

THE MINERAL INDUSTRY OF

IRAN

By William S. Kirk

Iran continued to rebuild its economy and to move toward independence from oil revenues. The value of industrial output reached US\$15.4 billion per year with the mining and metals sectors accounting for 24% (Mining Journal, 1997).

Government Policies and Programs

The current Five-Year Plan (1995-99) pursues two main development strategies—industries based on natural resources, in particular natural gas, mines, and metal products, and export-oriented industries. The highest priority is given to the development of mineral resources and the production of intermediate and final metal products, particularly steel, aluminum, copper, and zinc.

Structure of the Mineral Industry

The overall management of the minerals sector was under the auspices of the Ministry of Mines and Metals. The Ministry's authority covers all mining, smelting, and refining industries except oil and gas, which were under the Ministry of Petroleum.

The Government continued to emphasize privatization of the mining industry. This included mostly small mines and excluded large operations such as the Sar Cheshmeh copper complex; the Chadormalu, the Choghart, the Gol-e Gohar, and the Sangan iron deposits; and the Angouran lead-zinc mine, although many of the operations, which were for sale, did not attract buyers because they had deteriorated as the result of ineffective management and lack of technical expertise in the 1980's.

Commodity Review

During the year, 42 mineral commodities, excluding sand and gravel, were produced from 1,785 mines with a crude ore output of 74 million metric tons (Mt). Iran's exports of metals and minerals were valued at US\$645 million.

Metals

Aluminum.—The first phase of construction and installation work on the Al-Mahdi aluminum plant at Port Bandar Abbas in the Strait of Hormuz was completed. The US\$1.6 billion project was expected to come onstream with a capacity of 110,000 metric tons per year (t/yr) in 1997. The final capacity of 220,000 t/yr was expected to be reached in 2000. Development of the 22 Mt bauxite deposit at Jajarm and the

construction of a 100,000-t/yr-capacity alumina refinery plant were begun. Iran also plans to produce alumina from the nepheline syenite deposits at Kaleybar and Sarab in eastern Azerbaijan Province.

Chromium.—Iran's first ferrochromium production plant began operating in Bandar Abbas. The plant, with four furnaces, is expected to have a production capacity of 60,000 t/yr (Ettala'at, 1996).

Copper.—National Iranian Copper Industries Co. produced about 14 Mt of crude copper ore at the Sarcheshmeh copper complex west of Rafsanjan in Kerman Province. From that crude ore, 367,000 metric tons (t) of copper concentrate and, in turn, 126,000 t of anode and 93,000 t of cathode was produced. An expansion project at the complex was expected to add heap leaching facilities with a solvent extraction-electrowinning plant, which, in turn, was expected to add 14,000 t/yr of capacity. To improve the production of the Songoon and Mazraeh copper mine and concentrator at Ahar in east Azerbaijan Province, a US\$350 million barter-trade agreement was signed with China. Iran expects to increase annual copper production to 250,000 t/yr by the end of the current Five-Year Plan in 1999.

Gold.—The Mouteh gold mine and smelter produced 255 kilograms of gold. Two new mines are being developed at Zarkouh, south of Damghan, and at Zar-e Shouran, southwest of Zanjan.

Iron and Steel.—Steel production by the National Iranian Steel Co. (Nisco), the Isfahan blast furnace, the direct reduction plants of Mobarakeh, and the Khoustan steel complex at Ahwaz totaled 5.7 Mt, up from 4.9 Mt in 1995. Nisco became the world's 30th largest steelmaker in 1996. The increased steel production prompted increased iron ore production in an effort to achieve Iran's goal to become self-sufficient in iron ore.

Iran has four main iron ore deposits that are currently being mined or are under development—Chadormalu, Choghart, Gole Gohar, and Sangan. The Chadormalu Mine and concentrator, 125 kilometers (km) northeast of Yazd, is being developed and is expected to be in operation by the end of 1997. The US\$900 million project is projected to produce 5.1 million metric tons per year (Mt/yr) of ore per year. The Choghart iron ore mine at Bafq near Yazd supplies about 5.2 Mt/yr year to the Isfahan steelworks. The addition of a US\$115 million ore processing plant is underway. The Gol-e Gohar Mine, 55 km southwest of

Sirjan, provides 2.5 Mt/yr of iron ore concentrate to the Mobarakeh steel complex. Its capacity is expected to rise to 5 Mt/yr of concentrate by 1999. The Sangan Mine, about 250 km southeast of Mashad close to the border with Afghanistan, is under development and is expected to have an initial capacity of 3.4 Mt/yr of concentrate (Metal Bulletin, 1996b).

Lead-Zinc.—The Nation's lead and zinc production was derived from six mines, of which three are the principal producers—the largest, Angouran, southwest of Zanjan; Irankuh, on the outskirts of Isfahan; and Kushk-Bafq, near Yazd. The country planned to invest US\$300 million to increase its zinc metal production. It was constructing a smelter in Bafgh, 580 km southeast of Tehran, which was expected to produce 30,000 t of zinc in 1997, eventually reaching 50,000 t/yr. As part of the Government's investment, a 7,000-t/yr smelter in the northwestern city of Zanjan, a 7,000-t/yr smelter in Bandar Abbas on the Arabian Gulf, and three smaller units were also nearing completion. Exploratory work at Mehdiabad in Yazd Province has been completed (Metal Bulletin, 1996a).

Industrial Minerals

Iran is a major producer of industrial minerals. It is the world's third largest producer of gypsum, is one of the leading producers of cement in the Middle East, and has 27 phosphate mines. New mining projects are underway for phosphate, magesite, celestite, asbestos, and titano-magnetioxide (Global Cement Report, 1996).

Mineral Fuels

Although production at Nisco's coal mines increased to 1.2 Mt, the steel mill at Isfahan had to import about 500,000 t of coking coal. Development of the major coal mining project at Tabas in the remote area of Khorassan was begun.

Reserves

Published reserves data were inadequate to provide a meaningful inventory of Iran's mineral resources. The Oil Ministry has reported the country's total oil reserves to be 90,000 million barrels. The Geological Survey of Iran was actively involved in a number of exploration programs for base and precious metals.

Infrastructure

Efforts were being made to rehabilitate or improve transportation facilities throughout the country. The construction of the Trans-Asian railway (298 km long, connecting Mashad in northeast Iran to Tajan in Turkmenistan) was completed and became operational. It was to provide access for Middle Eastern countries to international waters south of Iran.

Outlook

Iran has a number of comparative advantages in terms of steel production. Low labor costs, cheap energy from natural gas, sizable if low-grade iron ore deposits, and domestic supplies of coking coal and limestone should support the development of a significant steel industry.

The Government's main challenge was the successful implementation of its economic restructuring phase. Expansion of the mineral industry can be expected as trends favoring privatization and foreign investment continue.

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Major Sources of Information

Geological Survey of Iran
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TABLE 1
IRAN: PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Metric tons unless otherwise specified)

Commodity	1992	1993	1994	1995	1996 e/
METALS					
Aluminum:					
Bauxite, gross weight e/	100,000	100,000	100,000	100,000	100,000
Metal, primary ingot	117,230	109,190	116,000	118,000 e/	118,000
Arsenic, orpiment and realgar, concentrates e/	492 3/	500	500	500	500
Chromium, chromite, mine output: Concentrate (48% to 50% Cr₂O₃):					
Gross weight	130,265	114,780	129,000 e/	129,000 r/ e/	129,000
Cr ₂ O ₃ content e/	64,000	64,000	64,000	64,000	64,000
Copper:					
Mine output:					
Ore mined (1% to 1.2% Cu):					
Gross weight	9,230	10,800	12,400	13,150	13,000
Cu content	108,000	86,600	100,040	120,000 e/	120,000
Concentrate (29% to 35% Cu):					
Gross weight e/	304,000 3/	290,000	360,000	325,000	320,000
Cu content	105,400	86,600	117,900	102,200 r/	107,600
Metal:					
Smelter output, blister/anode					
Refined output, cathode	86,400	85,000	123,800	81,300 e/	82,000
Gold, mine output, Au content	101,800	84,900	90,200 r/	90,400 r/	99,100
Iron and steel:	500 e/	417	723	650 e/	650
Ore and concentrate:					
Gross weight	5,647	9,870	8,690	9,080 e/	9,000
Fe content e/	3,000	4,800	4,300	4,500	4,500
Metal:					
Pig iron	2,053	1,961	1,883	1,532	1,867 3/
Direct-reduced iron	709	1,631	2,861	3,301	3,778 3/
Ferrous alloys, ferrochromium e/	--	--	5	115 r/ 3/	150 3/
Steel, crude, ingots and casting	3,081	3,672	4,498	4,696	5,415 3/
Lead:					
Mine output, concentrate (56% to 60% Pb):					
Gross weight	20,000	22,000	30,000	30,000 e/	30,000
Pb content	12,400	14,700 r/	18,300	15,900 r/	15,700
Refinery output, includes secondary	42,000	52,000	51,000	45,000 r/	47,000
Manganese, mine output, (30% to 35% Mn):					
Gross weight	38,475	75,978	75,000 e/	75,000 r/ e/	75,000
Mn content e/	12,000	25,000	25,000	25,000	25,000
Molybdenum, mine output, concentrate (56% Mo): e/					
Gross weight	1,510 3/	1,200	1,200	1,600	1,600
Mo content	847 3/	700	670	560	560
Silver, mine output, Ag content e/	50	60	60	60	60
Zinc, mine output, concentrate (50 to 55% Zn):					
Gross weight e/	132,000 r/	154,000 r/	146,000	290,000 r/	152,000
Zn content	66,000 r/	77,000 r/	73,000 r/	145,000 r/	76,000
INDUSTRIAL MINERALS					
Asbestos:					
Concentrate, (3% to 8% marketable fiber)					
Marketable fiber e/	86,200	80,000 e/	80,000	65,000 e/	65,000
Barite	4,300	4,500	4,500	4,500 r/	4,500
Boron, borax e/	181,174	226,377	139,000 r/ e/	150,000 r/	150,000
Cement, hydraulic e/	420 3/	500	500	500	500
Clays:	15,200	16,000	16,000	16,300	16,500
Bauxite and refractory clays e/					
Bentonite	215,000 3/	220,000	220,000	220,000	220,000
Other:	62,000	53,667	70,000	32,000 e/	32,000
Industrial clays e/					
Kaolin	120,000 3/	250,000	300,000	250,000	250,000
Total	264,083	254,413	250,000 e/	250,000 e/	250,000
Diatomite e/	384,083	504,413	550,000 e/	500,000 e/	500,000
Feldspar	100	85 3/	90	90	90
	52,120	76,873	75,000 r/ e/	75,000 r/ e/	6,000

See footnotes at end of table.

TABLE 1--Continued
 IRAN: PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Metric tons unless otherwise specified)

Commodity	1992	1993	1994	1995	1996 e/
INDUSTRIAL MINERALS--Continued					
Fluorspar, fluorite e/	9,180 3/	10,000	10,000	10,000	10,000
Gemstones, turquoise e/ kilograms	1,000	5,000	5,000	5,000	5,000
Gypsum thousand tons	8,253	7,799	8,430 e/	8,230	8,300
Industrial or glass sand (quartzite and silica)	756,000	932,000	950,000 e/	1,000,000 e/	1,000,000
Lime e/ thousand tons	650	650	650	650	650
Magnesium compounds e/	36,165 3/	49,424 3/	45,000	55,000	55,000
Mica e/	7,850 3/	1,224 3/	3,000	3,000	3,000
Nitrogen: N content of ammonia	664,000	722,500	696,200	715,400	700,000
Perlite e/	5,000 3/	6,000	6,000	6,000	6,000
Pigments, mineral, natural iron oxide e/	2,310 3/	2,500	2,500	2,500	2,500
Pumice and related volcanic materials	330,000	185,000	200,000 e/	200,000 e/	200,000
Salt	1,018,000	988,700	1,050,000	936,000	450,000
Sodium compound, caustic soda e/	15,000	15,000	15,000	15,000	15,000
Stone:					
Construction and building, crushed, n.e.s. e/ thousand tons	4,340 3/	4,500	4,800	4,800	4,800
Dimension and decorative: e/					
Granite do.	24 3/	30	20	20	20
Marble:					
Blocks do.	3,970 3/	3,200	4,500	4,500	4,500
Crushed do.	786 3/	400	450	450	450
Slabs do.	19 3/	20	50	50	50
Travertine:					
Blocks do.	341 3/	300	500	500	500
Crushed and slabs do.	93 3/	60	70	70	70
Total do.	5,233 3/	4,010	5,590	5,590	5,590
Dolomite do.	227	173	200 e/	243	200
Limestone do.	23,800	26,000	28,000 e/	28,000 e/	28,000
Strontium, celestite e/	13,100 3/	20,000	20,000	20,000	20,000
Sulfates, natural:					
Aluminum potassium sulfate (alum) e/	12,000	12,000	12,000	12,000	12,000
Sodium sulfate	237,000	280,000	280,000 r/ e/	280,000 r/ e/	280,000
Sulfur: e/					
Byproduct of petroleum and natural gas	700,000	750,000	830,000	840,000	840,000
Byproduct of metallurgical processing, S content of acid	50,000	50,000	50,000	50,000	50,000
Total	750,000	800,000	880,000 3/	890,000	890,000
Talc	23,707	18,000	18,000 e/	20,000 e/	20,000
MINERAL FUELS AND RELATED MATERIALS					
Coal thousand tons	1,508	1,665	1,720	1,500 e/	1,500
Coke e/ do.	506 3/	600	700	700	700
Gas, natural:					
Gross million cubic meters	58,200	60,000	61,000	61,000 e/	61,000
Dry do.	25,000	27,100	28,200	28,200 e/	28,200
Natural gas plant liquids thousand 42-gallon barrels	20,000	23,300	23,500	23,500 e/	23,500
Petroleum:					
Crude do.	1,256,900	1,332,000	1,325,000	1,329,700	1,329,700
Refinery products: e/					
Liquefied petroleum gases do.	19,000 3/	20,000	23,000 r/ 3/	24,000	24,000
Motor gasoline do.	50,400 3/	50,000	51,500	54,500	54,500
Jet fuel do.	8,030 3/	8,000	9,200 r/ 3/	9,000	9,000
Kerosene do.	30,700 3/	32,000	34,400	37,000	37,000
Distillate fuel oil do.	101,000 3/	100,000	107,600 r/ 3/	117,000	117,000
Residual fuel oil do.	96,700 3/	100,000	103,000	114,000	114,000
Other do.	35,800 3/	40,000	35,800 r/ 3/	43,000	43,000
Total do.	341,630 3/	350,000	364,500 r/	398,500	398,500

e/ Estimated. r/ Revised.

1/ Table includes data available through Dec. 1997.

2/ Data are for Iranian years ending Mar. 21 of that stated, except data for natural gas, plant liquids, and petroleum, which are for Gregorian calendar years.

3/ Reported figure.