



# 2006 Minerals Yearbook

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## ERITREA

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# THE MINERAL INDUSTRY OF ERITREA

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The East African country of Eritrea was considered to have favorable geology for mineral resources yet was relatively unexplored by modern exploration methods. Geologically, Eritrea is largely made up of Tertiary to Recent volcanics and Neoproterozoic terranes. Marine sediments of Mesozoic to Quaternary age are exposed in the coastal area of Eritrea along the Red Sea. Several high-grade volcanic massive sulfide (VMS) discoveries were made in the past 5 years. The country has possible reserves of natural gas and petroleum. Eritrea had a crude refining capacity of 18,000 barrels per day, but the refinery located in the Red Sea Port of Assab has been shut down since 1997 owing to high operating and maintenance costs. Refined petroleum products were imported to meet domestic needs. Most energy came from biomass, such as charcoal and wood (Eritrea Embassy, London, 2006).

## Production

The country produced a variety of minerals and mineral products, such as industrial minerals and construction materials, which included basalt, cement, common clay, coral, granite, gravel, gypsum, kaolin, lime, limestone, marble, pumice, quartz, salt, sand, and silica sand (table 1). Artisan miners produced small amounts of gold. The country has deposits of barite, chromium, copper, feldspar, iron ore, lead, magnesium, nickel, potash, silver, talc, and zinc that were not exploited in 2006.

## Structure of the Mineral Industry

The structure of the mineral industry is listed in table 2. Most industries are small and privately owned.

## Government Policies and Programs

The Government suspension of all mineral exploration activity in Eritrea was lifted in early 2005 and companies, including Nevsun Resources Ltd., Sub-Sahara Resources N.L. of Australia, Sanu Resources Ltd., and Sunridge Gold Corp. of Canada, resumed exploration activities in late 2005 and continued their activities through 2006. Starting in 2006, the Government increased the maximum possible equity interest that it may hold in a project through an option agreement to 30%. The Eritrean mining code was based on the mining code of the Northern Territory of Australia. It provides a royalty of 5% on precious metals and 3% on base metals, and a corporate tax rate of 35% (Mining Journal Online, 2006).

## Commodity Review

### Metals

**Copper, Gold, Silver, and Zinc.**—Nevsun was continuing to advance its Bisha project. Bisha is a large base- and precious-

metals VMS deposit. A model for the deposit suggested felsic dominated bimodal-silicastic VMS and Noranda/Kuroko-type deposits. A comparison has been made to the Matagami VMS district in the Province of Quebec, Canada (Nevsun Resources Ltd., 2006b).

Nevsun completed the final Bisha feasibility study in October 2006. Highlights from the feasibility showed metal production (based on a 10-year open pit mine life) of 30 thousand kilograms of gold, 338 thousand metric tons of copper, and 285 thousand kilograms of silver. The operating cost was expected to be \$31.64 per milled metric ton through the life of the mine (Nevsun Resources Ltd., 2006a).

Sub-Sahara held the Adi Nefas, the Debarwa, and the Medrizien exploration licenses near Asmara; these licenses composed the company's Asmara Project. In 2006, 66 diamond drill holes that encompassed more than 12,000 meters (m) were drilled on the Adi Nefas VMS deposit; the drilling defined in greater detail the known zones of mineralization. The drill program confirmed that three distinct zones existed—a gold oxide zone underlain by a supergene copper zone underlain by a primary zinc-rich zone. Sub-Sahara and its joint-venture partner Dragon Mining NL of Australia continued diamond drilling at the Zara project in northwestern Eritrea (Dragon Mining N.L., 2006).

Sanu was the leading exploration landholder in Eritrea and had exploration licenses totaling more than 2,600 square kilometers (km<sup>2</sup>). Sanu continued exploration of its properties in western Eritrea. The company was concentrating mainly on the Hambok property, which was its most recent VMS discovery in the polymetallic belt. A total of 7,382 m in 43 diamond drill holes confirmed massive sulfide mineralization. This mineralization was intersected for more than 1,050 m of strike length and 300 m down dip and was open in all directions. Sanu considered that Hambok had the potential to be a significant copper-zinc deposit (Yahoo Finance, 2006).

Sunridge's Asmara project covers 1,100 km<sup>2</sup> in central Eritrea. Within the Asmara project were two copper, gold, silver, and zinc VMS deposits (Adi Nefas and Debarwa), one gold deposit (Gupo), and a large VMS deposit (Emba Derho). Drilling at Adi Nefas defined mineralization for a total of more than 450 m of strike length and down to more than 300 m from the surface. Drilling at Debarwa defined mineralization for a total of more than 1,000 m of strike length and down to about 250 m from the surface. The total estimated inferred resources at Adi Nefas and Debarwa as of January 2007 were 8.1 million metric tons (Mt) at grades of 1.91 grams per metric ton (g/t) gold, 39.51 g/t silver, 1.78% copper, and 2.46% zinc. Estimated inferred resources at the Gupo gold deposit was 1.9 Mt of ore at an average grade of 2.99 g/t gold (Sunridge Gold Corp., 2006).

## References Cited

Dragon Mining NL, 2006 Zara joint venture: Dragon Mining NL. (Accessed October 4, 2007, at <http://www.dragon-mining.com.au/exploration.asp?PageID=181>.)

Eritrea Embassy, London, 2006, Economy: Eritrea Embassy, London. (Accessed September 20, 2007, at <http://www.eritrean-embassy.org.uk/economy.htm>.)  
 Mining Journal Online, 2006, Eritrea. Mining Journal. (Accessed March 6, 2007, at [http://www.mining-journal.com/operations/operation\\_detail.aspx?articleid=7340](http://www.mining-journal.com/operations/operation_detail.aspx?articleid=7340).)  
 Nevsun Resources Ltd., 2006a, About Nevsun: Nevsun Resources Ltd. (Accessed September 22, 2007, at <http://www.nevsun.com/about.html>.)

Nevsun Resources Ltd., 2006b, Bisha, Eritrea. Nevsun Resources Ltd., p. 1. (Accessed September 22, 2007, at <http://www.nevsun.com/bishadessrip.html>.)  
 Sunridge Gold Corp, 2006, Eritrea: Sunridge Gold Corp. (Accessed April 10, 2007, at <http://www.sunridgegold.com/s/embaDerho.asp>.)  
 Yahoo Finance, 2006, Hambok discovery: Yahoo Financial News. (Accessed January 20, 2007, at <http://biz.yahoo.com/iw/070103/0199276.html>.)

TABLE 1  
 ERITREA: PRODUCTION OF MINERAL COMMODITIES<sup>1</sup>

(Metric tons unless otherwise specified)

Commodity <sup>2</sup>	2002	2003	2004	2005	2006 <sup>c</sup>
Basalt	148,424	111,677	499,349	184,027	185,000
Cement <sup>c</sup>	45,000	45,000	45,000	45,000	45,000
Clays:					
Common	225,504	218,539	173,412	3,700,000 <sup>r*</sup>	29,000 <sup>*</sup>
Kaolin	250	281	101	518 <sup>r</sup>	500
Coral	49,297	70,000 <sup>c</sup>	95,131	91,348	92,000
Gold kilograms	--	9	33	25	25
Granite	150,053	140,418	192,803	350,280	350,000
Gravel	220,928	340,125	169,254	219,837	220,000
Gypsum	504	1,284	500	212 <sup>r</sup>	225
Laterite	5,200	832	1,240	44	45
Lime	47,406	5,400	2,915	22,423	22,000
Limestone <sup>c, 3</sup>	2,900	2,900	2,900	2,900	3,000
Marble block* square meters*	12,851	1,777,814	780,733	36,046	36,000
Pumice	212	50	439	56	60
Quartz	215	370	4,496	103	150
Salt	116,268	52,414 <sup>r</sup>	30,754 <sup>r</sup>	63,000 <sup>r</sup>	60,000
Sand thousand metric tons	605	788	611	1,163	1,200
Silica sand	36	40 <sup>c</sup>	46	50 <sup>c</sup>	50

<sup>c</sup>Estimated; estimated data are rounded to no more than three significant digits. <sup>r</sup>Revised. -- Zero. <sup>\*</sup>Correction posted March 13, 2009.

<sup>1</sup>Table includes data available through July 30, 2007.

<sup>2</sup>In addition to the commodities listed, feldspar and talc reportedly were produced, but information is inadequate to estimate output.

<sup>3</sup>For other than cement.

TABLE 2  
 ERITREA: STRUCTURE OF THE MINERAL INDUSTRY IN 2006

(Metric tons unless otherwise specified)

Commodity	Major operating companies	Location of main facilities	Annual capacity
Cement	Eritrea Cement Works	Massawa	45,000

TABLE 3  
ERITREA: MINERAL RESOURCES IN 2006

Deposit	Operating companies	Tonnage <sup>1</sup>	Grade <sup>1</sup>	Mineral content <sup>1</sup>
<b>Bisha:</b>				
Primary zinc zone	Nevsun Resources Ltd.	13.6 Mt	8.8% Zn, 1% Cu, 0.7 Au, and 57 g/t Ag	1.2 Mt Zn, 130,000 t Cu, 770 t Ag, and 10 t Au.
Supergene copper zone	do.	7.83 Mt	3.8% Cu, 0.7 g/t Au, and 30.7 g/t Ag	300,000 t Cu, 240 t Ag, and 6 t Au.
Oxide zone	do.	5.11 Mt	7.1 g/t Au and 30.4 g/t Ag	36 t Au and 155 t Ag.
Primary copper zone	do.	2.1 Mt	3.1% Zn, 0.8% Cu, 0.7 g/t Au, and 32.3 g/t Ag	66,000t Zn, 18,000 t Cu, and 68 t Ag.
Emba Dero <sup>2</sup>	Sub-Sahara Resources NL, 48%; Sunridge Gold Corp., 40%; Africa Wide Resources Ltd., 12%	2.59 Mt	2.36% Zn, 0.39% Cu, 0.1 g/t Au, and 4.5 g/t Ag	61,000 t Zn, 10,000 t Cu, and 12 t Ag.
<b>Debarwa:<sup>2, 3</sup></b>				
Main and footwall zones	do.	1.65 Mt	5.1% Cu and 1.4 g/t Au	84,000 t Cu and 2 t Au.
Leached zone	do.	0.47 Mt	7.07 g/t Au	3 t Au.
Gupo Gold (Adi Nefas Doop) <sup>2</sup>	do.	1.9 Mt	2.99 g/t Au	6 t Au.
Adi Nefas Gossan <sup>2</sup>	do.	1.4 Mt	9.3% Zn, 1.4% Cu, 1.6% Pb, 4.28 g/t Au, and 160 g/t Ag	130,000 t Zn, 20,000 t Cu, 22,000 t Pb, 6 t Au, and 220 t Ag.

<sup>1</sup>Abbreviations used for units of measure in this table include the following: g/t--grams per metric ton; Mt--million metric tons; t--metric tons.

Abbreviations used for commodities in this table include the following: Ag--silver; Au--gold; Cu--copper; Pb--lead; Zn--zinc.

<sup>2</sup>Sub-Sahara indicated that these resource estimates are not in compliance with the standards set by the Australasian Joint Ore Reserves Committee; readers were advised to treat these estimates with caution.

<sup>3</sup>Sub-Sahara Resources NL reported that additional resources at Debarwa were 1.3 Mt; grades are not available.

Sources:

Sub-Sahara Resources NL, 2002, Annual report 2002: Perth, Australia, Sub-Sahara Resources NL, 49 p.

Sub-Sahara Resources NL, 2004, Annual report 2004: Perth, Australia, Sub-Sahara Resources NL, 48 p.

Yu, F.Y., Reddy, Douglas, Breisbois, Ken, and Melnyk, Lydell, 2005, Bisha property, Gash-Barka District, Eritrea—43-101 technical report and preliminary assessment: Oakville, Ontario, Canada, Amec Americas Ltd., 188 p.

