

THE MINERAL INDUSTRY OF

GERMANY

By Harold R. Newman

In 2000, Germany enjoyed the fastest real annual economic growth it had experienced since its reunification. Stronger export demands from outside Western Europe resulting from the world economic recovery, industrial investment, and productivity increases were contributing factors to the economic growth. The gross domestic product (GDP) grew by about 2.8%. Germany's economy remained the largest in Europe, equivalent to slightly more than \$2 trillion, and accounted for more than 25% of the European Union's (EU) economy. Unemployment continued to be a problem and averaged about 9.7% of the labor force. The top priorities of the Government were to maintain economic growth and to continue the development of the five Laenders (States) that make up eastern Germany. These areas were still dependent upon huge net resource transfers from the west via a variety of Federal and State social payments, entitlement and investment grants, and tax waiver incentives for investment and trade (U.S. Embassy, Berlin, Germany, 2001).

Government Policies and Programs

The Government's declared primary objective was to stimulate economic growth and employment and to get a grip on rising government debt. To this end, the Government was pursuing a combination of budget consolidation, growth incentives, and structural reform. Although the state intervenes in the economy through the provision of subsidies to selected sectors and the ownership of some segments of the economy, competition and free enterprise are promoted as significant segments of government policy.

Germany was one of the main supporters of European unification and a strong advocate of closer European economic integration. Its economic and commercial policies were increasingly determined by agreements among EU members. In harmony with the Schengen Agreement, which became effective on March 26, 1995, most of the EU member states, which included Germany, agreed to discontinue border controls. This internal market has provided a boost for Germany's export-oriented economy, as well as for the economies of other European countries.

On April 29, 1998, new energy legislation designed to introduce competition to the traditionally closed electricity and natural gas sectors came into force. The legislation, among other things, abolished utilities-demarked monopoly supply areas and created a framework for third-party access to electricity grids and natural gas pipelines. Lignite (brown coal) mining in Germany will be protected from competition as late as 2005. Germany is the world's largest lignite producer with about one-fifth of global output. Renewable and cogeneration plants are given special significance under the new legislation (U.S. Energy Information Administration, November 2000,

Germany, accessed November 16, 2000, at URL <http://www.eia.doe.gov/emeu/cabs/germany.html>).

In April 1998, Germany's constitutional court cleared the way for German membership in the European Monetary Union (EMU), and on April 23, 1998, Germany's Parliament (the Bundestag) voted to join the European single currency zone. The EMU began the process of creating a single European currency, referred to as the euro (€), by irrevocably setting the exchange rates of individual member states on January 1, 1999. Individual member-states' currencies including the German deutsche mark (DM) are to be phased out by February 28, 2002 (U.S. Energy Information Administration, December 2001, Germany, accessed December 28, 2001, at URL <http://www.eia.doe.gov/emu/cabs/germany.html>).

Environmental Issues

The environment in Germany is the responsibility of the Federal Ministry for the Environment, Water Conservation and Nuclear Safety. Falling within its purview is the Federal Environment Agency in Berlin, the Federal Office for Nature Conservation in Bonn, and the Federal Office for Radiation Protection in Salzgitter.

Environmental concerns that relate to mining are addressed under the Federal mining law and its provisions for environmental impact assessments that must be completed before mining can start. The objective of the assessment is to identify and evaluate all environmental consequences of a planned project by taking into account various design options. The environmental evaluation process in Germany presents a risk for the company involved because, even after completion of the assessment, which usually involves considerable time and resources, project approval is not guaranteed.

Following the reunification of the country, the major task of energy and environmental policy was to merge the radically different systems of the former German Democratic Republic (GDR) and the Federal Republic of Germany (FRG). The FRG had a diversified and mainly privately owned system of energy supply and a commitment to environmental protection. In contrast, the GDR's energy sector was highly centralized, predominantly state-owned, dependent on lignite as its primary fuel, and a major domestic source of air pollution. Lignite mines were either closed or retrofitted with gas-desulfurization equipment (U.S. Energy Information Administration, November 2000, Germany, accessed November 16, 2000, at URL <http://www.eia.doe.gov/emeu/cabs/germe.html>).

Germany's air quality had also suffered owing to the country's geographic proximity to the highly polluting centrally planned economies of the Soviet bloc. Emissions that caused acid rain and damaged forests blew over Germany. With the breakup of the Soviet bloc, this region is now polluting less

owing to stricter emission controls, a downturn in production, and an orientation toward processes that cause less pollution. This has improved Germany's air quality.

Production

The minerals and metals industry, which included industrial processing, construction, and mining, contributed almost 1% to the GDP. Production in the mining and metals industries depended on a variety of factors that included the availability of materials and supply and demand. The easing of the worldwide recession was a positive factor for those industries that depended on exporting their products. The importance of certain sectors of the German mining industry has decreased steadily during the past decades. Notwithstanding the general contraction of the industry, the production levels of certain minerals remain important domestically and on a worldwide scale. Even though its underground mining sector has shrunk significantly in recent years, Germany has remained a world leader in the mining equipment manufacturing sector. The high costs of production in Germany compared with those of competing foreign producers and the problems caused by trying to balance production between the merged GDR and FRG helped constrain production (table 1). The indices of production are listed in table 2.

Trade

Foreign trade was a key element in Germany's economic life with one-third of national output going to external markets. After the United States, Germany had the largest foreign trade volume in the world and was the world's third largest economy. Two-way United States-Germany trade was worth more than \$80 billion in 2000. Outside the EU, the United States and Japan, respectively, were Germany's major trading partners (Bureau of Economic and Business Affairs, 2001).

Germany, a major processing nation, relied mainly on imports to feed the metals processing industry, which transformed raw materials into products that supplied the manufacturing industry and provided the bulk of the country's exported materials. In 2000, German imports of mineral and energy commodities (fuels, metals, nonmetals, precious metals, and precious stones) totaled \$57 billion.¹ Demand for iron ore in 2000 was met by imports of more than 47 million metric tons (Mt). Most of the demand for ferroalloys was met by imports. The nonferrous metallurgical industry provided its raw materials by imports and recycling. Supply of precious metals originated from domestic nonferrous refineries, domestic supply of scrap, and imports of wrought metal and scrap. German consumption of nonferrous metals (aluminum, copper, lead, tin, and zinc) amounted to almost 4 Mt (Bundesanstalt für Geowissenschaften und Rohstoffe, 2000, p. K-4).

With the exception of potash and rock salt, feldspar is the sole industrial mineral for which Germany is independent from imports. In 2000, Germany's import dependence on other industrial minerals was as follows: 35% for kaolin and bentonite and 70% for barite and natural graphite (Bundesanstalt für Geowissenschaften und Rohstoffe, 2000, p. K-5).

¹Where necessary, values have been converted from German deutsche marks (DM) to U.S. dollars (\$) at the rate of DM2.23=US\$1.00.

The restructuring of the German steel industry has resulted in a reduction in steel production capacity. This led to a drop in imported raw materials, especially iron ore and coking coke, which previously represented a large sector of the dry bulk tonnage processed through the country's leading ports. Coupled with this, the planned closure of Germany's loss-making coal mines has been slower than anticipated, postponing the estimated increase in demand for steaming coal imports (Bulk Materials International, 2001).

While 2000 did not see a major growth in coal imports, it did see a big shift in sourcing, with more than 800,000 metric tons (t) more hard coal coming from Australia, more than 400,000 t more from China, more than 300,000 t more coming from Poland, and nearly 230,000 t coming from the Commonwealth of Independent States. Major losers have been coal imports from the South Africa (down by 890,000 t), from Columbia (down by 334,000 t), and from the United States (down by 179,000 t) (International Bulk Journal, 2000).

Structure of the Mineral Industry

The structure of the industry in Germany and the principal companies operating in the production and processing of metals and minerals are listed in table 3. Most of the producing and processing facilities still in operation were small compared with those in the former FRG, except for lignite and potash, both of which were very large operations. The restructuring and privatization of the facilities in the former GDR continued in 2000. The Interest Management Association (Treuhandanstalt) retained control of some of the companies until they were sold or closed.

Commodity Review

Metals

Aluminum.—In 2000, Germany's primary aluminum industry was the largest in the EU, although it was considered to be medium sized when compared with other world producers. VAW Aluminium AG (a member of VIAG Group) accounted for more than 75% of the country's primary aluminum production. VAW's wholly owned aluminum smelters in Germany and its participating interests in smelters abroad ensured the supply of input metal for the company's downstream fabricating operations.

The bidding process was underway for Alcoa Inc.'s stake in Aluminium Oxid Stade GmbH's alumina refinery, and the company was on course to divest its interest by the deadline set by the European Commission (EC). Pechiney Group of France and VAW were the main bidders; however, several chemical companies were reported to be interested and were in the bidding process. The divestment is still subject to an EC investigation into market share for alumina trihydrate (Metal Bulletin, 2000a).

Arsenic.—Metaleurop Handel GmbH increased its production of high-purity arsenic by 50%. High-purity arsenic is used in the production of gallium arsenide, which is a key component in semiconductors as well as in opto-electronics. Metaleurop's high-purity metals sector focuses on the production of arsenic, germanium, and indium for technology

purposes (Metal Bulletin, 2000b).

Copper.—Norddeutsche Affinerie AG (NA) acquired secondary copper producer Hüttenwerke Kayser AG (HK). NA operated a custom smelter and refinery at Hamburg and was the world's fifth largest custom copper smelter with production of about 360,000 metric tons per year (t/yr) of copper cathode, 320,000 t/yr of copper rod, and 176,000 t/yr of copper billets and cake. HK produced about 180,000 t/yr of cathodes from scrap. NA started construction of a new smelter at the Hüttenwerke recycling operation in Luenen that was scheduled to be completed by February 2002. A wider spectrum of materials can be accepted by the new operation (Mining Magazine, 2000).

Magnesium.—A group of secondary aluminum producers made up of Aluminiumschmelzwerk Oetinger GmbH, BAS Brinker Aluminium-Schmelzwerk GmbH, and Hannoversche Salzschlacke-Entsorgungs GmbH was planning to set up a new company, MR Magnesium-Recycling GmbH, that would specialize in recovering magnesium from residues and scraps. The decision to develop proprietary technology and to construct a specialized magnesium plant came as a result of an increase in magnesium alloy scrap received by secondary aluminum companies. Much of the increase resulted from the automobile companies BMW, Mercedes Benz, and Volkswagen changing from aluminum alloy to magnesium alloy for car manufacturing. The group believed that automobile companies would become major consumers of magnesium alloys (Magnesium Monthly Review, 2000).

Steel.—Europe's steel industry may look patchy to some observers, but it is the most consolidated in the world. Usinor Group [24-million-metric-tons-per-year (Mt/yr) capacity], Corus Group (22.9-Mt/yr capacity), Arbed Group (22.4-Mt/yr capacity), Thyssen Krupp Group (18.9-Mt/yr capacity), and the Riva Group (14-Mt/yr capacity) account for more than Mt/yr of raw steel capacity, which is about half of the EU total. Acquisitions and consolidations have created global players without adding to overall capacity (Metal Bulletin Monthly, 2000).

European steelmakers made very few advances in the field of direct-reduced iron (DRI). The lack of interest would appear to be the success of the blast furnace. Though centuries old, the technology encased in the blast furnace has yet to be surpassed. Even after installation costs, depreciation, and high replacement costs, the blast furnace still appears to be the cheapest source of high quality iron units. Ispat International N.V.'s minimill in Hamburg was the only plant making DRI in Western Europe, (Ispat International N.V., [undated], Ispat Hamburger Stahlwerke GmbH, accessed August 30, 2000, at URL <http://www.ispat.co.uk/>).

The parent company of Europe's fourth largest steel producer and the world's largest stainless steelmaker, Thyssen Krupp Group, has abandoned plans to sell its steel division. The company said it would keep steel on as one of its six core operating units. As the unit with the highest turnover, steel would resume its core position in the group along with the automotive, elevators, investment, materials, and services units (Metal Bulletin, 2000d).

Thyssen Krupp Stahl AG (TKS) signed finance contracts for

the construction of a new coke plant at its integrated steelworks in Duisberg. TKS needs the new plant to replace capacity lost at its existing aging coke plant. Under pressure from local residents to reduce emissions, the company closed down its three oldest batteries in 1999, halving production to a level of 1 Mt/yr from the three remaining operational batteries. When the new coke plant comes on-stream, it will produce about 70% of the steelwork's needs. At that point, the three batteries left operating will be closed (Metal Bulletin, 2000e).

Separately, TKS started construction of a new hot-dip galvanizing line at its Dortmund works. Part of an investment program to boost coated sheet production, the 350,000-t/yr-capacity line is scheduled to go into full production in 2001 (Metal Bulletin, 2000f).

Metaleurop S.A. sold its German galvanizing operations, consisting of 13 galvanizing plants, to the Kopf Group. The move was part of Metaleurop's general strategy to focus on its three core businesses; lead, precious metals, and zinc. The sale made Kopf one of Europe's leaders in galvanizing (Metal Bulletin, 2000c).

Preussag Stahl AG was a steel producer that supplied specially welded large pipes for long-distance petroleum and natural gas pipelines as well as flats and beams. Built to advanced technological standards, the Preussag electric steelworks, which had been brought on-line in Peine in late 1997, had a capacity of 750,000 t/yr.

Uranium.—The ongoing cleanup of the former Soviet Union uranium mining operations in the former GDR was viewed as Europe's biggest mine rehabilitation project. When the Wismut Mines were in production, the only goal was to maximize uranium output. This resulted in an environmental problem of monumental proportions. At various sites, 48 waste rock piles cover a surface area of about 15 square kilometers (km²) that contain about 311 million cubic meters of waste material. In addition, 14 tailing ponds contain 160 million cubic meters of residues from uranium-ore-processing plants and cover a surface area of 7 km². The German Government was expected to spend more than \$9 billion on this rehabilitation project during the next 10 to 15 years (Engineering and Mining Journal, 1999). Continuing remediation work in 2000 focused on decommissioning facilities and immobilizing contaminated material in a manner that would limit long-term hazards to humans and the environment.

Zinc.—Metallgesellschaft AG (MG) was negotiating to sell its Ruhr-Zink GmbH zinc refinery in Datteln. The refinery was reported to have been operating at only half capacity at the end of 1999. The move follows the sale of MG's other zinc products subsidiary Rheinzink GmbH in October 1999 to Grillo-Werke AG. MG reported the sales were a part of a "portfolio optimization" strategy, which involved MG focusing on the engineering and chemicals sectors. The company has virtually nothing more to do with metals. In keeping with that, MG plans to change its name to Mg Technologies AG (Mining Journal, 2000).

Industrial Minerals

Bentonite.—In terms of overseas developments, Süd-Chemie AG was the largest bentonite producer in Europe. The company

controlled or had part shares in companies in France, Indonesia, Mexico, the Republic of Korea, Turkey, and the United States. Süd-Chemie's main business was in Gammelsdorf, Bavaria, where it produced calcium, sodium, and acid-activated bentonite products.

Cement.—The Treuhandanstalt sold the former GDR's cement operations to mostly German or other Western European companies. A number of these plants were being extensively modernized and upgraded for more cost-efficient production.

The slowdown of construction in the latter half of 2000 affected the cement sector. Cement used for infrastructure projects has passed the "cement-intensive phase"; thus, a drop in domestic consumption was expected in the near term. However, a reduction in imports was expected to help the domestic market. Many German cement producers hold a fair amount of spare capacity that has to turn at least once a year in order to maintain operating permits, since permits for new kiln capacity are regarded as virtually impossible to obtain (The Global Cement Review, 2000).

Clays.—Between 140 and 160 small- to medium-sized clay mines were in operation in 2000 in Germany. About one-half of the high-quality refractory and ceramic clays produced were from the Rhineland-Palatinate area. Production in Bavaria was concentrated in the Oberfalz area.

Germany was the second largest producer of kaolin in Western Europe after the United Kingdom. Most of the German kaolin was mined in Bavaria, and Amberger Kaolinwerke GmbH was the largest producer with mines in Hirschau.

Graphite.—Graphitwerk Kropfmühl AG was the only company that mined and processed natural graphite in Germany. The company operated a mine and plant at Kropfmühl, Passau, and a plant at Werk Wedel, Holstein. About one-half of the company's production, which has been falling in recent years because of declining reserves, went into the European refractory industry.

Gypsum.—Germany was a major European producer of crude gypsum. Gebr. Knauf Westdeutsche Gipswerke GmbH, which was the largest German producer of gypsum, accounted for more than two-thirds of the gypsum produced. The company operated mines in Baden-Württemberg, Bavaria, Hesse, Saarland, and Lower Saxony. Rigips Baustoffwerke GmbH, which was the second largest producer, operated mines in Baden-Württemberg and Lower Saxony.

Potash.—After closings and restructuring, Kali und Salz AG (K+S) operated six mines in four potash districts and had a potassium chloride production capacity of 4 Mt/yr, of which the product grades were 2 Mt/yr standard-grade and 2 Mt/yr granular-grade. Germany was the third largest potash producer in the world after Canada and Russia. K+S had 13% of the world potash market and a 30% share of the market for potassium sulfate. K+S's Zielitz Mine was the company's largest operation and the linchpin of its potassium operations. The mine underwent a major investment program that resulted in a practically new potash operation (Kali und Salz Group, 2000).

Salt.—K+S and Solvay S.A. of Belgium were intending to join forces on the European salt market. The partners signed a Memorandum of Understanding aimed at creating a joint venture that would encompass their salt activities and whose output was intended for third parties. K+S would hold about 60% of the new company, and Solvay would own the remaining 40%, reflecting the value of the businesses that both partners bring to the joint venture. The joint venture would have a production of about 5 Mt/yr with facilities in Belgium, France, Germany, the Netherlands, Portugal, and Spain (K+S Aktiengesellschaft, October 20, 2000, Solvay and K+S intend to combine their salt businesses, accessed June 13, 2001, at URL http://www.k-plus-s.com/medien/pressemitteilungen/presse-001020_en.cfm).

Mineral Fuels

Germany relied principally on fossil fuels as sources of energy. In 2000, the most important energy source in Germany's consumption of primary energy was petroleum with a 40% share of total consumption, followed by natural gas with a 20% share; coal, 15%; lignite, 13%; nuclear, 10%; and hydroelectricity and wind power, 1% each. About 30% of Germany's energy requirement was satisfied from domestic sources; the remaining 70% of energy requirement was imported. By 2020, the share of imports was expected to rise to 80%, although oil was still expected to be the primary energy source. About 30% of electrical generation was supplied by nuclear plants (U.S. Energy Information Administration, November 2000, Germany, accessed August 1, 2001, at URL <http://www.eia.doe.gov/emeu/cabs/germany.html>).

In 1999, latest year for which data were available, the amount of electricity from alternate renewable energy sources, [5 billion kilowatthours (GkWh)], grew by 30%. The biggest renewable energy source was wind power, which contributed 2.9 GkWh (Alexander's Gas & Oil Connections, February 2, 1999, Renewable energy generation grew by 30% in Germany, accessed February 11, 1999, at URL <http://www.gasandoil.com/goc/news/nte90672.htm>).

Anthracite and Bituminous Coal.—The gradual phaseout of subsidies that have for so long supported Western Europe's coal industry was continuing. This was in line with EU policy to eliminate subsidies to industries. There was to be a significant reduction in subsidies and the closure of 7 or 8 of Germany's 19 hard coal mines, resulting in an estimated decline from 76,000 miners in 1997 to 36,000 by 2005. However, the EC and Germany were in a dispute over Germany's subsidies to its coal industry, which the EC maintains are unacceptable under EU law. The EC was expected to launch legal proceedings against Germany unless it changed the terms under which it granted almost \$2.9 billion of aid to its coal sector in 2000 (Coal Age, 2001).

Lignite.—Mining was mainly in the Rheinisch area to the west of Cologne and the Lusatian area near Dresden. Lignite mining was under less economic pressure than hard coal mining.

The lignite deposit in the Rhine region is the largest single formation in Europe and has considerable domestic importance. With estimated recoverable reserves of 43 billion metric tons of lignite and a production of 168 Mt in 2000, Germany was the

world's leading producer. Rheinbraun AG, which was Germany's major lignite producer, mined more than 100 Mt/yr from four opencast mines—Bergheim, Garzweiler, Hambach, and Inden. Laubag AG, the second largest lignite producer, mined more than 60 Mt of coal with plans to increase production in the coming years. There were plans to merge Laubag and the electricity producer Veag AG, which buys 95% of Laubag's coal (Coal Age, 2000).

Infrastructure

Germany had a total of 625,600 kilometers (km) of highways and roads that ranged from the high-speed autobahn system to undeveloped gravel-and-packed-dirt country roads. Of this total, the autobahn consisted of 10,814 km; national highways, 43,786 km; State highways, 99,447 km; and municipal, county, and secondary roads, 471,553 km. The railroad system included 45,468 km of track, about 90% of which was Government owned. Of this total, 44,769 km was 1.435 meter (m) standard-gauge track, and 699 km was 1.000-m gauge track. Pipelines included a 3,644-km line for petroleum, a 3,964-km line for refined products, and a 97,564-km line for natural gas. Inland waterways and canals consisted of 7,541 km and 31 major ports; the Kiel Canal served as an important connection between the Baltic Sea and the North Sea, and the Rhine-Main-Danube Canal served as a connection between the North Sea and the Black Sea. The major maritime ports of Hamburg, Rostock, Bremerhaven, Bremen, and Wilhelmshaven, in descending order, accounted for about 70% of total merchandise traffic.

Outlook

Germany's economy is expected to expand steadily for the next few years despite the huge burden of unification costs on the national economy. As growth in Germany's international trading partners increases, industrial production is expected to grow to meet the demands for consumer products. Restructuring industries, which included mineral-resource industries, to be more efficient was expected to result in increased unemployment, which in turn, would cut into the available resources of the Federal Government in the form of payments for unemployment compensation, retraining, and other social costs. This is expected to continue in the short term.

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Major Sources of Information

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Stilleweg 2, Postfach 51 01 53
30361 Hannover, Germany
- Bundesministerium für Forschung und Technologie (Federal Ministry for Research and Technology)
Heinemannstrasse 2
53175 Bonn, Germany
- Bundesministerium für Wirtschaft, Abteilung III, Energiepolitik, Mineralische Rohstoffe (Federal Ministry for Economics, Section III, Energy Policy and Mineral Raw Materials)
Villemombler Strasse 76
53100 Bonn-Duisdorf, Germany
- Deutsches Institut für Wirtschaftsforschung (German Institute for Economic Research)
Königen-Luise Strasse 5
14195 Berlin (Dahlem), Germany
- Statistisches Bundesamt (Federal Statistics Office)
Gustav-Stresemann-Ring 11
65180 Wiesbaden, Germany

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TABLE 1
GERMANY: PRODUCTION OF MINERAL COMMODITIES 1/ 2/ 3/

(Metric tons unless otherwise specified)

Commodity	1996	1997	1998	1999	2000 e/	
METALS						
Aluminum:						
Alumina, Al ₂ O ₃ equivalent						
Calcined	thousand tons	755	738	600 r/ e/	583 r/	500
Hydrate	do.	792	800	700 e/	700 e/	600
Metal:						
Primary		576,422	571,944	612,381	633,804	643,545 4/
Secondary		416,915	432,467	453,328	482,658	572,257 4/
Arsenic, white, Ar ₂ O ₃ content e/		250	250	200	200	200
Cadmium, metal, refinery including secondary		950	1,145 r/	1,020	1,145	1,020 4/
Cobalt, metal including alloys e/		800	600	500	500	500
Copper, metal:						
Smelter:						
Primary		296,800	273,100	258,600	266,400	275,000
Secondary e/		88,600	76,000	80,000 4/	60,000	75,000
Refined:						
Primary		315,600	297,800	322,800	271,000	335,000
Secondary		355,200	375,800	373,000	425,000	375,000
Iron and steel:						
Ore and concentrate:						
Gross weight		100,200	200,900	100,000 r/ e/	--	--
Fe content		14,600	28,100	14,000 r/ e/	--	--
Metal:						
Pig iron	thousand tons	27,722	30,939	30,162	27,932 r/	30,846 4/
Ferrous alloys 5/	do.	95	96	100 e/	90 e/	80
Of which ferrochromium	do.	25	26	28 e/	17	18
Steel, crude	do.	39,791	45,009	44,046	42,056	46,376 4/
Semimanufactures	do.	32,889	37,074	36,591	35,879 r/	38,974 4/
Lead, metal:						
Smelter		140,000	161,300	100,000 e/	160,600 r/	170,000
Refined:						
Primary		88,700	164,800	176,800	169,557	210,515 4/
Secondary		149,400	164,400	203,400	204,000	204,000
Platinum-group metals, metal, refined e/	kilograms	60,000	60,000	60,000	60,000	50,000
Selenium, metal	do.	115	100	100	100	100
Silver, metal, refined e/	do.	600,000	500,000	500,000	500,000	500,000
Tin, metal, primary and secondary		14,836	15,708	1,000 r/ e/	1,000 e/	500
Uranium, concentrate, U ₃ O ₈ content		46	27	25 e/	25 e/	28 4/
Zinc, metal including secondary		327,015	317,681	333,968	332,852	356,500 4/
INDUSTRIAL MINERALS						
Abrasives: e/						
Natural, pumice		210,000	212,000	300,000	250,000	200,000
Artificial, corundum		60,000	60,000	60,000	50,000	60,000
Barite, marketable (contained BaSO ₄)		121,476	118,698	123,300	118,500	111,800 4/
Boron materials, processed borax, Na ₂ B ₄ O ₇ 10H ₂ O content e/		1,500	1,200	1,200	1,000	1,000
Bromine e/		750	700	600	500	500
Cement:						
Clinker (intended for market) e/	thousand tons	1,100 4/	1,200	1,000	1,000	1,000
Hydraulic	do.	36,104	37,000 e/	36,610	38,099 r/	32,000
Chalk, crude including ground	do.	450	425	400	400 e/	400
Clays:						
Bentonite	do.	491	511	509	477 r/	465 4/
Ceramic clay e/	do.	3,500	3,500	5,000	3,543 r/ 4/	4,100 4/
Fire clay e/	do.	1,000 4/	1,000	1,000	1,000	1,000
Fuller's earth e/	do.	600 4/	500	600	500	500
Kaolin, marketable	do.	1,794	1,800 e/	3,400	3,543 r/	3,655 4/
Other, including brick clay	do.	21,600	22,000	20,000	20,000 e/	21,000
Diatomite	do.	--	--	54	53 r/	54 4/
Feldspar		359,666	455,969	460,000 e/	450,000 e/	450,000
Fluorspar:						
Acid-grade e/		31,000	22,500	25,000	26,800	29,600
Metallurgical-grade e/		1,448 4/	1,500	1,500	1,500	1,500
Total		32,448	24,000 e/	26,500 e/	28,300 4/	31,100 4/

See footnotes at end of table.

TABLE 1--Continued
GERMANY: PRODUCTION OF MINERAL COMMODITIES 1/ 2/ 3/

(Metric tons unless otherwise specified)

Commodity	1996	1997	1998	1999	2000 e/
INDUSTRIAL MINERALS--Continued					
Graphite, marketable	2,603	1,030	270	300	300
Gypsum and anhydrite, marketable e/ thousand tons	3,000	3,000	4,000 r/	4,600 r/	4,000
Lime, quicklime, dead-burned dolomite e/ do.	7,570	7,600	7,000	6,440 r/	6,850 4/
Magnesium salts (byproduct of potash mining) e/ do.	1,169 4/	1,200	1,200	1,200	1,200
Nitrogen, N content of ammonia do.	2,485	2,471	2,512	2,406	2,473 4/
Phosphate materials: e/					
Phosphatic fertilizers, P ₂ O ₅ content	750 4/	800	700	700	700
Thomas slag:					
Gross weight thousand tons	150	150	150	150	200
P ₂ O ₅ content	19,000	19,000	19,000	19,000	20,000
Pigments, mineral, natural	3,754	4,176	4,000 e/	4,000 e/	4,000
Potash, K ₂ O content thousand tons	3,332	3,423	3,582	3,543	3,407
Pumice, marketable e/ do.	600	600	600	500	500
Salt, marketable:					
Evaporated do.	731	700 e/	9,098	8,965	9,322 4/
Rock and other	15,176	15,087	5,056	6,921	4,904 4/
Sodium compounds, n.e.s.:					
Soda ash, manufactured e/ thousand tons	1,400	1,400	1,400	1,400	1,500
Sulfate, manufactured e/ do.	100	100	100	100	100
Stone, sand and gravel:					
Stone:					
Dimension, crude and partly worked e/	200,000	100,000	100,000	100,000	100,000
Dolomite and limestone, industrial thousand tons	64,000	68,000 e/	71,900	81,000 r/	77,900 4/
Quartz and quartzite	30,000	26,000 e/	25,000	25,000 e/	25,000
Slate	90,000	70,000 e/	70,000	70,000 e/	70,000
Sand and gravel:					
Building sand and gravel thousand tons	300,000	382,000	372,500	382,700	343,200 4/
Gravel including terrazzo splits e/ do.	225,000	200,000	200,000	200,000	200,000
Sand:					
Foundry do.	3,000	4,000 e/	3,500	3,500	3,500
Industrial (glass) do.	5,503	9,800 e/	10,000	10,000 e/	8,500
Sulfur, byproduct: e/					
Of metallurgy thousand tons	30	25	25	25	30
Of natural gas and petroleum do.	1,001 4/	1,085 4/	1,100	1,135 4/	1,100
Other do.	90	50	50	60	100
Total do.	1,121	1,160	1,175	1,220	1,230
Talc and steatite	10,005	8,819	9,000 e/	9,000 e/	8,000
MINERAL FUELS AND RELATED MATERIALS					
Asphalt and bitumen, natural	9,821	11,285	10,000 e/	9,000 e/	10,000
Coal:					
Anthracite and bituminous, marketable thousand tons	47,913	46,792	40,960	43,849 r/	37,377 4/
Lignite do.	187,247	177,099	166,035	162,242	168,051 4/
Coke:					
Of anthracite and bituminous coal do.	10,662	10,744	10,277	8,568	9,115 4/
Of lignite do.	178	185	175 e/	175 e/	175
Fuel briquets:					
Of anthracite and bituminous coal do.	357	322	185	174	175
Of lignite (including dust and dried) do.	4,896	3,539	2,345	2,072	2,000
Gas:					
Manufactured:					
Blast furnace million cubic meters	4,239	4,655	4,500 e/	4,000 e/	4,000
Coke oven do.	2,406	2,539	2,500 e/	2,000 e/	2,000
Total do.	6,645	7,194	7,000 e/	6,000 e/	6,000
Natural:					
Gross do.	23,058	22,473	22,000 e/	23,000 e/	22,000
Marketed do.	21,360	20,780	19,900 e/	21,200	21,000
Peat:					
Agricultural use thousand cubic meters	2,800 r/	2,800 r/	9,561	9,473	9,648 4/
Fuel use	180,000	180,000	175,000	175,000 e/	175,000

See footnotes at end of table.

TABLE 1--Continued
GERMANY: PRODUCTION OF MINERAL COMMODITIES 1/ 2/ 3/

(Metric tons unless otherwise specified)

Commodity	1996	1997	1998	1999	2000 e/	
MINERAL FUELS AND RELATED MATERIALS--Continued						
Petroleum:						
Crude	thousand 42-gallon barrels	20,756	20,361	21,146	19,728	22,658 4/
Refinery products:						
Liquefied petroleum gas	do.	32,352	29,208	29,255	31,888	32,688 4/
Gasoline including aviation	do.	226,058	219,311	223,465	228,038 r/	229,101 4/
Naphtha	do.	79,058	73,925	81,379	82,648	82,085 4/
Mineral jelly and wax	do.	3,600 e/	3,600 e/	1,527	1,472 r/	1,770 4/
Kerosene and jet fuel	do.	25,691	28,094	211,676	33,046 r/	33,534 4/
Distillate fuel oil	do.	353,052	338,744	265,555	343,167 r/	345,637 4/
Refinery gas	do.	3,437	2,821	3,227	2,706	3,269 4/
Lubricants	do.	4,800 e/	4,800 e/	10,787	11,298	10,556 4/
Nonlubricating oils	do.	7,000 e/	7,000 e/	7,867 r/	8,197	8,100 4/
Residual fuel oil	do.	77,769	70,216	14,626	67,399 r/	75,756 4/
Bitumen and other residues e/	do.	25,000 e/	26,000 e/	16,968	22,228 r/	22,587 4/
Bituminous mixtures	do.	1,200 e/	1,200 e/	1,211 r/	1,199	1,100 4/
Petroleum coke	do.	5,813	7,399	7,539	10,428	5,819 4/
Unspecified	do.	18,000	16,000	18,242	16,254	11,977 4/
Total	do.	863,000 e/	828,000 e/	893,324 r/	859,968 r/	863,979 4/

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

1/ Table contains data available through August 2001.

2/ Data are from a combined Germany.

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

4/ Reported figure.

5/ Includes speigeleisen, unspecified crude iron, and blast furnace ferromanganese with 2% or more carbon.

TABLE 2
GERMANY: SELECTED INDICES OF PRODUCTION

(1990=100)

Sector	1996	1997	1998	1999	2000 e/
General	101	104	109	110	115
Mining	94	91	85	84	79
Manufacturing	100	104	110	111	117
Electricity and gas	106	105	105	106	103
Construction	93	90	87	88	83

e/ Estimated.

Source: United Nations, 2000, Monthly Bulletin of Statistics, v. LIV, no. 12, December, p. 12.

TABLE 3
GERMANY: STRUCTURE OF THE MINERAL INDUSTRY IN 2000

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Alumina	VAW Aluminium AG	Plant at Schwandorf (special aluminas)	430
Do.	Aluminium Oxid Stade GmbH (VAW, 50%, Alcoa Inc., 50%)	Plant at Stade	750
Do.	Martinswerke GmbH (Alusuisse, 100%)	Plant at Bergheim (fused alumina)	350
Aluminum	VAW Aluminium AG	Smelters: Innwerke at Töging, Elbwerke at Stade, Rheinwerke at Neuss, Lippenwerke at Lünen (secondary)	300
Do.	Aluminium Essen GmbH	Smelter at Essen-Borbeck	95
Do.	Hamburger Aluminium-Werke GmbH (VAW, 33%)	Smelter at Hamburg	120

See footnotes at end of table.

TABLE 3--Continued
GERMANY: STRUCTURE OF THE MINERAL INDUSTRY IN 2000

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Arsenic, metal	tons	Metaleurop Handel GmbH	Plant at Langelsheim	5
Cement		38 companies, the major ones are:	64 mills (grinding) including:	59,000
Do.		Heidelberger Zement AG	Plants at Blaubeuren-Schelklingen, Leimen, Hassmersheim, Burglengenfeld, Kiefersselden, and others	-9,200
Do.		Dyckerhoff AG	Plants at Amoneburg, Golheim, Neuwied, Neubeckum, and others	-7,250
Do.		E. Schwenk, Zementwerke KG	Plants at Allmendingen, Karlstadt, and Margelstetten	-6,000
Do.		Anneliese Zementwerke AG	Plants at Ennigerloh-Nord, Ennigerloh-Sud, Geske, and Paderborn	-3,500
Do.		Zementwerke Deunan GmbH	Plant at Deuna	-3,000
Chalk		Kreidewerke Rugen GmbH	Quarries on Rugen Island	500
Coal, anthracite and bituminous		Four companies:	About 27 mines, including:	72,500
Do.		Ruhrkohle AG	14 mines in the Ruhr region	-40,000
Do.		Saarbergwerke AG	5 mines in the Saar Basin	-14,000
Do.		Preussag Anthrazit GmbH	Mine at Ibbenbüren	-2,500
Copper		Norddeutsche Affinerie AG (Dresdner Bank AG, 20%; Degussa AG, 10%)	Smelter at Hamburg	290
Do.		do.	Refinery at Hamburg	350
Do.		Hüttenwerke Kayser AG	Refinery at Lünen	120
Kaolin		Kemmlitzer Kaolinwerke GmbH	Mines at Gröppendorf, Oschatz, and Sachsen	100
Do.		do.	Plant at Sachsen	100
Limestone		Harz Kalk GmbH	Quarries at Bad Kösen, Rubelaand, and Kaltes Tal	6,000
Lead		Metaleurop Weser Blei GmbH	Smelter and refinery at Nordenham	120
Do.		Berzelius Metallhütten GmbH	QSL smelter at Stolberg	75
Do.		do.	Refinery at Duisberg	120
Do.		Norddeutsche Affinerie AG	Refinery at Hamburg	50
Lignite		Rheinische Braunkohlenwerke AG (Rheinbraun)	Surface mines in Rhenish mining area: Garzweiler, Bergheim, Inden, and Hambach	105,000
Do.		Lausitzer Braunkohle AG (LAUBAG)	Surface mines in Lausatian mining area: Jänschwalde/Cottbus-Nord, Welzow-Süd, and Nochten/Reichswalde	50,000
Natural gas	million cubic meters	Brigitta Erdgas und Erdöl GmbH and Elwerath Erdgas-Erdöl GmbH	Plants at Clenze and Grossenkmeten	9,500
Do.	do.	Mobil Erdgas-Erdöl GmbH	Plants at Scholen	4,000
Do.	do.	Other companies	Plants at Duste, Rutenbrock, and others	2,000
Petroleum:				
Crude	thousand 42-gallon barrels	The largest companies are:	6 areas with about 85 oilfields, including:	80,000
Do.	do.	Elwerath Erdgas-Erdöl GmbH	West of Ems River	-30,000
Do.	do.	Wintershall AG	Weser-Ems Rivers	-21,000
Do.	do.	Deutsche Texaco AG	Elbe-Weser Rivers	-20,000
Refined	do.	About 25 companies, of which the largest:	20 refineries, including:	2,062,000
Do.	do.	Deutsche Shell AG	Refineries at Godorf, Hamburg, and Grasbrook	-256,000
Do.	do.	Esso AG	Refineries at Karlsruhe and Ingolstadt	-245,000
Do.	do.	Ruhr Oel AG	Refinery at Gelsenkirchen	-215,500
Do.	do.	Erdoel Raffinerie Neustadt GmbH	Refinery at Neustadt-Donau	-145,000
Potash, K ₂ O content		Kali und Salz AG	Mines at Bergmannsseggen-Hugo, Niedersachsen-Riedel, Salzdettfurth, Sigmundshall, Hattorf, Neuhoft-Ellers, and Wintershall	3,500
Do.		MDK (Mitteldeutsche Kali und Sondershausen)	10 mines mostly in the State of Thüringen	2,500
Salt (rock)		Kali und Salz AG	Mines at Bad Friedrichshall-Kochendorf, Braunschweig-Lüneburg, Heilbronn, Riedel, Stetten, and Wesel (Borth)	15,000
Steel		Major companies including:	About 25 plants, including:	45,000
Do.		Thyssen Krupp Stahl AG	Plants at Krefeld, Duisburg, Hattungen, Oberhausen, and Witten	-13,000
Do.		Fried. Krupp AG Hoesch-Krupp	Plants at Bochum, Dortmund, and Rheinhausen	-9,000
Do.		Stahlwerke Peine-Salzgitter AG	Plants at Peine and Salzgitter	-4,500
Do.		Klöckner-Werke AG	Plants at Bremen and Osnabruck	-4,200
Zinc		Ruhr-Zink GmbH (Metallgesellschaft AG, 100%)	Refinery at Datteln	200
Do.		Berzelius Metallhütten GmbH	Imperial smelter and fire refinery at Duisburg	100
Do.		Metaleurop Weser Zink GmbH	Refinery at Nordenham	130