

# 2007 Minerals Yearbook

# ARMENIA

# THE MINERAL INDUSTRY OF ARMENIA

#### By Richard M. Levine and Glenn J. Wallace

Armenia was a major producer of molybdenum and ranked an estimated eighth in the world in mine output in 2007 (Magyar, 2008). Besides molybdenum, Armenia produced other metals, which included copper, gold, silver, and zinc, and industrial minerals, which included cement, diatomite, gypsum, limestone, and perlite. The country also produced aluminum foil using aluminum imported from Russia, and ferromolybdenum, molybdenum metal, and rhenium salt from local ores. It also had developed a diamond-cutting industry based on imported raw materials. The country had almost no domestic mineral fuel production and relied for electric power on a domestic nuclear powerplant and hydroelectric plants. It imported fuel for its nuclear powerplant and natural gas from Russia.

Armenia possesses significant resources of copper, gold, iron, lead, molybdenum, and zinc. It is also has resources of construction material (basalt, granite, limestone, marble, tuff, and so forth), semiprecious stones (agate, jasper, obsidian, and so forth), and other nonmetallic minerals, such as bentonite, diatomite, perlite, and zeolite. The copper, copper-molybdenum, and copper-polymetallic deposits in the north of Armenia contain about 475 million metric tons (Mt) of ore. The Zangezur copper-molybdenum complex possesses large molybdenum reserves, which are concentrated in the Kadzharan deposit. Gold reserves at the Zod deposit, which was being mined by Ararat Gold Recovery Co. (ARGC) are reportedly 80 metric tons (t) (Interfax Russia & CIS Metals and Mining Weekly, 2007a).

#### Minerals in the National Economy

The industrial sector, of which mining and metallurgical production were a part, accounted for about one-third of Armenia's gross domestic product (GDP) (U.S. Central Intelligence Agency, 2009). Mineral products, however, provided a larger portion of Armenia's export revenue earnings. In 2006 (the latest year for which data were available), total exports of goods and services accounted for \$986 million, of which the category precious metals and products accounted for 30.5%; nonprecious metals and products made of them, 28.5%; and mineral products, 13.9%. Armenia's main export partners were the European Union (EU), Iran, Israel, Russia, and the United States. In 2006, imports of goods and services were valued at \$2,191 million, of which the category precious stones and metals and products accounted for 16.7%; mineral products, 14.3%; and nonprecious metals and products made of them, 13.9% (Hovhannisyan, 2007).

#### Production

In 2007, mineral production decreased for two of the country's leading mineral commodities; blister copper production decreased by 21% and cut diamond production decreased by 33%. Significant production increases, however, took place for caustic soda, cement, ferromolybdenum, and zinc concentrate. Data on mineral production are in table 1.

#### Structure of the Mineral Industry

Foreign investors controlled a significant share of Armenia's mineral industry. Armenal, which operated the Kanaker foil mill, was a subsidiary of United Company RUSAL of Russia. The Zangezur copper-molybdenum complex was privatized at the end of 2004, and was owned by Cronimet Mining GmbH from Germany (60%), Open Joint Stock Company (OJSC) Yerevan Pure Iron Works (15%), and Armenian Molybdenum Production LLC (AMP) and LLC Zangezur Mining, which represented the enterprise's former management (12.5% each) (Interfax Russia & CIS Metals and Mining Weekly, 2007f). In 2003, the Agarak copper-molybdenum complex was purchased by Comsup Commodities, Inc. of the United States. The Kapan ore beneficiation plant, which processed copper ore from the Kapan Mine, was purchased by the Deno Gold Mining Co. of Switzerland in 2002 (MBendi Information Services (Pty) Ltd., undated). The country's copper smelter at Alavderdi was owned by the CJSC Armenian Copper Program (ACP). A Liechtensteinregistered firm, Valex F.M. Establishment, owned 81% of ACP and a Russian businessman owned the remaining 19% (Interfax Russia & CIS Metals and Mining Weekly, 2007b). AMP, which produced ferromolybdenum, molybdenum metal, and rhenium salts, was 51% owned by Cronimet Mining GmbH of Germany; and the remaining shares were owned by Armenian residents (Interfax Russia & CIS Metals and Mining Weekly, 2008b). Table 2 is a list of major mineral industry facilities.

#### **Commodity Review**

#### Metals

Aluminum.—The Kanaker aluminum foil rolling mill in Armenia was one of the leading production facilities in Armenia and was the only producer of aluminum foil in the Caucasus and Central Asia regions. Kanaker, together with two Russian foil mills—Sayanal in the Republic of Khakasiya and Urals Foil formed RUSAL's Packaging Division. Kanaker employed more than 600 people (RUSAL, 2007).

In December 2005, after renovations were completed, RUSAL launched production at the Kanaker foil mill. The revamping ensured that the Kanaker mill would have the capacity to produce 18,000 metric tons per year (t/yr) of thin foil and 7,000 t/yr of household foil. Kanaker was to produce only for export, and 97% percent of its exports would be destined for Europe (ArmeniaDiaspora.com, 2008).

**Copper and Molybdenum.**—Armenia's leading producers of copper and molybdenum concentrates were the Zangezur copper-molybdenum complex followed by the Agarak copper-molybdenum complex. Copper mining that did not include molybdenum took place at the Kapan copper complex.

In 2007, ACP reduced blister copper production to 6,954 t, or by 21% compared with output in 2006, because ACP switched

from purchasing copper concentrate from the Zangezur copper-molybdenum complex that had a 26% to 28% copper content to purchasing concentrate with a 14% to 15% copper content from its affiliate CJSC Base Metals. CJSC operated the Drombon copper-gold mine in Nagorno-Kararbakh, a predominately ethnic Armenian enclave in Azerbaijan that had been the subject of warfare and dispute concerning its status between Armenia and Azerbaijan (Interfax Russia & CIS Metals and Mining Weekly, 2007a, 2008a).

Plans called for ACP to develop the Tekhut copper-molybdenum deposit, which was the second largest deposit in Armenia after the Kadzharan copper-molybdenum deposit. Preliminary estimates put Tekhut's ore reserves at 450 Mt of ore containing 1.6 Mt of copper and 800,000 t of molybdenum. ACP planned to mine between 25,000 and 30,000 t/yr of copper and 800 t/yr of molybdenum from this deposit (Interfax Russia & CIS Metals and Mining Weekly, 2007c).

ACP exported all the copper it produced; 90% of the copper was sent to Germany and the remainder went to other European countries. In 2007, ACP exported 7,238 t of blister copper compared with 8,696 t in 2006. ACP exported more copper than it produced in 2007 because ACP had maintained stockpiles of copper (Interfax Russia & CIS Metals and Mining Weekly, 2008a).

The Zangezur copper-molybdenum complex processed 10.4 Mt of ore in 2006 and planned to process the same amount in 2007. The introduction of new capacity would result in Zangezur being able to increase ore processing in 2008 to 15 million metric tons per year (Mt/yr). Projections called for ore processing at Zangezur eventually to increase to between 17 and 18 Mt/yr (Interfax Russia & CIS Metals and Mining Weekly, 2007c).

Ferromolybdenum was produced by AMP and the Yerevan Pure Iron Works. AMP was established in 2003 and began steady operation in 2004. It had the capacity to produce 3,600 t/yr of ferromolybdenum. In 2007, AMP reportedly produced 2,854.4 t of ferromolybdenum, which was a 10.2% increase compared with output in 2006. Its main supplier was the Zangezur copper-molybdenum complex, but it also used imported ores from such countries as Chile, China, Peru, and Russia (Interfax Russia & CIS Metals and Mining Weekly, 2007d; 2008b; Armenian Molybdenum Production LLC, 2008).

#### Outlook

Armenia is positioned to increase its production of copper and molybdenum. Work was being planned to increase production of these metals by increasing extraction of copper and molybdenum ore and by increasing the degree of metal processing to export semifinished metal products instead of raw materials. Armenia would increase its energy supply when the country begins receiving natural gas from Iran through a pipeline that is under construction. The pipeline is being built in two stages; the first stage is scheduled for completion in 2007 and would supply Armenia with 450 million cubic meters per year. Upon expansion to full capacity, Iran would supply Armenia with 2.8 billion cubic meters per year through the pipeline (Interfax Russia & CIS Oil and Gas Weekly, 2007).

#### **References Cited**

ArmeniaDiaspora.com, 2008, Russian metals giant RusAl launches aluminium foil production in Armenia: ArmeniaDiaspora.com. (Accessed February 9, 2009, at http://www.armeniadiaspora.com/ADC/news.asp?id=479.)

Armenian Molybdenum Production LLC, 2008, About us: Armenian Molybdenum Production LLC. (Accessed January 8, 2009, at http://www.amp.am/?page=about.)

Hovhannisyan, Shoghik, 2007, Armenia—Statistical profile: The Sloan Center on Aging and Work at Boston College, Country Statistical Profile No. 7, June. (Accessed September 23, 2009, at http://agingandwork.bc.edu/documents/ CP07\_Workforce\_Armenia\_2009-06-12.pdf.)

Interfax Russia & CIS Metals and Mining Weekly, 2007a, Ararat gold in talks to sell assets in Armenia: Interfax Russia & CIS Metals and Mining Weekly, issue 27, June 29-July 5, p. 14.

Interfax Russia & CIS Metals and Mining Weekly, 2007b, Armenian copper program reduces blister output 22% in 2006: Interfax Russia & CIS Metals and Mining Weekly, issue 3, January 12-18, p 18.

Interfax Russia & CIS Metals and Mining Weekly, 2007c, Armenian copper to invest up to \$250 mln in copper-molybdenum deposit: Interfax Russia & CIS Metals and Mining Weekly, issue 45, November 2-8, p. 18.

Interfax Russia & CIS Metals and Mining Weekly, 2007d, Armenia's AMP boost ferromolybdenum output 35% in 2006: Interfax Russia & CIS Metals and Mining Weekly, issue 4, January 19-25, p. 23.

Interfax Russia & CIS Metals and Mining Weekly, 2007f, Armenia's Zangezur aims to process 50% more ore in 2008: Interfax Russia & CIS Metals and Mining Weekly, issue 42, November 12-18, p. 16.

Interfax Russia & CIS Metals and Mining Weekly, 2008a, ACP reduces unrefined copper production 21% in 2007: Russia & CIS Metals and Mining Weekly, v. 18, issue 1, December 28–January 10, p. 5, 6.

Interfax Russia & CIS Metals and Mining Weekly, 2008b, Armenia's pure iron raises ferromolybdenum output 10% in 2007: Interfax Russia & CIS Metals and Mining Weekly, v. 17, issue 2, p. 16.

Interfax Russia & CIS Oil and Gas Weekly, 2007, Armenia could get 2.8 bcm of gas per year from Iran starting in 2008: Interfax Russia & CIS Oil and Gas Weekly, issue 5, February 1-7, p. 21.

Magyar, M.J., 2008, Molybdenum: U.S. Geological Survey Mineral Commodity Summaries 2008, p. 112-113.

MBendi Information Services (Pty) Ltd., [undated], Armenia—Mining: Copper Mining, February. (Accessed February 15, 2008, at http://www.mbendi.co.za/ indy/ming/cppr/as/am/p0005.htm.)

RUSAL, 2007, Armenal: RUSAL. (Accessed November 9, 2007, at http://www.rusal.com/index.php?lang=eng&subtopic=57&subtopic2=72&sub `topic3=95&topic=3.)

U.S. Central Intelligence Agency, 2009, Armenia, *in* The world factbook: U.S. Central Intelligence Agency, September 11. (Accessed September 23, 2009, at https://www.cia.gov/library/publications/the-world-factbook/geos/am.html.)

## TABLE 1 ARMENIA: PRODUCTION OF MINERAL COMMODITIES<sup>1</sup>

#### (Metric tons unless otherwise specified)

Commodit	у	2003	2004	2005	2006	2007
METALS	5					
Aluminum, foil		9,317	6,193		945 <sup>r</sup>	12,256
Copper:						
Concentrate, Cu content		18,068	17,700 <sup>e</sup>	16,256	18,000 <sup>r</sup>	17,600 <sup>e</sup>
Blister, smelter, primary		6,259 <sup>r</sup>	9,470 <sup>r</sup>	9,881	8,791	6,954
Ferroalloys:						
Ferromolybdenum		1,674 <sup>r</sup>	2,709 <sup>r</sup>	5,566 <sup>r</sup>	4,865 r	5,977
Ferrotungsten		NA	NA	8	42	45
Gold, mine output, Au content	kilograms	1,800	2,100	1,400	1,400	1,400 <sup>e</sup>
Molybdenum:						
Concentrate, Mo content		2,763	2,950 °	3,030	4,088 <sup>r</sup>	4,295
Metal		NA	NA	270	487	500
Rhenium <sup>e</sup>	kilograms	1,000	1,000	1,200	1,200 <sup>r</sup>	1,200
Silver <sup>e</sup>	do.	4,000	4,000	4,000	4,000	4,000
Zinc, concentrate, Zn content		2,056	1,927	3,196	4,454 <sup>r</sup>	4,924
INDUSTRIAL MI	NERALS					
Barite		240	561	590	600	600
Caustic soda		1,800	2,800	6,200	4,166 <sup>r</sup>	5,484
Cement	thousand metric tons	384	501	605	625	722
Clays:						
Bentonite		55,000	40,000	38,000	37,000	40,000
Bentonite, powder		642 <sup>e</sup>	561 <sup>r</sup>	732	720	1,129
Diamond, cut	thousand carats	400	263	222	184	123
Diatomite		230	200	190	180	200
Gypsum		57,835 <sup>r</sup>	51,400 <sup>r</sup>	44,200	43,700 <sup>r</sup>	54,600
Limestone	thousand metric tons	13,000	16,000 <sup>e</sup>	17,000	17,000 <sup>e</sup>	18,000
Perlite		106,623 <sup>r</sup>	29,996 <sup>r</sup>	49,963 <sup>r</sup>	35,000 <sup>e</sup>	35,000 <sup>e</sup>
Salt		31,854 <sup>r</sup>	31,625 <sup>r</sup>	34,682 <sup>r</sup>	37,000	34,800
MINERAL FUELS AND REL	ATED MATERIALS					
Natural gas, dry	million cubic meters	NA	NA	NA	1,596	2,285

<sup>e</sup>Estimated; estimated data are rounded to no more than three significant digits. <sup>r</sup>Revised. do. Ditto. NA Not available. -- Zero.

<sup>1</sup>Table includes data available through September 30, 2009.

## TABLE 2 ARMENIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2007<sup>1, 2</sup>

#### (Metric tons unless otherwise specified)

Commo	odity	Major operating companies, main facilities, or deposits	Location or deposit names	Annual capacity <sup>e</sup>
Aluminum, rolled and foil		ARMENAL (formerly Kanaker aluminum plant) (United Company RUSAL)	K'anak'err	25,000
Copper:		Parilléire in annations		20,000,3
Mine output, Cu content		Agarak copper-molybdenum mining and processing complex [Comsup Commodities, Inc. (United States)]	Agarak	30,000 *
		Kapan mining complex [Deno Gold Mining Company (Switzerland)]	Kapan	
		Zangezur copper-molybdenum complex [Cronimet Mining GmbH (Germany), 60%; OJSC Yerevan	Kadzharan	
		Pure Iron Works, 15%; Armenian Molybdenum		
		Production LLC (AMP), 12.5%; LLC Zangezur		
		Mining, 12.5%]		
		Facilities apparently not in operation:		
		Akht'ala mining complex	Akht'ala	
		Shamlugh mining complex	Shamlugh	
Blister		CJSC Armenian Copper Programme (ACP) (Valex F.M. Establishment, 81%, and Russian	Alaverdi	15,000
		businessman, 19%)		
Diamond, cut stones		Aghavni diamond-cutting works <sup>4</sup>	Nor Geghi	NA
Do.		Amma group diamond-cutting works <sup>4</sup>	Artashat	NA
Do.		Andranik-Dashk diamond-cutting works	Nor Hachyn	NA
Do.		Arevakn diamond producing plant	do.	NA
Do.		Diamond Company of Armenia (DCA)	Yerevan	NA
Do.		Diamond Tech	Talin	NA
Do.		Lori diamond-cutting works	Nor Hachyn	NA
Do.		Lusampor <sup>4</sup>	Melik'gyugh	NA
Do.		Punji diamond-cutting works <sup>4</sup>	Yerevan	NA
Do.		Sapphire diamond-cutting works	Nor Hachyn	NA
Do.	thousand carats	Shoghakan gem-cutting plant	do.	120
Gold	kilograms	Zod mining complex	Zod	2,000
Do.		Megradzor deposit	Megradzor	NA
Do.		Lichkvazkoye, Shaumyanskiy Rayon, Sotkskoye, and Terterasarskove deposits	NA	NA
Iron ore		Hrazdan deposit	Sulagyan Mountains	NA
Molvbdenum:		1		
Mine output, Mo content		Agarak copper-molybdenum mining and processing complex [Comsup Commodities, Inc. (United States)]	Agarak	2,000
Do.		Zangezur copper-molybdenum complex [Cronimet Mining GmbH (Germany), 60%; OJSC Yerevan Pure Iron Works, 15%; Armenian Molybdenum Production LLC (AMP), 12.5%; LLC Zangezur	Kadzharan	20,400
		Mining, 12.5%]		
Metal, ferromolybdenum		Armenian Molybdenum Production LLC (AMP)	NA	3,600
-		[Cronimet Mining GmbH (Germany), 51%;		
		Armenian residents, 49%]		
Do.		QISC Yerevan Pure Iron Works	Yerevan	NA
Perlite	thousand metric tons	Aragats-Perlite mining-heneficiation complex	Aragats deposit	1 110
Zina mina output Zn and	nt	Kapan mining complex [Dong Cold Mining Co	Vanan	1,110 NTA
Zine, nine output, Zn conter	m	(Switzerland)]	каран	INA

See footnotes at end of table.

#### TABLE 2—Continued ARMENIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2007<sup>1, 2</sup>

<sup>e</sup>Estimated; estimated data are rounded to no more than three significant digits. Do., do. Ditto. NA Not available.

<sup>1</sup>Table includes data available through September 30, 2009.

<sup>2</sup>Many location names have changed since the breakup of the Soviet Union. Many enterprises, however, are still named or commonly referred to based on the former location name, which accounts for discrepancies in the names of enterprises and that of locations.

<sup>3</sup>Capacity estimates are totals for all enterprises that produce that commodity.

<sup>4</sup>Current existence of enterprise cannot be confirmed.