | 1,281 | 1,366 | 1,370 ^r | 1,630 ^r | 1,756 ³ |
| Coal, bituminous | | 65,041 | 30,795 ^r | 17,940 | 27,198 | 27,000 |
| Copper, contained in concentrates and doré | | 4,240 | 3,661 ^r | 3,284 ^r | 3,275 ^r | 2,700 |
| Diamond ⁴ | carats | 303,920 | 219,639 | 272,204 ^r | 282,786 | 180,000 |
| Gemstones, excluding diamond: ^{e, 5} | | | | | | |
| Amethyst | kilograms | 270 | 270 | 270 | 270 | 200 |
| Aquamarine | do. | 280 | 280 | 280 | 280 | 210 |
| Cordierite (iolite) | do. | 310 | 310 | 310 | 310 | 230 |
| Garnet | do. | 5,900 | 5,900 | 5,900 | 5,900 | 4,400 |
| Ruby | do. | 2,700 | 2,700 | 2,700 | 2,700 | 2,000 |
| Sapphire | do. | 1,300 | 1,300 | 1,300 | 1,300 | 1,000 |
| Tanzanite | do. | 3,916 r, 3 | 1,307 r,3 | 5,894 r, 3 | 8,187 r, 3 | 6,100 |
| Other | do. | 1,600,000 | 616,000 r | 2,480,000 | 1,280,000 r | 960,000 |
| Total | do. | 1,613,849 r, 3 | 627,797 r, 3 | 2,498,637 r,3 | 1,294,485 ^{r, 3} | 970,000 |
| Gold | do. | 48,176 | 47,270 ^r | 47,000 ^e | 40,193 | 36,000 |
| Gypsum and anhydrite, crude | | 59,231 | 23,119 ^r | 32,556 ^r | 52,759 ^r | 53,000 |
| Kaolin | | | | | 1,020 | 1,000 |
| Lime ^e | | 20,000 | 20,000 | 20,000 r | 15,000 ^r | 20,000 |
| Natural gas ⁶ | million cubic meters | 119 | 408 | 504 | 544 | 561 ³ |
| Phosphate rock: | _ | | | | | |
| Gross weight | | 6,570 | 7,096 | 2,881 | 8,261 | 8,300 |
| P ₂ O ₅ content | | 2,000 | 2,100 | 860 | 2,500 | 2,500 |
| Salt, all types | | 57,062 | 51,166 ^r | 34,798 | 35,224 | 35,000 |
| Silver, contained in concentrates and doré | kilograms | 13,216 | 12,480 ^r | 14,906 | 12,381 | 11,000 |
| Steel, semimanufactured | | 40,029 | 47,652 | 50,654 ^r | 46,016 ^r | 77,365 ³ |
| Stone, sand, and gravel: | | | | | | |
| Aggregates ^e | | 120,000 | 140,000 | 160,000 | 180,000 | 180,000 |
| Dolomite ^e | | 1,800 | 1,400 | 950 | 169 ^{r, 3} | 170 |
| Limestone, crushed | | 1,390,894 ^r | 2,006,407 ^r | 1,607,570 ^r | 1,322,023 ^r | 1,300,000 |
| Marble | | NA | NA | 337 | 370 e | 370 |
| Pozzolanic materials | | 152,679 | 163,499 | 129,295 | 184,070 | 180,000 |
| Sand ^e | | 3,900,000 | 5,800,000 | 7,577,210 3 | 8,400,000 | 8,400,000 |

^eEstimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. ^rRevised. do. Ditto. NA Not available.

⁻⁻ Zero.

¹Table includes data available through October 2, 2009.

²In addition to the commodities listed, modest quantities of crude construction materials, including brick clay, are produced, but available information is inadequate to make reliable estimates of output.

³Reported figure.

⁴Diamond figures are estimated to represent 85% gem-quality or semigem-quality and 15% industrial-quality stones. Does not include smuggled artisanal production.

⁵Other precious and semiprecious stones produced include alexandrite, chrysoprase, emerald, kyanite, moonstone, opal, peridot, quartz, spinel, and tourmaline. Does not include smuggled artisanal production.

⁶Orca Exploration Group Inc. only. Artumas Group Inc. also produced small amounts of natural gas in 2007 and 2008.

${\it TABLE~2}$ TANZANIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2008

(Metric tons unless otherwise specified)

| Co | mmodity | Major operating companies | Location of main facilities | Annual capacity |
|------------------------------|----------------------|---------------------------------------------------------------------------------------------------|--------------------------------------------------------------|-----------------------------|
| Cement | | Tanga Cement Company Ltd. (Holcim Mauritius Investment Holdings Ltd., 62.5%) | Plant at Tanga | 750,000. |
| Do. | | Tanzania Portland Cement Company Ltd. (TPCC) (HeidelbergCement AG, 69.3%) | Plant at Wazo Hill | 670,000. |
| Do. | | Mbeya Cement Company Ltd. (LaFarge Group, 58%) | Plant at Mbeya | 300,000. |
| Coal, bituminous | | Kiwira Coal and Power Ltd. (Tanpower Resources | Kiwira Mine | 150,000 run of mine; |
| | | Ltd., 85%, and Government, 15%) | | 93,000 washed. |
| Copper, in conce and doré | ntrates | Bulyanhulu Gold Mine Ltd. (Barrick Gold Corp., 100%) | Bulyanhulu Mine near Kahama | 3,700. |
| Diamond | | Williamson Diamonds Ltd. (Petra Diamonds Ltd., 75%, and Government, 25%) | Williamson Mine near Shinyanga ¹ | 4,000,000 ore processing |
| Do. | carats | do. | do. | 210,000 diamond. |
| Do. | do. | El Hillal Minerals Ltd. | Near Williamson Mine | 24,000.e |
| Glass | | Kioo Ltd. | Dar es Salaam | 55,000. |
| Gold | | Geita Gold Mining Ltd. (AngloGold Ashanti Ltd., 100%) | Geita Mine near Nyakabale | 6,000,000 ore processing |
| Do. | kilograms | do. | do. | 17,000 gold. |
| Do. | | Bulyanhulu Gold Mine Ltd. (Barrick Gold Corp., 100%) | Bulyanhulu Mine near Kahama | 1,100,000 ore processing |
| Do. | kilograms | do. | do. | 11,000 gold. |
| Do. | | North Mara Gold Mine Ltd. (Barrick Gold Corp., 100%) | North Mara Mine in Tarime District | 2,800,000 ore processing |
| Do. | kilograms | do. | do. | 8,700 gold. |
| Do. | | Resolute Mining Ltd. | Golden Pride Mine near Isanga | 3,000,000 ore processing |
| Do. | kilograms | do. | do. | 4,500 gold. |
| Do. | | Pangea Minerals Ltd. [Barrick Gold Corp., 70%, and Explorations Minières du Nord Ltée (MDN), 30%] | Tulawaka Mine | 365,000 ore processing. |
| Do. | kilograms | do. | do. | 3,500 gold. |
| Do. | | Tangold Ltd. | Buhemba Mine, 47 kilometers southeast of Musoma ¹ | 1,300,000 ore processing |
| Do. | kilograms | do. | do. | 2,600 gold. |
| Lime | mograms | Athi River Mining Ltd. (ARM) | Plant at Tanga | 20,000. |
| Natural gas | million cubic meters | Orca Exploration Group Inc. | Gasfield on Songo Songo Island | 930. |
| Do. | do. | Artumas Energy (Tanzania) Ltd. (subsidiary of Artumas Group Inc.) | Gasfield at Mnazi Bay | 100. |
| Petroleum produ | cts thousand | Tanzanian and Italian Petroleum Refining Co. Ltd. | Refinery at Dar es Salaam ¹ | 5,500. |
| | 42-gallon barrels | | | |
| Phosphate rock | | Minjingu Mines and Fertilizers Ltd. | Mine at Minjingu | 100,000. |
| Salt | | Nyanza Mines (Tanganyika) Ltd. | Nyanza Mines at Uvinza | 40,000. |
| Silver | kilograms | Bulyanhulu Gold Mine Ltd. | Bulyanhulu Mine near Kahama | 8,600. |
| Steel | | MM Integrated Steel Mills Ltd. | Plant at Dar es Salaam | 36,000 ^e rolled. |
| Do. | | Aluminum Africa Ltd. | do. | 33,000 ^e rolled. |
| Do. | | Steel Masters Ltd. | do. | 22,000 rolled. |
| Do. | | MM Integrated Steel Mills Ltd. | do. | 36,000 galvanized. |
| Do. | | Aluminum Africa Ltd. | do. | 33,000 galvanized. |
| Tanzanite | | TanzaniteOne Ltd. | Mine at Merelani, Block C ² | 120,000 ore processing. |
| Do. | kilograms | do. | do. | 1,200 tanzanite. |
| Do. | do. | Tanzanite Africa Ltd. (IPP Media Ltd.) | Mine at Merelani, Block D Extension | NA. |
| Do. | do. | Kilimanjaro Mines Ltd. | Mine at Merelani, Block A | NA. |
| Do. | do. | Small-scale and artisanal miners | Mines at Merelani, Blocks B | 7,500. ^e |
| | 30. | | and D | ,,500. |

^eEstimated; estimated data are rounded to no more than three significant digits. Do., do. Ditto. NA Not available.

¹Not operating at the end of 2008.

²Formerly the graphite processing plant at Merelani operated by Phoenix Minerals Ltd.

TABLE 3
TANZANIA: GOLD RESOURCES AND RESERVES IN 2008

| | | Grade | | | |
|---------------------------|-----------------------------------------------------------|-------------------------------|---------------------------|------------------------------|--|
| Project | Major operating companies | Tonnage (million metric tons) | (grams per metric ton) | Contained gold (metric tons) | |
| Reserves: | major operating companies | (minor metre tons) | metric ton) | (metric tons) | |
| Bulyanhulu ¹ | Bulyanhulu Gold Mine Ltd. (Barrick Gold Corp., 100%) | 37.7 | 9.9 | 373 | |
| Geita ² | Geita Gold Mining Ltd. (AngloGold Ashanti Ltd., 100%) | 54.3 | 2.9 | 159 | |
| Buzwagi ¹ | Barrick Gold Corp. | 65.1 | 1.5 | 102 | |
| North Mara ¹ | North Mara Gold Mine Ltd. (Barrick Gold Corp., 100%) | 30.5 | 3.1 | 94 | |
| Golden Pride ² | Resolute Mining Ltd. | 11.0 | 1.5 | 16 | |
| Total | | 198.6 | 3.7 | 744 | |
| Resources: | | | | | |
| Bulyanhulu | Bulyanhulu Gold Mine Ltd. | 37.6 | 10.0 3 | 425 | |
| Geita | Geita Gold Mines | 109.0 | 3.7 ³ | 400 | |
| Tusker | Barrick Gold Corp., 51%, and Sub-Sahara Resources NL, 49% | 123.3 | 1.2 | 142 | |
| North Mara | North Mara Gold Mine Ltd. | 49.6 | 2.7 | 131 | |
| Buzwagi | Barrick Gold Corp. | 85.5 | 1.5 | 130 | |
| Golden Pride | Resolute Mining Ltd. | 36.4 | 1.6 3 | 59 | |
| Buckreef/Rwamagaza | IAMGOLD Corp. | 27.8 | 2.1 | 59 | |
| Golden Ridge | Kahama Mining Corp. Ltd. | 33.1 | 1.5 | 46 | |
| Nyakafuru | Resolute Mining Ltd. | 19.4 | 1.7 | 33 | |
| Mgusu | Shanta Gold Ltd. | 6.2 | 3.7 | 23 | |
| Singida | do. | 24.0 | 1.4 | 17 | |
| Kitongo: | | | | | |
| Main Zone | IAMGOLD Corp. | 10.5 | 1.3 | 14 | |
| Isegenghe Hill | do. | 0.2 | 14.4 | 2 | |
| Miyabi | African Eagle Resources plc | 12.4 | 1.3 | 16 | |
| Tulawaka | Pangea Minerals Ltd. (Barrick Gold Corp., 70%, and | 1.1 | 6.7 | 7 | |
| | Exploration Minières du Nord Ltée, 30%) | | | | |
| Total | | 576 | 2.6 | 1,504 | |

Do., do. Ditto.

Sources:

AngloGold Ashanti Ltd., 2008, Annual financial statements 2007: Johannesburg, South Africa, AngloGold Ashanti Ltd., 326 p.

Barrick Gold Corp., 2008, Annual report 2007: Toronto, Ontario, Canada, Barrick Gold Corp., 148 p.

IAMGOLD Corp., Annual report 2008: Toronto, Ontario, Canada, IAMGOLD Corp., 152 p.

Resolute Mining Ltd., 2008, Annual report 08: Perth, Australia, Resolute Mining Ltd., 108 p.

Resource Information Unit, 2007, Tanzania, in Register of African mining 2007: Subiaco, Australia, Resource Information Unit, p. 211-225.

Resource Information Unit, 2008, Tanzania, in Register of African mining 2008: Subiaco, Australia, Resource Information Unit, p. 264-279.

VIPR Industries Inc., 2008, VIPR Industries closes acquistion of Singida Gold property adjacent to project with 543,000 oz indicated gold resource valued at over \$500 million: Toronto, Ontario, Canada, VIPR Industries Inc. press release, July 28, 2 p.

¹Definitions of resources and reserves are based on National Instrument 43-101, as required by Canadian securities regulatory authorities.

²Definitions of resources and reserves are based on the Australasian Code for the Reporting of Identified Mineral Resources and Ore Reserves issued by the Joint Committee for the Australasian Institute of Geoscientists and the Australian Mining Industry Council.

³Note that, in most cases, the grade of resources is lower than the grade for reserves, but in this case, the grade of the less economic material is higher, leading to the paradox of a higher resource grade.