

THE MINERAL INDUSTRY OF

IRAN

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The hydrocarbon sector, which included natural gas, crude and refined oil, and petrochemicals, was the foundation of the Iranian economy. Iranian oil production averaged about 3.4 million barrels per day (Mbbbl/d) in 2002, compared with 3.7 Mbbbl/d in 2001. The 2002 production, constrained by the Organization of the Petroleum Exporting Countries (OPEC) production ceilings, was the lowest reported annual output since 1992 (Organization of the Petroleum Exporting Countries, 2003, p. xi). In 2002, according to the U.S. Energy Information Administration (2003), Iran was the world's fourth largest producer of crude oil, after Saudi Arabia, Russia, and the United States, compared with BP plc's (2003¹) Statistical Review of World Energy 2003, which ranked Iran as the world's sixth largest producer of oil and natural gas liquids, after Saudi Arabia, Russia, the United States, Mexico, and China.

This Middle Eastern country supported a population of about 67 million people in an area of 1,648,196 square kilometers. In 2002, the gross domestic product (GDP), based on purchasing power parity valuation, was estimated by the International Monetary Fund (2003[§]) to be more than \$497 billion. The International Monetary Fund also reported that real GDP increased by about 6.7% in 2002 and revised the 2001 increase to 5.9%.

Government Policies and Programs

Mining was governed by the Mining Act of 1999. In 2002, a new Foreign Investment Promotion and Protection Act was enacted. The law outlined the conditions that would allow foreign capital to be used in the development of Iranian mineral resources. The Government continued to encourage private investment in the exploitation of metals and industrial minerals to diversify the nation's economic dependence on oil and natural gas. In recent years, the oil and gas contribution to the GDP has ranged from 15% to almost 20%. Foreign investment was considered to be more cost effective because mineral-resource exploration and development loans made by Iranian banks were capped at \$50 million and subject to a 17% interest rate. Foreign mining companies generally were able to raise funds privately or to borrow at some percentage points above the London Interbank Offered Rate, which, in 2002, ranged from 1.38% to 1.883%.

Corporate taxes were reduced to 25% on profits from 64%, and the foreign exchange rates were unified. Many restrictions on foreign exchange were removed. The Parliament considered the introduction of a value added tax and directed that the Ministry of Petroleum to submit all contracts with foreign companies worth more than \$20 million to the Parliament for approval. In November, the pricing of steel in Iran was transferred to the Minister of Commerce and the Minister of Industries and Mines from the control of the Higher Economic Council. The Ministers were to use market conditions to set steel prices.

Also in 2002, Circular Letter No. 105/18089 of April 29, which covered the supervision of the implementation of the "articles of the law concerning maximum use of Iranian technical engineering and manufacturing capabilities for projects implementation and provision of facilities for export of services" of March 3, 1997, was released. It authorized the State Management and Planning Organization to assign consultant engineering and contractor services on Iranian-foreign joint-venture projects.

The U.S. Government's Iran and Libya Sanctions Act of 1996 (ILSA) (Public Law 104-172) threatened to sanction any company (American or foreign) that exceeded a \$20 million per year investment or trading limit with Iran in the petroleum sector. In 2001, the ILSA Extension Act of 2001 (Public Law 107-24) extended ILSA through 2006 (Sipress and Behr, 2001). ILSA initially hampered foreign investment in petroleum and other mineral industry projects in Iran, but many foreign Governments no longer officially discouraged investment in Iran, which lessened ILSA's impact on Asian and European companies. In addition to ILSA and the ILSA Extension, the Iranian Transactions Regulation (Title 31 Part 560 of the U.S. Code of Federal Regulations) prohibited the exportation to Iran and importation from Iran of most goods and services (Dow Jones & Co., Inc., 2002[§]; Institute of Electrical and Electronics Engineers, 2003[§]). The prohibition of any involvement in the development of Iranian petroleum resources was specifically noted. American citizens and companies also were banned from investing or participating in Iran's mineral sector activities under Presidential Executive Orders 12957 of March 15, 1995; 12959 of May 6, 1995; and 13059 of August 19, 1997.

Trade

In 2002, total Iranian exports were valued at more than \$24.4 billion. Hydrocarbon exports were valued at \$19.2 billion. Crude oil accounted for about \$17 billion; refined petroleum products, \$2 billion; and natural gas, \$177 million. Other minerals commodity exports included iron and steel ingots (\$74 million), unwrought aluminum (about \$65 million), hot-rolled steel (\$50 million), ammonia (\$25 million), sulfur (\$18 million), portland cement (about \$16 million), marble and travertine (\$13 million), cement clinker (\$7.8 million), iron ore (\$6.8 million), gypsum (about \$5.7 million), and gravel (\$4.9 million) (International Monetary Fund, 2002, p. 31; Organization of the Petroleum Exporting Countries, 2003, p. 4-5; Islamic Republic of Iran Customs Administration, 2003a[§], b[§]).

¹References that include a section mark (§) are found in the Internet References Cited section.

Iran was a member of the D-8, the Economic Cooperation Organization, the International Monetary Fund, OPEC, the Organization of Islamic Conference, and World Bank Group agencies (which included the International Bank for Reconstruction and Development, the International Finance Cooperation, and the Multilateral Investment Guarantee Agency). Iran continued its quest, begun in 1996, to join the World Trade Organization.

In December 2002, the Government removed a \$25 per metric ton additional duty that it had imposed on imported hot-rolled coil, sheets, and plates with a thickness greater than 2.01 millimeters. A 12% import tax and a tax of \$44 per ton remained on hot-rolled steel coil, strip, and plate; cold-rolled steel coil and strip; and galvanized steel coil and sheets. Stainless steel products and steel slabs, billets, and blooms were subject to a 1% import tax.

Structure of the Mineral Industry

The overall management of the minerals sector was under the auspices of the Ministry of Industries and Mines. The Ministry's authority covered all mining, smelting, and refining industries except the oil and gas segments, which were administered by the Ministry of Petroleum. The Geological Survey of Iran performed initial geologic and mineral exploration and evaluation of the mineral resources (except hydrocarbons). Most of the country's active mines were privately owned, although the Government retained operational control of many of the larger companies in the minerals sector especially in the aluminum, ammonia, coal, copper, iron, salt, steel, and sulfur sectors.

Commodity Review

A wide variety of industrial and metallic minerals were produced in Iran. In 2002, Iran ranked 15th in the list of the world's copper producers (D.L. Edelstein, Copper Commodity Specialist, U.S. Geological Survey, written commun., January 5, 2004) and 22d on the list of world steel producers (M.D. Fenton, Iron and Steel Commodity Specialist, U.S. Geological Survey, written commun., January 5, 2004). Iran was the 21st leading lead-producing nation and the world's 15th leading zinc producer (Plachy, 2003§; Smith, 2003§). In Iran, sulfur production, which was derived from produced natural gas, increased during the winter months (December to March) when natural gas flows were increased (Fertilizer Week, 2003§).

Metals

Aluminum.—Iranian Aluminium Co.'s (IRALCO) 280,000-metric-ton-per-year (t/yr)-capacity alumina refinery at Jajarm began operations in 2002. IRALCO expected that the plant would be officially commissioned and operating at capacity by the end of 2003 (Mining Journal, 2003). Alumina production from the Jarjarm plant will be shipped to domestic aluminum smelters in Arak and Bandar Abbas to reduce the smelters' dependence on imported alumina.

Copper and Gold.—Much of the gold recovered in Iran was a byproduct of National Iranian Copper Industries Co.'s Sar Cheshmeh copper complex operations. Additional gold was recovered from the Mouteh Mine and from gold placer mines in the Neyshabour area. The Meiduk copper mine and the 80,000-t/yr-capacity copper smelter at Khatounabad were expected to be operational in 2003. The Meiduk Mine was designed to process 500,000 t/yr of 1% copper ore to produce 150,000 t/yr of copper concentrate (Balali, 2000§; National Iranian Copper Industries Co., 2002§).

Pouya Zarcan Agh Darreh Co. (PZA), which was Zarcan Minerals Inc.'s joint venture with IRAMCO Aluminum Raw Material Co., continued to evaluate the Agh Darreh gold prospect in northwestern Iran. Zarcan Minerals also continued its geophysical surveys and prospecting on the 10 copper-gold concessions of the Sistan va Baluchestan project. The joint venture of Rio Tinto plc (70%) and C.E.S. Co. (30%) received an investment license for the Dashkesan gold exploration project in Kurdistan Province. Other gold exploration activity included the Gandi Moalleman project in Hanedan Province, the Hyrd project in Khorassan Province, the Torqabeh prospect in Khorassan Province, and the Zartorosht prospect in Kerman Province. In 2002, Canasil Resources Inc. of Canada surrendered its exploration rights to the Rameshk exploration areas east of Bandar Abbas.

Iron and Steel.—In 2002, the 800,000-t/yr Zamzam direct-reduction iron plant was commissioned. More than 40 steel projects at various stages of planning or construction were underway by subsidiaries of the National Iranian Steel Co. (NISCO); these included the expansion of Isfahan Steel Co.'s plant with the addition of a 150-metric-ton electric arc furnace and a third blast furnace [1.4-million-metric-ton-per-year (Mt/yr)-capacity] and the continued expansion of hot-rolled coil capacity at the Mobarakeh Steel plant to 4.2 Mt/yr from 3.1 Mt/yr. Additional proposed facilities included a 4-Mt/yr iron ore pellet plant at Sirjan, a 1.65-Mt/yr direct-reduction iron plant at Bandar Abbas for the Hormozgan Steel Complex, a 1.5-Mt/yr steel slab mill at Bandar Abbas for the Hormozgan Steel Complex, a 400,000-t/yr cold-rolled mill at the Mobarakeh Steel plant, a 350,000-t/yr large-diameter pipe mill for Sadid Industrial Group, a 300,000-t/yr steel bar mill at Isfahan, a 120,000-t/yr light section steel mill at Isfahan, and a 120,000-t/yr tinplate line at the Mobarakeh Steel plant in addition to the development of the 3.2-Mt/yr Chegharat iron mine. Some of the increased domestic demand for steel was to be generated by the automobile manufacturing sector. In 2001, the local automobile industry manufactured 370,000 cars. By 2011, the Ministry was projecting annual output of 1 million cars (Metal Bulletin, 2000, 2001a-c, 2002; Middle East Economic Digest, 2001b, 2002a, f; Iran Daily, 2001§, 2003a§; IranWorld.com. 2002b§, c§; MEsteel.com, 2003§).

Industrial Minerals

Cement.—The nearly 40 companies that produced cement in Iran had a combined production capacity of about 30 Mt/yr. The cement companies continued to add production capacity to allow them to satisfy local demand and to supply the export market (especially Afghanistan), although in 2002, the domestic demand for cement increased to the extent that exports dropped significantly (Iran Daily, 2002d§). Nearly one-half of the companies were building or proposing to add additional capacity. The Government projected that national cement capacity would reach 70 Mt/yr by 2021 (Iran Cement, undated a§-d§; Iran Daily, 2002e§).

In 2002, FCB.Ciments (a subsidiary of Cie. de Fives-Lille of France) provided the equipment for Saveh White Cement Co.'s second 500-metric-ton-per-day (t/d)-capacity white cement line. Saveh White Cement also proposed to build a two-line 7,200-t/d-capacity grey portland cement facility; initial production was expected in 2006 (FLS Industries A/S, 2003§). Proposed plants for subsidiaries of Ehdasse Sanat Corp. included a 3,000-t/d facility for Darab Cement Co. and a 3,000-t/d plant for Bushehr Cement Co. (Ministry of Industries and Mines, 2002§). Ehdasse also proposed to build a 1.5-Mt/yr cement export terminal at Bandar Imam Khomeini (Ehdasse Sanat Corp., 2003§).

Clays.—Gorgin Ceramics and Refractory Industries Co. of Iran entered a \$95 million joint venture with Ceric S.A. of France for the construction of a brick and silicon carbide ceramics factory in Tabriz.

Nitrogen (Fertilizer).—Subsidiaries of the National Petrochemical Co. (NPC) operated nine petrochemical complexes in Iran. In 2002, the construction of a 676,500-t/yr-capacity ammonia plant in the Razi Petrochemical Economic Zone at Bandar Imam Khomeini got underway. NPC also was working on a plant with the capacity to produce 2,050 t/d of ammonia and 3,250 t/d of urea at Bandar Assaluyeh that was expected to be operational in 2004. In 2002, the contract to build a fertilizer facility with production capacities of about 1,200 t/d of ammonia and 2,000 t/d of urea in Kermanshah was awarded, and NPC initiated a study of a 330,000-t/yr ammonia plant on Kharg Island (Asian Chemical News, 2002b, c; Middle East Economic Digest, 2002c; Iran Daily, 2002i§). Additionally, the Qeshm Free Area Authority in a joint venture with the Indian Farmers Fertilizer Cooperative Ltd. of India and the Indian Government's Krishak Bharati Cooperative Ltd. continued to evaluate a proposal to build an ammonia plant in the Qeshm Free Area.

Soda ash.—In 2002, NPC canceled a new 80,000-t/yr soda ash plant for Shiraz Petrochemical Co. and proposed to expand the existing 80,000-t/yr light soda ash and the 66,000-t/yr heavy soda ash plants at Shiraz (Industrial Minerals, 2002; National Petrochemical Co., undated§).

Mineral Fuels

Coal.—Iran International Engineering Co. of Iran and IRASCO SRL of Italy awarded a mining services contract to Cementation Skanska of the United Kingdom for the 1.5-Mt/yr Tabas underground coal mine in the Parvadeh coalfield. A subsidiary of NISCO was expected to operate the mechanized longwall mine (IranWorld.com, 2002a§).

Coke.—IRALCO proposed to build a 300,000-t/yr petroleum coke calcining plant near one of the country's petroleum refineries and was awaiting the Ministry of Petroleum's decision about the plant location (Middle East Economic Digest, 2002e).

Methanol.—NPC arranged financing for a 1.65-Mt/yr methanol plant in the Bandar Assaluyeh Special Economic/Energy Zone for Zagros Petrochemical Co. Construction continued for the 1-Mt/yr third methanol plant at Bandar Imam Khomeini for NPC subsidiary Fanavaran Petrochemical Co. After an initial postponement of commercial operations from late 2002 to early 2003, initial operations at the plant were expected to begin no sooner than September 2003. About 740,000 t/yr of the output from the third methanol facility was expected to be exported. NPC also initiated a study of a 660,000-t/yr methanol facility on Kharg Island (Asian Chemical News, 2002a; Middle East Economic Digest, 2002d).

Natural Gas and Petroleum.—Construction continued on the third transcountry gas pipeline, the 142-centimeter-diameter, 85-million-cubic-meter-per-day capacity Iran Gas Trunkline 3 (IGAT-3), which will connect the South Pars gas facilities at Bandar Assaluyeh to distribution facilities in northwest Iran (Arab Petroleum Research Center, 2002, p. 149; Middle East Economic Digest, 2001a). The proposed 110-million-cubic-meter-per-day IGAT-4, which would run from South Pars to Saveh, and the proposed \$650 million IGAT-5 from South Pars to reinjection facilities at the Aghajari Oilfield were under evaluation (Middle East Economic Digest, 2001c, 2002b; Scientific Surveys Ltd., 2001, p. 5). A 360,000-barrel-per-day (bbl/d), 392-kilometer oil pipeline from the Caspian port of Neka to the Ray terminal (southern Tehran refinery) was expected to be completed in 2003. The pipeline was designed to be expanded to 500,000 bbl/d with the installation of additional pumping stations (Petroleum Economist, 2002).

A 14-billion-cubic-meter-per-year-capacity natural gas export pipeline to Turkey was completed in 2001, and gas exports to Turkey began in December. Turkey was contracted to import 4 billion cubic meters per year of natural gas at \$0.12 per cubic meter. The volume was to increase to 10 billion cubic meters per year by 2007; on June 24, 2002, however, Turkey suspended gas imports because of poor gas composition quality. The Iranian petroleum Ministry disputed the Turkish claims and reported that it had been told that slower-than-expected Turkish economic growth was the basis for the suspension of the gas trade. Negotiations between the Iranian and Turkish Ministries resulted in the resumption of gas exports to Turkey in October. The new shipments reportedly were delivered for \$0.08 per cubic meter (Iran Daily, 2002g§, h§, 2003b§).

Crude oil reserves were reported to be 270 billion barrels, and natural gas reserves were estimated to be 26.6 trillion cubic meters. In 2002, the discovery of an additional 31 billion cubic meters of gas reserves in the Dalan gasfield was announced (Iran Daily, 2002b§, c§). Additional coverage of the natural gas and petroleum industry of Iran is available from the U.S. Energy Information Administration (Feld, 2003§).

Infrastructure

Iran's network of highways, pipelines, and railroads, coupled with an extensive port system on the Caspian Sea, Gulf of Oman, and Persian Gulf, facilitated transport of minerals and mineral products with neighboring countries (Afghanistan, Armenia, Azerbaijan, Pakistan, Turkmenistan, and Turkey) and the rest of the world. Continued investment in the energy and transportation sectors would increase Iran's ability to develop and market its mineral resources.

In 2002, laying double track on the Mashhad-Tehran rail line was completed. A rail line from Torbat-e Heydarieh to Herat, Afghanistan, was started. Proposals were floated to extend the Bafq-Mashhad rail line to Kerman by 2004 and to build a railroad from Bam to Kerman by 2006. Locomotives for the new railroads were expected to be bought from China. In Mashhad, Khodro Toos Co. was building a 30,000-car-per-year-capacity automobile assembly line, and Peugeot Pars Co. was building a 10,000-car-per-year assembly plant.

At the beginning of 2002, the Iran Power Generation, Transmission & Distribution Management Co. (Tavanir) reported an electricity generating capacity of 28,302 megawatts (MW), which was supplemented by the 6,190-MW generating capacity of independent powerplants (much of which was associated with the mineral industry). About 71% of Tavanir's generating plants were natural gas fueled, 25% diesel fueled, and 4% hydroelectric. Some small photovoltaic electricity generating units were in rural areas. Tavanir was in the process of a long-term program to convert gas turbines open cycle units to more economical combined cycle units (Iran Power Generation, Transmission & Distribution Management Co., 2003b§).

Iranian peak load demand was projected to be more than 40,000 MW by 2011. To meet the anticipated demand, Tavanir indicated that it would need to achieve a national generating capacity of about 60,000 MW. A 1,000-MW \$800 million nuclear plant was under construction at Bushehr and expected to be operational by 2004. In 2002, plans for an additional five 1,000-MW nuclear reactors (three at Bushehr and two at Ahwaz) were announced. Sumitomo Corp. of Japan was contracted to build a 1,000-MW gas-fueled plant at Shirvan under a build-operate-transfer (BOT) program. The \$643 million plant was expected to be operational by 2007. The Sumitomo joint venture would operate the Shirvan powerplant for 20 years before transferring it to local authorities. Proposed electricity generating powerplants included a 1,500-MW coal-fired plant near the new coal mine in Tabas, a 990-MW gas-fired plant at Hormozgan, and BOT powerplants in Isfahan, Jalal, and Tabriz. Other power industry activities in 2002 included a preliminary environmental impact assessment of a 100-MW geothermal powerplant in the Mount Sabalan region of Ardabil Province in northwestern Iran and proposed wind-powered electricity generating plants at Rudbar (60 MW) and Manjil (25 MW) in Gilan Province in northwestern Iran (Baker, 2002; Noorollahi and Yousefi, 2003, p. 1-4, 6-7; Alexander's Gas & Oil Connections, 2002§; Iran Daily, 2002a§, f§; Iran Power Generation, Transmission & Distribution Management Co., 2003a§; Pravda, 2002§; Valve World, undated§).

References Cited

- Arab Petroleum Research Center, 2002, Iran: Arab Oil & Gas Directory—2002, p. 117-158.
- Asian Chemical News, 2002a, Capacity beyond consumption...: Asian Chemical News, v. 8, no. 368, August 12, p. 22-23.
- Asian Chemical News, 2002b, New project summaries: Asian Chemical News, v. 8, no. 373, September 30, p. 18.
- Asian Chemical News 2002c, Studies ammonia unit on Kharg Island: Asian Chemical News, v. 9, no. 384, December 23, p. 21.
- Baker, Peter, 2002, Russia plans 5 more nuclear plants in Iran: Washington Post, July 27, p. A15.
- Industrial Minerals, 2002, News in brief—Shiraz plant stopped: Industrial Minerals, no. 418, July, p. 22.
- International Monetary Fund, 2002, Staff Report for the 2002 Article IV Consultation: Washington, DC, International Monetary Fund Country Report No. 02/211, September, 51 p.
- Metal Bulletin, 2000, Nisco outlines steel plant expansions: Metal Bulletin, no. 8528, November 23, p. 19.
- Metal Bulletin, 2001a, Iran plans big capacity increase at Mobarakeh: Metal Bulletin, no. 8565, April 9, p. 17.
- Metal Bulletin, 2001b, Iranian tubemaker adds meltshop and two mills: Metal Bulletin, no. 8507, August 6, p. 13.
- Metal Bulletin, 2001c, National Iranian Steel Co invites bids for Hormozgan contract: Metal Bulletin, no. 8601, August 20, p. 13.
- Metal Bulletin, 2002, Sadid group buys fourth pipe mill: Metal Bulletin, no. 8695, August 1, p. 17.
- Middle East Economic Digest, 2001a, Bids for 12 pumping stations for new gas trunkline: Middle East Economic Digest, v. 45, no. 3, January 19, p. 9.
- Middle East Economic Digest, 2001b, New steel project announced: Middle East Economic Digest, v. 45, no. 32, August 10, p. 12.
- Middle East Economic Digest, 2001c, News in brief—Iran: Middle East Economic Digest, v. 45, no. 19, January 19, p. 16.
- Middle East Economic Digest, 2002a, Hormozgan awards second steel package: Middle East Economic Digest, v. 46, no. 45, November 8, p. 26.
- Middle East Economic Digest, 2002b, Japanese in IGAT talks: Middle East Economic Digest, v. 46, no. 23, June 7, p. 11.
- Middle East Economic Digest, 2002c, Kermanshah project awarded: Middle East Economic Digest, v. 46, no. 39 September 27, p. 14.
- Middle East Economic Digest, 2002d, News in brief—Iran: Middle East Economic Digest, v. 46, no. 36, September 6, p. 12.
- Middle East Economic Digest, 2002e, Petroleum coke plant to move ahead: Middle East Economic Digest, v. 46, no. 42, October 18, p. 19.
- Middle East Economic Digest, 2002f, Winner announced for Hormozgan steel project: Middle East Economic Digest, v. 46, no. 36, September 6, p. 17.
- Mining Journal, 2003, Jajarm alumina output rising: Mining Journal, v. 340, no. 8728, March 21, p. 205.
- Noorollahi, Younes and Yousefi, Hossein, 2003, Preliminary environmental impact assessment of a geothermal project in Meshkinshahr—NW-Iran: International Geothermal Conference, Reykjavik, Iceland, September 14-17, 2003, Presentation, 11 p.
- Organization of the Petroleum Exporting Countries, 2003, Annual statistical bulletin—2002: Vienna, Austria, Organization of the Petroleum Exporting Countries, 132 p.
- Petroleum Economist, 2002, News in brief—Middle East—Iran: Petroleum Economist, v. 69, no. 8, August, p. 45.
- Scientific Surveys Ltd., 2001, Iran—Studies start for IGAT-4: Pipeline Report, October, 16 p.

Sipress, Alan, and Behr, Peter, 2001, Bush says Iran, Libya sanctions to stay: Washington Post, April 20, p. A20.
U.S. Energy Information Administration, 2003, Table 11—World crude oil production, in Monthly Energy Review: Washington, DC, U.S. Energy Information Administration, August, p. 148-149.

Internet References Cited

Alexander's Gas & Oil Connections, 2002, Sumitomo to build power plant in Iran, accessed January 11, 2004, at URL <http://www.gasandoil.com/goc/company/cnm22648.htm>.

Balali, Mehrdad, 2000 (June 23), Iran seeks to expand copper production, accessed January 10, 2004, at URL http://metimes.com/2K/issue200025/bus.iran_seeks_to.htm.

BP plc, 2003, BP statistical review of world energy 2003, accessed June 10, 2003, via URL http://www.bp.com/files/16/bp_stats_history_16111.xls.

Dow Jones & Co., Inc., 2002 (July 3), U.S. fines 86 firms for business with nations on >enemies' list, accessed July 3, 2002, at URL http://biz.yahoo.com/djus/020703/200207030121000036_1.htm.

Ehdasse Sanat Corp., 2003, About us—Affiliated units, accessed January 4, 2004, at URL <http://www.ehdas.com/affiliatedunites.htm>.

Feld, Lowell, U.S. Energy Information Administration, 2003 (April), Iran, Country Analysis Brief, accessed May 29, 2003, at URL <http://www.eia.doe.gov/emeu/cabs/iran.html>.

Fertilizer Week, 2003 (February 26), Midweek briefing, accessed February 26, 2003, via URL <http://www.fertilizerweek.com/>.

FLS Industries A/S, 2003 (July 3), F.L.Smith wins record contract in Iran worth 500m Danish kroner, accessed August 14, 2003, via URL <http://www.flis.com/press/news/default.asp>.

Institute of Electrical and Electronics Engineers, 2003 (November), Will U.S. sanctions have chilling effect on scholarly publishing?, accessed October 30, 2003 at URL <http://www.spectrum.ieee.org/WEBONLY/resource/nov03/1103nvs.html>.

International Monetary Fund, 2003 (September), accessed September 26, 2003, via URL <http://www.imf.org/external/pubs/ft/weo/2003/02/data/dbginim.cfm>.

Iran Cement, [undated] a, News, accessed November 26, 2003, at URL <http://www.irancement.com/e-news.html>.

Iran Cement, [undated] b, Cement projects, accessed November 26, 2003, at URL <http://www.irancement.com/e-projects.html>.

Iran Cement, [undated] c, Extension projects, accessed November 26, 2003, at URL <http://www.irancement.com/e-projects-b.html>.

Iran Cement, [undated] d, Upgradation projects, accessed November 26, 2003, at URL <http://www.irancement.com/e-projects-c.html>.

Iran Daily, 2001 (March 15), Mobarakeh Steel complex finalizes buyback deal, accessed March 20, 2001, via page 3—Local Economics at URL <http://www.iran-daily.com/2>.

Iran Daily, 2002a (November 20), First geothermal power plant to be built in Sabalan, accessed November 20, 2002, via page 3—Local Economics at URL <http://www.iran-daily.com/daily.shtml>.

Iran Daily, 2002b (June 29), Hydrocarbon reserves put at 270bb, accessed July 2, 2002, via page 3—Local Economics at URL <http://www.iran-daily.com/3/>.

Iran Daily, 2002c (September 25), Major gas reserves discovered, accessed September 27, 2003, via page 3—Local Economics at URL <http://www.iran-daily.com/1/>.

Iran Daily, 2002d (August 25), Marked rise in cement consumption, accessed August 26, 2002, via page 3—Local Economics at URL <http://www.iran-daily.com/1/>.

Iran Daily, 2002e (July 3), Private investment in cement industry encouraged, accessed July 9, 2002, via page 3—Local Economics at URL <http://www.iran-daily.com/5/>.

Iran Daily, 2002f (July 27), Russia confirms long-term nuclear cooperation, accessed July 30, via page 3—Local Economics at URL <http://www.iran-daily.com/3/>.

Iran Daily, 2002g (September 10), Turkey suspends Iran gas import, accessed September 11, 2002, via page 3—Local Economics at URL <http://www.iran-daily.com/1/>.

Iran Daily, 2002h (September 11) Turkey's claims on gas quality rejected, accessed September 11, 2002, via page 3—Local Economics at URL <http://www.iran-daily.com/daily.shtml>.

Iran Daily, 2002i (September 28), Work in progress at urea unit, accessed October 2, 2002, via page 3—Local Economics at URL <http://www.iran-daily.com/down.htm/>.

Iran Daily, 2003a (June 26), Auto production will reach 1m by 2011, accessed July 2, 2002, via page 3—Local Economics at URL <http://www.iran-daily.com/5/>.

Iran Daily, 2003b (January 18), Selling gas to Turks at throw away prices, accessed January 20, 2003, via page 3—Local Economics at URL <http://www.iran-daily.com/2/>.

Iran Power Generation, Transmission & Distribution Management Co., 2003a (October 21), Generation, accessed January 10, 2004, at URL <http://www.tavanir.org.ir/latin/setad/FuturePerspective/Future2.1.asp>.

Iran Power Generation, Transmission & Distribution Management Co., 2003b (October 21), The installed capacity, accessed January 10, 2004, at URL <http://www.tavanir.org.ir/Latin/setad/Generation/Gen1.asp>.

IranWorld.com, 2002a (January 10), First UK cover for Iran coal mine project, accessed February 3, 2003, at URL <http://www.iranworld.com/News&EventsArchive-2002/nim-r080.htm>.

IranWorld.com 2002b (May 1) New projects will raise steel output—Official, accessed February 3, 2003, at URL <http://www.iranworld.com/News&EventsArchive-2002/nim-r112.htm>.

IranWorld.com 2002c (February 1) 800,000 tons to be added to Iran's sponge iron output, accessed February 3, 2003, at URL <http://www.iranworld.com/News&EventsArchive-2002/nim-r085.htm>.

Islamic Republic of Iran Customs Administration, 2003a, Table 2-2—Main items of exportation ordered in value, accessed July 17, 2003, at URL http://www.irica.gov.ir/EN_Report/2002/page22v.html.

Islamic Republic of Iran Customs Administration, 2003b, Table 2-2—Main items of exportation ordered in weight, accessed July 17, 2003, at URL http://www.irica.gov.ir/EN_Report/2002/page22w.html.

MESteel.com, 2003 (March 2), Mobarake expanding, accessed March 25, 2003 at URL <http://www.steelmillsoftheworld.com/news/newsdisplay.asp?sln=366>.

Ministry of Industries and Mines, 2002, Ehdasse Sanat Corp., accessed January 3, 2003, at URL <http://www.iranindustry.org.ehdas.english/ehdas1.htm>.

National Iranian Copper Industries Co., 2002, Miduk copper complex, accessed January 10, 2004, at URL <http://www.nicico.com/meyduk.htm>.

National Petrochemical Co., [undated], Shiraz Petrochemical Company, accessed April 20, 2003, at URL <http://www.nipc.net/affiliated/english/shiraz.html>.

Plachy, Jozef, 2003, Zinc, in Metals and minerals: U.S. Geological Survey Minerals Yearbook 2002, v. 1, Table 17 (no page number), accessed January 5, 2004, at URL <http://minerals.usgs.gov/minerals/pubs/commodity/zinc/zincmyb02.pdf>.

Pravda, 2002 (September 4), Russia-Iran energy cooperation not limited to building of nuclear power plant ABushehr@ alone, accessed January 11, 2004, at URL <http://english.pravda.ru/economics/2002/09/04/35978.html>.

Smith, G.R., 2003, Lead, in Metals and minerals: U.S. Geological Survey Minerals Yearbook 2002, v. 1, Table 14 (no page number), accessed January 5, 2004, at URL <http://minerals.usgs.gov/minerals/pubs/commodity/lead/leadmyb02r.pdf>.

Valve World, [undated], Power generation, accessed January 11, 2004, at URL http://www.valve-world.net/articles/iran_power.asp.

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 ³	1998	1999	2000 ^e	2001 ^e	2002 ^e
METALS					
Aluminum:					
Bauxite, gross weight	336,000	912,451	400,000	405,000 ^{r, 4}	420,000
Alumina	--	--	--	--	102,000
Metal, primary ingot	123,759	137,421	140,000	140,000	130,000
Arsenic, orpiment and realgar, concentrates ^e	323	300	400	400	400
Chromite, mine output, concentrate⁵					
Gross weight	211,555	254,685	153,000	104,900	80,000
Cr ₂ O ₃ content ^e	104,000	125,000	75,000	51,500	39,000
Copper:					
Mine output:					
Ore mined (1% to 1.2% Cu):					
Gross weight thousand tons	13,740	13,770	13,800	14,400	16,100
Cu content ^e	137,000	138,000	138,000	144,000	161,000
Concentrate (29% to 35% Cu):					
Gross weight	378,504	381,346	350,000	390,000	380,000
Cu content	128,300	131,000	125,000	121,000 ^r	121,000
Metal:					
Smelter output, blister/anode	138,000 ^r	132,000 ^r	135,000 ^r	135,000 ^r	146,000
Refined output, cathode	129,000	131,700	132,000	132,000	143,000
Gold, mine output, Au content ⁶ kilograms	856	930	765	770	650
Iron and steel:					
Ore and concentrate:					
Gross weight thousand tons	10,536	10,776	12,370 ⁴	10,300 ^r	11,300
Fe content ^e do.	5,200	5,300	6,100 ^r	5,100 ^r	5,600
Metal:					
Pig iron do.	2,087	2,147	2,200	2,300	2,400
Direct-reduced iron do.	3,690	4,120	4,740	5,000	5,280
Ferromanganese	13,745	13,680	11,505 ⁴	8,430	8,000
Ferrosilicon ^e	40,000	46,000	40,000	40,000	40,000
Steel, crude, ingots and castings thousand tons	5,608	6,277	6,600	6,890	7,293 ⁴
Lead:					
Mine output, concentrate:					
Gross weight ^e	21,216 ⁴	22,000	27,000	27,000	27,000
Pb content	11,000	11,000 ^e	15,000	15,000	15,000
Refinery output, includes secondary	47,000	50,000 ^e	53,000 ^e	50,000	50,000
Manganese, mine output, (30% to 35% Mn):					
Gross weight	101,390	104,096	105,000	101,000 ^{r, 4}	121,000
Mn content ^e	30,500	32,000	32,000	30,000	37,000
Molybdenum, mine output, concentrate (56% Mo):^e					
Gross weight	4,350 ⁴	4,906 ⁴	4,900	5,100	5,100
Mo content	1,400	1,600	1,600	1,700	1,700
Silver, mine output, Ag content	19	21	22	22	23
Zinc:^e					
Mine output, concentrate:					
Gross weight	160,000	160,000	182,000 ⁴	240,000 ⁴	240,000
Zn content	80,000	80,000	90,000	120,000	120,000
Metal	23,000	31,000 ⁴	49,000 ⁴	73,000 ⁴	100,000
INDUSTRIAL MINERALS					
Asbestos:^e					
Concentrate, (3% to 8% marketable fiber)	45,000	40,000	40,000	40,000	30,000
Marketable fiber	2,258 ⁴	2,000	2,000	2,000	1,500
Barite	187,677	183,850	185,000	218,000	195,000
Boron, borax	2,086	3,663	3,700	3,800	3,800
Cement, hydraulic thousand tons	21,300 ^e	22,080	23,880 ⁴	26,640 ^{r, 4}	28,600 ⁴

See footnotes at end of table.

TABLE 1--Continued
 IRAN: PRODUCTION OF MINERAL COMMODITIES^{1, 2}

(Metric tons unless otherwise specified)

Commodity ³	1998	1999	2000 ^e	2001 ^e	2002 ^e
INDUSTRIAL MINERALS--Continued					
Clays:					
Bentonite	83,279	64,957	70,000	80,000	80,000
Industrial clays ^e	450,000	400,000	450,000	485,000 ^{r, 4}	490,000
Kaolin	582,485	837,277	850,000	806,000 ^{r, 4}	810,000
Diatomite ^e	600	4,350	4,500	4,500	4,500
Feldspar	185,709	239,779	156,000 ^{r, 4}	168,000 ^{r, 4}	200,000
Fluorspar	25,904	18,387	20,000	20,000	20,000
Gemstones, turquoise kilograms	6,000	20,000	20,000	20,000	20,000
Gypsum thousand tons	11,843	10,834	10,700 ^r	10,890 ^{r, 4}	10,380 ⁴
Industrial or glass sand (quartzite and silica) ^e	1,000,000	1,000,000	1,000,000	1,700,000	1,700,000
Lime thousand tons	2,737	2,138	2,200	2,000 ^r	2,200
Magnesite	109,597	141,081	141,000	143,000	130,000
Mica	1,084	1,425	2,000	2,000	2,000
Nitrogen:					
N content of ammonia	1,034,000	865,000	965,000 ⁴	1,086,700 ^{r, 4}	1,119,100 ⁴
N content of urea	744,000	606,000	624,000	651,000	660,000
Perlite	13,320	15,069	15,000	15,000	15,000
Pigments, mineral, natural iron oxide, ochre ^e	13,300	13,300	13,500	13,000	13,000
Pumice and related volcanic materials ^e	150,000	150,000	150,000	760,000 ^{r, 4}	810,000
Salt	1,911,800	1,600,000	1,560,000 ^{r, 4}	1,985,000 ^{r, 4}	1,970,000
Soda ash	120,000	120,000	120,000	120,000	120,000
Sodium compound, caustic soda ^e	20,000	20,000	20,000	20,000	22,000
Stone:^e					
Construction and building, crushed thousand tons	11,670 ⁴	11,000	12,000	12,000	12,000
Dimension and decorative:					
Granite do.	181 ⁴	195 ⁴	200	200	200
Marble:					
Blocks do.	6,000	6,400	7,000	6,600	7,000
Crushed do.	500	500	550	500	600
Slabs do.	100	100	110	100	100
Travertine:					
Blocks do.	516 ⁴	435 ⁴	500	400	500
Crushed and slabs do.	100	65	100	100	100
Total do.	7,400	7,700	8,500	7,900	8,500
Dolomite do.	475	286	300	300	300
Limestone do.	33,000	33,000	35,000	41,800 ^r	41,100
Strontium, celestite ^e	2,000	1,650 ⁴	2,000	2,000	2,000
Sulfates, natural:^e					
Aluminum potassium sulfate (alum)	12,000	12,000	12,000	10,000	10,000
Sodium sulfate	264,973	308,093	420,000 ^{r, 4}	387,000 ^{r, 4}	580,000
Sulfur:^e					
Byproduct of petroleum and natural gas	889,000	963,000	963,000	933,000	950,000
Byproduct of metallurgical processing, S content of acid	50,000	47,000	50,000	50,000	50,000
Total	939,000	1,010,000	1,010,000	983,000	1,000,000
Talc	27,038	25,000 ^e	25,000	25,000	25,000
MINERAL FUELS AND RELATED MATERIALS					
Coal thousand tons	1,711	1,507	1,815 ⁴	2,002 ^{r, 4}	2,020
Coke do.	22,000	20,000 ^e	25,000	25,000	25,000

See footnotes at end of table.

TABLE 1--Continued
 IRAN: PRODUCTION OF MINERAL COMMODITIES^{1,2}

(Metric tons unless otherwise specified)

Commodity ³	1998	1999	2000 ^e	2001 ^e	2002 ^e	
MINERAL FUELS AND RELATED MATERIALS--Continued						
Gas, natural:						
Gross	million cubic meters	89,000	90,600 ^e	120,000	120,000	120,000
Dry	do.	50,000	51,000 ^e	57,800	60,000 ^r	63,000
Natural gas plant liquids ^e	thousand 42-gallon barrels	23,000	24,000	25,000	25,000	25,000
Petroleum:						
Crude	do.	1,325,000	1,300,000 ^e	1,360,000	1,350,000	1,230,000
Refinery products: ^e						
Liquefied petroleum gases	do.	15,700	15,000	16,000	16,000	16,000
Motor gasoline	do.	65,700	60,000	65,000	65,000	65,000
Jet fuel	do.	13,000	11,000	12,000	12,000	12,000
Kerosene	do.	40,000	36,000	40,000	40,000	40,000
Distillate fuel oil	do.	136,000	120,000	140,000	140,000	140,000
Residual fuel oil	do.	163,000	140,000	160,000	160,000	160,000
Other	do.	61,000	60,000	67,000	67,000	67,000
Total	do.	494,000	442,000	500,000	500,000	500,000

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

¹Table includes data available through December 29, 2003.

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

³In addition to commodities listed, the following may have been produced, but information is inadequate to estimate output: antimony, bromine, ferromolybdenum, nepheline syenite, phosphate rock, selenium, shell, silicomanganese, vermiculite, and zeolite.

⁴Reported figure.

⁵Chromite content of concentrate estimated to be 42% to 45% Cr₂O₃ for 1998 and 1999.

⁶Includes gold recovered from the Mouteh gold mine and from the Sarcheshmeh copper complex.