

THE MINERAL INDUSTRY OF GERMANY

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In 2004, the mineral industry of Germany continued to depend heavily on imports of raw mineral materials to support the country's extensive mineral-processing capacity, although this capacity has been decreasing steadily for more than a decade. In turn, much of the processed mineral commodity output, especially in the metals sector, was exported. Germany's ability to continue to add sufficient value in processing minerals that originate outside of the country depends on the country's efficient, highly skilled labor force; technological advances, especially in recycling; retaining, improving, and expanding free trade alliances; and keeping input costs, especially with respect to labor and energy expenditures, as low as possible. In 2004, German exporters were also slightly more competitive in all manufacturing industries as a consequence of the country's lower inflation rate compared with that of most of the rest of the members of the European Union (EU), which were the primary consumers of mineral commodity exports from Germany (Deutsches Institut für Wirtschaftsforschung, 2004, p. 6).

In 2004, Germany's gross domestic product (GDP) based on purchasing power parity was about \$2,392 billion (International Monetary Fund, 2005§¹). Mine production of minerals contributes only about 1% to the nominal GDP annually, but Germany still ranked as the world's leading producer of lignite and its third-leading producer of potash. The country also was the second-leading producer of kaolin in the EU and one of the leading European producers of crude gypsum, feldspar, and salt. The country exports about 30% of its total mine production, annually. For the most part, no metal is directly mined in Germany. A well-developed steel and nonferrous metals processing industry depended upon imports of raw metal minerals and accounted for about 6% to 7% of the GDP. The production levels of some of these metals and that of some industrial minerals were very significant on a worldwide scale. In 2004, Germany was the leading producer of crude steel in the EU and the sixth ranked producer in the world. Recycling of minerals from secondary sources to produce a growing set of metal commodities was not separately included in the officially recorded share of the GDP accounted for by production of the metal processing sector, but it was the most rapidly growing component of Germany's mineral industry in 2004 (Gwosdz and others, 2004; Mildner, undated§; Stahl-Zentrum, 2005§; Thomson Corporation, 2005§).

Continuing dependence on trade for the German mineral industry was consistent with a reliance on trade for the German economy, overall. One-third of the jobs in Germany were expected to be either directly or indirectly dependent on

exports by 2005 (Bundesverband der Deutschen Industrie e.V., 2005a§). In 2004, exports accounted for more than one-third of Germany's GDP and reached a record annual value in euros (Deutsches Institut für Wirtschaftsforschung, 2004, p. 5). The euro exchange rate, which, relative to the U.S. dollar, remained high in 2004, helped shield the mineral industry in Germany from paying higher costs for the necessary imports of mineral raw materials, especially metals, which were valued in U.S. dollars (RAG-Magazin, 2005). The downside of the high exchange rate was that Germany's mineral commodity products, which were valued in euros, were harder to price competitively for export outside of the EU. In 2004, international access to more raw minerals and scrap metal (particularly from Poland) was improved by the official expansion of the EU to include 10 additional countries (mostly in Eastern Europe) on May 1. This EU expansion provides additional markets where the German mineral industry will have a more-competitive position for its exports (Bundesministerium für Wirtschaft und Arbeit, 2005, p. 26, 78). In 2004, the growth rate of the real GDP was about 1.6% compared with an approximately 0.2% decrease in 2003 (International Monetary Fund, 2005§). This increased growth in economic output was primarily owing to an increase of about 8.7% in the real value of German exports during the same time period (International Monetary Fund, 2004§).

In 2004, many important concerns with the German economy, which included sluggish domestic demand, weak investment spending, and a persistent crisis in the construction sector, were also of concern to the country's mineral industry. Excess residential construction in the 1990s was most frequently blamed for the construction slowdown during the past 5 years, but residential construction was reported to have recovered somewhat in 2004. There still appeared to be a shortage of other construction, particularly public construction projects, however (HeidelbergCement AG, 2005, p. 19). Structural reforms of the German economy, which were aimed at alleviating the increasing economic pressure on major manufacturing firms (including major producers in the minerals industry) to shift production or more processing overseas, appeared to make some progress in 2004. These reforms included reducing inflexibility and overregulation in labor markets, alleviating some of the tax burden on these manufacturing firms, encouraging the establishment of new businesses in Germany, and enacting some measures to limit high social insurance costs. Domestically, however, such measures have limited efficacy when the economy depends so profoundly on exports and consumption trends in foreign countries. Also, technological advances and greater efficiencies in the labor force, as Germany has exhibited in its mineral industry, can result in greater unemployment, even with deregulation. Persistent high unemployment remained Germany's most sensitive political and economic issue in 2004. The mining and primary metal-processing sectors of the mineral

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

industry combined to employ about 1.1 million out of an officially eligible labor force of about 43.1 million people in the country (International Monetary Fund, 2004, p. 34, 45; Mildner, undated§; U.S. Commercial Service, 2005§).

Government Policies and Programs

In 2004, German concern with shortages of coke to supply its steel manufacturing sector and a growing concern with securing a consistent energy supply and supply of many other raw mineral materials led German authorities to renew debates on appropriate trade policy, environmental restrictions, energy resource diversification, and subsidizing hard coal production. Like the rest of the industrial world, Germany's ability to compete for mineral resources has been most recently perturbed by considerable growth in mineral resource consumption by Brazil, Russia, India, and China (BRIC); as much as 5% annual growth in resource consumption in these countries during the next 30 years is expected (Bundesanstalt für Geowissenschaften und Rohstoffe, 2004a). Given the economic dependence of Germany (and most fully industrialized countries) on imports of raw materials, the country has had to revise its energy and raw materials security policy repeatedly since the early 1970s. This strategy emphasizes maintaining a secure supply of mineral and other raw materials from countries where these materials are more abundant. The basic principles and rationale of this strategy have been basically unchanged since 1997, but changes to energy, trade, and raw materials policies as components of this overall strategy were being proposed in Germany toward the end of 2004 (Adamowitsch, 2004§; Bundesverband der Deutschen Industrie e.V., 2005a§).

Germany has few deposits of hydrocarbons or metallic and industrial minerals, but the country does contain large deposits of hard (bituminous) coal, lignite, and salt. Only the mining of hard coal in Germany was still directly subsidized in 2004, and one goal set in 1997 as part of the raw materials policy was to gradually phase out that subsidy by 2005. In 2003, however, this coal subsidy program was actually extended through 2012, although the Government has targeted regular decreases in the real value of the subsidy during that time (Bundesministerium für Wirtschaft und Arbeit, 2005, p. 66). The trade policy component of the raw materials security strategy is basically aimed at further multilateral and bilateral reduction of tariffs in all countries, starting with German tariffs on imports of the raw materials necessary for the survival of the country's industries. Because Germany imports extensive quantities of raw materials from all over the world, the Government is concerned with securing imports from the mineral-producing countries, which supply ores, concentrates, and ferroalloys and other industrial countries, which also have processing industries (foundries, refineries) but can export unrefined metals and semifinished products to Germany (Adamowitsch, 2004§).

Germany's minerals policies have also traditionally emphasized the growing importance of recycling used domestic mineral-containing materials and imported scrap in the country. Germany also has a long history of applying the latest advances in materials research and development through which the use of raw mineral material can be optimized. Germany's raw

materials strategy has been described by the following basic objectives since 1997:

- Maintain the efficiency of and further opening of the world's minerals markets;
- Stabilize commodity export earnings, especially in the less developed countries, with the aim of ensuring continuous supplies of raw mineral materials;
- Accelerate the industrialization process in and facilitate the transfer of technology to developing countries;
- Open the markets of all industrial countries to imports of manufactures and semimanufactures from the developing countries;
- Promote the flow of capital to the developing countries and protect investors from expropriation; and
- Explore new mineral deposits by means of cooperative projects (German Embassy, Washington, DC, 2005§).

In 2004, tighter markets for many mineral commodities, especially metals, and the expectation of normal lags in development of additional global mineral production capacity encouraged the German Government to contemplate adjusting this raw materials security strategy. For example, to maintain diversity in the energy supply, the Government could phase out the use of nuclear power less rapidly than was set out in 1997. Other proposed adjustments included decreasing domestic tariffs on raw materials, increasing support of multilateral tariff reduction through the World Trade Organization (WTO), and decreasing trade barriers bilaterally with countries that export raw materials to Germany, but are not part of the WTO. Additionally, the Government encouraged universal agreement on environmental standards, such as those set out in the Kyoto Protocol, to maintain the international competitiveness of Germany's mineral-using industries and support a sustainable global allocation of the consumption and use of minerals (Bundesministerium für Wirtschaft und Arbeit, 2005, p. 70; Bundesverband der Deutschen Industrie e.V., 2005b§). Toward the end of 2004, some German officials also considered that it may be necessary to solicit the EU to protect against increasing exports of metal scrap to China and elsewhere by classifying scrap metal as a strategically important economic resource (Köhl, 2004).

Environmental Issues

In 2004, industry officials expressed concern that the raw materials debate in Germany and the EU had focused too much on the environmental costs of intensive mineral use and on plans for divesting Germany of industrial and consumer reliance on certain types of natural resources, such as uranium, and that too little emphasis had been placed on German industry's economic dependency on imports of raw materials, which included metals, industrial minerals, and mineral fuels. With respect to mineral fuels, industrial leaders in Germany claimed that there is an essential compatibility between Germany's obligation to protect the climate and environment and a strategy to maintain diversity in the country's energy supply (Bundesverband der Deutschen Industrie e.V., 2005, 2005b§).

In 2002, the Government adopted a new National Sustainability Strategy, which has many components directly

relevant to the mining industry. The first progress report on this Strategy was published in autumn 2004 and stated that the productivity of raw mineral materials had increased by about 28% since 1994. This increase was partly owing to the reduction of mineral waste, more recycling of mineral-containing products, and substitution of regenerative technologies for some less efficient mineral uses. It was also partly owing to a decrease in the use of mineral materials in end-use construction and other nonrecyclable use, as well as decreased production and use of hard coal and lignite in Germany's energy mix. Germany has used many of the latest technologies to burn coal with low emissions of toxic substances; as a result, the social and environmental costs of burning coal are estimated to be not much higher (and may even be lower) than using other energy sources. The cost-effectiveness of coal use is hampered, however, by the high costs of developing, installing, and using the cleaner technologies. Additionally, production of hard coal is even less cost-effective than production and use of lignite because exploitable hard coal is available only very far underground in Germany (Bundesministerium für Wirtschaft und Arbeit, 2005, p. 68-69).

The National Sustainability Strategy also aimed to reduce emissions of the six greenhouse gases named in the Kyoto Protocol by 21% from the base years 1990 to 1995 as soon as 2008 and no later than 2012. Germany had already come close to this goal with the reduction of 18.5% achieved by the end of 2003, which was achieved mainly by reducing emissions in the energy sector, which included lowering coal usage, and in the manufacturing industries, which included mineral processing. Reports of excessive carbon dioxide emissions by the energy industry have been noted again in recent years, however, mainly owing to some reclassifications of acceptable limits in the energy sector and to some coal-fired power stations starting up operations. Germany has also implemented an emissions permit trading policy as an efficient method to comply with the Kyoto Protocol (Bundesministerium für Wirtschaft und Arbeit, 2005, p. 69-70).

Another part of the National Sustainability Strategy that is directly relevant to the mining industry is the German Government's joint position on a draft proposal for a uniform EU system for the registration, evaluation, and authorization of chemicals in conjunction with the Chemical Industry Association and the Mining, Chemicals, and Energy Union, which represent the branches of German industry that will be most affected by the proposal. This draft regulation would provide for registration of production of all chemical substances that exceed 1 metric ton per year (t/yr), greater responsibility for industry to control substances of concern, and a possible approvals procedure for some particularly dangerous chemical substances (Bundesministerium für Wirtschaft und Arbeit, 2005, p. 70-71).

The Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit (BMU) is responsible for protecting the environment in Germany and for the following main relevant Federal agencies: the Umweltbundesamt (UBA), in Dessau, whose mission is to provide scientific and technical support for the Ministry; the Bundesamt für Naturschutz (BfN), in Bonn, which advises the Ministry on all issues that relate to national and international nature conservation and landscape management, promotes nature conservation activities, supports

research projects, and acts as the authority permitting the import and export of protected species of animals and plants; and the Bundesamt für Strahlenschutz (BfS), in Salzgitter, which is a Federal scientific agency that specializes in developing advanced methods and policies in the fields of radiation protection, nuclear safety, transport and custody of nuclear fuels, and final disposal of radioactive waste (Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit, 2005§).

EU environmental directives require that the member nations (such as Germany) 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.

After reunification of the former German Democratic Republic (GDR) and the former Federal Republic of Germany (FRG), Germany's most costly environmental problems have often involved reducing waste and counteracting environmental damage done by the mining industry of the former GDR. The largest challenges have been related to achieving a publicly acceptable and cost-effective environmental decommissioning of the former GDR's uranium mining and processing industry (Bundesministerium für Wirtschaft und Arbeit, 2004, p. 20).

The ongoing cleanup of the former state-owned Wismut GmbH uranium mining operations in Saxony and Thuringia (in the former GDR) was viewed as Europe's biggest mine rehabilitation project. According to German environmental policy, the costs to remediate contamination at mining sites, such as coal mining sites, are funded 60% out of Federal funds and 40% out of State government funds. In the case of Wismut, 100% of the costs are being funded by the Federal Government because of the urgency of the problem, which is complicated by the close proximity of large populations. At various sites, 48 waste rock piles contained about 311 million cubic meters of waste material and covered a surface area of about 15 square kilometers (km²). In addition, 14 tailings ponds contained 160 million cubic meters of residues from uranium-ore-processing plants and covered a surface area of 7 km². As of 2002, more than one-half of the remediation was completed, and the rest of the initial cleanup work was scheduled to be completed in the next 6 to 8 years. Post-cleanup work will continue for quite some time after that, and the governments of Saxony and Thuringia are expected to bear some of the financial burden for those operations. The initial cleanup work in 2004 focused on decommissioning facilities and immobilizing contaminated material in a manner that would limit long-term hazards to humans and the environment (Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit, 2002, p. 37; Bundesministerium für Wirtschaft und Arbeit, 2004, p. 20-21).

Additional environmental concerns that relate to new mining projects and compliance with EU directives are addressed under the German mining law and its provisions for environmental impact assessments that must be completed before mining can start. The requirements of these assessments for mining were revised to comply with EU directives in 1990. The objective is to identify and evaluate all environmental consequences

of a planned mining project by taking into account various design options. The environmental evaluation process in Germany presents a risk for the company involved because project approval is not guaranteed even after completion of the assessment, which usually involves considerable time and resources (UWS Umweltmanagement GmbH, 2005§).

Production

Even without strong domestic demand, increased international prices for most metals in 2004 helped spur increased annual production of many ferrous and nonferrous metals in Germany. Germany produced many of these metals as byproducts of other metal or industrial mineral ore (mostly imported) that was processed in Germany. From ore that was mined domestically, the quantity of copper-silver concentrate recovered as a byproduct of fluorspar and barite mining was very small in 2004. The high costs of production in Germany compared with those of competing foreign producers and the problems caused by trying to balance production in the reunified Germany continued to constrain production. In 2004, Germany was still one of the world's leading producers of aluminum metal, barite, bentonite, cement, feldspar, kaolin, lignite, pig iron and steel, potash, and salt (Gwosdz and others, 2004).

Trade

In 2004, other member countries of the newly expanded EU were the leading recipients of exports from Germany's mineral industry. In 2003, German trade relationships with the newest members of the EU were already established. Outside the EU, Japan and the United States were Germany's major trading partners, although China has also recently become a more-prominent recipient of Germany's mineral exports. Besides importing raw minerals, processing them, and then exporting more-finished mineral products, the ports of Germany have also traditionally made Germany an important transshipper of ores and concentrates to other EU countries, especially to the south and east of Germany. In the past few years, Germany has successfully extended this role to provide transshipments of raw mineral commodities to many countries in Asia, especially China. For example, almost all Germany's exports of lead ore and concentrate and molybdenum ore and concentrate went to China in 2003. Germany's other notable metal exports to China were arsenic metal, copper oxides and scrap, nickel oxides, platinum-group metals (PGM), titanium oxide, and zinc scrap and semimanufactures (table 3).

EU countries imported mostly refined metal products from Germany but also significant quantities of cement, coal briquets, dimension stone, feldspar, fertilizers, gypsum and plaster, kaolin, lignite, lime, limestone, peat, quartz, refractory-grade dolomite, salt and brine, and silica sand. Particularly in the steel sector, German firms have had successful mineral joint ventures, cooperative projects, and foreign direct investment (FDI) ventures in China since the beginning of China's reforms to "open" certain areas of commercial interest to the rest of the world. For example, a joint group of two German companies

and Wuhan Iron and Steel Corporation (became Wuhan Iron and Steel Group in 2004) cooperated to create two large-scale steel facilities in China early in the 1970s. The Chinese city of Wuhan also became a sister city with the German city of Duisberg in 1982, and the Lower Rhine Chamber of Commerce set up an office in Wuhan in 1996. This is one of many examples of the long-term cooperative economic relationships between the Chinese and the German Governments that continue to allow German automobile components manufacturers, steel and other metal processing firms, and, more recently, engineering and financial firms to pursue foreign ventures in China with less political risk than many foreign rivals (Berry, 1997§; Pengxi, 2002§).

In 2004, Germany relied heavily on imports to feed the metals-processing industry. Some of the more-prominent suppliers of the critical raw minerals were Brazil for iron ore and concentrate; Chile for copper and molybdenum ores and concentrates; China for antimony oxides, magnesium oxides, and manganese metal; Guinea and Jamaica for bauxite and alumina; Russia for unwrought nickel metal; and South Africa for chromium, ferrochromium, and PGM. Germany also relied on imports of wrought metal, semimanufactures, and scrap for its large recycling capacity and secondary metal production. Imports of finished products, semifinished products, and scrap came mostly from EU countries, although some neighboring countries also functioned as transshippers to Germany of ores and concentrates from less developed countries. For example, Germany imported significant amounts of zinc ore and concentrate from Belgium in 2003. The nonferrous metal industry in Germany also imported a significant proportion of its raw materials requirements (mostly mineral fuels), semiprocessed mineral commodities, and scrap from many Eastern European countries, particularly Russia (table 4).

With respect to trade in industrial minerals, Germany was a major supplier of many mineral commodities to the rest of the (pre-expansion) EU in 2003. It imported significant quantities of barite from China; boron from Turkey; clays from the Czech Republic; fluorspar from China, Namibia, and South Africa; and phosphates from Israel. Germany also relied on imports of coal from Poland, Russia, and South Africa; coke from China and Poland; and crude petroleum from Russia (table 4). In 2004, the Government considered an extremely wide variety of minerals in its negotiations with the Governments of industrialized and developing countries in seeking to modernize Germany's trade policy and thereby increase the security of the country's supply of minerals for industrial and consumer use.

Structure of the Mineral Industry

The mineral industry in Germany is structured around trade. Toward the end of 2004, the mineral industry of Germany experienced import shortages of some critical raw materials. In the steel industry, international competition for iron ore and coke, mostly from China, meant that imports of scrap into Germany increased, but not enough to cover German domestic and export demand for steel in 2004. Germany ranked fifth in the world in apparent steel consumption in 2004; China was first. Also, Germany depended on imports for about 90% of the

steel alloy metals (ores, concentrates, oxides, and ferroalloys) annually required by the country's steel industry (Bundesanstalt für Geowissenschaften und Rohstoffe, 2004b). In 2004, despite increasing costs of minerals on most markets, Germany still spent, in euros, only slightly more for imports of minerals (metals, nonmetals, precious metals, gemstones, and energy resources) even during times of significant price increases for oil (Bundesanstalt für Geowissenschaften und Rohstoffe, 2004b). This was largely owing to the strength of the euro relative to the U.S. dollar (Christian and Fels, 2004§).

The nonferrous metal sector relied heavily on imports for its raw materials as well, although this sector obtained a higher proportion of its overall output from the reprocessing of scrap and waste material than the ferrous metal sector. Technological advances have allowed Germany to be more efficient in using these secondary materials and recycling in the production of metals and nonmetals. In 2004, Germany continued to lead the EU in secondary production of metals and continued to make advances in recycling technology. New capacity to recycle electrical and electronic scrap served to boost secondary production of ferrous and nonferrous metals in 2004. At least one plant was able to obtain 67% of the weight of waste electrical and electronic equipment (WEEE) in metal, of which 43% was ferrous metal, and 24%, nonferrous. According to the managing director of this German plant, aluminum constituted only from 3% to 5% of the WEEE, but the aluminum output of the plant had a 90% pure aluminum content. Also, the plant required about 14 metric tons (t) of WEEE to produce 1 t of copper and about 70,000 t of electronic scrap to produce 1 t of gold, which was a better production ratio than that for the 200,000 t of ore typically required to produce the same amount of pure gold (Vollrath, 2004). Byproducts from German nonferrous metal refineries, German scrap production, and some imports of metal and scrap were responsible for supplying all the domestic demand for precious metals (Bundesanstalt für Geowissenschaften und Rohstoffe, 2004b).

Most of the mines and associated mineral processing plants in Germany that were still in operation in 2004 were small compared with those in the former FRG, except for mining operations to produce lignite and potash. Germany was the world's fourth leading producer of potash in 2004 and the third leading producer of salt. Domestic demand for most mineral commodities has been consistently very weak since the mid-1990s, which has led to an even greater dependence on exports to generate revenues for the mineral industry (Christian and Fels, 2004§). Because production of many industrial minerals is subject to lower profit margins and higher transportation costs per metric ton, the decline in the German construction industry during the same time period has encouraged lower production of cement, crushed stone, sand and gravel, and other industrial minerals and metals that are not as attractive on the export market. German use of refined aluminum, copper, lead, tin, and zinc amounted to more than 4 million metric tons (Mt) in 2003 (Bundesanstalt für Geowissenschaften und Rohstoffe, 2004b). In 2004, about 6 million people were employed in the mineral and manufacturing industries, combined, which was 1.9% less than in 2003 (Statistisches Bundesamt Deutschland, 2005§).

Commodity Review

Metals

Aluminum.—In 2004, rising energy costs were of the greatest concern to Germany's primary aluminum smelting and alumina refining industry. Norsk Hydro ASA accounted for more than 75% of the country's primary aluminum production with a 100% interest each in two primary plants in Neuss and Stade and a 33% interest in a third primary smelter in Hamburg. Hydro wrote down the book value of these three primary aluminum plants at the end of 2004 mainly because of higher-than-expected energy costs and also partially because their revenues (in euros) were insufficient to support their book values as long as the euro remained strong (as measured against the U.S. dollar). The energy contracts for these plants were set in 2002 when Hydro acquired VAW Aluminium AG. Those contracts were due to expire at the end of 2005, and Hydro expected an even higher increase in energy costs by that time than was budgeted into the book value of these plants in 2002 (Norsk Hydro ASA, 2004§).

A strong euro is expected to help buffer the costs of producing aluminum because the raw materials, such as bauxite and alumina, that are imported into Germany are valued in U.S. dollars. Hydro divested itself of some of VAW's previously owned interests in Germany and abroad, which were used to help ensure a supply of metal for VAW's former downstream fabricating operations. On June 30, 2004, Hydro finished divesting itself of any alumina production capacity in Germany by selling its 50% interest in Aluminium Oxid Stade GmbH (AOS), which had been acquired from VAW in 2002. DADCO Alumina & Chemicals Ltd. (based in the United Kingdom) obtained sole control over AOS by acquiring Hydro's 50% interest in 2004. DADCO already controlled the other 50% after acquiring it from Alcoa Inc. in 2001. In 2004, DADCO's ability to control sales prices for alumina in the United Kingdom and the EU was investigated before the acquisition was finally cleared by the United Kingdom's Office of Fair Trading on October 29, 2004. Another fair trading concern was that DADCO would substantially control the supply of bauxite into the EU as a result of the company's long-term contract with Alcoa to purchase bauxite from Jamaica and the acquisition of Hydro's 10% interest in Halco Mining Inc. as part of DADCO's acquisition of Hydro's interest in AOS. Halco was a participant in a Guinea bauxite mining joint venture, but DADCO's interest was not deemed to constitute sufficient control of this necessary input into alumina and aluminum metal production to warrant EU sanctions on the deal. Still, AOS did essentially remain an alumina monopoly in Germany, and the company's (and Germany's) access to foreign sources of bauxite was solidified through the DADCO acquisition (Office of Fair Trading, 2004§).

Secondary aluminum production continued to flourish in 2004, but increased competition for scrap metal, especially from China, caused some German authorities and other interested Europeans to call for trade protection on exports of nonferrous scrap metal, which included aluminum, toward the end of the year. Legal grounds for limiting the export of scrap metal

from many European countries may rely upon the redefinition of scrap as an essential raw material or resource for the EU (Köhl, 2004). German demand for secondary aluminum, especially from major car manufacturers, increased in 2004, which encouraged Metallhüttenwerke Bruch GmbH to increase capacity by 30,000 t/yr in 2005, and reinforced the decision by VAW-IMCO Guss und Recycling GmbH to build a new aluminum recycling plant by 2006 (Metal Bulletin, 2004c; IMCO Recycling Inc., 2004§).

Copper.—Norddeutsche Affinerie AG (NA) operated the custom smelter and refinery at Hamburg and was the world's fifth ranked custom copper smelter with a production capacity of about 500,000 t/yr of copper cathode, 320,000 t/yr of copper rod, and 176,000 t/yr of copper billets and cake. Since its acquisition of Hüttenwerk Kayser AG (HK) in 2000, NA has essentially become a monopoly with respect to copper metal production in Germany and controls much of the secondary, as well as primary, production of the metal. As a result of higher metal prices, the global supply of copper concentrate increased substantially in 2004 but at a substantially higher cost to companies like NA. Therefore, NA decided to close down and refurbish parts of its main smelting facilities for part of the year, and annual production of custom copper metal products by NA decreased slightly in 2004 compared with that of 2003, although the company's production of cathodes from the refinery portion of the operation increased during the same timeframe (Norddeutsche Affinerie AG, 2005, p. 40-43).

NA faced strong competition from Chinese buyers for German scrap metal, but that competitive pressure appeared to relent somewhat toward the end of 2004 as China attempted to slow down its rapidly increasing demand for copper. Secondary smelter production of copper by NA was nonetheless lower in 2004 compared with that of 2003 because the international price of copper scrap was bid up above an economical level for German processing. Germany also did not have much domestic supply of scrap to direct toward domestic secondary smelters because the moribund German construction industry did not replace many existing copper-containing structures in 2004. More sources of copper scrap are expected to be available to NA in 2005 because the company developed a more-advanced recycling technology in 2004 that will allow it to recover an increased proportion of the potential copper contained in a wide set of sources, including the automotive, electronics, and engineering industries (Norddeutsche Affinerie AG, 2005, p. 42-43).

In 2003 and through the first quarter of 2004, NA went through a major restructuring to lower production costs and to coordinate production in the face of increasing costs for copper concentrate and scrap. This involved reducing secondary production at HK's Lünen plant and HK's workforce by about 30%. Among other restructuring steps were the streamlining of the Kayser Recycling System (KRS) and the eventual amalgamation of HK into NA as NA's main recycling center on March 1, 2004. The KRS was developed by HK, which claimed that it would be the most advanced copper recycling system in the world with high levels of environmental and energy efficiencies and the ability to process alternate feed, such as electronic scrap products. This new technology increased the

capacity of the Lünen plant to process 40% more input from a much wider set of sources. The new system also improved the recovery of complex materials to convert more of the byproducts, such as gold, lead, nickel, palladium, platinum, selenium, and silver, in the copper concentrates and secondary raw materials into high-grade products (Norddeutsche Affinerie AG, 2005, p. 23, 53).

Magnesium.—VAW-IMCO Guss und Recycling GmbH (a subsidiary of U.S.-based IMCO Recycling Inc.) was on schedule to start producing magnesium in December 2004. This production was to come from a new facility that would produce magnesium out of scrap next to VAW-IMCO's secondary aluminum refining plant in Töging. It was not completed by the end of 2004, and only 5,000 t of the designed capacity of 15,000 t/yr of magnesium was expected to be produced in 2005. About 90% of the cast magnesium ingots from the plant were expected to be sold to the European automobile industry, and IMCO obtained an initial contract to recycle BMW engine blocks for reuse by BMW (IMCO Recycling Inc., 2004§). On December 9, 2004, Aleris International Inc. was formed through a merger of Commonwealth Industries, Inc. with IMCO Recycling Inc., and VAW-IMCO became a wholly owned subsidiary of Aleris (Aleris International Inc., 2004§). In 2004, the price of magnesium surged owing to shortages of supply out of China, and this encouraged an increase in German recycling that resulted in an increase of slightly greater than 6% in production of magnesium castings (Köhl, 2004).

Iron and Steel.—Europe's steel industry has become increasingly consolidated since the privatization and closure of many Eastern European steel plants. This sector of the EU economy was dominated by a few large steel producers, which included the leading German-based steel producer ThyssenKrupp Group. In 2004, ThyssenKrupp had a global production capacity of about 19 million metric tons per year (Mt/yr) of crude steel and it was the 10th ranked crude steel producer in the world. ThyssenKrupp Stahl AG controlled German production for ThyssenKrupp Group and was the leading steel producer with an estimated production capacity within Germany of about 12 Mt/yr (ThyssenKrupp Stahl AG, 2005, p. 16-17). The Luxembourg-based Arcelor Group was the leading crude steel producer in the world (44-Mt/yr capacity) and was the second ranked producer in Germany with subsidiaries that included Stahlwerke Bremen GmbH (4-Mt/yr capacity) and EKO Stahl GmbH (2.5-Mt/yr capacity) (Stahlwerke Bremen GmbH, 2005§).

Theoretically, the latest wave of increased consolidation in the steel industry that began globally at the end of the 1990s was expected to help stabilize steel prices because fewer firms will have better control over supply (MEPS International Ltd., 2005§). In 2004, however, increased demand, primarily in Germany's steel export market, put pressure on German steel producers to increase domestic production capacity rather than to continue to import an increasing amount of raw materials, scrap, and finished steel. In 2004, the increasing German reliance on imports for the country's steel production sector was mostly met by other EU countries, which included many of the new Eastern European members that officially became a part of the EU on May 1, but it also needed to import

materials from outside of the EU, which were only sporadically available (Stahl-Zentrum, 2005§). Therefore, there were occasional shortages of raw materials, especially coke, and long delays in fulfilling orders for German steel products in 2004 (ThyssenKrupp Stahl AG, 2005, p. 11, 22). Germany's leading coke producer RAG Aktiengesellschaft reported that German steelmakers could face coke shortages of between 2 and 4 Mt/yr for the next 10 years if German coke-making capacity does not expand (Metal Bulletin, 2004b). In addition, Chinese imports of ferrous scrap from worldwide markets have more than doubled since 2000, and the increased competition for this raw material severely affected the minimills in Germany (Metal Bulletin, 2004a).

In the second half of 2004, production of crude steel by ThyssenKrupp Stahl was constrained by the restricted availability of sufficient coke of the required quality in Germany. Still, steel production facilities throughout Germany operated at near full capacity as demand increased following 2 years of decreases in steel consumption in Germany. Throughout 2004, the cost of energy and imported raw materials continued to increase in Germany although increasing global prices of iron ore and raw materials mostly produced outside of the EU were somewhat buffered by the strong exchange rate of the euro versus the U.S. dollar. To meet increased demand for steel in Western Europe, ThyssenKrupp Stahl and other German steel producers reduced inventories of finished and unfinished steel products and imported slabs of steel from outside the expanded EU (ThyssenKrupp Stahl AG, 2005, p.17).

After ThyssenKrupp Group, the Arcelor Group controlled the second largest amount of crude steel production capacity in Germany. Arcelor announced plans to decommission the smaller blast furnace (1.23-Mt/yr capacity) at Stahlwerke Bremen by 2012 but might stop production at this furnace much sooner because of the necessity to reline it in 2005 or 2006 and a coinciding expiration of Bremen's coke contract with RAG at the end of 2005. In 2004, Bremen sourced about two-thirds of its coke requirements from RAG and the rest from an Arcelor coke operation in Spain. High coke prices and shortages of coke in 2004 were reportedly responsible for delaying a contract extension beyond 2005 between Arcelor and RAG (Glasson, 2004a). Arcelor's German subsidiaries were still producing at nearly full capacity to serve increased export demand, mostly to the rest of the expanded EU, and their 2004 production of crude steel exceeded that of 2002 after having declined in 2003. Arcelor's German subsidiaries also increased steel shipments to China by about 6% above those of 2003. Like ThyssenKrupp Group, Arcelor focused on strategies to improve service to the expanding customer markets in the United States (North American Free Trade Agreement region) and Asia, particularly China (Arcelor S.A., 2005, p. 33).

In 2004, the German subsidiaries of Arcelor and ThyssenKrupp Groups were very concerned with the filing of an appeal by U.S. steel producers against an International Trade Commission (ITC) ruling that U.S. imports of cold flat-rolled products from 20 countries, which included Germany, had not harmed the U.S. steel industry and that the U.S. Government was not justified in attempting to levy antidumping or antisubsidy duties on U.S. imports from these countries. This appeal was filed in the U.S. Court of International Trade (CIT);

a decision was still pending at the end of 2004. If the ITC ruling is overturned, then these products produced by German steelmakers for export to the U.S. could be subject to new antidumping and antisubsidy duties. In retaliation, the European Commission (EC) imposed provisional antidumping duties on imports of certain U.S. cold-rolled flat stainless steels (20.6% on imports from AK Steel Corporation and 25% on imports from other companies). The EC cancelled this antidumping retaliation in March 2004, however, following a petition from the European Confederation of Iron and Steel Industries (Arcelor S.A., 2005, p. 129).

The third ranked steelmaker in Germany was Salzgitter AG, which was the leading seamless tube and pipe producer in Western Europe. On July 28, 2004, Salzgitter announced that it was to acquire the ThyssenKrupp Group's remaining 0.7% stake in Mannesmannröhren-Werke GmbH, which concluded another in a series of deals that have led to more consolidation in the steel sector of the EU and Germany. In response to increased export demand in 2004, Salzgitter was able to increase crude steel production despite high raw materials costs and shortages of coke in Germany (Salzgitter AG, 2005, p. 7). Salzgitter commissioned a new blast furnace and increased its hot metal production capacity by about 500,000 t/yr in November 2004. In 2004, Salzgitter had to import between 400,000 to 700,000 t of iron content to raise crude steel production to 8.69 Mt from 8.56 Mt in 2003. Modernization efforts and the additional capacity were expected to reduce Salzgitter's dependence on imports of iron to about 200,000 t in 2005 (Glasson, 2004b). In addition, Salzgitter received approval from the EU to build a plant to recycle steel and other scrap metals from cars supplied by Volkswagen AG (Metal Bulletin, 2004d). By the end of 2004, Salzgitter's share of the tubes unit at Mannesmannröhren-Werke had already helped Salzgitter to obtain a leading global position in the manufacture of steel tubes. Salzgitter was also among the top five producers of flat-rolled products and section segments in Europe (Salzgitter AG, 2005, p. 11).

The fourth ranked German steel producer, in terms of crude steel production capacity, was Saarstahl AG. In 2004, Saarstahl produced 2.72 Mt of crude steel and 2.52 Mt of rolled products, which represented the company's highest levels of production in more than 10 years. As with other German steel producers, Saarstahl increased production substantially in 2004 compared with that of 2003 in response to strong export demand, but it was more reliant on production of specialty steel products (Saarstahl AG, 2005a§). Saarstahl was one of the leading high-quality wire rod producers in Western Europe and specialized in the production of wire rod, steel bars, and semifinished products, which were targeted for sale to the automotive industry and its suppliers, the construction industry, power industry companies, the aerospace industry, and general mechanical engineering companies. The European automotive and automotive supplier industry represented Saarstahl's main sales market in 2004, and the company benefited from increased demand for its products from the construction and automotive sectors in the new Eastern European members of the EU and China (Saarstahl AG, 2005b§).

Zinc.—In 2004, Sudamin MHD GmbH controlled the zinc smelter and refinery in Duisburg, which had an annual

production of about 100,000 t of zinc (intelligence AG, 2004). Since purchasing the operation in 2002, Sudamin has undertaken a process to convert the smelter into a more-modern processing facility that can produce high-quality zinc and other minor metals from 100% recycled sources of feed; this meant that the company recovered other metals, such as cadmium and lead, in addition to its main line of secondary zinc production. This modernization process was expected to be completed by the end of June 2005 (Deutschen Zentrum für Luft-und Raumfahrt, 2005§). To improve the logistics for transporting the additional lead- and zinc-containing scrap, Sudamin set up a joint venture with Duisburger Hafen AG in 2004 that allowed better integration of the Duisburg Harbor's infrastructure into Sudamin's transportation network (Duisburger Hafen AG, 2004§).

In 2004, the leading zinc producer in Germany was the Nordenham zinc smelter, which was run by a subsidiary of Xstrata plc. This smelter produced more than 154,446 t of zinc metal in 2004, which was 10% more than its 2002 listed capacity. Xstrata acquired the Nordenham zinc smelter from Metaleurop SA at the end of 2002. Production at the smelter was expected to increase even more in 2005 owing to continuing operational improvements. Xstrata has contracts at least through 2005 with Glencore International AG to receive technical consultation concerning improvements to the Nordenham smelter, to purchase zinc concentrate from Glencore to feed the smelter, and to supply Glencore with a market-based proportion of zinc slabs and ingots produced at the smelter (Xstrata plc, 2005, p. 6, 62, 147).

Industrial Minerals

Bentonite.—In 2004, Süd-Chemie AG was the leading bentonite producer in Europe, with operations in France, Greece, Germany, Poland, Sardinia, Spain, Sweden, and Turkey, and was the world's leading producer of acid-activated bentonite, which is used in oil refining (Industrial Minerals, 2004). Süd-Chemie was serving the Asian market, which included China, with companies located in Indonesia and the Republic of Korea. In 2002, the company acquired a leading Chinese producer to improve service to China, which had the fastest-growing demand for Süd-Chemie's bentonite products, especially in the construction sector. In 2004, after acquiring SKW Gießerei-Technik GmbH & Co. KG of Germany and Tecpro Corp. of Atlanta, Georgia, in April, Süd-Chemie became the only full-service supplier of foundry chemicals for iron castings in Europe. The German and international foundry industries have been the main customers for bentonite products from Süd-Chemie (Süd-Chemie AG, 2005, p. 4, 21, 35).

Cement.—Despite HeidelbergCement AG being a large multinational producer, it shared the German and European market with at least two other large cement producers—Dyckerhoff AG and SCHWENK Zement KG. Germany exported cement to neighboring countries in 2004 mostly because of the weak domestic construction market. Dyckerhoff, in which Italian cement producer Buzzi Unicem SpA acquired a majority interest in 2004, benefited during the year from lowering some of its excess capacity in 2003; this included selling Anneliese Zementwerke AG to HeidelbergCement.

HeidelbergCement retained Anneliese through 2004 and maintained a considerable amount of its other production capacity. This strategy was partially blamed for its financial losses in 2004 (Rawlinson, 2004).

HeidelbergCement did rid itself of some clinker capacity by closing a kiln at its Mainz-Weisenau plant at the beginning of 2004 but added attributable capacity via the acquisition of a majority share in Teutonia Zementwerk AG. The company claimed that its strategy was based upon an expected recovery in the domestic construction sector. An improvement in cement demand from residential construction, however, was offset by a lack of recovery in other domestic markets for cement, especially in public works projects. Owing to its substantial capacity, HeidelbergCement increased production in 2004 compared with that of 2003 but sold much of its product to Asian countries (HeidelbergCement AG, 2005, p. 20, 22, 23). The revenues from these sales were lower than expected owing to lower prices in Asia as a result of a price war in Indonesia. In an attempt to control production costs at its plant in Germany, HeidelbergCement started a legal challenge to the German Government and EU laws on emissions trading. In 2004, cement prices did gradually increase in Germany as a result of the big German producers' (especially HeidelbergCement's) reluctance to produce up to capacity (World Cement, 2004).

After 2004, German-based cement companies expected that growth in the new EU accession states, mostly in Eastern Europe, will provide enough demand to warrant more fully utilizing the country's cement production capacity. During 2004, HeidelbergCement was not the only company that experienced losses in Germany. The German subsidiaries of foreign multinationals, such as Holcim Ltd. and Lafarge Company S.A., also recorded losses because the German construction industry continued to languish with Germany's population (demand) continuing to decrease slowly in 2004. The cement producers in Germany claimed to have made some adjustments to this situation, but much more restructuring in these companies, especially at HeidelbergCement, was expected after 2004. The German cement market remained the largest in the EU, and most of these companies expected to make profits in 2005 after becoming more efficient through restructuring in 2004. The realization of any profits will depend on whether cement prices can keep pace with increasing energy costs, however (Rawlinson, 2004).

Clay and Shale.—In 2004, Germany was one of the leading producers of kaolin in Western Europe. Amberger Kaolinwerke GmbH produced kaolin, mostly for sale as a paper additive, and significant amounts of feldspar, mostly for the EU ceramic industry. Amberger Kaolinwerke mined these materials, as well as quartz and other industrial minerals, in Hirschau and Schnaittenbach, Bavaria, and Caminau and Kemmlitz, Saxony. In 2004, European demand for kaolin continued to increase because paper treated with kaolin products was increasingly demanded for use with more-modern computers, printers, copiers, and other technology (Amberger Kaolinwerke GmbH, 2005§). In Western Europe, demand for kaolin products and mineral paper additives has increased at an annual rate of 9% since 1982, although substitution of calcium carbonate for kaolin products in EU high-quality paper production has meant

that demand for kaolin has been increasing at a much lower rate since the early 1990s. Still, EU demand and German production of kaolin was expected to continue to increase steadily through 2010 (Hieber, 2000§).

Graphite and Silicon.—In 2004, Graphit Kropfmühl AG was the only company that mined and processed natural graphite in Germany. The company operated graphite manufacturing plants in Bad Godesberg, Kropfmühl, and Wedel and was the only German producer of high-grade silicon metal after acquiring RW Silicium GmbH in Pocking, Germany, in 1998. In 2004, Graphit Kropfmühl controlled and secured supplies of raw materials for its graphite production through majority or 100% ownership of subsidiaries in China, the Czech Republic, Sri Lanka, and the United Kingdom. The company increased sales of silicon metal in the second half of 2004 largely owing to the official EU accession of the leading silicon consumers Slovakia and Slovenia. In 2004, however, higher energy costs continued to drag down the profitability of both product lines for the company, especially for silicon metal production (Graphit Kropfmühl AG, 2005, p. 18, 29, 53).

In 2004, about one-half of Graphit Kropfmühl's graphite production went into the European refractory industry. Demand for high-quality graphite products in Europe, which was the company's primary market, continued to grow, and China demanded significant high-quality graphite products for the first time in 2004. China almost exclusively demanded only commodity graphite products until 2004 and still was not viewed as having an influence on the European or German market for silicon metal (Graphitwerk Kropfmühl AG, 2005, p. 12, 52).

Gypsum.—Germany was a major European producer of crude gypsum. In 2004, the leading German producer was VG-ORTH GmbH & Co. KG, which was formed through the merger of Kurhessischen Gipswerke Peter Orth GmbH & Co. KG, which was based in Witzenhausen, and Vereinigten Gipswerken Stadtoldendorf GmbH & Co. KG, which was based in Stadtoldendorf. The company's primary production facilities were located in the Lower Saxony area, and the leading export markets for its products included Austria, Belgium, the Czech Republic, France, Hungary, Ireland, the Netherlands, Poland, Scandinavia, Switzerland, and the United Kingdom (Baustoffmarkt, 2004§).

Potash.—K+S Kali GmbH was the German mining subsidiary of K+S Aktiengesellschaft and operated six mines from which it extracts about 38 Mt/yr of potash and magnesium salts annually. In 2004, K+S Aktiengesellschaft was the fourth ranked producer of potash products in the world and the leading producer in Europe. K+S Aktiengesellschaft was the second ranked supplier of specialty and agricultural fertilizers in Europe. K+S Kali expected to begin processing 1.5 Mt/yr of sylvinit in 2005 from the deposits at Unterbreizbach at the Wintershall production facility within the company's Werra plant. The Werra plant annually produces more than 40% of K+S Kali's total output. The project was expected to increase capacity at the plant by about 250,000 t/yr of K₂O content by increasing the specialty product range at Wintershall and fully utilizing the Unterbreizbach mine (K+S Aktiengesellschaft, 2004§).

Salt.—On June 9, 2004, K+S Kali acquired the remaining 38% interest in Europe's leading salt provider esco GmbH, from

Solvay S.A. esco had production capacities of about 5.8 Mt/yr of rock salt, 2.3 Mt/yr of vacuum salt, and 1.7 Mt/yr of brine. After this acquisition, K+S Kali accounted for all the rock salt and salt brine produced in Germany (esco GmbH, 2004§).

Mineral Fuels

Relative to its consumption, Germany has relatively insignificant domestic energy sources, other than coal, and must rely on imports to meet its energy needs. 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) sources to 20% by 2020. 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 rest was provided by nonmineral-fuel energy sources (U.S. Energy Information Administration, 2004§).

Coal.—*Bituminous and Anthracite.*—The share of hard coal used in generating the total amount of electricity consumed in Germany in 2004 was estimated to be about 23% (RWE Aktiengesellschaft, 2005b, p. 75). In 2003, the Government passed a followup regulation to the Hard Coal Agreement of 1997, which was an agreement to continue mining subsidies but gradually lower them to provide financial support for just enough hard coal production capacity as is deemed critical to Germany's energy security. The 1997 agreement stipulated that the ceiling on hard coal subsidies needed to be reduced gradually by about 50% from 1998 to 2005. The 2003 extension of the agreement mandated that this ceiling should be reduced by another 50% from 2006 to 2012. In 2004, the Government expected that hard coal production will be reduced to about 16 Mt by 2012 as a result of this decrease in financial support from the German hard coal subsidy (Bundesministerium für Wirtschaft und Arbeit, 2005, p. 66). 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, 2005b§).

Because the EU policy was to eliminate completely subsidies to industries, individual country member exceptions must be approved by the EC. This broad policy objective has resulted in the gradual phaseout of subsidies (in some EU countries more rapidly than in others) that have supported Western Europe's coal industry for many years. In 2004, the German Government presented its long-term restructuring plan for German hard coal mining to the EC for approval. According to this plan, output in Warndt-Luisenthal would be stopped, and the Lohberg-Osterfeld mine would be closed in 2006; the Walsum and the Lippe Mines would then be closed in 2009 and 2010, respectively. Germany expected that further downward adjustments to hard coal mining capacities would be needed by 2012 to reduce production. In 2004, the Government estimated that a workforce of about 36,000 would produce about 26 Mt of hard coal in 2005 (Bundesministerium für Wirtschaft und Arbeit, 2005, p. 66).

In 2004, RAG sold off its foreign hard coal mining activities, but it retained some international activities, such as coal

trading and mining equipment manufacturing. In Germany, the company continued with hard coal mining and coke production for the steel industry through its mining division, which was controlled by Deutsche Steinkohle AG (DSK). RAG was also involved in related energy projects through its new energy division, which was controlled by STEAG AG; STEAG was the fifth ranked producer of electricity in Germany. In 2004, STEAG planned to begin construction of a new coal-fired powerplant in Germany (RAG Aktiengesellschaft, 2005, p. 5-10). By the end of 2004, RAG had just nine coal mines left, and the Government expected the company to close two in 2006, one in 2009, and one in 2010. DSK announced, however, that it had obtained Government approval to develop the company's new underground mine, Donar, which could produce 3 Mt/y of coking coal. RAG continued to negotiate with the Government to increase the capacity of its coking plant in Bottrop by 2 Mt/yr of coke. Members of Germany's steel industry indicated that they would share the costs of the expansion in Bottrop, and two-thirds of any additional coke production at the plant would be reserved for use by ThyssenKrupp Stahl (SBS Corporation, 2004§; SPG Media Limited, 2005b§).

Lignite.—In 2004, Germany was the world's leading producer of lignite. Lignite-fired powerplants were the second ranked supplier of electricity in Germany, and about 90% of Germany's total output of lignite was used in electricity generation (U.S. Energy Information Administration, 2004§). Including hard-coal-fired powerplants, coal was responsible for slightly more than one-half of all electricity produced in Germany; lignite was estimated to be responsible for about 26% of total electricity generation. The leading German producer of lignite was RWE Power Aktiengesellschaft, which was formed by the merger of RWE Rheinbraun with other interests of RWE Aktiengesellschaft (RWE) in 2003. RWE Power operated four large open pit mines (Bergheim, Garzweiler II, Hambach, and Inden) in the Rhenish area to the west of Cologne. These mines produced a total of 100.3 Mt of lignite in 2004. RWE Power planned to continue producing a total of about 100 Mt/yr from these mines after 2004 (RWE Aktiengesellschaft, 2005a, p. 21; 2005b, p. 75; SPG Media Limited, 2005a§).

Petroleum.—Although Germany's demand for petroleum continued to decrease slightly (by 1.2%) in 2004 compared with that of 2003, petroleum still comprised a 36% share of the country's primary energy consumption (RWE Aktiengesellschaft, 2005b, p. 75). German production also decreased by about 8% during the same timeframe; production was negligible compared to the country's level of consumption. The decrease in production was largely owing to lower production out of the Mittelplate oilfield owing to adverse weather conditions and technical difficulties (Niedersächsisches Landesamt für Bodenforschung, 2005§). Mittelplate was Germany's largest producing field and is located in the Wattenmeer tidal flatlands off the western coast of Schleswig-Holstein. RWE and Wintershall AG each have a 50% interest in the Mittelplate joint venture.

Germany was the third ranked petroleum importer in the world and its main suppliers were Libya, Norway, Russia, and the United Kingdom. Russia was Germany's leading supplier and a longstanding proposal to extend the main Druzhba oil

pipeline to the German Port of Wilhelmshaven was discussed in 2004. The pipeline extension would improve service to Germany through Poland and allow Russia to export oil to the U.S. and other markets without risking an environmental accident with tankers on the Baltic or the Black Sea. In 2004, however, negotiations were still ongoing because the tariff that Germany would have to charge on the oil transported through the pipeline extension to operate the German portion of the pipeline and the associated pumping stations profitably would be about 30% higher than that of Poland. An adequate cost-sharing agreement had not been reached by the end of the year (Soria and Gray, 2004).

Uranium.—In 2004, uranium was the leading source of German electricity generation with an estimated 27.5% share of the total (RWE Aktiengesellschaft, 2005b, p. 75). In 2002, Germany was the fourth ranked country in terms of installed nuclear capacity to generate electricity, but the country passed an amended Atomic Energy Act in April 2002 that legalized the planned phaseout of Germany's nuclear power production by 2021, although production from some plants could be extended. The powerplant in Stade was the first German nuclear plant to be decommissioned on November 14, 2003, and Germany's oldest nuclear powerplant, Obrigheim, will be closed in 2005. German industry, which included the mineral industry, has opposed the Government's nuclear phaseout program, and if the current ruling coalition (Social Democrats and Green Party) loses the expected 2005 election, the policy could be overturned (Gwosdz and others, 2004; U.S. Energy Information Administration, 2004§). The mining of uranium has been abandoned, but the country continues to recover trace amounts of uranium from the Wismut cleanup project each year. As the cleanup progresses, less uranium is expected to be recovered annually. The total amount of uranium recovered during 2004 was reported to be 77 t in U₃O₈ content compared to 104 t in 2003 (Bundesministerium für Wirtschaft und Arbeit, 2004, p. 38).

Outlook

The export-led boom that has provided a boost to the mineral industry of Germany since the end of 2002 was believed to have run its course by the second half of 2004, and exports of mineral commodities, particularly metal commodities, may continue to suffer if the euro exchange rate remains strong against currencies in important export markets for Germany, such as China, which used a U.S. dollar-based currency in 2004 (Christian and Fels, 2004§). In the short run, higher input costs for the country's mineral processing industries could potentially force more domestic mergers, closures, and outsourcing of mineral processing to be closer to the sources of the minerals (outside of Germany). In the long run, expectations are that Germany's share of global resource use in mineral industry production and consumption could decline steadily as global consumption of minerals shifts proportionally more toward the emerging economies of the world (Bundesanstalt für Geowissenschaften und Rohstoffe, 2004a).

On the input side of Germany's mineral industry, the costs of raw materials increased enough in 2004 to cause great concern among the leaders of German industry that supplies of these

materials may not be secure enough. These cost increases are especially alarming for the mineral industry because the strong euro exchange rate has thus far been a substantial buffer to higher prices for minerals currently being imported from countries outside of the EU (RAG-Magazin, 2005). Looking forward, dependence of the mineral industry and much of the German economy on trade is not going to change much in the near future, although rapid technological improvements in renewable domestic energy provision, recycling, and secondary production are keys to easing many of the uncertainties associated with this dependence on external markets. Also on the brighter side, the accession of 10 new markets into the EU in 2004 is expected to reduce some uncertainty with respect to the supplies of certain mineral raw materials and provide expanded markets where German mineral commodity exporters can be more competitive regardless of external fluctuations in the euro exchange rate.

German domestic consumption, which included consumption of mineral commodities and high-mineral content products, was still down in 2004. For the mineral industry, the most important sector that failed to pick up its consumption was construction. With about zero population growth and an aging population, the future prospects for domestic consumer-led boosts to the German mineral industry are not very promising. These problems were not new to the industry in 2004, however, and many restructuring efforts within the mineral industry were completed during the year. In steel production, global capacity consolidated substantially from 1997 through 2004, and the remaining German steel producers should benefit from more regional market power and price stability (MEPS International Ltd., 2005§). In cement production, German producers have pushed hard to reduce capacity and consolidate so that they can better control the quantity being produced and keep prices at profitable levels.

Any future growth in the mineral industry of Germany is likely to be led by exports. European-based (including German-based) mineral commodity producers have had to operate internationally for a longer period of time than producers based in other continents because they have relatively smaller home markets. The German Government and firms in the mineral industry appear to benefit from a long history of contributing exceptional operations, technology, quality, and labor and management skills to international joint ventures. Significant organizational skills are also necessary to coordinate capabilities effectively around the world; companies within the German mineral industry have traditionally proven to be very adept in successfully developing the international relationships necessary to maintain a secure supply of minerals and other raw materials into Germany (Wagner, 1998§). In 2004, many German mineral industry firms were benefiting from long-term contracts with raw materials suppliers and finished mineral product buyers within and especially outside of the EU. This international competitive advantage has been carefully cultivated, and most of these contracts should be in effect through 2010.

To improve benefits from some first-mover advantages that German firms enjoy with respect to technological advances in mineral processing development and recycling and access to

some difficult export markets, the Government has traditionally supported multilateral trade agreements and globally inclusive environmental regulations. The more progress that the WTO agreements make in limiting multilateral tariff and nontariff barriers to trade and the more successful international environmental regulations are at leveling competition based on costs of production internationally, the more the German mineral companies will be able to benefit from the extensive investments that they have already made in international commercial relationships and domestic production technology (Bundesverband der Deutschen Industrie e.V., 2005).

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Major Publications

Der Bergbau und der Bundesrepublik Deutschland: Statistische Mitteilungen der Bergbehörden [Mining in the Federal Republic of Germany: Statistical Reports]
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TABLE 1
GERMANY: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons unless otherwise specified)

Commodity	2000	2001	2002	2003	2004	
METALS						
Aluminum:						
Alumina, Al ₂ O ₃ equivalent, hydrate ^e	thousand metric tons ^f	826 ^r	715 ^r	720	830	835
Metal:						
Primary		643,545	651,592 ^r	652,845 ^r	660,793 ^r	667,839
Secondary		572,257	622,907 ^r	666,148	680,385	703,756
Total		1,215,802	1,274,499 ^r	1,318,993 ^r	1,341,178 ^r	1,371,595
Arsenic, white, As ₂ O ₃ content ^c		200	200	200	200	200
Cadmium, metal, refinery including secondary		458	539	422	430 ^{r,e}	420 ^e
Cobalt, metal, including alloys ^e		500	500	500	500	500
Copper, metal:						
Smelter:						
Primary		211,200	317,700	295,100 ^r	288,800	278,600 ^p
Secondary		360,400	240,900 ^r	283,100 ^r	306,600	262,600 ^p
Total		571,600	558,600 ^r	578,200 ^r	595,400	541,200 ^p
Refined:						
Primary		310,000 ^r	303,000 ^r	327,000 ^r	286,653 ^r	283,686
Secondary		399,472 ^r	390,773 ^r	368,791 ^r	310,925 ^r	368,956
Total		709,472 ^r	693,773 ^r	695,791 ^r	597,578 ^r	652,642
Iron and steel:						
Ore, run of mine:						
Gross weight ²	thousand metric tons	462	407	419	429	412
Fe content	do.	65	57	59	60	58
Metal:						
Pig iron	do.	30,846	29,184	29,427	29,461	30,018
Ferroalloys ^{e,3}	do.	80	72	80	80	80
Of which ferrochromium		21,600 ^r	19,308 ^r	20,018 ^r	18,318 ^r	24,857
Steel, crude	thousand metric tons	46,376	44,803	45,015	44,809	46,408
Semimanufactures	do.	38,974	37,011	37,763 ^r	37,174 ^r	39,976
Lead, metal:						
Smelter						
		-- ^r	-- ^r	-- ^r	-- ^r	--
Refined:						
Primary		169,989 ^r	155,862 ^r	141,202 ^r	132,155 ^r	115,869
Secondary		204,000 ^e	219,640	238,700	221,229	243,304
Total		373,989 ^r	375,502 ^r	379,902 ^r	353,384 ^r	359,173
Magnesium, including castings		21,134	25,945	24,506	25,987	26,591
Platinum-group metals, metal, refined ^d	kilograms	50,000	50,000	50,000	50,000	50,000
Selenium, metal ^c	do.	16,000 ^r	15,000 ^r	16,000 ^r	14,000 ^r	14,000
Silver, metal, refined ^d	do.	400,000	300,000	200,000	200,000	200,000
Tin, alloys		15,754 ^r	14,420 ^r	11,447 ^r	6,143 ^r	5,431
Uranium concentrate, U ₃ O ₈ content		280	260	285	104 ^r	77
Zinc, metal including secondary		356,516 ^r	358,341 ^r	378,561 ^r	388,131 ^r	382,020
INDUSTRIAL MINERALS						
Abrasives:						
Natural, pumice		161,000 ^r	124,000	43,000	-- ^r	-- ^e
Artificial, corundum		60,000 ^e	60,000 ^e	56,728 ^r	59,097 ^r	72,565
Barite, marketable (contained BaSO ₄)		111,790 ^r	108,111 ^r	100,993 ^r	109,506 ^r	93,624
Boron materials, processed borax ^e		1,000	1,000	1,000	1,000	1,000
Bromine ^e		500	500	500	500	500
Cement:						
Clinker, intended for market	thousand metric tons	28,494 ^r	25,227 ^r	23,954 ^r	25,233 ^r	26,281
Hydraulic	do.	35,414 ^r	32,118 ^r	31,009 ^r	32,749 ^r	31,954
Chalk, crude including ground	do.	1,061	1,045	1,022	1,001 ^r	1,005

See footnotes at end of table.

TABLE 1--Continued
GERMANY: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons unless otherwise specified)

Commodity	2000	2001	2002	2003	2004	
INDUSTRIAL MINERALS--Continued						
Clays:						
Bentonite	thousand metric tons	465	448	495	479 ^r	405
Ceramic clay	do.	5,500 ^r	5,500	4,700	4,300	4,400
Fuller's earth ^c	do.	500	500	500	500	500
Kaolin, marketable	do.	3,637 ^r	3,764 ^r	3,666 ^r	3,487 ^r	3,752
Other, including brick clay ^c	do.	21,000	20,000	20,000	20,000	20,000
Diatomite	do.	54	50	54 ^r	55 ^r	54 ^c
Feldspar ^c		544,000	500,000	500,000	500,000	500,000
Fluorspar:						
Acid-grade ^c		29,600	29,400	33,400	32,300	32,200
Metallurgical-grade ^c		1,500	1,000	1,000	1,000	1,000
Total		31,124 ^r	30,381 ^r	34,429 ^r	33,289 ^r	33,200
Graphite, marketable		3,414 ^r	3,190 ^r	3,312 ^r	2,840 ^r	3,155
Gypsum and anhydrite, marketable	thousand metric tons	2,601 ^r	2,336 ^r	1,761	1,748	1,579
Lime, quicklime, dead-burned dolomite	do.	6,850	6,630	6,620	6,630	6,680
Magnesium salts, byproduct of potash mining	do.	1,306 ^r	1,233 ^r	1,411 ^r	1,288 ^r	1,300 ^c
Nitrogen, N content of ammonia	do.	2,473	2,522	2,623	2,803 ^r	2,740
Phosphate materials:^c						
Phosphatic fertilizers, P ₂ O ₅ content		700	700	700	800	800
Thomas slag:						
Gross weight	thousand metric tons	200	200	200	150	150
P ₂ O ₅ content		20,000	20,000	20,000	18,000	18,000
Pigments, mineral, natural		400 ^c	400 ^c	419	429	400
Potash, K ₂ O content	thousand metric tons	3,407	3,549	3,472	3,563	3,626
Salt, marketable:						
Industrial brines, NaCl content	do.	8,493	7,629	8,307	9,078	10,432
Rock and other	do.	5,732 ^r	5,887 ^r	6,468 ^r	6,495 ^r	7,692
Table salt	do.	829	827	858	727	572
Total	do.	15,054	14,343	15,633	16,300	18,696
Sodium compounds, n.e.s.:^c						
Soda ash, manufactured	do.	1,500	1,500	1,500	1,500	1,500
Sulfate, manufactured	do.	100	100	100	100	100
Stone, sand and gravel:						
Stone:						
Dimension, crude and partially worked	do.	277 ^r	315 ^r	237	167	229
Of which, dolomite and limestone	do.	75	69	76	106	76
Dolomite and limestone, industrial	do.	36,400 ^r	34,410 ^r	31,300 ^r	30,000 ^r	23,700
Quartz and quartzite ^c		25,000	25,000	25,000	25,000	25,000
Slate ^c		14,000 ^r	14,000 ^r	14,000 ^r	13,550 ^{r,4}	13,600
Sand and gravel:						
Building sand and gravel	thousand metric tons	351,658 ^r	313,336 ^r	318,907 ^r	301,887 ^r	278,900
Gravel, including terrazzo splits	do.	189,336 ^r	172,555 ^r	166,798 ^r	160,961 ^r	161,000 ^c
Sand:						
Foundry	do.	3,818 ^r	3,665 ^r	3,561 ^r	3,447 ^r	3,500 ^c
Industrial, glass	do.	8,082 ^r	7,835 ^r	7,839 ^r	7,953 ^r	8,162
Sulfur:						
Marketable	do.	1,026	988	1,093	1,014	939
Byproduct:						
Metallurgy ^c	do.	618	684	754	701 ^r	591
Natural gas and petroleum	do.	1,735	1,749	1,745	1,661	1,560
Total	do.	2,353 ^r	2,433 ^r	2,499 ^r	2,362 ^r	2,151
Talc and steatite ^c		8,000	7,000	7,000	6,000	6,000

See footnotes at end of table.

TABLE 1--Continued
GERMANY: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons unless otherwise specified)

Commodity	2000	2001	2002	2003	2004
MINERAL FUELS AND RELATED MATERIALS					
Asphalt and bitumen, natural	9,381 ^r	9,910 ^r	8,011 ^r	1,680 ^r	1,500 ^e
Coal:					
Anthracite and bituminous, marketable thousand metric tons	33,309 ^r	27,054 ^r	26,088 ^r	25,684 ^r	25,691
Lignite do.	167,724 ^r	175,365 ^r	181,778	179,085 ^r	181,926
Coke:					
Of anthracite and bituminous coal do.	9,115	7,289	7,226	7,827	7,900 ^e
Of lignite ^c do.	175	173	154	165 ^{r,4}	187 ⁴
Fuel briquets:					
Of anthracite and bituminous coal do.	146	140 ^e	124	114	102
Of lignite including dust and dried do.	1,819	1,740	1,365	1,466 ^r	1,435
Gas:					
Manufactured: ^c					
Blast furnace million cubic meters	4,000	4,000	3,000	3,000	3,000
Coke oven do.	2,000	2,000	1,000	952 ^{r,4}	974 ⁴
Total do.	6,000	6,000	4,000	3,952 ^{r,4}	4,000 ⁵
Natural:					
Gross do.	21,576 ^r	21,545 ^r	21,422 ^r	22,091 ^r	20,405
Marketed do.	20,400 ^r	20,400 ^r	20,300 ^r	20,910 ^{r,4}	19,300
Peat:					
Agricultural use thousand cubic meters	9,648	9,722	9,788	8,497	8,500
Fuel use ^c do.	160,000	--	-- ⁴	--	--
Petroleum:					
Crude thousand 42-gallon barrels	22,536 ^r	24,883 ^r	26,732 ^r	27,505 ^r	25,398
Refinery products:					
Liquefied petroleum gas do.	32,688	35,032	34,289	35,450	33,849
Gasoline, including aviation do.	229,101	293,378	308,252	312,764	306,329
Naphtha do.	82,085	82,548	83,229	83,773	83,800 ^e
Mineral jelly and wax do.	1,575	1,554	1,645	1,699	2,070
Kerosene and jet fuel do.	234,461	227,153	246,822	269,312	269,000 ^e
Distillate fuel oil do.	345,637	349,853	351,114	350,411	350,000 ^e
Refinery gas do.	3,269	3,276	3,505	4,196	4,200 ^e
Lubricants do.	10,556	10,675	10,737	10,042	14,588
Nonlubricating oils do.	8,100	7,197	7,348	7,208	7,200 ^e
Residual fuel oil do.	15,756	16,257	12,847	8,527	8,500 ^e
Bitumen and other residues do.	22,592	19,450	21,252	21,337	22,258
Bituminous mixtures do.	1,210	1,100	1,209	1,198	1,200 ^e
Petroleum coke do.	5,819	9,328	9,031	9,984	9,885
Unspecified do.	11,977	9,919	10,920	8,932	8,900 ^e
Total do.	1,004,826	1,066,720	1,102,200	1,124,833	1,121,779

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

¹Table includes data available through January 2006.

²Iron ore is used domestically as an additive in cement and other construction materials but is of too low grade to use in the steel industry.

³Includes spiegeleisen, unspecified crude iron, and blast furnace ferromanganese with 2% or more carbon.

⁴Reported figure.

⁵Rounded to one significant digit.

TABLE 2
GERMANY: STRUCTURE OF THE MINERAL INDUSTRY IN 2004¹

(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	850
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	300
Do.		Aluminium Norf GmbH (Alcan Inc., 50%, and Norsk Hydro ASA, 50%)	Primary rolling mill at Neuss Lippenwerk at Lünen (Secondary)	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 ^e
Do.		Hamburger Aluminium-Werke GmbH (Norsk Hydro ASA, 33.33%, and two other private firms, 33.33% each)	Smelter at Hamburg	130
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		38 companies, of which the major ones are:		
Do.		HeidelbergCement AG	Plants at Blaubeuren-Schelklingen, Leimen, Hassmersheim, Burglengenfeld, Kieffersfelden, and others	9,200 ^e
Do.		Dyckerhoff AG (Buzzi Unicem SpA, 64.6%, and other private, 35.4%)	Plants at Amoneburg, Golheim, Neuwied, Neubeckum, and others	5,600 ^e
Do.		SCHWENK Zement KG	Plants at Allmendingen, Bernberg, Karlstadt, and Mergelstetten	5,000 ^e
Do.		Anneliese Zementwerke AG (HeidelbergCement AG, 100%)	Plants at Ennigerloh, Geseke, and Paderborn	3,500 ^e
Do.		Deuna Zement GmbH (Dyckerhoff AG, 100%)	Plant at Deuna	3,000 ^e
Chalk		Vereinigte Kreidewerke Dammann KG	Quarries on Rügen Island, and plants at Lägerdorf and Söhlde	500
Coal, anthracite and bituminous		Deutsche Steinkohle AG (RAG Aktiengesellschaft, 100%)	About 27 mines, including: 14 mines in Ruhr region	40,000 ^e
Do.		do.	5 mines in Saar basin	14,000 ^e
Do.		do.	Mine at Ibbenbüren	2,500 ^e
Copper		Norddeutsche Affinerie AG (HSH Nordbank AG, 10%; Possehl Beteiligungsverwaltung GmbH, 10%; Dresdner Bank AG, 8%)	Smelter at Hamburg	500
Do.		do.	Refinery at Hamburg	350
Do.		Hüttenwerke Kayser AG (Norddeutsche Affinerie AG, 100%)	Refinery at Lünen	120
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

See footnotes at end of table.

TABLE 2--Continued
GERMANY: STRUCTURE OF THE MINERAL INDUSTRY IN 2004¹

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners ²	Location of main facilities	Annual capacity
Gypsum		VG-ORTH GmbH & Co. KG	Mine and plant at Stadtoldendorf, and plants at Osterode, Spremberg, and Witzhausen	150
Do.		Gyproc GmbH Baustoff Production & Co. KG	Mines and plant in Lower Saxony	110
Kaolin		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 Grevnbrück	3,000
Magnesium	metric tons	Norsk Hydro Magnesiumgesellschaft GmbH	Recycling plant at Bottrop	26
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
Do.	do.	Other companies	Plants at Duste, Rutenbrock, and others	2,000
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 ^c
Do.	do.	Wintershall AG (BASF AG, 100%)	Weser-Ems Rivers	21,000 ^c
Do.	do.	Deutsche Texaco AG	Elbe-Weser Rivers	20,000 ^c
Refined		The largest companies were:	About 20 refineries, including:	
Do.	do.	Deutsche Shell AG	Refineries at Godorf, Hamburg, and Grasbrook	256,000 ^c
Do.	do.	Esso Deutschland GmbH (ExxonMobil Central Europe Holding GmbH, 100%)	Refineries at Karlsruhe and Ingolstadt	245,000 ^c
Do.	do.	Ruhr Oel GmbH (Petróleos de Venezuela S.A., 50%, and BP Gelsenkirchen GmbH, 50%)	Refinery at Gelsenkirchen	215,500 ^c
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 ^c
Potash, K ₂ O content		K+S Kali GmbH	Mines at Bergmannsseggen-Hugo, Niedersachsen-Riedel, Salzdetfurth, Sigmundshall, Hattorf, Neuhoof-Ellers, Sondershausen, and Wintershall	6,000
Salt (rock)		do.	Mines at Bad Friedrichshall-Kochendorf, Braunschweig-Lüneburg, Heilbronn, Riedel, Stetten, and Wesel (Borth)	15,000

See footnotes at end of table.

TABLE 2--Continued
GERMANY: STRUCTURE OF THE MINERAL INDUSTRY IN 2004¹

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners ²	Location of main facilities	Annual capacity
Steel	About 22 companies, of which the major ones were:		
Do.	ThyssenKrupp Stahl AG	Plants mostly in the Westphalia Region	12,000
Do.	Hüttenwerke Krupp Mannesmann GmbH (Thyssen Krupp Stahl AG, 50%; Vallourec & Mannesmann Tubes SA, 30%; Mannesmannröhren-Werke AG, 20%)	Plant at Duisberg	6,000
Do.	Salzgitter AG	Plants at Peine and Salzgitter	9,000
Do.	Stahlwerke Bremen GmbH (Arcelor S.A., 100%)	Plant at Bremen	4,000
Do.	Saarstahl AG (Montan-Stiftung Saar, 74.9%)	Plants at Völklingen, Burbach, und Neunkirchen	3,000
Zinc	Ruhr-Zink GmbH	Refinery at Datteln	140
Do.	Sudamin MHD GmbH	Smelter at Duisburg	100
Do.	Xstrata plc	Smelter at Nordenham	155 ^e

^eEstimated; estimated data are rounded to no more than three significant digits.

¹Table includes data available through October 2004.

²Many more industrial minerals companies are listed in the Industrial Minerals Directory, 2004.

TABLE 3
GERMANY: EXPORTS OF SELECTED MINERAL COMMODITIES IN 2003¹

(Kilograms unless otherwise specified)

Commodity	Total	Destinations	
		United States	Other (principal)
METALS			
Alkali and alkaline-earth metals:			
Alkali metals	value, thousands	\$12,458	\$716 Switzerland \$6,395; France \$822; unspecified Asia \$3,306.
Alkaline-earth metals		548,270	-- Spain 221,101; United Kingdom 101,601; Netherlands 79,699.
Aluminum:			
Ore and concentrate		26,666,205	-- France 9,629,000; Netherlands 1,819,187; Italy 1,789,687.
Oxides and hydroxides	metric tons	780,300	48,669 Italy 133,688; Netherlands 121,282; United Kingdom 108,686.
Ash and residue containing aluminum		23,307,446	-- Austria 7,508,699; Norway 7,356,500; Spain 5,146,800.
Metal, including alloys:			
Scrap	metric tons	556,405	72 Italy 123,872; Austria 101,597; Netherlands 82,001.
Unwrought	do.	389,343	396 Austria 114,476; France 58,781; Italy 41,182.
Semimanufactures:			
Powders and flakes		14,552,711	550,288 Austria 1,957,074; Italy 1,675,875; Sierra Leone 1,164,625.
Rods, bars, profiles	metric tons	185,389	3,486 Austria 25,295; France 21,866; Netherlands 13,277.
Wire		10,028,730	13,687 Austria 2,421,163; United Kingdom 1,103,101; Italy 824,421.
Plates, sheets, strips	metric tons	947,103	61,487 United Kingdom 126,356; Italy 121,371; France 82,871.
Foil	do.	294,000	26,935 Switzerland 38,758; France 35,151; Netherlands 26,935.
Tubes and pipes		24,480,558	2,285,773 Czech Republic 3,897,124; France 2,462,250; Spain 2,081,187.
Tube or pipe fittings		20,089	-- Macedonia 13,750; Cyprus 5,500; Albania 742.
Antimony:			
Ore and concentrate	value	\$8,000	-- All to Switzerland.
Oxides		682,809	15,812 Switzerland 195,101; Austria 125,398; Poland 53,101.
Metal, including alloys, all forms		29,917	500 Austria 12,000; Belgium 5,065; Sweden 3,375.
Arsenic, metal, including alloys, all forms		8,515	2,812 Japan 2,000; China 1,687; United Kingdom 1,000.
Beryllium, metal, including alloys, all forms	value	\$248,000	\$169,000 Hungary \$34,000; Switzerland \$31,000; United Kingdom \$14,000.
Bismuth, metal, including alloys, all forms		154,594	22,101 Czech Republic 46,601; France 21,101; Netherlands 12,687.
			Switzerland \$11,000; United Kingdom \$7,000; South Africa \$3,000.
Cadmium, metal, including alloys, all forms	value	\$29,000	--
Chromium:			
Ore and concentrate		3,666,520	19,500 Austria 714,875; France 697,812; Czech Republic 452,125.
Metal, including alloys, all forms		2,095,906	46,913 Netherlands 1,001,687; France 149,000; Belgium 109,897.
Cobalt:			
Oxides and hydroxides		151,464	3,000 France 66,199; Spain 17,601; Czech Republic 13,187.
Metal, including alloys, all forms		1,120,212	125,472 United Kingdom 189,198; France 155,999; Sweden 143,198.
Columbium (niobium) and tantalum, metal, including alloys, all forms, tantalum		324,172	3,687 Czech Republic 12,375; Portugal 2,500; unspecified 303,025.
Copper:			
Ore and concentrate		48,673,545	-- Sweden 44,745,398; Canada 3,549,375; Slovakia 183,601.
Matte and speiss, including cement copper		899,187	-- Canada 896,500; Sudan 2,687.
Oxides and hydroxides		3,955,804	4,312 United Kingdom 1,032,000; China 463,875; Netherlands 436,687.
Sulfate		2,159,877	20,398 France 532,312; United Kingdom 412,187; Denmark 279,187.
Ash and residue containing copper		11,772,758	-- Belgium 6,703,898; Slovakia 2,299,687; Austria 1,565,187.
Metal, including alloys:			
Scrap	metric tons	363,762	5,981 China 100,749; Netherlands 73,736; Belgium 38,163.
Unwrought	do.	140,580	8,741 France 40,501; Italy 21,690; Austria 10,954.
Semimanufactures:			
Powders and flakes		8,441,750	588,124 Italy 1,570,726; France 1,120,699; Austria 522,886.
Rods, bars, profiles	metric tons	117,199	4,526 France 17,336; Italy 15,795; United Kingdom 11,255.
Wire	do.	288,289	3,576 Italy 46,168; Austria 36,049; Netherlands 35,343.
Plates, sheets, strips	do.	287,465	28,491 Italy 37,870; United Kingdom 36,701; France 32,403.
Foil		20,525,041	363,674 Austria 2,376,824; Singapore 1,591,874; Italy 1,525,139.
Tubes and pipes	metric tons	145,549	9,539 Italy 23,000; France 18,916; United Kingdom 16,003.
Tube or pipe fittings		22,674,404	992,437 Poland 4,470,625; Italy 2,664,125; Austria 1,814,999.
Germanium, metal, including alloys, all forms		1,180	500 Israel 500; United Kingdom 97; France 37.

See footnotes at end of table.

TABLE 3--Continued
GERMANY: EXPORTS OF SELECTED MINERAL COMMODITIES IN 2003¹

(Kilograms unless otherwise specified)

Commodity	Total	Sources	
		United States	Other (principal)
METALS--Continued			
Gold:			
Waste and sweepings	709,064	1,100	Belgium 622,942; Italy 31,200; Switzerland 29,665.
Metal, including alloys, unwrought and partly wrought	40,056	367	United Kingdom 7,102; France 3,303; unspecified 10,400.
Iron and steel:			
Iron and concentrate:			
Including roasted pyrite	15,866,645	--	Switzerland 8,340,300; Poland 2,691,312; Slovakia 2,130,125.
Excluding roasted pyrite	9,376,045	--	Switzerland 3,032,500; Poland 2,691,312; Slovakia 2,130,125.
Pyrite, roasted	6,490,600	--	Switzerland 5,307,800; Slovenia 240,000; unspecified 885,500.
Metal:			
Scrap	metric tons 6,718,904	118	Luxembourg 1,485,092; Italy 1,179,040; France 1,101,205.
Pig iron, cast iron, related materials	do. 176,642	768	France 80,612; Netherlands 11,296; unspecified 25,344.
Ferrous alloys:			
Ferrosilicon	30,640,266	597	Belgium 5,622,125; Austria 4,379,500; France 4,152,000.
Ferromanganese	8,937,167	--	Austria 3,431,062; France 1,326,687; Switzerland 1,167,562.
Ferromolybdenum	2,054,001	--	Italy 389,375; France 362,375; Austria 319,687.
Ferronickel	94,210	--	France 43,500; India 41,898; Switzerland 6,812.
Ferrosilichromium	1,000	--	All to India.
Ferrosilicomanganese	metric tons 10,306	853	Luxembourg 2,837; France 1,959; Czech Republic 1,248.
Ferrosilicon	60,017,647	576,812	France 19,981,773; Belgium 11,469,101; Austria 6,033,101.
Ferrotungsten and ferrsilicotungsten	267,545	20,000	Austria 126,699; Italy 33,500; Ukraine 20,000.
Ferrotitanium and ferrosilicotitanium	2,477,815	39,800	Sweden 713,000; France 556,312; Italy 309,875.
Ferrovandium	652,628	--	Spain 132,800; Italy 121,601; Sweden 62,601.
Ferriobium	712,870	21,601	Slovakia 206,699; Italy 142,199; United Kingdom 64,199.
Silicon metal	16,142,577	348,687	Italy 5,039,000; Austria 4,546,398; Belgium 1,711,375.
Steel, primary forms	metric tons 2,563,185	288,167	France 759,933; Belgium 320,212; Singapore 193,104.
Semimanufactures:			
Flat-rolled products:			
Of iron or nonalloy steel:			
Not clad, plated, coated	do. 5,764,212	117,514	Italy 881,598; France 706,913; Netherlands 612,788.
Clad, plated, coated	do. 4,195,594	205,383	France 582,281; Spain 379,653; United Kingdom 346,627.
Of alloy steel			
Bars, rods, angles, shapes, sections	do. 5,967,216	192,168	Netherlands 803,993; France 635,021; Italy 603,816.
Rails and accessories	do. 154,027	543	Netherlands 31,990; United Kingdom 25,141; Switzerland 12,109.
Wire	do. 483,957	9,890	France 115,030; Netherlands 54,025; United Kingdom 44,533.
Tubes, pipes, fittings	do. 2,862,572	155,929	France 276,807; Netherlands 254,909; Italy 174,456.
Lead:			
Ore and concentrate	31,512,500	--	China 31,225,500; Czech Republic 287,000.
Oxides	16,999,154	--	France 3,334,874; Czech Republic 3,013,335; Poland 1,835,807.
Metal, including alloys:			
Scrap	15,481,169	--	Netherlands 7,663,300; Belgium 3,749,625; France 2,506,812.
Unwrought	metric tons 129,550	1	Czech Republic 37,210; France 33,142; United Kingdom 24,588.
Semimanufactures	29,366,008	836,972	France 8,498,264; Belgium 4,082,142; Netherlands 3,892,564.
Lithium, oxides and hydroxides	649,633	796	France 171,601; United Kingdom 123,898; Spain 113,898.
Magnesium, metal, including alloys:			
Scrap	metric tons 13,506	--	Czech Republic 6,650; United Kingdom 3,271; Austria 1,811.
Unwrought	591,295	--	Austria 225,300; France 87,101; Spain 67,398.
Semimanufactures	4,274,632	23,500	France 818,312; Belgium 759,101; Austria 653,476.
Manganese:			
Ore and concentrate	1,776,420	--	Belgium 1,551,000; Iran 65,000; France 46,699.
Oxides	2,104,581	57,601	Netherlands 528,585; Algeria 351,625; Italy 339,187.
Metal, including alloys, all forms	10,703,245	242,300	Austria 2,236,312; Luxembourg 837,500; France 677,375.
Mercury	50,762	15,875	Colombia 7,687; Switzerland 6,812; Argentina 3,125.

See footnotes at end of table.

TABLE 3--Continued
GERMANY: EXPORTS OF SELECTED MINERAL COMMODITIES IN 2003¹

(Kilograms unless otherwise specified)

Commodity	Total	Sources	
		United States	Other (principal)
METALS--Continued			
Molybdenum:			
Ore and concentrate:			
Roasted	296	--	All to Spain.
Unroasted	774,578	--	China 718,187; Brazil 23,199; Sweden 19,800.
Metal, including alloys, semimanufactures	1,468,197	12,952	Czech Republic 28,772; Poland 15,175; unspecified 1,306,672.
Nickel:			
Ore and concentrate	10,884,299	--	Canada 10,324,000; Finland 360,625; Netherlands 139,601.
Matte and speiss	1,159	--	Indonesia 699; Poland 261; Switzerland 199.
Oxides and hydroxides	246,132	6,312	Japan 175,398; China 19,699; Ukraine 9,875.
Metal, including alloys:			
Scrap	8,091,347	1,126,000	Netherlands 3,159,375; Sweden 1,950,812; Italy 388,812.
Unwrought	11,248,178	95,499	Austria 5,969,913; Sweden 979,523; unspecified Asia 1,131,124.
Semimanufactures	22,339,901	4,886,703	France 4,283,993; United Kingdom 2,308,058; Austria 2,262,634.
Platinum-group metals:			
Waste and sweepings	806,428	524,900	Belgium 122,600; United Kingdom 94,900; Austria 25,400.
Metal, including alloys, unwrought and partly wrought:			
Palladium	23,992	6,300	Switzerland 6,263; Brazil 2,700; United Kingdom 1,745.
Platinum	29,064	7,100	Switzerland 6,514; United Kingdom 2,231; Japan 2,100.
Rhodium	value, thousands \$36,021	\$5,272	Japan \$10,274; Brazil \$5,455; Hong Kong, China \$4,228.
Iridium, osmium, ruthenium	do. \$9,657	\$1,222	Japan \$2,447; Hong Kong, China \$1,817; Italy \$1,093.
Unspecified	57,801	14,032	Switzerland 13,057; Japan 4,535; United Kingdom 4,170.
Rare-earth metals, including alloys, all forms	value \$170,000	\$46,000	Turkey \$19,000; Austria \$15,000; United Kingdom \$15,000.
Selenium, elemental	898,577	1,125	France 616,812; Philippines 48,699; Canada 33,500.
Silver:			
Ore and concentrate	value \$1,000	--	All to Australia.
Metal, including alloys, unwrought and partly wrought	3,035,315	76,800	Belgium 424,200; Spain 199,256; unspecified 995,500.
Tin, metal, including alloys:			
Scrap	848,788	--	France 555,625; Belgium 157,000; Netherlands 100,601.
Unwrought	1,390,952	2,398	Austria 293,898; Belgium 160,901; Italy 128,698.
Titanium:			
Oxides	63,503,072	11,581,000	China 9,040,101; Belgium 4,332,500; unspecified Asia 8,450,699.
Metal, including alloys:			
Unwrought, waste or scrap, powders	metric tons 1,888	241	Canada 307; Netherlands 254; United Arab Emirates 224.
Semimanufactures	do. 4,819	902	United Kingdom 2,438; Spain 279; unspecified Asia 184.
Tungsten:			
Ore and concentrate	10,327	--	Austria 9,812; Poland 515.
Metal, including alloys:			
Powders (wolfram)	537,687	--	Unspecified 537,687.
Unwrought, bars/rods simply sintered, scrap	25,374	11,375	Brazil 5,500; Switzerland 2,875; Czech Republic 1,125.
Semimanufactures	1,656,716	167,971	Austria 562,812; United Kingdom 358,386; Finland 113,804.
All forms	2,219,777	179,346	Austria 563,108; United Kingdom 358,483; unspecified 537,687.
Vanadium:			
Oxides and hydroxides	102,199	--	Unspecified 102,199.
Metal, including alloys, all forms	483,676	165,898	United Kingdom 179,101; Japan 57,898; France 49,898.
Zinc:			
Ore and concentrate	4,740,749	--	Sweden 3,619,187; Belgium 725,187; United Kingdom 376,375.
Oxides	70,633,812	--	Unspecified 70,633,812.
Blue powder	2,013,858	--	Switzerland 434,875; Austria 347,687; Denmark 284,000.
Ash and residue containing zinc	13,547,325	--	Belgium 6,315,875; Spain 1,932,000; Netherlands 1,780,125.

See footnotes at end of table.

TABLE 3--Continued
GERMANY: EXPORTS OF SELECTED MINERAL COMMODITIES IN 2003¹

(Kilograms unless otherwise specified)

Commodity	Total	Sources	
		United States	Other (principal)
METALS--Continued			
Zinc--Continued:			
Metal, including alloys:			
Scrap	47,414,032	--	Belgium 17,015,300; China 11,075,699; India 6,472,699.
Unwrought metric tons	143,696	8	France 43,757; Austria 35,333; United Kingdom 15,375.
Semimanufactures	61,126,094	8,006,668	Denmark 534,300; China 475,375; unspecified 56,065,699.
Zirconium:			
Ore and concentrate	2,110,942	26,000	France 478,187; Austria 411,500; Switzerland 200,898.
Metal, including alloys:			
Unwrought, waste or scrap, powders	41,471	22,898	Japan 4,625; Chile 1,812; France 1,687.
Semimanufactures	259,518	115,800	France 72,401; Belgium 30,585; Russia 18,398.
All forms	300,989	138,698	France 74,088; Belgium 30,602; Russia 18,415.
Other, ashes and residues	51,180,877	124,699	Belgium 13,652,760; Austria 9,858,987; Norway 7,356,500.
INDUSTRIAL MINERALS			
Abrasives, n.e.s.:			
Natural: Corundum, emery, pumice, etc. do.	130,271	8	Netherlands 68,032; Luxembourg 43,974; Switzerland 6,570.
Artificial:			
Corundum	40,650,271	6,796,898	France 5,255,000; United Kingdom 5,196,398; Austria 3,896,187.
Silicon carbide	24,416,398	--	Unspecified 24,416,398.
Dust and powder of precious and semiprecious stones, including diamond value, millions	\$11	(2)	Austria \$6; United Kingdom \$1; Serbia and Montenegro. ²
Grinding and polishing wheels and stones	35,833,332	2,446,101	France 3,900,319; Switzerland 2,426,760; Italy 2,289,584.
Barite and witherite	32,545,625	--	Switzerland 7,125; unspecified 32,538,500.
Boron materials:			
Crude natural borates	132,796	--	Oman 60,000; Serbia and Montenegro 50,199; Switzerland 8,000.
Oxides and acids	1,379,347	15,500	Czech Republic 215,398; Poland 155,000; Hungary 130,300.
Cement metric tons	4,670,002	196	Netherlands 1,798,777; Austria 566,490; Belgium 511,585.
Chalk	92,878,075	19,199	Belgium 31,055,601; Sweden 19,001,000; Netherlands 16,474,199.
Clays, crude:			
Bentonite	57,237,482	10,625	Switzerland 15,084,699; France 8,774,800; Spain 7,076,500.
Chamotte earth and dinas earth	77,080,276	--	Italy 33,817,101; France 9,594,800; Netherlands 6,120,101.
Fire clay	36,394,129	18,000	Netherlands 19,795,800; Italy 5,323,300; Austria 4,885,699.
Fuller's earth	298,919	174,601	Japan 72,000; Austria 29,601; Denmark 11,625.
Kaolin metric tons	359,926	219	Italy 129,090; Austria 99,209; Netherlands 23,061.
Diamond, natural:			
Gem, not set or strung value, thousands	\$71,656	\$12,746	Israel \$12,561; Switzerland \$9,812; Thailand \$9,339.
Industrial stones value	\$2,049,000	--	Switzerland \$1,470,000; Thailand \$320,000; Poland \$48,000. Austria \$5,984; United Kingdom \$1,131; Serbia and Montenegro \$325.
Dust and powder value, thousands	\$11,474	\$302	\$325.
Diatomite and other infusorial earth	20,036,369	4,125	Switzerland 14,606,601; Austria 2,225,875; Russia 426,125.
Feldspar metric tons	102,472	55	France 53,451; Italy 19,058; Austria 6,395.
Fertilizer materials:			
Crude, n.e.s.	22,307,905	355,000	Switzerland 6,780,199; Netherlands 3,646,125; Austria 3,059,625.
Manufactured:			
Ammonia metric tons	392,646	68,699	France 169,464,886; Norway 82,334,687; Czech Republic 38,763.
Nitrogenous thousand metric tons	1,594	64	United Kingdom 269; Netherlands 127; unspecified 420.
Phosphatic metric tons	71,367	--	Netherlands 34,169; France 18,835; United Kingdom 5,181.
Potassic do.	5,433,963	93,932	Brazil 1,150,779; France 1,123,806; Belgium 715,980.
Unspecified and mixed do.	7,438,785	158,125	France 1,288,631; Brazil 1,150,996; unspecified 1,222,288.
Fluorspar	17,104,587	17,000	Poland 2,778,875; Hungary 2,687,625; Sweden 2,179,562.
Graphite, natural	11,746,253	139,601	France 3,338,562; Czech Republic 1,200,800; Austria 997,987.
Gypsum and plaster metric tons	1,213,135	1,611	Belgium 231,120; Netherlands 220,228; Poland 114,751.
Iodine	587,305	--	Spain 498,625; India 31,601; Ukraine 23,699.

See footnotes at end of table.

TABLE 3--Continued
GERMANY: EXPORTS OF SELECTED MINERAL COMMODITIES IN 2003¹

(Kilograms unless otherwise specified)

Commodity	Total	Destinations	
		United States	Other (principal)
INDUSTRIAL MINERALS--Continued			
Kyanite and related materials:			
Andalusite, kyanite, sillimanite	2,469,882	--	Hungary 677,000; Poland 334,125; Belgium 276,687.
Mullite	9,943,570	1,099,812	United Kingdom 2,379,125; Hungary 1,406,000; Italy 1,363,687.
Unspecified	12,413,452	1,099,812	United Kingdom 2,379,125; Hungary 2,083,000; Italy 1,482,085.
Lime	metric tons 900,264	71	Netherlands 633,351; France 97,800; Belgium 70,269.
Magnesium compounds:			
Magnesite, crude	do. 878	--	Czech Republic 388; Poland 293; United Kingdom 70.
Oxides and hydroxides	45,840,033	165,898	France 16,001,199; Austria 7,072,398; Italy 5,302,898.
Other	metric tons 658,287	11,014	France 184,534; Malaysia 108,624; Belgium 84,610.
Mica:			
Crude, including splittings and waste	2,464,252	24,500	Italy 643,875; Brazil 536,500; Austria 361,375.
Worked, including agglomerated splittings	654,173	7,187	France 154,824; Italy 113,125; Czech Republic 112,601.
Nitrates, crude	19,137,101	--	Unspecified 19,137,101.
Phosphates, crude	77,328	--	Poland 39,672; Uzbekistan 21,199; Russia 11,625.
Phosphorus, elemental	583,634	36,898	Poland 96,000; Japan 54,898; Indonesia 49,601.
Pigments, mineral, iron oxides and hydroxides, processed	metric tons 163,335	--	France 10; Italy 1; unspecified 163,324.
Precious and semiprecious stones other than diamond:			
Natural	value, thousands \$129,393	\$52,729	Switzerland \$17,806; Hong Kong, China \$10,893; Japan \$8,478.
Synthetic	do. \$19,964	\$12,415	Hong Kong, China \$668; Austria \$529; Italy \$476.
Pyrite, unroasted	389,486	3,000	Poland 119,300; France 99,898; Saudi Arabia 40,000.
Quartz crystal, piezoelectric	value \$3,090,000	\$80,000	Switzerland \$968,000; Singapore \$563,000; Slovakia \$491,000.
Salt and brine	metric tons 3,695,084	2,572	Belgium 1,063,140; Netherlands 597,670; Denmark 384,793.
Sodium compounds, n.e.s., natural and/or manufactured:			
Soda ash	do. 457,061	74	Netherlands 31,040; Denmark 28,616; unspecified 298,602.
Sulfate	do. 39,078	8	Czech Republic 11,584; Hungary 7,804; Austria 4,998.
Stone, sand and gravel:			
Dimension stone:			
Crude and partly worked	do. 252,980	388	Switzerland 116,513; Austria 81,281; Netherlands 20,662.
Worked	do. 186,650	6,095	France 41,897; Switzerland 32,366; Austria 27,894.
Dolomite, chiefly refractory-grade	do. 524,469	138	Luxembourg 379,656; Netherlands 71,162; Belgium 31,751.
Gravel and crushed rock	thousand metric tons 12,355	1	Netherlands 8,897; Switzerland 1,146; Belgium 1,034.
Limestone other than dimension	metric tons 101,169	--	Luxembourg 74,644; France 10,039; Netherlands 7,791.
Quartz and quartzite	71,573,577	147,999	Netherlands 49,487,574; Austria 5,447,648; Belgium 2,879,812.
Sand other than metal-bearing	metric tons 9,484,210	836	Netherlands 6,621,700; Belgium 1,898,127; Switzerland 413,306.
Sand and gravel	thousand metric tons 21,839	2	Netherlands 15,519; Belgium 2,932; Switzerland 1,559.
Sulfur:			
Elemental:			
Crude, including native and byproduct	metric tons 897,870	4	Belgium 145,484; Morocco 132,218; France 89,217.
Colloidal, precipitated, sublimed	4,020,820	3,125	Belgium 2,885,500; Denmark 519,687; France 230,800.
Dioxide	27,988,942	--	Austria 15,319,500; Spain 4,750,101; Netherlands 2,218,812.
Sulfuric acid	metric tons 1,007,523	87,067	Belgium 419,748; Norway 94,973; United Kingdom 71,343.
Talc, steatite, soapstone, pyrophyllite	5,284,598	47,574	Netherlands 1,055,875; Belgium 629,625; France 571,312.
Vermiculite, perlite, chlorite	1,619,069	--	Belgium 517,875; Poland 317,812; Luxembourg 130,800.
Other, slag and dross, not metal-bearing	metric tons 2,679,240	2,704	France 1,168,384; Netherlands 779,771; Belgium 219,979.
MINERAL FUELS AND RELATED MATERIALS			
Asphalt and bitumen, natural	metric tons 6,557	--	Denmark 5,348; Switzerland 537; Hong Kong, China 220.
Carbon black	do. 118,956	2,982	France 29,160; Belgium 12,221; Italy 9,697.
Coal:			
Briquets of anthracite and bituminous coal	47,724,497	--	France 41,951,101; Belgium 4,242,699; Switzerland 587,625.
Lignite, including briquets	metric tons 180,232	--	Austria 70,593; Belgium 49,408; France 17,394.
All grades, including briquets	do. 410,189	--	France 130,231; Belgium 117,976; Austria 94,629.

See footnotes at end of table.

TABLE 3--Continued
GERMANY: EXPORTS OF SELECTED MINERAL COMMODITIES IN 2003¹

(Kilograms unless otherwise specified)

Commodity	Total	Destinations		
		United States	Other (principal)	
MINERAL FUELS AND RELATED MATERIALS--Continued				
Coke and semicoke	metric tons	114,732	244	Austria 29,460; Netherlands 20,384; France 17,644.
Peat, including briquets and litter	do.	2,094,828	410	Netherlands 986,293; Italy 236,192; France 234,102.
Petroleum:				
Crude	do.	1,741,471	78,828	United Kingdom 1,584,482; France 77,505; Belgium 650.
Refinery products:				
Liquefied petroleum gas	do.	817,909	5,327	Poland 170,092; Netherlands 156,419; Belgium 136,093.
Mineral jelly and wax	do.	225,399	31	Netherlands 24,253; France 20,257; Poland 19,198.
Asphalt	do.	806,749	--	Austria 129,734; Czech Republic 120,478; France 117,851.
Bitumen and other residues		33,351,737	--	France 7,302,300; Poland 7,197,300; Austria 4,898,601.
Bituminous mixtures	metric tons	78,718	103	Luxembourg 21,207; Netherlands 13,333; France 11,193.
Petroleum coke	do.	651,701	982	Netherlands 333,024; France 106,237; Slovakia 50,522.
Unspecified	thousand metric tons	17,749	2,405	Austria 3,120; Switzerland 1,732; United Kingdom 1,725.
Uranium, metal, including alloys, all forms		156,000	100	Netherlands 119,100; United Kingdom 36,600; Canada 200.

¹Source: United Nations Statistics Division, Commodity Trade Statistics Database (COMTRADE), available at URL <http://unstats.un.org/unsd/comtrade/dqBasicQueryResults>.

²Less than 1/2 unit.

TABLE 4
GERMANY: IMPORTS OF SELECTED MINERAL COMMODITIES IN 2003¹

(Kilograms unless otherwise specified)

Commodity	Total	Destinations	
		United States	Other (principal)
METALS			
Alkali and alkaline-earth metals:			
Alkali metals	4,952,148	637,937	France 4,290,699; Italy 4,000; Japan 3,687.
Alkaline-earth metals	1,163,730	27,500	Russia 1,163,730; Netherlands 146,699; France 123,800.
Aluminum:			
Ore and concentrate	metric tons 1,907,966	288	Guinea 1,622,200; Greece 91,184; Australia 67,359.
Oxides and hydroxides	do. 1,273,905	6,730	Jamaica 467,948; Ireland 435,842; Greece 97,788.
Ash and residue containing aluminum	87,106,394	--	Netherlands 17,018,398; France 16,321,398; Denmark 13,029,601.
Metal, including alloys:			
Scrap	metric tons 462,320	422	Netherlands 74,393; Russia 64,679; Austria 61,398.
Unwrought	do. 1,895,615	421	Norway 404,203; United Kingdom 285,629; Netherlands 220,396.
Semimanufactures:			
Powders and flakes	24,912,276	2,681,000	Russia 9,224,000; Austria 4,379,101; France 3,863,824.
Rods, bars, profiles	metric tons 275,033	335	Austria 41,546; Hungary 29,171; Italy 28,624.
Wire	do. 117,598	559	Russia 61,949; Belgium 13,783; France 13,715.
Plates, sheets, strips	do. 442,402	3,717	France 73,625; Switzerland 48,202; United Kingdom 41,540.
Foil	do. 140,776	592	Switzerland 26,335; Italy 17,434; Austria 13,107.
Tubes and pipes	do. 43,416	276	Belgium 6,489; Denmark 5,863; Czech Republic 4,622.
Tube or pipe fittings	50,937	2,687	Italy 34,476; Netherlands 2,375; United Kingdom 1,625.
Antimony:			
Oxides	6,707,243	29,000	China 2,789,625; Belgium 2,171,312; France 1,136,125.
Metal, including alloys, all forms	149,389	1,909	China 78,601; Russia 51,101; United Kingdom 6,784.
Arsenic, metal, including alloys, all forms	value \$65,000	\$2,000	Japan \$54,000; China \$5,000; France \$2,000.
Beryllium, metal, including alloys, all forms	do. \$1,182,000	\$934,000	United Kingdom \$134,000; Belarus \$65,000; France \$16,000.
Bismuth, metal, including alloys, all forms	1,688,534	74,699	United Kingdom 1,152,375; Mexico 331,875; Peru 74,398.
Cadmium, metal, including alloys, all forms	value \$152,000	\$46,000	United Kingdom \$56,000; France \$19,000; Canada \$9,000.
Chromium:			
Ore and concentrate	metric tons 126,278	--	South Africa 90,525; Turkey 31,503; Netherlands 3,420.
Oxides and hydroxides	do. 8,367	271	United Kingdom 3,144; Kazakhstan 2,836; South Africa 1,320.
Metal, including alloys, all forms	4,066,944	88,901	Russia 1,582,675; Netherlands 1,020,140; France 595,187.
Cobalt:			
Oxides and hydroxides	438,972	2,375	Finland 205,601; Belgium 63,898; Canada 53,101.
Metal, including alloys, all forms	2,568,958	340,073	Belgium 391,862; United Kingdom 280,773; Russia 220,284.
Columbium (niobium) and tantalum, metal, including alloys, all forms, tantalum			
	239,390	63,612	Japan 117,351; United Kingdom 13,241; China 12,000.
Copper:			
Ore and concentrate	metric tons 880,332	--	Chile 266,929; Argentina 126,793; Portugal 126,416.
Matte and speiss, including cement copper	33,896,548	5,125	Brazil 20,670,601; Iran 10,092,199; Morocco 2,045,312.
Oxides and hydroxides	1,162,797	178,101	Poland 240,300; Belgium 203,000; Singapore 202,000.
Sulfate	11,133,615	2,687	Poland 2,763,187; Russia 2,598,500; Uzbekistan 2,039,000.
Ash and residue containing copper	53,983,481	4,524,699	Italy 13,701,101; Chile 9,061,800; Netherlands 5,567,398.
Metal, including alloys:			
Scrap	metric tons 379,726	7,774	Netherlands 42,224; France 40,956; United Kingdom 39,111.
Unwrought	do. 572,324	5,630	Russia 163,346; Chile 120,936; Poland 114,047.
Semimanufactures:			
Powders and flakes	5,237,889	210,898	Russia 2,941,375; United Kingdom 644,511; unspecified 566,625.
Rods, bars, profiles	74,382,413	344,875	Italy 13,050,198; France 10,734,425; Netherlands 9,995,596.
Wire	metric tons 203,258	84	France 90,066; Belgium 52,281; Sweden 24,006.
Plates, sheets, strips	53,302,370	1,414,560	Italy 10,702,435; Belgium 8,755,549; Finland 5,041,023.
Foil	9,096,768	412,671	Italy 1,112,875; France 974,386; unspecified Asia 2,208,853.
Tubes and pipes	34,837,782	47,874	Austria 6,416,487; Belgium 5,223,975; Greece 4,557,199.
Tube or pipe fittings	17,913,193	52,097	Italy 4,870,101; Poland 2,758,788; Belgium 1,853,726.
Germanium, metal, including alloys, all forms	1,626	51	China 1,125; Spain 199; United Kingdom 97.

See footnotes at end of table.

TABLE 4--Continued
GERMANY: IMPORTS OF SELECTED MINERAL COMMODITIES IN 2003¹

(Kilograms unless otherwise specified)

Commodity	Total	Sources	
		United States	Other (principal)
METALS--Continued			
Gold:			
Waste and sweepings	1,422,785	237,200	Australia 264,200; United Kingdom 246,872; Austria 175,900.
Metal, including alloys, unwrought and partly wrought	41,705	846	Switzerland 9,505; Belgium 6,800; Sweden 6,002.
Iron and steel:			
Iron and concentrate:			
Including roasted pyrite	metric tons 33,932,415	4,836	Brazil 17,989,960; Canada 4,636,332; Sweden 4,379,854.
Excluding roasted pyrite	do. 33,876,166	4,836	Brazil 17,989,959; Canada 4,636,332; Sweden 4,379,854.
Pyrite, roasted	56,248,986	--	Norway 40,136,800; Australia 15,251,601; Italy 859,687.
Metal:			
Scrap	metric tons 4,364,130	6,720	Netherlands 1,315,422; Poland 794,135; Czech Republic 503,215.
Pig iron, cast iron, related materials	do. 408,691	870	Trinidad and Tobago 67,463; Netherlands 66,952; Russia 46,768.
Ferrous alloys:			
Ferrosilicon	do. 478,204	2,908	South Africa 341,026; Kazakhstan 38,523; Zimbabwe 29,475.
Ferromanganese	do. 178,918	--	France 178,918; Spain 64,816; South Africa 34,140.
Ferromolybdenum	do. 10,369	94	Belgium 2,790; United Kingdom 2,331; Armenia 1,614.
Ferronickel	82,617,845	--	Venezuela 34,609,699; Greece 20,041,101; Indonesia 16,028,398.
Ferrosilichromium	8,354,000	--	Russia 1,128,000; Netherlands 283,625; unspecified 1,238,875.
Ferrosilicomanganese	metric tons 144,637	--	Norway 39,733; South Africa 26,650; Ukraine 22,389.
Ferrosilicon	do. 231,350	42	Poland 58,688; Norway 57,678; France 26,596.
Ferrotungsten and ferrosilicotungsten	486,596	--	China 386,375; North Korea 50,000; Netherlands 33,101.
Ferrotitanium and ferrosilicotitanium	metric tons 8,862	20	Russia 3,596; United Kingdom 2,429; Netherlands 1,073.
Ferrovandium	do. 5,471	--	Austria 2,691; Czech Republic 1,087; Luxembourg 351.
Ferriobium	3,196,850	--	Brazil 2,417,625; Canada 489,875; Netherlands 127,500.
Silicon metal	metric tons 119,747	386	Norway 48,612; Brazil 36,027; Canada 14,493.
Steel, primary forms	do. 1,306,240	134	Poland 435,577; Netherlands 173,488; France 120,454.
Semimanufactures:			
Flat-rolled products:			
Of iron or nonalloy steel:			
Not clad, plated, coated	do. 4,663,146	588	Belgium 809,683; Netherlands 660,573; Austria 474,882.
Clad, plated, coated	do. 3,186,584	1,251	Belgium 949,271; Austria 658,646; France 495,781.
Of alloy steel			
Bars, rods, angles, shapes, sections	do. 4,878,406	10,805	France 862,520; Italy 652,460; Poland 516,300.
Rails and accessories	do. 286,145	8	Austria 100,542; Poland 68,633; Czech Republic 54,906.
Wire	do. 578,036	1,472	France 87,888; Czech Republic 83,447; Belgium 80,751.
Tubes, pipes, fittings	do. 1,806,760	3,598	Italy 379,591; France 147,624; Austria 132,890.
Lead:			
Ore and concentrate	do. 193,156	1,590	Australia 42,438; Sweden 33,528; Poland 30,194.
Oxides	9,473,736	2,429	France 7,309,398; Netherlands 1,080,187; Poland 900,375.
Metal, including alloys:			
Scrap	metric tons 9,075	136	Czech Republic 2,756; Lithuania 1,850; Poland 1,218.
Unwrought	do. 159,874	1,101	Poland 37,747; United Kingdom 35,388; Sweden 25,230.
Semimanufactures	7,752,736	19,421	Belgium 5,240,495; Luxembourg 984,000; Sweden 739,987.
Lithium, oxides and hydroxides	4,405,307	664,375	Switzerland 3,193,187; Russia 308,125; Belgium 175,699.
Magnesium, metal, including alloys:			
Scrap	3,026,096	7,187	Switzerland 1,152,687; China 840,000; Italy 205,601.
Unwrought	18,787,587	20,000	China 14,200,898; Israel 1,202,187; Canada 889,125.
Semimanufactures	16,636,769	323,100	China 9,341,300; Russia 2,518,124; Austria 1,877,812.
Manganese:			
Ore and concentrate	6,917,448	182,699	Netherlands 2,647,000; Belgium 1,082,875; Morocco 1,060,000.
Oxides	7,009,143	212,199	Greece 2,080,000; Netherlands 1,433,999; South Africa 732,375.
Metal, including alloys, all forms	21,229,480	25,800	China 11,982,601; Ukraine 4,361,500; Russia 2,104,000.
Mercury	41,810	5,375	Czech Republic 12,312; Spain 10,000; Peru 6,875.

See footnotes at end of table.

TABLE 4--Continued
GERMANY: IMPORTS OF SELECTED MINERAL COMMODITIES IN 2003¹

(Kilograms unless otherwise specified)

Commodity	Total	Sources	
		United States	Other (principal)
METALS--Continued			
Molybdenum:			
Ore and concentrate:			
Roasted	1,517,401	--	Chile 420,000; Netherlands 381,500; China 239,300.
Unroasted	650,721	595,875	Canada 54,199; Japan 367; China 183.
Oxides and hydroxides	545,693	238	Uzbekistan 232,398; Chile 116,601; China 80,000.
Metal, including alloys:			
Scrap and unwrought	343,604	5,250	China 194,500; United Kingdom 47,300; Austria 29,699.
Semimanufactures	1,535,856	79,135	Austria 816,913; China 199,381; Armenia 162,498.
Nickel:			
Matte and speiss	4,030,104	500	Netherlands 3,980,625; Russia 24,800; Austria 12,125.
Oxides and hydroxides	563,148	97	Czech Republic 221,398; Canada 157,000; Japan 63,398.
Metal, including alloys:			
Scrap	metric tons 10,889	513	Netherlands 1,964; Austria 1,670; United Kingdom 1,270.
Unwrought	do. 74,503	313	Russia 32,651; United Kingdom 14,558; Norway 6,326.
Semimanufactures	13,291,664	1,492,579	Austria 5,028,140; France 2,927,761; Sweden 931,397.
Platinum-group metals:			
Waste and sweepings	3,840,881	300,900	United Kingdom 451,300; France 424,900; Netherlands 351,000.
Metal, including alloys, unwrought and partly wrought:			
Palladium	32,406	4,600	United Kingdom 7,938; South Africa 7,000; Russia 4,000.
Platinum	45,774	11,000	South Africa 16,800; United Kingdom 5,600; Sweden 3,910.
Rhodium	value, thousands \$59,938	\$9,056	South Africa \$20,218; United Kingdom \$16,789; Russia \$5,768.
Iridium, osmium, ruthenium	3,379	500	South Africa 2,100; Russia 300; United Kingdom 220.
Unspecified	84,737	16,401	South Africa 27,000; United Kingdom 16,401; Russia 7,000.
Rare-earth metals, including alloys, all forms	366,497	398	China 250,199; Austria 80,500; Japan 7,312.
Selenium, elemental	215,454	296	Russia 71,500; Sweden 49,199; Poland 39,000.
Silicon, high-purity	1,075,354	449,625	United Kingdom 205,199; Japan 182,300; Russia 129,500.
Silver, metal, including alloys, unwrought and partly wrought	2,816,072	55,100	Poland 390,097; Canada 366,700; unspecified 546,800.
Tin, metal, including alloys:			
Scrap	505,253	2,687	France 267,812; Austria 41,699; Czech Republic 38,199.
Unwrought	21,287,424	6,210	China 5,943,300; Peru 5,083,300; Indonesia 4,351,500.
Titanium:			
Oxides	16,767,672	21,699	France 4,674,199; Canada 2,556,000; China 1,893,812.
Metal, including alloys:			
Unwrought, waste or scrap, powders	metric tons 5,633	21	United Kingdom 367; Belgium 240; unspecified 4,664.
Semimanufactures	4,414,600	424,499	Italy 656,875; Russia 576,574; Japan 530,125.
Tungsten:			
Ore and concentrate	195,094	--	Nigeria 62,601; Thailand 61,300; Vietnam 21,000.
Metal, including alloys:			
Powders (wolfram)	1,423,145	62,300	Austria 612,187; Canada 484,187; Luxembourg 64,000.
Unwrought, bars/rods simply sintered, scrap	219,105	103,199	China 48,398; Austria 25,601; Italy 20,800.
Semimanufactures	3,237,428	877,710	United Kingdom 783,929; India 277,820; Japan 181,545.
All forms	4,879,678	1,043,209	United Kingdom 794,327; Austria 789,087; Canada 484,491.
Vanadium:			
Oxides and hydroxides	802,397	--	South Africa 620,000; China 80,101; United Kingdom 44,000.
Metal, including alloys, all forms	105,744	13,000	South Africa 75,300; Russia 8,625; United Kingdom 8,625.
Zinc:			
Ore and concentrate	metric tons 340,244	52,300	Belgium 113,569; Ireland 54,536; Australia 50,066.
Oxides	28,292,225	481,500	Poland 7,030,500; Austria 6,125,898; Netherlands 5,665,300.
Blue powder	7,963,539	--	Belgium 5,550,398; Norway 1,502,812; United Kingdom 708,812.
Ash and residue containing zinc	32,997,041	323,312	Netherlands 7,104,112; Poland 4,386,250; Belgium 4,286,698.

See footnotes at end of table.

TABLE 4--Continued
GERMANY: IMPORTS OF SELECTED MINERAL COMMODITIES IN 2003¹

(Kilograms unless otherwise specified)

Commodity	Total	Sources	
		United States	Other (principal)
METALS--Continued			
Zinc--Continued:			
Metal, including alloys:			
Scrap	26,648,967	143,699	France 9,808,101; Netherlands 5,087,101; Belgium 3,090,000.
Unwrought metric tons	354,066	(2)	Belgium 76,455; Spain 67,839; Finland 65,166.
Semimanufactures	44,645,134	42,203,317	France 7,370,495; Italy 6,727,985; Slovenia 6,435,487.
Zirconium:			
Ore and concentrate metric tons	50,088	13,419	Australia 19,789; South Africa 13,542; Belgium 1,674.
Metal, including alloys:			
Unwrought, waste or scrap, powders	195,277	2,687	Netherlands 175,000; France 9,625; China 4,687.
Semimanufactures	439,337	114,898	France 275,499; Sweden 10,125; Belgium 9,011.
All forms	634,614	117,585	France 285,124; Netherlands 175,152; Sweden 10,824.
Other, ashes and residues metric tons	236,964	5,793	Netherlands 36,282; France 20,848; Canada 17,343.
INDUSTRIAL MINERALS			
Abrasives, n.e.s.:			
Natural: Corundum, emery, pumice, etc.	55,339,296	2,541,062	Italy 37,607,687; Iceland 6,364,699; India 5,673,699.
Artificial:			
Corundum metric tons	101,355	1,211	China 26,440; Austria 17,586; Czech Republic 13,052.
Silicon carbide do.	103,435	87	Norway 16,189; Romania 12,896; unspecified 43,525.
Dust and powder of precious and semiprecious stones ex/including diamond value	\$46,687	\$5,668	Ireland \$36,582; Switzerland \$1,326; Belgium \$902.
Grinding and polishing wheels and stones	20,442,676	174,701	China 3,287,499; Poland 2,635,807; Slovenia 2,253,119.
Asbestos, crude	58,898	--	All from Canada.
Barite and witherite metric tons	218,811	199	China 100,282; France 40,298; Bulgaria 26,700.
Boron materials:			
Crude natural borates	9,835,607	21,636	Turkey 4,767,500; Belgium 3,435,437; Netherlands 823,500.
Oxides and acids	22,693,392	9,702,000	Turkey 7,260,199; Chile 2,584,500; Russia 1,735,500.
Cement metric tons	1,509,386	11	Belgium 437,042; Czech Republic 359,748; France 255,976.
Chalk do.	199,039	15	Netherlands 84,585; France 74,867; Belgium 26,882.
Clays, crude:			
Bentonite do.	253,998	1,237	Netherlands 121,880; Czech Republic 38,090; Italy 27,874.
Chamotte earth and dinas earth do.	66,051	30,876	Czech Republic 24,833; France 4,305; Netherlands 3,661.
Fire clay	25,111,078	125,500	Czech Republic 11,393,000; China 3,774,500; France 2,944,125.
Fuller's earth	8,482,986	1,818,000	Spain 4,535,500; Netherlands 1,532,500; Italy 318,000.
Kaolin thousand metric tons	772	187	Czech Republic 202; United Kingdom 148; Netherlands 124.
Diamond, natural:			
Gem, not set or strung value, thousands	\$185,117	\$4,072	India \$36,229; Israel \$35,119; Switzerland \$24,425.
Industrial stones do.	\$5,657	\$959	Belgium \$1,075; Switzerland \$976; South Africa \$739.
Dust and powder do.	\$46,687	\$5,668	Switzerland \$1,326; Belgium \$902; United Kingdom \$526.
Diatomite and other infusorial earth	43,408,628	11,272,800	Denmark 13,241,398; France 12,139,699; Mexico 2,405,875.
Feldspar	50,809,232	2,500	Norway 20,665,800; France 11,459,199; Austria 9,505,898.
Fertilizer materials:			
Crude, n.e.s.	33,559,930	120,000	Netherlands 23,941,101; Belgium 3,980,187; Austria 3,508,812.
Manufactured:			
Ammonia metric tons	379,318	1	Netherlands 201,930; Poland 74,713; Russia 47,914.
Nitrogenous do.	3,486,438	96	Netherlands 1,165,988; Poland 439,018; Austria 398,615.
Phosphatic do.	181,736	--	Netherlands 77,858; Russia 55,096; Morocco 16,562.
Potassic	91,407,469	617,648	Israel 36,022,898; Netherlands 26,900,499; France 17,181,800.
Unspecified and mixed metric tons	5,468,128	4,656	Netherlands 1,553,345; Belgium 695,734; Poland 649,311.
Fluorspar do.	234,074	--	China 71,271; South Africa 67,715; Namibia 63,879.
Graphite, natural	41,163,860	1,807,011	China 21,473,112; Madagascar 2,733,625; unspecified 21,473,112.
Gypsum and plaster metric tons	191,501	1,548	France 108,246; Austria 34,110; Netherlands 28,204.
Iodine	1,318,364	648,312	Japan 323,187; Chile 158,500; Belgium 150,398.

See footnotes at end of table.

TABLE 4--Continued
GERMANY: IMPORTS OF SELECTED MINERAL COMMODITIES IN 2003¹

(Kilograms unless otherwise specified)

Commodity	Total	Destinations	
		United States	Other (principal)
INDUSTRIAL MINERALS--Continued			
Kyanite and related materials:			
Andalusite, kyanite, sillimanite	56,512,900	2,715,500	Belgium 15,680,800; South Africa 13,792,101; France 13,223,199.
Mullite	metric tons 7,089	1,483	Hungary 1,787; Luxembourg 1,117; United Kingdom 952.
Unspecified	63,601,648	4,198,625	Belgium 15,680,800; South Africa 13,792,101; France 13,260,398.
Lime	metric tons 393,864	325	France 140,874; Czech Republic 129,938; Belgium 57,936.
Magnesium compounds:			
Magnesite, crude	7,723,975	97	Austria 3,623,187; Spain 1,936,687; Netherlands 1,474,187.
Oxides and hydroxides	metric tons 348,046	2,908	China 122,057,812; Netherlands 85,824,125; Slovakia 47,781,000.
Other	243,300	--	France 131,699; Netherlands 111,601.
Mica:			
Crude, including splittings and waste	26,050,888	1,190,187	India 9,970,875; France 8,338,398; Austria 1,911,125.
Worked, including agglomerated splittings	1,331,333	7,812	Switzerland 586,125; China 256,300; Belgium 238,788.
Nitrates, crude	5,021,522	--	Poland 1,261,687; Belgium 1,006,375; Chile 935,375.
Phosphates, crude	metric tons 120,231	1	Israel 96,348; Belgium 19,483; Russia 2,927.
Phosphorus, elemental	39,222,422	5,375	Netherlands 20,154,699; Kazakhstan 11,477,898; China 6,109,101.
Pigments, mineral, iron oxides and hydroxides, processed	32,467,584	756,125	China 17,459,499; Italy 7,203,000; France 1,227,875.
Precious and semiprecious stones other than diamond:			
Natural	value, thousands \$63,452	\$5,828	Thailand \$12,023; Brazil \$10,355; Hong Kong, China \$5,788.
Synthetic	do. \$14,791	\$1,265	Austria \$3,446; Switzerland \$2,985; Japan \$2,099.
Pyrite, unroasted	42,170,112	--	Finland 40,436,300; Italy 1,394,312; Austria 319,000.
Quartz crystal, piezoelectric	value \$9,233,000	\$5,802,000	Japan \$910,000; Czech Republic \$671,000; Russia \$423,000.
Salt and brine	metric tons 2,366,521	621	Netherlands 2,005,543; United Kingdom 96,886; Poland 86,159.
Sodium compounds, n.e.s., natural and/or manufactured:			
Soda ash	do. 325,201	1,246	France 98,071; Poland 93,105; Netherlands 78,280.
Sulfate	85,169,070	1,187	Spain 28,340,500; Austria 19,474,300; Belgium 18,344,000.
Stone, sand and gravel:			
Dimension stone:			
Crude and partly worked	metric tons 389,816	79	Poland 74,452; Norway 70,686; Austria 40,455.
Worked	do. 1,584,285	227	China 433,572; Poland 231,091; Italy 217,375.
Dolomite, chiefly refractory-grade	do. 645,348	6,180	Estonia 244,321; Belgium 167,850; Denmark 93,611.
Gravel and crushed rock	do. 10,623,867	48	Norway 4,887,427; France 1,886,722; United Kingdom 1,053,838.
Limestone other than dimension	do. 2,408,854	478	Poland 1,643,235; Austria 445,765; Sweden 191,269.
Quartz and quartzite	76,453,855	523,511	Austria 25,586,350; Belgium 9,373,699; Netherlands 9,353,324.
Sand other than metal-bearing	metric tons 1,822,361	8,997	France 1,085,431; Netherlands 380,128; Belgium 126,704.
Sand and gravel	do. 12,446,228	9,044	Norway 4,887,663; France 2,972,153; United Kingdom 1,055,318.
Sulfur:			
Elemental:			
Crude, including native and byproduct	45,978,721	16,718	Netherlands 19,963,699; France 6,087,699; Belgium 5,151,500.
Colloidal, precipitated, sublimed	1,448,419	23,800	India 1,242,125; France 161,601; Poland 20,500.
Dioxide	6,961,112	50,000	France 4,980,300; Switzerland 908,312; Sweden 907,125.
Sulfuric acid	metric tons 65,891	90	Netherlands 40,990; Belgium 8,269; Switzerland 7,660.
Talc, steatite, soapstone, pyrophyllite	do. 307,374	130	Netherlands 119,307; Austria 54,560; France 47,671.
Vermiculite, perlite, chlorite	do. 64,691	40	Greece 36,146; Hungary 14,902; South Africa 10,782.
Other, slag and dross, not metal-bearing	do. 1,914,527	2,268	Netherlands 1,104,472; France 230,051; Poland 174,913.
MINERAL FUELS AND RELATED MATERIALS			
Asphalt and bitumen, natural	metric tons 21,224	5,440	Netherlands 10,878; Trinidad and Tobago 4,550; Poland 256.
Carbon black	do. 175,542	3,590	France 29,588; Netherlands 27,839; Russia 27,035.
Coal:			
Anthracite	do. 1,143,312	253,869	Russia 268,921; Australia 177,967; Belgium 121,601.
Bituminous	do. 20,599,048	707,390	Poland 6,174,991; South Africa 4,312,782; Colombia 2,145,772.
Briquets of anthracite and bituminous coal	22,277,913	--	Colombia 10,733,000; Poland 5,051,601; Netherlands 4,830,000.

See footnotes at end of table.

TABLE 4--Continued
GERMANY: IMPORTS OF SELECTED MINERAL COMMODITIES IN 2003¹

(Kilograms unless otherwise specified)

Commodity	Total	Destinations		
		United States	Other (principal)	
MINERAL FUELS AND RELATED MATERIALS--Continued				
Coal--Continued:				
Lignite, including briquets	metric tons	206,148	36	Czech Republic 167,226; Poland 38,314; Azerbaijan 383.
All grades, including briquets	do.	26,536,716	961,526	Poland 6,888,769; South Africa 6,046,039; Colombia 2,910,361.
Coke and semicoke	do.	6,494,623	398,682	Poland 2,810,790; China 858,461; Spain 514,559.
Gas, natural, gaseous	do.	83,235,529	--	Unspecified 83,235,529.
Peat, including briquets and litter	do.	775,368	--	Estonia 341,151; Latvia 215,083; Lithuania 104,607.
Petroleum:				
Crude	thousand metric tons	107,269	--	Russia 29,238; Norway 21,520; United Kingdom 17,125.
Refinery products:				
Liquefied petroleum gas	metric tons	1,316,296	5,327	Belgium 514,433; Netherlands 440,176; Norway 130,732.
Mineral jelly and wax	do.	346,527	1,386	France 63,049; Netherlands 40,102; unspecified 189,068.
Asphalt	do.	397,550	93	France 121,563; Netherlands 93,547; Belgium 78,437.
Bitumen and other residues		8,864,062	--	Netherlands 5,346,000; France 1,935,187; Belgium 1,582,875.
Bituminous mixtures		11,995,980	555,500	Switzerland 4,588,500; France 2,635,312; Austria 1,306,625.
Petroleum coke	metric tons	837,018	490,960	Belgium 78,406; Argentina 49,166; Netherlands 38,233.
Unspecified	do.	29,683,173	19,331	Netherlands 15,875,013; Russia 3,959,599; Belgium 3,934,582.
Uranium, metal, including alloys, all forms		4,482,032	1,285,800	United Kingdom 1,493,700; Canada 991,800; France 709,900.

¹Source: United Nations Statistics Division, Commodity Trade Statistics Database (COMTRADE), available at URL <http://unstats.un.org/unsd/comtrade/dqBasicQueryResults>.

²Less than 1/2 unit.

