

TURKEY

By Philip M. Mobbs

Best known for its industrial minerals, Turkey was a major producer of barite, boron minerals, celestite (strontium), emery, feldspar, limestone, magnesite, marble, perlite, and pumice in 2000. A wide variety of primary metallic minerals were produced as well, but output generally was not considered to be large compared with that of other countries. Turkey was a significant world producer of such processed mineral commodities as refined borates and related chemicals, cement, ceramics, and glass and was a notable producer of ferrochromium and steel.

In 2000, the gross domestic product (GDP) was estimated to be about \$200 billion¹ in current [2000] dollars (World Bank, September 13, 2001, Turkey at a glance, accessed September 28, 2001, at URL http://www.worldbank.org/cgi-bin/sendoff.cgi?page=%2Fdata%2Fcountrydata%2Faag%2Ftur_aag.pdf). The contribution of the primary mineral sector to the economy has been in the range of between 1.1% and 1.5% of the GDP. Total revenues of the mineral industry (primary mineral commodities plus processed mineral commodities, should include refined petroleum products and steel) were estimated to account for about 10% of the GDP.

Government Policies and Programs

The Ministry of Energy and Natural Resources was responsible for mining and petroleum operations. Mining was regulated by the Mining Law No. 3213 of 1985. Hydrocarbon activities were regulated under law No. 6326 of 1954, law No. 6556 of 1955, law No. 6987 of 1957, law No. 1702 of 1973, and law No. 2808 of 1983.

The initiation of a structural reform program by the Turkish Government in December 1999 resulted in a drop in the inflation rate in 2000 to about 39%; this was down from an average inflation rate of 73% per year endured during the 1990s (U.S. & Foreign Commercial Service, [undated], Turkey—Major trends and outlook, accessed October 5, 2001, at URL <http://www.usatrade.gov/website/ccg.nsf/DC6D0C7300748AE2852568DA004BA257/852568E1005872D085256AB0004C9A67?OpenDocument>).

Trade

Total Turkish exports were valued at \$27.8 billion in 2000; this was up from \$26.6 billion in 1999. Turkey was a significant exporter of borates and steel. In addition to exports of limited quantities of chromite, copper, and zinc ores and ferrochromium and refined metals, the country also exported a wide variety of industrial minerals and derived chemicals. Exports of crude mine and quarry materials accounted for 1.4% of the value of total Turkish exports in 2000, and those of

¹Where necessary, values have been converted from Turkish lira to U.S. dollars at the rate of TL624,754=US\$1.00 for 2000 and TL420,649=US\$1.00 for 1999.

processed mineral commodities accounted for about 16% of the value of total exports (State Institute of Statistics, 2001, Table 5—Exports by selected chapters, accessed October 9, 2001, at URL <http://www.die.gov.tr/ENGLISH/SONIST/DISTICIST/27020005.gif>; State Institute of Statistics, 2001, Table 11—Annual foreign trade by international standard industrial classification, accessed October 9, 2001, at URL <http://www.die.gov.tr/ENGLISH/SONIST/DISTICIST/27090111.gif>).

The value of Turkish iron and steel exports increased to \$2.3 billion in 2000 compared with \$2.2 billion in 1999. Aluminum exports increased to \$295 million in 2000, which was up from \$260 million in 1999; much of the increase was attributed to shipments of bars and flat products. Copper exports increased to \$221 million in 2000 compared with \$180 million in 1999. Dimension stone exports increased to \$189 million in 2000 compared with \$151 million in 1999. Borates exports decreased to \$108 million in 2000 compared with \$123 million in 1999, and ferrochromium exports dropped to \$20 million in 2000 compared with \$69 million in 1999. (Istanbul Mineral Exporters' Association, [undated], Turkey's statistical data by product group, accessed June 8, 2001, at URL <http://www.immib.org.tr/Eng/maden/stat/urun.htm>; Istanbul Ferrous and Non-ferrous Metals Exporters' Association, [undated] Ferrous & non-ferrous metal export by product group of the 2000 year, accessed October 9, 2001, at URL <http://www.immib.org.tr/Eng/demir/stat/urun.htm>).

Turkey's mineral imports were dominated by crude oil and refined petroleum products, which were valued at \$9.5 billion in 2000 compared with \$5.4 billion in 1999. The Turkish steel industry depended on imported scrap as feed for the country's many electric-arc minimills. Turkish iron and steel imports were valued at \$2.7 billion in 2000; this was up from \$2.1 billion in 1999 (State Institute of Statistics, 2001, Table 6—Imports by selected chapters, accessed October 9, 2001, at URL <http://www.die.gov.tr/ENGLISH/SONIST/DISTICIST/27010006.gif>).

Structure of the Mineral Industry

Maden Tetkik ve Arama Genel Müdürlüğü was the state agency responsible for geologic exploration, mapping, and research in Turkey. Most of the nation's nearly 3,000 mines were small by world standards.

Despite the divestment of a large portion of the state-owned minerals sector holdings to domestic and foreign investors, the Government remained a significant factor in most sectors of the Turkish minerals industry through shareholdings in a number of private companies and various state-owned industrial corporations, which included companies of Eti Holding A.Ş. Genel Müdürlüğü group that produced aluminum, boron, chromite, copper, and silver; Türkiye Taşkömürü Kurumu Genel Müdürlüğü, which mined hard coal; and Türkiye Komur İşletmeleri Kumumu, which produced much of the country's

lignite and semibituminous coal. Most of Turkey's output of crude petroleum and natural gas was produced by the Government-owned Türkiye Petrolleri Anonim Ortaklığı (TPAO) and its subsidiaries. Domestic production and imported crude oil were the feedstock for the oil refineries of the state-owned Türkiye Petrol Rafinerileri A.Ş. (Tupras). In 2000, the Government's Privatization Administration offered to sell off all or part of such mineral concerns as Asil Çelik Sanayi ve Ticaret A.Ş., a steel producer; Ereğli Demir ve Çelik Fabrikaları T.A.Ş., steel; İskenderun Demir ve Çelik A.Ş., steel; İstanbul Gübre Sanayii A.Ş., fertilizer; Karadeniz Bakır İşletmeleri A.Ş. (KBİ), copper; Türkiye Gübre Sanayii A.Ş., fertilizer; Tupras; and a number of seaport operations. Most of the privatization tenders, however, were canceled.

Commodity Review

Metals

Copper.—Çayeli Bakır İşletmeleri A.Ş. [the joint venture of Inmet Mining Corp. (49% equity interest), Eti Holding (46%), and the Government (5%)] increased the capacity of the mill at the Çayeli copper mine to 1 million metric tons per year. Operations were disrupted for nearly a month in January with mill problems and again at yearend when union employees walked out in December. Because of the interruptions, only 861,000 metric tons (t) of ore were milled in 2000 from which about 37,400 t of copper and about 26,000 t of zinc were recovered compared with 1999 when 897,000 t were milled from which about 40,100 t copper and 32,600 t zinc were recovered (Inmet Mining Corp., 2001, p. 7, 19, 46). During 1999, Çayeli had installed a paste backfill system that allowed some of the tailings generated by the plant to be mixed with cement and pumped into the mine for use as backfill. The system reduced operating costs with the elimination of the need to purchase gravel for backfill and decreased the volume of tailings disposed of offshore.

Gold.—Eurogold Madencilik Ticaret ve Ltd. A.Ş. became a 100% subsidiary of Normandy Madencilik A.Ş. after Normandy bought out the 33.3% interest held by Inmet Mining in early 1999. During 2000, Eurogold's resolution of many of the permitting problems that had delayed work at the Ovacık Mine near Bergama since 1997 resulted in the expectation that the mine could begin operations in early 2001.

Tüprag Metal Madencilik San. ve Tic. Ltd., Sti. (a subsidiary of Eldorado Gold Corp. of Canada), evaluated the development of the Kisladağ gold prospect as an open pit mine and continued to drill the prospect to delineate the deposit. Difficulties with obtaining permits also delayed the company's Efemçukuru gold project.

Anatolia Minerals Development Ltd. terminated its joint venture with Rio Algom Ltd. in February. In April, Anatolia formed an exploration joint venture with Rio Tinto Mining and Exploration Ltd. The joint venture drilled and evaluated the Çukerdere copper-gold, the Kabataş copper-gold, and the Üçkaplı gold properties. Additional drilling was planned for 2001.

Iron and Steel.—İzmir Demir Çelik Sanayi A.Ş. reportedly acquired 90% equity interest in the 150,000-metric-ton-per-year (t/yr) Akdemir Çelik Sanayi ve Ticaret A.Ş. rolling mill (Metal Bulletin, 2000b). Yazıcı Demir Çelik Sanayi A.Ş.'s joint

venture acquired 94% equity interest in the 250,000-t/yr steel producer and mill Asil Çelik. The Yazıcı joint venture proposed to expand Asil Çelik's capacity to 400,000 t/yr (Metal Bulletin, 2000a, c).

Lead and Zinc.—Odyssey Resources Ltd. of Canada continued to drill its Lucky Star volcanogenic massive sulfide prospect, about 120 Kilometers (km) east-southeast of Samsun. In August 2000, Cominco Madencilik Sanayi A.Ş. (a subsidiary of Cominco Ltd. of Canada) acquired an option on Anatolia Mineral's Yahyali zinc property and planned to begin exploration in 2001.

The sale of the zinc smelter of Çinko Kurşun Metal Sanayii A.Ş. (Çinkur) was ordered by the Turkish courts. The Çinkur smelter had closed in November 1999 owing to power supply problems and remained closed in 2000 because the supply of Iranian zinc oxide concentrates formerly exported to Çinkur was diverted to new Iranian zinc smelters.

Industrial Minerals

Çukurova Group sold its magnesite producer Comag Continental Madencilik San. ve Tic. A.Ş. to Styromagnesit Steirische Magnesitindustrie GmbH of Austria. The former Comag operation was renamed Calmag Kalsine Manyezit İnalat ve Tic. A.Ş.

Mineral Fuels

In 1999 and 2000, Turkey imported 89% of its crude oil demand. TPAO was the country's leading crude oil producer, but crude production continued to decline. In 2000, TPAO's domestic production was down to 13.6 million barrels (Mbbbl) (72% of total Turkish production) compared with 16.9 Mbbbl (76% share) in 1998 (Turkish Petroleum Corp., Petroleum activities in Turkey, accessed October 5, 2001, at URL <http://www.tpa.gov.tr/rpte/activities.htm>). During 2000, 30 exploration and appraisal wells were drilled in Turkey. Successful exploration and development efforts resulted in the startup of the Yalankoz Field in southeastern Turkey by the joint venture of TPAO and N.V. Turske Perenco. The joint venture of TPAO and Amity Oil Ltd. discovered natural gas in the Thrace Basin with the Göçerler-1 well and proposed to build an 18.4-km pipeline to consumers in the Misinli industrial area.

Tupras' Izmit refinery continued to recover from the August 17, 1999, earthquake and fire. In 2000, the refinery was processing oil at about 75% of the rate it had averaged prior to the fire.

About 1 million barrels per day of Iraqi oil was exported through Turkey's Ceyhan oil terminal under the United Nations' (U.N.) oil-for-food exchange program (U.N. Security Council Resolution 986). In addition to the crude oil, Iraqi diesel fuel was brought across the border into Turkey at Habur.

Reserves

Turkey's mineral inventory was diverse and large (Erşen, 1989). Resources of metallic commodities minable by large-scale methods were known for bauxite, chromite, copper and copper-zinc, gold, iron, and silver. Turkey was renowned for its industrial minerals deposits, most significant of which were barite, boron, clays, limestone and marble, magnesite, perlite, pumice, strontium, and trona. The country had large lignite

reserves. Crude oil reserves were hosted in a number of small fields.

References Cited

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Major Sources of Information

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TABLE 1
TURKEY: PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Metric tons unless otherwise specified)

Commodity	1996	1997	1998	1999	2000 p/
METALS					
Aluminum:					
Bauxite 3/	544,513	369,482	458,028	207,743 r/	458,537
Alumina, gross weight:	159,298	164,333	156,825	159,122	155,448
Metal, smelter e/	60,000	62,019 4/	62,000 r/	62,000	60,000
Antimony:					
Ore, mine output:					
Gross weight	5384	585	500 e/	3400 r/ e/	6800 e/
Sb content	285	31	30 e/	180 r/ e/	360 e/
Concentrates:					
Gross weight	700	500	100 e/	500 r/ e/	1000 e/
Sb content	175	125	20 e/	100 r/ e/	200 e/
Cadmium	42	89	69	64 r/	--
Chromite, gross weight (34% to 43% chromic oxide) 5/	1,279,032	1,702,623	1,404,470	770,352	545,725
Copper:					
Mine output (exclusive of pyrite): 6/					
Gross weight	3,518,754	3,797,874	4,052,175	4,297,170 r/	4,473,711
Cu content of ore	33,792	36,460	40,000 e/	73,051 r/	76,053
Metal:					
Smelter output (primary and secondary)	38,600 e/	32,491	35,000 e/	19,159 r/	954
Refined e/	100,700	111,400	91,800	78,000	78,000
Gold, byproduct of base metals refining e/ 7/ kilograms	1,000	1,000	1,000	1,200	500
Iron and steel:					
Iron ore:					
Gross weight thousand metric tons	6,404	5,986	5,885	4,300 e/	4,500 e/
Fe content e/ do.	3,500	3,239 4/	3,200	2,300	2,450
Metal:					
Pig iron and ferroalloys:					
Ferrochromium	101,450	108,320	110,175	99,100 r/	97,240
Ferrosilicon	4,460	4,730	4,810	420 r/	--
Pig iron	489,516	577,427	456,465	314,670	300,000 e/
Steel, crude including castings thousand metric tons	13,382	13,644	13,351	14,309	14,325
Lead:					
Mine output, Pb and Pb-Zn ores:					
Gross weight	234,541	262,260	292,065	284,504 r/	345,391
Pb content	10,971	13,113	13,500 e/	14,225 r/	17,270
Concentrates:					
Gross weight	4,494	12,063	12,100 e/	11,500 r/ e/	13,000 e/
Pb content	3,140	7,912	7,900 e/	7,500 r/ e/	8,500 e/
Metal, refined e/	4,000	7,000	8,000	4,000	4,000
Manganese ore, gross weight 8/	37,000 e/	31,160	53,283	29,000 r/	23,300
Silver, mine output, Ag content e/ 9/ kilograms	70,000	90,200	110,000	100,000	110,000 e/
Zinc:					
Mine output, Zn and Pb-Zn ore:					
Gross weight	104,819	79,035	45,795	4,630 r/	--
Zn content	14,921	11,255	6,000 e/	545 r/	--
Concentrates:					
Gross weight	9,981	7,525	5,000 e/	500 r/ e/	-- e/
Zn content	5,529	4,169	3,000 e/	300 r/ e/	-- e/
Metal, smelter, primary	22,392	37,074	35,716	33,179 r/	--
INDUSTRIAL MINERALS					
Aluminum sulfate (alunite)	6,625	8,323	10,624	11,264 r/	12,266
Barite, run of mine	104,872	226,594	160,042	150,058 r/	120,893
Boron minerals:					
Run of mine	2,400,635	2,602,386	2,754,082	2,554,404 r/	2,398,220
Concentrates	1446697	1568571	1650000 e/	1500000 r/ e/	1450000 e/
Cement, hydraulic thousand metric tons	35,214	36,035	38,200	34,258 r/	35,825
Clays:					
Bentonite	515,452	521,158	565,708	899,614 r/	636,273
Kaolin	449,561	472,646	403,733	449,954 r/	595,415
Other e/	6,405,377 4/	6,400,000	6,000,000	6,000,000	6,500,000
Emery	11,092	12,345	19,027	14,535 r/	16,830
Feldspar, run of mine	910,814	1,011,542	1,089,483	1,369,655 r/	1,147,716

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity	1996	1997	1998	1999	2000 p/
INDUSTRIAL MINERALS--Continued					
Fluorspar	4,828	5,000 e/	5,000 e/	4,812 r/	4,113
Glass, crude	1,133	1,369	1,410 e/	1,203	1,300 e/
Graphite, run of mine e/	20,000	15,000	15,000	15,000	15,000
Gypsum, other than that for cement	754,277	413,802	351,557	242,960 r/	302,552
Lime 10/	1,023	1,170	1,066	975 r/	914
Magnesite, run of mine	2,339,138	1,409,768	2,703,343	1,724,744 r/	2,672,089
Meerschaum	500	400	400 e/	400 e/	500 e/
Nitrogen, N content of ammonia e/	518,800 4/	558,000	560,000	82,400	53,400
Perlite, run of mine	157,580	103,416	124,312	147,818 r/	149,429
Pumice	774,000 11/	681,000 11/	579,000 11/	950,189 r/	787,081
Pyrites, cupreous, gross weight	538,140	559,500	699,408	896,519 r/	561,565
Silica sand, gross weight	1,514	843	1,138	1,211 r/	1,485
Sodium compounds:					
Salt, NaCl, all types	2,068	2,344	2,170	2,146 r/	2,126
Soda ash (trona) e/	400	500 4/	500	500	500
Sodium sulfate, concentrates	328,953	300,000 e/	300,000 e/	438,069 r/	456,590
Stone:					
Dolomite	981,683	689,989	829,775	921,105 r/	957,182
Limestone, other than for cement	40,456	49,108	52,355	28,045 r/	30,295
Marble	275,000 r/ e/	433,517 r/	633,432 r/	739,240 r/	647,160
Quartzite	2,807,279	1,878,339	2,301,270	2,514,383 r/	2,743,271
Strontium minerals, celestite: e/					
Run of mine	50,000	50,000	50,000	40,000	40,000
Concentrates	30,000	30,000	30,000	25,000	25,000
Sulfur: e/					
S content of pyrites	126,000 r/	63,000 r/	-- r/	91,000 r/	60,000
Byproduct:					
Petroleum	37,000 r/	46,000 r/	54,000 r/	47,000 r/	50,000
Other	39,000 r/	91,000 r/	91,000 r/	75,000 r/	90,000
Total	202,000 r/	200,000 r/	145,000 r/	213,000 r/	200,000
Talc e/	4,000	4,000	5,000	48,378 r/	54,278
MINERAL FUELS AND RELATED MATERIALS					
Asphalt, natural	126,751	117,310	157,334	150,000 e/	150,000 e/
Carbon black	39,273	39,061	39,971	26,379 r/	35,144
Coal:					
Hard coal, run of mine	3,582	3,646	3,336	2,738 r/	3,330
Lignite, run of mine	57,532	56,780	66,499	66,706 r/	61,315
Coke and semicoke	2,297	2,335	2,144	2,811	2,090
Gas:					
Natural, marketed	203,967	250,804	561,995	718,806 r/	611,822
Coal, manufactured e/	37,000	35,000	15,000	-- r/	-- 4/
Petroleum:					
Crude	25,015	24,696	23,072	21,157 r/	19,783
Refinery products:					
Liquefied petroleum gas	9,580	8,418	8,774	8,071 r/	7,409
Gasoline	30,950	33,067	31,673	38,096 r/	39,889
Naphtha	13,227	13,644	15,917	16,106 r/	15,717
Jet fuel	11,324	13,445	13,767	11,883 r/	11,009
Kerosene	726	578	583	730 r/	638
Distillate fuel oil 12/	55,838	55,248	59,860	69,551 r/	70,333
Lubricants	2,000 e/	4,177	4,714	4,501 r/	4,322
Residual fuel oil	49,459	48,012	44,818	9,512 r/	8,769
Asphalt	7,233	8,029	10,912	7,635	7,764
Unspecified 13/	4,000 e/	33	26	1,644 r/	3,110
Total	184,337	184,651	191,044	167,729 r/	168,960

e/ Estimated. p/ Preliminary. r/ Revised. -- Zero.

1/ Table includes data available through October 5, 2001. Large quantities of construction materials (clay, sand, and gravel) are quarried. Also mined are basalt diabase, granite, onyx, sandstone, serpentine, slate, and travertine for building stone, limestone and gypsum for cement manufacture, and zeolite; but information is inadequate to estimate output.

2/ Estimated data are rounded to no more than three significant digits; may not add to totals shown.

3/ Data are for public sector only. Data for private sector production are not available, but production is believed to be approximately 30,000 metric tons per year.

4/ Reported figure.

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

5/ Approximately 70% of gross production is salable product. Previously reported estimates of salable product in metric tons: 1996--900,000; 1997--1,300,000; and 1998--1,000,000.

6/ Copper mines produce a copper concentrate (of about 22% Cu) and a cupreous pyrite concentrate (about 0.7% Cu). Copper is not recovered from the cupreous pyrite concentrate.

7/ Data are estimated content of Turkish copper refinery tankhouse slimes.

8/ Does not include manganiferous iron ore from the Deveci Mine, production of which amounts to several hundred thousand tons per year and has a manganese content of 3% to 5%.

9/ Includes estimated content of base-metals refinery tankhouse slimes.

10/ Data are lime produced for steel production and do not include the widespread artisanal production of lime for whitewash and sanitation purposes.

11/ Turkish pumice production was officially reported in cubic meters and has a density reported to range from 0.5 to 1.0 metric ton per cubic meter. Values in this table have been converted by using 1 cubic meter=0.75 metric ton.

12/ Diesel fuel (gasoil) and special heating oil.

13/ Includes refinery fuel and losses.