

# Exploration Review

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This summary of international mineral exploration activities for the year 2013 draws upon information from industry sources, published literature and U.S. Geological Survey (USGS) specialists. 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

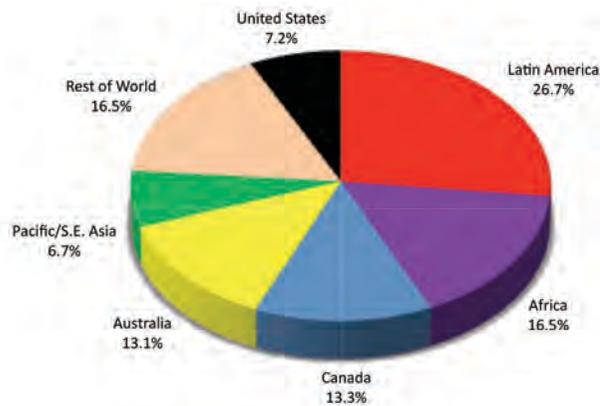
The SNL data summarize planned company budgets for worldwide exploration activities in 2013 for 20 nonfuel mineral commodities based on surveys returned by companies primarily focused on precious metals (gold, platinum-group metals and silver), base metals (cobalt, copper, lead, molybdenum, nickel, tin and zinc), bulk commodities (coal, iron ore, phosphate and potash), and specialty commodities (diamond, lithium, niobium, rare-earth elements, tantalum and uranium). Information on uranium exploration activities was included in the MEG overview for the first time in 2007. MEG included data on the commodities lithium, niobium, phosphate, potash, rare-earth elements and tantalum for the first time in 2010 because of the increased topical significance of these commodities. Since 1999, companies with exploration budgets of \$100,000 and greater were included in the MEG and SNL compilations. SNL budget estimates exclude aluminum, coal, and oil and gas. Budget estimates for iron ore have been compiled since 2011 but reported separately. The post-1999 budget surveys by MEG and SNL cover at least 90 percent of world's reported nonferrous, nonfuel mineral exploration budgets; the 2013 survey is reported by SNL to cover an estimated 95 percent of these budgets. The 5 percent that is not covered is accounted for by companies that chose not to participate in the SNL survey, private companies that do not publish their budget data, and government-funded exploration activities.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 and by other USGS scientists, as well as industry contacts and published trade journals. The USGS data 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 the MEG-SNL exploration budget data, the compiled site activity data and available information on regional conditions and influences to assess the level of exploration activity in 2013 and to report trends in mineral exploration activity for the period 2003 through 2013. This analysis identifies where mineral exploration is occurring by commodity and region, assesses the intensity of activity taking place in each region for selected mineral commodities and determines those factors that most affect any changes in this exploration activity.

Certain limitations apply when comparing

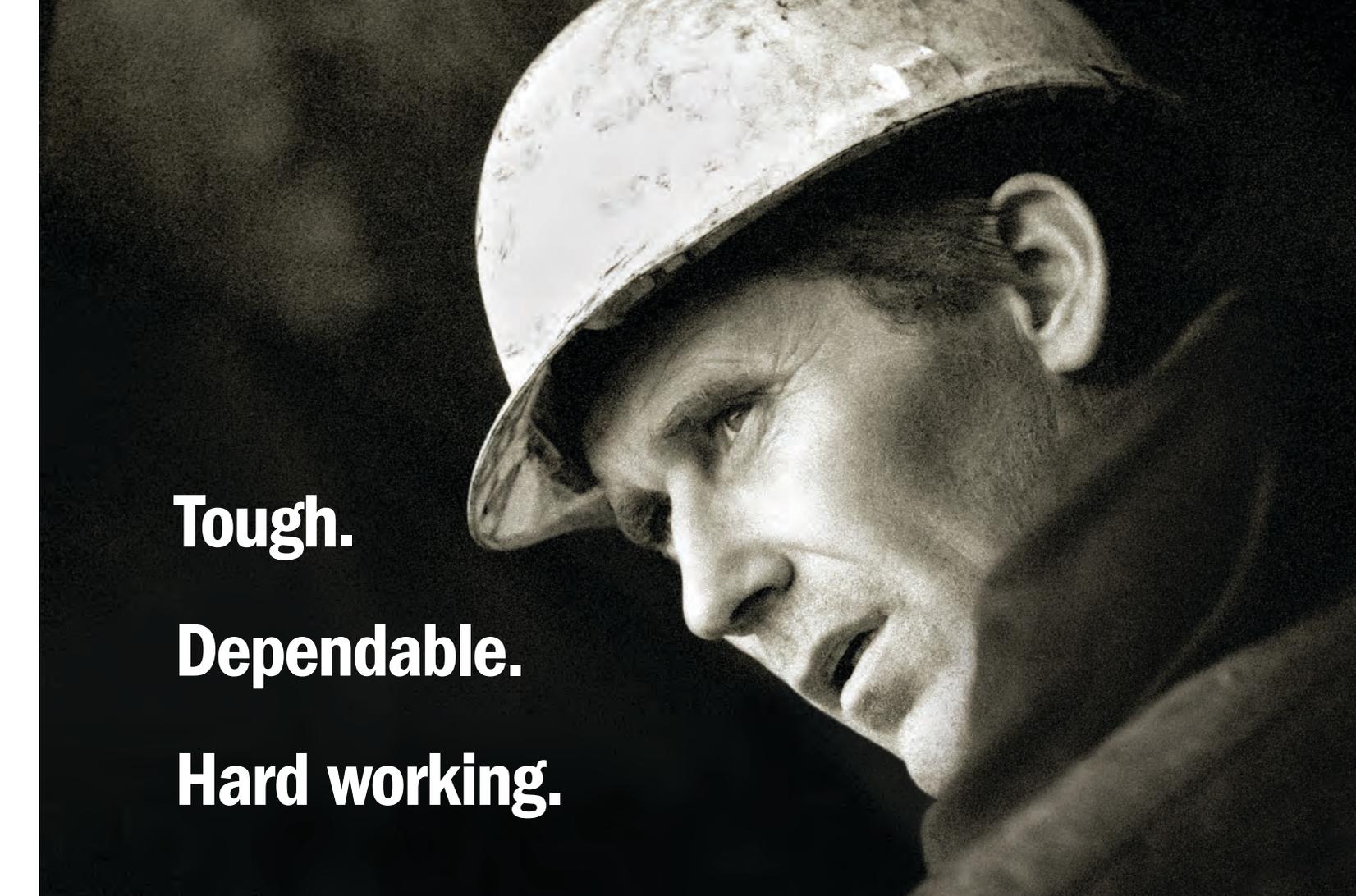
**Figure 1**

**Planned worldwide exploration budgets for analyzed nonferrous, nonfuel mineral commodities by region for 2013 (2,129 companies' budgets totaling US\$14.4 billion). Source: SNL Metals Economics Group, 2013.**



mineral exploration industry and presents analyses of exploration activities performed by the mineral industry.

Three sources of information are reported and analyzed in this annual review of international exploration for the year 2013: 1) budgetary statistics expressed in U.S. nominal dollars provided by SNL Metals & Mining (SNL) of Halifax, NS, Canada (formerly Metals Economics Group (MEG)); 2) regional and site-specific exploration activities that took place in 2013 as compiled by the USGS; and 3) regional events that affected exploration activities, including economic, social and political conditions, that were derived from published sources and unpublished discussions with USGS and industry specialists. Commodity and regional compilations are presented in this summary. Because multiple sources are used to develop commodity and regional compilations, reported statistics may vary depending on the source and type of data that are being reported.



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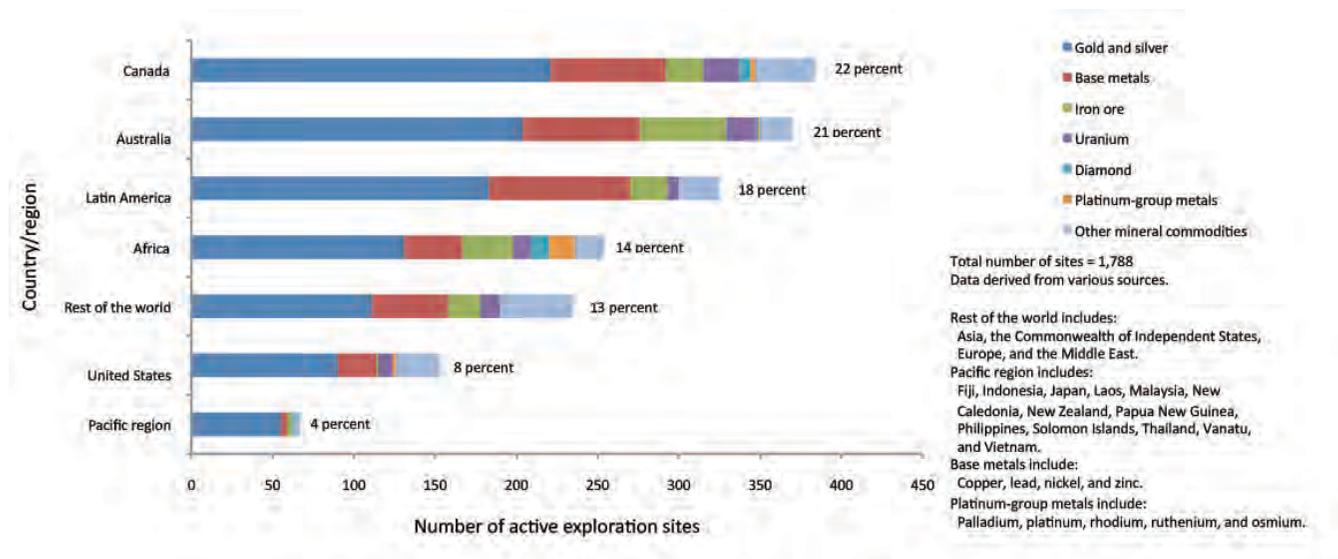
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**Figure 2**

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



estimates or evaluating the magnitude of regional changes from year to year because, as worldwide exploration allocations have changed, so, too, have energy, labor, material and service costs associated with mineral exploration. Consequently, an exploration budget of \$1 million allocated in 2013 would generally yield less exploration activity than a corresponding budget in 2003. Fluctuations in currency exchange rates and the value of trading currencies over time can influence the business pattern of foreign companies conducting business in other countries. Unless otherwise specified, this analysis does not take currency fluctuations into account and expresses worldwide exploration activity in U.S. nominal dollars to simplify comparisons by commodity and region. The scale of the planned development might influence the level of exploration investment, as the 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 MEG-SNL exploration data, such as trend analyses, are limited by changes in survey parameters. Because the sample of exploration and mining companies surveyed by MEG-SNL varies with time, companies included in the survey change on a year-to-year basis, and fluctuation of currency exchange rates affects the relative value of budget estimates from year to year. Also, mineral commodity and country coverage may differ from year to year. Annual data reported in this summary differ because the number of respondents to the MEG-SNL survey changes from year to year; in general, the number has increased for the more recent surveys. MEG-SNL and USGS statistical compilations have also been affected by corporate restructuring that has taken place since 2003.

## 2013 global mineral exploration activity and trends from 2003 through 2013

According to SNL, the total estimated worldwide budget allocation for nonferrous mineral exploration decreased by 30 percent in 2013 to about \$14.4 billion (on the basis of data from 2,129 companies when iron ore is excluded) from the 2012 budget allocation of about \$20.5 billion (based on 2,556 companies, excluding iron ore). The exploration budget for iron ore projects was first compiled by SNL/MEG in 2011, but was not included in the nonferrous budget data. The estimated budget for iron ore exploration in 2013 was reported by SNL as \$1.7 billion, a decrease of about 40 percent from the \$2.9 billion estimates for 2012. MEG-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 non-respondents, the global nonferrous exploration budget for 2013 is about \$15.2 billion. Continued market instability and the reduction in available funding for mining projects in 2013 resulted in exploration budget cutbacks and reduced the number of junior companies conducting minerals exploration.

Based on drilling data collected by SNL for the top 10 countries targeted for mineral exploration in 2013, the number of holes drilled in 2013 for nonfuel minerals decreased by about 7 percent from the 2012 level. SNL data suggest that exploration spending in countries with higher levels of junior activity resulted in a higher percentage of significant drilling results than countries with a smaller junior exploration sector.

Competing demand for assaying, drilling and geophysical services, increasing fuel and labor

## Figure 3

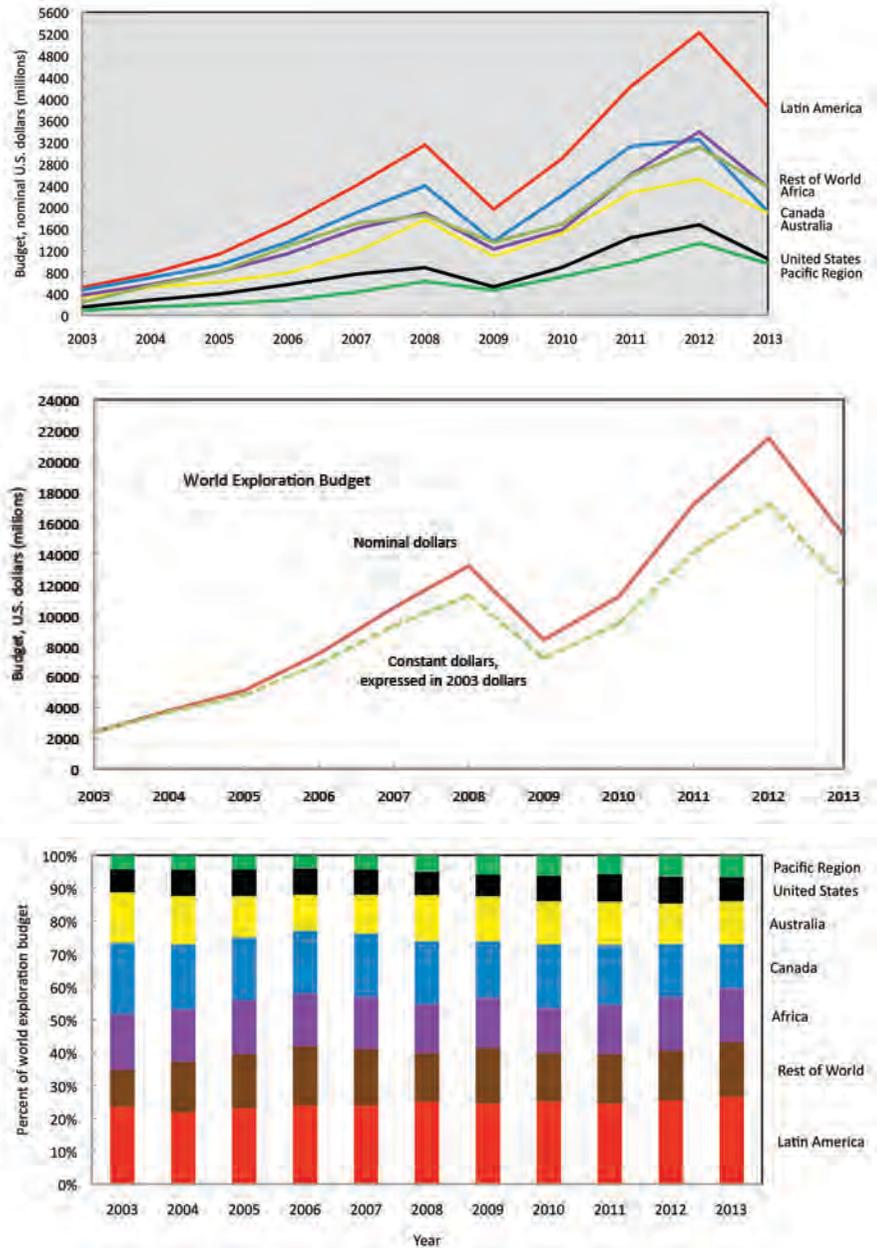
Trends in reported exploration budgets in selected regions, 2003 through 2013.  
Source: SNL Metals & Mining, 2014.

costs, higher taxes and environmental costs and a decreasing skilled labor force have increased the overall cost of exploration. Although copper exploration costs have increased, the price of copper has also increased, providing an incentive for exploration. Exploration cost increases, however, may have reduced the effective amount of exploration activity that can take place at a site over time, given a set exploration budget.

Figure 1 shows the 2013 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<sup>1</sup>. According to SNL, the 2013 exploration budgets in decreasing budget order were Latin America (\$3.8 billion), Africa (\$2.4 billion), Canada (\$1.9 billion), Australia (\$1.9 billion), the United States (\$1 billion) and the Pacific region (\$1 billion). Exploration taking place in countries included in the rest of the world category totaled \$2.4 billion, of which China and Russia accounted for about 58 percent of the regions' budget total. The exploration budget in 2013 in all regions was lower than the corresponding budget in 2012. The largest decreases in nominal dollar terms took place in Canada (with a 41 percent decrease) and the United States (38 percent decrease); the smallest decreases took place in Africa (with a 25-percent decrease) and Latin America (26 percent decrease). Latin America remained the region with the largest mineral exploration budget, expressed either in nominal dollars or percent of the global exploration budget.

USGS specialists gathered information from published literature and industry sources for about 1,800 exploration sites for 2013. 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 2013, followed by Australia, Latin America and Africa. The number of sites that are actively being explored



<sup>1</sup>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 rest of the world includes China, Europe, India and Pakistan, the Middle East and republics of the Commonwealth of Independent States. Australia, Canada and the United States are treated separately.

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**Table 1**

Prices for selected base and precious metals, 2003 to 2013.

Commodity	Average nominal price for specified year, expressed in U.S. currency										
	2003 <sup>1</sup>	2004 <sup>1</sup>	2005 <sup>1</sup>	2006 <sup>1</sup>	2007 <sup>1</sup>	2008 <sup>1</sup>	2009 <sup>1</sup>	2010 <sup>1</sup>	2011 <sup>1</sup>	2012 <sup>2</sup>	2013 <sup>2</sup>
Copper <sup>3</sup>	0.85	1.34	1.73	3.15	3.28	3.19	2.41	3.48	4.06	3.67	3.39
Gold <sup>4</sup>	365	411	446	606	699	874	975	1,228	1,572	1,673	1,415
Lead <sup>5</sup>	0.44	0.55	0.61	0.77	1.24	1.20	0.87	1.09	1.22	1.14	1.15
Nickel <sup>6</sup>	4.37	6.27	6.69	11.00	16.88	9.57	6.65	9.89	10.38	7.99	6.81
Palladium <sup>7</sup>	203	233	204	323	357	355	266	531	739	649	730
Platinum <sup>8</sup>	694	849	900	1,144	1,308	1,578	1,208	1,616	1,725	1,555	1,490
Silver <sup>9</sup>	4.91	6.69	7.34	11.57	13.41	15.00	14.69	20.20	35.26	30.00	23.78
Uranium oxide <sup>10</sup>	11.24	18.05	27.93	47.68	99.24	64.18	46.67	45.96	56.24	48.90	38.92
Zinc <sup>11</sup>	0.38	0.47	0.63	1.49	1.47	0.85	0.75	0.98	0.99	0.86	0.87
Neodymium oxide <sup>12</sup>	NA	NA	7.4	15	29	27	15	49	234	114	70

<sup>1</sup> Price reported in U.S. Geological Survey (USGS), Minerals Yearbook series for the years 2003 through 2013.

<sup>2</sup> Price reported in U.S. Geological Survey, Minerals Commodity Summaries series for the year 2011 or 2012 or updated based on oral and written communications, USGS mineral commodity specialists.

<sup>3</sup> U.S. producer cathode (minimum 99.99% pure), reported in \$/lb.

<sup>4</sup> Englehard Corporation industries quotation, reported in \$/oz.

<sup>5</sup> North American producer price, delivered (minimum 99.97% pure), in \$/lb.

<sup>6</sup> London Metal Exchange cash price for primary nickel (minimum 99.8% pure), in \$/lb.

<sup>7</sup> Unfabricated palladium, reported in \$/oz.

<sup>8</sup> Unfabricated platinum, reported in \$/oz.

<sup>9</sup> Handy and Harmon quotation, reported in \$/oz.

<sup>10</sup> Nuexco exchange spot price, reported in \$/lb. by the International Monetary Fund.

<sup>11</sup> London Metal Exchange cash price, reported in \$/lb.

<sup>12</sup> Metals Pages price, 99% pure, as reported by Arafura Resources Ltd., reported in \$/kg.

does not correlate directly with exploration budget estimates, but both are indicators of activity in the region of interest.

Figure 3 summarizes MEG-SNL budget data by region for the period 2003 through 2013 in terms of nominal dollars and percent of the world exploration budget. Figure 3 (top chart) shows that the planned exploration budget level (expressed in nominal dollars) for 2013 decreased from the 2012 level in all regions of the world. Ongoing economic uncertainty in Europe and the United States and concerns over reduced Chinese demand for nonfuel minerals caused most prices to decrease or stabilize during much of 2013. The largest nominal dollar regional budget reduction from 2012 to 2013 of approximately \$1.4 billion took place in Latin America, followed by a decrease of about \$1.3 billion for Canada. The regions with the smallest decrease in nominal exploration budget were the United States, with a \$376-million decrease, and Africa, with a \$536-million decrease from 2012 to 2013. Based on the percentage change, however, the budget for exploration in Canada showed the largest decrease and the budget for Australia showed the smallest decrease in percentage share of all regions. Figure 3 (bottom chart) shows that the percentage of the world exploration budget increased in 2013 from 2012 for Latin America and the Rest of the World in relative terms, even though the total exploration budget for these regions was lower in 2013 than in 2012.

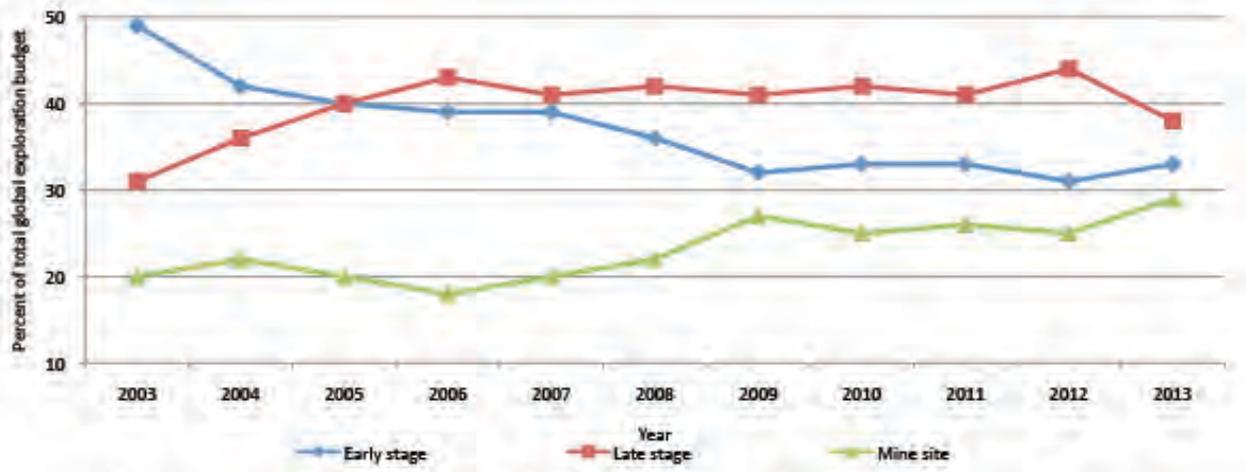
The 2013 SNL mineral exploration survey data

suggest that budgeted expenditures for sites at a late stage of exploration accounted for about 38 percent of the total exploration budget for 2013, early-stage sites accounted for about 33 percent, and exploration associated with established mine sites accounted for about 29 percent, compared to the 2012 values of 44, 31 and 25 percent, respectively. Since 2003, as shown in Fig. 4, the percentage of total global exploration budget attributed to mine site exploration has generally increased, while early-stage exploration has decreased. The percentage attributed to late-stage exploration increased from 2003 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. A survey conducted by Ventyx suggests that there is concern by mining executives about managing capital expenditures for projects. The capital-intensive nature of developing new sites is perceived to generate greater risk at a time when lenders are more selective in financing.

Junior companies have tended to focus on early-stage projects, hoping to attract the interest of a larger company if a project shows potential for a more capital-intensive exploration or development program. The decrease in nonferrous mineral commodity prices (particularly gold, nickel and silver) in 2013 and increased exploration costs have made companies more selective in site exploration and development. Low prices make it more difficult

**Figure 4**

Graph showing the percent of global mineral exploration activity attributed to stage of exploration for the years 2003 through 2013. Source: SNL Metals & Mining, 2014.



for smaller junior companies to obtain financing in a tight economy, so companies have been focusing available capital on fewer exploration projects. One consequence of the decline in early-stage exploration in the last decade is that the number of viable, large-scale assets considered available for development is likely to decrease in the future. This observation coincides with recent studies that suggest that the discovery rate and ore grades for gold have been declining steadily since 1999, as higher gold prices supported exploration and development of lower grade deposits.

Recent and anticipated mineral commodity prices contribute to exploration budget development and the amount of activity planned by mineral exploration companies. The USGS published a historical price series for 42 mineral commodities in 2013. Table 1 shows the average annual prices for selected metals for the years 2003 through 2013. However, because of metal price variation, reporting just the average prices for the year does not provide enough information to assess the effect of price changes on the level of exploration. Figure 5 shows the annual indexed prices in 2003 constant U.S. dollars for selected (a) precious metals, (b) base metals and (c) other selected mineral commodities for 2003 to 2013. Using constant dollar values based on the consumer price index removes the effects of inflation on prices of mineral commodities being considered over time. Most 2013 exploration budgets were planned or contracted based on economic considerations at the end of 2012 or early 2013, when metals prices were at levels higher than average for the past decade.

As shown in Fig. 5, the 2013 average constant dollar price for six of the nine selected commodities was lower in 2013 than in 2012. Of the commodities selected for evaluation, only the average constant-dollar palladium price was higher in 2013 than in

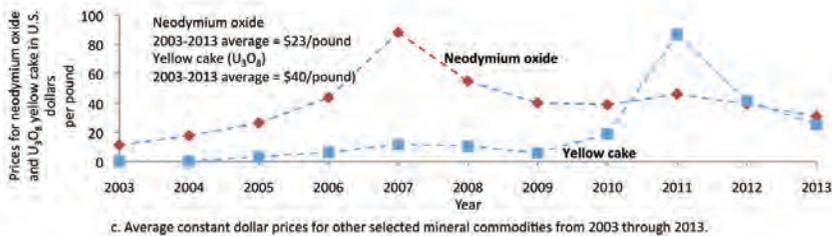
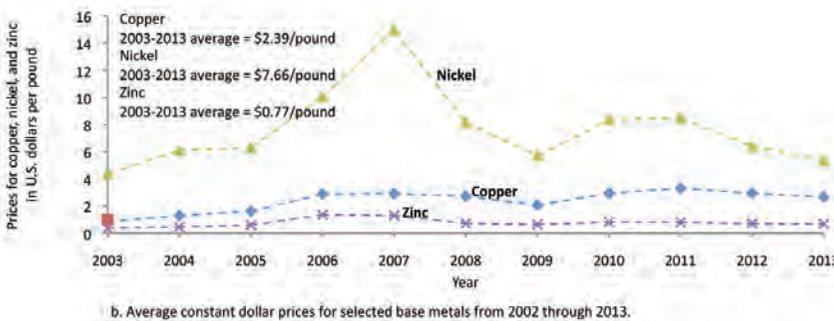
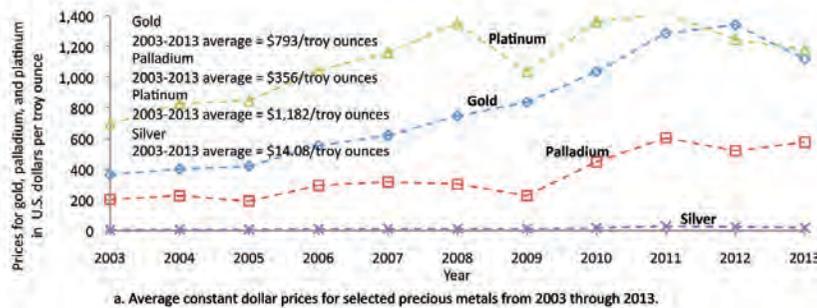
2012. In spite of generally lower prices in 2013, the 2013 average constant dollar price for gold was 41 percent higher than the average 2003-2013 constant dollar price for gold. Similarly, the 2013 constant dollar palladium price was 61 percent higher, the 2013 constant dollar silver price was 33 higher, the 2013 constant dollar copper price was 10 percent higher and the 2013 constant dollar price for neodymium oxide was 8 percent higher. The 2013 average constant dollar nickel price was 30 percent lower than the average 2003-2013 constant dollar price. Similarly, the 2013 constant dollar uranium price was 22 percent lower and the 2013 constant dollar zinc price was 10 percent lower. The 2013 constant dollar prices for lead and platinum were close to their average 2003-2013 constant dollar prices.

The stability of metals prices must be considered when determining where and what commodity target to spend available capital on exploration and development. During the period of increasing gold price that took place from 2005 through 2012, the major gold miners increased the recovery of lower ore grades and were able to maintain a satisfactory profit level, and some exploration companies reevaluated deposits with historically lower ore grades. The average gold price in 2013 was 16 percent lower than the average gold price in 2012, forcing some producers to lower the prices they use to calculate year-end 2013 reserves in order to comply with regulator's definitions of what defines an allowable "reserve" estimate. For example, Barrick Gold Corp. used a gold price of \$48.22/g (\$1,500/oz) to calculate its year-end 2012 reserves and a gold price of \$35.36/g (\$1,100/oz) to calculate its 2013 year-end reserves. 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.

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**Figure 5**

Average constant dollar prices for selected (a) precious metals, (b) base metals, and (c) other selected mineral commodities from 2003 through 2013. Constant dollar prices were calculated using nominal dollar prices from various sources and the consumer price index with a base year of 2003.



In 2013, metal markets faced increased uncertainty as a result of increasing costs, regional economic instability, increasing environmental activism, resource nationalism and skilled labor shortages. Such issues reduced acquisition and joint venture activity and reduced drilling activity during 2013. Investment funding was reduced and planned exploration activity was often reduced or curtailed. Historically high metals prices have fueled some governments' efforts to seek increased revenue from the mining sector. Contemplated or newly enacted mining reforms have generated uncertainty, and coupled with subsequent falling metal prices, have caused mining projects to be reconsidered or deferred.

SNL estimated that about half of the total global exploration budget for 2013 was derived from major exploration and mining companies, about 32 percent originated from junior companies, 12 percent was derived from intermediate companies and government entities and nongovernment organizations contributed the remaining 5 percent.

Junior and intermediate exploration companies, which often rely on credit financing or stock offerings, continued to have difficulty obtaining capital for exploration activities in 2013. Major and junior companies cut exploration budgets in 2013. SNL data for 2012 and 2013 suggest that, overall, major companies reduced their global exploration budget by 23 percent, intermediate companies by 29 percent and junior companies by 40 percent.

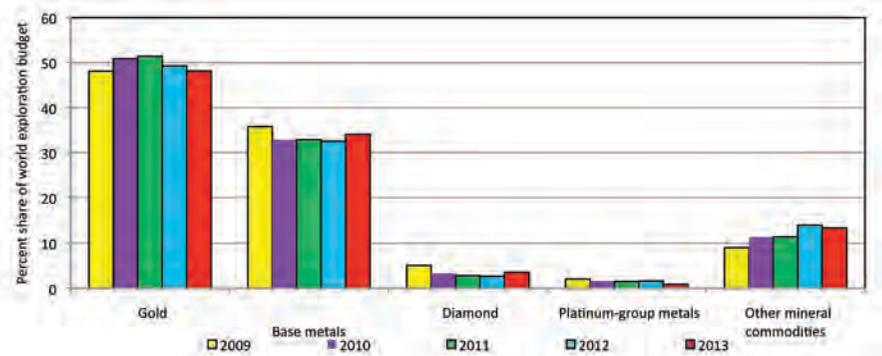
Data reported by the Raw Materials Group (RMG) suggested that the decline in copper and gold prices and the related slowdown of Chinese consumption influenced mining investment in 2013. The RMG data suggest that copper, gold, iron ore and nickel continued to be the most important mineral investment targets in 2013, together accounting for approximately 87 percent of the total project pipeline. In 2013, 95 new mine development projects were announced compared to 113 projects in 2012 and 167 projects in the peak year of 2010. The 2013 RMG study ranked the top five countries for mining investment, in descending order of expenditure, as Canada, Australia, Russia, Chile and Brazil. The United States ranked seventh in the RMG survey. The quantity of mining-related mergers and acquisitions in the first half of 2013 was 31 percent lower than those announced

for the first half of 2012 in terms of number of deals and down 70 percent in terms of the value of deals. Asia accounted for 68 percent of the deal value, expressed in terms of acquisition cost or purchase price, more than three times the 19 percent share it held in 2011.

Recent high commodity prices have led some governments to consider the mining and metals sector as a source of revenue and enacted legislation to derive revenue from the sector. Resource nationalism can take many forms, including imposing a resource tax, amending royalty or tax rates, establishing greater controls on foreign participation and encouraging in-country beneficiation and processing of materials in certain forms by limiting exports or imposing export duties. Several countries have written language into their laws giving them authority to nationalize or partially nationalize mining projects. This has increased the perceived risk of mineral exploration or development in these countries, increased the cost of production, and affected how companies

**Figure 6**

**Percent share of total world exploration budget for selected mineral commodity targets, 2009-2013. (Other mineral commodities include iron ore, lithium, niobium, phosphate, potash, rare-earth elements, silver, tantalum and uranium.) Source: SNL Metals Economics Group, 2013.**



conduct business in those countries. Environmental activism and social discontent has increased in regions where populations fail to see how mineral development will benefit them and can result in project development delays and conflicts over how to allocate profits of mining ventures. As prices fall, however, discontent by local entities can arise as companies cut spending on new projects, affecting local jobs and regional infrastructure development.

Since the turn of the century, the global landscape for mineral exploration and development has changed. Prior to 2004, the bulk of global mineral exploration was conducted by Australian, Canadian and U.S. companies. Although such companies continue to explore globally, and topped the 2013 list of countries with most significant drilling results, their market share has decreased by half in the last 20 years. Western exploration companies have now been joined by mining and investment companies from countries with expanding economies such as Brazil, China and India that are looking outside their borders for sources of mineral supply or investment opportunities. An analysis conducted by MinEx Consulting in 2013 estimated that China spent more on exploration activities than any other country, or about 14 percent of the 2012 global exploration expenditure. Half of this expenditure was for bulk minerals such as coal, iron ore, and oil and gas. Chinese interests have invested in Africa, Southeast Asia, Australia, Canada, Latin America and the United States, and are involved with projects in Brazil, Kazakhstan, Mongolia, Russia and Tajikistan. According to a report from KPMG LLP released in March 2013, Canada is the leading recipient of Chinese investment for mining projects. Even with the slowdown in Chinese industrialization as a result of the downturn in the global economy and lower commodity prices, China continues to look overseas, purchasing companies or taking stakes in mines and projects.

A study conducted in 2013 by MinEx Consulting concluded that about 45 percent of the most significant gold, base metals and uranium discoveries made since 1950, excluding satellite deposits found in existing mining camps, have been developed into mines. In general, projects that began production in recent years have longer development time frames than mines that came online prior to 2000. The development time from exploration prospect to mine depends on diverse factors such as the corporate business cycle; deposit location and geology; the level of regional exploration activity, legislation and local infrastructure; the mineral commodities being

targeted for production, and perceived country risk. Based on the MinEx Consulting study results, gold deposits reached production about 10 years after discovery and copper deposits achieved production after 17 years from discovery. Projects in lower risk countries were found to be 30 to 40 percent quicker to develop.

Many exploration projects are becoming more costly and difficult to develop. Cost factors include more complex orebodies, deeper lying deposits often with lower grades, more remote locations, increased infrastructure requirements and changing political and social conditions.

Some seabed mineral deposits are attractive because they generally contain higher concentrations of certain metals than many onshore deposits; however, commercial extraction for many operations will likely be expensive and environmental issues may be challenging. In 2007, Nautilus Minerals began exploration for massive sulfides off the coast of Papua New Guinea. In 2011 the company was granted a 20-year mining lease for the site. However, activities were temporarily halted in 2012 until an ownership dispute could be resolved. An arbitration decision was reached in 2013 allowing development of the Solwara 1 deposit to proceed, and the company is continuing its planned development activities at the site. The International Seabed Authority, an autonomous international organization established under 1994 provisions of the United Nations Convention on the Law of the Sea, released a draft report in 2013 to develop a framework for polymetallic nodule exploitation. In 2013, seabed exploration was also taking place or proposed for the Indian Ocean, the Pacific Ocean off the coast of India, the Red Sea and the South China Sea.

### Exploration activity by mineral commodity

The amount budgeted for gold exploration (\$6.6 billion) based on SNL data for 2013 is 31 percent lower than that budgeted for gold in 2012.

**Table 2**
**Selected noteworthy exploration sites for 2013.**

Location	Type <sup>1</sup>	Site	Commodity	Company	Resource <sup>2</sup> notes
<b>Africa</b>					
1 Burkina Faso	F	Bombore	Au	Orezone Gold Corp.	4.6 Moz Au (D)
2 Burkina Faso	F	Houndé	Au	Endeavor Mining Corp.	1.5 Moz Au (R)
3 Burkina Faso	F	Karma	Au	True Gold Mining Inc.	949,000 oz Au (PR)
4 Burkina Faso	P	Mana	Au	SEMAFO, Inc.	2.3 Moz Au (R)
5 Burkina Faso	F	Yaramoko	Au	Roxgold Inc.	850,000 oz Au (ID)
6 Congo (Kinshasa)	F	Kapulo	Cu	Mawson West Ltd.	188,000 t Cu (D)
7 Eritrea	P	Bisha	Au, Ag, Cu, Zn	Nevsun Resources Ltd.	750,000 oz Au, 36 Moz Ag, 472 kt Cu, 1.2 Mt Zn (R)
8 Ghana	E	Kubi	Au	PMI Gold Corp.	233,000 oz Au (D)
9 Ghana	P	Wassa	Au	Golden Star Resources Ltd.	1.5 Moz Au (R)
10 Guinea	F	Tri-K	Au	Avocet Mining plc.	480,000 oz Au (PR)
11 Liberia	F	Dugbe F	Au	Hummingbird Resources plc.	1.9 Moz Au (D)
12 Mali	E	Fekola	Au	Papillon Resources Ltd.	4.6 Moz Au (D)
13 Namibia	D	Otjikoto	Au	B2Gold Corp.	1.3 Moz Au (PR)
14 Sierra Leone	E	Nimini	Au	Polo Resources Ltd.	550,000 oz Au (D)
15 South Africa	E	Platreef	PGM, Au, Cu, Ni	Ivanhoe Platinum Ltd.	38 Moz PGM, 3.4 Moz Au, 1.1 Mt Cu, 1.7 Mt Ni (D)
16 South Africa	E	Waterberg	Pt, Pd, Au, Cu, Ni	Platinum Group Metals Ltd.	5.2 Moz Pt, 10.6 Moz Pd, 1.7 Moz Au, 62 kt Cu, 73 kt Ni (IF)
17 Sudan	E	Block 14 (Galat Sufar)	Au	Orca Gold Inc.	1.3 Moz Au (D)
18 Zambia	E	Mumbwa	Cu, Au, Ag, U <sub>3</sub> O <sub>8</sub>	Blackthorn Resources Ltd.	795 kt Cu, 33,000 oz Au, 1.1 Moz Ag, 937 t U <sub>3</sub> O <sub>8</sub> (D)
<b>Australia</b>					
19 New South Wales	E	McPhillamys	Au	Regis Resources Ltd.	1.7 Moz Au (D)
20 New South Wales	D	Tomingley	Au	Alkane Resources Ltd.	208,000 oz Au (R)
21 Northern Territory	E	Tennant Creek (Chariot)	Cu, Au	Emmerson Resources Ltd.	137,000 oz Au, 61 kt Cu (D)
22 South Australia	F	Hillside	Cu, Au, Fe	Rex Minerals Ltd.	938,000 t Cu, 757,000 oz Au, 26 Mt Fe (R)
23 Western Australia	E	Brown's Range	REE	Northern Minerals Ltd.	18,000 t REE (D)
24 Western Australia	F	Castle Hill (Kunanalling)	Au	Phoenix Gold Ltd.	1.16 Moz Au (R)
25 Western Australia	F	Gidgee	Au	Panoramic Resources Ltd.	1.3 Moz Au (D)
26 Western Australia	E	Matilda	Au	Blackham Resources Ltd.	408,000 oz Au (D)
27 Western Australia	P	St Ives	Au	Gold Fields Ltd.	2.2 Moz Au (R)
<b>Canada</b>					
28 British Columbia	F	Blackwater-Davidson	Au, Ag	New Gold Inc.	8.2 Moz Au, 61 Moz Ag (R)
29 British Columbia	F	Brucejack	Au, Ag	Pretium Resources Inc.	7.3 Moz Au, 35 Moz Ag (D)
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, 108 kt Mo (R)
31 British Columbia	P	New Afton	Au, Cu, Ag	New Gold Inc.	1.1 Moz Au, 488 kt Cu, 3.9 Moz Ag (R)
32 British Columbia	E	Premier	Au, Ag	Ascot Resources Ltd.	2.2 Moz Au, 15 Moz Ag (D)
33 Manitoba	P	Rice Lake	Au	San Gold Corp.	253,000 oz Au (R)
34 Nunavut	E	Back River	Au	Sabina Gold & Silver Corp.	2.7 Moz Au (R)
35 Nunavut	F	Meliadine	Au	Agnico-Eagle Mines Ltd.	3.0 Moz Au (R)
36 N.W. Territories	D	Gahcho Kue	Diamond	DeBeers SA	48 M carat diamond (PR)
37 Ontario	E	144	Au	Barrick Gold Corp.	Data not released.
38 Ontario	E	Albany	Graphite	Zenyatta Ventures Ltd.	977,000 t graphite (ID)
39 Ontario	E	Borden Lake	Au	Probe Mines Ltd.	3.7 Moz Au (D)
40 Ontario	E	Burns Block	Ag, Au	Bayfield Ventures Corp.	686,000 oz Ag, 60,000 oz Au (ID)
41 Ontario	P	Detour Lake	Au	Detour Gold Corp.	15.6 Moz Au (R)
42 Ontario	E	Golden Bear	Au	Northern Gold Mining Inc.	1.3 Moz Au (D)
43 Ontario	E	Golden Highway	Au	Moneta Porcupine Mines Inc.	1 moza Au (D)
44 Ontario	E	Hardrock (Trans-Canada)	Au	Premier Gold Mines Ltd.	3.2 Moz Au (ID)
45 Ontario	E	Kirkland Lake (Amalgamated)	Au	Osisko Mining Corp.	164,000 oz Au (D)
46 Ontario	P	Lac des Iles	Pd, Pt, Au, Ni, Cu	N. American Palladium Ltd.	1.2 Moz Pd, 86,000 oz Pt, 83,000 oz Au, 1.1 kt Ni, 7.1 kt Cu (R)
47 Ontario	E	Larder Lake	Au	Gold Fields Ltd.	44,000 oz Au (D)
48 Ontario	F	Rainy River	Au, Ag	New Gold Inc.	3.8 Moz Au, 9.4 Moz Ag (R)
49 Ontario	E	Upper Beaver	Au, Cu	Osisko Mining Corp.	1.5 Moz Au, 25,000 t Cu (D)
50 Quebec	P	Bachelor Lake	Au	Metanor Resources Inc.	200,000 oz Au (R)
51 Quebec	P	Casa Berardi	Au	Hecla Mining Co.	1.5 Moz Au (R)

Location	Type <sup>1</sup>	Site	Commodity	Company	Resource <sup>2</sup> notes
52 Quebec	E	Clearwater	Au	Eastmain Resources Inc.	720,000 oz Au (ID)
53 Quebec	E	Duparquet	Au	Clifton Star Resources Inc.	3.1 Moz Au (D)
54 Quebec	P	Island Gold	Au	Richmont Mines Inc.	141,000 oz Au (R)
55 Quebec	E	Windfall Lake	Au	Eagle Hill Exploration Corp.	538,000 oz Au (D)
56 Saskatchewan	E	Mann Lake	U <sub>3</sub> O <sub>8</sub>	Cameco Corp.	Data not released.
57 Saskatchewan	E	Patterson Lake So.	U <sub>3</sub> O <sub>8</sub>	Fission Uranium Corp.	Data not released.
58 Yukon Territory	E	Coffee	Au	Kaminak Gold Corp.	719,000 oz Au (D)
<b>Latin America</b>					
59 Argentina	E	Altar	Cu, Au	Stillwater Mining Co.	3.4 Mt Cu, 1.5 Moz Au (D)
60 Argentina	E	Cerro Moro	Au, Ag	Yamana Gold Inc.	880,000 oz Au, 53 Moz Ag (D)
61 Brazil	F	Volta Grande	Au	Belo Sun Mining Corp.	2.8 Moz Au (R)
62 Chile	P	Algarrobo	Fe	Compania Minera del Pacifico SA	65 Mt Fe (R)
63 Chile	E	Cerro Maricunga	Au	Atacama Pacific Gold Corp.	3.5 Moz Au (D)
64 Chile	E	Productora	Cu, Au, Mo	Hot Chili Ltd.	420 kt Cu, 226,000 oz Au, 10 kt Mo (D)
65 Chile	E	Los Helados	Cu, Au, Ag	NGEx Resources Inc.	6.9 Mt Cu, 8.9 Moz Au, 80 Moz Ag (D)
66 Colombia	E	Santa Rosa	Au	Red Eagle Mining Corp.	446,000 oz Au (D)
67 Colombia	P	Segovia	Au	Gran Colombia Gold Corp.	460,000 oz Au (D)
68 Colombia	E	Vetas	Au, Ag	Galway Gold Inc.	225,000 oz Au, 317,000 oz Ag (D)
69 French Guiana	E	Paul Isnard (Montagne d'Or)	Au	Columbus Gold Corp.	5.4 Moz Au (IF)
70 Mexico	P	Bolanitos	Ag, Au	Endeavor Silver Corp.	7.4 Moz Ag, 105,000 oz Au (R)
71 Mexico	P	El Chanate	Au, Ag	AuRico Gold Inc.	1.3 Moz Au (R)
72 Mexico	P	El Cubo	Ag, Au	Endeavor Silver Corp.	6.3 Moz Ag, 101,000 oz Au (R)
73 Mexico	D	Morelos (Media Luna)	Au, Ag	Torex Gold Resources Inc.	4.1 Moz Au, 6.8 Moz Ag (R)
74 Mexico	P	Mulatos	Au	Alamos Gold Inc.	2.4 Moz Au (R)
75 Mexico	E	Promontorio	Ag, Au, Zn, Pb	Kootenay Silver Inc.	40 Moz Ag, 508,000 oz Au, 210 kt Zn, 179 kt Pb (D)
76 Mexico	P	San Francisco	Au	Timmins Gold Corp.	1.6 Moz Au (R)
77 Mexico	P	Santa Elena	Ag, Au	SilverCrest Mines Inc.	20 Moz Ag, 327,000 oz Au (R)
78 Mexico	P	San Dimas	Au, Ag	Primero Mining Corp.	660,000 oz Au, 39 Moz Ag (PR)
79 Nicaragua	E	La India	Au, Ag	Condor Gold plc.	1.1 Moz Au, 1.8 Moz Ag (D)
<b>Pacific (Including Southeast Asia)</b>					
80 Cambodia	E	Okvau	Au	Renaissance Minerals Ltd.	1.1 Moz Au (ID)
81 Indonesia	P	Martabe	Au, Ag	G-Resources Group Ltd.	3.1 Moz Au, 33 Moz Ag (R)
82 Papua New Guinea	P	Lihir	Au	Newcrest Mining Ltd.	33 Moz Au (R)
83 Philippines	P	Co-O	Au	Medusa Mining Ltd.	567,000 oz Au (R)
84 Philippines	P	Masbate	Au	B2Gold Corp.	3.2 Moz Au (R)
<b>United States</b>					
85 Pebble	E	Pebble	Cu, Au, Mo	Northern Dynasty Minerals	24 Mt Cu, 63 Moz Au, 1.3 Mt Mo (D)
86 Idaho	E	Golden Meadows	Au, Ag, Sb	Midas Gold Corp.	4.3 Moz Au, 1.5 Moz Ag, 51kt Sb (D)
87 Nevada	E	Cove-McCoy	Au	Premier Gold Mines Ltd.	143,000 oz Au (D)
88 Nevada	E	Long Canyon	Au	Newmont Mining Corp.	2.6 Moz Au (IF)
89 Nevada	E	Spring Valley	Au	Barrick Gold Corp.	2.1 Moz Au (D)
90 Texas	D	Goliad (Burke Hollow)	U <sub>3</sub> O <sub>8</sub>	Uranium Energy Corp.	1,700 t U <sub>3</sub> O <sub>8</sub> (D)
91 Wyoming	E	Bear Lodge	REE	Rare Element Resources	224 kt REO (R)
<b>Rest of the World</b>					
92 Azerbaijan	P	Gedabek	Au, Cu, Ag	Anglo Asian Mining plc.	744,000 oz Au, 82 kt Cu, 8.6 Moz Ag (R)
93 China	P	White Mountain	Au	Eldorado Gold Corp.	558,000 oz Au (R)
94 China	P	Ying	Ag, Pb, Zn, Au	Silvercorp Metals Inc.	79 Moz Ag, 396 kt Pb, 137 kt Zn, 19,000 oz Au (R)
95 Kazakhstan	P	Sekisovskoye	Au, Ag	GoldBridges Global Resources	421,000 oz Au, 614,000 oz Ag (R)
96 Romania	F	Certej	Au, Ag	Eldorado Gold Corp.	2.4 Moz Au, 17 Moz Ag (R)
97 Russia	E	Malmyzh	Cu, Au	IG Copper LLC	Data not released.
98 Russia	P	Tardan	Au	Auriant Mining AB	175,000 oz Au (D)
99 Serbia	E	Timok	Cu, Au	Freeport-McRoRan	1.7 Mt Cu, 3 Moz Au (IF)
100 Turkey	E	TV Tower	Au, Cu	Pilot Gold Inc.	470,000 oz Au, 36 kt Cu, 20 Moz Ag (D).

K<sub>2</sub>SO<sub>4</sub> - 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 - Platinum; REE - Rare earth elements; Sb - Antimony; U<sub>3</sub>O<sub>8</sub> - Uranium oxide; Zn - Zinc; <sup>1</sup> D - Approved for development; E - Active exploration; F - Feasibility work ongoing/completed; P - Exploration at producing site. <sup>2</sup> 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 date were not released, the site was considered noteworthy by the authors based on the level of exploration activity or regional significance.

# Exploration Review

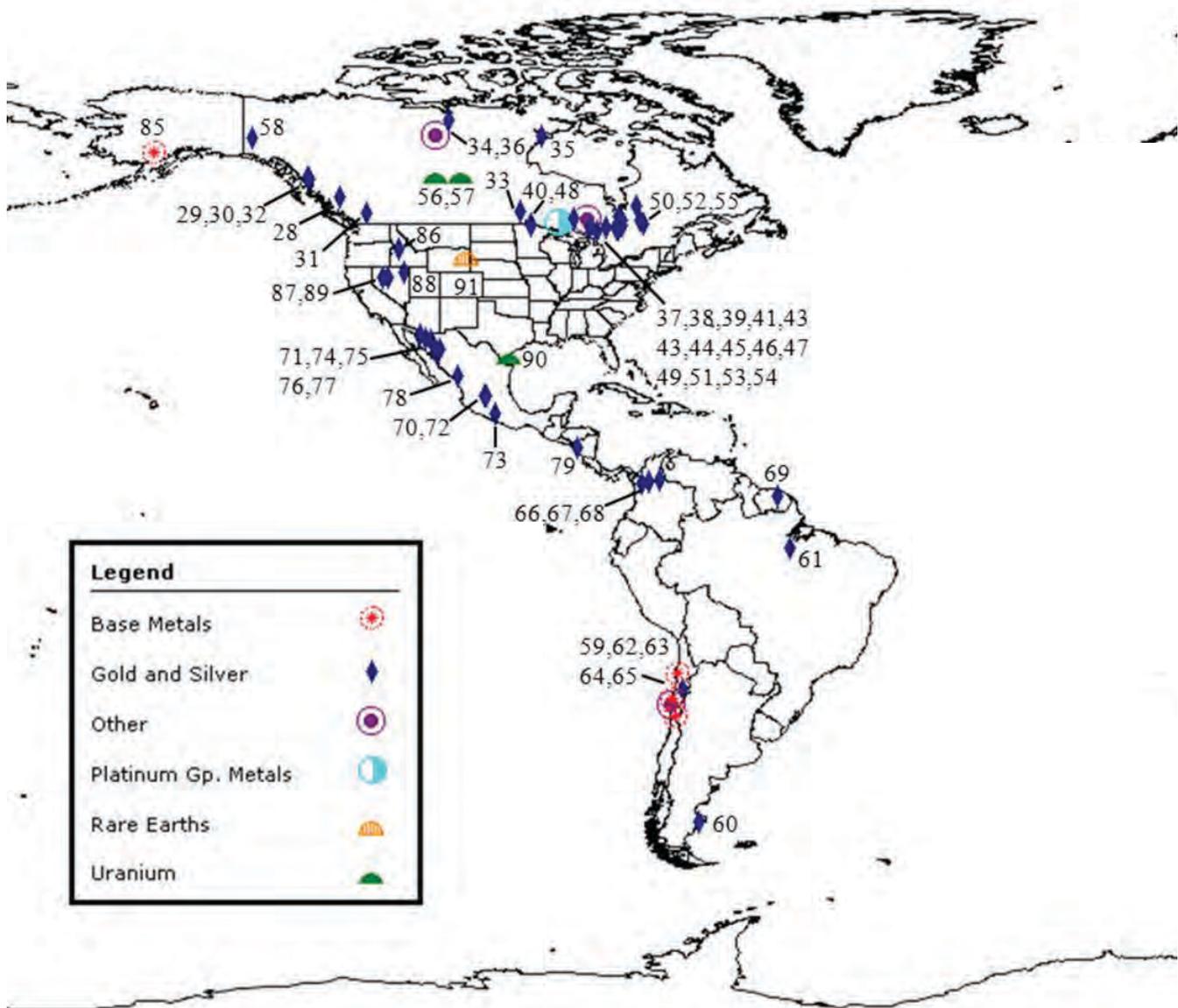
Figure 6 illustrates the 2009-2013 global percent share distribution of reported mineral exploration budget estimates by mineral commodity grouping (excluding uranium). Figure 6 shows that the percent share attributed to global gold exploration relative to exploration for all nonferrous minerals increased for the years 2009 through 2011, then decreased after 2011. In terms of percentage of worldwide nonferrous exploration budget, exploration for gold accounted for 48 percent in 2013 and 49 percent in 2012. This small variation may be an artifact of survey response. The budget for gold exploration in Canada accounted for 15.1

percent of the gold exploration budget, Australia accounted for 12.8 percent and the United States accounted for 7.8 percent in 2013. Other countries with significant gold exploration, in descending order by 2013 budget, include Mexico, Russia, Colombia, China, Burkina Faso, Peru, Chile and Papua New Guinea, which together accounted for an additional 32.6 percent of the 2013 gold exploration budget.

Exploration budgets for base-metal projects decreased 26 percent to \$4.7 billion in 2013 from \$6.4 billion in 2012, based on SNL data. In terms of percentage of total worldwide nonferrous

**Figure 7**

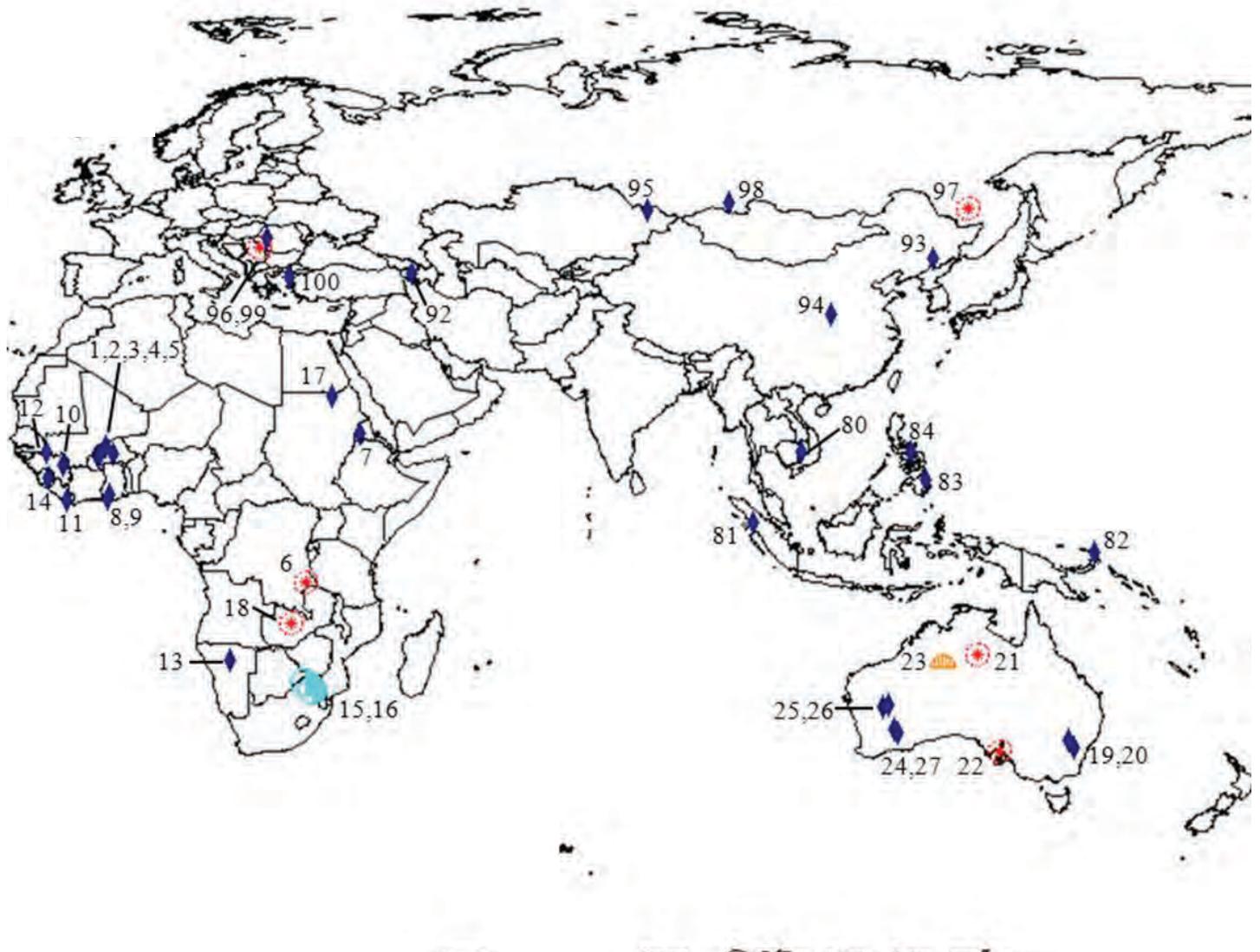
Map showing locations of the 100 noteworthy sites and their principal commodity. Figures reflect site numbers as shown in Table 2.



exploration budget, the estimated base-metal exploration budget increased to 34 percent in 2013. The percent allocation for base-metal exploration decreased from 2009 through 2010, remained stable from 2010 through 2012, and increased from 2012 through 2013. Variation may be an artifact of varying responses in the MEG and SNL surveys. Exploration for copper accounted for 73.6 percent of the base-metal budget for 2013, zinc exploration accounted for 13.7 percent and nickel exploration accounted for 12.7 percent. The budget for base-metal exploration in Chile accounted for 14.2 percent of the global base metal exploration budget

and Australia accounted for 13.2 percent in 2013. Other countries with significant gold exploration, in descending order by 2013 budget, include the United States, Peru, Canada, the Democratic Republic of the Congo and China, which together accounted for an additional 33.8 percent of the 2013 gold exploration budget.

The budget for diamond exploration estimated by SNL decreased 6 percent in 2013 in nominal dollar terms from 2012. In nominal dollar terms, the diamond exploration budget of about \$489 million in 2013 was about half of the budget for diamond in 2008 and represented about



3.5 percent of the global exploration budget, slightly higher than its share in 2012. Principal locations for diamond exploration in 2013 were Russia, Angola and Canada, in descending order by 2013 budget. Decreased diamond sales, increased international concern about illegal diamond mining, and energy shortages in South Africa may have contributed to the lower level of diamond exploration.

Based on the SNL exploration budget estimates, the 2013 estimate for platinum-group metals (PGM) of \$119 million was down 62 percent from the 2012 budget estimate of \$312 million, and represented less than 1 percent of the global exploration budget for 2013. Principal areas for planned PGM exploration in 2013 were South Africa, Canada and Russia, in descending order by 2013 budget.

According to SNL data, the estimated 2013 global budget for mineral commodity targets other than base metals, diamond, iron ore, PGMs and uranium was 33 percent lower (\$1.85 billion) in 2013 than the \$2.8 billion reported for 2012. Mineral commodities considered include silver, lithium, phosphate, potash and rare-earth elements. Exploration for lithium, potash and rare-earth elements 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 of issuing export quotas for rare-earth elements has led to increased exploration for these commodities at projects in Australia, Canada, South Africa and the United States.

The budget estimate for uranium exploration reported by SNL decreased from about \$873 million in 2012 to about \$616 million in 2013, likely owing to a combination of a weak economy, lower uranium price and the 2011 event in Japan at the Fukushima Daiichi nuclear power plant.

Based on global exploration site data compiled by the USGS, exploration for gold and silver accounted for about 55 percent of the active exploration sites in 2013. Base-metal exploration accounted for about 22 percent of the 2013 active exploration sites, iron ore accounted for about 8 percent, uranium accounted for about 4 percent, platinum-group metals about 1 percent, and diamond about 1 percent. Exploration for other mineral commodities accounted for about 9 percent. Both the SNL and USGS data support the conclusion that there is increasing interest in exploration for lithium, potash and rare-earth elements because of the increased use of lithium for batteries, potash for fertilizers and biofuels, and rare-earth elements for electronics.

### 2012 exploration highlights

Table 2 presents the most noteworthy exploration sites based on the amount of exploration activity conducted at the sites in 2013. A combined total of approximately 3.7 Mm (23,000 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 2013 along with ancillary exploration activities; where budget was used as the principal indicator, a site qualified if a 2013 budget of at least \$8 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 2013, the minimum drilling cutoff was reduced from 20,000 m (65,600 ft) in 2012 to 15,000 m (49,200 ft) in 2013.
- 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 occurred prior to 2013 were not included in Table 2 if the reported level of 2013 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 reported in *Mining Engineering*.

Gold continued to be the commodity generating the greatest exploration intensity by number of projects based on the list of noteworthy

**Table 3**

**Noteworthy exploration projects<sup>1</sup> by region for the years 2003-2013.**

Region	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Africa	16	20	18	21	19	24	22	13	23	22	18
Australia	10	4	10	6	6	10	13	5	6	4	9
Canada <sup>2</sup>	31	28	22	24	25	26	26	33	31	38	31
Latin America <sup>3</sup>	19	21	29	25	25	17	16	29	20	19	21
Pacific <sup>4</sup>	4	4	4	4	3	3	7	1	2	2	5
United States	12	12	4	6	8	8	7	9	9	8	7
Rest of the world <sup>5</sup>	8	14	13	14	14	12	9	10	9	7	9

<sup>1</sup> Based on data developed by the USGS and appearing in Table 2 of the exploration summary discussion published in the May issue of *Mining Engineering* for the years 2003–2013.

<sup>2</sup> Only 90 noteworthy exploration projects met the selection criteria for 2002.

<sup>3</sup> Including Central America, Mexico and South America.

<sup>4</sup> Including Southeast Asia and islands in the Pacific Ocean.

<sup>5</sup> Including China, the Commonwealth of Independent States, Europe, India, the Middle East, Mongolia and Pakistan.

exploration sites for 2013 as reported in Table 2. Of the 100 sites selected for Table 2, gold or silver was considered the primary mineral commodity at 79 sites, base metals were considered primary at 10 sites, PGMs were the primary target at three sites, uranium was the primary target at three sites, rare-earth elements were the primary target at two sites, and diamond, graphite and iron ore were a primary target at one site each. Determination of the primary commodity was based primarily on consideration of commodity value and contained resources 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 91 Mt (100 million st) of iron, 45 Mt (49 million st) of copper, about 2 Mt (2.2 million st) of lead and zinc, 1.8 Mt (2 million st) of nickel, 1.4 Mt (1.5 million st) of molybdenum, 1 Mt (1.1 million st) of graphite, 240 kt (265,000 st) of combined rare-earth oxides, 51 kt (56,000 st) of antimony, 23 kt (750 million oz) of silver, 9.1 kt (300 million oz) of gold, 1.7 kt (55 million oz) of PGM, 1.7 kt (1,900 st) of uranium and 48 million carats of diamond to the identified world resources for these mineral commodities. It is likely, however, assuming constant commodity prices, that only a portion of the listed resources will be converted to economic reserves based on future exploration activity.

Figure 7 plots the locations of those sites included in Table 2. Site numbers shown in Table 2 are reflected in Fig. 7 to allow the reader to identify each site. Sites have been classified by their primary commodity target.

Table 3 shows the number of noteworthy sites by region for the years 2003 through 2013. In terms of noteworthy projects identified for 2013, the number of projects in Australia and Latin America increased relative to the numbers

reported in 2012 and the numbers in Africa and Canada decreased. There was limited change in the number of significant projects reported for other regions.

The cost of doing business in a country can change based on many factors, including economic and environmental conditions, legislative actions, political activity, and attitude 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 2013 survey (published March 2014) includes data from 690 respondent companies with an aggregated exploration budget of US\$3.4 billion in 2013.

According to the 2013 Fraser survey, the top 10 destinations for mineral exploration based on overall investment attractiveness in 2013, listed in descending order, were Western Australia, Nevada (U.S.), Newfoundland and Labrador (Canada), Finland, Alaska (U.S.), Sweden, Saskatchewan (Canada), Yukon Territory (Canada), Greenland and Alberta (Canada). The top 10 destinations for mineral exploration based on their mineral potential independent of policy restrictions and listed in descending order, were Alaska (U.S.), Western Australia, Nevada (United States), Chile, British Columbia (Canada), Philippines, Yukon Territory (Canada), Greenland, Newfoundland and Labrador (Canada) and Manitoba (Canada). The top 10 destinations for mineral exploration based solely on policy attractiveness and listed in descending order, were Sweden, Finland, Alberta (Canada), Ireland, Wyoming (U.S.), Western Australia, New Brunswick (Canada), Nevada (U.S.), Newfoundland & Labrador (Canada) and Norway.

## Exploration activity and related legislation by region

Exploration-related activities and events within each region are summarized in the following section. The order of regional and country discussions is based on the amount budgeted for exploration in 2013 from highest to lowest. Areas not included in the regions discussed have been aggregated as 'Rest of the World' and are discussed separately at the end of this section.

Latin America continued its leading position as a destination for exploration activity based on MEG-SNL budget data since 1994, but was listed third after Canada and Australia by the USGS when the number of active sites was considered.

**Latin America.** Latin America continued its leading position as a destination for exploration activity based on MEG-SNL budget data since 1994, but was listed third after Canada and Australia by the USGS when the number of active sites was considered. SNL estimated that the 2013 exploration budget for Latin America decreased 26 percent to about \$3.8 billion from the \$5.2 billion estimated for 2012. Recent discoveries high in the Andes Mountains of Argentina and Chile have focused exploration in an area where exploration costs are relatively high due to the remoteness of the area; with increasing environmental activism, litigation and lower metal prices, development of several of these projects have been postponed. Brazil, Chile, Mexico and Peru were ranked in SNL's top-10 country list for anticipated exploration spending in 2013. 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 (90), Brazil (70), Peru (52), Chile (38), Argentina (25) and Colombia (19).

Approximately 56 percent of the deposits actively explored in 2013 in Latin America contained gold or silver and 29 percent contained base metals, or some combination of precious and base metals, based on the sites considered in the USGS compilation. Activity in 2013 was primarily used to further define early-stage discoveries (65 percent), conduct exploration at a producing site (20 percent), conduct prefeasibility and feasibility studies of economically promising prospects (8 percent) and further explore for resources of deposits under development (7 percent).

Based on SNL data, major companies accounted for about 60 percent of the Latin American exploration budget, junior companies accounted for about 26 percent, intermediate companies accounted for about 11 percent and other types of companies accounted for 3 percent. Approximately 35 percent of the Latin American exploration budget was targeted for activity near an existing mine site, 34 percent for late stage and feasibility activity and 31 percent for grassroots or early stage activity.

Latin America is considered a leading region for mineral exploration by many companies owing to its promising geology and its long history of world-class discoveries, the perception of its mineral policies, and its successful historical record of mineral production and development. In recent years, however, resource nationalism has become popular, and many Latin American countries have sought to increase revenues from mining activities by creating, or increasing, royalties, taxes or tariffs. South American countries that have done so include Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Peru and Venezuela. Increasing political and social pressure on exploration and mining activities in some Latin American countries such as Argentina, Bolivia, Chile, Peru and Venezuela have reduced activity in these countries. For example, more than \$30 billion worth of mining projects have been suspended or cancelled in Argentina owing to its economic and political climate. Vale S.A. suspended development work at its Rio Colorado potash project in Argentina, Pan American Silver stopped feasibility work at its Navidad silver project in Argentina and Barrick Gold Corp. suspended development of its Pascua Lama project that traverses the border of Argentina and Chile. Similarly, five significant projects in Chile representing \$30 billion in investment were suspended either by the local courts or their own developers. Although the overall exploration budget decreased in 2013 from 2012, its percent of global share increased from 25 percent to 27 percent, as other regions had a greater reduction in activity than did Latin America. More than 80 Australian companies were involved with 200 mineral exploration and development projects in Latin America.

The Bolivian government passed a law increasing the state's expropriation powers over mines deemed by the state to be unproductive, inactive or idle. According to Ernst & Young Global Ltd., this legislation affected 1,717 private exploration and mining licenses in the country.

A new mining code was introduced to the Brazilian congress in 2013 that would increase mining royalties to 4 percent of gross revenue, change the concessions system from a priority system to an auction system and change the agency that oversees the mining sector. It is expected that debate on this legislation will continue into 2014; some new exploration activity in Brazil was suspended in 2011 when the mining ministry stopped issuing new licenses pending the new legislation.

Energy availability and water scarcity are considered significant issues affecting future mineral development and mining in Chile, the world's leading copper producing country. The

Chilean Congress is debating legislation that would ban mining activities close to glaciers, which provide a source of water for the Chilean population. Electricity costs have increased 11 percent since 2000, and permitting of new electrical generation projects in Chile has become more difficult, increasing the competition among industrial sectors for available electrical power. Miners are faced with increasing costs for water as competition for available water increases and new sources are expensive to develop. In spite of these challenges, 123 junior exploration companies from Canada, Australia and the United States are exploring for minerals in Peru.

Improved security conditions in Colombia since 2002 have resulted in increased interest in mineral exploration in the country. In 2013, the Colombian government announced plans to revise its mining code, to complete a national geological mapping program and to reopen its closed concession claims process. A number of regional disputes have taken place after the Mining Code of 2010 was ruled unconstitutional because it was developed without consulting the country's indigenous peoples. The government responded by issuing Decree 934 in 2013, declaring that local referenda and municipal bans have no legal validity. It is expected that this ruling will be contested, but, in the meantime, legal uncertainty has led to a temporary postponement of several exploration and development projects. Also in 2013, the government passed Decree 1374, which designated lands for exclusion of mining, and Resolution 341, which granted "national interest" status to 40 large-scale mining projects, thereby superseding any restrictions on mining operations. Colombia's national mining agency is reviewing mining applications and concessions in an effort to reduce illegal and unpermitted mining activity, which may be higher than 50 percent of current mining operations in the country.

Ecuador's legislature passed changes to its mining law in 2013. The new law sets up a tiered system for mining royalties based on the size of the project. Small-scale mines will pay 3 percent of sales in royalties, while mid-sized projects will owe 4 percent and large development 5 percent. The newly created medium-scale category of mining would be excluded from the 70-percent windfall profit tax. A mine included in this category would pay a 4-percent royalty and the state would get 50.1 percent of the net profits from mining. Kinross Gold Corp. announced plans to discontinue development of the Fruta del Norte gold-silver deposit, after failing to reach agreement with the government on key economic and legal terms.

The Mexican senate approved a 7.5-percent mining tax on sales and an additional 0.5-percent gross revenue tax on gold, silver and platinum

mines. The tax package went into effect on Jan. 1, 2014. The effect of these taxes on mineral projects is not yet known, but 69 projects in Mexico were suspended by mid-2013 owing to falling commodity prices and increasing local opposition to mine development.

Exploration and mining investment in Peru was expected to be more than \$3.6 billion in 2013. But decreasing metals prices, increasing exploration and development costs and continued social unrest triggered by opposition to extractive projects may reduce activity in Peru. In 2013, there were 149 reported conflicts involving mineral projects in the country. A 2011 law that requires mining and oil companies to consult with indigenous communities before developing a project may be revised to exclude certain communities from the law; community inclusion may be determined on a case-by-case basis. The governments of Peru and Honduras have signed a technical cooperation agreement for the sharing of expertise and development of joint programs and projects in the mining sector.

The congress in Uruguay passed legislation regulating large-scale mining projects (surface area of more than 400 ha or 980 acres) or investment of more than \$100 million) that imposed increased taxes, and implements more stringent environmental regulations on such projects.

**Africa.** According to SNL, African exploration budgets decreased to about \$2.4 billion in 2013 from about \$3.4 billion in 2012, a reduction of 30 percent. Countries with the greatest exploration activity in Africa, based on their exploration budget as reported by SNL for 2013, reported in decreasing order, were Congo (Kinshasa), Burkina Faso, South Africa, Zambia, Ghana, Mali and Tanzania. Based on site data compiled by the USGS, active gold and silver projects in 2013 accounted for approximately 48 percent of the reported African exploration projects, base-metal projects accounted for about 16 percent, iron ore projects accounted for about 12 percent, PGM projects accounted for about 6 percent, uranium projects accounted for about 4 percent, diamond projects made up about 4 percent and other minerals accounted for the remaining 10 percent. Exploration was focused primarily in South Africa, Burkina Faso, Congo (Kinshasa), Ghana, Tanzania, Mali, Namibia, Cote d'Ivoire, Zambia and Sierra Leone, in descending order based on the number of sites. But activity also took place in a number of other countries.

Based on the number of sites, early-stage projects comprised about 70 percent of the 2013 activity, while producing projects accounted for about 16 percent, feasibility stage projects represented about

11 percent and developing projects accounted for about 3 percent. Approximately 46 percent of the African exploration budget was targeted for late-stage and feasibility activity, 31 percent was for activity adjacent to an existing mine site and 23 percent for grassroots or early-stage activity. Based on the 2013 exploration budget, late-stage projects accounted for about 38 percent of the total African exploration budget, early-stage projects accounted for about 33 percent and mine site projects accounted for about 29 percent. Based on SNL data for 2013, junior companies accounted for about 43 percent of the African exploration budget, major companies accounted for about 42 percent, intermediate companies accounted for about 9 percent and other types of companies accounted for 6 percent.

Exploration activity in Africa in 2013 varied by region and country as recent discoveries and improved investor interest stimulated activity in some areas while factors that affect mineral supply related to labor issues and regional unrest have limited interest and activities in other areas. The level of interest was also affected by the amount and cost of infrastructure in some areas. Issues of concern include artisanal mining, conflict minerals, employment, government pressures and political instability. For example, ongoing conflict in Sudan and South Sudan has restricted mineral exploration activity. Mining-related tax increases have been implemented or proposed in the Congo (Kinshasa) and Mozambique, and a new mining code was approved in Burundi in 2013.

Interest in exploring for African mineral resources continued at a reduced level, as exploration companies of all sizes reduced their exploration budgets in 2013. Congo (Kinshasa), Burkina Faso and South Africa were the top three destinations for exploration on the continent in 2013. The limited amount of financing available forced many junior companies to limit their focus on selected projects. In spite of these issues, a survey of institutional investors conducted by the Economist Intelligence Group Ltd. found that two-thirds of the respondents listed Africa as having the greatest opportunity for investment of global frontier markets in spite of its macroeconomic and political risk.

A ban was placed on diamond exports from the Central African Republic by Kimberley Process (KP) members in May 2013 after a takeover of the government by rebel forces prevented KP monitors from verifying diamond certification.

A ban on the export of unprocessed cobalt and copper concentrates was ordered by the government of the Congo (Kinshasa) in an effort to encourage the development of local processing facilities to add value to mineral exports.

Implementation of the ban was delayed until the end of the year to allow the export of stockpiles and give the companies more time to construct processing facilities.

Unlike many other countries, the government of Guinea amended its mining code to reduce some taxes in order to improve its investment climate. Mining profit taxes on most mineral commodities were reduced from 35 percent to 30 percent, and the tax on bauxite was reduced from 0.55 percent of the international price for aluminum to 0.15 percent. Other changes include an increase in land holding and number of permitted mining licenses and a reduction in the minimum investment required for certain concessions.

In contrast, mineral royalties in Kenya were increased and mining licenses issued between January-May 2013 were revoked. Royalties for gold were increased from 2.5 percent to 5 percent of gross sales. Royalties for niobium, rare-earth and titanium ore were increased from 3 percent to 10 percent of gross sales, and royalty rates for other minerals vary from 1 to 12 percent. Drilling charges were also increased.

The government of Namibia placed a moratorium on planned marine phosphate mining off its coast until an environmental impact assessment was performed and 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, increased costs, labor disputes, safety issues, technical constraints and water restrictions resulted in the reduction or curtailment of some exploration and mining in the gold and platinum sectors. Factors leading to a decline in mineral exploration include lack of detailed and updated geologic maps, limited access to local risk capital, and uncertainty of legislation and mineral policies. The proposed changes to the 2002 Mineral and Petroleum Resources Development Act continued to be debated, and resolution was postponed until 2014. The platinum industry in South Africa has seen an electricity price increase of 258 percent since 2007, and the gold industry has seen an electricity price increase of 143 percent since 2007. In 2012-2013, labor unrest in the gold and PGM sectors led to higher labor costs, lower productivity and reduced production levels. In spite of these challenges, many projects are being developed, including the Steenkampskraal rare-earth project of Great Western Minerals Group Ltd, the Waterberg PGM project of Platinum Group Metals Ltd. and the Zandkopsdrift rare-earth project of Frontier Rare Earths.

In Tanzania, large foreign mining companies will need to procure at least 80 percent of goods

and services from local businesses by 2015. Mining firms likely to be affected by this ruling include AngloGold Ashanti, Barrick Gold and China National Gold.

The government of Zambia has imposed a 10-percent export tax on semi-processed base metals, imposed a 15-percent import duty on semi-processed copper products and continued its ban on exports of copper ore.

The government of Zimbabwe approved a policy banning alluvial mining near bodies of water, and cancelled all existing exploration permits in these areas. Local governments will be responsible for ensuring compliance with the government's ban. The government also announced plans to ban exports of raw platinum. The metal is currently shipped for refining in South Africa.

**Canada.** Statistics as of March 2014 released by the Canadian government show 2013 exploration expenditures through the feasibility level at C\$2.3 billion (US\$2.4 billion), down about 40 percent from C\$3.9 billion (US\$4 billion) for 2012. SNL reported budgeted exploration spending in Canada for 2013 at \$1.9 billion, or about 13 percent of the estimated overall worldwide exploration budget. Canadian government statistics include planned exploration expenditures for a wider variety of minerals and materials than are included in the MEG-SNL estimates. It is also important to note that the total of revised spending intentions for Canada reported by Natural Resources Canada as of March was 30 percent lower than its March 2013 estimate of C\$3.3 billion (US\$3.4 billion). In 2013, exploration for precious metals (gold and silver) accounted for C\$1.1 billion (US\$1.15 billion); base metals, C\$420 million (US\$430 million); uranium, C\$170 million (US\$175 million); iron ore, C\$110 million (US\$115 million); and diamond, C\$79 million (US\$82 million) of the C\$2.3 billion (US\$2.4 billion) exploration total. When the Canadian exploration statistics are reconfigured to make them comparable with SNL statistics, the reported exploration expenditures as of March 2014 by Natural Resources Canada would be C\$2 billion (US\$2.1 billion), or 8 percent higher than the SNL estimate, which is based on proposed exploration budgets rather than actual expenditures.

Company exploration spending for 2013 as reported by the Canadian government as of March 2014 was greatest in Ontario (26 percent of the total exploration and deposit appraisal expenditures for Canada), British Columbia (22 percent), Quebec (14 percent), Nunavut (12 percent), Saskatchewan (9.1 percent), and Newfoundland and Labrador (4.5 percent). The only Canadian province with an increase in exploration activity in 2013 from 2012 based on reported expenditures was New

Brunswick (with a modest 1.4-percent increase, primarily a result of increased exploration for gold, base metals and other metals). All other Canadian provinces or territories showed a decrease in exploration expenditures of at least 15 percent in 2013 from 2012. Senior exploration companies accounted for about 59 percent of total expenditure in 2013, up from 52 percent in 2012. In terms of mineral commodities sought country-wide, precious metals received the largest exploration expenditure (48 percent), followed by base metals (18 percent), uranium (7 percent), iron ore (5 percent) and diamond (3 percent) in 2013. Other mineral commodities comprise the remaining 19 percent.

Canadian provinces or territories with the greatest exploration activity, in descending order by number of sites in 2013 as compiled by the USGS, were Quebec, Ontario, British Columbia, Saskatchewan, Newfoundland/Labrador, New Brunswick, Manitoba, Yukon Territory, Northwest Territories and Nunavut. Based on the site data, 60 percent of the Canadian exploration sites targeted precious metals, 15 percent base metals, 6 percent iron ore, 6 percent uranium, 4 percent graphite, 3 percent rare-earth elements, and 2 percent of the sites targeted diamond, lithium, or potash in 2013. Approximately 82 percent of all reported exploration sites were considered early-stage sites.

Mineral exploration activity in Canada in 2013 decreased in terms of the exploration budget and the number of exploration sites from 2012. The decline in global commodity prices, increasing activism of aboriginal groups, legislative changes, and the shrinking of exploration funding all have contributed to the perception that Canada is not as attractive for mineral exploration as it has been in recent years. Canada has experienced limited growth or a gradual decline in exploration budget percent allocation (relative to other parts of the world) and number of active sites since 2003.

Much of Canada's legislation enacted in 2013 was aimed at addressing the skills shortage in the mining industry, improving aboriginal involvement and education, and stimulating the country's economy. Canada's 2013 federal budget included provisions to extend the temporary 15-percent Mineral Exploration Tax Credit and pledged C\$37 million (US\$38 million) over a two-year period (2013-2014) for mining research partnerships between government and industry. The 2013 federal budget eliminated the Accelerated Cost of Capital Allowance for new and expanding mines, and reduced the deduction rate for preproduction mine expenses. The Canadian Government allocated C\$100 million (US\$103 million) over a seven-year period to renew the Geomapping for Energy and Minerals (GEM) program designed

**Statistics as of March 2014 released by the Canadian government show 2013 exploration expenditures through the feasibility level at C\$2.3 billion (US\$2.4 billion), down about 40 percent from C\$3.9 billion (US\$4 billion) for 2012.**

to facilitate exploration activities in the northern parts of the country.

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 has led to confusion and project development delays. The issue of unsettled land claims is considered the most important barrier to mining investment in British Columbia based on information collected by the Fraser Institute.

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 2013.

In Ontario, new and amended regulations under the Mining Act of 2009 came into force. Under the Mining Act Awareness Program, anyone applying for or renewing an exploration license must complete a prospector's awareness program addressing recent changes to the Mining Act. It states that First Nations communities may apply to have sites of cultural significance withdrawn from mineral exploration and mining. Exploration plans must be submitted to the provincial government by the exploration company, and these plans are subject to government and First Nations review prior to commencing the activity. The provincial government is supporting the creation of a mining and exploration data center to assist the collection, filtering and analysis of exploration data.

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 and consideration of local ore processing, and further defines reporting and consultation requirements.

**Australia.** Exploration budget allocations reported by SNL for Australia showed a decrease

to about \$1.9 billion in calendar year 2013 from \$2.5 billion in calendar-year 2012. The Australian Bureau of Statistics reports mineral exploration expenditures (including coal and excluding petroleum) for the fiscal year from July 2012 through June 2013 of about A\$3 billion (US\$3.1 billion), about a 25-percent decrease from the Australian expenditure for fiscal year 2011-2012 of A\$4 billion (US\$4.1 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 5.9 percent from the 2011-2012 fiscal year to the 2012-2013 fiscal year, and the number of exploration licenses decreased 7 percent for the same timeframe. The Australian statistics include expenditures for coal, industrial minerals and mineral sands that are not included in the MEG and SNL statistics.

The estimated expenditures for iron ore exploration in Australia accounted for 44 percent of the total Australian expenditure for metals and minerals for fiscal year 2012-2013 (excluding petroleum), compared to 37 percent for 2011-2012, based on data reported by the Australian Bureau of Statistics as of Dec. 2, 2013. Gold exploration accounted for about 26 percent of the total nonfuel Australian expenditure for metals and minerals for fiscal year 2012-2013 and 25 percent in 2011-2012. In nominal terms, gold exploration in Australia decreased about 14 percent in fiscal year 2012-2013 to A\$662 million (US\$680 million). Uranium and coal are included in the Australian Bureau of Statistics data, but coal statistics have been removed for the statistics reported in this summary. Base metals accounted for 22 percent of the total nonfuel Australian expenditure in fiscal 2012-2013, compared to 26 percent in 2011-2012. The estimated expenditure for base metals exploration in Australia decreased 29 percent to A\$564 million (US\$580 million) in fiscal year 2012-2013. Uranium accounted for about 3 percent of the total nonfuel Australian expenditure in fiscal 2012-2013, compared to 5 percent in 2011-2012. Western Australia accounted for 70 percent of the Australian mineral exploration expenditure (excluding coal and petroleum); South Australia accounted for about 9 percent; Queensland accounted for about 8 percent; Northern Territory accounted for 5 percent; New South Wales accounted for 4 percent; Victoria accounted for 2 percent and Tasmania accounted for 2 percent.

About 8.4 Mm (27.5 million ft) were drilled at mineral prospects in Australia in 2012-2013, compared to 11.4 Mm (37.4 million ft) in 2011-2012, according to the Australian Bureau of Statistics. Of this drilling, approximately 67 percent was incurred on exploration at continuing projects and

Exploration budget allocations reported by SNL for Australia showed a decrease to about \$1.9 billion in calendar year 2013 from \$2.5 billion in calendar-year 2012.

33 percent was incurred for exploration of newly discovered projects. The early-stage (greenfield) project share has decreased from about 45 percent in 2003 to 33 percent in 2012. There has been a noticeable shift in activity from greenfield exploration to brownfield (areas previously explored or mined) exploration, particularly for bulk mineral commodities such as coal, iron ore, phosphate and potash. As commodity prices have increased, companies have focused their efforts in expanding reserves at undeveloped deposits and producing mines. Such a trend suggests that less drilling is being performed in greenfield areas with limited historical 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, based on data by SNL. Since the global economic downturn in 2008-2009, however, junior mining companies have found it more difficult to secure financing. They have had to focus exploration expenditures on fewer projects or reduce the exploration budgets at individual projects.

Data released by the Australia Bureau of Resources and Energy Economics show that investment in the country's mining industry, for committed and early-stage projects, has declined since mid-2012. These data reflect a record number of Australian projects at the "completed" stage and the lowest number of new projects approved for development in the past decade. Other factors contributing to the decrease in exploration activity in Australia include lower commodity prices, increased labor and costs associated with community infrastructure, the perceived low development rate of Australian projects and the uncertainty resulting from the introduction of the carbon tax and mineral resource rent tax.

The Queensland government announced plans to provide A\$30 million (US\$31 million) over three years to allow the Geological Survey of Queensland to search for potentially economic mineral deposits. The state government issued changes to streamline the environmental impact statement process and the mineral exploration approvals process. It also announced plans to ban all mineral development and mining on the Steve Irwin Wildlife Reserve and the Wenlock River area on Cape York Peninsula. The New South Wales government also announced plans to simplify regulations that would reduce mining lease approval times.

The 2013-2014 budget for South Australia included A\$6 million (US\$6.2 million) over four years to support a Mining and Petroleum Services Center of Excellence and A\$4 million (US\$4.1 million) over two years to continue funding for

the Plan for Accelerated Exploration initiative. The 2013-2014 budget for Victoria included A\$19 million (US\$20 million) directed toward stimulating mineral exploration and reducing barriers to mineral investment. The Western Australia government announced plans to invest A\$7.2 million (US\$7.4 million) in 61 exploration drilling programs conducted during 2013-2014. The government also announced a three-year royalty rebate for up to 50 percent for magnetite miners assessed on a project-by-project basis.

**United States.** The U.S. nonfuel mineral exploration budget decreased by about 38 percent to about \$1 billion in 2013 from \$1.7 billion in 2012, according to SNL data. The U.S. percentage of the world exploration budget was 7 percent in 2013. Based on the exploration budget, gold exploration accounted for about 50 percent of the total amount budgeted for U.S. exploration, base metals (primarily copper) accounted for about 36 percent, uranium exploration accounted for about 3.5 percent and the remaining 10.5 percent was budgeted for the exploration of other minerals. Major companies accounted for about 55 percent of the total U.S. budget and junior companies accounted for about 37 percent, based on SNL data. About 38 percent was for advanced stage exploration, 32 percent for early stage exploration, and 31 percent for exploration associated with a producing property. SNL data suggest that exploration drilling in the United States decreased about 43 percent in 2013 from 2012.

In 2013, data on 153 U.S. active exploration projects were collected and reviewed by the USGS; 37 percent were located in Nevada, 13 percent were located in Arizona, 12 percent were located in Alaska, 7 percent were located in Idaho, 5 percent were located in Utah, 4 percent each were located in California and Florida, and 3 percent each were located in Colorado, New Mexico and Wyoming. Exploration also took place in Alabama, Michigan, Minnesota, Montana, Oregon, South Carolina, South Dakota, Texas, Washington and Wisconsin. Most of these sites had prior exploration activity, suggesting that economic conditions were such that exploration companies were continuing prior exploration activity, or reevaluating sites based on technological advancements that would improve recovery or their proximity or geologic similarity to other recent discoveries.

A relatively high gold price in 2013 has sustained interest in Nevada exploration. Based on preliminary data compiled for 2012 by the Nevada Division of Minerals, exploration for precious metals was expected to represent 96 percent of projected mineral exploration expenditures for 2012. The principal exploration objectives in Nevada continued to be gold and silver, based

Based on SNL data, the 2013 exploration budget allocation for the Pacific region and Southeast Asia (excluding Australia) was about \$960 million, down 28 percent from the 2012 level of \$1.3 billion.

on USGS site data, although some exploration for copper, iron ore, lead, lithium, magnesium, molybdenum, potash, rare earths, tungsten, vanadium and zinc occurred in Nevada during 2012. Based on U.S. Bureau of Land Management statistics, 199,000 active claims were reported for Nevada in 2012.

There was significant exploration activity in Alaska during 2013, but compiled data were not yet available at the time of this writing. Preliminary data though suggest that exploration spending in Alaska would be less than the record amount spent in 2011. Based on a 2013 report released by the Alaska Department of Natural Resources, exploration expenditures (excluding development projects) in Alaska increased from about \$365 million in 2011 to about \$335 million in 2012. About 46 percent of the total estimated expenditure was to be spent in southwestern Alaska, 27 percent in the eastern interior, 10 percent in the northern region, 7 percent in the southeastern region, 5 percent in the western region, 4 percent in the south-central region and about 1 percent on the Alaskan Peninsula. About 45 percent of this expenditure was for precious metals, 45 percent for polymetallic deposits, 5 percent for base metals, and the remaining 5 percent for coal, industrial minerals, peat, and other minerals. In 2012, about 334,300 m (1.1 million ft) of hard rock and 4,000 m (13,000 ft) of placer drilling took place in Alaska.

In the United States, the U.S. Securities and Exchange Commission adopted rules mandated by the Dodd-Frank Wall Street Reform and Consumer Protection Act requiring resource extraction companies to disclose certain payments made to the U.S. government or foreign governments by May 2014. However, an April 2013 survey conducted by HIS Inc., found that 35 percent of the respondents had made no plans on how to conform to these rules. The U.S. Bureau of Land Management withdrew about 121,000 ha (300,000 acres) on public lands in six western states from location and entry under United States mining laws and the creation of solar energy zones. The U.S. Secretary of Interior extended a moratorium on new mining claims on Oregon's Klamath and Siskiyou watersheds for five years.

At the state level, New Mexico's Water Quality Control Commission approved the Copper Mine Rule that sets limits on discharges of water contaminants from copper mines in the state. In Wisconsin, the Wisconsin Mining Bill was enacted that governs a revised environmental permitting process in the state.

**Pacific Region.** Based on SNL data, the 2013 exploration budget allocation for the Pacific region and Southeast Asia (excluding Australia)

was about \$960 million, down 28 percent from the 2012 level of \$1.3 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 continued interest by Chinese and South Korean companies to expand sources of supply for gold, base metals and rare-earth elements 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, Papua New Guinea and the Philippines, together accounting for 69 percent of the active exploration sites in the region in 2013. Other countries with active exploration in 2012 include Cambodia, Fiji, Laos, Malaysia, New Zealand, the Solomon Islands, Thailand and Vietnam. Gold and silver exploration accounted for approximately 75 percent of all exploration interest in the Pacific region, base metals accounted for about 21 percent, with minor exploration activity for iron ore and other minerals in 2013. About 57 percent of the sites in this region were conducting early-stage exploration, 25 percent were exploring for minerals adjacent to producing mines, 12 percent were undergoing feasibility studies, 4 percent were in development and the remaining 2 percent were temporarily closed.

The Indonesian government initially imposed a ban on metal ore and concentrate exports in January 2013, but revisions of the legislation later in 2013 allowed exports of copper, iron ore, lead and zinc concentrates to continue with a new sliding-scale export tax. As a result, mineral exports from Indonesia have been severely curtailed, this particularly affected the nickel industry, as Indonesia had been the world's biggest exporter of nickel ore. In July 2012, an executive order was signed halting the issuing of new mining licenses in the Philippines while the government updated the Mining Act of 1995. The ban was lifted in March 2013, although debate on the mining law revisions continued. The Philippine Department of Environment and Natural Resources created a mining accountability body under the Philippine Extractive Industries Transparency Initiative to monitor government transactions of the mining industry. The Papua New Guinea government passed legislation giving the state complete ownership of the Ok Tedi copper-gold mine.

**Rest of the World.** Exploration budget allocations for the rest of the world (including mainland Asia, the countries of the Commonwealth

of Independent States, Europe and the Middle East) decreased by about 24 percent in the 2013 SNL survey to about \$2.4 billion from the \$3.1 billion budget reported in its 2012 survey; the percent share increased to 16.5 percent in 2013 from 15.2 percent in 2012. Russia and China accounted for about 58 percent of the region's exploration budget. Russia accounted for about 5 percent of the world exploration budget for 2013 and China accounted for about 4 percent. Based on the amount budgeted for exploration, the countries with the greatest exploration activity from this diverse region in 2013 are Russia, China, Kazakhstan, Turkey, Sweden, Finland and Mongolia. Together, these countries account for 76 percent of the regional exploration budget.

In terms of the number of exploration sites, Russia, Turkey, China, Mongolia, Sweden, Kazakhstan, Spain, India, Finland and Portugal were the most active countries. On the basis of exploration site data collected by the USGS, Russia accounted for about 13 percent of active exploration sites in the region, China and Turkey each accounted for about 10 percent, Mongolia accounted for about 8 percent, Sweden accounted for 6 percent, India and Kazakhstan each accounted for about 5 percent, Finland and Portugal each accounted for about 4 percent and Serbia accounted for about 3 percent. The remaining 32 percent occurred in 26 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 2013 primarily focused on precious metals (40 percent of all sites in this group), base metals (28 percent), iron ore (14 percent) and other minerals (18 percent). Exploration activity in the Commonwealth of Independent States focused on precious metals (47 percent), base metals (13 percent), iron ore (11 percent) and other minerals, largely potash and diamond (29 percent). European mineral exploration primarily focused on precious metals (42 percent), base metals (24 percent), iron ore (7 percent), tungsten (7 percent), tin (6 percent) and other minerals (14 percent). Middle Eastern exploration (including Turkey) primarily focused on precious metals (76 percent), base metals (9 percent), phosphate (9 percent), uranium (6 percent) and other mineral commodities.

In an effort to consolidate its rare-earth mining industry, China's largest rare-earths producer, the Inner Mongolia Baotou Steel Rare Earth Group, acquired nine regional mining companies. The government has encouraged the six largest Chinese rare-earth companies to integrate regional resources by providing preferential policies.

The government of India announced cuts in phosphate subsidies by 14 percent and potash by

21.5 percent for fiscal year 2013-2014. The Punjab state in Pakistan announced plans to spend \$13.3 million on exploration during fiscal year 2013-2014. The government announced plans to continue restrictions on gold imports at least until the beginning of 2014. The shortage of gold in India has raised the price for gold in India and may increase interest in gold exploration in that country.

The government of Mongolia passed the 2012 Strategic Entities Foreign Investment Law as a means of providing greater certainty surrounding mining taxes and royalties, and removes the distinction between foreign and domestic investors, but keeps certain restrictions on state-owned companies investing in the country. In 2013, the government cancelled 106 mining licenses of 11 foreign and 67 domestic firms planning to explore for a range of minerals.

In Kazakhstan, the Ministry of Regional Development was created to oversee policies related to the natural resources in the country. The government also lifted a ban on issuing new mineral exploration licenses.

In Greenland, legislation setting the framework for foreign exploration and mining in the country was passed in 2012. In 2013, the parliament of Greenland finalized legislation to remove a ban on uranium mining, allowing Greenland Minerals Energy Ltd, to move its Kvanefjeld uranium and rare-earths deposit to the feasibility stage.

The lower house of parliament in Romania rejected revisions to general mining legislation that could have enabled Gabriel Resources Ltd. to proceed with plans to develop the Rosia Montana gold mine.

Mineral exploration in Turkey has increased since the government amended its mining law in 2010. In 2013, there are 26 companies active in Turkey.

### 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, 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, 988 National Center, Reston, VA 20192; phone 703-648-4910 or mmagyar@usgs.gov. ■