

The United States of America

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The year 2001 was a year of change in the US. In January, Republican George W. Bush was inaugurated President following an eight-year Democratic Presidency. At the beginning of 2001 both the House of Representatives and the Senate were controlled by the Republican Party although with very thin margins. In late spring, the Senate leadership changed hands when one Senator moved from the Republican to the Democratic Party. The year began with an energy crisis. Prices for natural gas were at historical highs, electricity supplies in some regions of the nation were not adequate to meet demands. These two factors - higher energy prices and a shortage of electricity - affected the entire mining sector as well as the manufacturing sector. Several mining companies were forced to curtail production and processing due to lack of energy. Others closed in order to make electricity available to the grid. One of the first actions that President Bush took was to form an Energy Policy Task Force to develop a new National Energy Strategy. Energy legislation was front and centre in both the House and the Senate until September 11 and the terrorist attacks on New York and Washington.

The economy was changing as well. Following on the heels of the strongest economy in US history, 2001 marked the end of the nation's longest economic expansion and the beginning of the first recession in more than a decade. Shrinking global markets, lower consumer spending and higher energy costs took their toll. The economy was just beginning to turn around on September 11 when terrorists attacked New York's World Trade Center and the Pentagon near Washington D.C. This action exacerbated the recession, but by year-end there were signs of turnaround in many segments of the economy. The US Economy, as measured by current dollar GDP, rose to US\$10,208.1 billion an increase of 3.4% over 2000. This, however, followed a 6.2% increase

on an annual basis. The third quarter marked the low point in economic activity.

Domestic production of most metals and minerals were affected by the weak economy and strong foreign competition. As measured by value, the demand for minerals and mineral products fell by nearly 8% in 2001 to US\$374 billion. (See Table 1.) The total value of non-fuel raw minerals fell by 1% in 2001 to US\$39.0 billion. The value of metals declined by nearly 10% to US\$9.1 billion due to lower demand, lower prices and greater foreign competition which meant lower domestic production. The value of non-metals was up by just over 2.0% to US\$29.9 billion. (Note that all 2000 data have been revised.)

The estimated value of coal, crude oil and natural gas production was US\$150.2 billion, just 1% above 2000 levels. Actual US production of coal increased after two years of decline. Crude oil production was slightly higher and natural gas production was 2.2% greater. The value of crude declined, but the average value of natural gas was nearly 12% higher in 2001 than in 2000. The value of natural gas reached record highs during the first part of 2001 but then declined to more normal levels in the second half. The value of coal at the mine also increased.

Employment in coal mining increased to an average of 78,000 workers in 2001 as compared with 75,880 in 2000. Employment in metal mining declined to an average 32,000 (37,000 in 2000) and employment in non-metals increased to an average 111,000 workers (versus 108,750 in 2000). The Mine Safety and Health Administration (MSHA) reported that mine fatalities declined to 72 in 2001: 42 in coal and 30 in other mines.

The producer price indices (PPI) most closely associated with mineral products were mixed

US Metal and Mineral Production

		1999*	2000*	2001**	% change
Value of non-fuel processed minerals	US\$ billion	422.0	406.5	374.0	-8.00%
Value of non-fuel raw minerals	US\$ billion	39.1	39.4	39.0	-1.02%
of which: non-metallics	US\$ billion	28.7	29.3	29.9	2.05%
metals from US ores	US\$ billion	9.4	10.1	9.1	-9.90%
Coal (anthracite, bituminous, lignite)	Mt	998.1	974.0	1,017.3	4.45%
Steel (raw)	Mt	97.3	101.8	90.1	-11.49%
Steel mill products (shipments)	Mt	95.3	98.9	90.2	-8.80%
Iron and steel castings (shipments)	Mt	10.8	10.5	10.5	0.00%
Iron ore (production)	Mt	57.8	63.1	46.3	-26.62%
Iron (purchased scrap)	Mt	53.0	56.0	46.0	-17.86%
Aluminum (primary)	'000 t	3,779.0	3,668.0	2,637.0	-28.11%
Aluminum (secondary from scrap)	'000 t	1,550.0	1,370.0	1,250.0	-8.76%
Copper (mine)	'000 t	1,660.0	1,440.0	1,340.0	-6.94%
Copper (refined-primary)	'000 t	1,890.0	1,590.0	1,640.0	3.14%
Copper (refined-secondary)	'000 t	230.0	208.0	150.0	-27.88%
Lead (mine)	'000 t	505.0	457.0	450.0	-1.53%
Lead (refined-primary)	'000 t	350.0	341.0	300.0	-12.02%
Lead (refined-secondary)	'000 t	1,080.0	1,080.0	1,030.0	-4.63%
Zinc (mine- recoverable)	'000 t	843.0	814.0	673.0	-17.32%
Zinc (smelters- refined)	'000 t	356.0	363.0	299.0	-17.63%
Magnesium	'000 t	W	W	W	-
Titanium (mill product shipments)	'000 t	18.1	25.9	28.5	10.04%
Molybdenum (mine)	'000 t	43.0	40.9	37.6	-8.07%
Nickel (plant production)	'000 t	0.0	0.0	0.0	0.00%
Antimony (primary)	'000 t	23.8	20.9	18.0	-13.88%
Mercury (secondary)	t	NA	NA	NA	-
Tin (secondary from scrap)	'000 t	16.3	15.1	10.8	-28.48%
Gold (mine)	t	341.0	352.0	325.0	-7.67%
Gold (secondary)	t	143.0	82.0	100.0	21.95%
Silver (mine)	'000 t	2.0	1.8	1.6	-11.11%
Silver (secondary)	'000 t	1.5	1.7	1.7	0.00%
Platinum group metals (mine)	'000 kg	12.7	13.4	15.6	16.42%

Sources: US Geological Survey, Minerals Commodity Summaries 2002 and from Monthly or Quarterly Mineral Industry Surveys; American Iron and Steel Institute; National Mining Association and from the the US Department of Energy

W: Withheld to avoid disclosing company data. NA: Not available

* Revised

** Preliminary

in 2001 (1982 = 100). The PPI for metals and metal products declined by 2.1% to 125.4 owing to a decline in metal prices. The PPI for non-metallic mineral products increased by 1.3% to 144.3 in 2001. The PPI for fuels and related products and power increased 1.9% going from 103.5 in 2000 to 105.5 in 2001. This increase was due to an increase in natural gas prices - an increase that was offset in part by a decline in the prices of crude oil.

The US trade deficit in goods and services declined in 2001 to US\$347.8 billion. Reflecting the economic downturn, imports of consumer goods, capital goods and services were all lower. Exports were lower in 2001 as well. Imports of petroleum and petroleum products increased for the ninth consecutive year totalling 4,241 million barrels in 2001. Because the price for crude and product declined in 2001, the estimated value of these imports declined to US\$102.9 billion, 13.7% lower than in 2000. The value of exports of petroleum and petroleum products declined to an estimated US\$8.8 billion. The value of coal exported totalled US\$1.7 billion, lower than in 2000 owing to the 17% drop in US coal exports.

Total US trade (exports and imports) in raw minerals and processed material of mineral origin was valued at US\$107 billion in 2001. Imports of processed mineral material were valued at US\$65 billion, while exports were an estimated US\$42 billion for a mineral trade deficit of US\$23 billion, US\$6 billion lower than in 2000. Imports of metal ores and concentrates and of raw industrial minerals totalled US\$2.2 billion, but exports of these same materials totalled US\$2.5 billion. The most important sources of non-fuel mineral materials and import dependence for several commodities are listed in the following table.

Issues in 2001

The mining industry began 2001 with two top priorities: a National Energy Policy that recognises the importance of coal to the US economy and a National Minerals Policy that promotes the importance of mining metals

and minerals within the US and that results in responsible reform of the nation's mining law. An energy policy to support coal encompasses support for research and then development and commercialisation of clean-coal technologies. These technologies will allow use of more coal to generate affordable and reliable electricity while doing so more efficiently and with lower emissions. The new National Energy Policy released by the Bush Administration in May included a 'Clean Coal Power Initiative' that expands the current clean coal research and demonstration programme now housed within the Department of Energy. The Comprehensive Energy Bill that passed the House of Representatives in early August (and the Senate in April 2002) includes investment and tax credits to move these technologies to the commercial market.

Climate Change is also included under the Energy Policy umbrella. In March 2001, President Bush announced that the US would not be bound by the Kyoto Protocol for two reasons:

- 1 the Protocol will not result in emissions on a global basis and thus will be environmentally ineffective and
- 2 compliance with the Protocol's emission reduction requirements (7% below 1990 levels by 2008) would harm the US economy.

Instead, the President announced that the US would embark on a long-term effort to reduce emissions, an effort that includes additional research, technology development and voluntary industry actions. This programme was developed during the year with details announced in early 2002.

Air issues are also closely related to Energy Policy. The Bush Administration pledged to review all current and pending regulations affecting allowable emission levels at utilities. This review continued throughout the year with changes expected in mid 2002.

US 2001 Net Import Reliance For Selected Non-Fuel Mineral Materials

Commodity	%	Major Sources (1997-2000)*
Arsenic	100	China, Chile, Mexico
Asbestos	100	Canada
Bauxite and Alumina	100	Australia, Guinea, Jamaica, Brazil
Niobium (columbium)	100	Brazil, Canada, Germany, Russia
Fluorspar	100	China, South Africa, Mexico
Graphite (natural)	100	China, Mexico, Canada, Brazil
Manganese	100	South Africa, Gabon, Australia, Mexico
Mica, sheet (natural)	100	India, Belgium, Germany, China
Quartz Crystal	100	Brazil, Germany, Madagascar
Strontium	100	Mexico, Germany
Thallium	100	Belgium, Canada, Germany, UK, France
Thorium	100	France, Canada, Japan, Singapore
Vanadium	100	Canada, South Africa, China, Austria
Yttrium	100	China, Japan, UK, Germany
Gemstones	99	Israel, Belgium, India
Bismuth	95	Belgium, Mexico, UK, China
Indium	95	Canada, China, Russia, France
Tin	88	China, Peru, Indonesia, Brazil, Bolivia
Barite	87	China, India, Canada, Mexico
Palladium	87	Russia, South Africa, Belgium, UK
Antimony	86	China, Mexico, South Africa, Belgium, Bolivia
Diamond (natural)	83	UK, Switzerland, Ireland, Belgium
Potash	80	Canada, Russia, Belarus
Stone (dimension)	80	Italy, Brazil, Canada, India
Tantalum	80	Australia, China, Thailand, Japan
Chromium	78	South Africa, Kazakhstan, Russia, Turkey, Zimbabwe
Cobalt	78	Finland, Norway, Canada, Russia
Iodine	72	Chile, Japan, Russia
Titanium Mineral Concentrates	72	South Africa, Australia, Canada, Ukraine
Rhenium	71	Chile, Kazakhstan, Germany, Russia
Rare Earths	68	China, France, Japan, UK
Platinum	66	South Africa, UK, Germany, Russia
Zinc	60	Canada, Mexico, Peru

US 2001 Net Import Reliance For Selected Non-Fuel Mineral Materials (continued)

Commodity	%	Major Sources (1997-2000)*
Tungsten	59	China, Russia, Germany, Portugal
Titanium (sponge)	58	Russia, Japan, Kazakhstan
Nickel	56	Canada, Norway, Russia, Australia
Peat	50	Canada
Magnesium Metal	44	Canada, China, Russia, Israel
Silver	44	Mexico, Canada, Peru, UK
Silicon	42	Norway, South Africa, Russia, Canada
Beryllium	39	Russia, Canada, Germany, Kazakhstan
Magnesium Compounds	39	China, Canada, Australia, Austria
Aluminium	35	Canada, Russia, Venezuela, Mexico
Pumice	35	Greece, Italy, Turkey
Diamond (dust, grit and powder)	33	Ireland, China, Russia
Copper	31	Canada, Chile, Peru, Mexico
Nitrogen (fixed), Ammonia	29	Trinidad and Tobago, Canada, Mexico
Vermiculite	27	South Africa, China
Gypsum	25	Canada, Mexico, Spain
Cement	21	Canada, Thailand, China, Venezuela, Greece
Garnet (industrial)	20	Australia, India, China
Lead	20	Canada, Mexico, Australia, Peru
Mica, scrap and flake (natural)	19	Canada, India, Finland, China
Perlite	18	Greece
Salt	17	Canada, Chile, Mexico, The Bahamas
Iron and Steel	15	European Union, Canada, Japan, Mexico
Iron Ore	15	Canada, Brazil, Venezuela, Australia
Sulphur	12	Canada, Mexico, Venezuela
Iron and Steel Slag	8	Canada, Italy, Brazil, France
Bromine	5	Israel, UK, Belgium, Netherlands
Cadmium	3	Canada, Australia, Belgium, Germany
Phosphate Rock	2	Morocco
Stone (crushed)	1	Canada, Mexico, The Bahamas
Talc	1	China, Canada, France, Japan

* countries listed in descending order of importance

Source: US Geological Survey. Mineral Commodity Summary 2002

On the mining side, the year began on a more negative note when the outgoing Clinton Administration issued revised Section 3809 regulations governing hardrock mining on federal lands. However, the Bush Administration reviewed these regulations with a view toward making them more reasonable. The mining industry was successful in achieving important revisions to these regulations which became effective on December 31, 2001. Similarly, the Clinton Administration had issued regulations that would have prohibited exploration for metals and minerals and then development of these resources on Forest Service Lands. These regulations were withdrawn in mid 2001. Mining law reform is important to the industry but the last time that Congress considered meaningful reform was in 1999. The mining industry has been working toward that end and expects consideration of legislation in 2003.

Sustainable development and the mining industry has emerged as a new area in which the industry must be involved. A number of US mining companies were instrumental in founding the Global Mining Initiative and in supporting the review of mining and sustainable development under the 'Mining Minerals and Sustainable Development' initiative. US companies were involved in the efforts of this study directed toward the North American situation. The US industry ended the year in the midst of developing a programme geared towards domestic issues.

Energy*

The US consumed 96.52 quadrillion Btu (quads) of energy in 2001, 2.3% lower than in 2000. Energy use declined primarily due to a decline in economic activity but the decline was due in some measure to conservation measures taken to respond to higher prices. The market shares for the various sources of energy were as follows: 39.6% petroleum, 22.8% natural gas, 22.8% coal, 8.5% nuclear, 2.5% hydroelectric and 3.8% from geothermal, wind, biomass, solar

and other renewable sources. Domestic production of energy supplied 72.6 quads and net imports added another 26.0 quads. Additions to stocks of fossil fuels accounted for the 2 quad difference between consumption and production and net imports.

According to preliminary data, domestic production of crude oil increased for the first time since 1990 although the increase was just 0.5%. US crude production declined by 0.7% to 2,136 Mbbl. Imports of crude oil and petroleum products increased by 0.8% to 3,338 Mbbl. At year-end 550 Mbbl. were stored in the Strategic Petroleum Reserve. Natural gas production, on a dry basis, totalled 19,410 billion ft³, 2.2 % higher than in 2000. Meanwhile, natural gas imports continued to rise and, on a net basis, totalled 3,647 billion ft³, 3.0% higher than in 2000. Approximately 94% of US imports of natural gas come from Canada.

Coal production increased by 4.5% in 2001 totalling 1,017.3 Mt. Coal had an estimated value of US\$19.3 billion. About 65% of this production came from surface mines and 35% came from underground mines. Western production, primarily from the Powder River Basin located in Wyoming and Montana, accounted for 53% of US coal production. There are approximately 1,450 coal mines in the US. The number of mines is declining, but the average size of a mine has nearly doubled over the past decade.

Coal production levels in all regions of the country increased in 2001, reflecting an increase in demand for steam coal both for electricity generation and for stockpiling. The only major coal-producing states to experience a decline in production were North Dakota and Texas (lignite production declined in both states). The states with the largest coal production are Wyoming with 331.7 Mt and West Virginia with 145.5 Mt. Productivity continued to increase, reaching an average of 6.44 t/h in 2001.

* All energy data have been revised by the DOE's Energy Information Administration.

Domestic coal consumption in 2001 reached an estimated 963.9 Mt. This was lower than the record consumption of 2000 owing to lower use of coal by steel mills and by electricity generators. Both reflected the economic downturn. Some 879.1 Mt was used to generate electricity (approximately 52% of the US 2001 electricity production was from coal). The industrial sector consumed another 57.5.1 Mt and 23.6 Mt was used for coking. Together, the commercial and retail sectors consumed 3.7 Mt.

The US exported 43.2 Mt of coal in 2001, sharply lower than the 51.6 Mt exported in 2000. Shipments to all regions declined but the sharpest drop was in exports to the Asian nations. In particular, exports of metallurgical coal to Japan were zero and metallurgical coal shipments to Korea were only one-third that of 2000. Steam coal exports to that region also dropped, by nearly 50%. Shipments to Canada declined by nearly 1.0 Mt. Coal imports, primarily from Colombia, Venezuela, and Indonesia in the form of low-sulphur steam coal for utilities in Florida continued to increase, reaching an all time high of 17.9 Mt.

Iron, Steel and Ferro-alloys

Raw steel production in 2001 was 90.1 Mt, 11.5% below production in 2000. Raw steel is produced either in basic oxygen furnaces in integrated mills or in electric arc furnaces in mini-mills. Steel production in basic oxygen furnaces dropped slightly to 52.9% of total production in 2001. Electric arc furnace production was 47.4% of the total. Continuous casting accounted for 96.8% of processed steel production. The US had approximately 10.9% of worldwide production in 2001.

The steel industry had a difficult year in 2001. The economic downturn caused a reduction in demand for steel and prices continued to plummet, resulting in a record number of steel-industry bankruptcies. In the spring of 2001, at the request of the steel industry, the US Department of Commerce agreed to an investigation of alleged dumping of steel into the US market. In March 2002, a decision was

made to impose tariffs on imports of a large number of steel products from a selected set of countries. The Administration has reiterated its strong support to reduce excess steel capacity on a global basis and to address market-distorting factors in world steel trade.

Steel mill products shipped totalled 89.7 Mt in 2001. Carbon products made up the bulk of the shipments. Alloy and stainless shipments totalled 4.4 Mt and 1.7 Mt respectively. Imports of steel mill products declined in 2001 from 34.4 Mt to 28.7 Mt. Apparent consumption of steel was 105 Mt.

Reported consumption of iron and steel scrap was 73 Mt, just under the consumption reported in 2000. The US remained a net exporter of scrap in 2001. The total value of purchased scrap and exports was US\$5.1 billion, down about 7% from 2000 reflecting the record low prices for scrap. Iron and steel slag used or sold in 2001 was 18 Mt, valued at about US\$157 million.

In 2001, 13 mines, 10 concentrating plants and 10 pelletising plants shipped 46.3 Mt of usable iron ore worth US\$1.2 billion to customers in the US and abroad. This was sharply below 2000 levels, reflecting the state of the steel industry. Many of the operating mines were closed at least for a portion of the year. Bankruptcies in the steel industry caused the sale of a number of iron-ore mines, reducing the number of companies producing iron ore significantly. Several members of Congress asked the US Department of Commerce to initiate an investigation to determine if imports of steel and iron ore constituted a threat to national security. This case was closed in early 2002 with a non-threat finding.

There was no domestic production of chromium, manganese, nickel, cobalt or tungsten. Small amounts of vanadium were mined in 2001, but information about production is not available. US molybdenum production declined to 37,600 t valued at US\$195 million (based on average oxide prices). US production accounted for 28% of

estimated worldwide production in 2001. The decline in US production was directly correlated to lower price levels. Iron and steel producers account for 75% of the molybdenum consumed. Molybdenum exports were 32,300 t. Based on contained metal, net imports of chromium totaled 360,000 t, manganese 921,000 t, cobalt 6,400 t, primary and secondary nickel 87,100 t, tungsten 5,260 t, and vanadium 2,650 t.

Light Metals

Aluminum: Primary production totalled 2.6 Mt with an estimated value of US\$4.0 billion, roughly 11.1 % of worldwide production. This was down sharply due to production cutbacks caused by higher energy prices and reduced energy supplies in the Pacific Northwest. A number of companies curtailed production in order to resell power already under contract into the electricity grid. In 2001, 1.3 Mt was recovered from old scrap. The US imported 3.6 Mt, which was partially offset by 1.5 Mt of exports. Reflecting the state of the economy, consumption of aluminum declined by 20% to 6.0 Mt. Transportation accounted for 35%, packaging 25%, building 15%, electrical 7%, consumer durables 8% and 10% went for other uses. Only one company mines small quantities of bauxite for non-metallurgical uses, thus US primary aluminum production came entirely from the 9.5 Mt of imported bauxite (of which 95% went to the production of alumina) and the 2.8 Mt net imports of alumina.

Magnesium: The producer of primary magnesium metal in the state of Washington closed in 2001 leaving only one company operating a mine in Utah. As a result, total production capacity - which was about 83,000 t, declined to 43,000 t. This is about one-third the capacity of the industry at the end of 1998. As there is now only one producer, neither actual production amounts nor value is available from published sources. Recovery of old scrap supplied 30,000 t of magnesium metal and net imports totalled 50,000 t. As a result of trade actions, countervailing duties on imports of magnesium were imposed in 2000 and these remained in effect in 2001.

Apparent consumption dropped to 120,000 t, 53% in aluminum-based alloys, 30% in castings and wrought magnesium products, and 12% was used for desulphurisation of iron and steel, 1% for reducing agents in nonferrous metals production and 4% for other magnesium containing products. Although lagging behind European automakers in the use of magnesium in cars, US demand for magnesium castings for cars is increasing and, with the 2002 model cars, the average magnesium content per car is 4.1 kg. The magnesium content will continue to increase but, owing to limited production capacity, imports are likely to increase in tandem.

Titanium: Only two firms produce titanium sponge metal in the US, in Nevada and Utah, and thus mine production and primary metal production data are not available. Most titanium is consumed as titanium dioxide (TiO₂) pigment. Four companies produced 1.30 Mt of TiO₂ pigment in 2001, valued at US\$3.0 billion. Imports of sponge metal increased sharply to 11,500 t and exports increased to 2,180 t. TiO₂ exports were 432,000 t. Consumption of sponge metal increased in 2001 to 22,000 t owing to slightly higher demand from commercial aircraft manufacturers that use approximately 65% of the sponge metal used in the US. The remainder is used in the chemical process industry, and in power generation, marine, ordnance, medical and other non-aerospace industries. TiO₂ consumption was 1.19 Mt, 50% in paints, varnishes and lacquers, 21% in plastics and 29% in ceramics, coated fabrics, printing ink, paper and other uses.

Non-Ferrous Metals

Copper: Copper production declined for the fifth consecutive year in 2001, totalling 1.34 Mt, 7.0% below 2000 levels. The value of production was an estimated US\$2.2 billion. US production represented 10.2% of worldwide output in 2001. Refined copper production increased slightly to 1.64 Mt. Old scrap provided 280,000 t with net imports (ores and concentrates, refined and unmanufactured) increasing to 2.1 Mt.

Apparent consumption was 2.5 Mt - 39% in building construction, 28% electric and electronic products, 11% in industrial machinery and equipment, 11% transportation equipment and 11% consumer and general products. Domestic demand for refined copper, in particular demand for wire rod products, declined sharply. Copper prices, which had strengthened in 2000, ended the year at lower levels.

Reorganisation of the US copper industry was essentially completed in 2000 but mine closures continued well into 2001. Phelps Dodge, Kennecott Utah Copper and Asarco all cut back on production levels. Copper production was particularly affected by high energy costs and power disruptions during the first quarter of 2001.

Lead: Mine output in 2001 was 450,000 t just under 2% lower than in 2000. Mine output had a value of approximately US\$450 million. US output represented approximately 15% of worldwide production. Old scrap provided over 1.1 Mt. The US was a net exporter of lead, net exports were 70,000 t. Apparent consumption was 1.5 Mt, with 76% used in batteries, fuel tanks, solder, seals and bearings, and 22% used in electrical, electronic, communications, ammunition, television glass, construction, and protective coatings. The remaining 2% was used in weights, crystal glass, tubes and containers, type metal, foil, wire and specialised chemicals. Demand for automotive (replacement batteries) was lower in 2001 owing to lack of temperature extremes in most regions. Additionally, the economic slowdown meant that demand for new car batteries was lower as well. The technology meltdown meant that demand for batteries for use in the telecommunications and computer industries also fell.

Zinc: Nineteen mines produced 673,000 t valued at about US\$668 million in 2001. This was approximately 9% of estimated worldwide production. Old scrap provided 110,000 t and net imports reached 363,000 t. The trade data

are affected because production in Alaska is processed in Canada and then shipped to the US for use thus counting both as an export and an import. Consumption of all forms was 1.5 Mt with 55% used in galvanizing, 17% in zinc-based alloys, 13% in brass and bronze, and 15% going for other uses. Use of galvanised steel products was lower in 2001 for economic reasons.

Tin: While there was no domestic production of primary tin, 7,000 t were recovered from old scrap and 12,000 t came from the government stockpile. Net imports were 38,200 t. The US consumed 38,000 t of primary tin with 30% in cans and containers, 20% electrical 10% in both transportation and construction, and 30% in other uses.

Precious Metals

Gold: Mine production was 325 t, nearly 8% below production in 2000. Production was valued at US\$2.8 billion. US production was approximately 13.0% of worldwide production. Exports of refined gold, based on revised data, were 440 t in 2000 and 395 t in 2001. Domestic output continued to be centred in Nevada, California and Alaska, with 82% of 2001 mine production located in those states. Between July 2000 and June 2001 seven gold mines were closed. There were no new mines opened during this time. Mergers and acquisitions continued, as did the trend toward larger mines. Most larger companies were successfully replacing production with new reserves, but smaller companies continued to find this difficult. Because of continued low prices, exploration expenditures by US producers declined for the fourth straight year.

Silver: Silver mines in the US produced 1,600 t in 2001 approximately 10% below production in 2000. At least one major silver mine closed and many others worked on a reduced schedule throughout the year. Silver output was valued at US\$260 million, and US production represented nearly 10% of worldwide production. About 50% of this was from precious metal ores; the remainder was

from base metal ores. Recycling added an additional 1,680 t. The US was a net importer of silver in 2000, importing 2,940 t while exporting only 770 t. The US Government disposed of the remaining silver held in the National Defense Stockpile, selling it to the Department of the Treasury for coinage. Demand for silver from the electronics and photographic industries continued to decline during the year as digital imaging has affected silver demand in this market.

Platinum Group Metals: In 2001, ore containing 3,600 kg of platinum - just under 2.2% of worldwide production - and 12,000 kg of palladium - 6.8% of worldwide production - was mined, concentrated and smelted and the matte exported for refining. US production of both platinum and palladium continued to be at near record levels in 2001. Recycling provided 70 t and net imports were 220,000 kg. The automotive industry is the principal consumer of platinum group metals (PMG) as oxidation catalysts in catalytic converters. PMG are also used in jewellery and cancer chemotherapy.

Special Property Minerals

Many materials needed for high-intensity magnets, electronics, optics, nuclear applications, and resistance to corrosion or high temperatures, are by-products from the production, smelting and refining of major mineral materials. The estimated value of antimony (metal and oxide) production in 2001 was US\$55 million. Mine production of recoverable antimony (from the one silver mine in Idaho that produced antimony as a by-product) decreased from 449 t in 1999 to 340 t in 2000 and 300 t in 2001. That mine closed in mid-year.

Values for other special property minerals were: arsenic US\$20 million (value of arsenic consumed), beryllium US\$104 million (consumption), cadmium US\$249,000 (production), germanium (refinery products) US\$22 million and rhenium (consumption) US\$42.0 million. The value of rare earth oxides was US\$28 million. Although domestic

demand for rare earths in 2001 was much higher than in 2000, the increase in demand continues to be met with an increase in imports. Only one mine produces rare earth oxides in the US and that mine was forced to close temporarily its separation plant. The mine continues to produce bastnaesite concentrates and cerium concentrates.

Non-Metallics

Mine production of non-metallic industrial minerals are shown in the following tables:

Special Property Metals (Mt except where stated)

	2000 ^r	2001 ^p	% Change
Antimony	n.a.	300	-
Beryllium	180	180	0.0
Cadmium	1,890	1,400	-25.9
(refinery production)			
Cobalt (secondary)	2,550	2,500	-2.0
Germanium	23,000	20,000	-13.0
(refinery products) (kg)			
Rare Earth Oxides	5,000	5,000	0.0
Rhenium (kg)	12,600	9,700	-23.0

Data on production of Lithium, Mercury, Scandium, Selenium and Tellurium are withheld.

Source: US Geological Survey Mineral Commodity Summaries, 2002.

^p Preliminary.

^r Revised

Construction minerals: Production of sand and gravel (construction and industrial) was 1,120 Mt valued at US\$5.5 billion. Crushed stone production grew to 1,620 Mt worth US\$9.0 billion and cement output was 89.6 Mt worth US\$7.1 billion. Demand for sand and gravel and for crushed stone was essentially flat in 2001. But demand for cement increased owing to strong public sector spending. Ever increasing environmental and safety

Non-Metallic Minerals Production (‘000 t except where stated)

	2000 ^r	2001 ^p	% Change
Asbestos	5	5	0.0
Barite	392	400	2.0
Boron	546	650	19.0
Bromine	228	204	-10.5
Cement	87,846	89,600	2.0
Clays	40,800	40,600	-0.5
Diatomite	677	735	8.6
Feldspar	790	780	-1.3
Garnet	60	53	-11.7
Gypsum (crude)	19,500	18,800	-3.6
Iodine (000 kg)	1,470	1,700	15.6
Iron and Steel Slag	16,300	18,000	10.4
Kyanite	90	90	0.0
Lime	19,600	18,700	-4.6
Magnesium	370	360	-2.7
Compounds (Mg content)			
Mica (scrap and flake)	101	95	-5.9
Peat	755	812	7.5
Perlite	672	650	-3.3
Phosphate Rock	38,600	34,200	-11.4
Potash (K ₂ O)	1,300	1,200	-7.7
Pumice	697	687	-1.4
Salt	45,600	45,100	-1.1
Sand and Gravel (construction) (Mt)	1,120	1,120	0.0
(industrial)	28,400	28,800	1.4
Soda Ash	10,200	10,300	1.0
Sodium sulphate	491	510	3.9
Stone, Crushed (Mt)	1,560	1,620	3.8
Stone, Dimension	1,250	1,300	4.0
Sulphur	9,280	8,200	-11.6
(Frasch and recovered)			
Sulphur (other)	1,030	1,000	-2.9
Talc and Pyrophyllite	851	914	7.4
Titanium Dioxide (TiO ₂) (mfg.)	1,400	1,340	-4.3
Vermiculite	150	150	0.0
Zircon	100	100	0.0

Source: US Geological Survey

^r Revised

^p Preliminary

regulations continue to force quarries to relocate away from highly populated areas. This has resulted in a shortage of construction sand and gravel in these areas.

Cement: Production reached 89.6 Mt, which was about 5.5% of worldwide production. Net imports supplied an additional 25 Mt of cement. Concerns remain about emissions of carbon dioxide, cement kiln dust (CKD) and nitrogen oxides generated during the manufacture of cement. Reduction strategies include installation of more fuel efficient kiln technologies and other process changes. The rapid rise of fuel costs affected production and profitability of cement kilns in 2001.

Old Scrap Reclaimed in 2001

	t ^p	% of Consumption
Aluminium	1,280,000	20
Chromium	118,800	22
Cobalt	2,500	29
Copper	310,000	11
Gold (old + new)	100	50
Iron and Steel Scrap	76,000,000	100
Lead	1,100,000	67
Magnesium	30,000	25
Mercury	n.a.	100
Nickel	75,000	45
Platinum Group (old and new)	70	n.a.
Silver (old and new)	1,680	28
Tin	7,000	12
Tungsten	6,000	43
Zinc	110,000	7

Plus minor percentages of several other metals.

Source: US Geological Survey, Minerals Commodity Summaries, 2002

n.a. = Not available

^p Preliminary.

Ammonia: Production of nitrogen (fixed) ammonia was 9.5 Mt in 2001 representing 9.0% of worldwide production. High natural gas prices caused nearly 40% of US capacity to be shut during the first quarter of 2001. Most plants were back on line by summer although not all at full capacity. The majority of production capacity is still found in Louisiana, Oklahoma and Texas due to large supplies of natural gas feedstocks. US consumption of 13.5 Mt was largely used as fertilisers (89%). Ammonia was also used to produce plastics, synthetic fibres, resins, explosives, and numerous other chemical compounds.

Phosphate: Valued at about US\$855 million at the mine, the US produced 34.2 Mt of phosphate rock in 2001, about 27% of worldwide production. Domestic production came mostly from mines in Florida and North Carolina (85% of total production) and the remainder from southeastern Idaho and northwestern Utah. About 90% of the phosphate rock output goes to the production

of phosphoric acids used in making fertilisers. The remainder of US production goes towards industrial applications and exports.

Sulphur: Production was 9.2 Mt (17% of worldwide production) valued at about US\$200 million. Texas and Louisiana accounted for half the US output. Consumption of 10.4 Mt went to production of agricultural chemicals 63%, petroleum refining 14%, organic and inorganic chemicals 5%, and metal mining 5%. The remaining 13% went towards a variety of widespread industrial uses.

Lime: Production reached 18.7 Mt valued at about US\$1.12 billion in 2001 and accounted for 16.3% of worldwide production. Consumption declined to 18.8 Mt and was used in agricultural chemicals, steel production, environmental control and construction. Lime production and use were affected by the difficulties experienced by their largest customer, the steel industry.

Sources: US Department of Commerce: Bureau of the Census, Bureau of Economic Analysis; US Department of Defense: Defense Logistics Agency; US Department of Energy: Energy Information Administration; US Department of the Interior: US Geological Survey; US Department of Labor: Bureau of Labor Statistics; and various publications of the National Mining Association.