



2005 Minerals Yearbook

GERMANY

THE MINERAL INDUSTRY OF GERMANY

By Steven T. Anderson

In 2005, Germany remained a leading global exporter of industrial goods and services (including processed and fabricated mineral products). However, the country's mineral industry depended almost entirely on imported mineral raw materials. Germany did produce almost enough lignite to satisfy domestic consumption. The international competitiveness of the country's nonfuel mineral processing and fabrication sectors relied primarily on such factors as a highly skilled labor force, rapid assimilation of new technology (especially metal and other mineral materials recycling technologies), and the development and maintenance of liberal trade relationships both within and outside of the European Union (EU), which officially expanded to 25 members in May 2004. Through 2004 and 2005, rising global demand for fossil fuels and associated price increases for imports of mineral fuels into Germany have had a significant effect on the operating costs for the country's mineral industry. During this same timeframe, rapid development of mineral processing operations in economically less developed or lower cost (for mineral extraction, processing, and transportation) regions of the world placed increased pressure on the mineral industry to minimize energy, labor, and material costs within the country (U.S. Library of Congress, Federal Research Division, 2005, p. 10; Bundesverband der Deutschen Industrie e.V., 2006c).

In 2005, Germany's gross domestic product (GDP) based on purchasing power parity was about \$2,522 billion, which was 3.33% higher than that of 2004. The real GDP (adjusted only for inflation) increased by just 0.9% compared with that of 2004, and the rate of inflation was about 2%. In 2004 (the latest year for which reliable trade data were available), Germany spent 3% of its nominal GDP (or about \$76 billion) on imports of mineral raw materials, including crude petroleum (\$31 billion), natural gas (\$18 billion), nonferrous metals (\$9.4 billion), ferroalloys (\$4 billion), ferrous metals (\$3.7 billion), all types of coal (\$3.6 billion), precious metals and stones (\$3.2 billion), industrial minerals (\$1.5 billion), and other mineral fuels, including uranium (\$1.4 billion).¹ In 2005, the nominal value of Germany's production of basic ferrous and nonferrous metals (not including production of finished metal products, such as castings from German foundries) increased to about \$86.74 billion from \$76.95 billion in 2004 mainly because of higher metal prices (Bundesanstalt für Geowissenschaften und Rohstoffe, 2005, p. 24, 29-30; Statistisches Bundesamt, 2006, p. 15; International Monetary Fund, 2006§²).

In current dollars, the value of the country's mine output of industrial minerals was about \$4.4 billion and contributed about 0.16% of Germany's GDP compared with \$4.2 billion and about 0.15% of the GDP in 2004. Mine production of bituminous and anthracite (hard) coal was economical compared with importing

these types of coal to meet domestic demand but only because producers received Government subsidies. Because of these subsidies, it is not possible to accurately interpret publicly available figures concerning the total value of production of these types of coal and its contribution to the GDP. Domestic production of lignite was not subsidized. In 2005, the nominal value of the country's mine production of lignite was about \$195 billion and contributed about 7.11% of Germany's nominal GDP, which was a slight decrease compared with \$199 billion and about 7.25% of the GDP in 2004. In terms of tonnage, Germany was the world's leading producer of lignite. The country was also the fourth ranked producer of potash in the world and the leading producer in the EU. Germany led the EU and was the world's second ranked producer of salt (NaCl content). Germany was ranked only slightly below the Czech Republic in production of kaolin in the 25-member EU and was the fourth ranked producer in the world. Germany was also a leading producer of barite, bentonite, crude gypsum, and feldspar in the EU. Germany's metal processing sector was the leading producer of aluminum metal, refined copper, and crude steel in the EU and the EU's second leading producer of refined lead and zinc metal (Bundesanstalt für Geowissenschaften und Rohstoffe, 2005, p. 138, 150, 155, 157, 159, 161, 165; Kostick, 2006; Statistik der Kohlenwirtschaft e.V., 2006; Statistisches Bundesamt, 2006, p. 12; Virta, 2006; International Monetary Fund, 2006§).

In 2005, Germany's economy continued a trend begun in 1993 of increased expenditures on imports of mineral raw materials. Previously, the expenditure for net imports of nonprecious metals (mostly ores and concentrates) had decreased to 0.09% of Germany's real GDP by 1993 from about 0.5% in 1970 partially owing to more-efficient use of these materials in manufacturing and to evolution of the overall economy toward relatively greater added value from the services sector. In 2004 (the latest year for which reliable data were available), the cost of importing nonprecious metals (including rapidly increasing amounts of scrap metal) had increased to about 0.62% of the real GDP, which placed Germany among the upper one-third of industrialized countries that imported nonprecious metals and the country was estimated to have maintained that rank in 2005. For comparison, China spent about 1.5% of its real GDP on imports of nonprecious metals in 2004, and France spent -0.003%; Sweden, -0.012%; the United States, -0.026%; Canada, -0.158%; and India -0.217% (Bundesverband der Deutschen Industrie e.V., 2006a, d).

In 2004 (the latest year for which reliable statistics were available), the percent contribution of all industrial production to gross value added in the German economy was 25.1% compared with 30.6% in 1991. This value added by industrial production was led by, in decreasing order of percent contribution, the automobile industry, machinery production, production of chemicals (including those derived from domestically mined industrial minerals), and production of iron and steel products and nonferrous metals. From 1991 to 2005, the industrial sector

¹Where necessary, values have been converted from euros (€) to U.S. dollars (US\$) at an annual average exchange rate of €0.80431=US\$1.00 for 2004 and €0.80273=US\$1.00 for 2005.

²References that include a section mark (§) are found in the Internet References Cited section.

was losing its relative share in domestic gross value added to the services sector at a much lower rate than from 1970 to 1991, and industry's share appeared to be leveling off at about 25% in 2005. For at least the next 15 to 20 years, the value added by industrial production was expected to continue to retain its relative importance within the German domestic economy at above a 20% share. The gross domestic value added by the metals processing sector was an estimated \$60 billion through the foundry stage (amount does not include further stages in production of finished metal products, the services associated with selling metal products, or any processing and production of precious metals in Germany) (Bundesverband der Deutschen Industrie e.V., 2006c, d; Statistisches Bundesamt, 2006, p. 15; International Monetary Fund, 2006§).

Government Policies and Programs

In 2005, the Government continued to implement its "Agenda 2010," which was a series of policy objectives aimed at increasing international competitiveness and employment and decreasing expenditures on healthcare and welfare by both the Government and private firms, including those companies involved in the mineral industry. Germany's Agenda 2010 was being implemented alongside a set of reforms known as the Lisbon Strategy that was approved in 2000 by the European Commission to increase the competitiveness in global markets of all members of the EU. The series of changes in Germany's labor market associated with Agenda 2010 are known as Hartz I, II, III, and IV, after Peter Hartz (the head of the German commission that was set up in 2002 to draft these reforms). Hartz IV came into effect at the beginning of 2005. In 2005, the unemployment rate in Germany was 9.1%, which represented a slight decrease compared with an unemployment rate of 9.2% in 2004. Real wages in the country continued to fall after already falling in 2003 and 2004. In 2005, domestic employment levels increased only slightly, if at all, for most industries. Some companies increased investment in mineral-related development projects in foreign countries with lower labor costs and reduced their domestic production capacity. An incentive to invest abroad for firms in the processing sector (not just the extractive sector) of the mineral industry was the high cost of transporting ores and concentrates to Germany for further processing, which was at a record level in 2005. Traditionally, investment abroad by German mineral industrial companies had been more focused on investing only in mineral extraction in foreign countries to help secure those deposits of mineral raw materials for further processing and some end consumption in Germany (Berger and Danninger, 2006; Bundesverband der Deutschen Industrie e.V., 2006c; International Monetary Fund, 2006§).

Industrial representatives advocated that, because private companies—including those heavily involved in the mineral industry—had consolidated and restructured to cut costs extensively by the end of 2005, the Government should continue to follow through on its proposed Agenda 2010 reforms. These industrial leaders suggested that the Government still needed to make further reductions in the corporate tax in order to lower it to an internationally competitive level. They also lobbied for policymakers to not follow through on plans to implement

an increase of 3% (to 19% from 16%) in the value-added tax rate, to implement a proposed trade tax, or to increase taxes to supplement the national healthcare system in 2007. In 2005, the Government and industrial leaders did agree on some reforms, which included increasing the eligibility age for social security to 67 and increasing grants for industrial research and development. Industrial representatives continued to lobby for reducing such nonwage labor compensation as company financing of the social security system, company contributions to unemployment insurance, and company funding of the national healthcare system. These representatives basically continued to adopt the position that it was still too expensive to employ more workers in Germany. Companies also lobbied for more flexibility in hiring and firing, including reducing the trial period that firms must wait before dismissing a new employee to substantially below the Government's proposed period of 24 months (U.S. Library of Congress, Federal Research Division, 2005, p. 9-11; Berger and Danninger, 2006; Bundesverband der Deutschen Industrie e.V., 2006b).

In March 2005, the EU revised its Lisbon Strategy, including eliminating the target date for required completion of reforms (2010). The revised strategy set general guidelines for 3-year nation-specific economic reform programs to be more fully developed by each EU member state. By the end of 2005, the German Government was still debating implementation of the planned Agenda 2010 reforms of nonwage worker compensation by firms, and the Hartz IV reforms had not yet achieved the designed goals of reducing social welfare costs or the number of persons unemployed after the first full year of implementation. The Government was also considering proposals for a revised economic reform program to replace Agenda 2010, in compliance with the revised Lisbon Strategy (Sykes, 2005).

In 2005, some of the 10 newest members of the EU [the EU (10) countries], which were officially admitted on May 1, 2004, had already implemented extensive reforms to improve the efficiency and international competitiveness of their economies, including reforms of mineral industries that had been predominantly state-run before these market reforms were enacted. Even after implementation of Hartz IV, the mineral industry of Germany still had more-generous unemployment and other social benefits than were in effect in such new EU countries as the Czech Republic and Poland. In 2005, the mineral industries in some of the EU (10) countries were taking advantage of lower labor costs and a surprisingly attractive climate for investment, including foreign direct investment (FDI) by companies based in the 15 older EU countries [EU (15), including Germany], to create stronger competition within the EU (15) member countries for EU imports of raw mineral materials and exports of refined mineral products (U.S. Library of Congress, Federal Research Division, 2005, p. 2, 10, 14; Bundesverband der Deutschen Industrie e.V., 2006b, c, d; Norddeutsche Affinerie AG, 2006, p. 2-3).

In 2005, the Government was considering removing or reducing labor quotas that Germany and some other EU (15) countries had hitherto kept in place to restrict imports of labor from the EU (10) countries until 2011 (in Germany). Such a policy change could reduce incentives for companies to

transfer operations to or develop new mineral producing or processing projects in the EU (10) countries by speeding up equalization of labor costs for companies among the EU (15) and EU (10) countries. The German Government expressed a preference for EU (10) countries to raise wages and taxes more quickly, however, given the difficulty of lowering these costs in Germany. On December 29, the German finance minister called for the EU (10) countries to reform their tax systems to promote fair fiscal competition and to reduce the flow of EU (15) investment and relocations of German firms into EU (10) countries (Bundesverband der Deutschen Industrie e.V., 2006b; EUBusiness Ltd., 2005§).

Trade policy was another important policy issue for the mineral industry of Germany. In 2005, industrial representatives in Germany continued to be concerned about securing primary mineral raw materials (ores and concentrates) for the country's metals processing sector and other industries, and they lobbied specifically for better EU trade protection rules against exports of scrap metal. They suggested that Germany possesses some of the most efficient and environmentally friendly technology in the world to extract metals from scrap materials, but that the current EU trade guidelines were resulting in increased outflows of scrap metals from Germany and other EU countries as the international markets for these metals continued to experience shortages during the year. These industrial advocates cited Russia as an example of a nearby competitor for scrap metals that was utilizing a 15% tariff on exports of scrap steel and a 50% tariff on exports of scrap aluminum and copper to retain more of that country's scrap for recycling of these strategically important metals. Well before scrap metals became such a scarce commodity and China accounted for such a significant proportion of global demand for scrap, many EU-based metallurgical companies had replaced open hearth operations with mainly scrap-fed electric arc furnaces (Bundesverband der Deutschen Industrie e.V., 2006a, c, d; Norddeutsche Affinerie AG, 2006, p. 2-3).

Structure of the Mineral Industry

In 2005, small- to medium-scale producers (SMEs) still represented the most common scale of production within the mineral industry of Germany, although more in the mining, quarrying, and processing of industrial minerals than in the processing of metals. The German term for describing most of the companies in the mineral industry is "Mittelstand," which is commonly used to describe a firm of 100 to 1,000 employees. Many metal processing companies have become quite large with increased consolidation of ownership in the EU and Germany, although some of these companies were still considered part of the Mittelstand either because of the historic workforce levels or because they were producers of intermediate goods, regardless of the scale of production or the number of employees. In 2005, mineral industry firms still labeled as part of the Mittelstand included companies with 5 to 5,000 employees, although the Institut für Mittelstandsforschung Bonn (in cooperation with the EU) was attempting to redefine Mittelstand firms to be only those that hire fewer than 500 employees and are almost entirely family owned (Hartmann, 2005).

The major companies involved in the mineral industry of Germany that employ more than 1,000 people are the coal producers RAG Aktiengesellschaft (hard coal) and RWE Power AG (lignite). About 35,000 of RAG Aktiengesellschaft's 98,000 employees were employed by the company's coal mining subsidiary, Deutsche Steinkohle AG, and 18,923 of these were employed "subsurface" (RAG Aktiengesellschaft, 2006, p. 1, 22). In 2005, RWE Power was the subsidiary of RWE Aktiengesellschaft, which was still in charge of lignite production, and 5,572 of RWE Power's approximately 18,700 employees contributed to mine production of lignite on a full-time basis (RWE Power AG, 2006).

Most of the metal processing companies, especially the steel producers, employed substantial numbers. In 2005, the major steel producers were ThyssenKrupp Steel AG (28,400 employees in production of crude steel within Germany), Salzgitter AG (17,600 employees), and Arcelor S.A. (about 6,000, which included only employees at EKO Stahl GmbH and Stahlwerke Bremen GmbH). The nonferrous metal processing companies that were large employers in Germany were Hydro Aluminium Deutschland GmbH (5,600 in Germany) and Norddeutsche Affinerie AG (2,424). Xstrata plc was a prominent example of a metal processor in Germany that ranked solidly in the Mittelstand, because about 300 people were employed by its zinc smelter in Nordenham, Germany. The company that employed the most people to produce industrial minerals in Germany was HeidelbergCement AG (4,400). On average from 2001 through 2005, the metal processing sector employed roughly 800,000 people per year within Germany, and the industrial minerals sector employed about 150,000 people per year (HeidelbergCement AG, 2006, p. 49; Norddeutsche Affinerie AG, 2006, p. 71; Norsk Hydro ASA, 2006, p. 86; Salzgitter AG, 2006, p. 5; Sigge, 2006; ThyssenKrupp Steel AG, 2006, p. 96; Arcelor Eisenhüttenstadt GmbH, 2006§).

Almost all sectors of the mineral industry of the EU have undergone increased concentration in ownership, and this trend continued in 2005. In the steel sector, consolidation of ownership took a big step in 2006 with the acquisition of Arcelor (based in Luxembourg) by Mittal Steel Co. NV of the Netherlands. In Germany, Arcelor completely owned EKO Stahl, Stahlwerke Bremen, and Stahlwerk Thüringen GmbH in addition to a majority interest (51.25%) in AG der Dillinger Hüttenwerke. Mittal had already acquired a steel plant in Hamburg through acquisition of Hamburger Stahlwerke GmbH in 1995 and two steel plants near Duisburg through acquisition of Thyssen Duisburg GmbH in 1997. Arcelor was formed in 2002 by the merger of ARBED S.A. (Luxembourg), Aceralia Corporación Siderúrgica (Spain), and USINOR S.A. (France). ARBED contributed its ownership of Stahlwerke Bremen (acquired in 1995) and Stahlwerk Thüringen (acquired in 1992) to Arcelor's properties in Germany, and USINOR contributed its ownership of EKO Stahl (acquired in 1998) and its interest in Dillinger Hüttenwerke (acquired in 1989) (Businessworld, 2005; AG der Dillinger Hüttenwerke, 2005§; Arcelor S.A., 2006§; Arcelor Thüringen GmbH, undated§).

The merger of Thyssen Stahl AG and Krupp Stahl AG in 1999 to form ThyssenKrupp Stahl AG (the name was changed to ThyssenKrupp Steel AG in 2005) provided the leading

German-based counterweight to foreign ownership of crude steel production capacity. In 2005, the second ranked producer was Salzgitter AG whose indirect interests in Hüttenwerke Krupp Mannesmann GmbH (HKM) enabled it to outrank Arcelor during the year. Salzgitter owned about 7.9 million metric tons per year (Mt/yr) of crude steel production capacity in Germany. Arcelor, which ranked a close third with about 7.7 Mt/yr of capacity, was expected to move up in the rankings in 2006 because of its merger with Mittal. In June 2005, Salzgitter formed a joint venture with Vallourec S.A. of France. This resulted in Salzgitter's 45% share of Vallourec & Mannesmann Tubes S.A. (VMT) being transferred to Vallourec, which in turn reduced its share in HKM to 20% compared with 30% in 2004. Also as part of this deal, Salzgitter increased its direct share in HKM to 30% from 20% through Salzgitter's wholly owned subsidiary, Mannesmannröhren-Werke GmbH (for which it had just finished acquiring the last 7% interest from ThyssenKrupp in December 2004). By the end of 2005, Salzgitter's share of Vallourec (and VMT) was 17.2% (table 2; Salzgitter AG, 2006, p. 6, 10-11, 12, 14, 19; ThyssenKrupp Steel AG, 2006, p. 9, 13; Thyssen AG, 1998, p. 27).

In 2005, Norsk Hydro ASA of Oslo, Norway, owned the largest share of combined primary and secondary aluminum production capacity in Germany, but production still remained competitive because of lower entry costs for potential producers of secondary metal. Primary production in Germany required additional investment in negotiating contracts with foreign alumina and bauxite mineral providers and paying transportation costs to import the necessary raw mineral materials from a much greater distance than that required to transport scrap to the country's secondary smelters, on average. Along with domestic energy costs, international transportation costs were at record levels during the year. Norsk Hydro also targeted replacement of primary production capacity with secondary at its wholly owned subsidiary Hydro Aluminium Deutschland GmbH mainly because secondary production of aluminum metal was estimated to require about 95% less energy. Since completing its acquisition of Hüttenwerke Kayser AG in 2003, Norddeutsche Affinerie controlled production of almost all the secondary refined copper in Germany and was essentially the only producer of primary refined cathodes in the country (Norddeutsche Affinerie AG, 2006, p. 12, 56-58; Norsk Hydro ASA, 2006, p. 5, 33, 35, 39, 55).

Consolidation in ownership of the production capacities for producing industrial minerals also continued to increase in 2005. In January, Buzzi Unicem SpA (Italy) increased its share of the total share capital of Dyckerhoff AG to about 76.7% compared with 64.9% in 2004. Buzzi Unicem began its acquisition of Dyckerhoff in August 2003 and was the second ranked producer of cement in Germany in 2005. This was partly owing to Dyckerhoff's acquisition of Deuna Zement GmbH in 1991. HeidelbergCement AG was the leading cement producer in Germany after the company completed its acquisition of Anneliese Zementwerke AG in March 2003 by purchasing the remaining 48.8% interest held by Dyckerhoff. WBB Minerals Limited of the United Kingdom acquired Fuchs'sche Tongruben GmbH & Co. KG in 1974 and was the leading producer of kaolin in Germany until it was acquired by S.C.R.-Sibelco NV

of Belgium through Sibelco's merger with Watts Blake Bearne & Co. of the United Kingdom in 2001. Kali und Salz GmbH has been the only producer of potash in Germany since acquiring Mitteldeutsche Kali Aktiengesellschaft in 1993, and of rock salt since merging the company's salt business with that of Solvay S.A. (Belgium), including the Solvay subsidiary esco GmbH, in 2004. At the beginning of 2005, K+S Salz GmbH was separated from Kali und Salz as a separate company focused on the increased rock salt business, and Kali und Salz was renamed K+S Kali GmbH to reflect its focus on potash ("Kali") production (WBB Minerals Limited, 2005; Dyckerhoff AG, 2006, p. 44-45; HeidelbergCement AG, 2006, p. 48, 82, 141; King, 2006; K+S Aktiengesellschaft, 2006§).

In 2005, Sibelco was the world's leading producer of silica sand and ball clay with more than 225 plants on 5 continents. Increased concentration of ownership of mineral commodity production capacity globally could continue to contribute to the ongoing increase in the ownership concentrations in the industrial minerals and metals sectors of the mineral industry of Germany. Mergers and acquisitions in the metals processing sector appear to take place in waves of increased activity followed by lulls of very little activity. The surge in consolidation activity that was ongoing in 2005 appears to have resulted from an increased emphasis on privatization of industry in the EU and less restrictions on FDI, especially after the Lisbon Strategy was adopted in 2000. In 2006, consolidation in the metals processing sector of the mineral industry of the EU was still continuing even following EU approval of the merger of Arcelor and Mittal, and it was not clear when the pace of consolidation would subside to negligible levels again. A similar level of consolidation in ownership of mining and quarrying capacities for production of industrial minerals in Germany and the EU appears to have already taken place substantially earlier than in the metals sector. This was at least partially because the ownership rights to extract industrial minerals from existing sites were under less control by EU-member Governments, on average, although acquiring new lands and opening new areas for the extraction of industrial minerals has recently become more difficult owing to increased levels of environmental protection in EU land-management legislation (Sykes, 2005; WBB Minerals Limited, 2005; MEPS International Ltd., 2006a, b; Okes-Voysey and Forbes, 2006, p. 1).

Environmental Issues

EU environmental directives require that the member nations reach certain environmental objectives by a set date, and that the provisions of the directives have to be included as part of the national laws of all members. These EU directives usually outline general rules but seldom set out any detailed requirements and do not regulate how the directive is to be implemented. Directives are the most frequently used policy instruments in EU environmental policy. In 2005, the EU environmental directives that were of particular concern to companies involved in the mineral industry of Germany were the Greenhouse Gas Emission Trading Scheme (EU-ETS Directive), Mining Waste Directive, and Groundwater Directive. Based on a 2004 study, steel industry officials claimed that

the uneven implementation of the EU-ETS by individual EU member states had placed steel companies operating in Germany at a disadvantage in 2005 compared with those operating in almost every other EU member country, including steel companies in Austria, Finland, Luxembourg, the Netherlands, and the United Kingdom. This was because the emissions trading scheme allowed companies with high emissions in other countries to acquire a greater number of EU permits to continue lower-cost (higher-emissions) production, while companies based in Germany still had to install required scrubbers to lower emissions as part of Germany's own domestic emissions reduction program and could not use the permits. The evaluation in the study determined that the costs associated with acquiring and renewing these permits would add less to other EU-country-based companies' operating costs than the costs to companies based in Germany of using and maintaining the cleaner technologies (Steel Institute VDEh and German Steel Federation, 2004; Sykes, 2005; European Communities, 2006§).

Mineral and metals companies were also required to comply with the EU's Pollutant Release and Transfer Register (EU-PRTR) in order for the EU to track the emission, transportation, and disposal of potential pollutants. During autumn 2005, the EU parliament began formal debate on the EU's new chemical control directive—Registration, Evaluation, Authorization and Restriction of Chemicals (REACH). Although other EU safety and environmental regulations already cover such mine products as minerals, ores, and concentrates, the REACH proposal was designed to more directly require mineral producers to prove that these substances should not be classified as hazardous materials by testing and registering all contents of these chemically complex substances rather than leave this task to EU regulators. REACH could allow classification of many industrial minerals and metals (including metals contained in scrap) as hazardous chemicals until proven otherwise by the producers. For mine production of metals, representatives of mineral industries in Africa and South America were attempting to defend the producers in those countries against the additional costs that REACH would impose on mineral companies that export to Germany and other EU states. German steel producers were also lobbying for steel scrap to no longer be declared as waste, according to the European Waste Directive, or defined as a hazardous material, according to REACH (Mining Journal, 2004; Sykes, 2005; Wall Street Journal, The, 2005; Association of German Steel Recycling and Disposal Companies and German Steel Federation, 2006; Azzopardi, 2006§).

Production

In 2005, most mineral producing and processing companies in Germany were able to demonstrate higher productivity, in accordance with the provisions of the Lisbon Strategy and Agenda 2010, but these claims were based on reduced costs through restructuring coupled with high prices for most of the mineral commodity output of these firms. Levels of production of processed metals mostly remained the same or decreased in 2005 compared with those of 2004. The few exceptions were recovery of refined copper from secondary sources, primary production of lead metal, secondary production of magnesium

metal, recovery of platinum-group metals (PGM) (mostly as a byproduct of copper refining, including from secondary sources), and recovery of a bit more uranium from the ongoing cleanup of the former Wismut Mine (table 1; Kidd, 2005). Decreased production of metals was not primarily caused by constraints on production capacity, however, although limiting excess capacity was a goal in the restructuring efforts of many metal processing companies during this timeframe in Germany. The largest constraints on production were the high costs of energy and mineral raw material inputs, most of which were imported (Okes-Voysey and Forbes, 2006, p. 4, 10, 16-18).

In 2005, demand for industrial minerals by the chemical industry of Germany, which was mostly export-oriented, helped encourage increased production of a few industrial minerals compared with 2004, such as boron compounds, fluorspar, synthetic soda ash, and marketable sulfur. Demand for industrial minerals by the domestic agricultural and construction sectors remained mostly stagnant, however, and production of cement, lime, nitrogen, phosphoric acid, and dimension stone decreased. In Germany and the EU, production of natural industrial minerals was becoming increasingly constrained by limited land access to mineral resources. Advocates of the industrial minerals sector claimed that operations that extracted these minerals in 2005 occupied about 0.02% of the total land area regulated by the EU, while agriculture occupied more than 30%. An estimated 20% of the EU's surface area was environmentally protected to a level that prohibited raw mineral extraction, and German officials claimed that the European Commission considered minerals to be of low importance, relative to the environment, in land-use planning for the EU (table 1; Sykes, 2005).

Trade

In 2005, a leading concern of the metal processing sector was the amount of scrap that was leaving the country. In 2004, Germany exported about 9.2 million metric tons (Mt) of iron and steel scrap, 614,000 metric tons (t) of scrap aluminum, 408,000 t of refined copper scrap, and significant quantities of most other marketable scrap metals. For aluminum, copper, and ferrous metals, scrap was the leading export of each metal, respectively. Scrap exports of aluminum and ferrous metals were shipped mostly to other EU countries, but Germany's most important customer for copper scrap metal was China. The rest of Germany's trade in metals reflected its primary role in the global mineral industry as an importer of metallic ores and concentrates and an exporter and consumer of processed metal. Germany did export small amounts of some metallic ores and concentrates as an important transshipping hub. Even refined metal commodities were mostly not exported but further used in German industrial production of automobiles, machinery, and other finished products, of which the metal content is not contained in the tables of this chapter. The United States was generally not a significant consumer (importing at least 5%) of Germany's metal exports, but was the top ranked importer of arsenic; bismuth; cobalt contained in scrap; ferrochromium; iridium, osmium, and ruthenium; mercury; PGM (waste); palladium; rhodium; and zirconium. U.S. imports of nickel contained in scrap, tungsten contained in scrap, and zinc powder

ranked it as second among Germany's export markets for these metals. The United States was also the third ranked importer of German exports of refined copper and platinum metal (tables 3, 4; Bundesverband der Deutschen Industrie e.V., 2006c).

In 2004, the mineral industry of Germany was an important primary producer of industrial minerals and supplier for the EU, although a considerable amount of the country's exports in this sector were also part of its extensive role as a transshipper. As a primary producer, Germany was an important supplier of cement, kaolin, feldspar, peat, salt, silica sand, and sulfur, almost entirely to other EU countries. The United States was a top ranked importer only of mullite from Germany; otherwise the U.S. market was not a leading destination for industrial minerals from Germany. Mullite is an important product of ceramic clay producers in the Westerwald region of Germany, however. As Germany continues gradually to reduce the Government's subsidy on mine production of hard coal, the country has become more dependent on imports. The steel manufacturing sector has become especially dependent on imports of hard coking coal as domestic supplies continue to decrease. Before Poland officially joined the EU in 2004, Germany's most important sources of hard coal and coke were all outside of the EU, including, in order of quantity imported, Australia, Canada, China, South Africa, and Russia. Germany is basically self-sufficient in lignite but substantially import dependent on all other mineral fuels. The only mineral fuel for which the United States is a significant importer from Germany is enriched uranium (tables 3, 4; Taylor, 2005; Bundesverband der Deutschen Industrie e.V., 2006c; King, 2006).

Commodity Review

Metals

Aluminum.—At the end of 2005, Norsk Hydro closed the smelter and carbon capacity of the Hamburger Aluminium-Werke GmbH (HAW) in agreement with the two other joint owners of HAW. Hydro also announced that it planned to close its Elbwerk primary aluminum plant at Stade at the end of 2006. These closures and announcements of further closures were reportedly in response to the inability of the company to secure energy contracts for these plants at rates that would sustain profitable production for a sufficient period into the future. The company expressed optimism that these two closures would improve the international competitiveness of its primary aluminum production operations (Norsk Hydro ASA, 2006, p. 35, 54).

Copper.—In 2005, Norddeutsche Affinerie AG (NA) still had the largest capacity for producing refined copper in the EU, even after restructuring in 2003 and the first quarter of 2004. This restructuring resulted in a relative decrease in primary production, such that only 60% of its copper cathode production was produced from inputs of imported ores and concentrates and 40% was from recycled materials (which were much more available and less costly domestically). Although NA still did not venture into owning a majority interest in any foreign copper mines, the company secured two new contracts in July 2005 to process concentrates from the Ok Tedi Mine in Papua New

Guinea and the Batu Hijau Mine in Indonesia. The company expected these contracts to result in increased production of primary refined copper in 2006 and a more-efficient utilization of existing production capacity. The production of primary refined PGM increased substantially in 2004 compared with that of 2003 and increased significantly again in 2005. These increases in production are related to the PGM content of copper ores and concentrates processed by NA (unpublished). Total German imports of copper ores and concentrates increased to 1,142 t in 2004 compared with 880 t in 2003 and were expected to increase again (slightly) to about 1,150 t in 2005 (table 1; Bundesanstalt für Geowissenschaften und Rohstoffe, 2005, p. 86; Mining Journal, 2005; Norddeutsche Affinerie AG, 2006, p. 12, 63).

Iron and Steel.—In 2005, Germany accounted for about one-fourth of total crude steel production in the EU (25), and was ranked sixth in world production. ThyssenKrupp Steel was the 10th ranked producer in the world (Bundesministerium für Wirtschaft and Technologie, 2006§). ThyssenKrupp continued to restructure to reduce its crude steel production costs in response to decreasing availability and increasing costs of importing the necessary mineral raw materials in Germany. During the year, ThyssenKrupp's cost-cutting efforts included cutting back production of crude steel by 100,000 Mt in the second quarter and by another 200,000 Mt in the third quarter from levels planned at the beginning of the year. The cuts were primarily owing to an unexpected buildup in company inventories during the first quarter (AFX News Limited, 2005).

The company agreed to invest in an expansion of its crude steel production capacity, but in Sepetiba, Brazil, rather than in Germany. In Brazil, costs were considerably lower and the availability of mineral raw materials, especially iron ore, was substantially higher. Companhia Vale do Rio Doce of Brazil had a 10% interest in the new Brazilian steel mill, and ThyssenKrupp expected the mill to have a production capacity of 4.4 Mt/yr of crude steel and be completed by about the middle of 2008. The company expected eventually to expand its production capacity of coated steel and rolled products in Germany after securing this additional, lower-cost supply of crude steel from this project in Brazil, although no timeline for this capacity expansion in Germany was provided in 2005. In addition to vertically integrating downward into securing energy sources for metals processing by owning controlling shares in mineral fuel production facilities, which was taking place in the aluminum and copper refining sectors in Germany, ThyssenKrupp also had secured the exclusive services of at least one existing hard coal mine in Germany that had provided energy and coking coal for the steel company since 2003 (Statistik der Kohlenwirtschaft e.V., 2004; ThyssenKrupp Steel AG, 2006, p. 11, 37, 48-49).

Zinc.—Since purchasing the zinc smelter and refinery in Duisburg in 2003, Sudamin MHD GmbH invested in restructuring the operation to convert it into a more-modern processing facility that could produce high-quality zinc and other minor metals from 100% recycled sources of feed (intelligence AG, 2004). This modernization process was scheduled to be completed in 2005, but the restructuring was reportedly not sufficient to keep pace with increasing energy

costs in Germany. Instead, the company officially closed the smelter on August 8, 2005 (Thurtell, 2005; BaseMetals.com, 2005§).

Industrial Minerals

Cement.—HeidelbergCement AG was the leading producer of cement in Germany and the fourth ranked producer in the world. In 2005, the company's operations in Germany still exhibited a lower use of capacity than company leaders wanted. These leaders also expressed dissatisfaction with high costs (especially for energy) and high taxes in Germany. The company did increase domestic production by 7% to 7.6 Mt in 2005 compared with 7.1 Mt in 2004 after acquiring Teutonia Zementwerk AG, Hannover, in December 2004. In 2005, the company continued restructuring its operations in Germany to increase capacity utilization and reduce costs. The company estimated that its domestic production from the same plants that it operated in 2004 (excluding Teutonia Zementwerk) decreased by about 2% in 2005. New methods to reduce costs included substituting blast furnace slag (recycled from steel production) and fly ash (recovered from coal driven power stations) for clinker in some of the company's domestic cement production. These recycled inputs were less costly than the natural raw mineral inputs that are traditionally used in the production of clinker. Other cement companies also substituted these inputs in their cement production in Germany. Of the total cement produced in Germany in 2005, about 3 Mt (9.8%) was produced using fly ash and 2.5 Mt (8.2%) was produced using blast furnace slag (HeidelbergCement AG, 2006, p. 2, 22, 28, 36, 42-43, 48; ICR Research, 2006).

Clay and Shale.—In 2005, not much restructuring was going on in the clays sector of the mineral industry of Germany because most ownership consolidation and reorganization had already taken place long before. The leading producer was WBB Fuchs GmbH & Co. KG (a subsidiary of WBB Minerals and a specialist in kaolinitic clays), but some other significant German companies were still family-owned SMEs, such as Goerg & Schneider GmbH & Co. and Stephan Schmidt KG. Germany was one of the leading producers of kaolin in Western Europe. All these producers were able to remain internationally competitive by producing relatively valuable customized blends, which was still cost effective because up to 25 different clays could be extracted from any one pit operated by these companies, which were located predominantly in the Westerwald region. WBB Fuchs specialized in high alumina blue clays, light firing refractory clay, and kaolins for refractories. The company produced about 200 different blends of clays, many for specific ceramic applications, such as isostatic pressing and pressure casting. Stephan Schmidt produced white- and light-firing clays, red-firing clays with high mechanical strength, special clays for engobes and glazes, binding clays, granulated clays, and spray-dried clay bodies. Goerg & Schneider specialized in refractory clays, especially chamotte (or firebrick clay) and ball clays (or plastic clays). All these clay blends contained kaolins, but WBB Fuchs produced the highest grade kaolin, on average, with about 38% Al_2O_3 content (Taylor, 2005; King, 2006).

Mineral Fuels

Relative to its consumption, Germany has relatively insignificant domestic mineral fuel sources, other than coal, and must rely on imports to meet its energy needs. As a result of energy-saving measures, energy efficiency (the amount of energy required to produce a unit of gross domestic product) has been improving since the beginning of the 1970s. Oil was expected to remain the primary energy source, but Germany planned to reduce import reliance and reliance on nuclear energy by increasing the energy consumption share of renewable sources (mostly wind-generated energy and some biomass projects) to 20% by 2020 from 7% in 2005. The Government's policy to accomplish this goal centered around "feed-in tariffs," which are included in prices paid by electricity distribution companies to companies that generate electricity from renewable sources. The "tariff" portion of the premium price paid by distributors for renewable power is then subsidized by the Government. In 2004, the share of Germany's primary energy consumption that was provided by oil was about 36% followed by natural gas (23%), hard coal (14%), nuclear power (13%), and lignite (11%); the remainder was provided by nonmineral-fuel energy sources. In 2000, the Government agreed to phase out all nuclear powerplants by 2022 and this policy resulted in the closure of the Obrigheim plant on May 11, 2005 (U.S. Energy Information Administration, 2005, U.S. Library of Congress, Federal Research Division, 2005, p. 11-12; Energy Research Centre of the Netherlands, 2005§). In 2005, industrial leaders in Germany asserted that there is an essential compatibility between Germany's obligation to protect the environment and a strategy to maintain diversity in the country's energy supply, including nuclear fuel (Bundesverband der Deutschen Industrie e.V., 2005).

Coal.—Hard coal mining is centered in the Ibbenbüren, the Ruhr, and the Saar coalfields in Germany and is uneconomical without subsidies because the current resources lie prohibitively far underground (SPG Media Limited, 2005§). As the hard coal subsidy is phased out, more mines are being closed resulting in greater imports of hard coal, coking coal, and coke. The Lohberg-Osterfeld Mine was scheduled to be closed, which resulted in only eight active hard coal mines being left operational. The Walsum and the Lippe Mines were also scheduled to be closed in 2009 and 2010, respectively (Bundesministerium für Wirtschaft und Arbeit, 2005, p. 66). In the second quarter of 2005, however, the price of imports of hard coal was 22% higher than that of the second quarter of 2004. In 2004, 99% of the coal imported into Germany was hard coal, and the country imported even more hard coal in 2005. If the price of imports continues to rise, then production of hard coal could potentially become economically viable again without a subsidy. The amount of the subsidy was about \$3.36 billion in 2005, which was about \$130 per metric ton of combined anthracite and bituminous coal produced during the year. Companies in the mineral industry of Germany did not expect this to be the case before the Walsum and Lippe Mines are closed, however. RAG's energy subsidiary, STEAG AG, planned to build a new coal-fired powerplant at Walsum, which is located close to the Rhine River, because the river

offers efficient access to imports of hard coal. Norddeutsche Affinerie also was interested in entering the electricity supply sector in Germany by building a hard coal-fired powerplant in the Hamburg area that would be accessible to imports of hard coal through the harbor there (Frondel and others, 2006; RWE Aktiengesellschaft, 2006, p. 97-98; Rzeznitzcek, 2006).

Outlook

In 2005, a reconsideration of industrial competitiveness policies in the EU and Germany was underway, the outcome of which could greatly affect how the mineral industry of Germany will evolve. Costs for labor, energy, and mineral raw materials continued to increase in the country and even surpassed those in many fellow members of the EU, especially the new EU (10) countries. The response of companies has been to restructure internally to reduce these costs and to invest in developing new capacity abroad rather than domestically. Additionally, vertical integration and concentration of ownership has increased, even across sectors of the mineral industry. In the metal processing sector, it can be expected that more of the metals companies that have so far been mostly left out of the recent wave of mergers and acquisitions will be attempting to find additional partners in 2006 and 2007 (Bundesverband der Deutschen Industrie e.V., 2006c).

Even as the scarcity of domestic minerals in Germany is increasing, the Government's hard coal subsidy and the EU's land-use policy is being debated. Together with all of the other high costs in Germany, the higher cost of imports of hard coal, coking coal, and coke for steel manufacturing encouraged steel manufacturers to lobby for keeping existing mines open in the country. Representatives of the industrial minerals sector also lobbied the EU for increased access to environmentally protected lands and areas currently occupied by subsidized agricultural interests. Some metal processing companies established new long-term contracts with producers of natural mineral materials (mines and quarries) outside of the EU, to secure a flow of the necessary mineral raw materials. This traditional approach for companies in Germany continued to become more costly in 2005, however, primarily because transportation costs continued to attain record levels. The primary concern for maintaining an economically important mineral industry in Germany will be to reduce the cost burdens on the companies, including energy, labor, and taxes, in order to encourage investment in continuing mineral production and at least maintaining processing capacity domestically.

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TABLE 1
GERMANY: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons unless otherwise specified)

| Commodity | 2001 | 2002 | 2003 | 2004 | 2005 |
|---|----------------------|----------------------|----------------------|----------------------|----------------------|
| METALS | | | | | |
| Aluminum: | | | | | |
| Alumina, Al ₂ O ₃ equivalent ^c | 715 | 717 ^r | 830 | 835 | 830 |
| Metal: | | | | | |
| Primary | 651,592 | 652,845 | 660,793 | 667,839 | 647,934 |
| Secondary | 622,907 | 666,148 | 680,385 | 703,756 | 703,545 |
| Total | 1,274,499 | 1,318,993 | 1,341,178 | 1,371,595 | 1,351,479 |
| Arsenic, white, Ar ₂ O ₃ content ^c | 100 ^r | 100 ^r | -- ^r | -- ^{r,2} | -- ² |
| Cadmium, metal, refinery including secondary | 539 | 422 | 640 ^r | 640 ^{r,e} | 640 ^e |
| Cobalt, metal, including cobalt oxide ^c | -- ^r | -- ^r | -- ^r | -- ^r | -- |
| Copper, metal: | | | | | |
| Smelter: | | | | | |
| Primary | 317,700 | 295,100 | 288,800 | 278,600 | 257,200 |
| Secondary | 240,900 | 283,100 | 306,600 | 262,600 | 251,400 |
| Total | 558,600 | 578,200 | 595,400 | 541,200 | 508,600 |
| Refined: | | | | | |
| Primary | 303,000 | 327,000 | 286,653 | 283,686 | 239,982 |
| Secondary | 390,773 | 368,791 | 310,925 | 368,956 | 398,778 |
| Total | 693,773 | 695,791 | 597,578 | 652,642 | 638,760 |
| Iron and steel: | | | | | |
| Ore, run of mine³: | | | | | |
| Gross weight | 407 | 419 | 429 | 412 | 360 |
| Fe content | 57 | 59 | 60 | 58 | 38 |
| Metal: | | | | | |
| Pig iron | 29,184 | 29,427 | 29,461 | 30,018 | 28,854 |
| Direct reduced iron | 210 | 540 | 590 | 610 | 400 ^e |
| Ferroalloys: | | | | | |
| Ferrochromium | 19,308 | 20,018 | 18,318 | 24,857 | 22,672 |
| Other ^{e,4} | 35,000 | 30,000 | 32,000 | 26,000 | 25,000 |
| Steel, crude | 44,803 | 45,015 | 44,809 | 46,374 ^r | 44,524 |
| Semimanufactures | 37,011 | 37,763 | 37,174 | 39,976 | 37,771 |
| Lead, metal, refined: | | | | | |
| Primary | 155,862 | 141,202 | 132,155 | 115,869 | 118,778 |
| Secondary ^{e,5} | 217,500 ^r | 238,700 ^r | 224,700 ^r | 243,304 ² | 222,932 ² |
| Total | 373,400 ^r | 379,902 | 356,900 ^r | 359,173 | 341,710 |
| Magnesium, metal including castings | 25,945 | 24,506 | 25,987 | 26,591 | 28,160 |
| Platinum-group metals, metal, refined | 60,439 ^r | 35,561 ^r | 51,847 ^r | 95,135 ^r | 104,725 |
| Selenium, metal ^c | 15,000 | 16,000 | 14,000 | 14,000 | 12,000 |
| Silicon, metal ^c | 27,739 ² | 25,257 ² | 27,500 | 27,500 | 27,500 |
| Silver, metal, refined, secondary | 523 ^r | 520 ^r | 592 ^r | 568 ^r | 546 |
| Tin, alloys | 14,420 | 11,447 | 6,143 | 5,431 | 4,912 |
| Zinc, metal: | | | | | |
| Primary | 269,200 | 272,900 | 255,200 | 252,133 | 245,140 |
| Secondary ^{e,5} | 89,140 | 105,700 | 132,900 | 129,887 ² | 89,751 ² |
| Total | 358,341 | 378,561 | 388,131 | 382,020 | 334,891 |
| INDUSTRIAL MINERALS | | | | | |
| Abrasives: | | | | | |
| Natural, pumice | 123,755 ^r | 43,354 ^r | -- | -- ^e | -- ^e |
| Artificial, corundum | 56,939 ^r | 56,728 | 59,097 | 72,565 | 73,620 |
| Barite, marketable (contained BaSO ₄) | 108,111 | 100,993 | 109,506 | 93,624 | 88,591 |
| Boron compounds, manufactured, including boric acid and oxide | 127,670 ^r | 168,250 ^r | 176,837 ^r | 168,841 ^r | 203,475 |
| Bromine compounds, manufactured, including oxide | 231 ^r | 413 ^r | 388 ^r | 248 ^r | 274 |
| Cement: | | | | | |
| Clinker, intended for market | 25,227 | 23,954 | 25,233 | 26,281 | 24,315 |
| Hydraulic | 32,118 | 31,009 | 32,749 | 31,854 ^r | 30,629 |

See footnotes at end of table.

TABLE 1--Continued
GERMANY: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons unless otherwise specified)

| Commodity | 2001 | 2002 | 2003 | 2004 | 2005 |
|--|------------------------|------------------------|----------------------|----------------------|----------------------|
| INDUSTRIAL MINERALS--Continued | | | | | |
| Chalk, natural, including ground | 1,045 | 1,022 | 1,001 | 1,005 | 1,068 |
| Clays, natural: | | | | | |
| Bentonite | 448 | 495 | 479 | 405 | 405 |
| Ceramic and refractory clays | 5,500 | 4,700 | 4,300 | 4,400 | 4,500 |
| Of which, fire clay and chamotte | 159 | 167 | 167 | 176 | 176 |
| Fuller's earth ^c | -- ^r | -- ^r | -- ^r | -- ^r | -- |
| Kaolin, marketable | 3,764 | 3,666 | 3,487 | 3,752 | 3,768 |
| Other, unspecified | 341 ^r | 281 ^r | 191 ^r | 197 ^r | 185 |
| Diatomite | 50 | 54 ^r | 55 ^r | 54 ^e | 54 ^e |
| Feldspar ^{e,6} | 302,650 ^{r,2} | 243,368 ^{r,2} | 400,000 ^r | 500,000 | 500,000 |
| Fluorspar: | | | | | |
| Acid-grade | 30,381 ^r | 34,429 ^r | 33,289 ^r | 33,203 ^r | 35,400 |
| Metallurgical-grade ^c | -- ^r | -- ^r | -- ^r | -- ^{r,2} | -- ² |
| Total | 30,381 ^r | 34,429 ^r | 33,289 ^r | 33,203 ^r | 35,400 |
| Graphite, natural | 3,190 | 3,312 | 2,840 | 3,155 | 2,638 |
| Gypsum and anhydrite, natural | 1,966 ^r | 1,761 | 1,748 | 1,579 | 1,644 |
| Lime, quicklime, dead-burned dolomite | 6,920 ^r | 7,139 ^r | 6,876 ^r | 6,947 ^r | 6,810 ^e |
| Magnesium salts, byproduct of potash mining | 1,233 | 1,411 | 1,288 | 1,197 ^r | 1,200 ^e |
| Nitrogen, N content of ammonia | 2,522 | 2,560 ^r | 2,803 | 2,741 ^r | 2,289 |
| Peat, natural | 115,470 | 122,696 | 135,356 | 119,961 | 120,000 ^e |
| Phosphate materials: | | | | | |
| Phosphatic fertilizers, P ₂ O ₅ content ^c | -- ^r | -- ^r | -- ^r | -- ^r | -- |
| Phosphoric acid, manufactured, P ₂ O ₅ content | 35,340 | 34,486 | 32,569 | 37,810 | 37,374 |
| Thomas slag: ^e | | | | | |
| Gross weight | -- ^r | -- ^r | -- ^r | -- ^r | -- |
| P ₂ O ₅ content | -- ^r | -- ^r | -- ^r | -- ^r | -- |
| Pigments, iron oxide ^c | 4,000 ^r | 4,000 ^r | 4,000 ^r | 4,000 ^r | 4,000 |
| Potash, K ₂ O content: | | | | | |
| Crude | 4,337 | 4,278 | 4,413 | 4,439 | 4,434 |
| Marketable | 3,549 | 3,472 | 3,563 ^r | 3,627 ^r | 3,664 |
| Salt, NaCl content, marketable: | | | | | |
| Evaporated salt, including marine salt | 827 | 858 | 727 | 572 | 594 |
| Industrial brines | 7,629 | 8,307 | 9,078 | 10,432 | 9,904 |
| Rocksalt and other brines | 5,887 | 6,468 | 6,501 ^r | 7,701 ^r | 8,679 |
| Total | 14,343 ^r | 15,633 ^r | 16,306 ^r | 18,705 ^r | 19,177 |
| Siliceous earth, marketable | 50,361 | 53,711 | 54,517 | 54,801 | 50,000 ^e |
| Sodium compounds, n.e.s.: | | | | | |
| Soda ash (Na ₂ CO ₃), manufactured | 1,500 ^e | 1,512 ^r | 1,493 ^r | 1,438 ^r | 1,533 |
| Sulfate, manufactured ^c | -- ^r | -- ^r | -- ^r | -- ^r | -- |
| Stone, sand and gravel: | | | | | |
| Stone, crude: | | | | | |
| Dimension, including partially worked | 315 | 237 | 167 | 229 | 212 |
| Of which, dolomite and limestone | 69 | 76 | 106 | 76 | 75 |
| Crushed, not including chalk | 172,585 ^r | 166,798 | 160,851 | 153,040 | 153,000 ^e |
| Dolomite and limestone, not for cement manufacture | 34,410 | 31,300 | 30,000 | 23,700 | 20,600 |
| Gravel, natural: | | | | | |
| Building gravel | 77,406 ^r | 73,131 ^r | 70,173 ^r | 65,566 ^r | 65,700 ^e |
| Crude, including flint and pebbles | 16,697 ^r | 14,505 ^r | 13,632 ^r | 12,889 ^r | 12,900 ^e |
| Other gravel, including quartzite | 11,600 | 11,877 | 13,295 | 10,898 | 10,900 ^e |
| Sand, natural: | | | | | |
| Building sand | 70,912 ^r | 65,414 ^r | 67,603 ^r | 63,785 ^r | 63,800 ^e |
| Silica sand, including glass sand and quartz sand | 7,835 | 7,839 | 7,953 | 8,162 | 8,200 ^e |
| Other, including from granite and pegmatite | 11,603 | 11,617 | 13,115 | 13,239 | 13,300 ^e |
| Total sand and gravel | 196,053 ^r | 184,383 ^r | 185,771 ^r | 174,539 ^r | 175,000 ^e |

See footnotes at end of table.

TABLE 1--Continued
GERMANY: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons unless otherwise specified)

| Commodity | 2001 | 2002 | 2003 | 2004 | 2005 |
|--|-----------------------|----------------------|----------------------|----------------------|---------------------|
| INDUSTRIAL MINERALS--Continued | | | | | |
| Sulfur: | | | | | |
| Marketable thousand metric tons | 988 | 1,093 | 1,014 | 939 | 1,055 |
| Byproduct: | | | | | |
| Metallurgy ^c do. | 684 | 754 | 701 | 591 | 600 ^e |
| Natural gas and petroleum do. | 1,749 | 1,745 | 1,661 | 1,503 ^r | 1,585 |
| Total do. | 2,433 | 2,499 | 2,362 | 2,094 ^r | 2,190 ^e |
| Talc and steatite, natural ^c | -- ^r | -- ^r | -- ^r | -- ^r | -- ^r |
| MINERAL FUELS AND RELATED MATERIALS | | | | | |
| Asphalt and bitumen, natural | 9,910 | 8,011 | 1,680 | -- ^r | -- |
| Coal: | | | | | |
| Anthracite and bituminous, marketable thousand metric tons | 27,054 | 26,088 | 25,684 | 26,496 ^r | 25,698 |
| Lignite do. | 175,365 | 181,778 | 179,085 | 181,926 | 177,907 |
| Coke: | | | | | |
| Of anthracite and bituminous coal do. | 7,289 | 7,226 | 7,827 | 8,200 ^e | 8,100 ^e |
| Of lignite do. | 173 ^e | 154 ^e | 165 | 187 | 173 |
| Fuel briquets: | | | | | |
| Of anthracite and bituminous coal do. | 140 ^e | 124 | 114 | 102 | 92 |
| Of lignite including dust and dried do. | 1,740 | 1,365 | 1,466 | 1,435 | 1,490 |
| Gas: | | | | | |
| Manufactured: | | | | | |
| Blast furnace thousand cubic meters | 8,749 | 8,781 | 8,936 | 9,100 ^e | 8,800 ^e |
| Coke oven do. | 3,362 | 3,310 | 2,870 | 3,000 ^e | 2,900 ^e |
| Total do. | 12,111 | 12,091 | 11,806 | 12,100 ^e | 11,700 ^e |
| Natural: | | | | | |
| Gross do. | 21,545 | 21,422 | 22,092 ^r | 20,405 | 19,903 |
| Marketable do. | 20,200 ^{r,e} | 20,116 ^r | 20,190 ^r | 19,333 ^r | 18,900 ^e |
| Petroleum:^{e,7} | | | | | |
| Crude thousand 42-gallon barrels | 26,200 ^r | 27,600 ^r | 27,900 ^r | 25,800 ^r | 26,200 |
| Refinery products: | | | | | |
| Liquefied petroleum gas do. | 38,000 ^r | 37,000 ^r | 38,000 ^r | 37,000 ^r | 37,000 |
| Distillate fuel oil do. | 350,000 ^r | 350,000 ^r | 360,000 ^r | 370,000 ^r | 390,000 |
| Residual fuel oil do. | 70,000 ^r | 65,000 ^r | 69,000 ^r | 77,000 ^r | 74,000 |
| Gasoline, including aviation do. | 210,000 ^r | 210,000 ^r | 210,000 ^r | 210,000 ^r | 210,000 |
| Kerosene and jet fuel do. | 32,000 ^r | 32,000 ^r | 32,000 ^r | 34,000 ^r | 33,000 |
| Naphtha do. | 82,000 ^r | 82,000 ^r | 86,000 ^r | 94,000 ^r | 94,000 |
| Refinery gas do. | 45,100 ^r | 48,700 ^r | 51,600 ^r | 51,300 ^r | 50,600 |
| Bitumen, bituminous mixtures, and other residues do. | 32,000 ^r | 32,000 ^r | 30,000 ^r | 29,000 ^r | 32,000 |
| Lubricants and miscellaneous oils do. | 11,000 ^r | 11,000 ^r | 11,000 ^r | 15,000 ^r | 14,000 |
| Petroleum coke do. | 9,700 ^r | 9,400 ^r | 10,000 ^r | 10,000 ^r | 11,000 |
| Mineral jelly, waxes, and paraffins do. | 1,600 ^r | 1,500 ^r | 1,500 ^r | 1,800 ^r | 1,800 |
| Other do. | 13,000 ^r | 12,000 ^r | 8,400 ^r | 11,000 ^r | 9,400 |
| Total do. | 890,000 ^r | 890,000 ^r | 910,000 ^r | 940,000 ^r | 960,000 |
| Uranium concentrate, U content | 27 ^r | 221 ^r | 104 | 77 | 80 |

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

¹Table includes data available through November 2006.

²Reported figure.

³Iron ore is used domestically as an additive in cement and other construction materials but is of too low a grade to use in the steel industry.

⁴Estimated from reported domestic sales of ferroalloys [Statistische Bundesamt, 2006, Fachserie 4, Reihe 3.1—Produzierendes Gewerbe, Produktion im Produzierenden Gewerbe, Jahr 2005: Wiesbaden, Germany, Statistische Bundesamt, August, p. 178].

⁵Estimated by subtraction of primary from total, and rounded to four significant digits.

⁶After 2002, figures estimated from reported figures that include production of feldspar bearing rocks, but excluding the estimated production of aggregates from these rocks where the feldspar was not extracted and the feldspar content was not measured.

⁷All figures were converted to barrels from those reported in metric tons according to data from Mineralölwirtschaftsverband e.V., 2006, Jahresbericht—Mineralöl-Zahlen, 2005: Hamburg, Germany, Mineralölwirtschaftsverband e.V., May, p. 79, and reflect significant digits of conversion factors (three digits for crude petroleum and two digits for refinery products).

TABLE 2
GERMANY: STRUCTURE OF THE MINERAL INDUSTRY IN 2005¹

(Thousand metric tons unless otherwise specified)

| Commodity | Major operating companies and major equity owners ² | Location of main facilities | Annual capacity | |
|---|--|--|----------------------|---|
| Alumina | Nabaltec GmbH | Plant at Schwandorf (special aluminas) | 55 | |
| Do. | Aluminium Oxid Stade GmbH (DADCO Alumina & Chemicals Ltd., 100%) | Plant at Stade | 900 | |
| Do. | Martinswerk GmbH (Albemarle Corporation, 100%) | Plant at Bergheim (fused alumina) | 350 | |
| Aluminium | Hydro Aluminium Deutschland GmbH (Norsk Hydro ASA, 100%) | Primary smelters: Elbewerk at Stade and Rheinwerk at Neuss; Primary rolling mill at Grevenbroich | 300 | |
| Do. | Aluminium Norf GmbH (Alcan Inc., 50%, and Norsk Hydro ASA, 50%) | Lippenwerk at Lünen (secondary) and primary rolling mill at Neuss | 600 | |
| Do. | Metallhüttenwerke Bruch GmbH | Secondary foundry alloy plant at Dortmund; secondary cast alloy plants at Asperg and Bad Säckingen | 110 | |
| Do. | VAW-IMCO Guss und Recycling GmbH (Aleris International, Inc., 100%) | Secondary smelters: Erftwerk at Grevenbroich and Innwerk at Töging | 320 | |
| Do. | Trimet Aluminium AG | Smelter at Essen-Borbeck | 155 ^c | |
| Do. | Hamburger Aluminium-Werke GmbH (Norsk Hydro ASA, Alcoa Inc., and Austria Metall AG, 33.33% each) | Primary smelter at Hamburg | 130 | |
| Do. | Corus Aluminium Voerde GmbH | Primary smelter at Voerde and rolling mill at Koblenz | 100 | |
| Arsenic, metal | metric tons | PPM Pure Metals GmbH (Metaleurop S.A., 100%) | Plant at Langelsheim | 5 |
| Barite | Sachtleben Bergbau GmbH | Clara Mine in the Black Forest and plant at Wolfach | 60 | |
| Do. | Deutsche Baryt-Industrie Dr. Rudolf Alberti GmbH & Co. KG | Wolkenhügel Mine in the Harz Mountains and plant at Bad Lauterberg | 50 | |
| Bentonite | Süd-Chemie AG | Plants at Moosburg, Duisburg, and Heufeld | 500 | |
| Do. | Kärlicher Ton- und Schamotte-Werke Mannheim & Co. KG (KTS) | Quarry at Mülheim-Kärlich | 50 | |
| Cement | HeidelbergCement AG | Plants at Blaubeuren-Schelklingen, Burglengenfeld, Hannover, Hassmersheim, Kiefersfelden, Leimen, and others | 9,200 ^c | |
| Do. | Dyckerhoff AG (Buzzi Unicem SpA, 76.73%, and other private, 23.27%) | Plants at Amoneburg, Golheim, Neuwied, Neubeckum, and others | 5,600 ^c | |
| Do. | SCHWENK Zement KG | Plants at Allmendingen, Bernberg, Karlstadt, and Mergelstetten | 5,000 ^c | |
| Do. | Anneliese Zementwerke AG (HeidelbergCement AG, 100%) | Plants at Ennigerloh, Geseke, and Paderborn | 3,500 ^c | |
| Do. | Deuna Zement GmbH (Dyckerhoff AG, 100%) | Plant at Deuna | 3,000 ^c | |
| Chalk | Vereinigte Kreidewerke Dammann KG | Quarries on Rügen Island, and plants at Lägerdorf and Söhle | 500 | |
| Clay, including ball and refractory clays | Stephan Schmidt KG | Tonbergbau Grube Anton open pit mine, Dornburg-Langendernbach, Müllernbach and Thewald Mines, Höhr-Grenzhausen; Wiesa-Thonberg and Cunnersdorf quarries, Kamenz-Wiesa, Westerwald region | 1,400 ^c | |
| Do. | Marx Bergbau GmbH & Co. KG (Stephan Schmidt KG, 100%) | Lämmersbach and Meudt Mines, Ruppach-Goldhausen quarry, Dornburg-Langendernbach, Westerwald region | 300 ^c | |
| Do. | Goerg & Schneider GmbH & Co. | Quarry and main plant at Boden, others at Mogendorf, Goddert, Siershahn, Wirges/Staudt, and Kettenbach/Taunus, Westerwald region; others in Saxony and Eifel regions | NA | |
| Do. | Mittelhessische Tonbergbau GmbH (Goerg & Schneider GmbH & Co., 50%, and Stephan Schmidt KG, 50%) | Quarry and plant in the Gießen/Lahn region | 100 | |
| Do. | Rohstoffgesellschaft GmbH Ponholz | Mine and chamotte plant at Maxhütte-Haidoff, and Aufofweiher Mine, Bavaria | 100 | |
| Do. | Adolf Gottfried Tonwerke GmbH | Quarries and plant near Grossheirath, Coburg, Bavaria | 100 | |

See footnotes at end of table.

TABLE 2--Continued
GERMANY: STRUCTURE OF THE MINERAL INDUSTRY IN 2005

(Thousand metric tons unless otherwise specified)

| Commodity | | Major operating companies and major equity owners ² | Location of main facilities | Annual capacity |
|---------------------------------|----------------------|--|--|--------------------|
| Coal, anthracite and bituminous | | Deutsche Steinkohle AG (RAG Aktiengesellschaft, 100%) | West, Lohberg/Osterfeld, Walsum, Prosper-haniel, Lippe, Augusta Victoria/Blumenthal, and Ost Mines, Ruhr region, North Rhine-Westphalia | 18,000 |
| Do. | | do. | Saar Mine, Saar Basin, Saarland | 6,000 |
| Do. | | do. | Ibbenbüren Mine, Steinfurt District, North Rhine-Westphalia | 2,100 |
| Coke contained in domestic coal | | Deutsche Steinkohle AG (RAG Aktiengesellschaft, 100%) | Two pitside coking plants at Ibbenbüren Mine and Lohberg/Osterfeld Mine | 3,000 |
| Do. | | Thyssen Krupp Steel AG | Schwelgern plant at Duisburg | 2,100 |
| Do. | | do. | About 2 other pitside coking plants, Ruhr region, North Rhine-Westphalia | 2,000 |
| Do. | | Hüttenwerke Krupp Mannesmann GmbH (Thyssen Krupp Steel AG, 50%; Vallourec & Mannesmann Tubes SA, 20%; Mannesmannröhren-Werke GmbH, 30%) | Plant at Duisberg-Huckingen steel complex | 1,100 |
| Copper (cathodes) | | Norddeutsche Affinerie AG (HSH Nordbank AG, 10%; Possehl Beteiligungsverwaltung GmbH, 10%; Other private, 80%) | Primary smelter and refinery and secondary plant at Hamburg | 560 ^c |
| Do. | | Hüttenwerke Kayser AG (Norddeutsche Affinerie AG, 100%) | Secondary plant and refinery at Lünen | 185 ^c |
| Fluorspar | | Sachtleben Bergbau GmbH | Clara Mine in the Black Forest and plant at Wolfach | 35 |
| Graphite | metric tons | Graphit Kropfmühl AG | Mine and plant at Kropfmühl, Passau | 20,000 |
| Do. | do. | do. | Plants at Bad Godesberg and Wedel, Holstein | 8,000 |
| Gypsum | | VG-ORTH GmbH & Co. KG | Mine and plant at Stadtoldendorf, and plants at Osterode, Spremberg, and Witzzenhausen | 150 |
| Do. | | Gyproc GmbH Baustoff Production & Co. KG | Mines and plant in Lower Saxony | 110 |
| Kaolin | | WBB Fuchs GmbH & Co. KG, subsidiary of WBB Minerals plc (S.C.R.- Sibelco NV, 100%) | 25 quarries and 8 plants, including 2 at Ransbach and Kannenbäckerland plant in Höhr-Grenzhausen, Westerwald region; also including quarries and plants of Kaolin- und Tonwerke Seilitz-Löthain, Saxony region | 2,000 |
| Do. | | Amberger Kaolinwerke GmbH—Eduard Kick GmbH & Co. KG (Quarzwerke GmbH, 100%) | Mines at Caminau, Hirschau, Kemmlitz, and Schnaittenbach | 300 |
| Lead | | Metaleurop Weser GmbH (Metaleurop S.A., 100%) | Smelter and refinery at Nordenham | 120 |
| Do. | | Berzelius Metall GmbH | Primary smelter at Stolberg and secondary smelters at Braubach am Rhein and Freiberg/Sachsen | 200 |
| Do. | | Sudamin MHD GmbH | Refinery at Duisburg | 120 |
| Do. | | Norddeutsche Affinerie AG | Refinery at Hamburg | 50 |
| Lignite | | RWE Power Aktiengesellschaft | Surface mines in Rhenish mining area: Bergheim, Garzweiler, Inden, and Hambach | 105,000 |
| Do. | | Vattenfall Europe Mining AG | Surface mines in Lausatian mining area: Jänschwalde, Schwarze Pumpe, and Boxberg | 60,000 |
| Limestone | | Harz-Kalk GmbH | Quarry at Rübeland | 2,000 ^c |
| Do. | | Kalkwerk Bad Kösen GmbH | Quarry at Bad Kösen | 2,000 ^c |
| Do. | | Fels-Werke GmbH | Quarry at Kaltes Tal | 2,000 ^c |
| Do. | | Schäfer Kalk GmbH & Co KG | Plants at Hahnstätten, Steeden, Stromberg, and Grevenbrück | 3,000 |
| Magnesium, secondary | metric tons | Norsk Hydro Magnesiumgesellschaft GmbH | Plant at Bottrop | 26 |
| Do. | do. | IMCO GmbH | Plant at Toeging | 15 |
| Natural gas | million cubic meters | BEB Erdgas-Erdöl GmbH (ExxonMobil Central Europe Holding GmbH, 50%) | Plants at Clenze and Grossenkmeten | 9,500 |
| Do. | do. | Mobil Erdgas-Erdöl GmbH (ExxonMobil Central Europe Holding GmbH, 100%) | Plants at Scholen | 4,000 |

See footnotes at end of table.

TABLE 2--Continued
GERMANY: STRUCTURE OF THE MINERAL INDUSTRY IN 2005

(Thousand metric tons unless otherwise specified)

| Commodity | Major operating companies and major equity owners ² | Location of main facilities | Annual capacity | |
|----------------------------------|---|--|--|--------|
| Petroleum: | | | | |
| Crude | The largest companies were: | 6 areas with about 85 oilfields, including: | | |
| Do. thousand 42-gallon barrels | BEB Erdgas-Erdöl GmbH | West of Ems River | 30,000 ^e | |
| Do. do. | Wintershall AG (BASF AG, 100%) | Weser-Ems Rivers | 21,000 ^e | |
| Do. do. | Deutsche Texaco AG | Elbe-Weser Rivers | 20,000 ^e | |
| Refined | The largest companies were: | About 20 refineries, including: | | |
| Do. do. | Deutsche Shell AG | Refineries at Godorf, Hamburg, and Grasbrook | 256,000 ^e | |
| Do. do. | Esso Deutschland GmbH (ExxonMobil Central Europe Holding GmbH, 100%) | Refineries at Karlsruhe and Ingolstadt | 245,000 ^e | |
| Do. do. | Ruhr Oel GmbH (Petróleos de Venezuela S.A., 50%, and BP Gelsenkirchen GmbH, 50%) | Refinery at Gelsenkirchen | 215,500 ^e | |
| Do. do. | BAYERNOIL Raffineriegesellschaft mbH (OMV AG, 45%; Ruhr Oel GmbH, 25%; AGIP Deutschland GmbH, 20%; Deutsche BP AG, 10%) | Refinery at Neustadt-Donau | 145,000 ^e | |
| Potash, K ₂ O content | K+S Kali GmbH (K+S Aktiengesellschaft, 100%) | Mines at Bergmannsseggen-Hugo, Niedersachsen-Riedel, Salzdettfurth, Sigmundshall, Hattorf, Neuhof-Ellers, Sondershausen, and Wintershall | 6,000 | |
| Salt (rock) | K+S Salz GmbH (K+S Aktiengesellschaft, 100%) | Mines at Bad Friedrichshall-Kochendorf, Braunschweig-Lüneburg, Heilbronn, Riedel, Stetten, and Wesel (Borth) | 15,000 | |
| Silicon, metal | metric tons | RW Silicium GmbH (Graphit Kropfmühl AG, 100%) | Four electric arc furnaces in plant at Pocking | 27,500 |
| Steel, crude | ThyssenKrupp Steel AG | Bruckhausen and Beeckerwerth plants, near Duisburg | 11,000 | |
| Do. | Hüttenwerke Krupp Mannesmann GmbH (Thyssen Krupp Steel AG, 50%; Vallourec & Mannesmann Tubes SA, 20%; Mannesmannröhren-Werke GmbH, 30%) | Plant at Duisberg-Huckingen | 6,000 | |
| Do. | Salzgitter AG | Plants at Peine and Salzgitter | 5,100 | |
| Do. | Stahlwerke Bremen GmbH (Arcelor S.A., 100%) | Plant at Bremen | 4,000 | |
| Do. | Mittal Steel Co. NV | Plant at Hamburg and two plants near Duisburg | 2,800 | |
| Do. | Saarstahl AG (Struktur-Holding-Stahl GmbH & Co KG, 74.9%; Dillinger Hüttenwerke AG, 25.1%) | Plants at Völklingen, Burbach, und Neunkirchen | 2,800 | |
| Do. | AG der Dillinger Hüttenwerke (Arcelor S.A., 51.25%; Saarstahl AG, 33.75%; Struktur-Holding-Stahl GmbH & Co KG, 15%) | Plant at Dillingen | 2,500 | |
| Do. | EKO Stahl GmbH (Arcelor S.A., 100%) | Plant at Eisenhüttenstadt | 2,500 | |
| Zinc, metal | Xstrata plc | Smelter at Nordenham | 155 ^e | |
| Do. | Ruhr-Zink GmbH | Refinery at Datteln | 140 | |
| Do. | Sudamin MHD GmbH | Smelter at Duisburg | 100 | |

^eEstimated; estimated data are rounded to no more than three significant digits. NA Not available.

¹Table includes data available through November 2006.

²Many more industrial minerals companies are listed in the Industrial Minerals Directory, 2006.

TABLE 3
GERMANY: EXPORTS OF SELECTED MINERAL COMMODITIES IN 2004¹

(Metric tons unless otherwise specified)

| Commodity | Total | Destinations | |
|---|-------------------------------|---------------|--|
| | | United States | Other (principal) ² |
| METALS | | | |
| Aluminum: | | | |
| Bauxite, ore and concentrate | 48,435 | -- | France 11,188; Austria 9,929; Belgium 8,670. |
| Oxides | 294,405 | -- | Italy 87,733; United Kingdom 29,146; Netherlands 24,730. |
| Hydroxides | thousand metric tons 529 | 38 | Netherlands 134; United Kingdom 74; Sweden 50. |
| Ash and residue containing aluminum | 16,992 | -- | Spain 5,828; Netherlands 4,044; Austria 2,923. |
| Metal, including alloys: | | | |
| Primary, not alloyed | 63,132 | -- | Austria 26,957; Italy 13,889; Netherlands 10,417. |
| Primary, alloys, all forms | 222,578 | -- | Austria 55,199; Belgium 30,493; Italy 19,587. |
| Secondary | 179,029 | -- | France 36,343; Netherlands 33,478; Austria 28,108. |
| Scrap | 613,688 | -- | Italy 152,808; Netherlands 104,327; Austria 101,872. |
| Antimony: | | | |
| Ore and concentrate | < 1 | -- | Switzerland, 100%. |
| Metal, including alloys, all forms | 11 | -- | Romania 5; Taiwan 2; Japan 1. |
| Arsenic, metal, including alloys, all forms | 14 | 5 | China 4; Republic of Korea 2; United Kingdom 1. |
| Bismuth, metal, including alloys, all forms | 221 | 40 | Italy 40; France 38; Czech Republic 27. |
| Chromium, ore and concentrate | 20,837 | -- | Czech Republic 5,793; Poland 3,834; Austria 3,813. |
| Cobalt: | | | |
| Ore and concentrate | 367 | -- | Finland 250; Sweden 57; Belgium 29. |
| Oxides and hydroxides | 233 | -- | China 77; Italy 35; Spain 31. |
| Metal, including alloys, all forms | 537 | -- | United Kingdom 133; France 129; Turkey 49. |
| Scrap | 494 | 158 | Sweden 82; Canada 73; France 59. |
| Columbium (niobium), ore and concentrate, including tantalum | 93 | -- | Unspecified 93. |
| Copper: | | | |
| Ore and concentrate | 49,619 | -- | Sweden 47,386. |
| Matte and speiss, including cement copper | 943 | -- | Canada 925. |
| Ash and residue containing copper | 19,260 | -- | Belgium 10,632; Canada 4,391; Spain 1,714. |
| Metal, including alloys: | | | |
| Unrefined | 53 | -- | Netherlands 20; Czech Republic 10; Slovenia 8. |
| Refined, not alloyed | 148,256 | 24,907 | France 50,259; Italy 31,430; United Kingdom 7,561. |
| Alloys, all forms | 21,863 | -- | Italy 3,476; Switzerland 2,143; Austria 1,858. |
| Scrap | 407,768 | -- | China 143,534; Netherlands 79,923; Belgium 39,146. |
| Gallium, indium, and thallium, metal including scrap | 18 | -- | France 11; Netherlands 2; Denmark 1. |
| Germanium, oxides | 433 | -- | United Kingdom 322; France 36; Italy 25. |
| Gold: | | | |
| Metal, including alloys, all forms | kilograms 24,002 | -- | Unspecified 9,049; Thailand 3,216; Italy 2,184. |
| Waste and sweepings | 30 | 6 | Switzerland 16; Italy 7. |
| Iron and steel: | | | |
| Ore and concentrate | 13,612 | -- | Slovakia 5,064; Luxembourg 4,737; Poland 1,307. |
| Pyrite, roasted | 3,241 | -- | Switzerland 2,622; Other countries (Unspecified) 606. |
| Ash and residue containing iron | thousand metric tons 891 | -- | France 493; Netherlands 132; Luxembourg 132. |
| Metal: | | | |
| Pig iron, cast iron, related materials | 165,119 | -- | France 61,920; Belgium 23,282; Netherlands 22,456. |
| Scrap | thousand metric tons 9,182 | -- | France 2,130; Luxembourg 1,680; Netherlands 1,634. |
| Sponge iron, powder | 149,643 | -- | France 118,068; Unspecified 31,126. |
| Ferroalloys: | | | |
| Ferrochromium | 29,288 | 5,184 | France 4,071; Italy 3,661; Austria 3,192. |
| Ferromanganese | 15,864 | -- | Austria 5,045; Switzerland 3,934; Hungary 1,459. |
| Ferromolybdenum | 2,841 | -- | France 608; Belgium 435; Italy 403. |
| Ferronickel | 625 | -- | Spain 433; France 86; Sweden 79. |
| Ferrosilicochromium | 79 | -- | Netherlands 52; Malta 25. |
| Ferrosilicomagnesium | 15,824 | -- | Italy 6,425; France 3,054; Netherlands 1,424. |
| Ferrosilicomanganese | 9,340 | -- | Luxembourg 3,493; France 2,372; Switzerland 1,196. |
| Ferrosilicon | 66,995 | -- | France 18,156; Austria 13,533; Belgium 10,116. |

See footnotes at end of table.

TABLE 3--Continued
GERMANY: EXPORTS OF SELECTED MINERAL COMMODITIES IN 2004¹

(Metric tons unless otherwise specified)

| Commodity | Total | Destinations | |
|--|------------------|---------------|---|
| | | United States | Other (principal ²) |
| METALS--Continued | | | |
| Iron and steel, metal, ferroalloys--Continued: | | | |
| Ferrotungsten | 183 | -- | Austria 42; Italy 36; China 27. |
| Ferrotitanium | 3,796 | -- | Sweden 854; Italy 501; France 475. |
| Ferrovandium | 876 | -- | Italy 300; Spain 190; Austria 105. |
| Ferriobium | 1,424 | -- | Ukraine 261; Belgium 236; France 188. |
| Other ferroalloys | 39,116 | -- | France 5,515; Italy 4,498; Japan 3,442. |
| Steel, crude | 2,780 | -- | Romania 528; Australia 339; Mexico 264. |
| Lead: | | | |
| Ore and concentrate | 3,423 | -- | Belgium 3,423. |
| Lead containing antimony | 17,582 | -- | Czech Republic 10,831; Austria 2,848; Poland 1,776. |
| Metal, including alloys: | | | |
| Alloys, all forms | 41,714 | -- | France 24,278; Spain 5,923; Czech Republic 5,548. |
| Refined | 62,839 | -- | Czech Republic 19,040; France 12,882; Netherlands 11,939. |
| Unrefined | 116 | -- | Spain 94; Greece 20. |
| Scrap | 19,662 | -- | Belgium 9,261; Netherlands 6,017; France 2,772. |
| Lithium: | | | |
| Carbonate | 2,660 | -- | France 702; Belgium 628; Republic of Korea 271. |
| Oxides and hydroxides | 624 | -- | France 142; United Kingdom 125; Spain 113. |
| Magnesium, metal, including alloys: | | | |
| Scrap | 17,028 | -- | Czech Republic 7,067; Austria 4,904; Netherlands 1,924. |
| Unwrought | 5,214 | -- | Romania 1,496; Hungary 1,006; Austria 850. |
| Manganese, ore and concentrate | 2,872 | -- | Belgium 2,375; France 181. |
| Mercury | 56 | 22 | India 5; Liechtenstein 4; Ecuador 4. |
| Molybdenum, ore and concentrate | 2,309 | -- | China 933; Netherlands 563; Belgium 480. |
| Nickel: | | | |
| Matte, speiss, related materials | 644 | -- | Canada 644. |
| Oxides and hydroxides | 105 | -- | Japan 73; Canada 7; Sweden 6. |
| Ash and residue containing nickel | 643 | -- | Sweden 330; Netherlands 257; Austria 57. |
| Metal, including alloys: | | | |
| Alloys, all forms | 8,775 | -- | Austria 6,994; Sweden 1,088. |
| Unalloyed | 5,753 | -- | Austria 1,749; France 863; Czech Republic 627. |
| Scrap | 9,255 | 1,860 | Netherlands 3,369; France 824; Austria 592. |
| Platinum-group metals: | | | |
| Waste and sweepings | 812 | 624 | United Kingdom 99; Belgium 50. |
| Metal, including alloys, all forms: | | | |
| Platinum | kilograms 27,898 | 4,408 | Belgium 6,221; China 4,603; Switzerland 4,296. |
| Palladium | do. 12,497 | 3,112 | Switzerland 2,162; Brazil 1,425; Japan 937. |
| Rhodium | do. 3,866 | 928 | Belgium 785; Japan 665; Switzerland 503. |
| Iridium, osmium and ruthenium | do. 2,512 | 859 | Hong Kong 631; United Kingdom 271; Italy 196. |
| Rare-earth metals, including alloys: | | | |
| Metal | 4 | -- | Turkey 2; Austria < 1; Czech Republic < 1. |
| Compounds, all forms | 91 | -- | Austria 13; Malaysia 10; Japan 9. |
| Selenium, elemental | 235 | -- | Belgium 40; United Kingdom 33; Mexico 20. |
| Silicon, metal | 18,717 | -- | Italy 3,800; Austria 3,594; Slovenia 2,789. |
| Silver: | | | |
| Ore and concentrate | < 1 | -- | Switzerland, 100%. |
| Metal | 1,720 | -- | Unspecified 1,013; Turkey 160; France 98. |
| Powder | kilograms 60,297 | 3,618 | France 18,451; Italy 13,084; Japan 7,597. |
| Tin: | | | |
| Ore and concentrate | < 1 | -- | Czech Republic, 100%. |
| Ash and residue containing tin | 931 | -- | Belgium 880. |
| Metal, including alloys | 1,572 | -- | Netherlands 421; Poland 156; Belgium 141. |
| Scrap | 1,143 | -- | France 568; Austria 331; Belgium 134. |
| Titanium, ore and concentrate | 319 | -- | Italy 82; Mexico 76; Austria 56. |

See footnotes at end of table.

TABLE 3--Continued
GERMANY: EXPORTS OF SELECTED MINERAL COMMODITIES IN 2004¹

(Metric tons unless otherwise specified)

| Commodity | Total | Destinations | |
|---|----------------------------|---------------|---|
| | | United States | Other (principal) ² |
| METALS--Continued | | | |
| Tungsten: | | | |
| Ore and concentrate | 6 | -- | Austria 6. |
| Metal, including alloys: | | | |
| Metal | 742 | -- | Unspecified 716. |
| Scrap | 1,942 | 456 | Austria 542; United Kingdom 318; Sweden 184. |
| Wolframite | 3,186 | -- | Unspecified 3,186. |
| Vanadium, oxides and hydroxides | 296 | -- | Unspecified 296. |
| Zinc: | | | |
| Ore and concentrate | 1,632 | -- | Belgium 909; United Kingdom 689. |
| Matte and related materials | 9,781 | -- | Belgium 1,946; Netherlands 1,790; Luxembourg 1,604. |
| Blue powder | 4,697 | 573 | Switzerland 803; China 465; Austria 409. |
| Ash and residue containing zinc | 13,438 | -- | Belgium 8,708; Netherlands 4,058. |
| Metal, including alloys: | | | |
| Alloys, all forms | 37,897 | -- | Austria 22,852; France 4,699; Italy 3,790. |
| Unalloyed | 97,074 | -- | France 31,355; United Kingdom 26,889; Austria 7,960. |
| Scrap | 54,284 | -- | Belgium 15,471; China 14,711; Netherlands 6,623. |
| Zirconium: | | | |
| Ore and concentrate | 2,567 | -- | Austria 698; Belgium 357; France 208. |
| Metal, including alloys | 35 | 18 | Japan 5; France 3. |
| INDUSTRIAL MINERALS | | | |
| Abrasives, natural: | | | |
| Corundum, emery, garnet, etc. | 4,259 | -- | Sweden 1,567; Switzerland 848; Netherlands 622. |
| Pumice | 94,572 | -- | Netherlands 40,855; Luxembourg 34,330; Switzerland 7,755. |
| Asbestos, crude | 7 | -- | Switzerland 7. |
| Barite and witherite | 32,383 | -- | Unspecified 32,383. |
| Borates, natural, crude, including calcined | 33 | -- | Czech Republic 20; Switzerland 10; South Africa 3. |
| Cement | thousand metric tons 6,185 | -- | Netherlands 2,437; Belgium 841; France 421. |
| Chalk, natural | 116,065 | -- | Netherlands 30,641; Belgium 24,142; Sweden 17,410. |
| Clays, crude: | | | |
| Bentonite | 60,953 | -- | Austria 13,836; Switzerland 13,166; France 8,107. |
| Kaolin | 417,606 | -- | Austria 120,688; Italy 107,742; Netherlands 45,101. |
| Other, unspecified | thousand metric tons 2,461 | -- | Italy 945; Netherlands 743; Belgium 317. |
| Diamond, natural: | | | |
| Gem, not set or strung | carats 190,272 | 18,266 | Thailand 30,634; Switzerland 25,306; Hong Kong 21,501. |
| Industrial stones | do. 7,997 | -- | Austria 3,095; Switzerland 1,256; Thailand 1,248. |
| Dust and powder | kilograms 10,863 | -- | Austria 2,064; Italy 1,782; United Kingdom 1,238. |
| Diatomite and other infusorial earth | 21,073 | -- | Switzerland 13,676; Austria 3,772. |
| Feldspar | 131,383 | -- | France 59,385; Italy 25,488; Spain 12,481. |
| Fluorspar: | | | |
| Acid-grade | 8,953 | -- | Sweden 1,934; Hungary 1,603; Belgium 1,155. |
| Metallurgical-grade | 8,676 | -- | Luxembourg 2,212; Czech Republic 2,048; Poland 2,022. |
| Graphite, natural | 14,652 | -- | Czech Republic 2,974; France 2,198; Sweden 1,114. |
| Gypsum and plaster | thousand metric tons 1,349 | -- | Belgium 325; Netherlands 224; Norway 186. |
| Kyanite and related materials: | | | |
| Andalusite, kyanite, sillimanite | 1,968 | -- | Hungary 661; Italy 529; Austria 244. |
| Mullite | 12,879 | 3,104 | United Kingdom 2,705; Italy 1,700; Hungary 1,494. |
| Lime, hydrated | thousand metric tons 1,036 | -- | Netherlands 663; France 132; Belgium 102. |
| Magnesium compounds: | | | |
| Magnesite, crude, including burned | 73,127 | -- | Austria 24,936; France 21,426; Slovakia 5,777. |
| Epsomite | 713,247 | -- | France 178,312; Malaysia 153,348; Indonesia 104,134. |
| Mica, crude, including splittings and waste | 3,890 | -- | Italy 1,039; Brazil 1,031; Austria 490. |
| Peat, natural | thousand metric tons 2,737 | -- | Netherlands 1,322; France 317; Italy 293. |

See footnotes at end of table.

TABLE 3--Continued
GERMANY: EXPORTS OF SELECTED MINERAL COMMODITIES IN 2004¹

(Metric tons unless otherwise specified)

| Commodity | Total | Destinations | |
|--|-----------------------------|---------------|---|
| | | United States | Other (principal ²) |
| INDUSTRIAL MINERALS--Continued | | | |
| Phosphates: | | | |
| Crude | < 1 | -- | Poland, 50%; Switzerland, 50%. |
| Milled | 43 | -- | Czech Republic 21; Kazakhstan 10; Russia 6. |
| Precious and semiprecious stones, natural (other than diamond): | | | |
| Gem, not set or strung | 776 | -- | Hong Kong 367; India 148; Thailand 57. |
| Industrial stones | grams 5,608 | -- | United Kingdom 3,656; France 1,952. |
| Pyrite, unroasted | 339 | -- | France 119; Poland 62; Saudi Arabia 60. |
| Salt and brine | thousand metric tons 3,207 | -- | Belgium 638; Netherlands 552; Czech Republic 468. |
| Stone, sand and gravel: | | | |
| Basalt, lava rocks, etc. | 195,561 | -- | Netherlands 166,618; Switzerland 24,250. |
| Dimension stone: | | | |
| Dolomite and limestone | thousand metric tons 744 | -- | Luxembourg 504; Netherlands 80; Belgium 45. |
| Granite | 68,438 | -- | Switzerland 57,899. |
| Marble, travertine, etc. | 191,278 | -- | Switzerland 65,800; Netherlands 53,558; Belgium 28,500. |
| Foundation sand and gravel | 190,492 | -- | Switzerland 99,818; Austria 68,196; France 19,621. |
| Limestone for cement | 119,765 | -- | Luxembourg 87,069; France 10,539; Netherlands 9,581. |
| Quartz and quartzite | 114,619 | -- | Netherlands 87,454; Austria 7,565. |
| Quartz sand | thousand metric tons 10,229 | -- | Netherlands 7,078; Belgium 1,913. |
| Sandstone | 8,358 | -- | Netherlands 5,650; Austria 1,028. |
| Schist and shale | 21,330 | -- | Belgium 8,148; Netherlands 3,711; Austria 2,837. |
| Unworked stone, natural | thousand metric tons 10,279 | -- | Netherlands 7,113; Belgium 1,264; Switzerland 884. |
| Other natural stone, unspecified | do. 5,561 | -- | Netherlands 3,887; France 790; Switzerland 295. |
| Sulfur, crude, including native and byproduct | do. 931 | -- | Belgium 129; Morocco 111; Senegal 110. |
| Talc, steatite, soapstone, pyrophyllite | 3,890 | -- | France 657; Romania 529; Netherlands 331. |
| Vermiculite, perlite, chlorite | 3,172 | -- | Austria 1,050; Poland 374; France 352. |
| MINERAL FUELS AND RELATED MATERIALS | | | |
| Asphalt and bitumen, natural | 110,261 | -- | Netherlands 18,965; Luxembourg 14,665; Denmark 12,680. |
| Coal: | | | |
| Anthracite | 8,761 | -- | Croatia 5,239; Austria 850; Netherlands 534. |
| Lignite | thousand metric tons 49 | -- | Austria 29; United Kingdom 16. |
| Other bituminous, including briquets | 231,708 | -- | France 109,366; Belgium 74,610; Austria 31,512. |
| Coke: | | | |
| Of anthracite and bituminous coal | 100,824 | -- | Netherlands 39,422; United Kingdom 24,299; France 13,208. |
| Of lignite | 10,389 | -- | Austria 4,415; Czech Republic 2,431; Canada 1,808. |
| Gas, natural, gaseous | thousand metric tons 20,967 | -- | Unspecified 20,967. |
| Petroleum, crude | do. 1,253 | -- | United Kingdom 1,131; Belgium 84. |
| Uranium, natural: | | | |
| Crude, U content | kilograms 135,807 | -- | Argentina 102,127; Netherlands 33,409. |
| Enriched, fissile isotopes | do. 15,412 | 8,400 | Belgium 2,635; Sweden 2,481; United Kingdom 786. |

-- Less than 5%.

¹Source: Bundesanstalt für Geowissenschaften und Rohstoffe, 2005, Table 1.2—Rohstoffsituation, 2004: Hannover, Germany, October.

²Destination country imported at least 5% of Germany's total exports of the mineral commodity.

TABLE 4
GERMANY: IMPORTS OF SELECTED MINERAL COMMODITIES IN 2004¹

(Metric tons unless otherwise specified)

| Commodity | Total | Sources | |
|---|----------------------|---------------|--|
| | | United States | Other (principal ²) |
| METALS | | | |
| Aluminum: | | | |
| Bauxite, ore and concentrate | thousand metric tons | 2,147 | -- Guinea 1,737; Greece 116. |
| Oxides | do. | 1,111 | -- Jamaica 434; Ireland 207; Spain 146. |
| Hydroxides | | 205,376 | -- Ireland 138,423; Hungary 27,931; France 11,706. |
| Ash and residue containing aluminum | | 176,613 | -- France 54,220; Netherlands 43,094; Denmark 23,843. |
| Metal, including alloys: | | | |
| Primary, not alloyed | thousand metric tons | 648 | -- Russia 145; Netherlands 107; Brazil 101. |
| Primary, alloys, all forms | do. | 769 | -- Norway 170; Netherlands 168; United Kingdom 151. |
| Secondary | | 440,369 | -- United Kingdom 107,450; Netherlands 47,560; Austria 40,954. |
| Scrap | | 497,180 | -- Netherlands 84,023; Russia 71,594; Austria 45,741. |
| Antimony: | | | |
| Ore and concentrate | | 15 | -- Russia 15. |
| Metal, including alloys, all forms | | 277 | -- Belgium 100; China 99; Kyrgyzstan 41. |
| Arsenic, metal, including alloys, all forms | | 4 | 2 China 2. |
| Bismuth, metal, including alloys, all forms | | 1,679 | -- United Kingdom 1,128; Mexico 480. |
| Chromium, ore and concentrate | | 132,429 | -- South Africa 76,809; Turkey 39,861; Netherlands 6,754. |
| Cobalt: | | | |
| Ore and concentrate | | 21 | -- Congo (Kinshasa) 9; Norway 5; Czech Republic 3. |
| Oxides and hydroxides | | 484 | -- Finland 235; Belgium 64; Netherlands 36. |
| Metal, including alloys, all forms | | 2,014 | 266 Belgium 441; United Kingdom 236; Finland 213. |
| Scrap | | 294 | 36 United Kingdom 45; Netherlands 38; South Africa 37. |
| Columbium (niobium): | | | |
| Ore and concentrate, including tantalum | | 80,659 | -- Unspecified 80,659. |
| Scrap containing both niobium and tantalum | | 383 | -- Belgium 240; Japan 85; Thailand 36. |
| Copper: | | | |
| Ore and concentrate | thousand metric tons | 1,142 | -- Chile 471; Peru 161; Argentina 156. |
| Matte and speiss, including cement copper | | 15,086 | -- Mexico 10,711; Bulgaria 1,478; Morocco 1,418. |
| Ash and residue containing copper | | 49,837 | 4,435 Italy 10,366; Ukraine 5,980; Netherlands 5,881. |
| Metal, including alloys: | | | |
| Unrefined | | 11,635 | -- Armenia 6,911; Belgium 3,002. |
| Refined, not alloyed | thousand metric tons | 644 | -- Russia 209; Chile 161; Poland 102. |
| Alloys, all forms | | 26,055 | -- Belgium 4,664; United Kingdom 4,481; Poland 3,908. |
| Scrap | | 500,748 | -- France 67,100; Netherlands 45,568; United Kingdom 40,060. |
| Gallium, indium, and thallium, metal, including scrap | | 39 | 4 China 11; United Kingdom 8; France 8. |
| Germanium, oxides | | 2,821 | 632 France 810; China 513; United Kingdom 378. |
| Gold: | | | |
| Metal, including alloys, all forms | kilograms | 39,024 | -- Belgium 12,175; Switzerland 6,088; Sweden 5,385. |
| Waste and sweepings | | 1,379 | -- Australia 416; United Kingdom 371; Austria 305. |
| Iron and steel: | | | |
| Ore and concentrate | thousand metric tons | 46,394 | -- Brazil 25,981; Canada 6,959; Sweden 4,407. |
| Pyrite, roasted | | 37,194 | -- Norway 36,153. |
| Ash and residue containing iron | | 218,465 | -- Austria 140,036; Poland 46,533; Luxembourg 26,434. |
| Metal: | | | |
| Pig iron, cast iron, related materials | | 404,547 | -- Russia 100,732; Netherlands 67,964; Canada 61,896. |
| Scrap | thousand metric tons | 6,298 | -- Netherlands 1,568; Poland 1,020; Czech Republic 819. |
| Sponge iron, powder | | 181,153 | -- Trinidad & Tobago 99,996; Sweden 31,883; Canada 28,622. |
| Ferrous alloys: | | | |
| Ferromanganese | | 464,049 | -- South Africa 329,475; Netherlands 63,575; Russia 24,595. |
| Ferromanganese | | 215,700 | -- France 67,298; South Africa 44,219; China 28,041. |
| Ferromolybdenum | | 14,305 | -- Belgium 5,937; United Kingdom 1,760; Armenia 1,287. |
| Ferrous nickel | | 129,300 | -- United Kingdom 56,375; Venezuela 29,739; Greece 21,593. |
| Ferrosilicochromium | | 11,391 | -- Russia 5,194; Belgium 4,294; Unspecified 1,310. |
| Ferrosilicomagnesium | | 1,735 | -- Slovenia 989; Argentina 227; France 186. |

See footnotes at end of table.

TABLE 4--Continued
GERMANY: IMPORTS OF SELECTED MINERAL COMMODITIES IN 2004¹

(Metric tons unless otherwise specified)

| Commodity | Total | Sources | |
|---|---------------------|---------------|--|
| | | United States | Other (principal ²) |
| METALS--Continued | | | |
| Iron and steel, metal, ferroalloys--Continued: | | | |
| Ferrosilicomanganese | 183,564 | -- | China 32,307; Norway 25,332; Ukraine 24,965. |
| Ferrosilicon | 248,584 | -- | Norway 77,558; Poland 45,491; France 27,344. |
| Ferrotungsten | 480 | -- | China 312; Netherlands 90; Austria 43. |
| Ferrotitanium | 8,141 | -- | United Kingdom 3,305; Russia 1,929; Netherlands 1,628. |
| Ferrovandium | 4,517 | -- | Austria 2,055; Russia 565; Netherlands 375. |
| Ferriobium | 4,345 | -- | Brazil 3,624; Canada 591. |
| Other ferroalloys | 71,334 | -- | France 30,674; United Kingdom 7,419; Italy 6,063. |
| Steel, crude | 13,489 | -- | Czech Republic 8,161; United Kingdom 3,332. |
| Lead: | | | |
| Ore and concentrate | 207,411 | -- | Australia 48,534; Sweden 41,897; Poland 30,697. |
| Lead containing antimony | 27,988 | -- | Sweden 7,025; Belgium 6,913; Ukraine 3,750. |
| Metal, including alloys: | | | |
| Alloys, all forms | 12,621 | -- | United Kingdom 7,686; Netherlands 1,350; Poland 1,237. |
| Refined | 83,896 | -- | United Kingdom 24,498; Sweden 15,353; Poland 15,101. |
| Unrefined | 19,993 | -- | Poland 9,877; Belgium 5,598; Switzerland 2,219. |
| Scrap | 60,574 | -- | United Kingdom 28,349; Netherlands 11,691; Poland 4,180. |
| Lithium: | | | |
| Carbonate | 7,189 | 827 | Chile 5,823. |
| Oxides and hydroxides | 3,698 | 784 | Switzerland 2,278; Russia 436. |
| Magnesium, metal, including alloys: | | | |
| Scrap | 18,948 | -- | China 10,857; Austria 3,107; Switzerland 1,857. |
| Unwrought | 45,392 | -- | China 20,971; Czech Republic 7,444; Austria 7,172. |
| Manganese, ore and concentrate | 8,636 | 760 | Netherlands 3,273; Belgium 1,434; France 1,174. |
| Mercury | 81 | -- | Switzerland 51; Netherlands 11; Peru 10. |
| Molybdenum, ore and concentrate | 13,590 | 3,112 | Chile 3,574; Netherlands 2,120; China 1,332. |
| Nickel: | | | |
| Matte, speiss, related materials | 7,264 | -- | Netherlands 7,249. |
| Oxides and hydroxides | 603 | -- | Czech Republic 196; Canada 164; Japan 79. |
| Ash and residue containing nickel | 11,101 | -- | Netherlands 5,184; United Kingdom 1,432; Singapore 977. |
| Metal, including alloys: | | | |
| Alloys, all forms | 2,032 | -- | United Kingdom 772; Netherlands 343; Austria 287. |
| Unalloyed | 88,288 | -- | Russia 36,110; United Kingdom 19,335; Norway 7,063. |
| Scrap | 11,973 | 635 | Austria 2,442; United Kingdom 1,293; Russia 1,137. |
| Platinum-group metals: | | | |
| Waste and sweepings | 4,500 | 342 | Netherlands 540; France 464; South Africa 446. |
| Metal, including alloys, all forms: | | | |
| Platinum | kilograms 56,087 | 5,497 | Belgium 26,193; South Africa 14,527; United Kingdom 5,497. |
| Palladium | do. 25,115 | 1,331 | South Africa 7,007; United Kingdom 6,731; Belgium 5,651. |
| Rare-earth metals, including alloys: | | | |
| Metal | 288 | -- | China 137; Austria 120. |
| Compounds, all forms | 1,139 | -- | China 519; France 319; Austria 222. |
| Selenium, elemental | 299 | -- | Sweden 118; Russia 84; Canada 24. |
| Silicon, metal | 133,144 | -- | Norway 45,535; Brazil 34,351; France 21,170. |
| Tin: | | | |
| Ore and concentrate | 1 | -- | Kazakhstan 1. |
| Ash and residue containing tin | 1,178 | -- | Netherlands 908; Belgium 165; United Kingdom 79. |
| Metal, including alloys | 21,955 | -- | Peru 5,489; Indonesia 4,193; Belgium 3,227. |
| Scrap | 428 | -- | France 220; Netherlands 53; Slovakia 36. |
| Titanium, ore and concentrate | 542,692 | -- | Norway 245,297; South Africa 133,502; Canada 125,362. |
| Tungsten: | | | |
| Ore and concentrate | 389 | -- | Vietnam 81; Russia 76; Nigeria 57. |

See footnotes at end of table.

TABLE 4--Continued
GERMANY: IMPORTS OF SELECTED MINERAL COMMODITIES IN 2004¹

(Metric tons unless otherwise specified)

| Commodity | Total | Sources | |
|---|---------|---------------|---|
| | | United States | Other (principal ²) |
| METALS--Continued | | | |
| Tungsten--Continued: | | | |
| Metal, including alloys: | | | |
| Metal | 1,841 | 125 | Canada 716; Austria 569; China 134. |
| Scrap | 3,175 | 876 | United Kingdom 476; Austria 371; Netherlands 187. |
| Wolframite | 815 | 187 | China 262; Ireland 225; Russia 140. |
| Vanadium, oxides and hydroxides | 649 | -- | South Africa 460; China 100; United Kingdom 51. |
| Zinc: | | | |
| Ore and concentrate | 495,066 | 72,775 | Sweden 121,786; Ireland 104,954; Belgium 64,854. |
| Matte and related materials | 13,793 | -- | Netherlands 3,683; Belgium 3,476; United Kingdom 2,772. |
| Blue powder | 7,341 | -- | Belgium 5,080; Norway 1,263; Switzerland 470. |
| Ash and residue containing zinc | 18,026 | 1,370 | Netherlands 3,010; Switzerland 2,758; Poland 2,343. |
| Metal, including alloys: | | | |
| Alloys, all forms | 85,062 | -- | Belgium 51,973; France 13,525; Finland 11,739. |
| Unalloyed | 259,802 | -- | Spain 77,421; Finland 49,622; Netherlands 36,632. |
| Scrap | 24,382 | -- | France 9,997; Netherlands 4,754; United Kingdom 2,194. |
| Zirconium, metal, including alloys | 134 | -- | Netherlands 100; China 25. |
| INDUSTRIAL MINERALS | | | |
| Abrasives, natural: | | | |
| Corundum, emery, garnet, etc. | 11,887 | -- | India 7,810; Netherlands 1,379; Japan 618. |
| Pumice | 55,099 | -- | Italy 30,690; Iceland 22,480. |
| Asbestos, crude | 69 | 10 | Canada 59. |
| Barite and witherite | 228,477 | -- | China 143,941; France 49,123; Netherlands 15,308. |
| Borates, natural, crude, including calcined | 11,335 | -- | Netherlands 3,627; Turkey 3,559; Belgium 2,936. |
| Cement | 1,993 | -- | Belgium 448; Czech Republic 438; France 430. |
| Chalk, natural | 256,953 | -- | Netherlands 120,254; France 86,079; Belgium 35,716. |
| Clays, crude: | | | |
| Bentonite | 312,160 | -- | Netherlands 144,530; Czech Republic 47,136; Italy 39,332. |
| Kaolin | 801 | 190 | Czech Republic 174; United Kingdom 151; Netherlands 143. |
| Other, unspecified | 217,941 | 50,344 | Czech Republic 61,677; United Kingdom 20,051; Netherlands 15,910. |
| Diamond, natural: | | | |
| Gem, not set or strung | 513,371 | -- | Belgium 181,220; India 175,573; Israel 52,877. |
| Industrial stones | 764 | 62 | Ireland 241; United Kingdom 228; South Africa 108. |
| Dust and powder | 19,312 | 8,864 | Ireland 6,373; China 985. |
| Diatomite and other infusorial earth | 104,531 | 12,021 | Spain 49,130; Denmark 21,011; France 11,812. |
| Feldspar | 73,579 | -- | Norway 22,368; France 19,793; Austria 9,860. |
| Fluorspar: | | | |
| Acid-grade | 28,224 | -- | China 26,841. |
| Metallurgical-grade | 281,567 | -- | South Africa 92,072; China 86,441; Namibia 69,265. |
| Graphite, natural | 53,966 | -- | China 19,806; Netherlands 19,428; Unspecified 8,581. |
| Gypsum and plaster | 236,074 | -- | France 89,944; Austria 61,615; Poland 42,021. |
| Kyanite and related materials: | | | |
| Andalusite, kyanite, sillimanite | 59,432 | 3,150 | South Africa 23,832; France 10,698; Belgium 9,569. |
| Mullite | 4,822 | 743 | Hungary 2,252; United Kingdom 984; Luxembourg 420. |
| Lime, hydrated | 456 | -- | France 219; Czech Republic 129; Belgium 64. |
| Magnesium compounds: | | | |
| Magnesite, crude, including burned | 399,824 | -- | China 121,546; Netherlands 83,163; Slovakia 60,773. |
| Epsomite | 371 | -- | France 159; Netherlands 111; Belgium 101. |
| Mica, crude, including splittings and waste | 30,576 | -- | India 11,588; France 9,815; United Kingdom 2,385. |
| Peat, natural | 565,172 | -- | Estonia 149,771; Netherlands 146,380; Latvia 141,858. |
| Phosphates: | | | |
| Crude | 129,848 | -- | Israel 95,438; Netherlands 20,646; Russia 13,634. |
| Milled | 18,484 | -- | Belgium 17,227. |
| Potash, K ₂ O content | 270,795 | -- | Israel 261,588. |

See footnotes at end of table.

TABLE 4--Continued
GERMANY: IMPORTS OF SELECTED MINERAL COMMODITIES IN 2004¹

(Metric tons unless otherwise specified)

| Commodity | Total | Sources | |
|--|----------------------------|---------------|--|
| | | United States | Other (principal ²) |
| INDUSTRIAL MINERALS--Continued | | | |
| Precious and semiprecious stones, natural (other than diamond): | | | |
| Gem, not set or strung | 1,943 | -- | Brazil 729; Madagascar 402; South Africa 233. |
| Industrial stones | grams 16,100 | 1,546 | United Kingdom 5,506; China 5,345; Taiwan 3,703. |
| Pyrite, unroasted | 55,072 | -- | Finland 50,556. |
| Salt and brine | thousand metric tons 2,636 | -- | Netherlands 2,125. |
| Stone, sand and gravel: | | | |
| Basalt, lava rocks, etc. | 76,308 | -- | Norway 35,941; Italy 11,294; China 7,554. |
| Dimension stone: | | | |
| Dolomite and limestone | 704,680 | -- | Estonia 326,972; Belgium 273,416; Netherlands 69,059. |
| Granite | 309,684 | -- | China 48,620; Sweden 45,833; Poland 41,807. |
| Marble, travertine, etc. | thousand metric tons 2,659 | -- | Norway 1,383; Austria 907; Italy 258. |
| Foundation sand and gravel | 11,696 | -- | Switzerland 11,696. |
| Limestone for cement | thousand metric tons 2,166 | -- | Poland 1,007; Austria 520; Belgium 327. |
| Quartz and quartzite | 87,121 | -- | Austria 41,731; Brazil 15,420; Belgium 10,890. |
| Quartz sand | thousand metric tons 1,831 | -- | France 1,186; Netherlands 339; Belgium 134. |
| Sandstone | 37,309 | -- | India 11,305; Italy 9,663; Poland 5,634. |
| Schist and shale | 31,921 | -- | France 28,537. |
| Natural stones, unworked | thousand metric tons 1,954 | -- | France 1,667. |
| Other natural stone, unspecified | do. 6,308 | -- | Norway 3,419; United Kingdom 1,167; Sweden 542. |
| Sulfur, crude, including native and byproduct | 57,088 | -- | Belgium 24,034; Netherlands 12,502; Czech Republic 4,852. |
| Talc, steatite, soapstone, pyrophyllite | 359,543 | -- | Netherlands 114,335; France 68,673; Austria 63,639. |
| Vermiculite, perlite, chlorite | 132,013 | -- | Greece 100,858; Hungary 15,578; South Africa 11,617. |
| MINERAL FUELS AND RELATED MATERIALS | | | |
| Asphalt and bitumen, natural | 28,763 | 6,328 | Switzerland 4,487; Austria 4,314; Trinidad & Tobago 4,084. |
| Coal: | | | |
| Bituminous: | | | |
| Anthracite | thousand metric tons 2,271 | 193 | South Africa 843; Russia 456; Colombia 232. |
| Coke | do. 8,013 | 417 | Poland 1,827; Australia 1,506; China 1,386. |
| Semicoke, coking coal | do. 5,504 | 732 | Australia 2,554; Canada 2,036. |
| Other, including briquets | do. 26,516 | -- | South Africa 6,762; Poland 5,993; Russia 4,905. |
| Lignite, all forms | do. 104 | -- | Czech Republic 94; Poland 9. |
| Gas, natural, gaseous | do. 77,414 | -- | Unspecified 77,414. |
| Petroleum, crude | do. 112,675 | -- | Russia 35,267; Norway 20,732; United Kingdom 19,380. |
| Uranium, natural: | | | |
| Crude, U content | 930 | -- | Canada 436; United Kingdom 238; Russia 179. |
| Enriched, fissile isotopes | kilograms 25,220 | -- | France 9,004; United Kingdom 7,743; Russia 4,414. |

-- Less than 5%

¹Source: Bundesanstalt für Geowissenschaften und Rohstoffe, 2005, Table 1.1—Rohstoffsituation, 2004; Hannover, Germany, October.

²Source country was responsible for at least 5% of Germany's total imports of the mineral commodity.

