

2008 Minerals Yearbook

YEMEN

THE MINERAL INDUSTRY OF YEMEN

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Yemen has substantial reserves of metallic and nonmetallic minerals, which could be mined to increase the mineral industry's contribution to the national economy. Except for hydrocarbon production, which had been an important source of revenue for the Government in recent years, Yemen was not a significant contributor to the world's mineral supply. In 2008, Yemen suffered natural disasters, including floods in the Hadramawt and the Al Mahrah Governorates, as well as political turmoil, including the ongoing conflict between the Government and Al-Houthi rebels, which continued to have an adverse effect on mining activity in the conflict area in and around the Sa'dah Governorate in northwestern Yemen.

Minerals in the National Economy

In 2008, crude oil exports were valued at \$7.77 billion, or 11.0% of the gross domestic product (GDP), compared with \$6.26 billion, or 11.8% of the GDP, in 2007. The oil sector accounted for 90% of total merchandise exports and about 73% of Government revenue. The International Monetary Fund projected that Yemen's hydrocarbon exports in 2009 would be reduced in value by 30%, or by 6.1% of the GDP. The Government had been concentrating on the production and exporting of liquefied natural gas (LNG) to compensate for the expected revenue losses from the projected decline in crude oil production. Net direct investments in the LNG sector, which were \$1.20 billion in 2006, increased to \$1.79 billion in 2007, then decreased to \$875 million in 2008. Yemen exported 44.5 million barrels (Mbbl) of crude oil in 2008 compared with 42.4 Mbbl in 2007 and 63.7 Mbbl in 2006. Yemeni crude oil exports and refinery products were received by China (39.0%), Thailand (30.0%), South Africa (14.8%), India (9.1%), Malaysia (4.5%), and Singapore (2.6%). Domestic sales of Yemeni crude oil included 24.4 Mbbl to the Aden refinery and 3.1 Mbbl to the Marib refinery (Middle East Economic Digest, 2008, p. 38; International Monetary Fund, 2009, p. 25).

Government Policies and Programs

Article 8 of the Constitution gives the state ownership of the country's mineral and energy resources. Metallic and industrial mineral exploration and production operations were governed by the Mines and Quarries law No. 24 of 2002. Mineral projects also were subject to the provisions of the Investment law No. 22 of 2002. A new mining law and regulations were prepared by the Yemen Geological Survey and Mineral Resources Board (GSMRB) under the Yemen Mining Policy Reform Project with the help of the International Finance Corp. (IFC) of the World Bank Group and Yemen's Ministry of Oil and Minerals. The new law, which emphasizes transparency, efficiency, and accountability, was expected to be presented to the Parliament for approval in 2009. The proposed law would apply an 8% royalty for precious stones, a 5% royalty for nonmetallic

minerals, and a 3% royalty for metallic and other minerals. The law also proposes a 30% to 35% income tax on remitted dividends and an exemption of import duties during mine construction (Yemen Geological Survey and Mineral Resources Board, 2009a).

Production

In 2008, cement production increased by about 22%, which was attributable to the startup of a new production line at the state-owned Amran plant, which was operated by Yemen Cement Corp., and to the partial year production of National Cement Co.'s plant at Wadi Saim, which was the first privately owned plant in Yemen. In 2008, crude oil production decreased by 8% compared with a 13% decrease in 2007, thus extending the downward trend in production following the peak of 160 Mbbl achieved in 2001. The decrease in crude oil output in 2008 (33% less than that of 2001) was attributable to the depletion of oil reserves. Yemen also produced gypsum, limestone, natural gas, and salt for domestic use and export (table 1).

Structure of the Mineral Industry

The GSMRB is one of the agencies of the Ministry of Oil and Minerals. The agency is responsible for promoting investment in Yemen's mining sector and disseminating information on the mineral resources of Yemen, including copper, gold, lead, nickel, platinum-group metals (PGM), and zinc. The GSMRB identified seven occurrences of gold mineralization in Yemen that were minable. The Precambrian basement of Hadramawt Governate had four such locations (the Al-Harigah, the Hiro, the Musayani, and the Wadi Madan); two other locations [the Al-Wazeyaah (Ta'iz,) and the Waraqah (Dhamar)] had Tertiary volcanic-hosted gold mineralization, and one location [the Am Surrah-Habalain (Abyan)] had sediment-hosted gold mineralization. Several occurrences of copper, nickel and PGM mineralization were identified, including the Al-Humurah, the Al-Qabyta, the Qaifa, the Salibah, the Suwar, and the Wadi Marbar (Yemen Geological Survey and Mineral Resources Board, 2009b, c).

As of November 2008, 16 mining companies were registered with the GSMRB to search for, explore, or exploit base-metals, precious metals, and industrial mineral resources in Yemen. These companies were Ansan Wakfs (Hadramaut) Ltd. of the United Kingdom and Yemen, which had a license to search for rare-earth minerals; Arab Mining Co. of Jordan, which held a prospective permit to search for dolomite and magnesite; Arabian Limestone and Dolomite Co. S.A. of India and the United Kingdom, which was licensed to explore for dolomite and limestone; Cantex Mine Development Corp. of Canada, which was exploring for copper, gold, nickel, and platinum; CC Mining Co. S.A. of Panama; Jabal Salab Co. (Yemen) Ltd. of the Cayman Islands and Yemen, which was mining a zinc oxide deposit; Meshreq Iron Ore Mining and Trading Co. of India, which had an exploration permit for titanium; Nagarjuna Corp. Ltd. of India, which was registered to explore for gold; Naine Mineral Resources of Singapore; Minerals and Metal Resources Shabbir Co. Ltd. of India, which held an iron ore exploitation contract and iron ore exploration license; Thani Dubai Mining of the United Arab Emirates, which was exploring for gold; Triton Resources Pty Ltd. of Australia, which held an exploration license for metallic minerals; Stone Resources (Yemen) Ltd. of China, which held a search permit for cobalt, copper, and nickel; Volrock Mining Ltd. of Saudi Arabia and the United Kingdom, which had a permit to explore for gold; Yemen Iron Steel Ltd., which was exploring for iron ore; and 3S Mineral Ltd. of India and the United Kingdom, which was quarrying chalk limestone (Yemen Geological Survey and Mineral Resources Board, 2008).

Natural gas and petroleum exploration and production activities were managed by the Petroleum Exploration and Production Authority of the Ministry of Oil and Minerals. About 34% of the crude oil produced in Yemen in 2008 was refined by state-owned Aden Refinery Co. and 4% was refined by Yemen Oil Refining Co. (Yemen Oil Refining Co., 2008).

Commodity Review

Metals

Cobalt, Copper, and Nickel.—Cantex began drill tests of the Suwar nickel-copper-cobalt deposit following the completion of an 11-hole drilling program at the Wadi Qutabah project. Cantex, which wholly owned the exploration license, planned to complete a prefeasibility study of the Suwar project by mid-2012. In November 2008, Companhia Vale Do Rio Doce (CVRD) of Brazil committed a \$2 million option to the project, drilled near the mineralization area discovered by Cantex, collected and analyzed soil samples, and performed geophysical surveys. Cantex and CVRD were trying to discover a continuous mineralization that would make the prefeasibility study worth additional investment (Cantex Mine Development Corp., 2009).

Zinc.—The GSMRB mapped 16 zinc-lead-silver occurrences that were concentrated in the rift valley that extends from the Gulf of Eden coast on the Arabian Sea to Jabal Al-Ahmar, which is located northwest of Sana'a. However, the Jabal Salab and the Tabaq deposits were considered to be the main areas of zinc-lead mineralization (Yemen Geological Survey and Mineral Resources Board, 2009d).

Jabal Salab Co., which was registered in the Cayman Islands and owned jointly by ZincOx Resources p.l.c. of the United Kingdom (52% interest) and Ansan Wikfs Investments Ltd. of Yemen (48%), continued with construction of the Jabali zinc-lead-silver mine, which was the first large-scale metal mine in Yemen. The Jabali Mine is located in the Nehim area about 110 kilometers (km) northeast of Sana'a. Production was expected to begin in the first quarter of 2010. The mine would treat 800,000 metric tons per year (t/yr) of zinc ore for more than 12 years using an open pit with a 2:1 strip ratio. The deposit was estimated to contain 12.6 million metric tons (Mt) of oxide ore grading 1.2% lead, 68 grams per metric ton silver, and 8.9% zinc, and minable reserves were estimated to be 8.7 Mt grading 9.2% zinc with a cutoff grade of 4.4%. The ore would be crushed, calcined, and milled to produce 70,000 t/yr of zinc oxide (Yemen Geological Survey and Mineral Resources Board, 2009d; ZincOx Resources plc, 2009, p. 10).

Industrial Minerals

Cement.—The Government proposed building five new cement plants to increase the national cement production capacity to 7 million metric tons per year (Mt/yr) by 2009 to reduce the country's reliance on imported cement. Yemen imported 1.942 Mt in 2007 from such countries as Oman and Pakistan. According to the latest available Government statistics, Yemen produced 1.73 Mt and consumed 3.67 Mt of cement in 2007. The production capacity in 2008 was estimated to be 3 Mt.

In June 2008, the IFC, which is the private sector development organization of the World Bank Group, approved a loan of \$70 million of its own funds and arranged for another \$55 million in loans from commercial banks for the construction and operation of a greenfield integrated cement plant for Arabian Yemen Cement Co. Ltd. at Al-Oyoun, which is located 60 km north of the Port of Mukalla (the capital of Hadramawt Governorate). The cost of the plant, which covers 22 square kilometers, was estimated to be \$260 million. The plant would have 1.5-Mt/yr production capacity of portland, salt, and sulfate-resistant cement. Sinoma International Engineering Co. Ltd. of China signed a turnkey contract to build the factory under the supervision of Hotec Consulting Private Ltd. of India. The plant was owned by the Eastern Province Cement Co. of Saudi Arabia and other Yemeni investors. Initial production from the plant was expected to commence in 2009 (International Finance Corp., 2008; Zawya Ltd., 2009a, b).

In July 2008, National Cement Co. began production at its greenfield cement plant in Wadi Saim, which is located 70 km northeast of the city of Aden. The 1.5-Mt/yr-capacity plant, which was powered by coal, was the first privately owned cement plant to commence production in Yemen. The plant was owned by Hayel Saeed Anam Group and another 4,000 shareholders (National Cement Co., 2008).

Mineral Fuels

Natural Gas.—Yemen's proved gas reserves at the end of December 2008 were estimated to be 556 billion cubic meters (18.215 trillion cubic feet). Eighty-one percent of the gas reserves was in the Marib-Block 18 and 7% was in the Jennah-5 gasfield (Ministry of Oil and Minerals, 2009, p. 76).

The construction of a two-train 6.7-Mt/yr-capacity natural gas liquefaction plant and related dock facilities at the Belhaf terminal on the Gulf of Aden for Yemen LNG Co. continued in 2008. The project, which began in 2005, included establishing a 320-km natural gas pipeline to carry the dry gas produced from Block 18 fields in the Marib-Jawf region of central Yemen to the natural gas liquefaction plant at Belhaf in the south. The \$4.5 billion that was invested in the Yemen LNG project was considered the single largest investment ever made in the

country. The first shipment of LNG was expected by yearend 2009 using four LNG carriers that were being built in Japan with a total capacity of 644,000 cubic meters. The shareholders of Yemen LNG Co. were as follows: Total S.A. of France, 39.62%; Hunt Oil Co. of the United States, 17.25%; Yemen Gas Co., 16.73%; SK Energy Co. Ltd., 9.55%; Korea Gas Corp., 6.00%; Hyundai Corp. of the Republic of Korea, 5.88%; and the General Authority for Social Security and Pensions of Yemen, 5.00% (Ministry of Oil and Minerals, 2009, p. 76; Yemen LNG Co., 2009).

Petroleum.—In November 2008, the Government of Yemen, Korea National Oil Corp., and Total formed a joint venture to explore for gas and oil in the onshore Block 70 located southeast of the Marib Basin. The block was held by Daesung Industrial Co. Ltd. and Samsung C&T Corp. (both of the Republic of Korea), Total, and Yemen General Corporation for Oil and Gas. In 2008, Yemen produced 294,000 barrels per day out of its proven crude oil reserves, which were estimated to be 3 billion barrels. Yemen exported 44.5 Mbbl of crude oil, about 46% of which was from Al Masila field. Two oil discoveries were reported in the Sharnah-1 well of Block 47 and in the basement near the Henin-1 well of Block 71 (Petroleum Economist, 2008; Public Exploration and Production Authority, 2008; Organization of Arab Petroleum Exporting Countries, 2009, p. 9, 19).

Outlook

The Government, with the help of the IFC, continued to promote investment in Yemen's mineral resources, especially the development of its known mineral deposits, which included clays, feldspar, gold, iron ore, lead, limestone, perlite, PGM, quartz, salt, silica sand, silver, and zeolite. Yemen's crude oil resources are depleting quickly and the deficit in Government revenue because of declining oil production has pressed the Government to invest in the development of large natural gas reserves and to begin exporting LNG in late 2009. Zinc (and possibly lead and silver) production from the Jabal Salab Mine is expected to start in 2010. The volume of cement production will increase with the commencement of the new cement plants that are being built. Political unrest, especially the conflict between the Government and the Al-Houthi opposition groups, which continued throughout 2008 north of Sana'a, is likely to continue to have an adverse affect on the development of mineral production in northwestern Yemen.

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TABLE 1 YEMEN: PRODUCTION OF MINERAL COMMODITIES¹

(Thousand metric tons unless otherwise specified)

Commodity ² Cement Gypsum		2004	2005	2006	2007	2008
		1,546 37	1,550 38	1,470 44	1,728 44	2,111 50
Gross millio	on cubic meters	28,500	29,500	28,100	29,200 r	29,600
Dry	do.	731 ^r	758 ^r	788 ^r	820 ^r	842
Liquids thousand 42-gallon barrels		3,650 r	3,650 r	3,650 r	3,650 r	3,650
Petroleum:						
Crude	do.	147,500	146,100 ^r	133,500 r	116,700 ^r	107,400
Refinery products:						
Liquefied petroleum gas	do.	475 ³	438 ³	438 ^{r, 3}	438	438
Naphtha	do.	1,100	1,200	1,200 3	1,400	1,400
Gasoline	do.	7,665 ^{r, 3}	5,110 ^{r, 3}	5,110 ^r	5,110 ^r	5,110
Kerosene do.		6,972 ^{r, 3}	4,052 ^{r, 3}	4,052 ^r	4,052 ^r	4,052
Distillate fuel oil do.		10,330 ^{r, 3}	7,775 ^{r, 3}	7,775 ^r	7,775 ^r	7,775
Residual fuel oil do.		18,400 ^{r, 3}	14,750 ^{r, 3}	14,750 ^r	14,750 ^r	14,750
Other do.		5,161 ^{r, 3}	3,723 ^{r, 3}	3,723 ^r	3,723 ^r	3,723
Total	do.	50,103 ³	37,048 3	37,048 r	37,248 r	37,248
Salt ^e		88	90	100	100	100
Sand and gravel ^e		668	1,030	1,162	1,200	1,200
Stone:						
Marble thousand	square meters	97	100	127	130	130
Other quarried stone		2,269	3,533	3,986	4,000	4,000

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

¹Table includes data available through November 30, 2009.

²In addition to the commodities listed, aggregate, feldspar, limestone, mica, pumice, rolled-steel bars, scoria, silica sand, talc, and zeolites may have been produced but available information is inadequate to make a reliable estimate of output.

³Reported figure.

TABLE 2YEMEN: STRUCTURE OF THE MINERAL INDUSTRY IN 2008

(Metric tons unless otherwise specified)

	Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Cement		Amran Cement Factory (Yemen Cement Manufacturing and Marketing Co., 100%)	Kilns and mills at Amran	1,500,000
Do.		Al Barh Cement Factory (Yemen Cement Manufacturing and Marketing Co., 100%)	Kilns and mills at Mafraq near Taiz	580,000
Do.		Bajil Cement Factory (Yemen Cement Manufacturing and Marketing Co., 100%)	Kilns and mills at Bajil	262,000
Do.		Yemen Cement Co.	Wadi Saim, Aden	1,500,000
Natural gas	million cubic meters	Safer Exploration and Production Operations Co. (Government, 100%)	Block 18	20,000
Do.	do.	Yemen Exploration and Production Co. (Yemen Hunt Oil Co., 51%, and Exxon Yemen, Inc., 49%)	Block 14	10,000
Petroleum:				
Crude million 42-gallon	million 42-gallon barrels	Crude oil was produced under production-sharing agreements,	Oilfield on Blocks 4, 5, 9,	160
		with joint ventures that included domestic or international	10, 14, 18, 32, 43, 51,	
		companies, and one Government-owned operation	53, S-1, and S-2	
Refined	42-gallon barrels per day	Aden Refinery Co. (Government, 100%)	Refinery at Aden	120,000
Do.	do.	Yemen Oil Refining Co. (Yemen Hunt Oil Co. and	Topping plant at Marib	20,000
		Exxon Yemen, Inc., 75.5%, and Yukong Group, 24.5%)		
Salt:				
Crude:				
Marine		Local private companies	Eleven saltworks near Aden	150,000
Rock		do.	Five salt mines near Salif	140,000
Refined		Salt Refining and Packing Factory (Government)	Salif	NA
Do.		Aden Salt Factory (Government)	Aden	NA
Steel, rolling mill	S	Arab Iron and Steel Corp.	do.	40,000
Do.		Mukalla Iron and Steel Co.	Rayan	120,000 2
Do.		Yemen Steel Manufacturing Company Ltd. (Al-Rhabi Trading Group, 100%)	Al Hodeidah	120,000
Stone, block, crushed, or dimension		About 1,900 local private companies	Dhamar, Mayana, Sana'a, Taiz, and Wadi Marek areas	NA

Do., do. Ditto. NA Not available.

¹Most produced natural gas was stripped of hydrocarbon liquids and reinjected into oil reservoirs.

²Under construction.