

Mineral Resources Program

Production of Mineral Commodities and Geospatial Map of the Mineral Industries and Related Infrastructure of China

Pamphlet to accompany

Open-File Report 2026–1018

**U.S. Department of the Interior
U.S. Geological Survey**

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By Jaewon Chung, Elizabeth R. Neustaedter, Ji Won Moon, Sean Xun, and Steven D. Textoris

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Conversion Factors

International System of Units to U.S. customary units

| Multiply | By | To obtain |
|-----------------|-----------|-------------------------|
| Length | | |
| meter (m) | 3.281 | foot (ft) |
| kilometer (km) | 0.6214 | mile (mi) |
| kilometer (km) | 0.5400 | mile, nautical (nmi) |
| Mass | | |
| gram (g) | 0.03527 | ounce, avoirdupois (oz) |
| kilogram (kg) | 2.205 | pound avoirdupois (lb) |
| metric ton (t) | 1.102 | ton, short [2,000 lb] |
| metric ton (t) | 0.9842 | ton, long [2,240 lb] |
| Energy | | |
| joule (J) | 0.0000002 | kilowatthour (kWh) |

U.S. customary units to International System of Units

| Multiply | By | To obtain |
|-------------------------|-----------|------------------|
| Length | | |
| foot (ft) | 0.3048 | meter (m) |
| mile (mi) | 1.609 | kilometer (km) |
| mile, nautical (nmi) | 1.852 | kilometer (km) |
| Mass | | |
| ounce, avoirdupois (oz) | 28.35 | gram (g) |
| pound, avoirdupois (lb) | 0.4536 | kilogram (kg) |
| ton, short (2,000 lb) | 0.9072 | metric ton (t) |
| ton, long (2,240 lb) | 1.016 | metric ton (t) |
| Energy | | |
| kilowatthour (kWh) | 3,600,000 | joule (J) |

Datum

Horizontal coordinate information is referenced to the World Geodetic System of 1984.

Abbreviations

| | |
|--------|--|
| \$ | U.S. dollars |
| GDP | gross domestic product |
| GeoPDF | geospatial (or georeferenced) portable document format |
| GIS | geographic information system |
| MCS | Mineral Commodity Summaries |
| Mt/yr | million metric tons per year |
| NMIC | National Minerals Information Center |
| R/P | reserves-to-production |
| U.S. | United States |
| USGS | U.S. Geological Survey |
| WGS 84 | World Geodetic System of 1984 |

Production of Mineral Commodities and Geospatial Map of the Mineral Industries and Related Infrastructure of China

By Jaewon Chung, Elizabeth R. Neustaedter, Ji Won Moon, Sean Xun, and Steven D. Textoris

Abstract

As part of the U.S. Geological Survey's (USGS) mission to distribute global mineral information and analyze supply chains, this study provides a comprehensive review of the global significance of China's mineral production and capacity in 2023. Of 77 mineral commodities in the USGS dataset, China produced 74 and was the world's first-ranked producer for 39 of the 74. Compared to the high share of global mineral production, including up to 98 percent of global gallium production, the country's share of global mineral reserves was relatively small, ranging from 20 percent (zinc ore) to 52 percent (tungsten ore). China's imports of metal ores, slag, and ash accounted for 64 percent of global imports of such commodities by value. The country's exports of base metals and articles of base metal accounted for 17 percent of the global exports. To help nongeographic information system users assess the spatial distribution of mineral mines, processing facilities, and ports for trades in China, this study created a geospatial (also called "georeferenced") portable document format (GeoPDF) map. In addition, the GeoPDF contains mineral resource tracts (such as antimony, copper, potash, coal, and oil and gas), exploration sites, and energy infrastructure based on the preexisting USGS data.

Introduction

The National Minerals Information Center (NMIC) of the United States Geological Survey (USGS) reports annual statistics for mineral commodities in about 180 countries and compiles information on the world's mineral facilities. To understand the spatial characteristics of the worldwide mineral commodity supply chains, the NMIC has compiled geographic information system (GIS) geodatabases for the mineral industries and related infrastructure of Latin America and the Caribbean (Baker and other, 2017), Africa (Padilla and others, 2021), countries in Southwest Asia (Padilla and others, 2022) and in the Indo-Pacific (Trimmer and others, 2024), and China (Neustaedter and others, 2023).

The USGS Mineral Commodity Summaries (MCS) by the NMIC have provided the latest annual production and (or) reserves of 77 individual minerals by country. In 2023, China continued to be the dominant global mineral producer. Of 77 mineral commodities, China produced 74, and it was the world's leading producer for 39 (including 25 metals and 14 industrial minerals) (table 1; U.S. Geological Survey, 2025b). The geodatabase for China, with updated information on major mines and mineral processing plants using Moon (2026), provides a dataset for a total of 932 mines and quarries (including oil and gas fields) and 1,506 mineral processing plants. These numbers reflected counting a facility more than once for producing multiple commodities; for example, if a mine produces copper and gold, the mine was listed under both copper and gold (table 2; Neustaedter and others, 2023).

Table 1. Number of mineral commodities listed in the USGS Mineral Commodity Summaries and those commodities that China was the leading global producer in 2023.

[Data from U.S. Geological Survey (2025b) and Moon (2026). MCS, mineral commodity summaries; USGS, U.S. Geological Survey]

| Mineral commodity group | Mineral commodities listed in MCS | Mineral commodities China produced ¹ | Mineral commodities for which China was the world's first-ranked producer |
|-------------------------|-----------------------------------|---|---|
| Metals | 40 | 39 | 25 |
| Industrial minerals | 37 | 35 | 14 |
| Total | 77 | 74 | 39 |

¹China's production of iron oxide pigments, peat, and pumice has not been reported.

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Table 2. Number of commodities produced at mineral facilities as listed in Neustaedter and others (2023) and updated with Moon (2026), and indication of critical minerals of China and the United States.

[The number of critical minerals in common with both China and the United States [for example, “CN, U.S.” in last column] is 16; the three aluminum commodities shown are considered one commodity. CN, China; U.S., United States; -, not applicable for critical minerals of China in 2016 or critical minerals of the United States in 2025]

| Commodity | Mines and quarries | Processing plants | Critical minerals |
|-------------------------------|--------------------|-------------------|-------------------|
| | Metals | | |
| Aluminum, bauxite | 21 | 0 | CN, U.S. |
| Aluminum, alumina | 0 | 25 | CN, U.S. |
| Aluminum, metal | 0 | 44 | CN, U.S. |
| Antimony | 4 | 9 | CN, U.S. |
| Beryllium | 0 | 5 | U.S. |
| Bismuth | 0 | 11 | U.S. |
| Cadmium | 6 | 1 | - |
| Cesium | 0 | 0 | U.S. |
| Chromium (chromite) | 1 | 0 | CN, U.S. |
| Cobalt | 6 | 34 | CN, U.S. |
| Copper | 54 | 74 | CN, U.S. |
| Ferroalloys, ferrochromium | 0 | 29 | - |
| Ferroalloys, ferromanganese | 0 | 26 | - |
| Ferroalloys, ferromolybdenum | 0 | 1 | - |
| Ferroalloys, ferronickel | 0 | 20 | - |
| Ferroalloys, ferrosilicon | 0 | 8 | - |
| Ferroalloys, ferrotitanium | 0 | 3 | - |
| Ferroalloys, ferrotungsten | 0 | 5 | - |
| Ferroalloys, silicomanganese | 0 | 32 | - |
| Gallium | 0 | 16 | U.S. |
| Germanium | 0 | 8 | U.S. |
| Gold | 178 | 11 | CN |
| Hafnium | 0 | 0 | U.S. |
| Indium | 0 | 20 | U.S. |
| Iron ore | 55 | 0 | CN |
| Iron and steel, raw steel | 0 | 356 | CN |
| Lead | 59 | 63 | U.S. |
| Magnesium | 3 | 32 | U.S. |
| Manganese | 10 | 18 | U.S. |
| Mercury | 3 | 4 | - |
| Molybdenum | 7 | 0 | CN |
| Nickel | 9 | 23 | CN, U.S. |
| Niobium | 1 | 19 | U.S. |
| Platinum-group metals | 6 | 6 | U.S. |
| Rare earths | 15 | 15 | CN, U.S. |
| Rhenium | 0 | 5 | U.S. |
| Rubidium | 1 | 0 | U.S. |
| Scandium (rare-earth element) | 0 | 1 | U.S. |
| Selenium | 0 | 4 | - |
| Silicon, metal | 0 | 23 | U.S. |

Table 2. Number of commodities produced at mineral facilities as listed in Neustaedter and others (2023) and updated with Moon (2026), and indication of critical minerals of China and the United States.—Continued

[CN, China; U.S., United States; -, not applicable for critical minerals of China in 2016 or critical minerals of the United States in 2025]

| Commodity | Mines and quarries | Processing plants | Critical minerals |
|--|--------------------|-------------------|-------------------|
| Metals—Continued | | | |
| Silver | 69 | 32 | U.S. |
| Strontium | 0 | 6 | - |
| Tantalum | 4 | 20 | U.S. |
| Tellurium | 0 | 2 | U.S. |
| Tin | 9 | 4 | CN, U.S. |
| Titanium | 11 | 16 | U.S. |
| Tungsten | 19 | 26 | CN, U.S. |
| Vanadium | 1 | 13 | U.S. |
| Zinc | 65 | 52 | U.S. |
| Zirconium | 1 | 1 | CN, U.S. |
| Total | 618 | 1,123 | |
| Industrial Minerals | | | |
| Arsenic | 0 | 0 | U.S. |
| Asbestos | 2 | 0 | - |
| Barite | 3 | 1 | U.S. |
| Boron | 4 | 4 | U.S. |
| Cement | 0 | 312 | - |
| Clay, kaolin | 4 | 0 | - |
| Clay, vermiculite | 1 | 0 | - |
| Fluorspar | 7 | 4 | CN, U.S. |
| Graphite | 5 | 1 | CN, U.S. |
| Gypsum | 13 | 6 | - |
| Lithium | 20 | 29 | CN, U.S. |
| Magnesite (magnesium oxide) | 1 | 0 | U.S. |
| Nitrogen, ammonia | 0 | 1 | - |
| Phosphate | 8 | 1 | CN, U.S. |
| Potash | 6 | 0 | CN, U.S. |
| Salt | 10 | 1 | - |
| Sand and gravel, construction | 8 | 0 | - |
| Talc | 3 | 0 | - |
| Total | 95 | 360 | |
| Mineral Fuels and Related Materials | | | |
| Coal | 109 | 0 | CN |
| Coke, metallurgical | 0 | 7 | U.S. |
| Natural gas | 32 | 3 | CN |
| Petroleum | 71 | 13 | CN |
| Uranium | 7 | 0 | CN, U.S. |
| Coalbed methane, shale gas | 0 | 0 | CN |
| Total | 219 | 23 | |
| Grand total | 932 | 1,506 | |

Purpose and Scope

Considering the importance of China's mineral industry to the global economy, this study reviewed the significance of China's mineral production and summarized the country's major mineral facilities as of 2023. To provide non-GIS users with insights into the spatial distribution of mineral facilities (including oil and gas) and ports for trade, this study also created a geospatial (also called "georeferenced") portable document format (GeoPDF) map using the GIS-based geodatabase by Neustaedter and others (2023). The GeoPDF also contains mineral resource tracts (such as antimony, copper, potash, coal, and oil and gas), mineral exploration sites, and energy infrastructure. This effort reflects USGS's ongoing mission of analyzing the contribution of an individual country to the mineral industry and global commodity supply chains and providing the spatial distribution of global mineral resources and mineral facilities.

China's Economy

China's economic growth in the past two decades, driven largely by investment in manufacturing and exports of goods, resulted in large increases in China's production of, and demand for, mineral commodities (Xun, 2022; Ministry of Commerce of the People's Republic of China, 2024). As a result, China had become the world's leading producer and consumer of numerous mineral commodities. Beginning with the economic slowdown that started late 2012, the country's economic development had been, and was continuing to be, increasingly consumption driven (International Monetary Fund, 2025). China's manufacturing sector, however, still accounted for about 25 percent of the gross domestic product (GDP) in 2024 (National Bureau of Statistics of China, 2025b), which is notably higher than the percentage for the world's major economies by GDP, such as Germany and Japan (19 percent each), India (13 percent), and the United States (11 percent) in 2023 (Our World in Data, 2025).

Mineral Industry

After the implementation of the National Mineral Resources Plan (2008 to 2015) of China, the domestic reserves of major metal minerals, such as copper-gold, lead-zinc, molybdenum, and tungsten, have continued to increase. The outputs of minerals have substantially increased as well (National Development and Reform Commission of the People's Republic of China, 2017). The large and growing industrial base was helping keep downstream demand strong and supporting the mineral industry's move to expand capacity. The mineral industry (except for oil and gas extraction) has nonetheless been faced with some challenges,

such as underutilization of production capacity, slow growth in demand, depletion of high-quality resources, and stricter environmental regulations (Xun, 2022; Moon, 2026).

In 2024, China's capacity utilization rate of the smelting and pressing of nonferrous metals was 79 percent; the smelting and pressing of ferrous metals, 78 percent; the mining industry, 75 percent; and the manufacturing of nonmetallic mineral products, 62 percent (National Bureau of Statistics of China, 2025a). These low utilization rates indicate the existence of overcapacity relative to domestic and global demands. It also implies that these facilities operating at low utilization rates could ramp up production to full capacity in the short term and export excess output to oversupply the global market, driving down global prices and undermining sustainability of foreign competitors (Alonso and others, 2025). For example, more than 800 million metric tons per year (Mt/yr) of raw steel capacity came online in China between 2000 and 2015. The production by China has been about equal to or greater than the total of the rest of the world since 2013. The overstock by China resulted in record low steel prices and consequently led to the decreased utilization rates of foreign steelmakers (Shambaugh, 2024).

Export Measures and Mineral Production

Table 3 highlights mineral production, reserves, and annual production capacity for 39 mineral commodities, for which China was the world's leading producer in 2023 (U.S. Geological Survey, 2025b; Moon, 2026). These 39 mineral commodities include all mineral commodities and related products and (or) technologies that China has implemented export controls on since 2023. These minerals are antimony, bismuth, gallium, germanium, graphite, indium, magnesium, molybdenum, rare earths, tellurium, and tungsten (table 3; Ministry of Commerce of the People's Republic of China, 2025a, b). Because China holds a majority share of global production, any instances of export or production restriction of these commodities by China could cause a considerable supply chain disruption.

For 15 of the 39 mineral commodities, China accounted for more than 65 percent of global production. These included, in order of China's share, gallium (primary refined, 98 percent), magnesium (metal, 89 percent), mercury (mined, 88 percent), silicon (metal, 85 percent), tungsten (mined, 83 percent), bismuth (refined, 82 percent), graphite (natural, 79 percent), germanium (refined, 77 percent), tellurium (refined, 77 percent), wollastonite (76 percent), lime (73 percent), titanium (sponge metal, 69 percent), indium (refined, 68 percent), rare earths (mined, 68 percent), and vanadium (mined, 67 percent).

Production Capacity and Reserves

China's shares of global annual production capacity were estimated to range from 45 percent (abrasives, silicon carbide) to 91 percent (primary, refined gallium)

(table 3). Some production capacity data on alumina, raw steel, and refined copper that were not available for 2023 are estimated based on prior-year data (Flanagan, 2024; Organisation for Economic Co-operation and Development, 2024; Merrill, 2025). China has implemented new capacity management policies in raw materials industry in recent years, including restrictions on new capacity for certain minerals, capacity replacement (allowing new, efficient capacity to replace old, outdated capacity), reinforcement of a capacity ceiling for certain minerals, and abolition of inefficient capacity (Ministry of Industry and Information Technology of China, 2021). An example is the capacity ceiling for primary aluminum, which was established in 2017 to be 45 Mt/yr and has been kept at this level as of 2024 (China Nonferrous Metals News, 2025).

Compared with production and production capacity, China's share of global mineral reserves was relatively small, ranging from 20 percent (zinc, mined) to 52 percent (tungsten, mined) (table 3). The smaller shares were in line with the fact that China has lower reserves-to-production (R/P) ratios (in years) for some minerals compared with those of other mineral-rich countries. For example, the R/P ratio of gold in China was 8 years as of 2023, whereas those in Russia and South Africa were 38 and 48 years, respectively. Russia and South Africa held more gold reserves but produced less mined gold compared with China in 2023 (U.S. Geological Survey, 2024, 2025b). The low R/P ratio indicates that the mining activities have outpaced the discovery of new mineral resources in the country.

Mineral Trade

In 2023, China maintained its position as the world's leading producer and importer of numerous mineral commodities as well as the world's leading manufacturer and exporter. The country's imports of metal ores, slag, and ash were valued at \$239 billion, which accounted for 64 percent of global imports of such commodities by value. The country's exports of base metals and articles of base metal were valued at \$268 billion, accounting 17 percent of the global exports (U.S. Geological Survey, 2025b; Zen Innovations AG, 2025).

Of the 39 mineral commodities, for which China was the world's leading producer in 2023, China's mineral exports of 11 of these accounted for more than 30 percent (about one-third) of total global exports by value (table 4; Zen Innovations AG, 2025). These included, in order of China's share of total global exports, gallium (metal, 68 percent), magnesium (metal, 68 percent), abrasives (fused aluminum oxide, 63 percent), graphite (natural, 58 percent), bismuth (metal, alloys, and scrap, 44 percent), abrasives (silicon carbide, 43 percent), germanium (metal, 41 percent), indium (metal, 41 percent), magnesium (compounds, 37 percent), antimony (metal and oxide, 35 percent), and molybdenum (metal, 32 percent).

China's shares of global exports (table 4) are lower than China's shares of global production (table 3), which indicates that the production was mostly (and unproportionally) consumed by domestic downstream markets. It is likely a considerable amount of the consumption of the mineral

materials (from domestic supply and imports) were also exported as embedded components in downstream manufactured products, although the magnitude is not straightforward to quantify (McCaffrey and others, 2023; Renaud and others, 2023). For example, China's exports of high-tech products, which is the main consumption sector for critical minerals, amounted to about \$875 billion (6,279.2 billion Chinese Yuan) in 2024, accounting for 25 percent of the country's total export of goods (National Bureau of Statistics of China, 2025c).

U.S. Mineral Reliance

Of 39 mineral commodities, for which China was the world's leading producer in 2023, imports of 6 commodities from China accounted for more than 30 percent (about one-third) of U.S. apparent consumption. These included, in order of China's share, rare earths (compounds and metals, 67 percent), bismuth (metal, alloys, and scrap, 63 percent), abrasives (silicon carbide, 63 percent), abrasives (fused aluminum oxide, 60 percent), antimony (metal and oxide, 53 percent), and graphite (43 percent). Higher shares indicate that U.S. consumption is more dependent on China's supplies (table 4; U.S. Geological Survey, 2025b; Zen Innovations AG, 2025; Moon, 2026).

Critical Minerals of China and the United States

In 2016, the Government of China released a list of 24 critical (called "strategic") minerals for the country. Critical minerals refer to minerals (elements and deposits) that have no substitutes and are key materials in high-tech industries, such as new materials, new energy, next generation information technology, artificial intelligence, biotechnology, advanced equipment manufacturing, and national defense and military industries (table 2; Ministry of Land and Resources, 2016).

For the United States, according to the Energy Act of 2020 (Public Law 116–260), critical minerals are defined as a nonfuel mineral or mineral material essential to the economic or national security of the United States and which has a supply chain vulnerable to disruption. Critical minerals are also characterized as serving an essential function in the manufacturing of a product, the absence of which would have significant consequences for the economy or national security. The most recent list of the U.S. critical minerals published in 2025 contains 60 minerals (including individual rare earth elements and platinum-group metals) (U.S. Geological Survey, 2025a). Of these 60 critical minerals, 16 are also found in China's list, including rare earths, tungsten, potash, aluminum, and antimony, which are the top 5 minerals in order of risk ranking (U.S. Geological Survey, 2025a); these 16 overlapping minerals are shown in table 2.

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Table 3. Mineral production, reserves, and annual production capacity for which China was the world's first-ranked producer in 2023.

[Data from Flanagan (2024), Organisation for Economic Co-operation and Development (2024), U.S. Geological Survey (2024, 2025b), Merrill (2025), and Moon (2026). NA, not applicable for commodity refined at a mineral facility; n.r., not reported; <, less than; %, percent]

| Mineral commodity | Production | | Reserves | | Annual production capacity ¹ | |
|---|-----------------------|------------------------------------|-----------------------|------------------------------------|---|------------------------------------|
| | China, in metric tons | China's share of world total, in % | China, in metric tons | China's share of world total, in % | China, in metric tons | China's share of world total, in % |
| Abrasives (fused aluminum oxide) | n.r. | n.r. | NA | NA | 800,000 | 61 |
| Abrasives (silicon carbide) | n.r. | n.r. | NA | NA | 450,000 | 45 |
| Alumina | 82,400,000 | 58 | NA | NA | 91,200,000 | n.r. |
| Aluminum | 41,600,000 | 59 | NA | NA | 45,000,000 | 57 |
| Antimony ² (mined) | 62,300 | 59 | 830,000 | <39 | 80,000 ³ | n.r. |
| Bismuth ² (refined) | 13,300 | 82 | NA | NA | 17,800 | n.r. |
| Cadmium (refined) | 9,300 | 39 | NA | NA | n.r. | n.r. |
| Cement | 2,000,000,000 | 49 | NA | NA | 3,800,000,000 | 53 |
| Copper (refined) | 12,000,000 | 44 | NA | NA | 12,500,000 | 42 |
| Fluorspar (mined) | 6,000,000 | 63 | 67,000,000 | 24 | 6,300,000 ³ | n.r. |
| Gallium ² (primary) | 621 | 98 | NA | NA | 1,000 | 91 |
| Germanium ² (refined) ⁴ | 154 | 77 | NA | NA | 262 | n.r. |
| Gold (mined) | 375 | 12 | 3,000 | 5 | 380 ³ | n.r. |
| Graphite ² (natural) | 1,210,000 | 79 | 78,000,000 | 28 | 1,800,000 | n.r. |
| Indium ² (refined) | 690 | 68 | NA | NA | 1,100 | 61 |
| Iron and steel (raw) | 1,020,000,000 | 54 | NA | NA | 1,150,000,000 | 47 |
| Lead (mined) | 1,960,000 | 45 | 20,000,000 | 21 | 2,010,000 ³ | n.r. |
| Lime | 310,000,000 | 73 | NA | NA | n.r. | n.r. |
| Magnesite | 13,000,000 | 59 | 580,000,000 | 8 | 14,100,000 ³ | n.r. |
| Magnesium ² (metal) | 805,000 | 89 | NA | NA | 1,800,000 | 86 |
| Mercury (mined) | 1,000 | 88 | n.r. | n.r. | 2,300 ³ | n.r. |
| Molybdenum ² (mined) | 96,000 | 39 | 5,800,000 | 39 | 120,000 ³ | n.r. |
| Nitrogen (ammonia) | 47,000,000 | 31 | NA | NA | n.r. | n.r. |
| Perlite (mined) | 1,500,000 | 35 | 32,000,000 | n.r. | n.r. | n.r. |
| Phosphate rock | 105,000,000 | 45 | 3,800,000,000 | 5 | n.r. | n.r. |
| Rare earths ² (mined) ⁵ | 255,000 | 68 | 44,000,000 | 40 | 255,000 ³ | n.r. |
| Salt | 54,000,000 | 20 | n.r. | n.r. | 68,000,000 ³ | n.r. |
| Selenium (refined) | 1,780 | 50 | NA | NA | n.r. | n.r. |
| Silicon (metal) | 3,630,000 | 85 | NA | NA | 6,400,000 | n.r. |
| Sulfur | 19,400,000 | 23 | NA | NA | n.r. | n.r. |
| Talc and pyrophyllite | 1,400,000 | 21 | 72,000,000 | n.r. | n.r. | n.r. |
| Tellurium ² (refined) | 725 | 77 | NA | NA | n.r. | n.r. |
| Tin (mined) | 70,000 | 23 | 1,100,000 | 26 | 95,000 ³ | n.r. |
| Titanium (mined) ⁵ | 3,250,000 | 34 | 210,000,000 | 28 | n.r. | n.r. |
| Titanium (sponge metal) | 220,000 | 69 | NA | NA | 260,000 | 63 |
| Tungsten ² (mined) | 66,000 | 83 | 2,300,000 | 52 | 71,000 ³ | n.r. |
| Vanadium (mined) | 70,000 | 67 | 4,400,000 | 23 | 84,000 ³ | n.r. |
| Wollastonite | 770,000 | 76 | n.r. | n.r. | 890,000 ³ | n.r. |
| Zinc (mined) | 4,060,000 | 34 | 44,000,000 | 20 | 4,200,000 ³ | n.r. |

¹Estimated.

²Mineral commodity and related items subject to China's export control announced in 2023–2025.

³Based on the highest production between 2019 and 2023.

⁴This study assumed global germanium production in 2023 was 200 metric tons based on global production in 2020 (the latest year for which data were available) (U.S. Geological Survey, 2021).

⁵Mineral concentrates.

Table 4. China's share of global exports and of U.S. apparent consumption averaged in 2020–2023.

[Trade codes of commodities are detailed in U.S. Geological Survey (2025b). FeV, ferrovanadium; NA, not applicable; U.S., United States; V₂O₅, vanadium pentoxide; >, greater than; <, less than; %, percent]

| Mineral commodity | Global exports, in metric tons | Global exports, in U.S. dollars | China's share of global exports by value, in % | U.S. net import reliance of apparent consumption, in % | China's share of U.S. apparent consumption, in % |
|--|--------------------------------|---------------------------------|--|--|--|
| Abrasives (fused aluminum oxide) | 1,220,000 | 1.5 billion | 63 | >95 | 60 |
| Abrasives (silicon carbide) | 707,000 | 400 million | 43 | 74 | 63 |
| Alumina | 38,400,000 | 14 billion | 3 | 58 | 2 |
| Aluminum | 16,200,000 | 36 billion | 1 | 44 | 1 |
| Antimony (metal and oxide) | 27,400 | 250 million | 35 | 84 | 53 |
| Bismuth (metal, alloys, and scrap) | 12,100 | 100 million | 44 | 94 | 63 |
| Cadmium (metal) | 8,620 | 22 million | 14 | >50 | 17 |
| Cement | 224,000,000 | 13 billion | 2 | 20 | 0 |
| Copper (refined) | 10,600,000 | 84 billion | 2 | 45 | 0 |
| Fluorspar | 2,320,000 | 730 million | 18 | 100 | 8 |
| Gallium (metal) | 66 | 14 million | 68 | 100 | 19 |
| Germanium (metal) | 92 | 40 million | 41 | >50 | 26 |
| Gold (metal) | NA | NA | NA | NA | NA |
| Graphite (natural) | 650,000 | 560 million | 58 | 100 | 43 |
| Indium (metal) | 64 | 9 million | 41 | 100 | 8 |
| Iron and steel | NA | NA | NA | 14 | 0 |
| Lead (refined) | 2,000,000 | 4.3 billion | 5 | 28 | 1 |
| Lime | NA | NA | NA | <1 | 0 |
| Magnesium (compounds) | 8,500,000 | 2.5 billion | 37 | 53 | 24 |
| Magnesium (metal) | 303,000 | 1.3 billion | 68 | >50 | 10 |
| Mercury (metal) | 1,010 | 25 million | 3 | NA | NA |
| Molybdenum (metal) | 22,000 | 737 million | 32 | NA | NA |
| Nitrogen (ammonia) | NA | NA | NA | 9 | 0 |
| Perlite | 1,780,000 | 240 million | 14 | 25 | 1 |
| Phosphate rock (calcium phosphates) | 25,200,000 | 3 billion | 2 | 11 | 0 |
| Rare earths (compounds and metals) | 281,000 | 3 billion | 26 | 96 | 67 |
| Salt | 57,000,000 | 3 billion | 4 | 28 | 1 |
| Selenium (metal) | 5,400 | 98 million | 26 | >56 | 1 |
| Silicon (metal) | 1,660,000 | 8.5 billion | 21 | <44 | 0 |
| Sulfur | 23,200,000 | 2 billion | 10 | 13 | 0 |
| Talc and pyrophyllite | 2,720,000 | 950 million | 16 | 11 | 1 |
| Tellurium | NA | NA | NA | 82 | 4 |
| Tin (refined) | 300,000 | 6 billion | 5 | 77 | 2 |
| Titanium (mineral concentrates) | 5,140,000 | 2 billion | 2 | 87 | 0 |
| Titanium (sponge metal) | 78,400 | 850 million | 4 | >95 | 1 |
| Tungsten (concentrates and other forms) | 29,600 | 510 million | 26 | >50 | 14 |
| Vanadium (V ₂ O ₅ and FeV) | 70,500 | 1.4 billion | 15 | 59 | <1 |
| Wollastonite | NA | NA | NA | NA | NA |
| Zinc (refined) | 5,430,000 | 16 billion | 1 | 77 | 0 |

Mineral Facilities

Table 5 shows China's largest (up to the top 4) mineral facility operators by annual production capacity and location (latitude and longitude) for which China was the world's leading producer for mineral commodities in the mining and processing stages as of 2023. Namely, China was the world's leading alumina and aluminum producer and the world's third bauxite producer. Table 5 shows the locations of major bauxite mines, alumina refineries, and aluminum smelters, providing data for future analyses of spatial proximity of these facilities and mapping domestic logistics and supply chains. Commonly, a mine and a smelter (or a refinery) may produce multiple metals during the mining and processing of ore concentrates. For example, gold is produced as a coproduct with copper mine production; gallium, as a byproduct from bauxite and zinc; and indium, as a byproduct from zinc concentrate (Nassar and Fortier, 2021). The data of these mineral facilities were collected and reproduced from USGS publications (Neustaedter and others, 2023; Moon, 2026).

As shown in table 5, Yunnan is one of the country's major mineral industry provinces by the number of major mineral facilities. The province held the country's major mines of bauxite, lead-zinc, phosphate rock, and tin, and processing plants of lead and tin. Other provinces with major mineral facilities include Henan, Hunan, Jiangxi, Shandong, and Sichuan. For rare earths, Nei Mongol is the province with the country's largest mine and smelter.

Geospatial PDF Map and Feature Datasets

One of the goals of this study is to create a GeoPDF of the geodatabase from Neustaedter and others (2023) with updated major mineral facilities using Moon (2026). Updated feature attributes in the mineral facilities feature class from the original geodatabase included annual production capacity, capacity notes, commodity, facility name, major operating company, and (or) operating status as well as the addition of 21 new entries. The GeoPDF map presents data on mineral

facilities, exploration sites, and permissive tracts for mineral resource assessment of antimony, coal, copper, phosphate, and potash. The permissive tracts refer to the geologic environments of formation that were described in the deposit model; that is, the tracts will contain all the undiscovered deposits postulated in the assessment. Base cartographic elements from Natural Earth (2025) were also incorporated on the GeoPDF map to represent political and physical features in the study area and to aid in visual interpretation.

Figure 1 presents a screenshot of the GeoPDF map showing the locations of zinc mines and smelters (mineral processing plants), of which the major facilities were listed in table 5. Zinc is classified as critical by the United States and is a host commodity of other critical minerals, such as gallium, germanium, indium, and tellurium (U.S. Geological Survey, 2025a).

Table 6 summarizes the feature datasets organized as folders in the GeoPDF, which contain individual selectable map layers, and lists the subset of feature attributes that are viewable on the map. The updated mineral facilities feature class contains the location of 932 mines and quarries and 1,506 processing plants across China (table 2). To aid in the visual interpretation of the mineral facilities feature class, it was divided by commodity into separate map layers, which were grouped into subfolders in the mineral facilities feature dataset called "Critical Minerals" of the United States and "Other Fuel and Nonfuel Minerals" (see "Layers" on GeoPDF map). Additionally, the electric power generating facilities feature class was divided by capacity classification into separate map layers to aid in visual interpretation. All other feature classes from the original geodatabase were included on the GeoPDF map as a single layer. The original full dataset as well as comprehensive metadata containing detailed definitions for all user-defined attribute data and documentation of all data sources are available via the accompanying USGS data release (Neustaedter and others, 2023). Instructions on how to view the layers and attribute data are included on the GeoPDF map. Additional information and instructions for navigating the layers of the GeoPDF map as well as accessing the attribute data can be found in Baker and others (2017) and TerraGo Technologies Inc. (2025a, b).

Table 5. Major mines and mineral processing plants for mineral commodities listed in [table 3](#).

[Data from U.S. Geological Survey (Neustaedter and others, 2023; Moon, 2026). Annual capacity is in thousand metric tons unless otherwise specified. Latitude and longitude are in decimal degrees. Au, gold; Corp., Corporation; Cu, copper; Hg, mercury; Mo, molybdenum; NA, not available; Pb, lead; Sb, antimony; Sn, tin; WGS 84, World Geodetic System of 1984; Zn, zinc]

| Commodity | Operating company or owner ¹ | Facility | Province or autonomous region ^{2, 3} | Annual capacity ⁴ | Latitude (WGS 84) | Longitude (WGS 84) |
|-------------------------------|--|------------------------------|---|------------------------------|-------------------|--------------------|
| Aluminum | | | | | | |
| Bauxite | Aluminum Corp. of China | Pingguo Mine | Guangxi | 5,800 | 23.38 | 107.51 |
| Bauxite | Aluminum Corp. of China | Huaxing Mine | Shanxi | 2,800 | 38.47 | 111.14 |
| Bauxite | Yunnan Wenshan Aluminum Co. Ltd. | Mine in Wenshan | Yunnan | 3,000 | 23.48 | 104.13 |
| Alumina | Aluminum Corp. of China | Zhongzhou Refinery | Henan | 3,050 | 35.38 | 113.45 |
| Alumina | Shandong Weiqiao Aluminum and Power Co. Ltd. | Shandong Weiqiao Refinery | Shandong | 15,000 | 36.90 | 117.76 |
| Alumina | SPIC Shanxi Aluminum Co. Ltd. | Refinery in Yuanping | Shanxi | 2,900 | 38.79 | 112.76 |
| Aluminum, metal | Aluminum Corp. of China | Baotou Aluminum Plant | Nei Mongol | 1,340 | 40.57 | 110.13 |
| Aluminum, metal | Shandong Weiqiao Aluminum and Power Co. Ltd. | Shandong Weiqiao Plant | Shandong | 6,500 | 36.90 | 117.76 |
| Aluminum, metal | Gansu Dongxing Aluminum Co. Ltd. | Plant in Jiayuguan | Gansu | 1,700 | 39.83 | 98.27 |
| Antimony | | | | | | |
| Mine, ore | Hsikwangshan Twinkling Star Co. Ltd. | Mine in Lengshuijiang | Hunan | 600 | 27.79 | 111.48 |
| Mine, concentrate | Hunan Gold Corp. Ltd. | Chenzhou Mine | Hunan | 8 | 28.53 | 110.87 |
| Mine, Sb content | Tibet Huayu Mining Co. Ltd. | Zhaxikang Mine ⁵ | Xizang | 8 | 28.39 | 92.00 |
| Metal, including intermediate | Hsikwangshan Twinkling Star Co. Ltd. | Plant in Lengshuijiang | Hunan | 40 | 27.75 | 111.47 |
| Metal, including intermediate | Huaxi Group Industrial Co. Ltd. | Plant in Hechi ⁵ | Guangxi | 40 | 24.69 | 108.02 |
| Metal, including intermediate | Hunan Chenzhou Mining Group Co. Ltd. | Plant in Yuanling | Hunan | 20 | 28.58 | 110.57 |
| Bismuth | | | | | | |
| Bismuth, metal | Beijing GeoEnviron Engineering & Technology Inc. (BGE) | Plant in Baiyin ⁵ | Gansu | 3,600 ⁶ | 36.54 | 104.15 |
| Bismuth, metal | Hunan Jinwang Bismuth Industry Co. Ltd. | Plant in Chenzhou | Hunan | 8,000 ⁶ | 25.87 | 113.11 |
| Bismuth, metal | Shizhuyuan Nonferrous Metals Co. Ltd. | Zhuying Smelter | Hunan | 1,200 ⁶ | 27.85 | 113.15 |
| Cadmium | | | | | | |
| Cadmium, refinery | Yunnan Chihong Zinc and Germanium Co. Ltd. | Chihong Smelter | Yunnan | 1,000 ⁶ | 25.55 | 103.73 |
| Cadmium, refinery | Zhuye Torch Metals Co. Ltd. | Zhuzhou Smelter | Hunan | 1,000 ⁶ | 27.87 | 113.08 |
| Copper | | | | | | |
| Mine, Cu content | China Gold International Resources Corp. Ltd. | Jiama Mine | Xizang | 150 | 29.69 | 91.75 |
| Mine, Cu content | Jiangxi Copper Co. Ltd. | Dexing Complex | Jiangxi | 190 | 29.01 | 117.72 |

Table 5. Major mines and mineral processing plants for mineral commodities listed in table 3.—Continued

[Data from U.S. Geological Survey (Neustaedter and others, 2023; Moon, 2026). Annual capacity is in thousand metric tons unless otherwise specified. Latitude and longitude are in decimal degrees. Au, gold; Corp., Corporation; Cu, copper; Hg, mercury; Mo, molybdenum; NA, not available; Pb, lead; Sb, antimony; Sn, tin; WGS 84, World Geodetic System of 1984; Zn, zinc]

| Commodity | Operating company or owner ¹ | Facility | Province or autonomous region ^{2,3} | Annual capacity ⁴ | Latitude (WGS 84) | Longitude (WGS 84) |
|-------------------------|--|----------------------------|--|------------------------------|-------------------|--------------------|
| Copper—Continued | | | | | | |
| Mine, Cu content | Western Mining Co. Ltd | Qulong Mine | Xizang | 150 | 29.59 | 91.61 |
| Mine, Cu content | Zijin Mining Group Co. Ltd. | Duobaoshan Mine | Heilongjiang | 110 | 50.14 | 125.79 |
| Refined | Guangxi Nanguo Copper Industry Co. Ltd. | Nanguo Copper Smelter | Guangxi | 700 | 22.53 | 107.80 |
| Refined | Jiangxi Copper Co. Ltd. | Guixi Smelter | Jiangxi | 1,800 | 28.34 | 117.23 |
| Refined | Tongling Nonferrous Metals Group Holding Co. Ltd. | Jinlong (Tongdu) Smelter | Anhui | 1,600 | 31.00 | 117.79 |
| Fluorspar | | | | | | |
| Fluorspar | Inner Mongolia Huasheng Fluorite Mining Co. Ltd. | Aobao Mine | Nei Mongol | 300 | 43.13 | 111.83 |
| Fluorspar | Jinshi Resources Group Co. Ltd. | Mine in Hangzhou | Zhejiang | 500 | 29.92 | 119.44 |
| Fluorspar | Zhejiang Wuyi Shenlong Flotation Co. Ltd. | Xili Mine | Zhejiang | 300 | 28.89 | 119.81 |
| Gallium | | | | | | |
| Gallium | Aluminum Corp. of China | Zunyi Smelter | Guizhou | 150 ⁶ | 27.52 | 106.84 |
| Gallium | East Hope Mianchi Gallium Industry Co. Ltd. | Smelter in Sanmenxia | Henan | 80 ⁶ | 34.78 | 111.80 |
| Gallium | Zhuhai SEZ Fangyuan Inc. (Aluminum Corp. of China) | Nanchuan Refinery | Chongqing | NA | 29.16 | 107.17 |
| Gallium | Zhuhai SEZ Fangyuan Inc. (Aluminum Corp. of China) | Jingxi Refinery | Guangxi | NA | 23.16 | 106.34 |
| Gallium | Zhuhai SEZ Fangyuan Inc. (Aluminum Corp. of China) | Dengfeng Refinery | Henan | NA | 34.40 | 113.04 |
| Gallium | Zhuhai SEZ Fangyuan Inc. (Aluminum Corp. of China) | Lushan County Refinery | Henan | NA | 33.73 | 112.80 |
| Gallium | Zhuhai SEZ Fangyuan Inc. (Aluminum Corp. of China) | Zouping Refinery | Shandong | NA | 36.89 | 117.77 |
| Gallium | Zhuhai SEZ Fangyuan Inc. (Aluminum Corp. of China) | Yuanping Refinery | Shanxi | NA | 38.79 | 112.70 |
| Germanium | | | | | | |
| Germanium, refinery | China Germanium Co. Ltd. | Plant in Nanjing | Jiangsu | 30 ⁶ | 31.66 | 119.02 |
| Germanium, refinery | Shenzhen Nonfemet Co. Ltd. | Shaoguan Smelter | Guangdong | 30 ⁶ | 24.85 | 113.66 |
| Germanium, refinery | Yunnan Chihong Zinc and Germanium Co. Ltd. | Chihong Smelter | Yunnan | 70 ⁶ | 25.55 | 103.73 |
| Germanium, refinery | Yunnan Lincang Xinyuan Germanium Industrial Co. Ltd. | Plant in Lincang | Yunnan | 50 ⁶ | 23.92 | 100.10 |
| Gold | | | | | | |
| Mine, Au content | China National Gold Group Co. Ltd. | Wenyu Mine | Henan | 20 ⁶ | 34.43 | 110.44 |
| Mine, Au content | Hunan Gold Corp. Ltd. | Chenzhou Mine | Hunan | 36 ⁶ | 28.53 | 110.87 |
| Mine, Au content | Shandong Gold Mining Co. Ltd. | Jiaojia Mine ⁵ | Shandong | 33 ⁶ | 37.40 | 120.13 |
| Mine, Au content | Zijin Mining Group Co. Ltd. | Zijinshan Gold-Copper Mine | Fujian | 15 ⁶ | 25.19 | 116.41 |

Table 5. Major mines and mineral processing plants for mineral commodities listed in table 3.—Continued

[Data from U.S. Geological Survey (Neustaedter and others, 2023; Moon, 2026). Annual capacity is in thousand metric tons unless otherwise specified. Latitude and longitude are in decimal degrees. Au, gold; Corp., Corporation; Cu, copper; Hg, mercury; Mo, molybdenum; NA, not available; Pb, lead; Sb, antimony; Sn, tin; WGS 84, World Geodetic System of 1984; Zn, zinc]

| Commodity | Operating company or owner ¹ | Facility | Province or autonomous region ^{2,3} | Annual capacity ⁴ | Latitude (WGS 84) | Longitude (WGS 84) |
|-----------------------------|--|--|--|------------------------------|-------------------|--------------------|
| Gold—Continued | | | | | | |
| Refinery | Shandong Zhaojin Gold & Silver Refining Co. Ltd. | Shandong Zhaojin Refinery ⁵ | Shandong | 200 ⁶ | 37.37 | 120.43 |
| Refinery | Sichuan Tianze Precious Metals Co. Ltd. | Sichuan Tianze Refinery ⁵ | Sichuan | 150 ⁶ | 30.68 | 104.17 |
| Refinery | Zijin Mining Group Gold Smelting Co. Ltd. | Fujian Refinery ⁵ | Fujian | 160 ⁶ | 25.12 | 116.99 |
| Graphite | | | | | | |
| Graphite | Jixi Aoyu Graphite Co. Ltd. | Mine in Jixi | Heilongjiang | 100 | 45.62 | 132.46 |
| Graphite | Jixi Puchen Graphite Co. Ltd. | Liumao Mine | Heilongjiang | 80 | 45.08 | 130.78 |
| Graphite | Qingdao Haida Graphite Co. Ltd. | Mine in Pingdu ⁵ | Shandong | 60 | 36.73 | 119.92 |
| Indium | | | | | | |
| Indium, refinery | China Germanium Co. Ltd. | Plant in Nanjing | Jiangsu | 150 ⁶ | 31.66 | 119.02 |
| Indium, refinery | Guangxi Debang Technology Co. Ltd. | Plant in Xinxing | Guangxi | 120 ⁶ | 24.48 | 109.39 |
| Indium, refinery | Xiangtan Zhengtan Nonferrous Metal Co. Ltd. | Plant in Xiangtan | Hunan | 75 ⁶ | 27.90 | 112.97 |
| Iron ore | | | | | | |
| Iron ore, mine, concentrate | Anshan Mining Co. Ltd. | Gongchangling Mine | Liaoning | 10,000 | 41.10 | 123.51 |
| Iron ore, mine, concentrate | Panzhuhua Fengyuan Mining Co. Ltd. | Baima Mine | Sichuan | 13,000 | 27.03 | 102.10 |
| Iron ore, mine, concentrate | Taiyuan Iron and Steel Co. Ltd. | Mine in Taiyuan | Shanxi | 12,000 | 37.95 | 112.30 |
| Iron and steel | | | | | | |
| Iron and steel, raw steel | Ansteel Group Corp. Ltd. | Plant in Anshan | Liaoning | 56,000 | 41.12 | 122.98 |
| Iron and steel, raw steel | Baowu Steel Group Corp. Ltd. | Plants in multiple locations | Shanghai | 115,000 | 31.18 | 121.49 |
| Iron and steel, raw steel | Hebei Iron and Steel Group Co. Ltd. (HBIS) | Plant in Fuxing District | Hebei | 57,500 | 36.60 | 114.44 |
| Iron and steel, raw steel | Jiangsu Shagang Group Co. Ltd. | Plant in Jinfeng | Jiangsu | 39,000 | 31.98 | 120.64 |
| Lead | | | | | | |
| Mine, Pb content | China Gold International Resources Corp. Ltd. | Jiama Mine | Xizang | 54 | 29.69 | 91.75 |
| Mine, Pb content | Shenzhen Zhongjin Lingnan Nonferrous Metals Co. Ltd. | Fankou Mine | Guangdong | 93 | 25.10 | 113.60 |
| Mine, Pb content | Yunnan Chihong Zinc and Germanium Co. Ltd. | Qilinchang Mine | Yunnan | 50 | 26.64 | 103.72 |
| Refinery, primary | Henan Jinli Gold and Lead Group Co. Ltd. | Jiyuan Smelter | Henan | 300 | 35.09 | 112.55 |
| Refinery, primary | Henan Yuguang Gold and Lead Co. Ltd. | Yuguang Smelter | Henan | 400 | 35.09 | 112.55 |
| Refinery, primary | Yunnan Chihong Zinc and Germanium Co. Ltd. | Chihong Smelter | Yunnan | 300 | 25.55 | 103.73 |

Table 5. Major mines and mineral processing plants for mineral commodities listed in table 3.—Continued

[Data from U.S. Geological Survey (Neustaedter and others, 2023; Moon, 2026). Annual capacity is in thousand metric tons unless otherwise specified. Latitude and longitude are in decimal degrees. Au, gold; Corp., Corporation; Cu, copper; Hg, mercury; Mo, molybdenum; NA, not available; Pb, lead; Sb, antimony; Sn, tin; WGS 84, World Geodetic System of 1984; Zn, zinc]

| Commodity | Operating company or owner ¹ | Facility | Province or autonomous region ^{2,3} | Annual capacity ⁴ | Latitude (WGS 84) | Longitude (WGS 84) |
|--|--|--------------------------------|--|------------------------------|-------------------|--------------------|
| Magnesium | | | | | | |
| Magnesium, metal | Baowu Magnesium Technology Co. Ltd. | Plant in Nanjing | Jiangsu | 200 | 31.60 | 118.98 |
| Magnesium, metal | Century Sunshine Group Holding Ltd. | Plant in Baishan ⁵ | Jilin | 75 | 41.95 | 126.43 |
| Magnesium, metal | Shanxi Regal Advanced Material Co. Ltd. | Plant in Wenxi | Shanxi | 55 | 35.28 | 111.31 |
| Magnesium, metal | Shanxi Yinguang Huasheng Magnesium Industry Co. Ltd. | Plant in Wenxi | Shanxi | 65 | 35.48 | 111.35 |
| Mercury | | | | | | |
| Mine, Hg content | Guizhou Dalong Yinxing Mercury Co. Ltd. | Wanshan Mercury Mine | Guizhou | 500 ⁶ | 27.53 | 109.21 |
| Mine, Hg content | Guizhou Hongling Mercury Co. Ltd. | Tongren Mine | Guizhou | NA | 27.70 | 109.38 |
| Mine, Hg content | Shaanxi Mercury and Antimony Technology Co. Ltd. | Qingtonggou and Xunyang Mines | Shaanxi | NA | 33.05 | 109.37 |
| Smelter | Guizhou Hongjing Mercury Industry Co. Ltd. | Plant in Wanshan | Guizhou | 350 ⁶ | 27.52 | 109.20 |
| Smelter | Shaanxi Mercury and Antimony Technology Co. Ltd. | Plant in Xi'An | Shaanxi | NA | 34.20 | 108.93 |
| Molybdenum | | | | | | |
| Molybdenum, mine, Mo content | China Molybdenum Co. Ltd. (CMOC) | Sandaozhuang Mine ⁵ | Henan | 15 | 33.92 | 111.50 |
| Molybdenum, mine, Mo content | Jinduicheng Molybdenum Industry Co. Ltd. (Shaanxi Non-ferrous Metals Holding Group Co. Ltd.) | Jinduicheng Mine ⁵ | Shaanxi | 12 | 34.33 | 109.96 |
| Molybdenum, mine, Mo content | Yichun Luming Mining Co. Ltd. (China Railway Group Ltd.) | Luming Mine ⁵ | Heilongjiang | 20 | 47.35 | 128.54 |
| Phosphate | | | | | | |
| Phosphate rock | Guizhou Kailin (Group) Co. Ltd. | Mine in Xifeng | Guizhou | 10,000 | 27.19 | 106.71 |
| Phosphate rock | Yunnan Phosphate Chemical Group Co. Ltd. | Haikou Mine ⁵ | Yunnan | 11,500 | 24.77 | 102.48 |
| Phosphate rock | Yunnan Tianning Mining Co. Ltd. | Mine in Anning | Yunnan | 12,000 | 24.85 | 102.39 |
| Rare earths (rare-earth-oxide equivalent) | | | | | | |
| Mine | China Northern Rare Earth (Group) High-Tech Co. Ltd. | Banyan Obo Mine | Nei Mongol | 179,000 ⁶ | 41.80 | 109.97 |
| Mine | China Rare Earth Group Co. Ltd. | Weishanhu Mine | Shandong | NA | 34.87 | 116.99 |
| Mine | China Rare Earth Group Co. Ltd. | Mines in Ganzhou | Jiangxi | 8,500 ⁶ | 25.70 | 115.24 |
| Mine | China Rare Earth Group Co. Ltd. | Maoniuping Mine | Sichuan | 34,000 ⁶ | 28.46 | 101.98 |
| Smelter | China Northern Rare Earth (Group) High-Tech Co. Ltd. | Plant in Baotou | Nei Mongol | 164,000 ⁶ | 40.66 | 109.75 |
| Smelter | China Rare Earth Group Co. Ltd. | Plants in Jinshanzhen | Shandong | NA | 36.75 | 118.26 |

Table 5. Major mines and mineral processing plants for mineral commodities listed in table 3.—Continued

[Data from U.S. Geological Survey (Neustaedter and others, 2023; Moon, 2026). Annual capacity is in thousand metric tons unless otherwise specified. Latitude and longitude are in decimal degrees. Au, gold; Corp., Corporation; Cu, copper; Hg, mercury; Mo, molybdenum; NA, not available; Pb, lead; Sb, antimony; Sn, tin; WGS 84, World Geodetic System of 1984; Zn, zinc]

| Commodity | Operating company or owner ¹ | Facility | Province or autonomous region ^{2,3} | Annual capacity ⁴ | Latitude (WGS 84) | Longitude (WGS 84) |
|---|---|---------------------------------------|--|------------------------------|-------------------|--------------------|
| Rare earths (rare-earth-oxide equivalent)—Continued | | | | | | |
| Smelter | China Southern Rare Earth Group Co. Ltd. | Plant in Ganzhou | Jiangxi | 28,300 ⁶ | 24.85 | 114.81 |
| Selenium | | | | | | |
| Primary | Jiangxi Copper Co. Ltd. | Guixi Smelter | Jiangxi | 300 ⁶ | 28.33 | 117.23 |
| Primary | Jinchuan Group Co. Ltd. | Jinchuan Smelter ⁵ | Gansu | 50 ⁶ | 38.51 | 102.20 |
| Secondary | Vital Materials Co. Ltd. (Guangdong Xiandao Co. Ltd.) | High Purity Materials Plant | Guangdong | 1,000 ⁶ | 23.91 | 112.91 |
| Silicon | | | | | | |
| Silicon, metal | Changji Jisheng New Building Materials Co. Ltd. | Plant in Changji | Xinjiang Uyghur | 370 | 44.78 | 88.86 |
| Silicon, metal | Inner Mongolia Erdos Power and Metallurgy Group Co. Ltd. | Plant in Qipanqing Industrial Park | Nei Mongol | 800 | 39.37 | 107.02 |
| Silicon, metal | Xinjiang Hoshine Silicon Industry Co. Ltd. | Plant in Karamay | Xinjiang Uyghur | 1,400 | 44.73 | 84.93 |
| Talc | | | | | | |
| Talc | China National Nonmetallic Industry Corp. | Fanjiabauzi Mine | Liaoning | 50 | 40.81 | 122.91 |
| Talc | Guangxi Longguang Talc Development Co. Ltd. | Mine in Longshen | Guangxi | 130 | 25.86 | 109.10 |
| Tellurium | | | | | | |
| Refined, primary | Jiangxi Copper Co. Ltd. | Guixi Smelter | Jiangxi | 70 ⁶ | 28.33 | 117.23 |
| Refined, secondary | Vital Materials Co. Ltd. (Guangdong Xiandao Co. Ltd.) | High Purity Materials Plant | Guangdong | 280 ⁶ | 23.92 | 112.91 |
| Tin | | | | | | |
| Mine, Sn content | Liuzhou Huaxi Group Co. | Nandan Longquan Mine ⁵ | Guangxi | 11 | 24.86 | 107.65 |
| Mine, Sn content | Yunnan Hualian Zinc Indium Co. Ltd. | Wenshandulong Mine | Yunnan | 12 | 22.98 | 104.49 |
| Mine, Sn content | Yunnan Tin Industry Group Co. Ltd. | Yunnan Mine | Yunnan | 80 | 23.17 | 103.09 |
| Smelter | Chenzhou Yunxiang Mining and Metallurgy Co. Ltd. (Yunnan Tin Industry Group Co. Ltd.) | Smelter in Chenzhou ⁵ | Hunan | 20 | 25.93 | 113.22 |
| Smelter | Guangxi Huaxi Nonferrous Metals Co. Ltd. | Laibin (Liuzhou) Smelter ⁵ | Guangxi | 25 | 23.70 | 109.22 |
| Smelter | Yunnan Tin Industry Group Co. Ltd. | Gejiu (YTC) Smelter ⁵ | Yunnan | 80 | 23.38 | 103.15 |
| Titanium | | | | | | |
| Mine, concentrate | Pangang Group Vanadium and Titanium Resources Co. Ltd. | Sichuan Panzhihua Mine | Sichuan | 1,000 | 26.62 | 101.73 |
| Mine, concentrate | Panzhihua Longmang Mineral Products Co. Ltd. | Mine in Yanbian County | Sichuan | 950 | 26.63 | 101.99 |
| Mine, concentrate | Xichang Mining Co. (Chongqing Iron and Steel Co. Ltd.) | Mine in Xichang | Sichuan | 600 | 27.87 | 102.10 |

Table 5. Major mines and mineral processing plants for mineral commodities listed in table 3.—Continued

[Data from U.S. Geological Survey (Neustaedter and others, 2023; Moon, 2026). Annual capacity is in thousand metric tons unless otherwise specified. Latitude and longitude are in decimal degrees. Au, gold; Corp., Corporation; Cu, copper; Hg, mercury; Mo, molybdenum; NA, not available; Pb, lead; Sb, antimony; Sn, tin; WGS 84, World Geodetic System of 1984; Zn, zinc]

| Commodity | Operating company or owner ¹ | Facility | Province or autonomous region ^{2,3} | Annual capacity ⁴ | Latitude (WGS 84) | Longitude (WGS 84) |
|--|---|----------------------------|--|------------------------------|-------------------|--------------------|
| Titanium—Continued | | | | | | |
| Sponge | Chaoyang Jinda Titanium Co. Ltd. | Plant in Chaoyang | Liaoning | 16 | 41.52 | 120.39 |
| Sponge | Luoyang Sunrui Wanji Titanium Industry Co. Ltd. | Plant in Xin'an County | Henan | 30 | 34.73 | 112.06 |
| Sponge | Panzhuhua Iron and Steel Group Co. Ltd. (Pangang) | Plant in Dong District | Sichuan | 23 | 26.56 | 101.69 |
| Tungsten | | | | | | |
| Mine, WO ₃ in concentrate | China Molybdenum Co. Ltd. | Sandaozhuang Mine | Henan | 8 | 33.92 | 111.50 |
| Mine, WO ₃ in concentrate | Jiangxi Rare Earth and Rare Metals Tungsten Group Corp. | Kuimeishan Mine | Jiangxi | 7 | 24.71 | 114.88 |
| Mine, WO ₃ in concentrate | Jiangxi Tungsten Industry Holding Group Co. Ltd. | Dangping Mine | Jiangxi | 9 | 25.47 | 114.33 |
| Ammonium paratungstate | Hunan Shizhuyuan Nonferrous Metals Co. Ltd. | Plant in Suxian District | Hunan | 20 | 25.80 | 113.16 |
| Ammonium paratungstate | Jiangxi Xinsheng Tungsten Industry Co. Ltd. | Plant in Futian | Jiangxi | 12 | 29.14 | 114.70 |
| Ammonium paratungstate | Xiamen Tungsten Co. Ltd. (XTC) | Plant in Xiamen | Fujian | 6 | 24.46 | 117.97 |
| Vanadium | | | | | | |
| Vanadium, V ₂ O ₅ equivalent | HBIS Chengde Vanadium Titanium New Material Co. | Chengde Chenggang Plant | Hebei | 22 | 40.95 | 117.72 |
| Vanadium, V ₂ O ₅ equivalent | Pangang Group Vanadium & Titanium Resources Co. Ltd. | Plant in Xiangyang Village | Sichuan | 44 | 26.56 | 101.69 |
| Vanadium, V ₂ O ₅ equivalent | Sichuan Neijiang Tranvic Special Steel Co. Ltd. | Plant in Neijiang | Sichuan | 24 | 29.68 | 104.98 |
| Zinc | | | | | | |
| Mine, Zn content | Yunnan Chihong Zinc and Germanium Co. Ltd. | Dashuijing Mine | Yunnan | 300 | 25.65 | 99.05 |
| Mine, Zn content | Yunnan Jinding Zinc Industry Co. Ltd. | Lanping Jinding Mine | Yunnan | 200 | 26.40 | 99.43 |
| Mine, Zn content | Zijin Mining Group Co. Ltd. | Wulagen Mine | Xinjiang Uyghur | 140 | 39.69 | 75.06 |
| Refinery, primary | Guangxi Nandan Nanfang Nonferrous Metal Smelting Co. Ltd. | Nanfang Smelter | Guangxi | 400 | 24.86 | 107.66 |
| Refinery, primary | Hanzhong Zinc Industry Co. Ltd. (Youser Group) | Mianxian Smelter | Shaanxi | 360 | 33.08 | 106.72 |
| Refinery, primary | Huludao Zinc Smelting Co. Ltd. | Huludao Smelter | Liaoning | 390 | 40.73 | 120.94 |
| Refinery, primary | Zhuzhou Smelter Group Co. Ltd. | Zhuzhou Smelter | Hunan | 560 | 27.87 | 113.08 |

¹Most companies are owned by the central Government or a provincial government.

²Listed by province or autonomous region, followed by locality. Only headquarter locations are provided for some companies that have numerous facilities throughout the country.

³Some locations have different official translations; for example, “Nei Mongol” is also known as “Inner Mongolia,” and “Xizang” is also known as “Tibet.”

⁴Estimated, rounded to no more than three significant digits.

⁵Facility added in this study based on Moon (2026).

⁶Estimated, in metric tons.

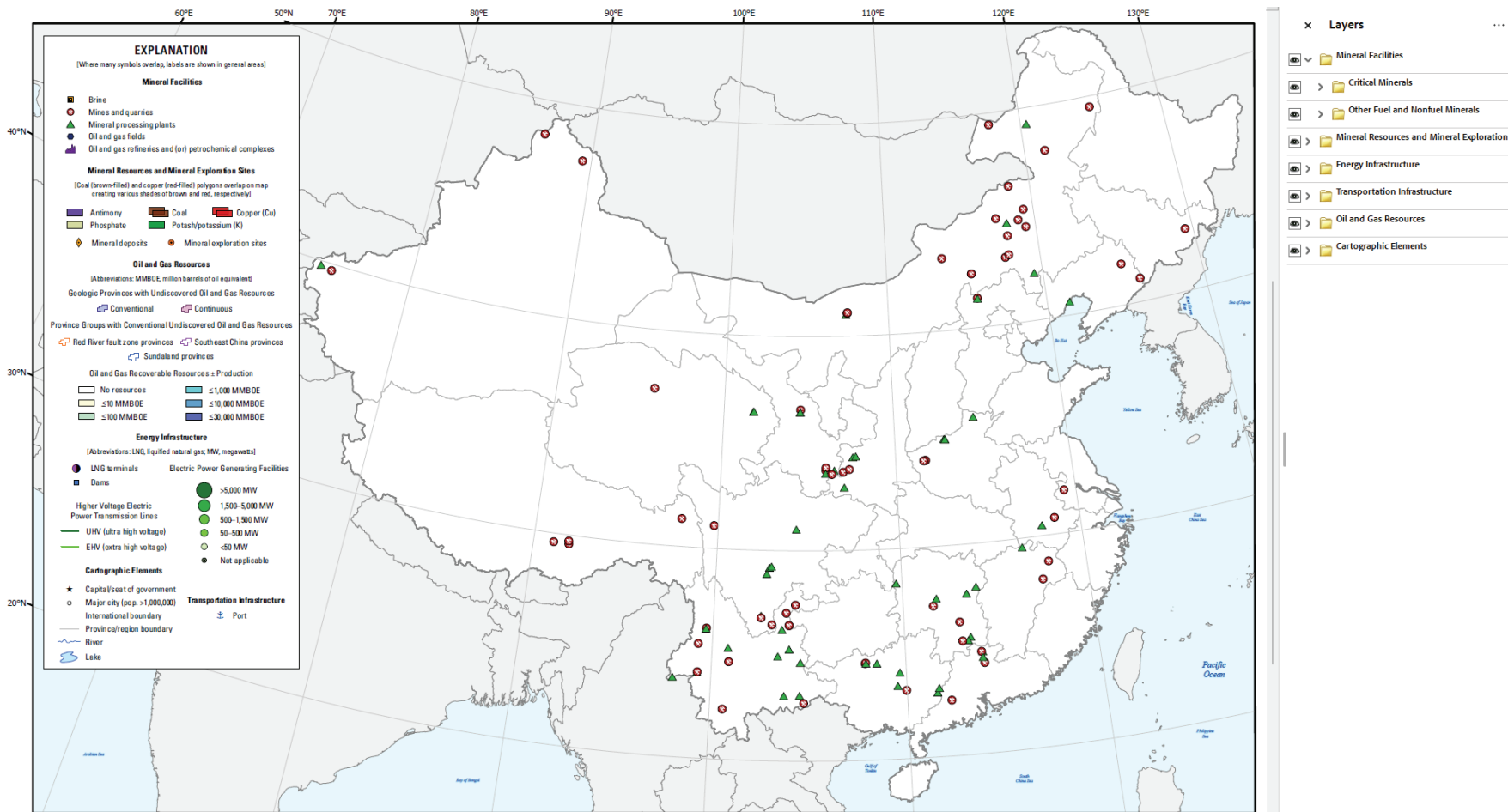


Figure 1. Screenshot of the GeoPDF map showing the locations of zinc mines (red circles) and smelters (mineral processing plants, green triangles) in China. Information on the major mineral facilities is detailed in [table 5](#).

Table 6. GeoPDF feature datasets, map layers, and feature attributes.

[ID, identification; LNG, liquefied natural gas; NA, not applicable; USGS, U.S. Geological Survey]

| GeoPDF feature datasets | GeoPDF map layers | GeoPDF feature attributes (field alias names) |
|---|--|---|
| Mineral facilities | Critical minerals ¹ Other fuel and nonfuel minerals | USGS Facility ID, facility name, feature type, commodity, commodity product, annual production capacity, capacity units, capacity notes, operating status, major operating company |
| Mineral resources and mineral exploration sites | Antimony resources Coal resources Copper resources Phosphate resources Potash resources Mineral deposits Mineral exploration sites | Tract name, commodity, deposit type, geologic age Geologic age Tract name, commodity, deposit type, expected deposits Commodity, geologic age, geology Tract name, commodity, deposit type Deposit ID, deposit name, commodity Exploration ID, site name, commodity |
| Energy infrastructure | Liquefied natural gas (LNG) terminals Dams Electric power generating facilities Electric power transmission lines | Facility name, LNG plant type, capacity, operating status Project name, storage capacity, installed capacity Project name, installed capacity, fuel type Voltage classification |
| Transportation infrastructure | Ports | USGS port ID, port name, port type, commodity exports, commodity form, port operator |
| Oil and gas resources | Continuous undiscovered oil and gas resources Province groups with conventional undiscovered oil and gas resources Conventional undiscovered oil and gas resources Oil and gas recoverable resources ± production | Province name, mean total volume of oil, gas, and natural gas liquids each from oil and gas fields NA |
| Cartographic elements | Cities, lakes, rivers, China, China provinces, international boundaries ² | NA |

¹Critical materials of the United States (U.S. Geological Survey, 2025a).

²Map layers from Natural Earth (2025).

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