



# 2009 Minerals Yearbook

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GERMANY [ADVANCE RELEASE]

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# THE MINERAL INDUSTRY OF GERMANY

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In 2009, Germany was a leading global exporter of industrial goods and services (including processed and fabricated mineral products). The country's mineral industry, however, depended heavily on imported mineral raw materials. Germany was the leading producer of lignite in the world, and essentially all of the lignite consumed in the country was supplied by domestic production. Combustion of lignite accounted for 11.3% of total primary energy consumption in the country. Germany was dependent on imports of other mineral fuels for most of the remainder of its primary energy consumption, and combustion of petroleum and petroleum refinery products accounted for 34.7% of total primary energy consumption in Germany; that of natural gas, 21.8%; and that of bituminous and anthracite (hard) coal, 11.1%. Nuclear energy accounted for 11% of total primary energy consumption; renewable energy resources, such as wind power, accounted for 8.9%. Germany's metal processing sector relied on imports of metal ores and concentrates and reprocessing of metallic scrap and waste materials (both imported and produced domestically), because no metals were mined in sufficient concentrations for domestic metallurgical use in the country. Germany is also heavily reliant on imports for the country's use of numerous industrial minerals and many refined metals (Bundesanstalt für Geowissenschaften und Rohstoffe, 2010, p. 21-24; 39, 49-50, 55, 189; Bundesministerium für Wirtschaft und Technologie, 2010b, p. 6-15; Casteel, 2010, p. 2).

In 2008 (the latest year for which information was available), Germany accounted for about 18% of total production of lignite in the world. In 2009, the country was the third ranked producer of kaolin (and was estimated to have accounted for about 14% of global production), salt (7.2%), and refined lead (4.4%); Germany was the sixth ranked producer of potash (8.2%); and it was the seventh ranked producer of refined copper and crude steel (3.7% and 2.7%, respectively). Additionally in 2009, Germany either produced or was estimated to have produced greater than 1% of the world's output of barite, bentonite, cadmium (secondary), cement, feldspar, gallium, gypsum, indium, crude iron, lime, magnesium compounds (as byproducts of potash mining), nitrogen (ammonia), industrial quartz, silica (industrial sand and gravel), sulfur, and zinc metal. Germany's domestic mineral processing sector was estimated to have accounted for at least 5% of the world's total production capacity of alumina, fused aluminum oxide (abrasive), graphite, magnesium metal (secondary), rhenium metal (byproduct), strontium compounds, and titanium dioxide pigments (table 1; Bundesanstalt für Geowissenschaften und Rohstoffe, 2009, p. 172; 2010, p. 35, 59, 65, 67-68, 75, 147, 155, 158, 161, 164, 170; Kostick, 2010; Virta, 2010).

The international competitiveness of the country's nonfuel mineral processing and fabrication sectors relied primarily on such factors as a highly skilled labor force, research, development and rapid assimilation of new technologies (including metal and other mineral materials recycling technologies), and the development and maintenance of liberal

trade relationships both within and outside the European Union (EU). The prices of many mineral commodities that were requisite inputs into Germany's mineral processing sector and (or) important mineral materials output by the mineral industry of the country decreased substantially from March through December 2008, including a 69% decrease in the price of nickel, 68% decrease in the price of lead, 63% decrease in the price of copper, 61% decrease in the price of crude petroleum, 56% decrease in the price of zinc, 50% decrease in the price of aluminum, and 43% decrease in the price of tin. In 2009, stimulus packages and other governmental policies in the G-20 countries appeared to help encourage increased global demand for mineral commodities and orders for industrial products (including for those produced in Germany). From January to August 2009, the price of copper increased by 126%; nickel, 89%; lead, 85%; tin, 83%; crude petroleum, 78%; zinc, 72%; and aluminum, 50%; and prices were expected to remain at higher (compared with yearend 2008) levels through the end of 2009 and into 2010 mostly owing to an expected continuation of strong demand for minerals and mineral-based products in China and somewhat to expected increases in demand in Brazil, India, and Russia (Bundesanstalt für Geowissenschaften und Rohstoffe, 2010, p. 18-28; Bundesministerium für Wirtschaft und Technologie, 2010b, p. 6-15).

Germany's relative position in the global mineral economy is predominantly as a major consumer and processor of minerals, and this role continues to evolve as emerging economies grow and competition for the use of minerals increases. In 2009, China was the world's leading consumer of crude steel (accounting for 53% of global consumption), hard coal (51%), tin (about 45%), lead (slightly greater than 44%), zinc (slightly less than 44%), aluminum (about 41%), copper (39%), and nickel (36%). The United States was the second ranked consumer of all of these same mineral commodities except for nickel, for which Japan was ranked second and the United States was ranked third. The United States was the leading consumer of crude petroleum in the world; China was ranked second; and Japan, third. Germany was the world's third ranked consumer of copper, the fourth ranked consumer of lead and nickel, and the fifth ranked consumer of aluminum and tin; it was not one of the world's top five consumers of hard coal, crude petroleum, crude steel, or zinc. Also, China replaced Germany as the leading exporter in the world (in terms of the total value of exports of all goods and services) (Bundesanstalt für Geowissenschaften und Rohstoffe, 2010, p. 18-21; Bundesministerium für Wirtschaft und Technologie, 2010b, p. 6-15; McDonald, 2010).

The planned nonferrous metals exploration budgets (excluding planned expenditures to fund exploration for bauxite, but including that for uranium) of 1,846 companies worldwide decreased to a total of \$7.32 billion compared with \$12.6 billion in 2008, and this increased the uncertainty of Germany being able to secure adequate supplies of the nonferrous metallic mineral raw materials required by the

country's metal-processing sector in the future. Even as many mineral commodity prices appeared to be recovering from the downturn during the latter half of 2008, credit availability (including for junior mineral exploration companies) had not, and some analysts expected a lingering effect on supplies of imported mineral raw materials for use in Germany's industrial sector owing to lag times for new mineral supplies to become available, even if global exploration and development expenditures were to increase substantially in 2010 (Bundesanstalt für Geowissenschaften und Rohstoffe, 2010, p. 18-21; Bundesministerium für Wirtschaft und Technologie, 2010b, p. 6-15; Goulden, 2010).

## Minerals in the National Economy

In 2009, the total value of Germany's industrial output (including the value of output by the country's mineral industry, but not that of the construction sector) accounted for about 22% of the gross domestic product (GDP), which was reportedly the highest share of a nation's GDP accounted for by this economic sector among leading developed economies. In 2008 [the latest year for which detailed information was available from the Federal Statistical Office of Germany (DESTATIS)], the total value of output by the country's metals processing sector (up to the foundry stage) accounted for about 4.7% (\$171 billion<sup>1</sup>) of the GDP, and the minerals extraction sector [mining (including coal mining), quarrying, and the extraction of crude petroleum and natural gas] reportedly accounted for 0.5% (\$19 billion) of the GDP. According to Germany's Federal Institute for Geosciences and Natural Resources (BGR), the value of the country's total production of mineral raw materials and fuels was about \$24 billion in 2009, which would account for about 0.7% of the GDP, but this BGR figure appears to include the value of production of some mineral products that are not included in the DESTATIS series (Schäfer, 2009; Bundesanstalt für Geowissenschaften und Rohstoffe, 2010, p. 21, 28, 35-39, 83; Statistisches Bundesamt, 2010c, p. 376, 629, 637).

One of Germany's (international) competitive advantages in continuing to harbor a vibrant industrial sector appears to be the country's ability to maintain a highly skilled industrial workforce. At least partially owing to Government labor subsidies, industrial company workforce flexibility measures, and a structure for labor contracts that typically makes it difficult and expensive for companies in Germany to fire permanent employees, the number of employees in the country's industrial sector decreased by only about 4.45% to 5,734,000 compared with about 6,001,000 employees in 2008, although the value of production of the sector was estimated to have decreased by about 21% to about \$660 billion compared with about \$840 billion during the same timeframe. The apparently small decrease in employment in the industrial sector could be viewed as even more surprising if one considers that the 2008 level of employment in the sector in Germany was the highest since 2004. In 2009, the total number of employees in the

<sup>1</sup>Where necessary, values have been converted from European Union euros (€) to U.S. dollars (US\$) at an annual average exchange rate of €0.7964=US\$1.00 for 2006, €0.7296=US\$1.00 for 2007, €0.6795=US\$1.00 for 2008, and €0.718=US\$1.00 for 2009. All values are nominal, at current prices, unless otherwise stated.

metals processing sector decreased to about 250,000 compared with 270,000 in 2008 (or by about 6.7%), and that in the mineral extraction sector decreased to about 74,000 compared with about 77,000 (or by 3.9%) during the same timeframe. Compatible data on the change in the value of production of the mineral extraction sector between 2008 and 2009 were not available, but data on the marketed production of the metals processing sector indicate that this value decreased to \$85 billion compared with \$141 billion (or by 40%) during this timeframe (Statistisches Bundesamt, 2006, p. 359; 2009, p. 15; 2010a, p. 11; 2010c, p. 369, 381, 641-642; Schäfer, 2009, 2010; Bundesministerium für Wirtschaft und Technologie, 2010b, p. 6-15).

According to the BGR, the 12 most valuable mineral raw materials produced in Germany in 2009 were (in decreasing order of value of production) lignite (\$9.0 billion); natural gas (about \$4.4 billion); construction sand and gravel (\$2.0 billion); crushed stone, including chalk (\$1.8 billion); hard coal (\$1.5 billion); crude petroleum (about \$1.3 billion); potash (\$1.1 billion); rock salt and industrial brines, NaCl content (\$936 million); dolomite, limestone and marble (about \$602 million); kaolin (\$586 million); ceramic and refractory clays (about \$481 million); and silica sand (\$231 million). Domestic production of mineral fuels appeared to have some economic benefit in addition to the simple value of output in that it helped somewhat mitigate uncertainty in the domestic provision of electricity and distribution of imported mineral fuels. For example, domestic production of natural gas and other mineral fuels could conceivably help substitute for imports of natural gas if, for instance, there is an unexpected reduction in supplies of imported natural gas (as took place with supplies of natural gas that passed through Ukraine on their way to Germany in both 2006 and 2008) (Bundesanstalt für Geowissenschaften und Rohstoffe, 2010, p. 37-39; Gesamtverbands Steinkohle e.V., 2010, p. 40-50; Global Intelligence Report, The, 2010).

According to DESTATIS, the country's estimated mineral trade balance in 2009 for all sectors of the mineral industry (including trade in intermediate mineral products, such as cement) was -\$93 billion, compared with -\$154 billion in 2008 and -\$108 billion in 2007. In 2009, Germany's mineral trade deficit decreased compared with that of 2008 because the decrease in the total value of the country's mineral imports (to \$141 billion from \$230 billion) was of greater magnitude than the decrease in the total value of its mineral exports (to \$48 billion from \$76 billion) during this timeframe. As an example, the value of petroleum refinery products exports, which was the leading mineral export category, decreased to \$13 billion in 2009 from \$24 billion in 2008, but the combined value of the country's imports of crude petroleum and natural gas (which was the leading mineral import category, by value) decreased to about \$77 billion compared with \$122 billion during this same timeframe. According to the BGR, the value of Germany's imports of minerals fuels and related materials in 2009 decreased to \$84 billion from about \$132 billion in 2008; that of metallic raw materials, to \$31 billion from about \$53 billion; and that of industrial minerals, to \$2.2 billion from about \$2.9 billion (Bundesanstalt für Geowissenschaften und Rohstoffe, 2010, p. 39-40; International Monetary Fund, 2010; Statistisches Bundesamt, 2010b, p. 71-75).

Reliable information concerning the separate contribution of Germany's secondary mineral materials production to the GDP in 2009 was not available. In addition to any contribution to the GDP, Germany's recovery of secondary mineral materials and use in the mineral industry is important to the economy because it reduces the country's reliance on imports of primary mineral raw materials, helps the mineral industry consume less energy (on average), helps lower emissions of greenhouse gases relative to primary mineral industry production, and promotes a more sustainable supply of mineral raw materials in the future. In 2009, Germany faced the common challenges concerning the availability of scrap and volatility in the prices of secondary materials. Prices of secondary mineral materials often fluctuate in correlation with the prices of primary materials (for which they can be substituted). International availability of secondary materials can often be restricted. For example, important German trading partners that had recently raised duties on the export of scrap metals included China, India, Russia, and Ukraine, among others (Bundesanstalt für Geowissenschaften und Rohstoffe, 2010, p. 42-45).

Germany continued to invest in advanced technologies for recycling and in developing advanced technologies to recycle waste electrical and electronic equipment (WEEE) to obtain such precious metals as gold, platinum-group metals (PGMs), and silver, and such other metals as aluminum, copper, ferrous metals, indium, lead, nickel, tantalum, and zinc, while taking care to safely reuse or dispose of potentially harmful elements in recycled electronic products, such as arsenic, cesium, and (or) mercury. A particular challenge for being able to profitably recycle electronic products is that the valuable elements are often present only in very small amounts and (or) are often included in these products in a manner that makes it very complex to extract them. Even when the technology appears to be advanced enough to profitably recycle end products to obtain secondary mineral materials, there is a common problem with availability owing to fairly long useful lives of those products. For example, Germany's copper institute has estimated that the average life of a product that contains a profitable amount of recyclable copper is about 33 years. Also, Germany may have some particular economic disadvantages in using more secondary mineral materials relative to some other countries. For example, electronic steel furnaces can produce crude steel using 100% recycled material whereas oxygen blown converters can use a maximum of 25% secondary raw material; however, only 32% of Germany's crude steel production capacity is accounted for by production from electric arc furnaces whereas electric arc furnaces account for 80% of the crude steel production capacity in Turkey (for instance). An economic reason for this could be that electricity is comparatively more expensive in Germany than in other countries (such as Turkey, perhaps), and the result is that Germany possibly uses proportionally less steel scrap than some other countries. Despite such challenges, the proportion of refined copper produced in Germany from secondary materials was estimated to have been about 3.7 times greater than the global average, that of aluminum was about 1.7 times greater, that of lead was 1.2 times greater, and that of crude steel was 1.1 times greater (Scheben, 2009; Bundesanstalt für Geowissenschaften und Rohstoffe, 2010, p. 43-45).

Germany was also involved in the recycling of industrial minerals, but that activity mostly involved the reuse or recycling of the end products, such as glass or various building materials. During the process of using industrial minerals to produce products for end use, industrial minerals are typically transformed to an extent that prohibits economically recovering the mineral raw materials (such as trying to recover clay from bricks, feldspar from glass, or limestone from cement). From 1970 to 2009, however, an estimated 40 million metric tons (Mt) of silica sand and many millions of metric tons of such minerals as feldspar and soda ash have been saved (for future use) in Germany through the country's glass-recycling program (Bundesanstalt für Geowissenschaften und Rohstoffe, 2010, p. 45-46).

## Government Policies and Programs

Germany's main mining law is the Federal Mining Act (BGBl. IS. 1310), which was approved on August 13, 1980, and revised on December 9, 2006, through slight revision to provisions of Article 11 (BGBl. IS. 2833). The country's production of some minerals (including gypsum and anhydrite, limestone and some other types of natural stone, peat, and some types of sand and gravel) was not directly regulated under the Federal Mining Act, but was covered by a variety of other land-management and environmental regulations at both the Federal and State levels. Also, the setup of the Federal Mines Inspectorate was not determined in the Federal Mining Act (although this inspectorate does enforce many of the regulations in the main mining law); the Federal Mines Inspectorate was established through Articles 83 and 84 of Germany's constitutional law. During 2009, the Government program to phase out the subsidy for the mining of hard coal was ongoing and continued to adhere to a schedule to completely eliminate the subsidy by 2018. In 2009, the total amount of this subsidy decreased to about 2.2 billion euros (about \$3.1 billion) compared with 2.4 billion euros (\$3.5 billion) in 2008 and 2.5 billion euros (\$3.4 billion) in 2007, and the subsidy was still scheduled to be further reduced to 2 billion euros in 2010 and to 1.8 billion euros in 2012 (Bundesministerium der Justiz, 2007, p. 1; Bundesanstalt für Geowissenschaften und Rohstoffe, 2010, p. 37-38, 53-54; Bundesministerium für Wirtschaft und Technologie, 2010a, p. 11, 36-49; Casteel, 2010, p. 4; Gesamtverbands Steinkohle e.V., 2010, p. 12).

A Government program that appeared to be important in maintaining Germany's (1) industrial and manufacturing production capacity during the economic downturn that lasted through almost all of 2009, (2) capacity to continue to process minerals and produce high-value-added mineral-based products, and (3) workforce's expertise to do so was a policy to subsidize part-time work ("Kurzarbeit"). The country's Kurzarbeit subsidy is a policy that allows the Government to directly pay up to two-thirds of the wages that would otherwise be lost by an employee if his or her employer decides to cut that worker's hours below the full-time level. This policy appears to be based on legislation that was passed in 1910 to aid Germany's potash producers. In 2009, the Government increased the maximum time for selected workers to receive the Kurzarbeit subsidy to 24 months and allowed companies still to hire and train

workers while the workers received this subsidy. In 2009, instead of firing highly trained workers and losing much of the expertise of existing employees and that of younger potential employees who might shun the sector (while still in school) in favor of another career path that might appear to have greater job security, many industrial companies (including in many sectors of the mineral industry) appeared to be able to invest in machinery and materials (often at far lower prices than in 2007 or 2008), in research and development to improve their processes and products, and in training or retraining workers to possibly be able to produce at an even higher rates of efficiency than before the economic downturn. In 2009, Government expenditures on its Kurzarbeit program were estimated to be about \$8.4 billion (Braithwaite, Benoit, and Atkins, 2009; Bryant, 2009; Schäfer, 2009; Bundesministerium für Wirtschaft und Technologie, 2010b, p. 6-15; 2010c, p. 20).

In January 2009, the Government began a program of issuing certificates worth about \$3,500 to buyers of new cars who simultaneously traded in a car that was at least 9 years old. This program ended in September, and the Government was estimated to have spent about \$7 billion on it. About 2 million German consumers were estimated to have scrapped at least one old automobile to receive this bonus, which could have substantially increased the availability of recycled metallic materials in the country during the year, including aluminum, lead (from the old car batteries), PGMs (from the old catalytic converters), and other metals. Even with this program continuing for many months in 2009, sales of new automobiles in Germany appeared to have decreased by between 13% and 14% compared with that of 2008, and it did not appear as though enough manufacturing of new automobiles took place to provide sufficient increases in domestic demand to result in net increases in production of metals in the country. In 2009, about 30% of Germany's production of processed nonferrous metals (not including precious metals, such as PGMs or silver) was used in the automobile industry (transportation sector), on average, although the proportions varied substantially from 73% of lead or 44% of aluminum, to 6% of copper or an insignificant amount (1% or less) of zinc (table 1; Bryant, 2009; El-Sharif, 2009; Kirschbaum, 2009; Atkins, 2010; Bundesanstalt für Geowissenschaften und Rohstoffe, 2010, p. 41-45; Wirtschaftsvereinigung Metalle e.V., 2010, p. 82-83; 102-103).

In 2007, the Government together with industry leaders developed the components of a new raw materials strategy, and the Chancellor established an Interministerial Committee on Raw Materials to identify problems with the supply of raw materials (including minerals) for German industries and to produce solutions. In 2009, an interim report on the work of this committee was presented to Parliament, and submission of a final version of this strategy to the Government for possible adoption as a Federal policy was expected to happen sometime in 2010. In short form, the main objectives of the new raw materials strategy appeared to be—

- Reduce trade barriers and distortions of competition
- Help German industry diversify its sources of raw materials
- Help industry develop synergies from sustainable economic activity and enhanced materials efficiency

- Develop technologies and instruments to improve the conditions for recycling
- Establish bilateral raw materials partnerships with selected countries
- Do research into substitution and materials in order to open up fresh options
- Focus research programs relating to raw materials
- Create transparency and good governance in raw materials extraction
- Integrate national measures with European policy on raw materials

On November 4, 2008, the European Commission (EC) adopted a new raw materials initiative that includes measures to secure and improve access to raw materials (including minerals) for the EU. The EC expected to report on its progress in implementing this EU initiative sometime in 2011. This EU initiative could be viewed as supplemental to Germany's new raw materials strategy, because it appeared as if it will be more focused on international trade and development issues than on specific industrial objectives within any specific country (Commission of the European Communities, 2008; Bundesanstalt für Geowissenschaften und Rohstoffe, 2010, p. 46-49; Bundesministerium für Wirtschaft und Technologie, 2010b, p. 6-15, 26-27; 2010c, p. 6-7, 25).

The Environmental Impact Assessment Act (EIA Act) (BGBl. IS. 1757, 2797), which was approved on June 25, 2005, and revised through slight changes to Article 2 (BGBl. IS. 3316) of the Act on December 21, 2006, was the environmental law that was most applicable to the mineral industry during 2009. This Act incorporates provisions of an older ordinance concerning the assessment of environmental impacts for mining projects (BGBl. IS. 1420), which was approved on July 13, 1990, and revised through slight changes to Article 8 (BGBl. IS. 2819) on December 9, 2006; the Act also incorporated other older ordinances, such as one for the protection of groundwater against pollution caused by certain dangerous substances (BGBl. IS. 542), which was approved on March 18, 1997, and was still applicable to the use and disposal of many of the chemicals used in mining and mineral processing in Germany. The EIA Act requires environmental impact assessments for all domestic waste repositories created or used by the mineral industry. The Federal Mining Act actually stipulates how these repositories are to be constructed and operated (monitored) (Bundesministerium der Justiz, 2007, p. 30; Bundesministerium für Wirtschaft und Technologie, 2010a, p. 36-38, 48-50).

On June 25, 2009, Directive 2009/29/EC of the European Parliament and of the Council (of April 23, 2009) entered into force to amend Directive 2003/87/EC (which established the greenhouse gas emission allowance trading scheme [ETS] for the EU), with the main goals of improving the ETS and extending it beyond 2012. In 2009, Trimet Aluminium AG (Germany's leading producer of primary aluminum) claimed that the ETS was leading to increases in electricity rates in Germany that were far greater than in neighboring countries, because Germany's Government was not controlling electricity rates to as great an extent as in some other aluminum-producing countries. (The process to produce primary aluminum is very

electricity-intensive.) Under Directive 2003/87/EC, electrical companies in the EU were able to pass along the cost of purchasing greenhouse gas emission allowances (carbon permits) to electricity consumers unless this practice was regulated against at the country or State level, and it did not appear that any of the amendments in Directive 2009/29/EC would establish greater regulation of this practice at the EU level. Although most of these carbon permits were issued for free (and could continue to be through 2012), at least some companies reportedly sold off carbon permits to acquire cash during the economic downturn (possibly because demand for their products decreased, leading to the companies decreasing production and emitting less CO<sub>2</sub>, and therefore requiring fewer carbon permits). When demand for their products increases, however, companies (including power generating companies and many companies within the mineral industry) that need to emit CO<sub>2</sub> to produce could need to buy back carbon permits, which could drive up the price of the permits. During 2009 and 2010, Trimet expected to spend about \$45 million per year for the costs of the carbon permits embedded in its electricity bills; the company expected that its annual expenditure (indirectly) on CO<sub>2</sub> emissions by electricity generators would reach about \$115 million in 2011 and 2012 and an estimated \$150 million in 2013 and beyond. In June 2009, the German Government agreed in principle to grant about \$56 million to domestic producers of nonferrous metals to help compensate them for part of their estimated CO<sub>2</sub> costs related to these companies' consumption of electricity, but this proposed grant was being investigated by the EC as possibly not being compatible with EU single market rules concerning individual member state aid. Information concerning the ruling of the EC on this matter or whether the German Government was able to help mitigate these indirect CO<sub>2</sub> costs for nonferrous metals producers (with this policy or in some other way) was not available at the time of this writing (European Parliament and Council, 2009, p. 63-68, 71-74; Harvey, 2009; Scheben, 2009; Trimet Aluminium AG, 2009, p. 2; Commission of the European Communities, 2010; Gesamtverbands Steinkohle e.V., 2010, p. 30-36; Kanter, 2010; Szabo, 2010).

## Production

Data on mineral production are in table 1. In 2009, production of almost all minerals and mineral-based products in Germany decreased compared with that of 2008 owing to decreases in demand for German production of these mineral commodities. Among the metals, the apparent use of aluminum in the country decreased by about 31% compared with that of 2008, crude steel (30%), zinc metal (about 29%), refined lead (greater than 19%), and refined copper (19%). Given this information on decreases in Germany's use of metals in 2009, the country's total production of refined copper was notable for having decreased by only 3% compared with that of 2008. The country's production of copper may not have decreased as much as that of other metals because demand for copper from Germany's trading partners may not have decreased as much as for other metals. Global use of refined copper appeared actually to increase by about 9% compared with that of 2008, which was a greater proportional increase than for the other

major metals that Germany produced, such as refined lead (the global use of which increased by about 2.5%), aluminum (which decreased by approximately 5%), refined zinc (which decreased by 6%), and finished steel products (which decreased by 7%) (table 1; Gesamtverband der Aluminiumindustrie e.V., 2009; Bundesanstalt für Geowissenschaften und Rohstoffe, 2010, p. 148, 153, 156, 159, 162, 165; Wirtschaftsvereinigung Metalle e.V., 2010, p. 88-89, 92-93).

Germany's secondary production of most of these same metals did not decrease as much as primary production, except that secondary production of zinc metal was estimated to have decreased by about 77% (compared with a decrease of about 37% in the production of primary zinc metal). Production of both primary and secondary zinc metal decreased owing to the closure of Ruhr-Zink GmbH at the end of 2008, and production of secondary zinc may have decreased even more than secondary production of aluminum (which decreased by 22%), refined copper (which decreased by 2.7%), and refined lead (which decreased by 5.4%) because of a lower availability of scrap zinc compared with the availability of scrap containing these other metals, including as a result of the Government's program to subsidize scrapping of automobiles in 2009. Also, the greater decrease in the production of secondary zinc could be related to a greater correlation with the decrease in the production of steel in Germany than that of aluminum, copper, or lead, because some secondary zinc in the country is produced from waste electric steel mill dust. Germany's production of crude steel decreased by about 29% (table 1; GEA Group AG, 2009, p. 118; Bundesanstalt für Geowissenschaften und Rohstoffe, 2010, p. 65-71, 148, 153; Recylex S.A., 2010, p. 1-3; Wirtschaftsvereinigung Metalle e.V., 2010, p. 88-89, 92-93).

Production of almost all industrial minerals in Germany decreased substantially in 2009 compared with that of 2008. Production of kaolin increased by about 25%, however, almost entirely owing to an increase of about 45% in production at mines in Bavaria (by far the leading kaolin-producing State in the country) during this timeframe. Production of rock salt and some brines increased by about 43% mostly in response to an increase in European demand for deicing salt products during the more severe and longer-lasting (than average) winter weather conditions during the first quarter and last two weeks of 2009 compared with that during the same periods in 2008. Production of minerals and mineral products primarily for the construction sector also decreased, mostly owing to continuing decreases in orders received for the domestic construction sector. Production of dimension stone increased by about 84% during this timeframe, however, although detailed information concerning the reason(s) for this increase was not available. The country's exports of granite, marble, travertine, and some other dimension stones increased significantly compared with that of 2008, and the leading export destination for these stones in 2009 was Switzerland. Thus, Germany's increased production of dimension stone could have been in response to a sudden increase in demand for some Swiss project(s) or increased demand in some other export market for German dimension stone (table 1; Bundesministerium für Wirtschaft und Technologie, 2009, p. 55; 2010a, p. 25-26, 54; Bundesanstalt für Geowissenschaften und Rohstoffe, 2010, p. 74-78, 137-138;

K+S Aktiengesellschaft, 2010a, p. 7, 62; Statistisches Bundesamt, 2010c, p. 395).

The Lippe Mine was closed on January 1, 2009, and the Walsum Mine was closed in mid-2008, and production of anthracite and bituminous coal in Germany decreased by about 19% compared with that of 2008 almost entirely owing to these mine closures. The production of coke from anthracite and bituminous coal decreased by about 18% during this timeframe, which was consistent with the decrease in the production of hard coal. Production of neither crude petroleum, lignite, or natural gas decreased by greater than 10%, and production of lignite decreased by only 3%. Production of blast furnace gas was estimated to have decreased by the same proportion as production of pig (blast-furnace) iron. In 2009, the project to clean up and remove radioactive material in and around the uranium mine sites of the former Soviet-German mining company WISMUT SDAG in the States of Saxony and Thuringia did not result in any reported production of uranium, and this was also the case in 2008 (table 1; Bundesministerium für Wirtschaft und Technologie, 2010a, p. 11-19, 21-23; Bundesanstalt für Geowissenschaften und Rohstoffe, 2010, p. 49-58; Gesamtverbands Steinkohle e.V., 2010, p. 13; Landesamt für Bergbau, Energie und Geologie, 2010, p. 9, 29-38).

### Structure of the Mineral Industry

Table 2 is a list of major mineral industry facilities. Since the closure of the last metal mines in 1992, there has been no mining of metallic minerals in Germany. Many of the leading companies in the global metals processing sector owned and operated significant facilities in Germany, however. ArcelorMittal (based in Luxembourg) was the leading producer of crude steel in the world and the second ranked producer in Germany. ThyssenKrupp AG (based in Duisburg) was the leading producer of crude steel in Germany and the 20th ranked producer of crude steel in the world. In 2009, Norddeutsche Affinerie AG (based in Hamburg) was renamed Aurubis AG and was the third ranked producer of marketable copper metal in the world and the leading producer of secondary refined copper. Aurubis was the leading producer of total refined copper in the EU. Salzgitter AG was the third ranked producer of crude steel in Germany and held a 20% ownership interest in Aurubis. Xstrata plc (based in Switzerland and registered in the United Kingdom) was the leading producer of zinc metal in Germany and claimed to be the leading integrated (mining to metal) producer of zinc in the world. Norsk Hydro ASA of Norway was the second ranked producer of aluminum in Germany and the fourth ranked producer in the world, and the company owned the largest single primary aluminum smelter in Germany (the Rheinwerk primary smelter at Neuss). On February 3, 2009, Briand Investments B.V. (a subsidiary of Klesch & Company Ltd. of the United Kingdom) acquired the smallest remaining primary aluminum smelter (at Voerde) in Germany from Corus Aluminium Voerde GmbH (a subsidiary of Tata Steel Ltd. of India), and renamed its new German subsidiary Aluminiumwerk Voerde Aluminium GmbH. The lead smelter of Berzelius Metall GmbH at Stolberg in Germany was one of the largest and most modern in the world,

and it had a production capacity of about 150,000 metric tons per year (t/yr) of primary refined lead, which made Berzelius the leading producer of primary lead in the country (table 2; Aurubis AG, 2009, p. 10-14, 52-55; Klesch & Company Ltd., 2009; Bundesanstalt für Geowissenschaften und Rohstoffe, 2010, p. 58-59; 65-71; Norsk Hydro ASA, 2010, p. 27; Stahlinstitut VDEh and Wirtschaftsvereinigung Stahl, 2010, p. 18-21, 24-26, 34-36, 43-45; World Steel Association, 2010, p. 8; Xstrata plc, 2010, p. 11, 19, 85-89).

S.C.R.-Sibelco NV of Belgium was the leading producer of olivine, plastic (ball) clays, quartz, and silica (industrial) sand in the world, and Sibelco Deutschland GmbH (a German subsidiary of S.C.R.-Sibelco) was Germany's leading producer of mineral raw materials for use in the production of ceramics. Other than this subsidiary of a multinational company, family-owned small and medium-scale enterprises (SMEs) accounted for most of the remainder of the country's production of ceramic, kaolinitic, and plastic (ball) clays in the country. S&B Industrial Minerals S.A. of Greece was the leading producer of bentonite in the EU and the second ranked producer of bentonite in the world. Süd-Chemie AG was the leading supplier of bentonite-based adsorbents and additives in the world, and the company was the other major producer of bentonite in Germany (besides S&B). HeidelbergCement AG was the leading producer of cement in the country and the third ranked producer in the world. HeidelbergCement was also the world's leading producer of aggregates. K+S Aktiengesellschaft (K+S AG) was the leading producer of potash and salt (NaCl) in the EU, and the company was the leading producer of salt and the fourth ranked producer of potash in the world (table 2; Arbeitsgemeinschaft Westerwald-Ton e.V., 2009; HeidelbergCement AG, 2009, p. 3; 2010, p. 7, 66; Bundesanstalt für Geowissenschaften und Rohstoffe, 2010, p. 74-78; K+S Aktiengesellschaft, 2010a, p. 5, 12, 26; S&B Industrial Minerals S.A., 2010, p. 26; Süd-Chemie AG, 2010, p. 61; Sibelco Deutschland GmbH, undated).

In 2009, RWE Power AG accounted for about 54% of the total production of lignite in Germany, and about 89% of the company's lignite production was used to generate electricity domestically. RWE was the leading producer of electricity in Germany, the second ranked producer in the Netherlands, and the third ranked producer in the United Kingdom. About 90% of all the lignite produced in Germany was used domestically to produce electricity. In 2009, 77% of the salable production of hard coal in the country was used to produce electricity, 20% was used to produce steel, and about 3% was used to produce thermal energy. Reliable information concerning the individual production capacities of the six remaining hard coal mines in Germany was not available, especially as production may have been decreasing as these mines continue to get nearer to their expected closure dates (table 2; Bundesanstalt für Geowissenschaften und Rohstoffe, 2010, p. 55-56; Bundesministerium für Wirtschaft und Technologie, 2010a, p. 11, 15; Gesamtverbands Steinkohle e.V., 2010, p. 10-14; RWE Aktiengesellschaft, 2010, p. 1, 32, 80).

## Mineral Trade

Data on exports and imports of selected mineral commodities in 2008 (the latest year for which data were available) are provided in tables 3 and 4, respectively. In 2008, Germany produced enough potash to account for 100% of the country's domestic demand (volume) and was able to export about four times (432%) the domestic volume of consumption; the same was true for the country's production and exports of sulfur (69%), gypsum and anhydrite (31%), aggregates (6%), salt (6%), limestone and dolomite (1%), and lignite (0.6%). In addition to being 100% dependent on imports of metallic ores and concentrates, Germany also imported 100% of the magnesite; natural graphite; phosphates; and soapstone, steatite, and talc consumed in the country. In addition, imports accounted for 97% of the country's consumption of crude petroleum; 88%, of fluorspar; 84%, of natural gas; 78%, of barite; 72%, of hard coal; 48%,<sup>2</sup> of refined copper; 47%,<sup>2</sup> of aluminum; 44%, of bentonite; 28%,<sup>2</sup> of refined lead; 9.5%, of feldspar; and 4.3%, of kaolin (tables 3, 4; Bundesanstalt für Geowissenschaften und Rohstoffe, 2010, p. 39-41).

Although Germany has traditionally attempted to import minerals from as diverse a number of source countries as possible, the country has had to depend on individual countries for close to 80% (or even more) of certain minerals during one or more years between 2000 and 2009. For at least 1 year during this timeframe, Brazil had accounted for 80% or more of Germany's imports of ferromanganese; Chile had accounted for that of lithium carbonate; China had accounted for that of antimony, barite, ferrotungsten and (or) tungsten oxides and hydroxides; fluorspar, graphite, manganese, and rare earths; Guinea had accounted for that of bauxite; and South Africa had accounted for that of chromite, ferrochromium, and (or) the PGMs iridium, osmium, platinum, and (or) ruthenium. According to an analysis of the concentration of mineral supply by country (using an index indicator based on the Herfindahl-Hirschman Index) combined with the country risk ratings of the World Bank's Aggregate Governance Index, the EC determined that enough of a supply risk to EU countries existed for supplies of antimony, beryllium, cobalt, fluorspar, gallium, germanium, graphite, indium, magnesium, niobium, PGMs, rare earths, tantalum, and tungsten to rate these minerals as "critical." In addition to this possible "source country risk," Germany and the EC also expressed concern regarding the possibilities of certain minerals being produced by only a few companies worldwide. Some minerals that were considered by either the EC or Germany's BGR to have a notably high level of corporate concentration in their global production from 1998 through 2008 included numerous industrial minerals, iron ore that is shipped overseas, niobium, PGMs, rare earths, rhenium, and tantalum (table 4; Bundesanstalt für Geowissenschaften und Rohstoffe, 2010, p. 21-24, 41-49; Bundesministerium für Wirtschaft und Technologie, 2010b, p. 6-15, 26-27; 2010c, p. 6-7, 25; European Commission, 2010, p. 5-7, 23-27, 34-35).

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<sup>2</sup>Includes use of primary refined metal that was produced in Germany from imported mineral raw materials.

## Commodity Review

### Metals

**Aluminum.**—During the second quarter of 2009, Norsk Hydro temporarily shut down about 185,000 t/yr of primary aluminum production capacity at the company's Rheinwerk plant at Neuss, and about 700 employees there were given reduced working hours. This restructuring resulted in a decrease in production to 82,000 t of primary aluminum in 2009 by the Rheinwerk primary smelter compared with production of 234,000 t in 2008. In April 2009, the company announced that it was considering shutting down the primary aluminum smelter completely because of high electricity rates in Germany and continuing low demand for aluminum, and Norsk Hydro reported that the company was still discussing this closure through the end of the year and into 2010. Norsk Hydro also owned 50% of Aluminium Norf GmbH (AluNorf) at Neuss, which reportedly operated the leading aluminum hot-rolling mill in the world, and the total number of Norsk Hydro employees in Germany decreased to 4,417 at the end of 2009 compared with 4,553 at yearend 2008 (Hogan, 2009b; Norsk Hydro ASA, 2010, p. 20, 27, 30, 46, 56).

Trimet did not appear to close any aluminum plants completely in 2009, and the company also arranged for employees to work part time during 2009. The number of Trimet employees from July 1, 2008, through June 30, 2009, decreased to 1,548 from 1,569 during the same period from mid-2007 though mid-2008, and the number of employees at the company that underwent additional training (while working part time) increased by about 18% during this timeframe. Trimet reported that the company's production of primary aluminum during the first half of 2009 was (at most) about 60% of production capacity, on average, and that the company's plant at Essen produced at about 45% and the Hamburger Aluminium-Werke (HAW) plant produced at about 70% of their primary aluminum production capacities. Trimet reportedly expected to increase production of primary aluminum at Essen to more than 50% of production capacity, but information on actual production volumes during all of 2009 was not available (Gesamtverband der Aluminiumindustrie e.V., 2009; Hogan, 2009a; Trimet Aluminium AG, 2009, p. 2, 16-17, 28-29, 36-40; Bundesanstalt für Geowissenschaften und Rohstoffe, 2010, p. 65-66).

Aleris International Inc. of Beachwood, Ohio was expected to emerge from Chapter 11 bankruptcy proceedings as a privately owned company on or around June 1, 2010. The company's Europe segment claimed that its operations were not significantly interrupted by the bankruptcy proceedings in the United States. Separate information concerning the actual production of secondary aluminum by Aleris's subsidiary in Germany (Aleris Recycling [German Works] GmbH) was not available (Aleris Europe, 2009; Aleris International Inc., 2010).

**Copper.**—In 2009, about 57% of Germany's production of refined copper was used in electronics and for cables, 15% was used in construction, and 8% was used in the mechanical engineering sector. During fiscal year 2009, which ran from October 1, 2008, through September 30, 2009, Aurubis AG produced 571,000 t of copper cathodes at the company's main

production sites in Hamburg and Luenen (Germany), and this production was not significantly less than the total of 572,000 t of copper cathodes produced at the same locations during fiscal year 2007, which ran from the beginning of October 2006 through the end of September 2007. Separate data on production of copper cathodes at Aurubis's copper cathode production sites in Germany during fiscal year 2008 was not available, but the company expected its production of copper cathodes in Germany to increase slightly during fiscal year 2010. During 2009, Aurubis did employ part-time workers at its copper production sites in Germany and also hired 58 new apprentices and 13 new trainees to work at its main primary copper production facilities in Hamburg. By December 15, 2009, Salzgitter had purchased enough shares to increase its ownership share in Aurubis to about 25% (Aurubis AG, 2009, p. 7, 11, 27, 66-68; 2010, p. 48, 66; Norddeutsche Affinerie AG, 2009, p. 62-63; Bundesanstalt für Geowissenschaften und Rohstoffe, 2010, p. 66-68).

**Iron and Steel.**—About 12,500 employees of ThyssenKrupp AG in Germany worked part time in 2009, and most of these were in the company's steel segment. ThyssenKrupp expected to reduce part-time working in the company significantly towards the end of the year. Each year, on average, about 40% of the company's steel products are sold to the automobile sector. In 2009, the value of orders for ThyssenKrupp's crude steel output decreased by about 41% compared with that of 2008, and the company reacted by shutting down production capacity for repairs. In March 2009, ThyssenKrupp shut down the company's blast furnace 9, which had a production capacity of 4,500 metric tons per day of hot iron metal; temporarily shut down blast furnace A at the company's 50%-owned subsidiary Hüttenwerke Krupp Mannesmann GmbH (HKM); and operated the company's other three blast furnaces at minimum levels through the end of July. ThyssenKrupp gradually increased the capacity utilization at these last three blast furnaces and restarted the production of blast furnace 9 on November 1, 2009. In 2009, ThyssenKrupp's production of crude steel (not including the company's share of production by HKM) decreased by 35% (to 9.2 Mt of crude steel) compared with that of 2008. As of September 30, 2009, the steel segment of ThyssenKrupp employed 39,156 people compared with 41,311 employees on the same date in 2008. The company expected that its restructuring in 2009 would make it a more efficient producer in 2010 and beyond (Gerlach, 2009; ThyssenKrupp AG, 2009, p. 6, 79-81, 103, 112-113; Stahlinstitut VDEh and Wirtschaftsvereinigung Stahl, 2010, p. 43).

After ThyssenKrupp, the three top producers of crude steel in Germany in 2009 had the following production levels and levels of employment in the country: ArcelorMittal produced a total of 5.3 Mt of crude steel and had about 7,600 employees in Germany compared with 8.2 Mt of crude steel and 7,800 employees in the country in 2008; Salzgitter produced 4.9 Mt of crude steel and had about 24,000 employees compared with 7 Mt and about the same number of employees in the country in 2008; Hüttenwerke Krupp Mannesmann produced 2.8 Mt of crude steel and had about 3,000 employees compared with 5.2 Mt of crude steel and about the same number of employees in 2008. In March 2009, Salzgitter temporarily shut down blast

furnace C, which had a capacity of 1,900 metric tons per day of pig iron, but the company kept its other two larger blast furnaces (A and B) running. In 2009, Salzgitter experienced about a 40% decrease in orders for steel, and crude steel production capacity utilization was about 50% at some of the company's operations. The iron and steel sector in Germany did not experience a significant drop in the number of permanent employees, overall, because of Kurzarbeit policies and allowing employees to use up accrued working credits during the widespread decreases in production (mostly in response to decreased demand from the transportation and mechanical engineering sectors in the country). The iron and steel sector did appear to have a decrease in the number of trainees in 2008 and 2009, however, unlike in some other sectors of the mineral industry (Stahlinstitut VDEh and Wirtschaftsvereinigung Stahl, 2009, p. 24-26, 29-30, 34-36; 2010, p. 12-14; 24-26, 29-30, 34-36; Bundesanstalt für Geowissenschaften und Rohstoffe, 2010, p. 58-61; Salzgitter AG, 2010, p. 85, 91, 103).

**Lead.**—Annually, replacement of vehicle batteries accounts for about 40% of the world's demand for lead, and there was reportedly a substantial increase in battery demand in Europe in early 2009 [which could have been owing to more people attempting to extend the useful life of their existing vehicles (requiring new batteries) for a longer period of time during the economic recession combined with harsher winter weather conditions that may have required a greater intensity of battery use than during early 2008]. In Germany, about 100,000 t of lead contained in batteries is recycled every year, although more specific data on actual recovery of lead from batteries in the country in 2009 were not available. Berzelius was believed to be one of the leading producers of secondary lead in the world, although reliable information on the world's secondary production of lead by company was not available. In 2009, Recylex S.A. operated in Belgium, France, and Germany, and claimed to be the third ranked producer of lead metal in Europe. The company also cited the weather conditions in Europe during 2009 as being conducive to battery replacement, and Recylex processed slightly greater than 131,000 t of batteries compared with about 122,000 t in 2008. Despite the increase in the tonnage of batteries processed, Recylex decreased production to about 120,000 t of lead metal compared with 136,000 t in 2008, and most of this production during both years was at the company's lead processing facilities in Nordenham. Recylex combines lead recovered from secondary sources (mostly batteries) with lead from ore in the company's production of primary lead, but information concerning the exact proportion of primary lead was not available (Taylor, 2009; Bundesanstalt für Geowissenschaften und Rohstoffe, 2010, p. 68-70; Recylex S.A., 2010, p. 2, 8-11).

**Zinc.**—In addition to the drastic reduction in production of both primary and secondary zinc metal attributable to the closure of Ruhr-Zink at the end of 2008, Xstrata decreased production of zinc metal at the company's Nordenham smelter by about 13% as part of a restructuring of the company's global zinc business during the first half of 2009. During the second half of 2009, however, Xstrata increased production at Nordenham, and this facility ended up producing 140,615 t of zinc metal during the entire year, which was only about 3% less

than the 144,994 t produced by the company at Nordenham in 2008. During 2008, GEA Group AG attempted to find a buyer for Ruhr-Zink but ended up closing Ruhr-Zink's plant in Datteln on December 31, citing significant losses by Ruhr-Zink during the year. During the first half of 2009, Recylex did not recycle any zinc-enriched steel mill dust until after April, and the company produced about 43,000 t of Waelz oxides during the entire year compared with 73,000 t in 2008. (The company then sold these zinc oxides to zinc producers to produce zinc ingots, but information concerning the exact locations where this secondary zinc metal was finally produced was unavailable.) In 2009, Recylex produced only about 22,000 t of zinc oxides from scrap zinc compared with 31,000 t in 2008 because the company temporarily closed its secondary zinc plant in Oker-Goslar during part of 2009. Recylex sold almost all the high-purity zinc oxides that it produced from spent zinc to manufacturers of cosmetics, glass, pharmaceuticals, and tires (GEA Group AG, 2009, p. 4, 30, 118-119; Recylex S.A., 2009, p. 1, 63; 2010, p. 1-4, 12-15; Bundesanstalt für Geowissenschaften und Rohstoffe, 2010, p. 70-71; Xstrata plc, 2010, p. 5, 11, 14-15, 19, 26, 43, 87-91, 95).

### **Industrial Minerals**

**Cement.**—In 2009, production by companies in the construction sector (including cement companies and producers of minerals used intensively in construction projects) could have depended on the efficacy of Government stimulus measures to increase the number of construction projects (including infrastructure projects) and on the extent of possible construction in excess of demand (overbuilding) before the economic downturn. Also, if Governments spent almost all of the stimulus funds before 2009 (or early in 2009) and only had large debts for a significant portion of 2009 (or expected to in 2010), then this could have led to cutbacks in publically funded construction and infrastructure projects, which might have negatively affected production by companies in the construction sector. HeidelbergCement estimated that Government stimulus programs in both Europe and in the United States did not appear to have had a sufficiently strong effect on the construction sectors in either location in 2009, although the company expected that the full effect of stimulus measures on the production of its subsidiaries might not be felt until sometime in 2010. HeidelbergCement reported that the company's volume of sales of cement in Germany in 2009 was only slightly lower than that of 2008, although information on individual companies' actual tonnages of annual production in the country was not available. Production of limestone and dolomite for use in the manufacturing of cement in Germany decreased to about 43.3 Mt compared with 50.8 Mt in 2008, and this decrease in production was consistent with the decrease of about 9.4% in the production of cement in the country during this timeframe (Simonian, 2008; Hammond, 2009; Bundesanstalt für Geowissenschaften und Rohstoffe, 2010, p. 77; HeidelbergCement AG, 2010, p. 26-27, 47-48, 66-73)

**Clay and Shale.**—Production of specialty clays, including ceramic and refractory clays, took place in almost all the States of Germany, but the greatest share of the country's

total production of specialty clays happened in the State of Rhineland-Palatinate, which includes almost all the Westerwald region. In 2009, marketable production of specialty clays in Rhineland-Palatinate totaled 2.8 Mt compared with about 3.1 Mt in 2008, about 1.2 Mt was produced in the State of Bavaria (the second ranked State for the production of specialty clays in the country) compared with about 1.3 Mt in 2008, and slightly less than 0.8 Mt was produced in the State of Baden-Württemberg (the third ranked State) compared with 1.0 Mt in 2008. The kaolinitic clays of the Westerwald region also appear to be used mostly in ceramics, and it was not clear if most of the production of kaolinitic clays in the Westerwald region was classified as kaolin or as specialty clays. Demand for ceramic clays produced in Germany (including in one of the Westerwald's apparently leading sales markets—tile manufacturing in Italy) appeared to decrease during the economic downturn, whereas demand for kaolin produced in Germany appeared to increase during the same timeframe. The leading market for clays classified as kaolin in Germany appeared to be for use in the manufacturing of paper. Marketable production of kaolin in Bavaria increased to 3.2 Mt compared with about 2.2 Mt in 2008, and that in the State of Saxony decreased to about 1.2 Mt compared with 1.3 Mt in 2008. In 2008 and 2009, marketable production of clays classified as kaolin took place in only five States in Germany, and that in Bavaria and Saxony accounted for slightly greater than 98% of the country's total marketable production of kaolin in 2009. By far the leading region for production of kaolin in Germany was the upper palatinate region in Bavaria (Arbeitsgemeinschaft Westerwald-Ton e.V., 2009, 2010; Roberts, 2009; Bundesministerium für Wirtschaft und Technologie, 2009, p. 55-59; 2010a, p. 26-29, 54-58; Bundesanstalt für Geowissenschaften und Rohstoffe, 2010, p. 75-78; Bundesverband Keramische Rohstoffe und Industriemineralien e.V., 2010, p. 8-18).

**Potash.**—In 2009, K+S AG responded to a considerable shift in the relative demand for the company's production of potash to outside of its traditional European market. In 2009, K+S AG's sales of potash and magnesium products outside of Europe accounted for 56.1% of revenues from this segment of the company's business compared with 37.3% in 2008, that within Europe (excluding Germany) accounted for just 31.6% compared with 49% in 2008, and that just within Germany still accounted for 12.3% compared with 13.7% in 2008. The leading cause of this shift appeared to be an increase in company sales of potash to China. Germany exported about 170,000 t of potash to China during the first quarter of 2009, which was estimated to be about three times as much as during the same period in 2008. The substantial increase in China's demand for potash from Germany appeared to be mostly owing to a drought in China coupled with lags in negotiations between Chinese buyers and the world's leading potash suppliers, including those sourcing potash from Belarus, Canada, Israel, and Russia. All the potash produced by K+S AG in 2009 was from six mines in Germany, and the company's total marketable production of potash during the entire year decreased by about 44% compared with that of 2008. About 88% of K+S AG's employees in the company's potash and magnesium products business segment in Germany

had to work part time, but the company only had to decrease the number of employees in this segment to 7,818 compared with 7,845 in 2008. With the help of the Federal Government's Kurzarbeit working program in 2009, K+S AG increased the percentage of (initial) trainees in the company's total workforce in Germany to 6.3% compared with 6% in 2008, and 6,977 existing employees participated in further education and training programs with K+S AG compared with 5,550 in 2008 (Helmer, 2009; Bundesanstalt für Geowissenschaften und Rohstoffe, 2010, p. 74, 86, 169; Bundesministerium für Wirtschaft und Technologie, 2010a, p. 23-25; K+S Aktiengesellschaft, 2010a, p. 5-7, 26-34; 2010b, p. 76-80, 87-88, 112-114, 149).

**Salt.**—In 2009, it appeared as if Südsalz GmbH (a 90%-owned subsidiary of Südwestdeutsche Salzwerke AG) increased production of rock salt and unspecified (nonindustrial) salt brines in Germany to about 4 Mt compared with about 3 Mt in 2008, and esco-european salt company GmbH & Co. KG (a 100%-owned subsidiary of K+S AG) appeared to increase production of the same classification of salt products in the country to 4.5 Mt compared with about 3.5 Mt during this timeframe. In 2009, the combined production by these two companies accounted for about 96% of the total production of rock salt and unspecified brines in Germany, and both companies cited the average increase in severity and duration of the winter conditions in Europe in 2009 as the primary reason for the increased demand for their salt products. According to a measure of degree days, 2009 in Germany was estimated to have been about 2% colder than 2008 in the country, on average (Bundesanstalt für Geowissenschaften und Rohstoffe, 2010, p. 74-75, 187; Bundesministerium für Wirtschaft und Technologie, 2010a, p. 9, 25-26; K+S Aktiengesellschaft, 2010b, p. 11, 30, 58, 62-64; Südwestdeutsche Salzwerke AG, 2010, p. 40-41).

### **Mineral Fuels**

**Coal.**—Hard coal mining was centered in the Ibbenbüren, the Ruhr, and the Saar coalfields in Germany and was uneconomical without a subsidy. The Lippe and the Walsum Mines were located in the Ruhr coal mining district, and their closures resulted in a decrease of production in the Ruhr district to 10.9 Mt of anthracite and bituminous coal compared with 14.2 Mt in 2008. The Federal Government's program to eliminate subsidies for hard coal mining by 2018 came into effect on December 28, 2007, and the plan was to be reviewed in 2012 to determine whether it should be amended. An economic consequence of decreasing production of hard coal domestically is that Germany will become more dependent on costly imported coke and coking coal from hard coal mines outside of the country, and this will subject sectors of the mineral industry, such as steel manufacturing, and other sectors of the economy to greater cost uncertainty. In 2009, Germany's production of coke from hard coal decreased to about 6.8 Mt compared with about 8.2 Mt in 2008, and the average price of German imports of coking coal increased to \$242 per metric ton compared with about \$186 per metric ton in 2008. The decrease in steel production in the country, however, was held mostly responsible for a 32% decrease in Germany's consumption of coke and

coking coal during this timeframe, and this led to a decrease in imports of coke from hard coal to about 3 Mt from 5 Mt in 2008 and a decrease in imports of coking coal to 6.8 Mt from about 9.5 Mt in 2008 (Bundesanstalt für Geowissenschaften und Rohstoffe, 2010, p. 27, 53-55, 85, 90-91; Bundesministerium für Wirtschaft und Technologie, 2010a, p. 9-14; Gesamtverbands Steinkohle e.V., 2010, p. 7-8, 11, 41, 54).

Electricity consumption was a subset of primary energy consumption in Germany, and combustion of lignite accounted for 24.6% of the electricity supply in the country in 2009. (Nuclear fuel accounted for 22.6% of the electricity supply in Germany in 2009; hard coal, 18.3%; natural gas, 13%; and renewable energy, 15.6%, including 6.4% by wind power and 3.2% by hydroelectric power.) In 2009, 153.4 Mt of lignite was used to produce electricity in the country compared with 159.4 Mt in 2008. In 2009, there were about 22,600 total workers employed in the lignite sector, including about 16,600 employed in enterprises that mined lignite and about 6,000 employed in powerplants that burned lignite to generate electricity, and this was slightly greater than approximately 22,500 total workers, including 16,530 and about 5,950, respectively, in 2008. In 2009, RWE produced about 92 Mt of lignite compared with 96 Mt in 2008 at the company's Garzweiler, Hambach, and Inden Mines in the Rhineland, which was the main region for production of lignite by RWE and for Germany (Bundesministerium für Wirtschaft und Technologie, 2009, p. 15; 2010a, p. 9-11, 14-16; Bundesanstalt für Geowissenschaften und Rohstoffe, 2010, p. 21, 50, 55-57; RWE Aktiengesellschaft, 2010, p. 80).

**Natural Gas.**—In 2009, consumption of natural gas in Germany decreased by about 5.5% compared with that of 2008 owing to a decrease in consumption by German industry (including companies in the mineral industry) and powerplants that burn natural gas to generate electricity. Although RWE was the leading producer of electricity in Germany, E.ON AG appeared to have been the leading energy utility company in the country, and this may have been owing to E.ON possibly providing a greater total amount of energy contained in natural gas as well as electricity to consumers than did RWE. In 2009, most of the natural gas stored and (or) distributed by E.ON in Germany appeared to be procured from other natural gas production companies, although E.ON did appear also still to be producing natural gas in the North Sea. The company procured natural gas from companies in Norway (which accounted for 27% of E.ON's total procurement of natural gas in 2009), Russia (26%), Germany (22%), and the Netherlands (15%). In 2009, domestic production accounted for about 16% of Germany's total consumption of natural gas (which was approximately the same percentage as in 2008), and production in the State of Lower Saxony accounted for about 94% of the country's total production of natural gas. In 2009, the leading producers of natural gas in Germany were BEB Erdgas und Erdöl GmbH (which produced 6.3 billion cubic meters), Mobil Erdgas-Erdöl GmbH (3.5 billion cubic meters), and RWE-Dea AG (2.2 billion cubic meters). The leading field for the production of natural gas in the country was the Rotenburg-Taaken complex of fields in Lower Saxony (co-owned by Mobil Erdgas-Erdöl and RWE-Dea), which produced about 2.3 billion cubic meters

of natural gas and accounted for about 15% of the total production of natural gas in Germany in 2009 (Bundesanstalt für Geowissenschaften und Rohstoffe, 2010, p. 49-53; Bundesministerium für Wirtschaft und Technologie, 2010a, p. 18-20; E.ON AG, 2010, p. 4, 10, 15, 46; Landesamt für Bergbau, Energie und Geologie, 2010, p. 34-38).

## Reserves and Resources

At the end of 2009, Germany's reserves of lignite were estimated to be 40.6 billion metric tons (Gt), and this preliminary figure was equal to the estimated lignite reserves at yearend 2008; the country's reserves of natural gas were estimated to have decreased to 162 billion cubic meters compared with about 194 billion cubic meters in 2008; and its reserves of crude petroleum were estimated to be 301 million barrels (Mbbbl) (converted from a reported figure of 41.131 Mt) compared with 249 Mbbbl (33.981 Mt) in 2008. At the end of 2008 (the latest year for which reliable data were available), K+S AG estimated company reserves of potash (K<sub>2</sub>O content) to be slightly greater than 147 Mt and the company's reserves of salt in Germany to be about 206 Mt. Reliable information concerning additional reserves of industrial minerals in the country was not available (Bundesanstalt für Geowissenschaften und Rohstoffe, 2009, p. 25, 168; 2010, p. 51-55, 190, 192-193, 202; Bundesverband Braunkohle e.V., 2009; Bundesministerium für Wirtschaft und Technologie, 2010a, p. 17, 19; K+S Aktiengesellschaft, 2010b, p. 243-244; Landesamt für Bergbau, Energie und Geologie, 2010, p. 39-42).

Assuming that the phasing out of the Federal Government's subsidy of hard coal production would proceed according to the schedule as it stood in 2009, this policy will gradually increase the volumes of hard coal resources in Germany that are not economical to mine until the end of 2018, when zero hard coal in the country is expected to be economically profitable to produce. In 2009, however, the Government had an estimate of how much hard coal would be produced in 2010 and through 2018 (conditional on the subsidies allowing it to be economic to do so), and considered this estimated future production to represent a type of reserve figure for hard coal in Germany. Under this definition, the country's economically exploitable reserves of hard coal (in the presence of planned subsidies) were estimated to be about 73 Mt at the end of 2009 compared with about 99 Mt at yearend 2008, and the country's annual production of hard coal was expected to be the primary reason for annual decreases in reserves until the end of 2018. In 2009, the country's hard coal resources remained at approximately 83 Gt, which was the same as the hard coal resource estimate in 2008 (Bundesanstalt für Geowissenschaften und Rohstoffe, 2009, p. 25, 160; 2010, p. 196).

## Outlook

German Government and EU policies are expected to have a strong influence on the future of the mineral industry in Germany, especially in the realm of securing supplies of mineral raw materials (including scrap) and enabling provision of electrical power at prices that could help keep the companies

in the country's mineral industry internationally competitive. Consumption of mineral fuels produced and distributed in Germany decreased substantially during the downturn, but E.ON, RWE, and other energy companies expected that demand for mineral fuels, such as coal and natural gas, would increase again in 2010 and beyond. This could be because of evolving constraints on the development of alternative energy sources, such as uncertainty in Germany's ability to secure rare-earth elements from China for a planned expansion in construction and installation of wind turbines or limits on Germany's use of solar technology owing to the typically cloudy weather conditions in the country (and the costliness of installing the infrastructure necessary to transmit solar power from more sunny regions); increased development and use of clean coal technologies in the country; ongoing efforts by the EU to decrease use of nuclear power within the region; and (or) additional factors. RWE expected that the company would complete construction and startup a modern lignite-fired powerplant in Neurath (near Cologne) sometime in 2011 and that this new powerplant would increase demand for (and the company's production of) lignite in Germany. At least until yearend 2012, however, it did appear to be fairly certain that Germany would continue to proceed towards elimination of the production of hard coal in the country by 2018, including planned closures of the Ost Mine on September 30, 2010, the Saar Mine on July 1, 2012, and the West Mine at the end of 2012. This would leave only three mines producing hard coal in Germany in 2013 (Watson, 2009; Bundesanstalt für Geowissenschaften und Rohstoffe, 2010, p. 23-24; E.ON AG, 2010, p. 48-51; Gesamtverbands Steinkohle e.V., 2010, p. 12-14, 35-38, 41-51; RWE Aktiengesellschaft, 2010, p. 77, 105-112).

During the economic downturn, many mineral companies in Germany were able to avoid permanent closures of production capacity and to retain most of their permanent highly trained employees; possibly to increase efficiencies through (re)training of workers, purchase more modern equipment, and improve processing technologies; invest in research and development of new mineral-based products; and find new uses for existing products to stay competitive in the evolving global market for minerals. Many new uses for industrial minerals produced in Germany are continuing to be investigated, such as increasing the use of various industrial minerals in waste remediation (including using more bentonite to help with nuclear disposal) and in sequestration of carbon dioxide. Metal foundries are important users of such industrial minerals as bentonite and silica, and expected increases in foundry production in 2010 and beyond could have a corresponding effect on levels of production of these industrial minerals in the country. Similarly, other industrial minerals produced in Germany are used in the country's metallurgical sector (such as fluorspar being used in the manufacturing of both aluminum and steel), and expected increases in production of these metals in the country in 2010 could correlate with increased production of these industrial minerals (Gesamtverband der Aluminiumindustrie e.V., 2009; Hawley, 2009a, b; Bundesministerium für Wirtschaft und Technologie, 2010a, p. 26-30).

In the latter part of 2008 and early 2009, the continuing economic downturn caused a decrease in demand for the mineral-based products that Germany produces mainly in the construction, mechanical engineering, and transportation sectors. The steel sector (and production of associated ferroalloys used in specialty steels, and so forth) was particularly hard hit because this sector relies heavily on demand from all these sectors. In 2010, significant economic recovery was expected in the transportation (automobile industry) and mechanical engineering sectors, but the construction sector was not expected to increase production significantly until sometime in 2011, depending on the timing of expected effects from stimulus measures and public spending on construction projects. Thus, significant increases in Germany's production of such construction mineral materials as cement, gypsum, and certain clays were not expected until 2011, and production of nonferrous metals in the country was expected to increase in 2010. The outlook for Germany's production of steel in 2010 was also very positive, but production of steel in the country was not expected to reach 2007 levels until after 2011. Even if demand for the products of Germany's mineral industry increases, however, the costs of raw materials were expected also to increase, and the mineral industry companies in the country will continue to face both country-specific and supplier company-specific risks in securing a supply of mineral raw materials. As an example of the company-specific risks faced by the steel industry, more than 50% of the world's coking coal was produced by just four companies worldwide, and 60% of the world's overseas shipments of iron ore were supplied by just three companies in 2009. Since the closure of Ruhr-Zink, production of primary zinc metal in Germany appears unlikely to increase much above the 2009 level, although production of secondary zinc could increase, especially if there is an increase in steel production (European Confederation of Iron and Steel Industries, 2010; Gesamtverbands Steinkohle e.V., 2010, p. 54-55, 61; Schäfer, 2010; Stahlinstitut VDEh and Wirtschaftsvereinigung Stahl, 2010, p. 3).

Future levels of production of fertilizer minerals (such as potash) in Germany was expected to vary more with respect to fluctuations in demand outside of Europe, whereas the country's production of salt was expected to be more closely correlated with demand inside Europe. In 2010 and beyond, K+S expected increases in the global population and in the level of prosperity in emerging market economies, including those of Latin America and Southeast Asia. In addition to this growth leading to an expected increase in the intensity of land cultivation overall, the company also expected that consumption patterns in these countries would continue to include increases in meat consumption, which would increase the need for animal feed and therefore increase demand for almost all of the company's fertilizer products (including potash) even more than just an increase in the total level of food consumption. In 2009 and into 2010, the company was reportedly examining projects to enhance its base stock of available mineral raw materials to help it increase production in response to expected increases in global demand for the company's production of potash and other fertilizer materials, but information concerning company approval of a specific project was not available (K+S Aktiengesellschaft, 2010b, p. 141-150).

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TABLE 1  
 GERMANY: PRODUCTION OF MINERAL COMMODITIES<sup>1</sup>

(Metric tons unless otherwise specified)

Commodity	2005	2006	2007	2008	2009
<b>METALS</b>					
<b>Aluminum:</b>					
Alumina <sup>e</sup> thousand metric tons	830	850	1,000	900 <sup>r</sup>	900 <sup>e</sup>
Aluminum hydroxide, Al <sub>2</sub> O <sub>3</sub> equivalent do.	1,255	1,393	1,388	1,395	1,154
<b>Metal:</b>					
Primary	647,934	515,539	551,030	605,876	291,750
Secondary	718,291	795,668	857,619	720,898	560,755
Total	1,366,225	1,311,207	1,408,649	1,326,774	852,505
Cadmium, metal, refinery, including secondary <sup>e</sup>	640	640	400	420 <sup>r</sup>	278
Cobalt, matte, including shavings and scrap	601	686	685	913	654
<b>Copper, metal:</b>					
<b>Smelter:</b>					
Primary	257,200	273,800	270,200	295,000	251,100 <sup>p</sup>
Secondary	251,400	266,300	273,400	293,300	282,700 <sup>p</sup>
Total	508,600	540,100	543,600	588,300	533,800 <sup>p</sup>
<b>Refined:</b>					
Primary	293,812	312,092	301,702	300,470	290,200
Secondary	344,446	350,246	363,815	389,300	378,745
Total	638,258	662,338	665,517	689,770	668,945
Gallium, crude <sup>e</sup>	12	12	12	12	10
Indium, refined <sup>e</sup>	10	10	10	10	10
<b>Iron and steel:</b>					
<b>Ore, run of mine:<sup>2</sup></b>					
Gross weight thousand metric tons	360	416	422	455	364
Fe content do.	38	44	44	48	38
<b>Metal:</b>					
Pig iron do.	28,854	30,362	31,149	29,111	20,104
Direct-reduced iron do.	440	580	590	520	380
<b>Ferroalloys:</b>					
Ferrochromium	22,672	26,710	22,030	26,960	13,667
Other <sup>e</sup>	25,400 <sup>3</sup>	24,100 <sup>3</sup>	5,000	5,000	--
Steel, crude thousand metric tons	44,524	47,224	48,550	45,833	32,671
Semimanufactures do.	37,771	41,174	41,999	39,805	29,041
<b>Lead, metal, refined:</b>					
Primary	118,778	113,760	110,934	113,200	104,900 <sup>p</sup>
Secondary	298,915	265,190	294,147 <sup>r</sup>	301,900	285,700 <sup>p</sup>
Total	417,693	378,950	405,081 <sup>r</sup>	415,100	390,600 <sup>p</sup>
Magnesium, metal including castings	27,282	30,556	30,791	29,818	20,015
Platinum-group metals, metal, refined kilograms	104,725	116,350	137,645	121,597	110,000 <sup>e</sup>
Selenium, metal <sup>e</sup>	680	720	700	250 <sup>r</sup>	250
Silicon, metal <sup>e</sup>	29,349 <sup>4</sup>	35,500	35,254 <sup>4</sup>	35,000	20,000
Silver, metal, refined, including secondary	1,386	1,527	1,673	1,783	1,616
Tin, alloys	5,612	6,046	6,674	6,114	5,003
<b>Zinc, metal:</b>					
Primary	245,140	245,883	206,000 <sup>r,e</sup>	211,370	134,000 <sup>e</sup>
Secondary	89,751	96,683	89,000 <sup>r,e</sup>	80,910	19,000 <sup>e</sup>
Total	334,891	342,566	294,735 <sup>r</sup>	292,280	153,000 <sup>e</sup>

See footnotes at end of table.

TABLE 1—Continued  
GERMANY: PRODUCTION OF MINERAL COMMODITIES<sup>1</sup>

(Metric tons unless otherwise specified)

Commodity	2005	2006	2007	2008	2009
<b>INDUSTRIAL MINERALS</b>					
Abrasives, manufactured	73,620	75,817	84,666	94,566	48,802
Aluminum salt slag, Al <sub>2</sub> O <sub>3</sub> equivalent <sup>c</sup> thousand metric tons	200	200	200	200	150
Barite, marketable (contained BaSO <sub>4</sub> )	88,591	85,524	88,265	78,941	45,606
Boron compounds, manufactured, including boric acid and oxide	203,475	222,169	217,885	204,411	129,928
Bromine compounds, including oxide	274	431	1,612	1,680 <sup>r,e</sup>	960 <sup>e</sup>
<b>Cement:</b>					
Clinker, intended for market thousand metric tons	24,378	24,921	26,992	25,366	23,232 <sup>p</sup>
Hydraulic do.	31,009	33,630	33,382	33,581	30,441 <sup>p</sup>
Chalk, natural, including ground do.	1,068	1,309	1,358	1,495	1,322
<b>Clays, natural:</b>					
Bentonite do.	352	364	385	414	326
Ceramic and refractory clays <sup>e</sup> do.	4,430	4,600	4,400	4,140	3,650
Of which, fire clay and chamotte do.	176	194	252	267	250 <sup>e</sup>
Kaolin, marketable do.	3,768	3,815	3,843	3,622 <sup>r</sup>	4,514
Other, unspecified do.	185	509	467	182	193
Diatomite <sup>e</sup>	1,500	1,500	1,500	1,500	1,500
Feldspar	168,640	167,332	171,303	161,416	160,000
Fluorspar, acid-grade	35,364	53,009	54,359	48,519	49,962
Graphite, mine output	2,638	--	--	--	--
<b>Gypsum and anhydrite:</b>					
Natural thousand metric tons	1,644	1,771	1,898	2,112	1,898
Byproduct of flue-gas desulfurization <sup>e</sup> do.	7,640	7,490	7,100	6,900 <sup>r</sup>	7,100 <sup>e</sup>
Lime, quicklime, dead-burned dolomite do.	6,823	7,119	7,218	7,313	5,830
Magnesium compounds, byproduct of potash mining do.	1,290	1,203	1,357	1,418	811
Nitrogen, N content of ammonia do.	2,789	2,718	2,746	2,819	2,363
Peat, natural thousand cubic meters	283 <sup>r</sup>	248 <sup>r</sup>	97 <sup>r</sup>	135 <sup>r</sup>	135
Phosphoric acid, manufactured, P <sub>2</sub> O <sub>5</sub> content	37,374	34,373	31,684	31,756	19,531
Pigments, iron oxide (including synthetic iron oxide)	231,585	242,264	240,310	251,412	209,172
<b>Potash, K<sub>2</sub>O content:</b>					
Crude thousand metric tons	4,434	4,385	4,406	4,046	2,208
Marketable do.	3,664	3,625	3,637	3,280	1,825
<b>Salt, NaCl content, marketable:</b>					
Evaporated salt, including marine salt do.	594	593	592	580	325
Industrial brines do.	9,904	9,590	10,395	9,084	9,798
Rock salt and other brines do.	8,834	9,663	7,819	6,169 <sup>r</sup>	8,816
Total do.	19,332	19,846	18,806	15,833 <sup>r</sup>	18,939
Siliceous earth, marketable	50,399	53,282	51,980	52,003	42,602
Soda ash (Na <sub>2</sub> CO <sub>3</sub> ), manufactured thousand metric tons	1,533	1,515	1,510	1,567	1,200 <sup>e</sup>
<b>Stone, sand and gravel:</b>					
<b>Stone, crude:</b>					
Dimension, including partially worked do.	212	219	200	207 <sup>r</sup>	380
Of which, dolomite and limestone do.	75	75	63	68	80 <sup>e</sup>
Crushed, not including chalk do.	150,747	162,168	152,790	154,032	155,430
Dolomite and limestone, not for cement manufacture do.	20,600	22,400	22,800	21,300	19,000
<b>Gravel, natural:</b>					
Construction gravel do.	62,498	68,706	65,370	63,962 <sup>r</sup>	59,100 <sup>e</sup>
Crude, including flint and pebbles do.	12,753	13,301	12,928	12,631	10,442
Other gravel, including quartzite do.	12,014	13,326	12,639	11,911	11,000 <sup>e</sup>
<b>Sand, natural:</b>					
Construction sand do.	57,463	59,767	56,851	56,866 <sup>r</sup>	53,400 <sup>e</sup>
Silica sand, including glass sand and quartz sand do.	7,681	7,703	8,382	8,186	6,453
Other, including from granite and pegmatite do.	13,185	13,578	12,796	13,416	12,600 <sup>e</sup>
Total sand and gravel do.	165,594	176,381	168,966	166,972 <sup>r</sup>	153,000 <sup>e</sup>
Strontium carbonate, manufactured <sup>e</sup> do.	80	80	80	80	50

See footnotes at end of table.

TABLE 1—Continued  
GERMANY: PRODUCTION OF MINERAL COMMODITIES<sup>1</sup>

(Metric tons unless otherwise specified)

Commodity		2005	2006	2007	2008	2009
INDUSTRIAL MINERALS—Continued						
Sulfur:						
Marketable	thousand metric tons	1,055	1,114	1,093	1,030	927
Byproduct:						
Metallurgy	do.	2,292 <sup>r</sup>	2,437 <sup>r</sup>	2,454 <sup>r</sup>	2,458 <sup>r</sup>	2,137
Natural gas and petroleum	do.	1,585	1,686	1,637	1,709	1,623
Total	do.	3,877 <sup>r</sup>	4,123 <sup>r</sup>	4,091 <sup>r</sup>	4,167 <sup>r</sup>	3,760
MINERAL FUELS AND RELATED MATERIALS						
Carbon black	do.	333	631	665	607	494
Coal:						
Anthracite and bituminous, marketable	do.	24,713	20,674	21,307	17,077	13,766
Lignite	do.	177,908	176,324	180,412	175,313 <sup>r</sup>	169,857
Coke:						
Of anthracite and bituminous coal	do.	8,397	8,372	8,432	8,246 <sup>r</sup>	6,771
Of lignite	do.	173	181	173	177	153
Fuel briquets:						
Of anthracite and bituminous coal	do.	92	96	89	--	--
Of lignite, including dust and dried	do.	1,490	1,662	1,328	1,631	1,959
Gas:						
Manufactured:						
Blast furnace <sup>e</sup>	million cubic meters	9	9	9	9	6
Coke oven	do.	974	958	970	969	718
Total <sup>e</sup>	do.	983	967	979	978	725
Natural:						
Gross	do.	19,762	19,667	17,966	16,547 <sup>r</sup>	15,554
Marketable	do.	18,666	18,443	16,884	15,377	14,380
Petroleum: <sup>2</sup>						
Crude	thousand 42-gallon barrels	26,200	25,800	25,300	22,400	20,500
Refinery products:						
Liquefied petroleum gas	do.	37,130	36,800	38,560	36,390	33,490
Distillate fuel oil	do.	390,000	380,000	380,000	370,000	360,000
Residual fuel oil	do.	74,500	76,200	75,300	67,500	55,600
Gasoline, including aviation	do.	210,000	210,000	200,000	200,000	200,000
Kerosene and jet fuel	do.	32,700	33,900	35,200	36,500	35,200
Naphtha	do.	94,000	90,000	86,000	87,000	75,000
Refinery gas	do.	50,600	49,100	48,300	47,800	44,500
Bitumen, bituminous mixtures, and other residues	do.	32,100	30,900	31,300	33,900	34,300
Lubricants and miscellaneous oils	do.	14,000	16,000	17,000	17,000	16,000
Petroleum coke	do.	10,900	11,000	10,600	11,500	10,900
Mineral jelly, waxes, and paraffins	do.	1,800	2,000	2,100	1,300	800
Other	do.	9,440	9,850	10,700	8,290	6,040
Total <sup>e</sup>	do.	957,000	946,000	935,000	917,000	872,000
Uranium concentrate, U <sub>3</sub> O <sub>8</sub> content		111	77	48	--	--

<sup>e</sup>Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. <sup>p</sup>Preliminary. <sup>r</sup>Revised. do. Ditto. -- Zero.

<sup>1</sup>Table includes data available through December 31, 2010.

<sup>2</sup>Iron ore is used domestically as an additive in cement and other construction materials but is of too low a grade to be used in the steel industry.

<sup>3</sup>Estimated from reported total marketed production of ferroalloys [Statistische Bundesamt, 2007, Fachserie 4, Reihe 3.1—Produzierendes Gewerbe, Produktion im Produzierenden Gewerbe, Jahr 2006: Wiesbaden, Germany, Statistische Bundesamt, April 30, p. 176].

<sup>4</sup>Reported figure.

<sup>5</sup>All figures were converted to barrels from those reported in metric tons according to data from Mineralölwirtschaftsverband e.V., 2010, Jahresbericht—Mineralöl-Zahlen, 2009: Berlin, Germany, Mineralölwirtschaftsverband e.V., May, p. 48 and 79, and reflect the significant digits of the conversion factors.

TABLE 2  
GERMANY: STRUCTURE OF THE MINERAL INDUSTRY IN 2009<sup>1</sup>

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Abrasives (silicon carbide)	ESK-SiC GmbH	Plant at Grefrath, Cologne	65
Alumina	Almatis GmbH (Dubai International Capital LLC)	Plant at Ludwigshafen	NA
Do.	Nabaltec AG	Plant at Schwandorf	120
Do.	Aluminium Oxid Stade GmbH (DADCO Alumina & Chemicals Ltd., 100%)	Plant at Stade	1,050
Do.	Martinswerk GmbH (Albemarle Corp., 100%)	Plant at Bergheim	350
Aluminum	Hydro Aluminium Deutschland GmbH (Norsk Hydro ASA, 100%)	Rheinwerk primary smelter at Neuss	235
Do.	Metallhüttenwerke Bruch GmbH	Secondary foundry alloy plant at Dortmund; secondary cast alloy plants at Asperg and Bad Saeckingen	110
Do.	Aleris Recycling (German Works) GmbH (Aleris International Inc., 100%)	Secondary smelters: Erftwerk at Grevenbroich, Innwerk at Toeing am Inn, and Neckarwerk at Deizisau	320
Do.	Trimet Aluminium AG	Primary smelter at Essen-Borbeck	175 <sup>e</sup>
Do.	Hamburger Aluminium-Werke GmbH (Trimet Aluminium AG, 100%)	Primary smelter at Hamburg	133
Do.	Aluminiumwerk Voerde Aluminium GmbH (Klesch & Company Ltd., 100%)	Primary smelter at Voerde, North Rhine-Westphalia	90
Aluminum, hot-rolled products	Aluminium Norf GmbH [Novelis Inc. (Hindalco Industries Ltd., 100%), 50%, and Hydro Aluminium Deutschland GmbH, 50%]	Lippenwerk at Luenen (secondary) and rolling mill at Neuss	1,500
Aluminum salt slag	Alsa Technologies GmbH (Agor AG, 100%)	Plants at Hannover, Luenen, and Toeing	380
Do.	K+S Entsorgung GmbH (K+S Aktiengesellschaft, 100%)	REKAL plant at Sigmundshall	100
Arsenic, metal	metric tons PPM Pure Metals GmbH <sup>2</sup> (Recylex S.A., 100%)	Plant at Langelsheim	5
Do.	do. Reinstmetalle Osterwieck GmbH (PPM Pure Metals GmbH, <sup>2</sup> 100%)	Plant at Osterwieck	NA
Barite	Sachtleben Bergbau GmbH	Clara Mine in the Black Forest and plant at Wolfach, and Dreislar Mine at Medebach-Dreislar	87
Do.	Deutsche Baryt-Industrie Dr. Rudolf Alberti GmbH & Co. KG (Sachtleben Bergbau GmbH, 75%, and other private, 25%)	Wolkenhügel Mine <sup>3</sup> in the Harz Mountains and plant at Bad Lauterberg	50
Bentonite	Süd-Chemie AG	Mining near Gammelsdorf, Bavaria, and plants at Moosburg, Duisburg, and Heufeld	500
Do.	S&B Industrial Minerals GmbH (S&B Industrial Minerals S.A., 100%)	Mining in region between Landshut and Mainburg, Bavaria	400
Do.	do.	Stollberg plant at Oberhausen	200 <sup>e</sup>
Do.	do.	Plant at Neuss	50
Do.	Kärlicher Ton- und Schamotte-Werke Mannheim & Co. KG (KTS)	Quarry at Muelheim-Kaerlich	50
Calcium carbonate, natural, ground	Alpha Calcit Fullstoff GmbH & Co. KG	Plant at Cologne	250
Do.	Omya GmbH (Omya AG, 100%)	Plants at Burgberg, Emden, Lagerdorf, and Sohlde, and another plant near Hamburg	2,250
Do.	Eduard Merkle GmbH & Co. KG	Mine at Ulm, Blaubeuren	NA
Calcium carbonate, natural, including chalk	Vereinigte Kreidewerke Dammann KG (OMYA AG, 100%)	Quarries and plants at Laegerdorf, on Ruegen Island, and at Soehle	500
Cement	HeidelbergCement AG	Plant at Burglengenfeld; two plants at Ennigerloh; two plants at Geseke; plants at Koening Wusterhausen, Leimen, Paderborn, Mainz-Weisenau, and Schelklingen; the Lengfurt plant at Triefenstein; and plant at Wetzlar	9,500 <sup>e</sup>
Do.	Dyckerhoff AG (Buzzi Unicem SpA, 88.37%, and other private, 11.63%)	Plants at Deuna, Geseke, Goellheim, Lengerich, Neuss, Neuwied, and the Amöneburg plant at Wiesbaden	7,200

See footnotes at end of table.

TABLE 2—Continued  
GERMANY: STRUCTURE OF THE MINERAL INDUSTRY IN 2009<sup>1</sup>

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Cement—Continued	CEMEX Deutschland AG (CEMEX S.A. de C.V., 100%)	Two plants at Beckum; plants at Dortmund, Duisburg, Eisenhuettenstadt, and Ruedersdorf	6,000
Do.	SCHWENK Zement KG	Plants at Allmendingen, Bernburg, Heidenheim-Mergelstetten, and Karlstadt	5,000 <sup>e</sup>
Do.	Holcim (Deutschland) AG (Holcim Ltd., 88.9%, and other private, 11.1%)	HANSA plant at Bremen, plants at Laegerdorf and Rostock, and the Höver plant at Sehnde	3,600
Do.	Lafarge Zement GmbH (Lafarge S.A., 100%)	Plants at Kall-Soetenich, Karsdorf, and Walzbachtal	3,500
Do.	Holcim (Baden-Württemberg) AG (Holcim Ltd., 100%)	Plant at Dotternhausen	1,600
Do.	TEUTONIA Zementwerk AG (HeidelbergCement AG, 94.2%, and other private, 5.8%)	Plant at Hannover	900
Do.	Märker Zement GmbH	Plants at Harburg and Lauffen	NA
Clays, including ball, ceramic, kaolinitic, and refractory clays	Sibelco Deutschland GmbH (S.C.R.- Sibelco NV, 100%)	25 quarries and 8 plants, including 2 at Ransbach and the Kannenbäckerland plant in Hoehr-Grenzhausen, Westerwald region; also including quarries and plants of Kaolin- und Tonwerke Seilitz-Loethain, Saxony region	2,000
Do.	Stephan Schmidt KG	Tonbergbau Grube Anton open pit mine, Dornburg-Langendernbach, Müllenbach and Thewald Mines, Hoehr-Grenzhausen; Wiesa-Thonberg and Cunnersdorf quarries, Kamenz-Wiesa, Westerwald	1,600
Do.	Marx Bergbau GmbH & Co. KG (Stephan Schmidt KG, 100%)	Lämmersbach and Meudt Mines, Ruppach-Goldhausen quarry, Dornburg-Langendernbach, Westerwald	350
Do.	Goerg & Schneider GmbH & Co. KG	Quarry and main plant at Boden, others at Mogendorf, Goddert, Siershahn, Wirges/Staudt, and Kettenbach/Taunus, Westerwald region; others in Saxony and Eifel regions	NA
Do.	Mittelhessische Tonbergbau GmbH (Goerg & Schneider GmbH & Co. KG, 50%, and Stephan Schmidt KG, 50%)	Quarry and plant in the Giessen/Lahn region	100
Do.	Rohstoffgesellschaft GmbH Ponholz	Mine and chamotte plant at Maxhuetten-Haidoff, and Aufofweiher Mine, Bavaria	150
Do.	Adolf Gottfried Tonwerke GmbH	Quarries and plant near Grosssheirath, Coburg, Bavaria	100
Do.	Erbsloh Lohrheim GmbH (Erbsloh family, 100%)	Mine at Lohrheim, Rheinland-Pfalz	30
Coal, anthracite and bituminous	Deutsche Steinkohle AG (RAG Aktiengesellschaft, 100%)	Augusta Victoria/Blumenthal, Ost, Prosper-Haniel, and West Mines, Ruhr region, North Rhine-Westphalia	14,500 <sup>e</sup>
Do.	do.	Saar Mine, Saar Basin, Saarland	2,000 <sup>e</sup>
Do.	do.	Ibbenbüren Mine, Steinfurt District, North Rhine-Westphalia	2,100
Coke	Deutsche Steinkohle AG (RAG Aktiengesellschaft, 100%)	Pitside coking plant at the Prosper-Haniel Mine	2,000 <sup>e</sup>
Do.	ThyssenKrupp Steel AG	Schwelgern plant at Duisburg	2,100
Do.	Hüttenwerke Krupp Mannesmann GmbH (ThyssenKrupp Steel AG, 50%; Vallourec & Mannesmann Tubes SA, 20%; Mannesmannröhren-Werke GmbH, 30%)	Plant at Duisberg-Huckingen steel complex	1,100
Copper, refined	Norddeutsche Affinerie AG (Salzgitter AG, 25%; other private investors, 30%; institutional investors, 45%)	Primary smelter and refinery and secondary plant at Hamburg	500 <sup>e</sup>
Do.	Hüttenwerke Kayser AG (Norddeutsche Affinerie AG, 100%)	Secondary plant and refinery at Luenen	210 <sup>e</sup>

See footnotes at end of table.

TABLE 2—Continued  
GERMANY: STRUCTURE OF THE MINERAL INDUSTRY IN 2009<sup>1</sup>

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Dolomite		Rheinkalk Hagen-Halden GmbH & Co KG (Lhoist NV, 100%)	Steinbruch-Donnerkuhle quarry and Hönnetal plant at Menden, and plant at Hagen-Halden	7,500
Dolomite and lime		Geomin Erzgebirgische Kalkwerke GmbH	Underground mines at Hermsdorf and Lengenfeld	NA
Feldspar		Saarfeldspatwerke H. Huppert GmbH & Co. KG	Mine at Oberthal, Gudesweiler, Saarland	60
Do.		Gottfried Feldspat GmbH	Mine at Freihung-Thansuss, Weiden, Bavaria	15
Ferrochrome		Elektrowerk Weisweiler GmbH (Kermas Ltd., 100%)	Plant at Eschweiler-Weisweiler, near Aachen	30
Fluorspar		Sachtleben Bergbau GmbH	Clara Mine in the Black Forest and plant at Wolfach	55 <sup>e</sup>
Gallium	metric tons	Geo Gallium S.A. (Mining & Chemical Products Ltd., 50%, and Recapture Metals Inc., 50%)	Ingal plant at Stade	35
Do.	do.	PPM Pure Metals GmbH <sup>2</sup> (Recylex S.A., 100%)	Plant at Langelsheim	NA
Graphite, manufactured		Graphit Kropfmühl AG	Plant at Kropfmuehl, Passau	20
Do.		do.	Plants at Bad Godesberg and Wedel, Holstein	8
Gypsum		VG-ORTH GmbH & Co. KG	Mine and plant at Stadtoldendorf, and plants at Osterode, Spremberg, and Witzenhausen	150
Do.		Gyproc GmbH (Lafarge S.A., 100%)	Mines and plant in Lower Saxony	110
Iron, blast furnace		ThyssenKrupp Steel AG	Two blast furnace plants at Hamborn and Schelgern	12,000
Iron, direct reduced		ArcelorMittal Hamburg GmbH (ArcelorMittal, 100%)	Plant at Hamburg	600 <sup>e</sup>
Iron oxide, pigments		Lanxess AG	Plant at Krefeld-Uerdingen	300
Kaolin, feldspar, and quartz		Amberger Kaolinwerke GmbH—Eduard Kick GmbH & Co. KG (Quarzwerke GmbH, 100%)	Mines at Caminau, Hirschau, Kemmlitz, and Schnaittenbach, Bavaria	350
Do.		Geb Brüder Dorfner GmbH & Co Kaolin - und Kristallquarzsand Werk KG	Mine near Hirschau, Bavaria	NA
Lead, metal		Weser Metall GmbH (Recylex S.A., 100%)	Primary and secondary smelter and refinery at Nordenhan	145
Do.		Berzelius Metall GmbH [Eco-Bat Technologies Ltd. (Quexco Inc., 100%), 100%]	Secondary smelters at Braubach am Rhein and Freiberg/Sachsen	200
Do.		do.	Primary smelter at Stolberg	150
Do.		Muldenhütten Recycling- und Umweltechnik GmbH	Secondary smelter at Freiburg, Saxony	55
Do.		Norddeutsche Affinerie AG	Refinery at Hamburg	50
Lignite		RWE Power AG (RWE Aktiengesellschaft, 100%)	Open pit mines in Rhenish mining area: Bergheim, Garzweiler, Inden, and Hambach	105,000
Do.		Vattenfall Europe Mining AG	Jänschwalde-Cottbus-Nord, Nochten, and Welzow-Süd Mines, Lausatian mining area	60,000
Do.		Mitteldeutsche Braunkohlengesellschaft AG	Profen and Vereinigtes Schleenhain mines	25,000
Limestone		Harz-Kalk GmbH	Quarry at Ruebeland	2,000 <sup>e</sup>
Do.		Kalkwerk Bad Kösen GmbH	Quarry at Bad Kösen	2,000 <sup>e</sup>
Do.		Fels-Werke GmbH	Quarry at Kaltes Tal	2,000 <sup>e</sup>
Do.		Schäfer Kalk GmbH & Co KG	Plants at Hahnstaetten, Steeden, Stromberg, and Grevenbrueck	3,000
Do.		Rheinkalk GmbH & Co KG (Lhoist NV, 100%)	Flandersbach quarry and plant at Wuelfrath	7,500
Magnesium, metal, secondary		Norsk Hydro Magnesiumgesellschaft GmbH (Norsk Hydro ASA, 100%)	Plant at Bottrop	26
Do.		Aleris Recycling (German Works) GmbH (Aleris International Inc., 100%)	Plant at Toeing am Inn	15
Do.		do.	Plant at Deizisau	50
Natural gas	million cubic meters	Mobil Erdgas-Erdöl GmbH (Exxon Mobil Corp., 100%), including any fields owned or operated by BEB Erdgas und Erdöl GmbH (Exxon Mobil Corp., 50%, and Royal Dutch Shell plc, 50%)	Goldenstedt, Hemmelte, Klosterseele, Söhlingen, and other fields in Lower Saxony	14,000 <sup>e</sup>
Do.	do.	RWE-Dea AG (RWE Power AG, 100%)	Böttersen, Hemsbünde, Völkersen, and smaller fields in Lower Saxony; and Inzenham-West Field, Bavaria	3,000 <sup>e</sup>
Do.	do.	Gaz de France Produktion Exploration Deutschland GmbH (Gaz de France S.A., 100%)	Salzwedel Field, Saxony-Anhalt; Schneeren and smaller fields in Lower Saxony	1,500 <sup>e</sup>

See footnotes at end of table.

TABLE 2—Continued  
GERMANY: STRUCTURE OF THE MINERAL INDUSTRY IN 2009<sup>1</sup>

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Natural gas—Continued	million cubic meters	Wintershall Holding AG (BASF AG, 100%)	A6/B4 blocks offshore of Schleswig Holstein; and smaller fields in Lower Saxony	1,200 <sup>e</sup>
Do.	do.	EEG-Erdgas Erdöl GmbH (Gaz de France S.A., 100%)	Muehlhausen and other fields in Thüringen	50 <sup>e</sup>
Petroleum:				
Crude	thousand 42-gallon barrels	Wintershall Holding AG (BASF AG, 100%), 50%, and RWE-Dea AG (RWE Power AG, 100%), 50%	Mittelplate-Dieksand field, in tidal flats of the North Sea, offshore of Schleswig-Holstein	15,500
Do.	do.	Wintershall Holding AG (BASF AG, 100%)	A6/B4 blocks offshore of Schleswig Holstein; Aitingen field, Bavaria; Emlichheim field, Lower Saxony; and smaller fields in Lower Saxony and Rheinland-Pfalz	2,000 <sup>e</sup>
Do.	do.	Gaz de France Produktion Exploration Deutschland GmbH (Gaz de France S.A., 100%)	Bramberge, Ruehlertwist, Scheerhorn, and Ringe fields in Lower Saxony; and smaller fields in the States of Bavaria, Hamburg, Lower Saxony, and Mecklenburg-Western Pomerania	3,500 <sup>e</sup>
Do.	do.	Mobil Erdgas-Erdöl GmbH (Exxon Mobil Corp., 100%)	Barenburg, Riehme, and Lueben fields, Lower Saxony; and smaller fields in the States of Lower Saxony and Rheinland-Pfalz	1,800 <sup>e</sup>
Do.	do.	BEB Erdgas und Erdöl GmbH (Exxon Mobil Corp., 50%, and Royal Dutch Shell plc, 50%)	Georgsdorf, Meppen, and Ruelermoor fields, west of the Ems river (Emsland), Lower Saxony	3,000 <sup>e</sup>
Refined	do.	Deutsche Shell AG	Refineries at Godorf, Hamburg, and Grasbrook	256,000 <sup>e</sup>
Do.	do.	Esso Deutschland GmbH (ExxonMobil Central Europe Holding GmbH, 100%)	Refineries at Karlsruhe and Ingolstadt	245,000 <sup>e</sup>
Do.	do.	Ruhr Oel GmbH (Petróleos de Venezuela S.A., 50%, and BP Gelsenkirchen GmbH, 50%)	Refinery at Gelsenkirchen	215,500 <sup>e</sup>
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 <sup>e</sup>
Potash, K <sub>2</sub> O content		K+S Kali GmbH (K+S Aktiengesellschaft, 100%)	Mines at Hattorf, Neuhoef-Ellers, Niedersachsen-Riedel, Sigmundshall, Unterbreizbach, Wintershall, and Zielitz	6,000
Salt (evaporated and rock)		esco - european salt company GmbH & Co. KG [K+S Salz GmbH (K+S Aktiengesellschaft, 100%)]	Bernburg Mine and evaporated salt works; Borth Mine and evaporated salt works near Wesel; and the Braunschweig-Lüneburg Mine near Helmstedt	5,300 <sup>e</sup>
Do.		Wacker Chemie AG	Stetten rock salt mine near Haigerloch	500
Do.		Südsalz GmbH (Südwestdeutsche Salzwerke AG, 90%, and Vereinigte Schweizerische Rheinsalinen AG, 10%)	Rock salt mine at Berchtesgaden and evaporated salt works at Bad Reichenhall, Bavaria; and mine at Heilbronn and evaporated salt works at Bad Friedrichshall-Kochendorf, Heilbronn district, State of Baden-Württemberg	5,000
Do.		Saline Luisenhall GmbH	Evaporated salt works at Göttingen	NA
Selenium, metal	metric tons	Retorte GmbH (Norddeutsche Affinerie AG, 100%)	Plant at Röthenbach	2,500
Silica sand (industrial sand)		Quarzwerke GmbH	Mines and plants at Frechen, Gambach, Haltern, Hohenbocka, and Weferlingen	4,500 <sup>e</sup>
Do.		Amberger Kaolinwerke GmbH—Eduard Kick GmbH & Co. KG (Quarzwerke GmbH, 100%)	Mines and plants at Hirschau and Schnaittenbach	850
Siliceous earth, silica		Hoffmann Mineral and Co. KG	Mine and plant near Neuburg	55
Silicon, metal	metric tons	RW Silicium GmbH (Graphit Kropfmühl AG, 100%)	Four electric arc furnaces in plant at Pocking	27,500
Soda ash		Solvay S.A.	Plant at Rheinberg, Germany	NA
Steel, crude		ThyssenKrupp Steel AG (ThyssenKrupp AG, 100%)	Bruckhausen and Beeckerwerth plants, near Duisburg	12,000
Do.		Salzgitter AG	Plants at Peine and Salzgitter	6,400 <sup>e</sup>
Do.		Hüttenwerke Krupp Mannesmann GmbH (ThyssenKrupp Steel AG, 50%; Vallourec & Mannesmann Tubes SA, 20%; Mannesmannröhren-Werke GmbH, 30%)	Plant at Duisberg-Huckingen	5,600

See footnotes at end of table.

TABLE 2—Continued  
GERMANY: STRUCTURE OF THE MINERAL INDUSTRY IN 2009<sup>1</sup>

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Steel, crude—Continued	ArcelorMittal Bremen GmbH (ArcelorMittal, 99.88%, and other private, 0.12%)	Plant at Bremen	4,000
Do.	Saarstahl AG (Struktur-Holding-Stahl GmbH & Co KG, 74.9%, and Dillinger Hüttenwerke AG, 25.1%)	Plants at Burbach, Neunkirchen, and Voelklingen	3,000
Do.	AG der Dillinger Hüttenwerke (Saarstahl AG, 33.75%; ArcelorMittal, 30.08%; Struktur-Holding-Stahl GmbH & Co KG, 26.17%; Dillinger Hütte und Saarstahl mbH, 10%; other, 4.72%)	Plant at Dillingen	2,800
Do.	ArcelorMittal Eisenhüttenstadt GmbH (ArcelorMittal, 100%)	Plant at Eisenhuettenstadt	2,700
Do.	Badische Stahlwerke GmbH	Plant at Kehl	2,300 <sup>e</sup>
Do.	Brandenburger Elektrostahlwerk GmbH (RIVA FIRE S.p.A, 100%)	Plant at Brandenburg	1,700 <sup>e</sup>
Do.	ThyssenKrupp Nirosta (ThyssenKrupp Steel AG, 100%)	Plants at Bochum and Krefeld	1,600 <sup>e</sup>
Do.	ArcelorMittal Ruhrort GmbH (ArcelorMittal, 100%)	Plant at Duisburg	1,500 <sup>e</sup>
Do.	Georgsmarienhütte GmbH	Plants at Bous, Georgsmarienhütte, and Groeditz	1,300 <sup>e</sup>
Do.	Stahlwerk Thüringen GmbH (Alfonso Gallardo S.A., 100%)	Plant at Unterwellenborn	1,100 <sup>e</sup>
Do.	Deutsche Edelstahlwerke GmbH	Plants at Siegen and Witten	1,100 <sup>e</sup>
Do.	Lech-Stahlwerke GmbH (Max Aicher GmbH & Co. KG, 100%)	Plant at Herbertshofen	1,100 <sup>e</sup>
Do.	ArcelorMittal Hamburg GmbH (ArcelorMittal, 100%)	Plant at Hamburg	1,100 <sup>e</sup>
Do.	Hennigsdorfer Elektrostahlwerk GmbH (RIVA FIRE S.p.A, 100%)	Plant at Hennigsdorf	1,000 <sup>e</sup>
Do.	Elbe-Stahlwerke Feralpi GmbH (Feralpi Siderurgica S.p.A., 100%)	Plant at Riesa	950 <sup>e</sup>
Strontium carbonate	Solvay & CPC Barium Strontium GmbH & Co. KG (Solvay S.A., 75%, and Chemical Products Corp., 25%)	Plant at Bad Hoenningen, near Hannover	95
Sulfur	Norddeutsche Erdgas-Aufbereitungs GmbH NEAG [BEB Erdgas und Erdöl GmbH (ExxonMobil Production Deutschland GmbH, 50%, and Royal Dutch Shell plc, 50%), 100%]	Natural gas desulfurization plants at Grossenkneten and Voigtei (near Nienburg-Weser), Lower Saxony	600
Zeolites	Hans G. Hauri Mineralstoffwerk GmbH	Mine and plant at Boetzingen, near Freiburg	NA
Zinc, metal	Metaleurop Zinkbetrieb GmbH & Co. KG (Xstrata plc, 100%)	Nordenham Smelter, near Bremerhaven	160
Do.	Ruhr-Zink GmbH (GEA Group AG, 100%)	Refinery at Datteln <sup>4</sup>	140
Zinc, oxides	Harz Metall GmbH (Recylex S.A., 100%)	Waëlz rotary kilns at Oker-Goslar	80 <sup>e</sup>
Do.	Norzinco GmbH (Recylex S.A., 100%)	Secondary plant at Oker-Goslar	35 <sup>e</sup>

<sup>e</sup>Estimated; estimated data are rounded to no more than three significant digits. NA Not available.

<sup>1</sup>Table includes data available through December 31, 2010.

<sup>2</sup>In addition to producing arsenic as a byproduct of chemical manufacturing and gallium as a byproduct of aluminum production, PPM Pure Metals GmbH produces small quantities of germanium as a byproduct of processing imported ores and concentrates and small quantities of indium and tellurium as byproducts of zinc metal production by PPM's parent company, Recylex S.A.

<sup>3</sup>Closed in 2007.

<sup>4</sup>Closed at the end of 2008, and approximately 40% of total production of zinc metal at this refinery was from secondary materials.

TABLE 3  
GERMANY: EXPORTS OF SELECTED MINERAL COMMODITIES IN 2008<sup>1</sup>

(Metric tons unless otherwise specified)

Commodity	Total	Destinations <sup>c</sup>	
		United States	Other (principal) <sup>2</sup>
<b>METALS</b>			
<b>Aluminum:</b>			
Bauxite, ore and concentrate	33,636	--	Netherlands 8,070; France 6,760; Czech Republic 2,420.
Oxides	305,510	--	France 62,900; Poland 33,000; Norway 29,900.
Hydroxides	634,632	105,000	Netherlands 114,000; United Kingdom 74,900; Sweden 62,200.
Ash and residues containing aluminum	15,167	--	Norway 5,980; France 3,340; Netherlands 1,930.
<b>Metal:</b>			
Primary, not alloyed	75,386	--	France 19,600; United Kingdom 15,900; Netherlands 10,600.
Primary, alloys, all forms	141,472	--	Poland 34,800; Austria 31,700; Belgium 21,500.
Secondary	218,155	--	France 61,300; Netherlands 24,700; Italy 23,100.
Scrap	702,737	--	Italy 159,000; Netherlands 111,000; Austria 89,200.
<b>Antimony:</b>			
Metal, including alloys, all forms	33	--	Slovakia 17; Sweden 7; Greece 6.
Oxides	932	--	Czech Republic 121; Norway 100; Belgium 97.
Arsenic, metal, including alloys, all forms	41	3	Japan 19; China 15; Republic of Korea 3.
Bismuth, metal, crude, including scrap	251	--	France 99; Czech Republic 82; United Kingdom 13.
<b>Chromium:</b>			
Ore and concentrate	23,563	--	Czech Republic 4,360; United Kingdom 3,490; Slovakia 3,160.
<b>Metal:</b>			
Crude, including powder	1,363	248	Austria 166; Canada 114; Czech Republic 87.
Scrap	3,949	--	Sweden 2,250; Austria 691; Netherlands 600.
<b>Cobalt:</b>			
Ore and concentrate	145	--	Belgium 71; Finland 30; India 26.
Oxides and hydroxides	158	13	France 29; Spain 20; Hong Kong 19.
Metal, including alloys, all forms	418	--	United Kingdom 68; France 61; Japan 41.
Scrap	550	115	United Kingdom 301; Canada 62; Austria 32.
<b>Copper:</b>			
Ore and concentrate	48,234	--	Sweden 46,500.
Ash and residue containing copper	15,193	--	Belgium 8,660; Canada 4,850; Netherlands 820.
Matte and speiss, including cement copper	2	--	Liechtenstein 1; Malaysia < 1; Hungary < 1.
<b>Metal:</b>			
Unrefined	182	--	Czech Republic 180.
Refined, not alloyed	124,979	--	China 25,900; France 24,000; Italy 13,900.
Alloys, all forms	16,485	--	Sweden 2,340; Italy 2,080; Switzerland 1,730.
Scrap	478,640	--	China 196,000; Netherlands 83,800; Austria 43,600.
Gallium, indium, and thallium, metal, including scrap	27	13	United Kingdom 12.
<b>Germanium:</b>			
Oxides	266	40	Hungary 94; Austria 45; Italy 22.
Metal, all forms	5		China 4; Russia 1.
<b>Gold:</b>			
Metal, including alloys, all forms	kilograms 172	80	Austria 58; Spain 16.
Waste and sweepings	do. 5,327	2,060	Switzerland 2,920.
<b>Iron and steel:</b>			
Ore and concentrate	34,496	--	Netherlands 15,600; China 4,210; Finland 3,730.
Pyrite, roasted	12,700	--	Switzerland, 100%.
Ash and residue containing iron	thousand metric tons 1,675	--	France 435; Netherlands 427; United Kingdom 325.
<b>Metal:</b>			
Pig iron, cast iron, related materials	153,890	--	Italy 34,900; France 20,900; Czech Republic 27,100.
Scrap	thousand metric tons 8,953	--	France 1,780; Netherlands 1,580; Italy 1,450.
Sponge iron, powder	95,836	--	France 74,000.
<b>Ferrous alloys:</b>			
Ferrochromium	36,856	4,460	Belgium 7,040; Austria 6,780; France 4,350.
Ferromanganese	11,803	--	Poland 2,880; Austria 2,460; Switzerland 1,880.
Ferromolybdenum	3,858	--	Italy 995; Czech Republic 849; Sweden 448.
Ferronickel	1,036	--	Sweden 400; France 316; Belgium 130.

See footnotes at end of table.

TABLE 3—Continued  
GERMANY: EXPORTS OF SELECTED MINERAL COMMODITIES IN 2008<sup>1</sup>

(Metric tons unless otherwise specified)

Commodity	Total	Destinations <sup>c</sup>	
		United States	Other (principal) <sup>2</sup>
METALS—Continued			
Iron and steel, metal—Continued:			
Ferroalloys—Continued:			
Ferroniobium	1,056	62	Belgium 231; Italy 170; Sweden 132.
Ferrosilicomagnesium	6,342	--	Italy 3,370; Czech Republic 571; Belgium 355.
Ferrosilicomanganese	10,354	--	Belgium 3,300; France 2,060; Spain 1,490.
Ferrosilicon	63,858	--	Austria 11,800; Belgium 9,450; France 7,540.
Ferrotitanium	4,237	--	France 852; Italy 703; Sweden 640.
Ferrotungsten	460	--	Austria 222; Italy 78; France 39.
Ferrovandium	413	--	Italy 139; Belgium 40; Czech Republic 34.
Other ferroalloys	45,449	--	France 10,300; Italy 4,860; Japan 3,500.
Steel, crude	3,245	1,130	Iceland 581; Australia 227; United Arab Emirates 201.
Lead:			
Ash, residues and slimes containing lead	4,622	--	Belgium 2,580; China 2,000.
Lead containing antimony	6,355	--	France 2,210; Austria 1,890; Czech Republic 1,240.
Metal:			
Alloys, all forms	37,365	--	Luxembourg 12,900; France 9,710; Belgium 5,010.
Refined	132,892	--	France 31,400; Italy 21,800; Czech Republic 20,100.
Unrefined	517	--	Switzerland 504.
Scrap	13,133	--	Netherlands 5,630; Belgium 1,510; Czech Republic 1,460.
Lithium carbonate	2,290	--	France 621; Turkey 405; Austria 197.
Magnesium, metal, including alloys:			
Scrap	12,406	--	Czech Republic 4,640; Austria 4,260; Netherlands 806.
Unwrought	19,136	1,400	France 3,100; Spain 2,830; Austria 1,950.
Manganese, ore and concentrate	3,321	--	Belgium 2,430; Turkey 252.
Mercury	111	31	Spain 36; Libya 16; Israel 6.
Molybdenum:			
Ore and concentrate	3,574	--	Belgium 1,250; Italy 640; China 497.
Metal, scrap	2,693	--	Unspecified, 100%.
Nickel:			
Ore and concentrate	316	--	Finland 264; Canada 28; Sweden 24.
Matte, speiss, related materials	20,202	--	Canada 19,800.
Oxides and hydroxides	25	4	Austria 8; Switzerland 4; Italy 3.
Ash and residue containing nickel	725	--	Sweden 534; Netherlands 165.
Metal, including alloys:			
Alloys, all forms	8,988	791	Austria 6,740; United Kingdom 989.
Unalloyed	5,200	--	Austria 1,870; Czech Republic 582; France 489.
Scrap	5,647	1,390	Netherlands 695; France 649.
Niobium (columbium), metal, powder, containing both niobium and rhenium	< 1	--	France, 50%; Unspecified 50%.
Platinum-group metals:			
Metal, including alloys, all forms:			
Platinum	kilograms 24,763	2,550	Switzerland 10,600; United Kingdom 2,400; Japan 1,910.
Palladium	do. 24,037	2,280	Belgium 7,500; China 4,250; Brazil 2,860.
Rhodium	do. 3,130	1,070	Japan 635; China 444; Brazil 307.
Iridium, osmium and ruthenium	do. 24,518	20,100	Belgium 1,990.
Waste, sweepings and scrap	3,239	2,190	Belgium 379; United Kingdom 272; Netherlands 236.
Rare-earth metals, including alloys:			
Compounds, all forms	189	13	France 35; Italy 33; Republic of Korea 21.
Metal	3	--	Turkey, 100%.
Selenium, metal	367	--	Philippines 58; Canada 56; Mexico 41.
Silver:			
Ore and concentrate	3	--	Ecuador, 100%.
Metal	1,516	--	Unspecified 791; Belgium 165; Netherlands 136.
Powder	kilograms 66,756	10,000	Greece 18,900; France 10,900; Netherlands 5,810.

See footnotes at end of table.

TABLE 3—Continued  
GERMANY: EXPORTS OF SELECTED MINERAL COMMODITIES IN 2008<sup>1</sup>

(Metric tons unless otherwise specified)

Commodity	Total	Destinations <sup>c</sup>	
		United States	Other (principal) <sup>2</sup>
METALS—Continued			
Tantalum, metal:			
Powder	do.	214,573	-- Unspecified, 100%.
Waste and scrap	do.	57,290	-- Unspecified, 100%.
Tin:			
Ore and concentrate		< 1	-- Norway, 50%; Thailand, 50%.
Ash and residue containing tin		257	-- Belgium 228; Netherlands 29.
Metal:			
Alloys, all forms		1,531	-- Republic of Korea 421; Italy 217; Poland 139.
Crude		1,612	-- Switzerland 440; Belgium 300; France 153.
Waste and scrap		1,649	-- France 821; Netherlands 381; Belgium 376.
Titanium:			
Metal:			
Powder		2,370	922 Italy 246; Canada 173; Taiwan 147.
Waste and scrap		4,742	1,360 United Kingdom 2,650.
Ore and concentrate		3,322	2,980
Oxide		51,538	3,500 Austria 4,900; China 4,330; Taiwan 4,020.
Titaniferous slag		69	-- Netherlands, 100%.
Tungsten:			
Ore and concentrate		206	-- China 131; Tunisia 42; Republic of Korea 21.
Wolframite		2,275	-- Unspecified, 100%.
Metal, including alloys:			
Metal, crude		752	-- Unspecified, 100%.
Scrap		3,738	1,640 France 583; United Kingdom 336; Austria 258.
Vanadium:			
Metal, including scrap		450	117 United Kingdom 107; Russia 62; Japan 55.
Ore and concentrate		1,405	-- Unspecified, 100%.
Oxides and hydroxides		1,173	-- Unspecified, 100%.
Zinc:			
Ore and concentrate		1,835	-- United Kingdom 1,810.
Ash and residue containing zinc		44,312	-- Belgium 36,800.
Matte and related materials		2,904	-- Luxembourg 1,820; Austria 799; Belgium 186.
Metal:			
Alloys, all forms		89,737	-- Belgium 62,000; Netherlands 9,060; United Kingdom 7,360.
Unalloyed		70,724	-- France 23,100; Austria 14,100; Belgium 6,080.
Powder and dust		5,446	-- Luxembourg 958; Switzerland 752; China 713.
Scrap		51,800	-- China 14,700; Belgium 13,900; Italy 5,080.
Zirconium:			
Ore and concentrate		2,799	-- Russia 1,020; Austria 521; Belgium 218.
Metal, including alloys		38	13 Japan 7; Canada 3; Czech Republic 2.
Scrap		31	-- Spain 14; Belgium 13; United Kingdom 3.
INDUSTRIAL MINERALS			
Abrasives, natural:			
Corundum, emery, garnet, etc.		12,383	-- Sweden 3,570; Switzerland 1,980; Norway 1,800.
Pumice		228,671	-- Netherlands 167,000; Luxembourg 43,900.
Asbestos, crude		< 1	-- Switzerland, 100%.
Barite		38,111	-- Unspecified, 100%.
Borates, natural, including calcined		200	-- Belgium 141; Oman 20; Switzerland 18.
Cement	thousand metric tons	8,313	-- Netherlands 2,770; Belgium 1,060; Poland 790.
Chalk, natural		204,185	-- Netherlands 61,900; Poland 34,300; Finland 28,200.
Clays, crude:			
Bentonite		67,107	-- Netherlands 13,000; Austria 10,900; France 10,100.
Kaolin		498,163	-- Austria 10,700; Netherlands 10,200; Italy 87,200.
Other, unspecified	thousand metric tons	2,593	-- Italy 1,020; Netherlands 767; Belgium 360.

See footnotes at end of table.

TABLE 3—Continued  
GERMANY: EXPORTS OF SELECTED MINERAL COMMODITIES IN 2008<sup>1</sup>

(Metric tons unless otherwise specified)

Commodity	Total	Destinations <sup>c</sup>		
		United States	Other (principal) <sup>2</sup>	
<b>INDUSTRIAL MINERALS—Continued</b>				
Diamond, natural:				
Gem, not set or strung	carats	153,893	18,600	Hong Kong 32,300; Thailand 25,400; India 10,800.
Industrial stones	do.	11,966	--	Belgium 6,090; Switzerland 3,430; Austria 909.
Dust and powder	kilograms	682	--	Syria 182; India 141; Switzerland 93.
Diatomite and other infusorial earth		7,189	--	Netherlands 1,020; Austria 963; Russia 956.
Feldspar		121,776	--	France 50,700; Italy 15,300; Czech Republic 10,700.
Fluorspar:				
Acid-grade		35,295	--	Czech Republic 16,000; France 3,990; Poland 3,920.
Metallurgical-grade		15,043	--	Czech Republic 4,320; France 4,150; Austria 2,150.
Graphite, natural		18,950	--	Czech Republic 4,960; France 4,000; Austria 1,550.
Gypsum and anhydrite, natural	thousand metric tons	2,223	--	Poland 431; Belgium 407; Netherlands 269.
Kyanite and related materials:				
Andalusite, kyanite, sillimanite		5,431	--	Hungary 1,160; Czech Republic 983; Switzerland 945.
Mullite		12,800	3,100	Italy 2,040; United Kingdom 1,420; Spain 1,320.
Lime, hydrated	thousand metric tons	1,227	--	Netherlands 724; France 128; Belgium 125.
Magnesium compounds:				
Magnesite, natural, including burned		72,706	--	France 25,500; Austria 12,400; Slovakia 7,710.
Epsomite		722,620	--	Malaysia 164,000; France 156,000; Indonesia 124,000.
Meerschaum, sepiolite		966		China 490; Austria 433.
Mica, natural, including splittings and waste		4,711	--	Brazil 1,320; Italy 551; Switzerland 349.
Peat, natural	thousand metric tons	2,149	--	Netherlands 1,000; Italy 211; France 211.
Phosphates:				
Crude		< 1	--	Czech Republic, 100%.
Milled		314	--	Kazakhstan 176; Austria 83; Switzerland 46.
Precious and semiprecious gemstones, natural (other than diamond):				
	kilograms	345,175	21,100	Hong Kong 174,000; India 25,900.
Pyrite, unroasted		485	--	Czech Republic 112; Saudi Arabia 80; Italy 75.
Salt and brine	thousand metric tons	2,783	--	Belgium 863; Sweden 323; Czech Republic 273.
Stone, sand and gravel:				
Basalt, lava rocks, and so forth		286,983	--	Netherlands 281,000.
Crushed rock, macadam		82,103	--	Switzerland 73,300; France 8,460.
Dimension stone:				
Dolomite and limestone		901,442	--	Luxembourg 585,000; Belgium 79,300; Netherlands 64,000.
Granite		78,154	--	Switzerland 67,200.
Marble, travertine, and so forth		194,778	--	Switzerland 69,000; Netherlands 34,100; China 20,300.
Limestone for cement		219,757	--	Luxembourg 141,000; Netherlands 35,800; France 18,500.
Quartz and quartzite		396,733	--	France 248,000; Netherlands 71,800; Luxembourg 48,000.
Sand, natural	thousand metric tons	10,901	--	Netherlands 7,890; Belgium 1,570.
Sandstone		2,584	--	Netherlands 1,080; Austria 659; Australia 339.
Schist and shale		18,824	--	Belgium 8,210; Netherlands 5,970; Denmark 3,900.
Unworked stone, natural	thousand metric tons	13,256	--	Netherlands 9,240; Belgium 1,210; Switzerland 1,110.
Other natural stone, unspecified	do.	7,670	--	Netherlands 3,370; Poland 1,690; Belgium 629.
Sulfur		654,808	--	Morocco 105,000; Poland 96,300; Namibia 70,700.
Talc, steatite and soapstone, natural		6,380	--	Slovenia 1,190; Denmark 785; Netherlands 772.
Vermiculite and perlite, natural		4,338	--	Austria 694; Poland 638; Belgium 607.
<b>MINERAL FUELS AND RELATED MATERIALS</b>				
Asphalt and bitumen, natural		162,084	--	Austria 70,300; Luxembourg 33,600; Belgium 13,500.
Coal:				
Anthracite		16,575	--	Spain 4,340; Netherlands 3,270; Algeria 3,100.
Lignite		792,133	--	Belgium 234,000; France 148,000; Czech Republic 105,000.
Other bituminous, including briquets		505,811	--	France 327,000; Belgium 112,000.
Coke:				
Of anthracite and bituminous coal		165,052	--	United Kingdom 50,000; Netherlands 44,200; France 27,900.
Of lignite		202,800	--	Belgium 89,400; France 42,400; Austria 26,400.

See footnotes at end of table.

TABLE 3—Continued  
GERMANY: EXPORTS OF SELECTED MINERAL COMMODITIES IN 2008<sup>1</sup>

(Metric tons unless otherwise specified)

Commodity	Total	Destinations <sup>c</sup>		
		United States	Other (principal) <sup>2</sup>	
MINERAL FUELS AND RELATED MATERIALS—Continued				
Gas, natural, gaseous	thousand metric tons	9,769	--	Unspecified, 100%.
Petroleum, crude	do.	40	--	United Kingdom 36; Austria 4.
Uranium, natural:				
Crude, U content	kilograms	4,601	--	Sweden 4,360.
Enriched, fissile isotopes	do.	16,508	4,330	Belgium 5,560; Republic of Korea 2,280; Sweden 1,570.

<sup>c</sup>Estimated; estimated tonnages are rounded to no more than three significant digits; may not add to totals shown. -- Less than 5%.

<sup>1</sup>Source: Bundesanstalt für Geowissenschaften und Rohstoffe, 2009, Table 1—Rohstoffsituation, 2008: Hannover, Germany, October.

<sup>2</sup>Destination country was estimated to have accounted for at least 5% of Germany's total exports of the mineral commodity.

TABLE 4  
GERMANY: IMPORTS OF SELECTED MINERAL COMMODITIES IN 2008<sup>1</sup>

(Metric tons unless otherwise specified)

Commodity	Total	Sources <sup>e</sup>		
		United States	Other (principal) <sup>2</sup>	
<b>METALS</b>				
<b>Aluminum:</b>				
Bauxite, ore and concentrate	thousand metric tons	2,995	183	Guinea 1,980; Ghana 303; Brazil 249.
Oxides	do.	1,018	--	Jamaica 434; Ireland 229; Netherlands 118.
Hydroxides		241,735	--	Ireland 81,700; Spain 67,400; France 42,800.
Ash and residue containing aluminum		140,471	--	France 50,100; Netherlands 22,100; Switzerland 19,100.
<b>Metal:</b>				
Primary, not alloyed		693,074	--	Russia 222,000; Iceland 142,000; Netherlands 110,000.
Primary, alloys, all forms		835,984	--	Netherlands 232,000; Norway 214,000; France 93,600.
Secondary		534,196	--	United Kingdom 240,000; Austria 47,000; Italy 39,500.
Scrap		543,837	--	Netherlands 113,000; France 54,900; United Kingdom 52,800.
<b>Antimony:</b>				
Metal, including alloys, all forms		697	--	China 374; Vietnam 217; United Kingdom 43.
Ore and concentrate		61	--	Belgium 42; India 14; Netherlands 5.
Oxides		8,672	--	China 3,620; France 2,350; Belgium 2,000.
Scrap		3	--	China, 100%.
Arsenic, metal, including alloys, all forms		< 1	25%	Japan, 25%; Switzerland, 25%; China, 25%.
Bismuth, metal, crude, including scrap		1,188	--	Belgium 434; United Kingdom 253; China 229.
<b>Chromium:</b>				
Ore and concentrate		175,277	--	South Africa 122,000; Netherlands 26,100; Turkey 23,500.
<b>Metal:</b>				
Crude, including powder		5,408	--	Russia 1,670; United Kingdom 1,300; France 1,060.
Scrap		1,465	--	Netherlands 621; Poland 415; France 388.
<b>Cobalt:</b>				
Ore and concentrate	thousand metric tons	15	--	United Kingdom 10; China 5.
Oxides and hydroxides		1,057	--	Finland 803; Belgium 137.
Metal, including alloys, all forms		2,109	278	United Kingdom 462; Canada 348; Belgium 333.
Scrap		262	--	Switzerland 64; Netherlands 59; France 35.
<b>Copper:</b>				
Ore and concentrate	thousand metric tons	1,088	--	Chile 374; Peru 269; Argentina 144.
Matte and speiss, including cement copper		10,102	--	Morocco 2,870; Bulgaria 2,460; Canada 2,010.
Ash and residue containing copper		39,004	2,810	Italy 8,310; Netherlands 7,800; Ukraine 3,590.
<b>Metal:</b>				
Unrefined		24,706	--	South Africa 9,390; Armenia 6,720; Congo 4,080.
Refined, not alloyed		833,354	--	Chile 197,000; Russia 176,000; Belgium 75,800.
Alloys, all forms		40,071	--	United Kingdom 7,850; Belgium 6,290; Poland 4,570.
Scrap		563,559	--	Netherlands 67,100; United Kingdom 55,800; France 51,300.
Gallium, indium, and thallium, metal, including scrap		43	7	United Kingdom 17; Slovakia 6; China 6.
<b>Germanium:</b>				
Metal, all forms		20	3	China 17.
Oxides		2,991	437	China 1,210; France 694; United Kingdom 410.
<b>Gold:</b>				
Metal, including alloys, all forms	kilograms	72	11	Switzerland 56.
Waste and sweepings		1,394	--	United Kingdom 763; Poland 141; Hungary 135.
<b>Iron and steel:</b>				
Ore and concentrate	thousand metric tons	44,339	--	Brazil 24,000; Canada 7,400; Sweden 4,610.
Ash and residue containing iron		259,811	--	Austria 225,000; Luxembourg 32,000.
<b>Metal:</b>				
Pig iron, cast iron, related materials		713,475	--	Russia 355,000; South Africa 99,900; Brazil 91,300.
Scrap	thousand metric tons	6,034	--	Netherlands 1,090; Czech Republic 1,080; Denmark 742.
Sponge iron, powder		90,064	13,400	Trinidad & Tobago 27,500; Sweden 15,000; Turkey 8,830.
<b>Ferroalloys:</b>				
Ferromanganese		544,619	--	South Africa 350,000; Kazakhstan 95,300; Netherlands 37,000.
Ferromanganese		209,083	--	South Africa 51,200; Norway 44,500; Spain 25,500.

See footnotes at end of table.

TABLE 4—Continued  
GERMANY: IMPORTS OF SELECTED MINERAL COMMODITIES IN 2008<sup>1</sup>

(Metric tons unless otherwise specified)

Commodity	Total	Sources <sup>6</sup>	
		United States	Other (principal) <sup>2</sup>
METALS—Continued			
Iron and steel, metal—Continued:			
Ferroalloys—Continued:			
Ferromolybdenum	17,434	--	Belgium 5,840; United Kingdom 3,990; Armenia 2,210.
Ferronickel	177,851	--	Ukraine 59,200; Greece 33,400; Indonesia 33,300.
Ferrosilichromium	12,886	--	Belgium 9,370; Kazakhstan 3,500.
Ferrosilicomagnesium	11,536	--	Norway 3,710; Slovenia 2,500; Brazil 2,030.
Ferrosilicomanganese	156,484	--	India 29,400; Norway 24,700; Netherlands 17,400.
Ferrosilicon	215,373	--	Norway 59,400; France 32,700; Poland 20,900.
Ferrotungsten	2,182	--	China 1,520; Sweden 212; Vietnam 129.
Ferrotitanium	13,824	--	United Kingdom 4,300; Netherlands 3,000; Russia 2,310.
Ferrovandium	5,333	--	Austria 2,990; Czech Republic 645; Russia 469.
Ferriobium	6,269	--	Brazil 4,410; Netherlands 846; Canada 784.
Other ferroalloys	97,210	--	France 28,200; Russia 25,400; China 9,530.
Steel, crude	67,991	--	Belarus 24,600; Czech Republic 23,100; Ukraine 5,440.
Lead:			
Ore and concentrate	212,602	--	Sweden 62,300; Australia 42,100; Ireland 26,200.
Ash, residues and slimes containing lead	122,747	--	France 79,800; United Kingdom 23,400; Netherlands 9,330.
Lead containing antimony	20,429	--	Russia 7,660; Sweden 6,700; Belgium 2,550.
Metal:			
Alloys, all forms	6,027	--	United Kingdom 3,040; Poland 1,150; Switzerland 976.
Refined	78,414	--	United Kingdom 21,200; Belgium 16,500; Poland 9,490.
Unrefined	13,909	--	Belgium 5,470; Switzerland 4,260; United Kingdom 1,420.
Scrap	28,230	--	Lithuania 9,650; Switzerland 4,150; Netherlands 3,160.
Lithium:			
Carbonate	7,098	731	Chile 6,120.
Oxides and hydroxides	5,420	580	Switzerland 3,830.
Magnesium, metal, including alloys:			
Scrap	19,672	--	China 10,600; Austria 2,730; Spain 1,550.
Unwrought	44,519	--	China 18,500; Austria 9,840; Czech Republic 6,370.
Manganese, ore and concentrate	14,917	820	Netherlands 6,240; Brazil 3,070; Australia 2,190.
Mercury	20	--	Finland 16; Netherlands 3.
Molybdenum:			
Ore and concentrate	9,646	781	Belgium 1,890; China 1,570; Netherlands 1,310.
Oxides and hydroxides, powder	2,201	--	Chile 960; United Kingdom 436; Netherlands 216.
Molybdate	473	114	Italy 152; Chile 76; China 54.
Metal:			
Crude	272	--	China 221; United Kingdom 21.
Scrap	2,344	--	China 870; Austria 642; Armenia 300.
Nickel:			
Ore and concentrate	1,310	595	Thailand 220; Malaysia 182; Egypt 67.
Ash and residue containing nickel	10,672	1,180	Netherlands 1,750; China 1,170; Austria 1,080.
Matte, speiss, related materials	797	--	Netherlands 788.
Oxides and hydroxides	617	--	Czech Republic 249; Canada 177; Finland 66.
Metal:			
Alloys, all forms	6,101	--	Netherlands 3,810; United Kingdom 696; Canada 616.
Unalloyed	68,767	--	Russia 26,200; United Kingdom 13,600; Norway 9,150.
Scrap	18,315	1,390	Austria 4,360; Ukraine 4,270; Sweden 1,250.
Niobium (columbium):			
Ore and concentrate, including tantalum	77,306	--	Unspecified, 100%.
Metal, powder containing both niobium and rhenium	435	--	Brazil 354; Estonia 49.
Scrap containing both niobium and tantalum	328	--	Malaysia 140; Belgium 126; Japan 37.
Platinum-group metals:			
Waste and scrap	10,985	2,180	United Kingdom 1,100; Switzerland 747; Italy 648.

See footnotes at end of table.

TABLE 4—Continued  
GERMANY: IMPORTS OF SELECTED MINERAL COMMODITIES IN 2008<sup>1</sup>

(Metric tons unless otherwise specified)

Commodity	Total	Sources <sup>e</sup>	
		United States	Other (principal) <sup>2</sup>
METALS—Continued			
Platinum-group metals—Continued:			
Metal, including alloys, all forms:			
Platinum kilograms	37,180	3,380	South Africa 15,600; Belgium 9,890; Russia 2,600.
Palladium do.	52,562	--	Belgium 15,000; Russia 14,000; United Kingdom 5,780.
Rhodium do.	5,401	308	Belgium 2,820; South Africa 837; Russia 751.
Iridium, osmium, and ruthenium do.	3,022	293	South Africa 1,120; United Kingdom 834; Belgium 592.
Rare-earth metals, including alloys:			
Compounds, all forms	673	46	China 236; France 135; Austria 116.
Metal	430	--	Austria 188; China 178; Sweden 28.
Selenium, metal	312	--	Sweden 115; Canada 79; Finland 24.
Silicon, metal	225,184	--	Norway 59,700; Brazil 46,400; France 38,300.
Silver:			
Ore and concentrate	6,024	--	Argentina 4,250; Peru 1,390.
Metal	2,030	--	Unspecified 696; Kazakhstan 568 Morocco 240.
Powder kilograms	189,150	96,300	France 77,700; Switzerland 11,000.
Tantalum, metal:			
Powder do.	41,157	6,170	Kazakhstan 28,200; Thailand 3,620.
Waste and scrap do.	106,499	40,200	United Kingdom 30,500; China 7,350; Thailand 7,030.
Tin:			
Ore and concentrate	121	--	Rwanda, 100%.
Ash and residue containing tin	472	--	Belgium 408; France 42.
Metal:			
Alloys, all forms	179	--	Netherlands 107; United Kingdom 23; France 20.
Crude	22,161	--	Peru 4,610; Indonesia 4,210; Belgium 3,660.
Waste and scrap	2,243	--	Netherlands 541; United Kingdom 518; France 482.
Titanium:			
Ore and concentrate	725,561	--	Norway 290,000; Canada 185,000; South Africa 148,000.
Oxide	14,873	--	France 4,740; Finland 2,220; China 1,810.
Titaniferous slag	76,107	--	Canada 66,400; South Africa 8,220.
Metal:			
Powder	9,864	--	Kazakhstan 5,800; Japan 819; United Kingdom 740.
Waste and scrap	4,210	286	Italy 1,570; Austria 316; Switzerland 282.
Tungsten:			
Ore and concentrate	967	532	Rwanda 326.
Carbide	2,526	192	Austria 808; Canada 467; China 452.
Oxides and hydroxides	665	112	China 463; Russia 80.
Wolframite	3,035	595	China 1,600; Russia 540; Ireland 255.
Metal:			
Crude	167	55	China 35; Austria 34; United Kingdom 26.
Powder	1,735	90	Austria 833; Canada 399; Finland 144.
Waste and scrap	3,114	364	Italy 358; United Kingdom 339; Switzerland 315.
Vanadium:			
Ore and concentrate	60	--	United Kingdom 59.
Oxides and hydroxides	879	--	Unspecified, 100%.
Metal, including scrap	139	49	United Kingdom 31; Russia 28; France 15.
Zinc:			
Ore and concentrate	383,789	66,000	Ireland 106,000; Peru 72,900; Sweden 62,200.
Matte and related materials	11,135	--	Netherlands 2,490; Austria 2,320; Belgium 2,170.
Ash and residue containing zinc	25,355	1,650	Switzerland 6,440; Austria 4,390; Netherlands 2,360.
Metal:			
Alloys, all forms	89,737	--	Belgium 62,000; Netherlands 9,060; United Kingdom 7,360.
Unalloyed	305,076	--	Finland 87,300; Spain 80,200; Netherlands 53,400.
Powder and dust	6,523	--	Unspecified 6,220.
Waste and scrap	17,395	--	France 3,900; Netherlands 3,250; Denmark 2,590.

See footnotes at end of table.

TABLE 4—Continued  
GERMANY: IMPORTS OF SELECTED MINERAL COMMODITIES IN 2008<sup>1</sup>

(Metric tons unless otherwise specified)

Commodity	Total	Sources <sup>e</sup>	
		United States	Other (principal) <sup>2</sup>
<b>METALS—Continued</b>			
<b>Zirconium:</b>			
Metal	244	--	Netherlands 175; China 30; France 29.
Waste and scrap	6	--	Russia 5; United Kingdom 1; Austria < 1.
<b>INDUSTRIAL MINERALS</b>			
<b>Abrasives, natural:</b>			
Corundum, emery, garnet, etc.	26,855	--	India 18,900; China 4,570.
Pumice	5,516	1,120	Iceland 4,160.
Asbestos, crude	54	18	Canada 36.
Barite	278,335	--	China 244,000; Netherlands 18,400.
Borates, natural, including calcined	6,425	--	Turkey 3,100; Belgium 2,420; Argentina 430.
Cement	thousand metric tons 1,078	--	France 333; Netherlands 184; Luxembourg 179.
Chalk, natural	257,909	--	Netherlands 88,700; Belgium 74,300; France 71,700.
<b>Clays, crude:</b>			
Bentonite	361,782	--	Netherlands 150,000; Czech Republic 51,700; Italy 48,500.
Kaolin	647,278	177,000	United Kingdom 155,000; Belgium 86,700; Netherlands 66,700.
Other, unspecified	239,576	71,200	Czech Republic 49,400; Luxembourg 30,200; United Kingdom 18,900.
<b>Diamond, natural:</b>			
Gem, not set or strung	carats 699,619	--	India 418,000; Belgium 175,000; Israel 40,600.
Industrial stones	do. 502,045	--	United Kingdom 179,000; Belgium 110,000; Netherlands 51,200.
Dust and powder	kilograms 9,178	927	Ireland 2,950; China 2,430; Switzerland 909.
Diatomite and other infusorial earth	49,236	7,530	Denmark 21,300; Mexico 8,810; Italy 4,680.
Feldspar	143,758	--	Turkey 38,700; Norway 34,800; France 27,000.
<b>Fluorspar:</b>			
Acid-grade	299,527	--	South Africa 108,000; Namibia 67,400; China 59,000.
Metallurgical-grade	58,388	--	United Kingdom 50,400; Netherlands 3,800.
Graphite, natural	62,180	--	China 37,200; Unspecified 6,400; Austria 54,700.
Gypsum and anhydrite, natural	131,207	--	France 49,600; Austria 36,000; Netherlands 22,600.
<b>Kyanite and related materials:</b>			
Andalusite, kyanite, sillimanite	56,555	3,450	South Africa 28,400; France 18,100; Belgium 3,680.
Mullite	23,113	--	China 13,800; United Kingdom 3,100; Hungary 2,800.
Lime, hydrated	538,198	--	France 358,000; Czech Republic 84,000; Belgium 43,100.
<b>Magnesium compounds:</b>			
Magnesite, natural, including burned	571,038	--	China 214,000; Netherlands 155,000; Slovakia 34,300.
Epsomite	501	--	Netherlands 476; France 25.
Meerschaum, sepiolite	5,979	--	Spain 3,490; Netherlands 1,490; Belgium 568.
Mica, natural, including splittings and waste	34,527	--	India 10,200; China 10,200; France 7,080.
Peat, natural	887,447	--	Lithuania 259,000; Netherlands 253,000; Latvia 184,000.
<b>Phosphates:</b>			
Crude	142,507	--	Netherlands 60,300; Israel 53,900; Morocco 9,260.
Milled	3,398	--	France 1,410; Denmark 1,190; Poland 350.
<b>Precious and semiprecious stones, natural (other than diamond):</b>			
Gem, not set or strung	1,242	--	Brazil 706; South Africa 119; China 101.
Industrial stones	grams 57,113	15,500	China 29,900; Republic of Korea 9,080.
Pyrite, unroasted	109,955	--	Finland 104,000.
Salt and brine	thousand metric tons 2,319	--	Netherlands 1,990; United Kingdom 116.
<b>Stone, sand and gravel:</b>			
Basalt, lava rocks, etc.	75,855	--	Norway 49,500; Italy 9,940; Netherlands 4,780.
Crushed rock, macadam	14,775	--	Switzerland, 100%.
<b>Dimension stone:</b>			
Dolomite and limestone	677,105	--	Estonia 277,000; Belgium 266,000; Norway 48,100.
Granite	187,617	--	Norway 84,600; Poland 15,600; Austria 15,000.
Marble, travertine, etc.	thousand metric tons 2,513	--	Norway 1,120; Austria 990; Italy 246.

See footnotes at end of table.

TABLE 4—Continued  
GERMANY: IMPORTS OF SELECTED MINERAL COMMODITIES IN 2008<sup>1</sup>

(Metric tons unless otherwise specified)

Commodity	Total	Sources <sup>6</sup>	
		United States	Other (principal) <sup>2</sup>
<b>INDUSTRIAL MINERALS—Continued</b>			
Stone, sand and gravel—Continued:			
Limestone for cement	do. 2,095	--	Belgium 633; Austria 553; Poland 421.
Quartz and quartzite	90,550	--	Austria 35,900; Brazil 16,200; Sweden 9,240.
Sand, natural	thousand metric tons 1,984	--	France 1,190; Netherlands 351; Belgium 187.
Sandstone	20,231	--	India 8,090; Poland 3,520; Netherlands 2,120.
Schist and shale	28,538	--	France 20,300; Brazil 5,540.
Natural stones, unworked	thousand metric tons 1,374	--	France 1,140; Netherlands 102.
Other natural stone, unspecified	do. 8,398	--	Norway 5,130; United Kingdom 1,210; Poland 949.
Sulfur	53,601	--	Belgium 24,800; Netherlands 15,300; Norway 6,650.
Talc, steatite and soapstone, natural	338,606	--	Netherlands 98,900; France 62,600; Austria 56,200.
Vermiculite and perlite, natural	137,449	--	Greece 101,000; Hungary 19,400; South Africa 13,300.
<b>MINERAL FUELS AND RELATED MATERIALS</b>			
Asphalt and bitumen, natural	36,752	3,680	Switzerland 9,960; Trinidad & Tobago 4,520; Poland 3,530.
Coal:			
Bituminous:			
Anthracite	thousand metric tons 4,138	368	South Africa 2,140; Colombia 480; Russia 463.
Coke	do. 4,873	--	Poland 1,560; China 629; Australia 624.
Semicoke, coking coal	do. 9,392	2,550	Australia 4,400; Canada 1,610; Russia 610.
Other, including briquets	do. 27,848	2,700	Russia 6,710; South Africa 5,960; Colombia 5,240.
Lignite	84,576	--	Czech Republic 80,200.
Coke of lignite	2,597	--	Austria 1,460; Italy 1,130.
Gas, natural, gaseous	thousand metric tons 78,227	--	Unspecified, 100%.
Petroleum, crude	do. 105,836	--	Russia 33,900; United Kingdom 15,100; Norway 14,700.
Uranium, natural:			
Crude, U content	2,923	246	France 1,690; United Kingdom 856.
Enriched, fissile isotopes	kilograms 23,506	--	France 12,100; Russia 7,830; Netherlands 2,090.

<sup>6</sup>Estimated; estimated tonnages are rounded to no more than three significant digits; may not add to totals shown. -- Less than 5%.

<sup>1</sup>Source: Bundesanstalt für Geowissenschaften und Rohstoffe, 2009, Table 1—Rohstoffsituation, 2008: Hannover, Germany, October.

<sup>2</sup>Source country was estimated to have accounted for at least 5% of Germany's total imports of the mineral commodity.