Exploration Review

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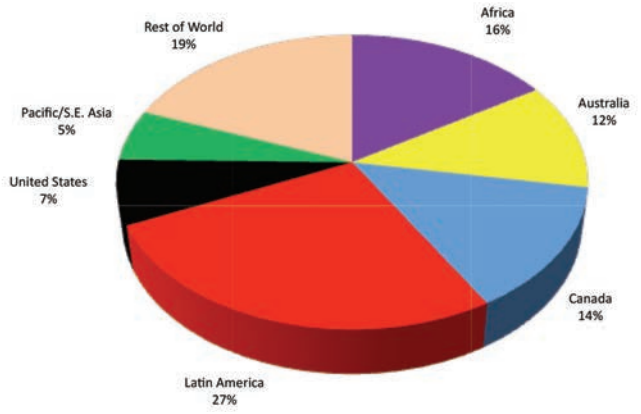
This summary of international mineral exploration activities for the year 2014 draws upon information from industry sources, published literature and specialists in the U.S. Geological Survey (USGS) National Minerals Information Center. The summary provides data on exploration budgets by region and mineral commodity, identifies significant mineral discoveries and areas of mineral exploration, discusses government programs affecting the mineral exploration industry and presents analyses of exploration activities performed by the mineral industry.

Figure 1

Planned worldwide exploration budgets for analyzed nonfuel mineral commodities by region for 2014 (1,961 companies' budgets totaling US$10.7 billion). Source: SNL Metals & Mining, 2014.



Three types of information are reported and analyzed in this annual review of international exploration: 1) budgetary statistics expressed in U.S. current dollars provided by SNL Metals & Mining (SNL) of Charlottesville, VA; 2) regional and site-specific exploration activities that took place in 2014 as compiled by the USGS and 3) regional events that affected exploration activities including economic, social and political conditions, which were derived from published sources and discussions with USGS and industry specialists. Commodity and regional compilations are presented in this summary. Because multiple sources are used to develop these compilations, statistics may differ depending on the source and type of data that are being reported.

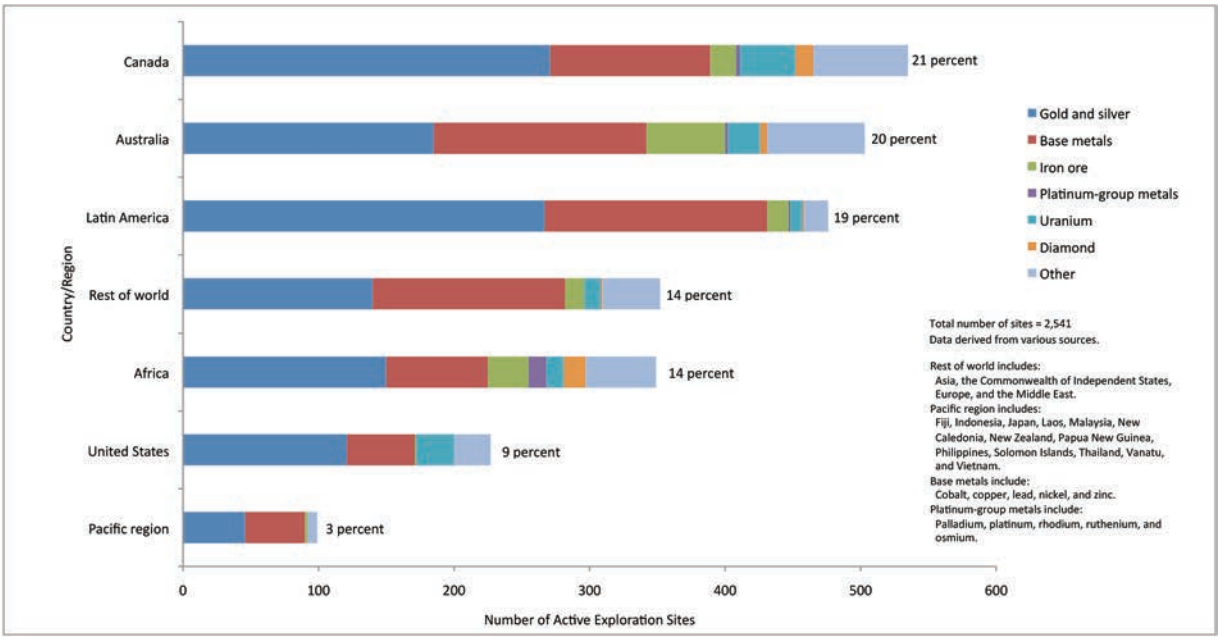
The SNL data summarize planned company budgets for worldwide exploration activities in 2014 for 19 nonfuel mineral commodities based on company surveys. Research focused on precious metals (gold, platinum-group metals and silver), base metals (cobalt, copper, lead, molybdenum, nickel, tin and zinc), bulk commodities (iron ore, phosphate and potash), and specialty mineral commodities (diamond, lithium, niobium, rare-earth elements, tantalum and uranium). Information on uranium exploration activities was included for the first time in 2007. Data on lithium, niobium, phosphate, potash, rare-earth elements and tantalum were compiled for the first time in 2010 because of their increased significance. Since 1999, companies with exploration budgets of $100,000 and greater were included in the SNL compilations. SNL budget estimates exclude bauxite, coal and oil and gas. Exploration budget estimates for iron ore have been compiled since 2011 but reported separately. The 2014 SNL company survey is reported by SNL to cover an estimated 95 percent of the world's nonferrous, nonfuel mineral exploration budgets. The 5 percent that is not covered includes companies that chose not to participate in the SNL survey, private companies that do not publish their budget data, and government-funded exploration activities.

USGS data compilations and analyses are based on information provided by USGS mineral commodity and country specialists, as well as industry contacts and published in trade journals. The USGS compilations summarize exploration site data collected for more than 80 minerals and materials, with a focus on nonfuel minerals including base metals, diamond and precious metals. Iron ore and uranium were included in the USGS analysis after 2007. The USGS analyzed available information to assess the level of exploration activity in 2014 and to report trends in mineral exploration activity for the period 2004 through 2014. This analysis identifies where mineral exploration is taking place by commodity and region, assesses the intensity of activity that is taking place in each region for selected mineral commodities, and determines those factors that most affect changes in exploration activity.

Certain limitations apply when comparing estimates or evaluating the magnitude of regional changes from year to year because as worldwide exploration allocations have changed, so too have factors such as energy, labor, material and service costs associated with mineral exploration. Consequently, an exploration budget of $1 million allocated in 2014 would generally yield

Figure 2

Number of active exploration sites by region in 2014 as compiled by the U.S. Geological Survey.



less exploration activity than a corresponding budget in 2004. The global economic climate and fluctuations in currency exchange rates and the value of trading currencies over time also can influence the business pattern of companies conducting business in other countries. Unless otherwise specified, this report expresses worldwide exploration activity in U.S. current dollars to simplify comparisons by commodity and region. The level of exploration investment also may be influenced by the scale of the planned operation. Development of a large-scale operation usually requires a greater exploration investment than a small-scale operation with a shorter project life.

Temporal interpretations of the SNL exploration data, such as trend analyses, are limited by changes in survey parameters. Because the sample of exploration and mining companies surveyed by SNL has changed over the years, companies included in the survey have changed on a year-to-year basis. In addition, fluctuation of currency exchange rates affects the relative value of company budget estimates from year to year. Also, mineral commodity and country coverage have differed from year to year and corporate restructuring within the mining industry has taken place. Industry coverage varies from year to year because the number of respondents to the SNL survey changes over time. In general, the number has increased for the more recent surveys.

2014 global mineral exploration activity and trends from 2004 through 2014

According to SNL, the total estimated worldwide budget allocation for nonferrous mineral exploration decreased by 26 percent in 2014 to about $10.7 billion (on the basis of data from 1,961 companies when iron ore is excluded) from the 2013 budget allocation of about $14.4 billion (based on 2,129 companies, excluding iron ore). The exploration budget for iron ore projects, first compiled in 2011, was not included in the nonferrous budget data. Continued market instability and the reduction in available funding for mining projects in 2014 resulted in exploration budget cutbacks and reduced the number of junior companies conducting minerals exploration.

SNL annual survey estimates reflect budgeted expenditures, rather than actual dollars spent, and reflect an estimated 95 percent of worldwide exploration. When SNL includes estimates for exploration budgets for nonrespondents, the global nonferrous exploration budget for 2014 is estimated by SNL at about $11.4 billion. Exploration conducted by government entities in locations such as China may not be included in SNL estimates.

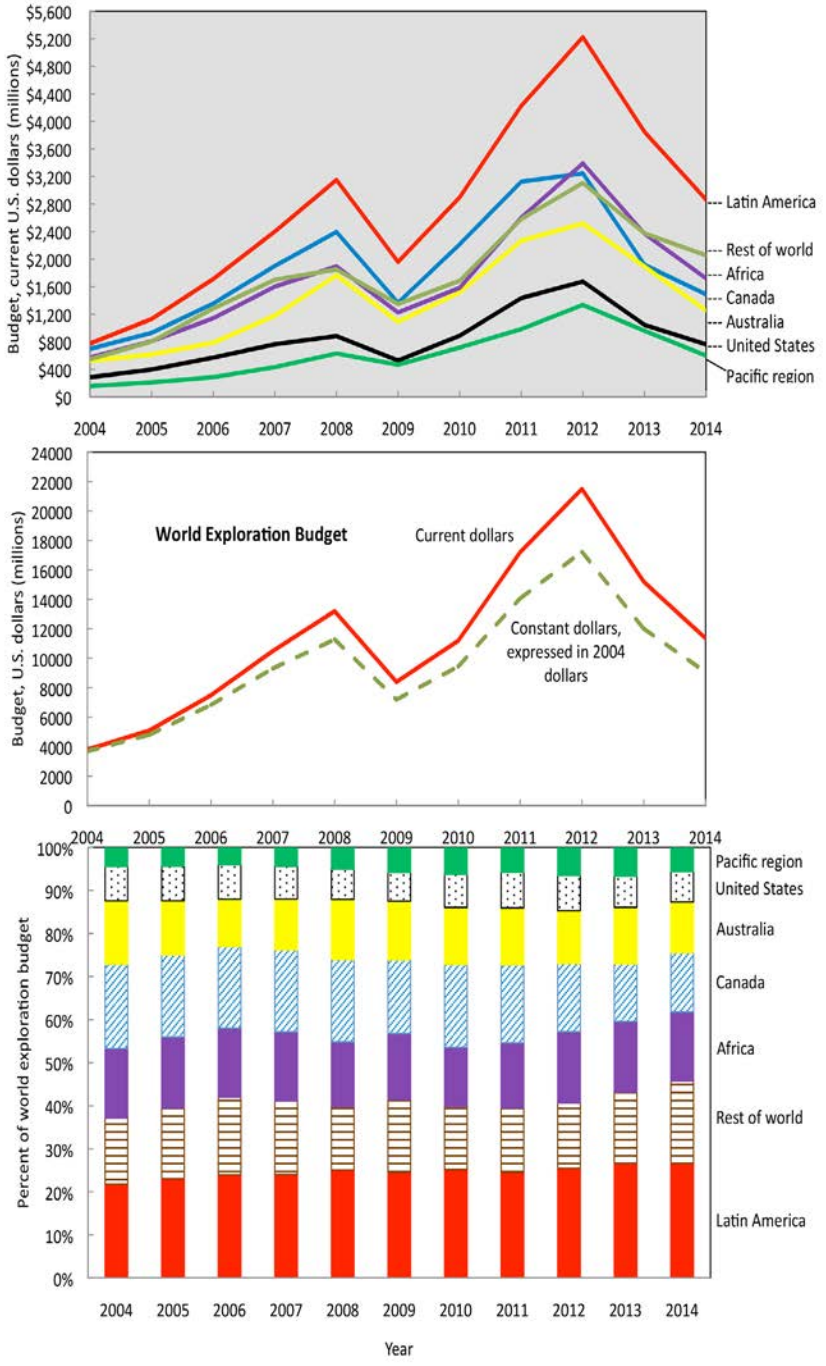
Competing demand for assaying, drilling and geophysical services, changing fuel and labor costs, higher taxes and environmental costs and a decreasing skilled labor force have resulted in an increase in the total cost of exploration during the past decade. Exploration cost increases, combined with lower prices for many mineral commodities experienced during the past several years have reduced investor interest and the level of exploration activity. Even if the overall exploration expenditure remains stable, increased exploration costs have reduced the effective amount of exploration activity that can be conducted at a site over time.

Figure 1 shows the 2014 worldwide nonferrous minerals exploration budgets allocated by region, based on SNL data. SNL "regions" reflect a mixture of individual countries, continents and other groupings, but they are reported consistently on an annual basis and provide a means of assessing the flow of budgeted exploration expenditures from year to year. The 2014 nonferrous exploration budgets in decreasing budget order were Latin America, Africa, Canada, Australia, the United States and the Pacific region. According to SNL data, China and Russia accounted for about 56 percent of the Rest of World region budget total. The exploration budget in 2014 in all regions was lower than the corresponding budget in 2013. The largest decreases by current dollar percentage took place in the Pacific region (38-percent decrease) and Australia (34-percent decrease); the smallest decreases took place in Canada (22-percent decrease) and Latin America (26-percent decrease). Latin America remained the region with the largest mineral exploration budget, expressed either in current dollars or percent of the global exploration budget.

For 2014, information for about 2,500 exploration sites was gathered by USGS specialists from published literature and industry sources. The regional distribution of these exploration targets is represented in Fig. 2 by principal commodity target, based on the number of projects reported for each region. Canada remained the top destination in terms of active exploration sites in 2014, followed by Australia, Latin America, Rest of World and Africa. For ease of comparison within this study, the USGS used the SNL regional classification when grouping site data.

Figure 3

Trends in reported exploration budgets in selected regions, 2004 through 2014. Source: SNL Metals & Mining, 2014.



[1]As defined by SNL, Latin America includes countries in the Caribbean, Central America, Mexico, and South America. The Pacific region includes Fiji, Indonesia, Japan, Laos, Malaysia, New Caledonia, New Zealand, Papua New Guinea, Philippines, Solomon Islands, Thailand, Vanuatu, and Vietnam. Africa includes countries on the African subcontinent. The Commonwealth of Independent States (CIS) includes Azerbaijan, Armenia, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, Turkmenistan, Uzbekistan, and Ukraine. The Rest of the World includes China, Europe, India and Pakistan, the Middle East, and Russia and the other republics of the Commonwealth of Independent States. Australia, Canada, and the United States are treated separately.

Table 1

Prices for selected base and precious metals, 2004 to 2014.

Commodity	Average nominal price for specified year, expressed in U.S. current dollars.										
	2004[1]	2005[1]	2006[1]	2007[1]	2008[1]	2009[1]	2010[1]	2011[1]	2012[1]	2013[2]	2014[2]
Copper[3]	1.34	1.73	3.15	3.28	3.19	2.41	3.48	4.06	3.67	3.40	3.18
Gold[4]	411	446	606	699	874	975	1,228	1,572	1,673	1,415	1,269
Lead[5]	0.55	0.61	0.77	1.24	1.20	0.87	1.09	1.22	1.14	1.15	1.07
Nickel[6]	6.27	6.69	11.00	16.88	9.57	6.65	9.89	10.38	7.95	6.81	7.65
Palladium[7]	233	204	323	357	355	366	531	739	649	730	810
Platinum[8]	849	900	1,144	1,308	1,578	1,208	1,616	1,725	1,555	1,490	1,388
Silver[9]	6.69	7.34	11.57	13.41	15.00	14.69	20.20	35.26	31.21	23.80	19.03
Uranium oxide[10]	18.05	27.93	47.68	99.24	64.18	46.67	45.96	56.24	48.90	38.92	33.50
Zinc[11]	0.47	0.63	1.49	1.47	0.85	0.75	0.98	0.99	0.88	0.87	0.98
Neodymium oxide[12]	NA[13]	3.36	6.81	13.10	12.26	7.03	22.62	106.26	51.81	31.55	28.57

[1] Price reported in U.S. Geological Survey (USGS), Minerals Yearbook series for the years 2004 through 2012.
[2] Price reported in U.S. Geological Survey, Minerals Commodity Summaries series for the years 2013 and 2014 or updated based on oral and written communications, USGS mineral commodity specialists.
[3] U.S. producer cathode (minimum 99.99% pure), reported in $/lb.
[4] Englehard Corporation industries quotation, reported in $/oz.
[5] North American producer price, delivered (minimum 99.97% pure), in $/lb. In 2014, the North American market price in $/lb is reported.
[6] London Metal Exchange cash price for primary nickel (minimum 99.80% pure), in $/lb.
[7] Unfabricated palladium, reported in $/oz.
[8] Unfabricated platinum, reported in $/oz.
[9] Handy and Harmon quotation, reported in $/oz.
[10] Nuexco exchange spot price, reported in $/lb by the International Monetary Fund.
[11] London Metal Exchange cash price, reported in $/lb.
[12] Metals Pages price, 99% pure, as reported by Arafura Resources Ltd., in $/kg.
[13] NA, information not available.

Thus, regional classifications may vary from other USGS publications. The number of sites that are actively being explored does not correlate directly with exploration budget estimates, but both are indicators of activity in the region of interest.

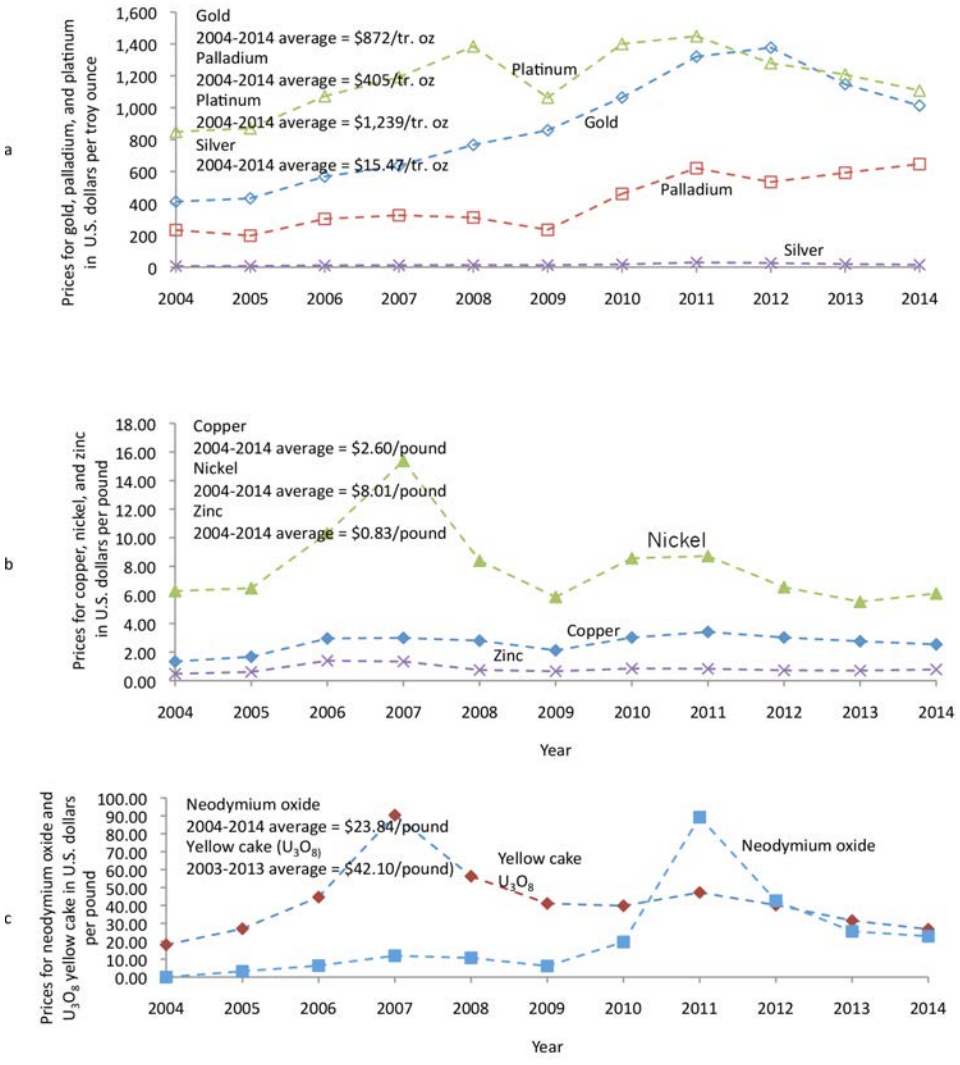
Figure 3 summarizes SNL budget data by region for the period 2004 through 2014 in terms of current dollars and percent of the world exploration budget. The top chart of Fig. 3 shows that the planned exploration budget level (expressed in current dollars) for 2014 decreased from the 2013 budget level in all regions of the world. The largest current dollar regional budget reduction from 2013 to 2014 took place in Latin America, followed by Africa. The regions with the smallest decrease in exploration budgets were the United States and the Rest of World region (including China and India, countries in the Commonwealth of Independent States) (including Russia) Europe and the Middle East). The middle chart of Fig. 3 shows the trend in global exploration budgets in terms of both current dollars and constant dollars. Figure 3 (bottom chart) shows that the percentage of the world exploration budget increased in 2014 from 2013 for Canada, Latin America and Rest of World in relative terms, even though the total exploration budget for these regions was lower in 2014 than in 2013.

The SNL mineral exploration survey data suggest that, since 2004, the amount of the total global exploration budget attributed to mine-site exploration has generally increased, while early-stage (greenfield) exploration has decreased to a level less than that for mine-site exploration in 2014. The amount attributed to late-stage exploration increased from 2004 to 2006, and mine-site exploration from 2006 through 2009, as larger companies shifted their exploration focus toward advanced-stage projects or mine site projects as a less expensive means of replacing or adding reserves. The budget estimate for early stage exploration was 32 percent lower in 2014 than that reported for 2013, corresponding to a level last seen during the economic downturn that took place in 2008-2009. Traditionally, major companies leave greenfield exploration to junior companies. In 2014, however, many junior companies had difficulty securing sufficient financing to conduct extensive exploration. Consequently, larger companies contributed a greater budget to greenfield exploration, accounting for about 40 percent of the 2014 early-stage exploration allocation.

Changing mineral commodity prices (particularly for copper, gold, nickel and silver), fluctuating currency exchange rates and increased exploration costs were among the considerations used by companies in determining exploration targets and development plans for 2014. Low

Figure 4

Average constant dollar prices for selected (a) precious metals, (b) base metals, and (c) other selected mineral commodities from 2004 through 2014. Current dollar prices from various sources were indexed using the Consumer Price Index with a base year of 2004.



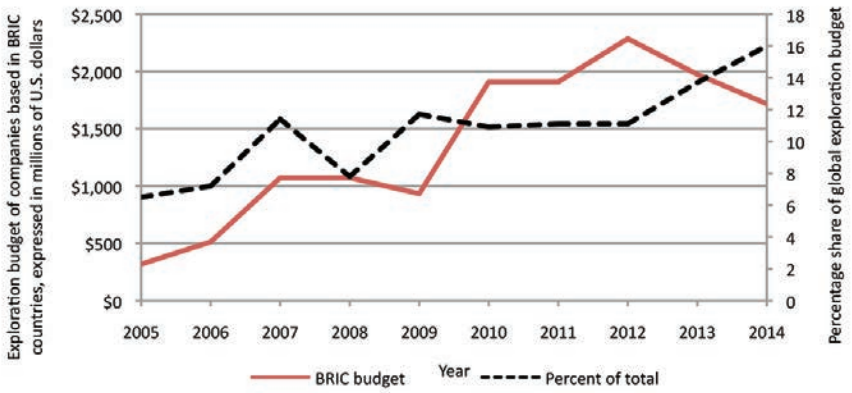
commodity prices make it more difficult for smaller junior companies to obtain financing in a tight economy, so companies have been focusing available capital on fewer exploration projects. Fewer large deposits have been found because of reduced exploration expenditures, and those that have been identified have required greater exploration expenditures because of their remote location or increasing depth of occurrence. The number of viable, large-scale assets considered available for development is likely to decrease in the near term. These observations coincide with recent studies that suggest that the discovery rate and ore grades for some mineral commodities, especially gold, have been declining steadily since 1999.

Recent and anticipated mineral commodity prices contribute to exploration budget development and the amount of activity planned by mineral exploration companies. Table 1 shows the average annual prices for selected metals for the years 2004 through 2014. However, because of metal price variation, reporting just the average annual prices does not provide enough information to assess the effect of multi-year price changes on the level of exploration. Figure 4 shows the annual indexed prices in 2004 constant U.S. dollars for selected (a) precious metals, (b) base metals and (c) other selected mineral commodities for 2004 to 2014. Using constant dollar values based on the Consumer Price Index reduces the effects of inflation on prices of mineral commodities being considered over time. When expressed in terms of current dollars, the average 2014 price for eight of the 10 selected commodities was higher in 2014 that the 2004-2014 average price of that commodity. However, when expressed in terms of constant dollars, the average price for eight of the 10 selected commodities was lower in 2014 than the 2004-2014 average price of that commodity. The average prices for copper and zinc have remained relatively stable for the period, when expressed in terms of constant dollars.

As shown in Fig. 4, the 2014 average constant dollar price for seven of the 10 selected commodities was lower in 2014 than in the two previous years. Of the commodities selected for evaluation, only the average constant-dollar prices for nickel, palladium and zinc were higher in 2014 than in 2013. In spite of generally lower prices in 2014, the 2014 average constant dollar price for gold was 16 percent higher than the average 2004-2014 constant dollar price for gold. Similarly, the 2014 constant dollar palladium price was 60 percent higher. The 2014 average constant dollar uranium yellow cake price was 37 percent lower than the average 2004-2014 constant dollar price, the 2014 constant dollar nickel price was 24

Figure 5

Exploration budgets of companies based in Brazil, Russia, India, China (BRIC) countries and their share of annual global exploration budgets, 2005-2014. Source: SNL Metals & Mining, 2014.



percent lower, the 2014 constant dollar platinum price was 8 percent lower, the 2014 constant dollar zinc price was 7 percent lower, the 2014 constant dollar price for copper was 6 percent lower and the 2014 constant dollar price for neodymium oxide was 5 percent lower. The 2014 constant dollar prices for lead and silver were close to their average 2004-2014 constant dollar prices.

Historical and future trends of metals prices are considered when determining where and what commodity target to spend available capital on exploration and development. During the period of increasing gold prices from 2005 through 2012, the major gold miners increased the recovery from lower grade ore and were able to maintain a satisfactory profit level, and some exploration companies re-evaluated deposits with historically lower ore grades. The higher price permitted the company to expand the "reserve" of the deposit. In 2014, however, the average gold price was 24 percent lower than the average gold price in 2012. This forced some producers to lower the prices they used to calculate year-end 2014 reserves in order to comply with regulator's definitions of what defines an allowable reserve estimate, thus reducing the reserve estimate. In response to low gold prices, some companies are reducing costs by cutting capital expenditures and exploration spending, reducing overhead costs, and scaling back mine plans to focus on extracting higher-grade ore. Exploration activity at some sites with lower gold grades is being curtailed and some marginal mines are being closed, at least temporarily, until the gold price increases.

Currency movements were an important consideration for the minerals exploration and mining sector in 2014. The U.S. dollar strengthened against all other major currencies in 2014 for the first time this century. A strong U.S. dollar has a negative impact on international investment returns and increases the costs associated with foreign projects that purchase goods or supplies using U.S. dollars. It also may increase the relative costs of exploration in the United States when compared to other regions, as labor and material costs are incurred in U.S. dollars.

Ernst & Young Global Ltd. estimated the greatest business risks for the mining and minerals exploration industry in 2014, in declining order of importance, as productivity, capital sourcing, the social license to operate, capital projects, resource nationalism, price and currency volatility, infrastructure access, benefit sharing, labor issues and access to water and energy. Productivity in the mining sector reportedly has been declining on a volume basis since 2000. A primary cause for the apparent decline in productivity was the fast pace in which mining companies expanded during the 2000s.

During the past few years, the declining prices of some metals, massive write-offs and reduced earnings have made investors wary of the mining sector. Global demand for some metals has been affected by the recent global recession and a reduction in Chinese consumption for these metals. While the major companies and junior companies have lowered their planned exploration spending, restricted access to investor funds have affected the junior companies more than larger companies, which have other sources of revenue. Data suggest that the junior sector share of exploration budgets decreased to a 12-year low of 32 percent in 2014 while the major company share increased to an 11-year high of about 49 percent. Intermediate company share was reported to be about 11 percent in 2014. Improved reporting by Chinese entities has shown an increased share for government-controlled companies to more than 8 percent of the exploration budget globally, as these companies are expanding their exploration activity beyond China.

The lack of available capital targeted for preproduction assets has made it difficult for junior companies to obtain sufficient capital to sustain exploration activities. One study suggests that one in 10 junior miners may go into administration, and a further 16 percent are likely to halt operations temporarily. There was a general trend in declining merger and acquisition activity in 2014, with the number declining from 702 in 2013 to 544 in 2014 and the value of these deals decreasing 49 percent from $87.3 billion in 2013 to $44.6 billion in 2014, according to Ernst & Young Global. Some junior companies are turning to engineering and construction companies, many from China and the Republic of Korea, or private equity investment as potential sources of funding. Some major

companies are looking internally for growth opportunities while others are divesting some holdings to separate unprofitable assets. BHP Billiton Ltd., Vale S.A. and Yamana Gold Inc. have all announced plans to separate or sell off noncore assets.

Resource nationalism is a term used to describe policies initiated by some countries to balance promoting investment and maximizing in-country benefits. Resource nationalism can take many forms, including imposing a resource tax, amending royalty or tax rates, establishing greater controls on foreign participation, establishing state ownership or control, or mandating in-country value-added processing and/or limiting exports. The ban on exports of mined ores imposed in Indonesia in January 2014, in an effort to encourage in-country processing, is one example of resource nationalism. Indonesia is a leading producer of nickel laterite ore and bauxite. The legislation resulted in a ban on metal ore and concentrate exports from Indonesia. Anticipation of reduced nickel supply resulting from the ban led to an increase in the nickel price during 2014 and increases in nickel global inventories and stocks. Increased nickel laterite production from the Philippines reduced the gap in supply from Indonesia. China, a leading consumer of Indonesian ores, has begun to source its bauxite from other countries and built new processing facilities capable of handling lower-grade material from other countries. Similarly, China has been blending nickel ore for its stockpiles with lower-grade nickel ore from the Philippines used in nickel pig iron production.

Since 2000, the global landscape for mineral exploration and development has changed. At the end of the 20th century, the bulk of global mineral exploration was conducted by Australian, Canadian and U.S. companies. Companies headquartered in these countries continue to explore globally and generated the greatest exploration budget in 2014. However, the share of companies headquartered in these three countries has declined, accounting for about half of the global exploration budget in 2014 compared to about two-thirds of the exploration budget in 2005. Exploration and mining investment has shifted from these traditional jurisdictions to virtually all countries. The term BRIC commonly refers to the grouping of several countries with growing economies (Brazil, Russia, India and China). The exploration budget for the BRIC countries (excluding India) has increased from about $300 million in 2005 to more than $1.7 billion in 2014. In percentage terms, exploration in these countries increased from less than 7 percent of the global exploration budget in 2005 to more than 12 percent of the global budget in 2014. Figure 5 shows this global trend using SNL budget estimates. However, Fig. 5 does not include India, which was not reported by SNL for all years from 2005 through 2014. In addition, SNL data for China varies significantly from data reported by Chinese sources for metal and nonmetal mineral exploration (excluding oil and gas). This set of data may be more inclusive than data for China compiled by SNL, as it reportedly includes exploration expenditures for a wider range of mineral commodities from both private and public entities. When these factors are considered, the increase in the contribution of BRIC countries is greater than that shown in Fig. 5 but the overall trend remains the same.

Many exploration projects are becoming increasingly more costly and difficult to develop. There is a growing trend toward exploring for deeper deposits as shallower reserves are depleted. The Resolution copper deposit in Arizona, the Cukaru Peki copper deposit in Serbia and the Cascabel copper deposit in Ecuador are all examples of high-grade ore deposits that are deeper extensions of active or previously mined sites. In South Africa, older, high-cost mines that do not lend themselves to mechanization are being phased out in favor of highly mechanized mines. In Australia, exploration companies are looking for high-grade deposits under covered terrain. Although the country's historical success rate for locating minable deposits in covered terrain has not been high, depletion of shallow deposits is driving explorationists to look in areas that have traditionally been more cost intensive and technically challenging.

Competing demand for energy and water have increased risks related to energy and water access. Mining companies spent $11.9 billion on water infrastructure in 2013, a 250-percent increase from

Figure 6

Worldwide exploration budgets for selected mineral commodity targets, 2010-2014. (Base metals include copper, lead, nickel, and zinc. Other minerals include iron ore, lithium, molybdenum, niobium, phosphate, potash, rare-earth elements, silver, tantalum, uranium and tin.) Source: SNL Metals & Mining, 2014.

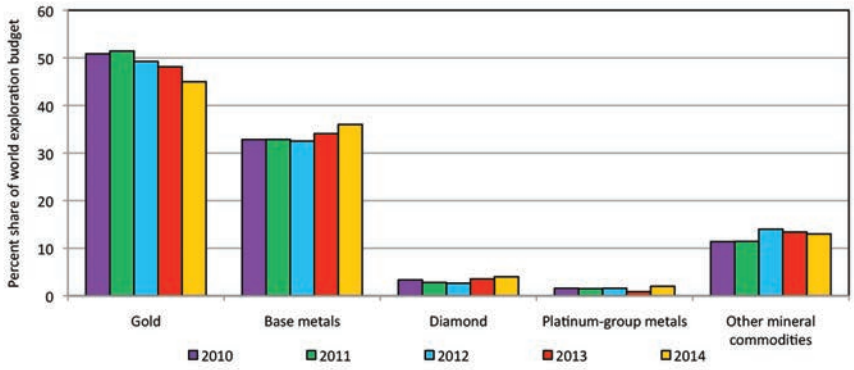


Table 2

Selected noteworthy exploration sites for 2014.

Location	Type[1]	Site	Commodity	Company	Resource[2] notes
Africa					
1 Burkina Faso	F	Bombore	Au	Orezone Gold Corp.	4.6 Moz Au (D)
2 Burkina Faso	P	Essakane	Au	Iamgold Corp.	3.9 Moz Au (R)
3 Burkina Faso	F	Hounde	Au	Endeavor Mining Corp.	2.1 Moz Au (R)
4 Burkina Faso	P	Mana (Siou)	Au	SEMAFO, Inc.	2.8 Moz Au (R)
5 Burkina Faso	F	Yaramoko	Au	Roxgold Inc.	850,000 oz Au (ID)
6 Congo (Kinshasa)	E	Kipushi	Zn, Cu	Ivanhoe Mines Ltd.	2.8 Mt Zn, 389,000 t Cu (D)
7 Cote d'Ivoire	E	Mt. Yaoure	Au	Amara Mining plc.	4.4 Moz Au (D)
8 Eritrea	P	Bisha	Au, Ag, Cu, Zn	Nevsun Resources Ltd.	547,000 oz Au, 33.6 Moz Ag, 451 kt Cu, 1.0 Mt Zn (R)
9 Ghana	P	Bibiani	Au	Resolute Mining Ltd.	834,000 oz Au (D)
10 Ghana	P	Wassa	Au	Golden Star Resources Ltd.	1.5 Moz Au (R)
11 Mali	P	Tabakoto	Au	Endeavor Mining Corp.	794,000 oz Au (R)
12 Namibia	D	Otjikoto (Wolfshag)	Au	B2Gold Corp.	1.3 Moz Au (PR)
13 Senegal	E	Dalafin	Au	Stratex Int'l. plc	Data not released.
14 South Africa	D	Platreef	PGM, Au, Cu, Ni	Ivanhoe Platinum Ltd.	26 Moz PGM, 2 Moz Au, 364 kt Cu, 728 kt Ni (D)
15 South Africa	E	Waterberg	Pt, Pd, Au, Cu, Ni	Platinum Group Metals Ltd.	8.7 Moz Pt, 17.7 Mo Pd, 369,000 oz Rh, 2.3 Moz Au, 287 kt Cu, 517 kt Ni (IF)
16 Sudan	E	Block 14 (Galat Sufar)	Au	Orca Gold Inc.	1.6 Moz Au (D)
17 Tanzania	E	Ntaka Hill	Ni	IMX Resources Ltd.	118 kt Ni (D)
18 Tanzania	E	Panda Hill	Nb	Cradle Resources Ltd.	223 kt Nb_2O_5 (ID)
Australia					
19 New South Wales	P	Peak	Au, Ag, Cu	New Gold Inc.	412,000 oz Au, 820,000 oz Ag, 44 kt Cu (R)
20 Western Australia	F	Castle Hill (Kinore)	Au	Phoenix Gold Ltd.	709,000 oz Au (R)
21 Western Australia	P	DeGrussa	Cu, Au	Sandfire Resources NL	376 kt Cu, 456,000 oz Au (R)
22 Western Australia	P	Duketon area	Au	Regis Resources Ltd.	2.5 Moz Au (R)
23 Western Australia	P	Jundee	Au	Northern Star Resources Ltd.	415,000 oz Au (R)
24 Western Australia	P	Paulsens	Au	Northern Star Resources Ltd.	124,000 oz Au (R)
25 Western Australia	E	Pilbara Iron Ore	Iron Ore	Flinders Mines Ltd.	500 Mt iron ore (D)
26 Western Australia	P	Tropicana	Au	Anglogold Ashanti Ltd.	3.6 Moz Au (R)
27 Western Australia	E	West Musgrave	Ni, Cu, Co	Cassini Resources Ltd.	218 kt Ni, 187 kt Cu, 7.3 kt Co (IF)
28 Western Australia	F	Wiluna	Uranium	Toro Energy Ltd.	24.9 kt U_3O_8 (D)
29 Western Australia	F	Yamarna belt	Au	Gold Road Resources Ltd.	2.5 Moz Au (D)
Canada					
30 British Columbia	F	Kerr-Sulphurets Mitchell (KSM)	Au, Cu, Ag, Mo	Seabridge Gold Inc.	38 Moz Au, 4.5 Mt Cu, 191 Moz Ag, 96 kt Mo (R)
31 British Columbia	P	New Afton	Au, Cu, Ag	New Gold Inc.	879,000 oz Au, 410 kt Cu, 3.5 Moz Ag (R)
32 British Columbia	E	Premier	Au, Ag	Ascot Resources Ltd.	2.5 Moz Au, 21 Moz Ag (D)
33 Manitoba	E	Monument Bay	Au, W	Mega Precious Metals Inc.	2.1 Moz Au, 2.5 kt WO_3 (D)
34 New Brunswick	E	Stratmat	Zn, Pb	Trevali Mining Corp.	337 kt Zn, 143 kt Pb (IF)
35 NW Territories	E	Kennady Lake North	Diamond	Kennady Diamonds Inc.	Data not released.
36 Nunavut	E	Amaruq	Au	Agnico-Eagle Mines Ltd.	Data not released.
37 Nunavut	E	Back River	Au	Sabina Gold & Silver Corp.	2.7 Moz Au (R)
38 Nunavut	D	Meliadine	Au	Agnico-Eagle Mines Ltd.	2.8 Moz Au (R)
39 Ontario	P	Bell Creek	Au	Lake Shore Gold Corp.	707,000 oz Au (R)
40 Ontario	E	Black Fox	Au	Primero Mining Corp.	538,000 oz Au (R)
41 Ontario	E	Borden Lake	Au	Probe Mines Ltd.	3.9 Moz Au (D)
42 Ontario	D	Cochenour	Au	Goldcorp Inc.	3.2 Moz Au (IF)
43 Ontario	E	Coté	Au	Iamgold Corp.	7.7 Moz Au (D)
44 Ontario	E	Grey Fox	Au	Primero Mining Corp.	558,000 oz Au (D)
45 Ontario	E	Hardrock (Trans-Canada)	Au	Premier Gold Mines Ltd.	4.9 Moz Au (ID)
46 Ontario	E	Kirkland Lake (Amalgamated)	Au	Agnico-Eagle Mines Ltd.	1 Moz Au (D)
47 Ontario	P	Lac des Iles	Pd, Pt, Au, Ni, Cu	North American Palladium Ltd.	1.2 Moz Pd, 86,000 oz Pt, 83,000 oz Au, 9.8 kt Ni, 7.1 kt Cu (R)
48 Ontario	P	Macassa (S. Claims)	Au	Kirkland Lake Gold Inc.	2.2 Moz Au (R)
49 Ontario	D	Phoenix	Au	Rubicon Minerals Corp.	1.1 Moz Au (D)

Location	Type[1]	Site	Commodity	Company	Resource[2] notes
50 Ontario	F	Rainy River	Au, Ag	New Gold Inc.	3.8 Moz Au, 9.4 Moz Ag (R)
51 Ontario	P	Timmins West (144)	Au	Lake Shore Gold Corp.	492,000 oz Au (R)
52 Quebec	P	Bachelor Lake	Au	Metanor Resources Inc.	200,000 oz Au (R)
53 Quebec	P	Eleonore	Au	Goldcorp Inc.	5 Moz Au (R)
54 Quebec	E	LaMaque	Au	Integra Gold Corp.	1 Moz Au (D)
55 Quebec	P	Niobec	Nb	Magris Resources Inc.	1.8 Mt Nb_2O_5 (PR)
56 Quebec	P	Westwood	Au	Iamgold Corp.	539,000 oz Au (R)
57 Saskatchewan	E	Patterson Lake So.	Uranium	Fission Uranium Corp.	36.1 kt U_3O_8 (ID)
58 Saskatchewan	E	Rook 1	Uranium	NexGen Energy Ltd.	Data not released.
59 Saskatchewan	E	Wheeler River	Uranium	Denison Mines Corp.	166 kt U_3O_8 (D)
60 Yukon Territory	E	Coffee (Supremo)	Au	Kaminak Gold Corp.	719,000 oz Au (D)
Latin America					
61 Brazil	E	Pitangui	Au	Iamgold Corp.	638,000 oz Au (IF)
62 Brazil	P	Tucano	Au	Beadell Resources Ltd.	1.5 Moz Au (R)
63 Brazil	E	Cerrado Verde	Potash	Verde Potash plc.	135 Mt K_2O (D)
64 Chile	P	Cerro Bayo	Ag, Au	Mandalay Resources Corp.	17 Moz Ag, 165,000 oz Au (R)
65 Chile	P	El Penon	Au, Ag	Yamana Gold Inc.	1.7 Moz Au, 64 Moz Ag (R)
66 Chile	E	Productora	Cu, Au, Mo	Hot Chili Ltd.	433 kt Cu, 308,000 oz Au, 15.5 kt Mo (PR)
67 French Guiana	E	Paul Isnard (Montagne d'Or)	Au	Columbus Gold Corp.	4.3 Moz Au (IF)
68 Mexico	P	Bolanitos	Ag, Au	Endeavor Silver Corp.	2.9 Moz Ag, 54,000 oz Au (R)
69 Mexico	E	Camino Rojo	Ag, Au	Goldcorp Inc.	37 Moz Ag, 1.85 Moz Au (R)
70 Mexico	P	El Cubo	Ag, Au	Endeavor Silver Corp.	3.5 Moz Ag, 47,000 oz Au (R)
71 Mexico	P	Mulatos	Au	Alamos Gold Inc.	2 Moz Au (R)
72 Mexico	P	Palmarejo	Ag, Au	Coeur Mining Inc.	31 Moz Ag, 488,000 oz Au (R)
73 Mexico	P	San Francisco	Au	Timmins Gold Corp.	1.6 Moz Au (R)
74 Mexico	P	San Dimas	Au, Ag	Primero Mining Corp.	870,000 oz Au, 49 Moz Ag (R)
75 Peru	E	Zafranal	Cu, Au	Teck Resources Ltd.	2.3 Mt Cu, 1.6 Moz Au (D)
76 Suriname	P	Rosebel	Au	Iamgold Corp.	3.2 Moz Au (R)
Pacific (Including Southeast Asia)					
77 Cambodia	E	Kou Sa	Cu	Geopacific Resources Ltd.	Data not released.
78 Cambodia	E	Okvau	Au	Renaissance Minerals Ltd.	1.1 Moz Au (ID)
79 Indonesia	P	Martabe	Au, Ag	G-Resources Group Ltd.	3 Moz Au, 31.9 Moz Ag (R)
80 Philippines	P	Co-O	Au	Medusa Mining Ltd.	446,000 oz Au (R)
81 Philippines	P	Masbate	Au	B2Gold Corp.	3.2 Moz Au (R)
United States					
82 Alaska	P	Kensington	Au	Coeur Mining Inc.	629,000 oz Au (R)
83 Alaska	P	Pogo	Au	Sumitomo Metal Mining Co.	5 Mt Au (R)
84 Arizona	F	Rosemont	Cu, Mo, Ag	HudBay Minerals Inc.	2.7 Mt Cu, 91 kt Mo, 73 Moz Ag (R)
85 Nevada	E	Ann Mason	Cu, Au, Ag	Entrée Gold Corp.	556 kt Cu, 619,000 oz Au, 4.2 Moz Ag (PR)
86 Nevada	P	Cortez (Goldrush)	Au	Barrick Gold Corp.	10.6 Moz Au (D)
87 Nevada	E	Kinsley Mountain	Au	Pilot Gold inc.	Data not released.
88 Nevada	E	North Bullfrog	Au, Ag	Corvus Gold Inc.	433,000 oz Au, 1.1 Moz Ag (D)
89 Texas	D	Goliad (Burke Hollow)	Uranium	Uranium Energy Corp.	2,300 t U_3O_8 (IF)
90 Nevada	E	Long Canyon	Au	Newmont Mining Corp.	2.6 Moz Au (IF)
91 Wyoming	E	Bear Lodge	REE	Rare Element Resources	433 kt REO (R)
Rest of the World					
92 China	P	White Mountain	Au	Eldorado Gold Corp.	571,000 oz Au (R)
93 China	P	Ying	Ag, Pb, Zn, Au	Silvercorp Metals Inc.	83 Moz Ag, 377 kt Pb, 120 kt Zn, 29,000 oz Au (R)
94 Kazakhstan	P	Sekisovskoye	Au, Ag	GoldBridges Global Res.	421,000 oz Au, 614,000 oz Ag (R)
95 Mongolia	E	Kharmagtai	Cu, Au	Xanadu Mines Ltd.	245 kt Cu, 939,000 oz Au (D)
96 Turkey	E	TV Tower	Au, Ag	Pilot Gold Inc.	455,000 oz Au, 36 kt Cu, 17 Moz Ag (D)

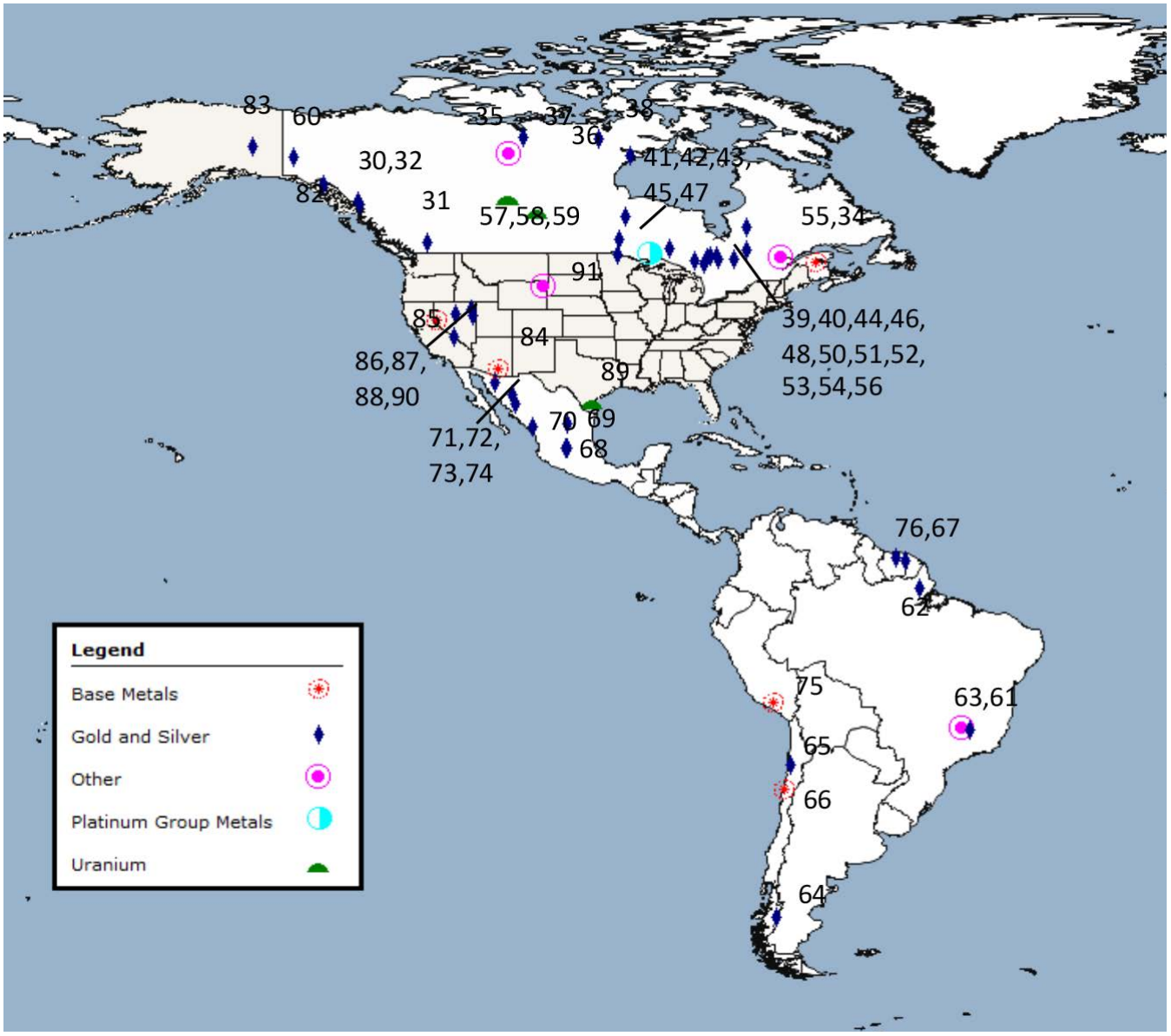
K_2SO_4 - potash; Moz - million troy ounces; Mt - million metric tons; kt - thousand metric tons; oz - troy ounces; t - metric tons; Ag - Silver; Au - Gold; Fe - Iron; Mo - Molybdenum; Ni - Nickel; Pb - Lead; PGM - platinum-group metals; Pt - Platnuml REE - Rare earth elements, Sb - Antimony; U_3O_8 - Uranium oxide; Zn - Zinc; [1] D - Approved for development; E - Active exploration; F - Feasibility work ongoing/completed; P - Exploration at producing site. [2] Resource estimate as of end of 2103 derived from various 2013 sources: D=measured + indicated, ID=indicated, IF=inferred, R=proven + probable, P= proven, PR=probable. Data were not verified by the U.S. Geological Survey. Where resource data were not released, the site was considered noteworthy by the authors based on the level of exploration activity or regional significance.

2009. As exploration is taking place in more remote locations, countries such as Chile, Mongolia, Peru and South Africa are focusing on increasing access to or development of energy and water resources. Some mining companies are considering greater use of renewable energy as part of a strategy to lock in long-term energy prices and minimize exposure to regulatory changes, market pricing, and the rising demand for energy.

As global demand for natural resources continues to increase and viable land-based resources decline, there is increasing attention to exploring the ocean floor for its mineral potential. In 2007, Nautilus Minerals began exploration for massive sulfides off the coast of Papua New Guinea and a joint venture was formed in 2014 between the company and the nominee of the Independent State of Papua New Guinea to develop the Solwara 1 project site. There has been an increase in the number of exploration contract applications to the International Seabed Authority (ISA), an autonomous international organization established under 1994 provisions of the United Nations Convention on the Law of the Sea. In 2010, only six projects were ongoing in international waters; by 2014, 26 project

Figure 7

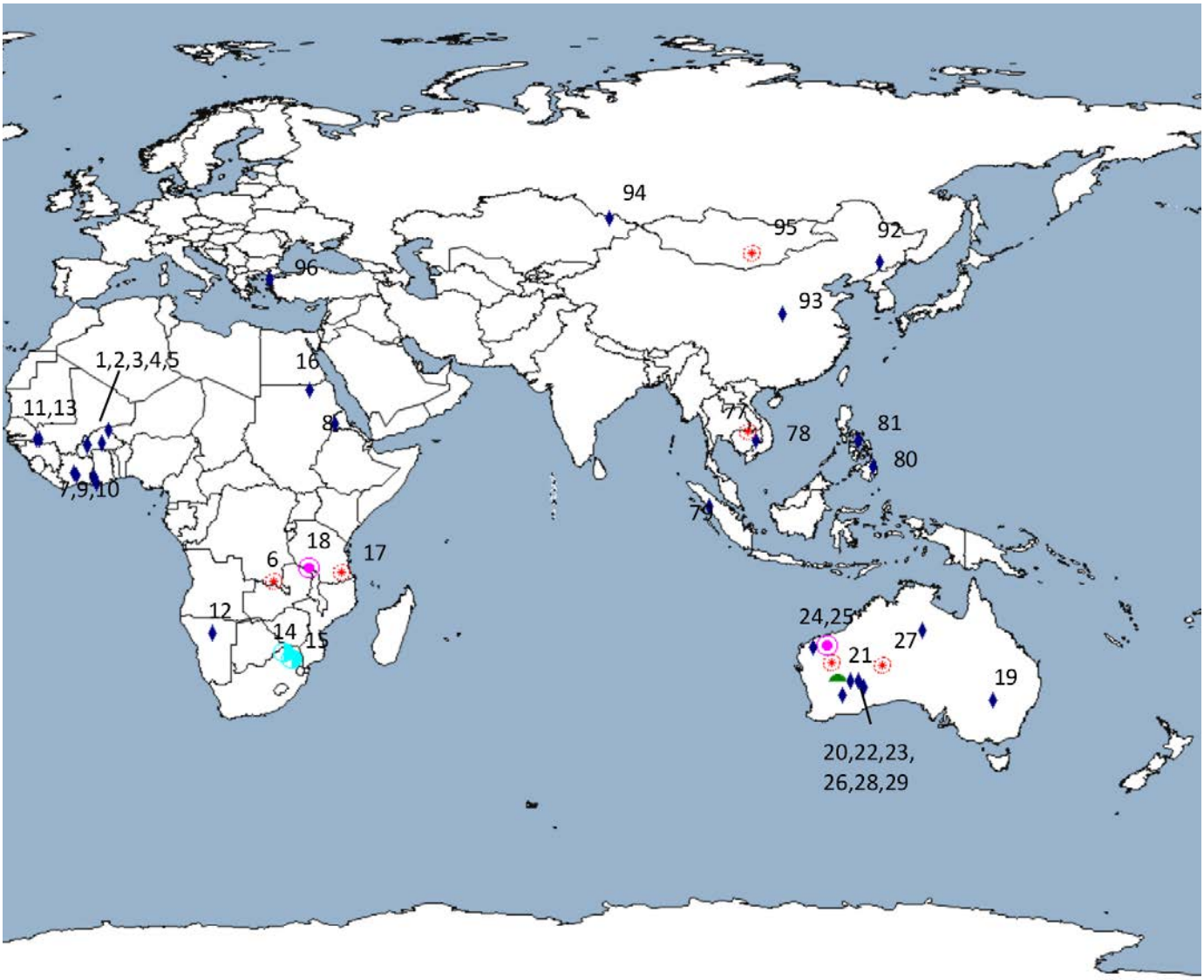
Map showing locations of the 100 noteworthy sites and their principal commodity. Figures reflect site numbers as shown in Table 2.



applications were expected to be received by the ISA. In 2014, the Japan Oil, Gas, and Metals National Corp (JOGMEC) announced the discovery of a hydrothermal mineral deposit off the coast of Okinawa Prefecture near Japan. A decision by New Zealand's Environmental Protection Authority to oppose a deep sea mining venture off its coasts may reduce interest in exploring for mineral deposits in the region.

Exploration activity by mineral commodity

The amount budgeted for gold exploration ($4.6 billion) based on SNL data for 2014 is 31 percent lower than that budgeted for gold in 2013. Figure 6 illustrates the 2010-2014 global percent share distribution of reported mineral exploration budget estimates by mineral commodity grouping (excluding uranium). Figure 6 shows that the percent share attributed to global gold exploration relative to exploration for all nonferrous minerals has been decreasing since 2011. In terms of percentage of worldwide nonferrous exploration budget, exploration for gold accounted for 45 percent in 2014 and 48 percent in 2013. This variation may be an artifact of survey response or other factors in light of generally lower gold



prices over the period. Latin America remains the leading region for gold exploration based on SNL data, accounting for more than a quarter of gold budget allocations. Other principal locations for gold exploration in 2014, in descending order by 2014 budget, are Canada, Australia, the United States, Mexico, China, Russia, Colombia, Peru, Burkina Faso, Chile, Papua New Guinea, Brazil and Indonesia.

Exploration budgets for base-metal projects decreased 21 percent to $3.7 billion in 2014 from $4.7 billion in 2013. In terms of percentage of total worldwide nonferrous exploration budget, however, the estimated base-metal exploration budget increased to 36 percent of the total in 2014. The percent allocation for base-metal exploration remained relatively stable from 2010 through 2011, and increased from 2013 through 2014. Exploration for copper accounted for more than 70 percent of the base-metal budget for 2014. Latin America retained the greatest percent share for base metals exploration of the global budget, in spite of a significant decline in budget allocation. Countries with the largest exploration budget for copper in 2014, in declining order by budget, were Chile, Australia, Peru, the Democratic Republic of the Congo, the United States, Canada, China, Zambia, Mexico and Brazil. Countries with the largest exploration budget for zinc/lead in 2014 were China, Canada, Mexico, Australia, Peru, the Democratic Republic of the Congo, Sweden, India, Ireland and the United States. Countries with the largest exploration budget for nickel in 2014 were Australia, Canada, Russia, Indonesia, China, the United States, Finland, Brazil, Tanzania and the Philippines.

The budget for diamond exploration decreased 9 percent in 2014 in current dollar terms from 2013, the smallest percentage decline of all commodities monitored by SNL. In current dollar terms, the diamond exploration budget of about $400 million in 2014 was about 44 percent of the budget for diamond in 2008 and represented about 4.4 percent of the global exploration budget, slightly higher than its share in 2013. Principal locations for diamond exploration in 2014, in declining order by budget, were Russia, Canada, Angola, Botswana and South Africa.

Based on exploration budget estimates, the 2014 estimate for platinum-group metals (PGM) of about $200 million was up 50 percent from the 2013 budget estimate of more than $100 million, and represented 1.7 percent of the global exploration budget for 2014. Principal areas for planned PGM exploration in 2014 were South Africa, Canada and Russia, in descending order by 2014 budget. Strikes taking place at several South African mines led to concern over mineral supply, as demand from the automotive industry for catalytic converters was strong in 2014. The World Platinum Investment Council projected an 885 kt (975,500 st) deficit in platinum supply for 2014. A portion of this projected deficit may be offset by palladium substitution.

The estimated 2014 global budget for other mineral commodity targets was 28 percent lower ($1.3 billion) in 2014 than the $1.8 billion reported for 2013. Mineral commodities considered include heavy-mineral sands, lithium, molybdenum, niobium, phosphate, potash, rare-earth elements (REE), silver, tantalum, tin and tungsten. Exploration for lithium, potash, and REE has increased as demand for and concerns related to supply of these commodities has risen. Concern about China being the sole source of supply and its policy (as of 2014) of issuing export quotas for REE has led to increased exploration for REE at projects in Australia, Canada, South Africa and the United States. Principal locations for exploration in 2014 for minerals other than those listed above include Canada, Mexico, Australia, China, Brazil, Peru, the United States, Argentina and Chile, in declining order by 2014 budget.

The budget estimate for uranium exploration decreased from about $616 million in 2013 to about $504 million in 2014. The global nuclear industry has not yet returned to its pre-Fukushima level, as safety concerns remain high. Principal locations for exploration of uranium in 2014, in declining order by 2014 budget, include Canada, Australia, Kazakhstan, Mongolia, Niger, Namibia and the United States.

Based on global exploration site data compiled by the USGS, gold was the principal target at 41 percent of the sites explored in 2014; copper was the target at 19 percent of the sites and iron ore, silver, uranium and zinc each were the target at 5 percent of the sites (20 percent combined); nickel at 4 percent of the sites; and other minerals represented the remaining 16 percent of the sites. The SNL and USGS data support the conclusion that there is continued interest in exploration for lithium, potash and REE, but the number of projects exploring for these commodities has declined from the 2012 peak.

2014 exploration highlights

Table 2 presents selected noteworthy exploration sites based on the amount of exploration activity conducted at the sites in 2014. Data were not verified by the USGS. Where resource data were not released, the site was considered noteworthy by the authors based on the level of exploration activity or regional significance. A combined total of more than 4.5 million m (2,796 miles) of drilling took place in

2013 on the sites included in Table 2. The following criteria were used as a basis for site inclusion:

- The high level of exploration interest at a site, determined either by intensity of drilling activity or level of capital investment. When drilling was used as the principal indicator, a site qualified if a minimum of 15,000 m (49,200 ft) of drilling (usually a combination of diamond or reverse-circulation drilling) took place during 2014 along with ancillary exploration activities; where budget was used as the principal indicator, a site qualified if a 2014 budget of at least $4 million was planned and executed for exploration and drilling activities. These criteria may eliminate early-stage projects (where the level of drilling was below cutoff) or development projects (where planned expenditures include costs for development or infrastructure). Owing to the decrease in exploration activity in 2014, the minimum drilling cutoff was reduced from 20,000 m (65,600 ft) in 2012 to 15,000 m (49,200 m) in 2014 and the minimum expenditure cutoff was reduced from $8 million in 2013 to $4 million in 2014.
- The magnitude of resource delineated when compared to prior resource estimates.
- The high potential of near-term development, based upon reported tonnage and grade estimates derived from company announcements.
- The regional significance of an activity based on economic or social needs of the locality.
- The project reflects an emerging source of mineral supply as a result of advances in extraction technology.

Sites where significant exploration activity and expenditures took place prior to 2014 were not included in Table 2 if the reported level of 2014 activity did not meet the selection criteria. Except where indicated, similar criteria have been applied to previous exploration summaries reported annually in the *USGS Minerals Yearbook* series and in exploration summary articles published in *Mining Engineering*.

As reported in Table 2, gold continued to be the commodity generating the greatest exploration intensity by number of projects based on the list of noteworthy exploration sites in 2014. Of the sites selected for Table 2, the primary targets were: (1) gold or silver at 76 percent of the sites, (2) base metals at 9 percent of the sites, (3) uranium at 5 percent of the sites, (4) PGMs at 3 percent of the sites and (5) other mineral commodities at 7 percent of the sites. Determination of the primary commodity was based on consideration of commodity value of the contained resource at each site.

The estimated resources reported in Table 2 reflect various stages of verification, different methodologies and multiple sources of information based on company data. Should these reserves/resources be confirmed, however, they would add about 500 Mt (550 million st) of iron, 13 Mt (14.3 million st) of copper, about 5 Mt (5.5 million st) of lead and zinc, 2 Mt (2.2 million st) of niobium, 1.6 Mt (1.7 million st) of nickel, 430 kt (475,000 st) of combined rare-earth oxides, 230 kt (253,000 st) of U_3O_8, 200 kt (220,000 st) of molybdenum, 21 kt (670 million oz) of silver, 5.6 kt (180 million oz) of gold, and 1.7 kt (54 million oz) of PGM to the identified world resources for these mineral commodities. It is likely, however, baring a dramatic sustained increase in commodity prices, that only a portion of the listed resources may be converted to reserves based on future exploration activity.

Figure 7 is a plot of the locations of those sites included in Table 2. The site numbers shown in Table 2 are used to identify the locations in Fig. 7. Sites have been classified by their primary commodity target.

The cost of doing business in a country can change based on many factors, including economic and environmental conditions, legislative actions, political activity and social receptivity to mining. These factors all determine the perceived risk profiles of a country. The Fraser Institute of British Columbia, Canada, annually publishes a survey assessing the effects of perceived "investment attractiveness," which combines geologic attractiveness and the perceptions of public policy on attitudes toward exploration investment around the world. The 2014 survey (published February 2015) includes data from 485 respondent companies with an aggregated exploration budget of US$2.7 billion in 2014, down from $3.2 billion in 2013.

According to the 2014 Fraser Institute Survey, the top 10 destinations for mineral exploration based on overall investment attractiveness in 2014, listed in descending order, were Finland, Saskatchewan (Canada), Nevada (United States), Manitoba (Canada), Western Australia (Australia), Quebec (Canada), Wyoming (United States), Newfoundland & Labrador (Canada), Yukon Territory (Canada) and Alaska (United States). Greenland and Sweden were including in the top 10 list for 2013, but fell out of the

Latin America has been considered the leading region for mineral exploration by many companies for the past decade owing to its promising geology, its long history of world-class discoveries, the perception of its mineral policies and its successful historical record of mineral production and development.

top 10 in list in 2014. The top 10 destinations for mineral exploration based on their mineral potential independent of policy restrictions and listed in descending order, were Yukon Territory (Canada), Nevada (United States), Alaska (United States), Northwest Territories (Canada), Manitoba (Canada), Chile, Peru, Western Australia (Australia), Idaho (United States) and Quebec (Canada). The top 10 destinations for mineral exploration based solely on policy attractiveness and listed in descending order, were Ireland, Finland, Alberta (Canada), Sweden, New Brunswick (Canada), Saskatchewan (Canada), Newfoundland & Labrador (Canada), Wyoming (United States), Manitoba (Canada) and Western Australia.

Exploration activity and related legislation by region

Exploration-related activities and events within each region are summarized. The order of regional and country discussions is based on the amount budgeted for exploration in 2014 from highest to lowest. Areas not included in the regions discussed have been aggregated as Rest of World and are discussed separately at the end of this section.

Latin America. Latin America continued its leading position as a destination for exploration activity based on exploration budget data collected by SNL since 1994, but was listed third after Canada and Australia by the USGS when the number of active sites was considered. On the basis of data compiled for this review by the USGS, Latin American countries with the greatest exploration activity, in descending order by number of sites for which data were compiled, were Mexico (136), Peru (93), Chile (79), Brazil (61), Argentina (39) and Colombia (16).

Approximately 57 percent of the deposits actively explored in 2014 in Latin America contained gold or silver and 34 percent contained base metals, or some combination of precious and base metals based on the sites considered in the USGS compilation. Activity in 2014 was primarily used to further define early-stage discoveries (47 percent), conduct exploration at a producing site (29 percent), conduct prefeasibility and feasibility studies of economically promising prospects (13 percent) and further explore deposits under development (11 percent).

Latin America has been considered the leading region for mineral exploration by many companies for the past decade owing to its promising geology, its long history of world-class discoveries, the perception of its mineral policies, and its successful historical record of mineral production and development. Although the overall trend of budget expenditures has declined for all regions since 2012, Latin America still remains the leading region for exploration with a regional budget close to $3 billion in 2014. The amount of drilling also has declined since 2012, following the worldwide trend. Lower commodity prices and reduced capital for mineral exploration are starting to affect exploration activities for many South American countries.

Argentina's exploration investment level has declined about 50 percent over the past two years owing to a combination of domestic factors and the global economy, resulting in the suspension of some exploration activity that had previously been announced.

In 2014, the Bolivian government passed a new mining law that restricts mining cooperatives from partnering with foreign or domestic private companies. Also included within the law is a stipulation that bans private firms from registering minerals as property, thus hindering the use of these resources as collateral for loans or claimed as assets in the acquisition of new financing in the development of projects. In response to public unrest, revisions to the law are being considered.

Currently, there are 115 mining exploration companies developing 321 projects in Brazil, according to the data compiled by minerals production agency DNPM. Gold projects account for more than one-third (127) of the total. The president of Brazil has proposed legislative changes to the mining sector including the creation of a new mining regulator, the creation of a single mining license in place of the current exploration and exploitation licenses, and raising royalty payments to 4 percent on gross revenues from 0.2-3 percent of net revenues. The outlook for this proposed legislation is questionable as a new presidential cabinet is being formed.

Energy availability and water scarcity have become significant issues in Chile, as the country is on track to double its energy demand between now and 2025, according to the state Copper Commission. This has caused many companies to find new ways of powering their projects so that development can proceed. Chile's mining sector energy operating costs represent roughly 14 percent of total production costs, equivalent to 27 percent per pound of metal, the highest level since 2000. There are many different types of renewable resources being developed in Chile to improve the availability of these resources. Wind, solar thermoelectric and hydroelectric plants are among the energy sources currently being used and developed.

Chile's mining industry currently consumes about 5 percent of the fresh water in the country,

and this figure is expected to increase by 50 percent if expansion plans by the Chilean copper industry come to fruition. An investment of $10 billion is underway by the Chilean mining industry to create desalination plants in order to provide additional sources of fresh water to these operations. Antofogasta Minerals is already using seawater in its operations. A $2.6-billion project pumps seawater from the Pacific Ocean along a 145-km (90-mile) pipeline; the seawater is treated prior to use in the mining operations of the Esperanza copper mine in Chile's Antofagasta region. This practice allows the company to reduce consumption of fresh water that is needed elsewhere in the region.

Chile signed into law legislation that would continue to fund state-owned Codelco during the next five years. Codelco, like many companies, is exploring for deposits at greater depth to support continued production at its established mines and is faced with declining ore grades from its older mines. The ore grades currently being extracted at some mines are not as profitable at the current price of copper. In order to aid the state-owned corporation, the government approved $4 billion in funding in October that would be provided to Codelco from 2014-2018 to cover expenses and manage debt.

According to a World Bank report, the investment climate of Colombia has improved, with greater access to credit made possible by a new secured transactions law and a reduced corporate income tax rate, although legislation to establish a profit tax (CREE) was introduced in 2014. A Colombian legal tribunal ordered 11 gold mining companies to cease operations and restore the land to the indigenous Embera people. Illegal mining activity is still widespread in the region. The governments of Bolivia, Colombia, Ecuador, Guyana, Peru, Suriname and Venezuela have established the Amazon Cooperation Treaty Organization to combat illegal mining activities. From 1999 to 2012, illegal mining in the Amazon region increased 400 percent. The Colombia National Mining Agency reported that 35 percent of the mining titles are for exploration stage projects, 26 percent are for projects under construction and 39 percent are for producing mines.

Legislation was passed by the Senate of the Dominican Republic declaring the region surrounding Glencore Plc's Falcondo nickel mine a national park. Mining operations and permitting costs could be affected if this legislation is signed into law.

The Guatemalan government approved increases in mining royalties for 2014, which would increase mining royalties from 5 percent to 10 percent.

The declining prices of gold and silver are starting to affect development of projects in Mexico. The weak prices have delayed or suspended at least six precious metals projects with a combined capital budget in excess of $1.5 billion. This is causing some companies to search for or recover higher-grade ores.

Exploration investments in Peru amounted to approximately US$500 million in 2014, down from $760 million in 2013 owing to social conflicts and lack of financing for junior exploration companies. About half of the 120 junior companies operating in Peru in 2012 have exited the country for lack of funding. About 1,000 of the 55,000 mining concessions in Peru are active, according to the Peruvian Ministry of Energy and Mines. Exploration is focused on brownfield projects near producing mines. The Peruvian government approved an economic stimulus package in 2014 that, in part, was intended to reduce the approval time for exploration and environmental impact study certification by as much as 29 months.

The Peruvian government is supporting plans to develop US$14 billion in energy projects over the next 10 years to assist in the development of new copper mines in the country. The Peruvian Energy Ministry reports the expected cost of electricity in Peru in 2020 will be about $0.066 kwh/lb of copper, compared to $0.078 kwh in Argentina, $0.09 kwh in Mexico and $0.12 kwh hour in Chile.

Africa. According to SNL, African exploration budgets decreased to about $1.7 billion in 2014 from about $2.4 billion in 2013, a reduction of 28 percent. Countries with the greatest exploration activity in Africa, based on their exploration budget as reported by SNL for 2014, reported in decreasing order, were Congo (Kinshasa), South Africa, Burkina Faso, Zambia, Tanzania, Ghana, Mali, Angola and Namibia. Based on site data compiled by the USGS, projects containing gold that were actively explored in 2014 accounted for approximately 43 percent of the reported African exploration projects, 17 percent of 2014 projects contained copper, 9 percent of projects contained iron ore, 5 percent of projects contained uranium, 5 percent of projects contained lead or zinc, 5 percent of projects contained platinum-group metals, 5 percent of projects contained diamond, and 11 percent of the projects were targeting other minerals. Exploration was focused primarily in South Africa, Burkina Faso, Congo (Kinshasa), Mauritania, Tanzania, Namibia, Zambia, Ghana and Botswana, in descending order based on the number of sites, but activity also took place in a number of other countries.

An investment of $10 billion is underway by the Chilean mining industry to create desalination plants in order to provide additional sources of fresh water to these operations. Antofogasta Minerals is already using sea water in its operations.

Based on the number of sites, early-stage projects comprised about 56 percent of the 2014 activity, while producing projects accounted for about 23 percent, feasibility stage projects represented about 11 percent, and developing projects accounted for about 10 percent. Approximately 39 percent of the African exploration budget in 2014 was targeted for late-stage and feasibility activity, 31 percent was for activity adjacent to an existing mine site and 30 percent for grassroots or early-stage activity. Based on SNL data for 2014, junior companies and major companies together accounted for about 80 percent of the exploration budget in Africa. Intermediate companies, small privately held companies and public entities accounted for the remaining 20 percent.

The African mining sector has faced a number of challenges in 2014 that have affected the level of mineral exploration on the continent. In addition to the uncertain global macroeconomic environment and lack of investor capital, African exploration and development was particularly affected by the lack of transportation and energy infrastructure and power shortages, labor strikes in South Africa, and the effects of the outbreak of the Ebola virus disease in West Africa. Other factors that influenced the level of activity included: conflict, corruption and illegal mining; inadequate or confusing regulations and a lack of reliable geologic data. The World Bank announced a plan to initiate a $1-billion program to map African mineral resources beginning in 2014.

The five-month labor strike in South Africa reduced the country's platinum production by 40 percent and resulted in massive layoffs. It may have also reduced the confidence of investors in mining investment across Africa. The platinum industry in South Africa began a massive restructuring, which has affected the level of exploration and resulted in the closure or temporary suspension of several producing mines.

The Ebola virus outbreak in West Africa appeared to have had only limited short-term effect on mineral exploration and mining in West Africa during 2014. The affected region included Guinea, Liberia, Nigeria and Sierra Leone, and neighboring countries were placed on alert for the disease. The region includes 45 producing mines and ongoing copper, gold and iron ore exploration in the region. Based on SNL data, the 2014 mineral exploration budget allocation for the four countries directly affected by the Ebola outbreak was $84 million, or 49 percent less than the $166 million allocation for 2013. Budgets in surrounding countries (Cote d'Ivoire, Mali and Senegal) also show a 49-percent reduction from $352 million 2013 to $178 million in 2014. The reported decline in exploration allocation, while likely affected by the ebola situation, can also be attributed to other factors such as the global investment climate.

The government of Burkina Faso was dissolved in 2014 and an interim government established. The transitional government announced plans to review mining contracts signed under the former president, in a manner similar to reviews conducted during the past decade by Congo (Kinshasa) and Guinea. The review in Guinea is ongoing, and delays resulting from the review have affected mineral investment in Guinea.

Project expansions that require additional electricity have been banned in Congo (Kinshasa), and an electricity rationing program has been implemented. The country is experiencing energy shortages that may take several years to resolve. This situation may affect short-term mineral exploration and development activities.

The number of mining licenses issued by the government of Ethiopia has increased from 117 in 2010 to 279 in 2014. Of these, 145 are held by foreign companies, 60 are joint ventures between foreign and local companies, and 74 are held by local companies.

The government of Ghana is in the process of revising the Minerals and Mining Act of 2006 to add regulations to govern illegal mining in the country. Illegal gold operations continue to be an issue in the Ashanti and Eastern regions of the country. A three-month moratorium on new applications for gold exploration is expected to be lifted by the end of 2014, following a review of Ghana's mining fiscal and regulatory regime.

The parliament of the Cote d'Ivoire (Ivory Coast) adopted a new mining code that is intended to modernize the mining sector of the country. Mining Decree No 2014-397 sets more stringent criteria for the issuance of exploration and mining licenses, establishes a longer license period, reduces the land surface area allowed, outlines criteria for government participation, and establishes tax and customs provisions.

The government of Lesotho passed legislation that tightens requirements for new mining licenses, requiring parties to begin exploration activities within six months of receiving the license.

As part of an ongoing review of existing mining contracts, the government of Mali has canceled 130 mining permits, or about 30 percent of existing permits in the country. The canceled licenses targeted areas where no development has taken place and do not involve mines already in production. Artisanal gold mining is increasing in Mali, as some neighboring countries (Burkina Faso, Ghana and Senegal) have imposed

restrictions on the sector. The government announced plans to boost funding and policing of the sector. The government also announced agreements with China Railway Engineering Corp. and China Railway Construction Corp. to construct $9.5 billion in rail infrastructure suitable for transporting the country's bauxite, iron ore and uranium to the Atlantic coast.

The government of Namibia continued its moratorium on planned marine phosphate mining off the coast of Namibia until an environmental impact assessment is completed and it is demonstrated that mining would not harm the country's fishing industry.

South Africa's mining industry continued to face a number of challenges. Aging infrastructure, energy shortages, extended labor strikes, regulatory uncertainty and technical constraints resulted in the reduction or curtailment of some exploration and mining in the gold and platinum sectors. Illegal mining activities and possible corruption have been reported. The amended 2002 Mineral and Petroleum Resources Development Act, aimed at streamlining the country's permitting process, was approved by the National Assembly in March, but it has yet to be signed into law. A five-month labor strike reduced production of platinum in South Africa by 40 percent. Because South Africa is the world's leading platinum producer, the strike had an impact on global supply and platinum price. Anglo American Platinum, South Africa's leading producer of platinum-group metals, initiated a 10-year strategy of introducing highly automated, mechanized mining equipment into its mines. Developing South Africa's Witwatersrand Basin lower-grade, deep gold deposits containing an estimated 36.8 kt (1.3 billion oz) of gold will also require improved technology. In spite of these challenges, a variety of mineral projects continue to be explored and developed, including the Bushveld iron ore, titanium and vanadium projects of Bushveld Minerals Ltd. the Platreef PGM project of Ivanhoe Mines Ltd. and the Waterberg PGM project of Platinum Group Metals Ltd.. Since 2011, the Chinese have invested in 10 South African resource projects for gold, platinum, copper, coal and iron ore.

The government of Zambia has increased royalty rates on openpit mining operations from 6 percent to 20 percent and underground operations from 6 percent to 8 percent, effective Jan. 1, 2015. Barrick Gold Corp. announced plans to suspend its Lumwana copper mine in response to the increased royalties and the government's decision to retain $600 million in value-added tax refunds from mining companies. The Zambian state power company (ZESCO) has received approval to increase its bulk power supply agreement tariffs by 25 percent.

The government of Zimbabwe announced plans to reduce the gold royalty from 7 percent to 5 percent, and is considering lowering its platinum royalty from its current level of 10 percent. Power shortages and high borrowing costs have affected the country's gold sector. Alluvial mining of the Marange diamond field has decreased owing to the depletion of surface reserves and lack of resource capital to explore for resources at depth.

Canada. Statistics as of September, 2014, released by Natural Resources Canada show 2014 planned exploration budgets through the feasibility level at C$2.1 billion (US$1.9 billion), down about 10 percent from an expenditure of C$2.3 billion (US$2.1 billion) for 2013. SNL reported budgeted exploration spending in Canada for 2014 at US$1.5 billion, or about 14 percent of the estimated overall worldwide exploration budget. Canadian government statistics include planned exploration expenditures for a wider variety of minerals than are included in the SNL estimates. It is also important to note that the total of revised 2013 spending intentions for Canada reported by Natural Resources Canada as of March 2014 was 30 percent lower than its March 2013 budget estimate of C$3.3 billion (US$3 billion). In 2014, the exploration and deposit appraisal budget for precious metals (gold and silver) accounted for C$831 million (US$ 753 million); base metals, C$460 million (US$417 million); uranium, C$169 million (US$153 million); iron ore, C$113 million (US$102 million) and diamond, C$102 million (US$92 million) of the C$2.1 billion (US$1.9 billion) exploration total. When the Canadian exploration statistics are reconfigured to make them comparable with SNL statistics, the reported exploration expenditures as of September 2014 by Natural Resources Canada would be C$1.67 billion (US$1.47 billion), very close to the budget estimate reported by SNL.

Company exploration spending for 2014, as reported by the Canadian government as of September 2014, was largest in Ontario (24 percent of the total exploration and deposit appraisal expenditures for Canada), followed by British Columbia (22 percent), Quebec (19 percent), Saskatchewan (11 percent), Nunavut (7 percent), Northwest Territories (5 percent), Newfoundland and Labrador (4 percent), Yukon Territory (4 percent) and other provinces about 4 percent. Canadian provinces with an increase in exploration activity in 2014 from 2013, based on reported budget allocations, were Nova Scotia (with a 59-percent increase), Northwest Territories (32 percent increase) New Brunswick

Although the level of mineral exploration expenditure in Canada has declined about 50 percent in 2014 from a peak in 2011–2012, Canada continues to receive the greatest amount of exploration budget of all individual countries.

(14 percent increase) and Quebec (6 percent increase). The exploration budget in Manitoba decreased 59 percent in 2014 from 2013; for Nunavut, 43 percent; for Alberta, 42 percent; and for Newfoundland and Labrador, 24 percent.

Senior exploration companies accounted for about 63 percent of Canadian exploration expenditures in 2014, compared to about 59 percent in 2013. In terms of mineral commodities sought country-wide, precious metals received the largest exploration expenditure (39 percent), followed by base metals (22 percent), uranium (8 percent), iron ore (5 percent) and diamond (5 percent) in 2013. Other mineral commodities compose the remaining 21 percent.

Canadian provinces or territories with the largest exploration activity, in descending order by number of sites in 2014 as compiled by the USGS, were Quebec, Ontario, British Columbia, Saskatchewan, Newfoundland/Labrador, Yukon Territory, Northwest Territories, Nunavut, Manitoba and New Brunswick. Based on the site data, 53 percent of the Canadian exploration sites targeted precious metals in 2014, 28 percent base metals, 8 percent uranium, 4 percent iron ore, 3 percent diamond, 2 percent graphite and 2 percent other mineral commodities. Approximately 77 percent of all reported exploration sites were considered early-stage sites.

Although the level of mineral exploration expenditure in Canada has declined about 50 percent in 2014 from a peak in 2011-2012, Canada continues to receive the greatest amount of exploration budget of all individual countries. In recent years, interest has been affected by the global economy, a complex regulatory environment, an increasing skills shortage and a lack of critical infrastructure.

Aboriginal (First Nations) consultation was considered a significant issue by the Canadian government, nongovernment organizations and the mining industry. As many as 600 mineral resource projects are under consideration for development over the next 10 years in Canada, and many of them are either in or within a 100-km (62-mile) radius of aboriginal communities. According to the Canadian government, development within close proximity of aboriginal lands cannot take place without engagement of the aboriginal community. Each province has established, or is in the process of establishing, procedures for consulting and negotiating with aboriginal groups, but differences in these procedures have led to confusion and project development delays. A 2014 Supreme Court of Canada ruling granting six First Nations title to a large piece of land outside their reserves is likely to have national implications for mineral development.

At the provincial level, the British Columbia government announced regulatory changes designed to make exploration and mining more efficient in the province and improve the environmental assessment and permitting process. The provincial government also extended the mining exploration tax credit for 2014, and the 2015 budget includes provisions for a further extension of the tax credit to the end of 2015 and to extend the New Mine Allowance to 2020.

In Ontario, the Northern Ontario Heritage Fund Corp. provides funds for mining research and investment. The organization has invested C$853 million in 6,200 projects across northern Ontario since 2003. The Ontario government established the Ring of Fire Infrastructure Development Corp. to allow collaboration between First Nations and the public and private sectors to create partnerships and facilitate investment in strategic transportation infrastructure.

Since 2011, mineral exploration in Quebec has declined about 52 percent. In 2013, the government of Quebec placed a moratorium on the issuance of exploration and mining permits for uranium in the province until an environmental impact study is performed. It also passed Bill 70, An Act to amend the Mining Act (Quebec), which adds certain requirements to the application process related to increasing local and First Nations involvement, consideration of local ore processing, and further defines reporting and consultation requirements (Gervais, 2014) and Bill 11, which modifies and clarifies the responsibility of the Société du Plan Nord (SPN) in the development of northern Quebec.

Australia. Exploration budget allocations reported by SNL for Australia showed a decrease to about US$1.3 billion in calendar year 2014 from US$1.9 billion in calendar year 2013. The Australian Bureau of Statistics reports expected mineral exploration expenditures (including coal and excluding petroleum) for their fiscal year from July 2013 through June 2014 of about A$2 billion (US$2.2 billion), about a 20-percent decrease from the actual Australian expenditure for fiscal year 2012-2013 of A$2.5 billion (US$2.6 billion). The Western Australia Department of Mines and Petroleum reports that the number of prospecting licenses for minerals and coal in Western Australia decreased about 3.4 percent from the 2012-2013 fiscal year to the 2013-2014 fiscal year, and the number of exploration licenses decreased 12 percent for the same period. The Australian statistics include expenditures for coal, industrial minerals and mineral sands that are not included in the SNL statistics.

The estimated expenditures for iron ore

exploration in Australia accounted for 40 percent of the total Australian expenditure for metals and minerals for fiscal year 2013-2014 (excluding coal and petroleum), compared to 44 percent for 2012-2013, based on data reported by the Australian Bureau of Statistics as of Jan. 12, 2015. Gold exploration accounted for about 26 percent of the total nonfuel Australian expenditure for metals and minerals for 2013-2014 and 26 percent in 2012-2013. In current dollar terms, gold exploration in Australia decreased about 37 percent in 2014 from the corresponding period in 2013. Uranium and coal are included in the Australian Bureau of Statistics data, but coal statistics have been removed from the statistics reported in this summary. Base metals accounted for 19 percent of the total nonfuel Australian expenditure in 2013-2014, compared to 22 percent in 2012-2013. The estimated expenditure for base metals exploration in Australia decreased 43 percent in 2013-2014 from 2012-2013. Uranium accounted for about 2.6 percent of the total nonfuel Australian expenditure in 2013-2014, compared to 3 percent in 2012-2013. Heavy-mineral sands accounted for about 3 percent in 2013-2014 from about 1.5 percent in 2012-2013. Other minerals (including construction materials, tin and tungsten) accounted for about 9.4 percent in 2013-2014 and 6.4 percent in 2012-2013.

Western Australia accounted for 57 percent of the Australian mineral exploration expenditure (excluding petroleum) in 2013-2014; Queensland, about 22 percent; New South Wales, about 7 percent; Northern Territory and South Australia, about 6 percent each; and Victoria and Tasmania, about 1 percent each.

Western Australia accounted for about 52 percent of the active Australian sites compiled by the USGS. Queensland accounted for about 14 percent; Northern Territory, about 10 percent; New South Wales and South Australia, about 9 percent each; and Tasmania and Victoria, about 3 percent each.

About 6.4 million m (4,000 miles) were drilled at mineral prospects in Australia in 2013-2014, compared to 8.4 million m (5,200 miles) in 2012-2013. Of this drilling, approximately 74 percent was performed on exploration at continuing projects and 26 percent was focused on exploration of newly discovered prospects. The early-stage (greenfield) project share has decreased from about 45 percent of the Australian exploration budget in 2003 to a low of 32 percent in 2013, rebounding slightly to about 36 percent in 2014. There has been a noticeable shift in activity from greenfield exploration to brownfield (areas previously explored or mined) exploration.

Junior mining companies, which conduct the majority of early-stage exploration activity, accounted for more than 50 percent of the exploration budget in Australia during the period of 2005-2011. Since the global economic downturn in 2008-2009, however, junior mining companies have found it more difficult to secure financing, so have had to focus exploration expenditures on fewer projects or reduce the exploration budgets at individual projects. Major companies have effectively increased their share of exploration in Australia.

Data released by the Australia Bureau of Resources and Energy Economics (BREE) show that investment in the country's mining industry for early-stage and feasibility-stage projects has declined since mid-2012. The number of uncommitted projects (including coal and oil and gas) declined by 22 percent from October 2013 to October 2014. As of October 2014, there were 22 mineral projects reported at the committed stage, as the Australian mining sector moves from the investment phase to the production phase. This transition is estimated to reduce labor in the sector by 20 percent by 2020.

During 2014, the Australian Senate repealed the carbon tax imposed on large industrial users in 2012 and repealed the Mineral Resource Rent Tax imposed in 2013. In an effort to stimulate the country's declining mineral exploration industry, the government introduced legislation that would provide A$100 million (US$83 million) in funding to exploration companies through tax incentives over a three-year period. The total value of the tax stimulus for 2014 was estimated at A$35 million (US$29 million). The government agreed upon a free trade agreement with China, which would reduce limitations on Chinese investment in Australia and provide a duty-free status for most Australian exports.

The government of New South Wales has selected six companies to apply for uranium exploration licenses in the state. Although a uranium mining ban remains in place, this action represents the first step to permit uranium exploration and mining since legislation authorizing uranium exploration was passed in 2012.

United States. The U.S. nonfuel mineral exploration budget decreased by about 27 percent to less than $800 million in 2014 from $1 billion in 2013, according to SNL. The U.S. percentage of the world exploration budget was 7 percent in 2014. Gold was the principal commodity targeted for exploration in 2014, followed by base metals (primarily copper) and uranium. About 10 percent of the 2014 exploration budget in the United States targeted other minerals. Major companies

Data released by the Australia Bureau of Resources and Energy Economics (BREE) show that investment in the country's mining industry for early-stage and feasibility-stage projects has declined since mid-2012.

accounted for about half of the total U.S. budget. Less than 30 percent of the U.S. exploration budget was for early-stage exploration. SNL data suggest that exploration drilling in the United States increased about 31 percent in 2014 from the level in 2013, based on the number of holes drilled.

In 2014, data on 226 U.S. active exploration projects were collected and reviewed by the USGS; 37 percent were located in Nevada, 11 percent in Arizona, 10 percent in Alaska, 7 percent in Utah, 5 percent each in Idaho and New Mexico, 4 percent each in California and Florida, and 3 percent each in California, Colorado and Wyoming. The remaining 8 percent took place in Alabama, Arkansas, Michigan, Minnesota, Montana, Nebraska, Oregon, South Carolina, South Dakota, Texas and Washington. Most of these sites had prior exploration activity, suggesting that economic conditions were such that exploration companies were continuing prior exploration activity, or re-evaluating sites based on technological advancements that would improve recovery or their proximity or geologic similarity to other recent discoveries.

In 2014, data on 226 U.S. active exploration projects were collected and reviewed by the USGS; 37 percent were located in Nevada, 11 percent in Arizona, 10 percent in Alaska, 7 percent in Utah, 5 percent each in Idaho and New Mexico, 4 percent each in California and Florida, and 3 percent each in California, Colorado and Wyoming.

Exploration for precious metals represented about 84 percent of projected mineral exploration activity based on 2014 site data compiled by the USGS. The principal exploration objectives in Nevada continued to be gold and silver based on USGS site data, although some exploration for copper, lead, lithium, molybdenum, potash, tungsten and zinc took place in Nevada during 2014. Based on U.S. Bureau of Land Management statistics, there were about 175,000 active claims in Nevada in 2014, down from about 199,000 claims in 2013.

There was a reduced amount of exploration activity in Alaska during 2014. Preliminary data suggest exploration spending in Alaska in 2014 to be between $80 million and $100 million, or about half of the reported expenditure of $176 million in 2013 and about 22 percent of the peak expenditure of $365 million in 2011. Based on a 2014 report released by the Alaska Department of Natural Resources, exploration expenditures (excluding development projects) spent in 2013 in Alaska decreased about 5 percent from the 2012 level. About 42 percent of the total estimated expenditure for 2013 was spent in southwestern Alaska, 27 percent in the eastern interior, 13 percent in the northern region, 9 percent in the southeastern region, 8 percent in the western region and 1 percent in the south-central region. About 59 percent of this expenditure was for polymetallic deposits of base and precious metals, 35 percent for precious metals, 5 percent for base metals, and the remaining 1 percent for coal, industrial minerals, peat, and other minerals. In 2013, approximately 6,900 federal and 42,000 state mining claims were active. Data for 2014 were unavailable.

Mineral exploration in Alaska in 2014 was affected by lower commodity prices, reduced availability of capital, and actual and perceived changing regulatory climate for the Alaskan mining sector. In February 2014, the U.S. Environmental Protection Agency (EPA) announced plans to initiate a process to protect the Bristol Bay fisheries from future mining of the Pebble copper-gold project. Although the EPA subsequently halted implementation of the process until at least January 2015, the mining industry reacted to this announcement by curtailing a significant amount of its planned exploration and development expenditure in Alaska in 2014 until the regulatory environment could be clarified. Exploration on the polymetallic Pebble project had accounted for more than 86 percent of the $77 million spent on copper porphyry exploration in Alaska in 2013, based on data from the Alaska Department of Natural Resources.

The U.S. Senate included legislation authorizing a transfer of landholdings in Arizona as part of its authorization of the 2015 budget for the U.S. Department of Defense. The legislation allows Rio Tinto, the operator of the Resolution copper project, to acquire 971 ha (2,400 acres) in the Tonto National Forest in exchange for 2,000 ha (5,000 acres) of company held parcels across the state, making it possible for the mine to be developed. A similar land swap was approved in December that transferred 4,280 ha (10,400 acres) of federal land to the city of Yerlington, NV, a precondition for the development of Nevada Copper Corp.'s Pumpkin Hollow copper project. A federal court ruled that the 20-year ban on uranium mining near the Grand Canyon will remain in place.

Pacific Region. Based on SNL data, the 2014 exploration budget allocation for the Pacific region and Southeast Asia (excluding Australia) was about $600 million, down 38 percent from the 2013 level of almost $1 billion. Indonesia, Papua New Guinea and the Philippines together accounted for about 82 percent of the total mineral exploration budget for the region when Australia is excluded. Much of the sustained interest in this region can be attributed to the continued interest by Chinese and South Korean companies to expand sources of supply for gold, base metals and REE and by Japanese companies to develop regional copper and nickel deposits to supply Japan's smelting industry. Based on the data on active exploration sites compiled by the USGS, the three countries included in this region

with the largest number of exploration sites were Indonesia, the Philippines and Papua New Guinea, together accounting for 67 percent of the active exploration sites in the region in 2014. Other countries with active exploration in 2014 include Burma (Myanmar), Cambodia, Fiji, the Republic of Korea, Laos, Malaysia, New Caledonia, New Zealand, the Solomon Islands, Thailand and Vietnam. Base and precious metals accounted for about 90 percent of all exploration activity in the Pacific region, with minor exploration activity for iron ore and other minerals in 2014. About 47 percent of the sites in this region were conducting early-stage exploration, 23 percent were exploring for minerals adjacent to producing mines, 20 percent were undergoing feasibility studies and 10 percent were in development.

The Constitutional Court in Indonesia upheld the country's ban on the export of unprocessed ore that came into effect in January 2014. While nickel ore and bauxite exports from Indonesia have been curtailed, nickel exports from the Philippines and Vietnam have increased to meet continued demand from China. China has begun sourcing bauxite from stockpiles and other countries in the region. Consequently, interest in exploration for nickel and bauxite increased in 2014 from countries in the region.

Revised mining regulations in New Zealand and the establishment of a two-tiered minerals permitting system have increased interest in mineral exploration in the country. Approximately 1,000 prospecting, exploration and mining permits are in effect in the country, and 357 permits were approved in 2013.

Legislation was passed in 2014 transferring control over mining activities in the autonomous region of Bougainville from the Papua New Guinea government to the local legislature. The legislation means that the agreement between Bougainville Copper Ltd. and the government is no longer in effect, and a new agreement must be negotiated before copper production can continue.

Rest of World. Exploration budget allocations for the Rest of the World (including China, India, Mongolia, Southeast Asia, the countries of the Commonwealth of Independent States, Europe and the Middle East, as defined in footnote 1) decreased by about 13 percent in the 2014 SNL survey to about $2 billion from the $2.4 billion budget reported in its 2013 survey. Russia and China accounted for about 56 percent of the region's exploration budget based on SNL data. Based on the amount budgeted for exploration, the countries with the greatest exploration activity from this diverse region in 2014 are China, Russia, Kazakhstan, Turkey, Sweden, India, Finland, Saudi Arabia and Mongolia. Together, these countries account for about 81 percent of the regional exploration budget.

Data for 2013 mineral exploration investment reported by the Chinese Ministry of Land and Resources is higher than the budget data reported for China by SNL for 2013. A 2013 expenditure of 46 billion yuan ($7.5 billion dollars) is reported for non-oil-and-gas minerals exploration, but this expenditure likely includes expenditures for a wider variety of mineral commodities (ferrous metals, industrial minerals) than the SNL estimate. In addition, it is likely that this estimate includes exploration expenses incurred by public and quasi-public entities not covered in the SNL survey. Data for 2014 were not reported.

In terms of the number of exploration sites, Russia, China, Turkey, India, Sweden, Spain, Kazakhstan, Mongolia and Finland were the most active countries. On the basis of exploration site data collected by the USGS, Russia accounted for about 18 percent of active exploration sites in this composite region; China, about 13 percent; Turkey, about 6 percent; India, Kazakhstan, Mongolia, Spain and Sweden, about 5 percent each; and Finland, about 4 percent. The remaining 34 percent took place in 31 other countries in Asia, the Commonwealth of Independent States, Europe and the Middle East.

Based on the number of exploration sites compiled by the USGS, exploration activity in Asia in 2014 primarily focused on base metals (50 percent of all Asian sites), precious metals (38 percent), iron ore (9 percent) and other minerals (3 percent). Exploration activity in the Commonwealth of Independent States focused on precious metals (67 percent), base metals (28 percent), iron ore (3 percent) and other minerals (2 percent). European mineral exploration primarily focused on base metals (37 percent), precious metals (32 percent), tungsten (8 percent), iron ore (6 percent) and other minerals (17 percent). Middle Eastern exploration (including Turkey) primarily focused on copper (54 percent), gold (27 percent), zinc (11 percent) and other minerals (8 percent).

The USGS released a series of maps in 2014 outlining the mineral potential of Afghanistan using hyperspectral imaging techniques. In July, Afghanistan passed its first mining law and the government has awarded two mining contracts, one to a Chinese company for copper exploration and the other to an Indian company for iron ore.

The Chinese government is continuing to encourage domestic companies to invest globally. Prior to 2014, Chinese companies had to seek approval from both the Ministry of Commerce

The development of phase 2 of the large Oyu Tolgoi copper project is progressing as Rio Tinto secured an agreement with the Mongolian government for the construction of a power generation plant to supply the project.

and the National Development and Reform Commission (NDRC) before they could proceed with investments in foreign countries. Under new rules issued by the Ministry of Commerce in 2014, registration requirements by domestic entities seeking overseas investment have been modified, according to the State Administration of Foreign Exchange. Chinese state-owned mining companies, private companies and investment groups are increasingly investing in overseas mining projects in two ways; some companies choose to acquire mining projects and apply for exploration and mining licenses by themselves, while other companies prefer to undertake mergers and acquisitions in more developed markets such as Australia and Canada.

The Chinese rare earths industry continued to undergo change in 2014. The World Trade Organization (WTO) found China's export restraints on rare earths, tungsten and molybdenum to be inconsistent with China's WTO obligations. China has increased its efforts to restrict illegal mining and export of rare earths. The Inner Mongolia Baotou Iron and Steel Rare Earth Group continued to consolidate the industry by announcing plans to merge with five other firms to establish the China North Rare Earth Group. In December 2014, the Ministry of Commerce announced the termination of rare earth export quotas.

The Estonian government approved legislation increasing the tax rate on mineral resource extraction by 3 percent and 6 percent annually from 2016 to 2025. The 3 percent rate applies to the shale oil industry and the 6 percent rate applies to peat, clay, sand and dolomite.

The government of India approved plans to increase royalty rates on 23 of 51 minerals. The royalty rate for iron ore and chromite was increased from 10 percent to 15 percent ad valorem, bauxite ore was increased from 0.5 to 0.6 percent and the rate for manganese ore was increased from 4.2 percent to 5 percent. The ministry planned to establish a National Mineral Exploration Fund using funds collected from the royalties.

With the implementation of the raw material export ban from Indonesia in 2014, Chinese companies have been investing in downstream processing facilities in Indonesia. In 2014, Shanghai-based ore trader Pan Pacific Group Co. Ltd. and Chinese steel producer Delong Holdings Ltd. announced plans to jointly construct a nickel processing plant. A second nickel processing facility is under construction by China Hanking Holdings Ltd.

The development of phase two of the large Oyu Tolgoi copper project is progressing, as Rio Tinto secured an agreement with the Mongolian government for the construction of a power generation plant to supply the project. Currently, the project is sourcing its power from China's state-owned Inner Mongolia Power Corp.. The government also announced the intent to open up an additional 10.1 million ha (39,000 sq miles) of territory for mining exploration.

Kazakhstan, Russia and Uzbekistan have increased investment in uranium exploration and development in recent years, leading to a growth in uranium production in these countries. Large uranium deposits in Russia are located in Yakutia and the Trans-Baikal region, and several new mines in North Kazakhstan and Chu-Sarysu region are being considered for development in Kazakhstan. Resource investments in the Russian Far East are reported to increase from $715 million in 2014 to $1.9 billion in 2015 through a number of public-private partnerships in the mining sector. A joint agreement to explore for metals such as beryllium, cesium, lithium, niobium, rubidium and tantalum in the Juzkuduk and Tamdiykuduk-Tulyantash regions of Uzbekistan has been agreed upon between the Japan Oil, Gas, and Metals National Corp. (JOGMEC) and the Uzbek State Committee on Geology and Mineral Resources.

The United Kingdom passed legislation in 2014 in line with the 2013 EU Accounting and Transparency Directives that require oil and gas and mining companies to publicly disclose payments made to governments for the extraction of natural resources. Once the EU Directives and similar ones in the United States are enacted, these laws would cover 65 percent of extractive companies by value worldwide. ■

For more information

The USGS collects and analyzes data on more than 100 mineral commodities in the United States and worldwide. This article draws from public and private sector sources and the knowledge and expertise of USGS mineral commodity, country, and mineral-resource specialists. More detailed information on the material covered in this article may be obtained from the author, David Wilburn, U.S. Geological Survey, National Minerals Information Center, P.O. Box 25046, MS 750, Denver Federal Center, Denver, CO 80225-0046; phone 303-236-5213; fax 303-236-4208 or wilburn@usgs.gov. For additional USGS information on mineral commodities and international mining activities, inquiries may be directed to Michael Magyar, U.S. Geological Survey, National Minerals Information Center, 988 National Center, Reston, VA 20192; phone 703-648-4910 or mmagyar@usgs.gov.