# Canada's Global Mining Presence

***André Lemieux***

*The author is with the Minerals and Metals Sector,*
*Natural Resources Canada.*
*Telephone: (613) 992-2709*
*E-mail: alemieux@nrcan.gc.ca*

## GLOBAL MARKET FOR MINERAL EXPLORATION

In 2001, the value of exploration programs planned around the world by companies of all sizes for precious metals, base metals and diamonds stood at an estimated $3.4 billion (US$2.2 billion), down by more than 10% from the $3.8 billion (US$2.6 billion) planned the previous year.[1] Exploration programs were reduced in about two-thirds of the countries and were postponed or abandoned entirely in others. Only in one country, Namibia, was an increase in exploration budgets of more than $10 million expected from 2000 to 2001.

## WORLD'S LARGER COMPANIES

Global trends in mineral exploration are based on data for the world's larger mining companies.[2] These companies are defined here as those with annual exploration budgets of more than $4.6 million in 2001 (constant US$3 million annually). The larger companies are the only ones for which there are consistent data on worldwide exploration activity spanning a period of 10 years. In 2001, 98 companies based around the world each planned to spend more than $4.6 million on exploration. In 2000, 121 companies had planned to spend an equivalent amount; in 1997, the number was 279.

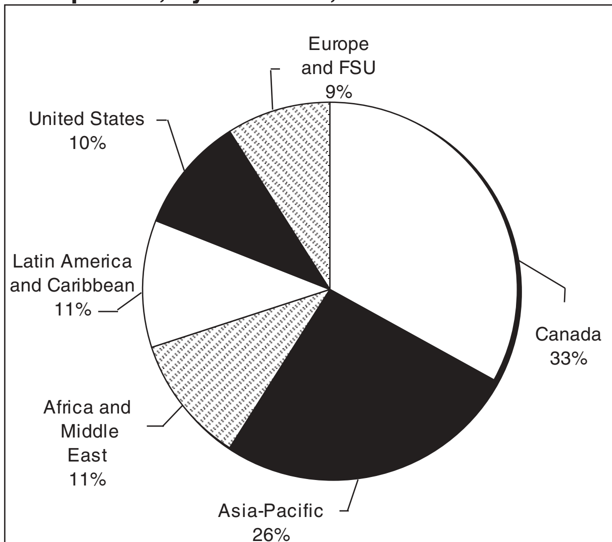
During 2001, the world's larger companies were expected to undertake exploration programs with a combined value of $2.5 billion (US$1.6 billion) in 99 countries, 7 countries fewer than in 2000.

The world's larger mining companies represent only about 15% of the 677 companies of all sizes that were expected to be active in mineral exploration worldwide in 2001. However, the larger companies account for over 80% of the value of all mineral exploration programs carried out around the globe. On a commodity basis, these companies account for almost 90% of the value of programs aimed at base metals and for 80% or more of those aimed at diamonds and gold. On a regional basis, they account for 90% of the programs planned for Latin America; 80% or more of those planned for Africa, Europe and the Former Soviet Union, and Asia-Pacific; and more than 70% of those planned for Canada.

## LARGER CANADIAN-BASED COMPANIES

There are more mineral exploration companies based in Canada than in any other country (Figure 1). In spite of generally low prices for mineral commodities

**Figure 1**
**Distribution of the World's Larger Exploration Companies, by Domicile, 2001**




Based on 100 companies with budgets of at least $4.6 million (US$3 million) for precious-metal, base-metal or diamond exploration.

Source: Natural Resources Canada, based on *Corporate Exploration Strategies: A Worldwide Analysis*, Metals Economics Group, Halifax, Nova Scotia.

in recent years and the difficulty for many companies who have no producing mines to raise capital, 32 Canadian-based companies each planned to spend $4.6 million or more on mineral exploration in 2001. In 2000, there were 48 Canadian-based companies that planned to spend an equivalent amount. In 1996, mining companies listed on Canadian stock exchanges raised a record amount of capital.[3] As a result, 141 Canadian-based companies had each planned to spend, in 1997, the equivalent of $4.6 million on exploration programs around the world. That year, their aggregate budgets for exploration, adjusted for inflation, reached an all-time high value of almost $2.1 billion.

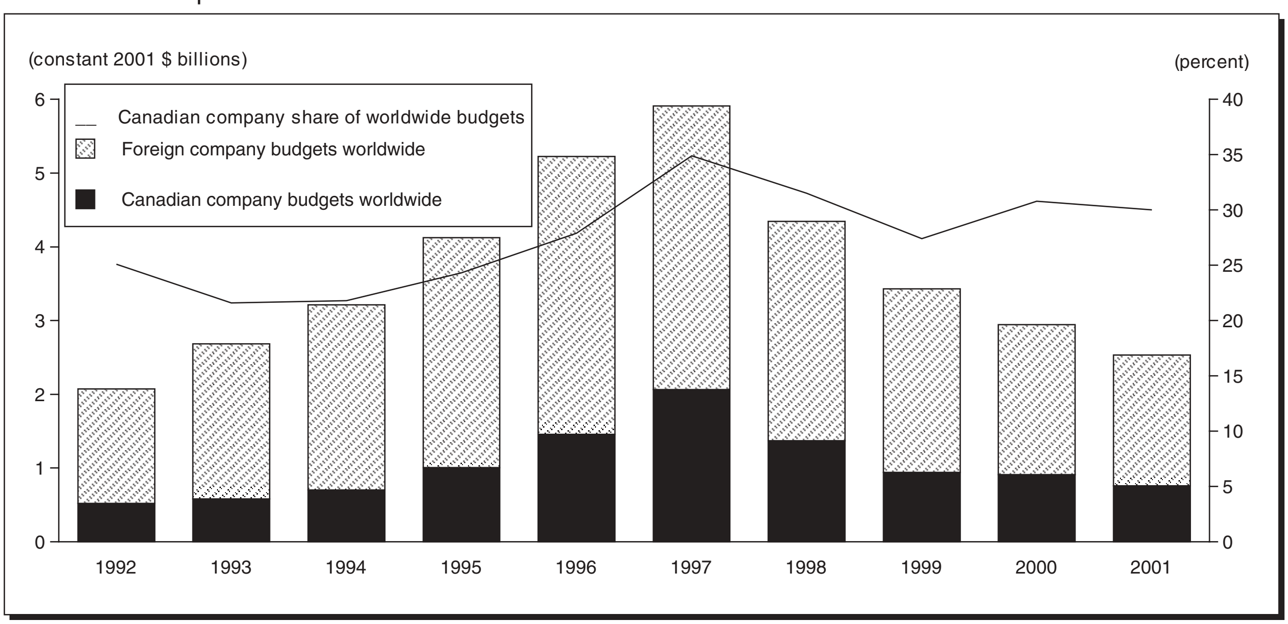
In 2001, the total value of the exploration programs that the larger Canadian-based companies planned to undertake in both Canada and elsewhere around the world stood at $760 million (Figure 2), down by 16% from almost $910 million budgeted in 2000. About two-thirds of the decrease from 2000 to 2001 was expected to occur abroad.

The programs that the larger Canadian-based companies planned to undertake during 2001 represent 30% of all larger-company exploration programs for the entire world. Canadians account for the dominant share, by far, of all worldwide mineral exploration activity. Their closest rivals, the Australians, account for 20% while the Europeans account for 15%. In 1997, Canadian programs accounted for a record 35% of the value of all mineral exploration programs planned worldwide.

The larger Canadian-based companies typically budget less individually for exploration programs than the industry average worldwide. In 2001, the larger Canadian-based companies had exploration budgets with a mean of $23.7 million and a median of $8.3 million, compared with global averages of $25.8 million and $10.2 million, respectively. In 2001, the mean of the budgets prepared by the larger Canadian-based companies increased by more than $5 million compared with that of the budgets prepared the previous year. This reflects increasing concentration within the larger-company segment of the mining industry.

Although, on a company-by-company basis, there can be a significant variation between budgets and expenditures, aggregate exploration budgets generally provide a reliable estimate of the actual total amount spent in the field worldwide. In the case of the larger Canadian companies, actual expenditures in 1999 were about 7% lower than budgeted, roughly the same departure as observed in the previous year.[4]

**Figure 2**
**Exploration Budgets of the World's Larger Companies, by Origin, 1992-2001**
Companies with Worldwide Budgets of at Least $4.6 Million in 2001 for Precious-Metal, Base-Metal or Diamond Exploration




Source: Natural Resources Canada, based on *Corporate Exploration Strategies: A Worldwide Analysis*, Metals Economics Group, Halifax, Nova Scotia.
Notes: The worldwide exploration budgets of companies that intended to spend less than $4.6 million in 2001 (US$3 million) are excluded. The worldwide exploration budgets for other commodities such as uranium or industrial minerals are also excluded.

At the end of 2001, companies of all sizes listed on Canadian stock exchanges held interests in a portfolio of almost 5700 mineral properties (Figure 3) located in Canada and in more than 100 other countries around the world.[5] Most of this portfolio is at the early stages of exploration. The number of properties held at the end of 2001 fell by about 600, or roughly 10%, compared with the number held at the end of the previous year. This reflects the difficulty, especially for the smaller companies, in continuing to obtain additional equity financing and the focus by most companies on core assets.

## LARGER-COMPANY EXPLORATION MARKET IN CANADA

In 2001, the larger-company mineral exploration market in Canada was valued at $365 million, down by $45 million, or 12%, from roughly $410 million in 2000 (Figure 4). Only in Australia and the United States were aggregate exploration programs expected to experience a larger year-over-year reduction. Canada ranks second, after Australia, in terms of countries where the global mineral exploration industry is the most active. Canada has held that position since 1992. The smaller companies are an important part of the mineral exploration industry in Canada, but their activities are not addressed specifically here.

In 2001, 38 of the world's larger domestic-based or foreign-based companies planned to explore for minerals in Canada, down from 53 in 2000. Nonetheless, more than 14% of the exploration efforts of all of the world's larger companies were expected to take place in Canada in 2001 (Figure 5). This proportion is only somewhat larger than in 2000, but it is up from about 11% during each of the previous three years. Prior to the large increase in exploration activity that occurred in developing countries starting in the early 1990s, the proportion of all worldwide exploration activity taking place in Canada stood at 18%.

At the end of 2001, there were more than 3000 mineral properties with recent exploration activity in this country (Figure 3).[6]

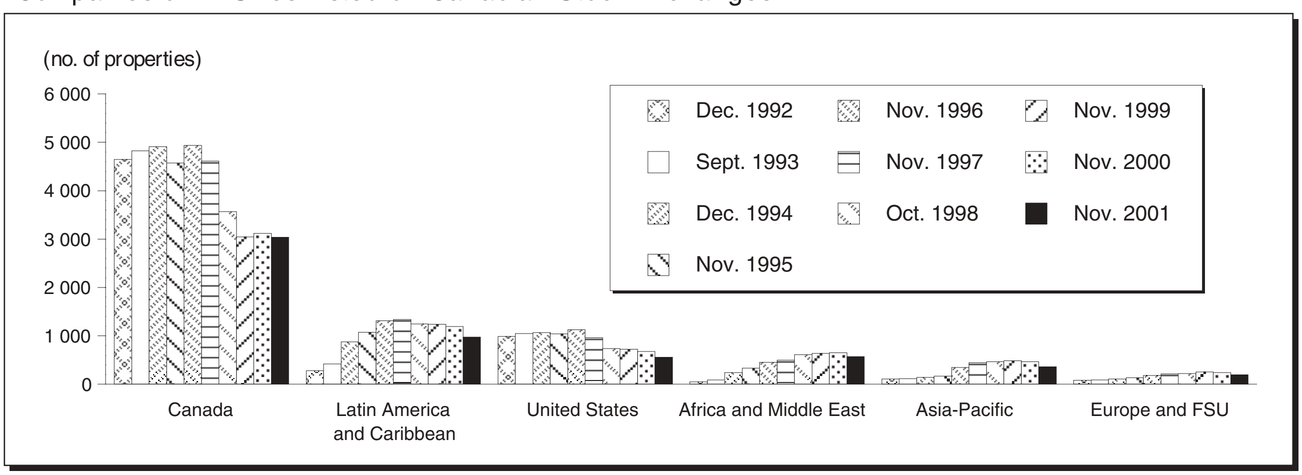
### Larger Canadian-Based Companies in Canada

In 2001, 20 of the larger Canadian-based companies allocated, in total, $207 million for exploration in Canada. This amount is down by almost $60 million, or 25%, from the roughly $270 million allocated in 2000.

For the second year in a row, Canadian companies planned to spend more on mineral exploration in Canada than in all of Latin America. From 1995 to 1999, Canadian-based companies spent more in that region of the world than in this country.

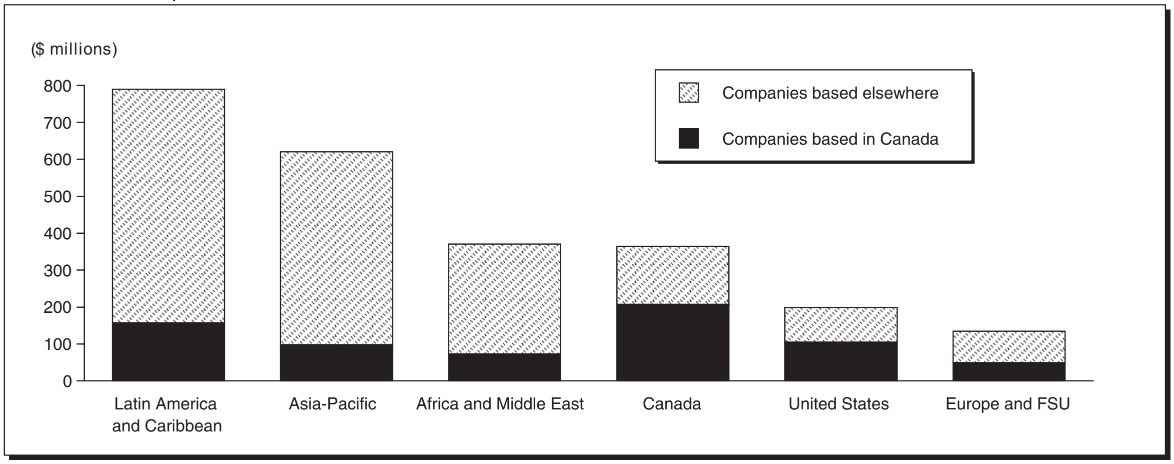
The larger Canadian-based companies control 57% of the larger-company mineral exploration market in Canada. The dominance of exploration programs by

**Figure 3**
**Canadian Mineral Property Portfolio Worldwide, by Region, 1992-2001**
Companies of All Sizes Listed on Canadian Stock Exchanges



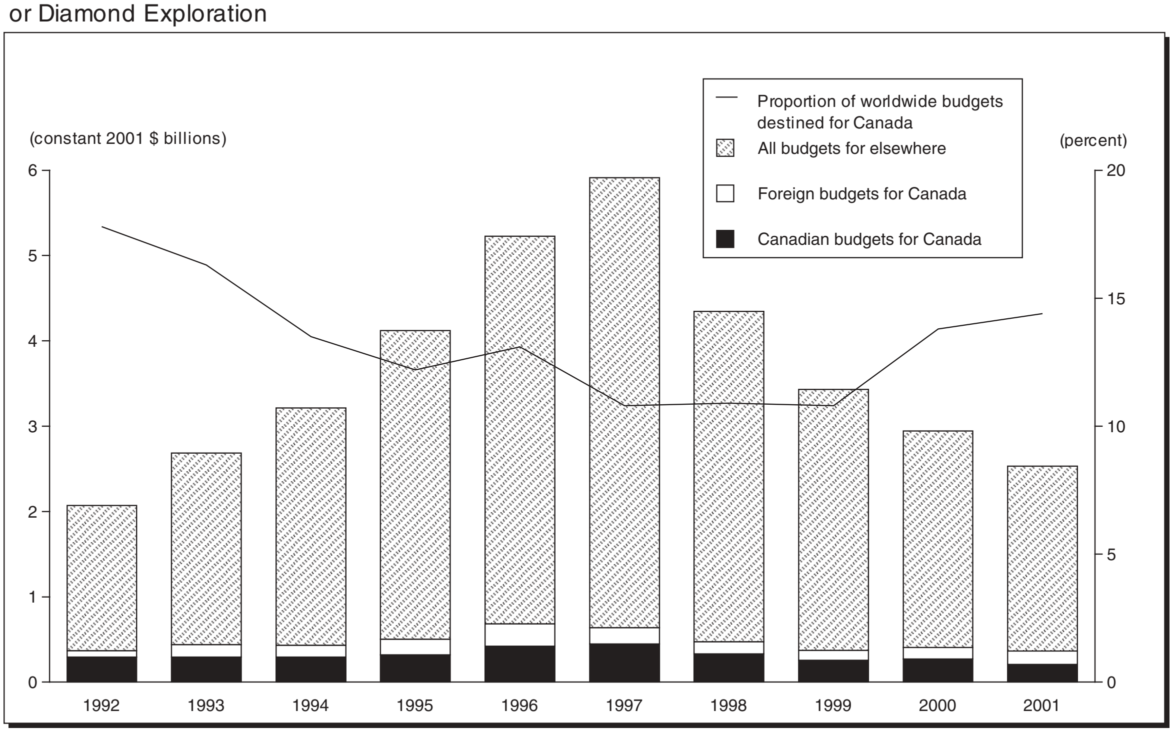

Source: Natural Resources Canada, based on *MIN-MET CANADA* for 1992-1997 and InfoMine db for 1998-2001, Robertson Info-Data Inc., Vancouver, British Columbia, and used under licence.
Note: The decrease in properties in Canada after 1997 is due, in part, to the implementation of database features that make it possible to exclude many inactive properties.

**Figure 4**
**Exploration Budgets of the World's Larger Companies for Selected Regions of the World, 2001**
Companies with Worldwide Budgets of at Least $4.6 Million for Precious-Metal, Base-Metal or Diamond Exploration




Source: Natural Resources Canada, based on *Corporate Exploration Strategies: A Worldwide Analysis*, Metals Economics Group, Halifax, Nova Scotia.
Notes: The worldwide exploration budgets of companies that intended to spend less than $4.6 million in 2001 (US$3 million) are excluded. The worldwide exploration budgets for other commodities such as uranium or industrial minerals are also excluded.

**Figure 5**
**Exploration Budgets of the World's Larger Companies for Canada and Elsewhere, 1992-2001**
Companies with Worldwide Budgets of at Least $4.6 Million in 2001 for Precious-Metal, Base-Metal or Diamond Exploration




Source: Natural Resources Canada, based on *Corporate Exploration Strategies: A Worldwide Analysis*, Metals Economics Group, Halifax, Nova Scotia.
Notes: The worldwide exploration budgets of companies that intended to spend less than $4.6 million in 2001 (US$3 million) are excluded. The worldwide exploration budgets for other commodities such as uranium or industrial minerals are also excluded.

domestic firms is relatively uncommon. In 2001, the only other countries where domestic companies controlled more than half of the larger-company market for mineral exploration were Sweden (56%), South Africa (66%), Australia (68%) and Japan (100%). That year, the market for mineral exploration was valued at over $400 million in Australia and over $65 million in South Africa, but was valued at less than $20 million in each of Japan and Sweden.

With increasing globalization, the share of the domestic exploration market controlled by Canadian-based companies has fallen gradually as foreign-based companies have increased the amount of exploration that they conduct in this country. In 1992, Canadian-based companies controlled 80% of the larger-company market in Canada but, by 2000, they controlled only two-thirds of it. Since the early 1990s, the share of the exploration market controlled by the larger domestic firms has also fallen gradually in the United States and Australia. Still, Canada remains the country where Canadian-based companies spend, by far, the largest proportion of their global mineral exploration budgets (Figure 6).

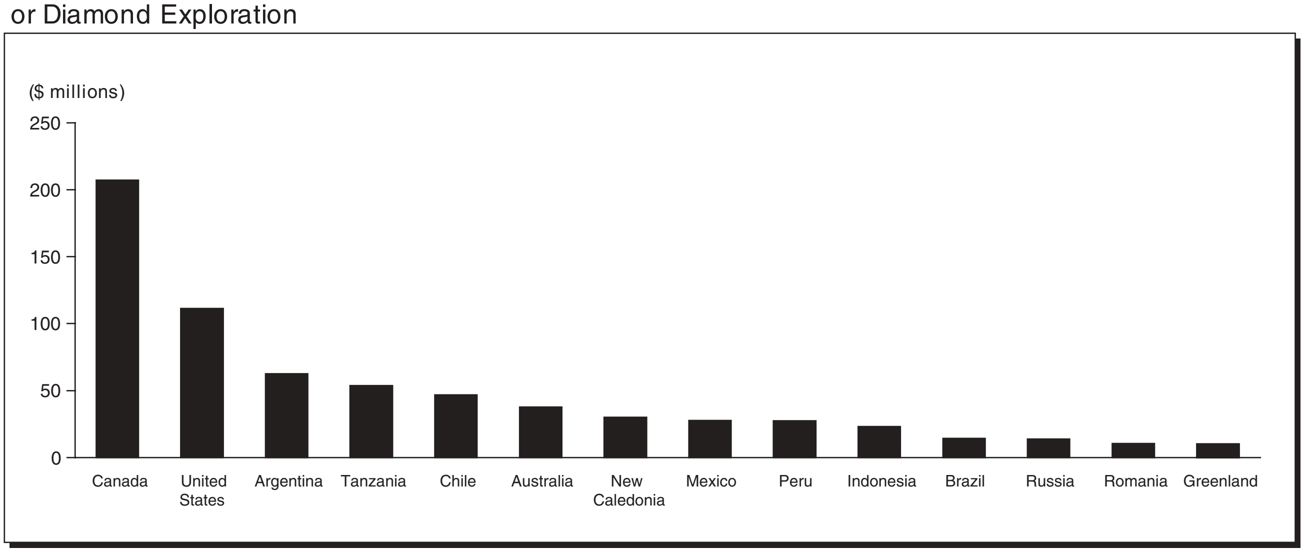
## Foreign-Based Companies in Canada

During 2001, 17 of the larger foreign-based companies planned to spend, in total, almost $160 million on mineral exploration in Canada (Figure 5). This represents almost 45% of all activity planned for this country, up from one-third in 2000. Compared with the previous year, the budgets of foreign-based companies for Canada increased by more than $30 million.

In 2001, the larger foreign-based companies active in mineral exploration in Canada included: BHP Billiton Limited-BHP Billiton Plc,[7] Normandy Mining Ltd., Pasminco Limited, and WMC Limited, all based in Australia; Echo Bay Mines Ltd., Freeport-McMoRan Copper & Gold Inc., Newmont Mining Corporation, and Phelps Dodge Corporation, all based in the United States; Anglo American plc, Boliden Limited,[8] Outokumpu Oyj, and Rio Tinto plc, all based in Europe; Anglo American Platinum Corporation Limited, AngloGold Limited, the De Beers group, and Impala Platinum Holdings Limited (IMPLATS), all based in South Africa; and the Mexican mining consortium, Grupo Mexico S.A. de C.V.

In 2001, De Beers reported an exploration budget for Canada of almost $60 million. This budget is the largest reported for this country by all domestic and foreign companies operating here.

**Figure 6**
**Exploration Budgets of the Larger Canadian-Based Companies, 2001**
**Countries Accounting for 90% of Canadian Budgets**
Companies with Worldwide Budgets of at Least $4.6 Million for Precious-Metal, Base-Metal or Diamond Exploration




Source: Natural Resources Canada, based on *Corporate Exploration Strategies: A Worldwide Analysis*, Metals Economics Group, Halifax, Nova Scotia.
Notes: The worldwide exploration budgets of companies that intended to spend less than $4.6 million in 2001 (US$3 million) are excluded. The worldwide exploration budgets for other commodities such as uranium or industrial minerals are also excluded.

## LARGER CANADIAN-BASED COMPANIES ABROAD

In 2001, the larger Canadian-based companies planned to spend over $550 million on mineral exploration outside of Canada (Figure 4). This amount is down by $70 million, or roughly 10%, from the more than $620 million these companies had planned to spend abroad in 2000.

More than 70% of the worldwide budgets of the larger Canadian-based companies for 2001 were allocated to programs abroad, the same proportion as in 2000. The foreign programs of the larger Canadian-based companies, as a proportion of their domestic and foreign programs combined, peaked at over 78% in 1997. In 1992, that proportion was only about 40%.

At the end of 2001, companies of all sizes listed on Canadian stock exchanges held interests in a portfolio of more than 2600 mineral properties located abroad (Figure 3), down by roughly 500 properties from the previous year. Foreign properties represent slightly more than half of the total mineral property portfolio held by all companies listed in Canada, up from about 25% in 1992.

Apart from the United States, where companies of all sizes listed on Canadian stock exchanges have a substantial mining presence, about 30 other nations, spread across the globe, account for most of the balance of their mineral property portfolio held abroad (Figure 7).

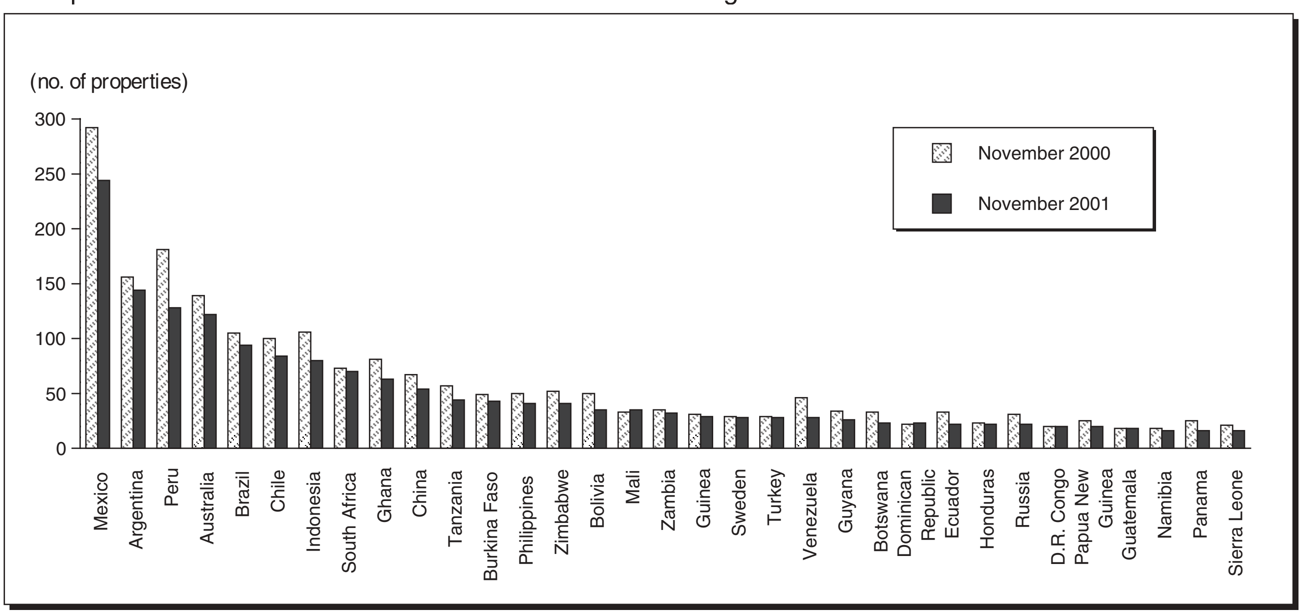
Canadian companies have interests in over 200 mines, smelters, refineries, plants under construction, or projects awaiting the results of a final production feasibility study in roughly 60 foreign countries.[9] They also have hundreds of other projects at the early stages of exploration in these countries and in more than 40 others. The activities of Canadian mining companies in Canada and abroad have fostered the development in this country of over 2200 suppliers of specialized mining goods and services, many of which export their products.[10]

### United States

In 2001, the larger-company mineral exploration market in the United States was valued at almost $200 million (Figure 4), or about 8% of the $2.5 billion larger-company market worldwide. Larger-company budgets for the United States were down by $120 million compared with those of the previous year. This decrease represents the largest year-over-year reduction in budgets for a single country.

In spite of considerable global retrenchment, 14 of the larger Canadian-based companies planned to

**Figure 7**
**Canadian Mineral Property Portfolio Abroad, 2000 and 2001 Countries Accounting for 80% of Canadian Holdings Located Outside the United States in 2001**
Companies of all Sizes Listed on Canadian Stock Exchanges




Source: Natural Resources Canada, based on InfoMine db, Robertson Info-Data Inc., Vancouver, British Columbia, and used under licence.

spend, in total, over $110 million in the United States, down from $160 million in 2000.

Companies based in most countries considerably reduced their exploration programs for the United States in recent years while those based in Canada increased theirs. As a result, the share of the larger-company exploration market held by Canadian-based companies in the United States has grown to over 55%. Canadian-based companies have increased their share of the exploration market in the United States almost every year since the early 1990s. The United States ranks second after Canada in terms of countries where Canadian companies are the most active in mineral exploration (Figure 6).

During 2001, Canadian companies were expected to spend $60 million more than American companies in the United States. U.S. companies have budgeted decreasing amounts for mineral exploration in their country most years since the early 1990s. Although U.S. companies accounted for almost 60% of the value of all exploration programs in their country in 1992, their activities represented only 26% in 2001.

In late 2001, companies of all sizes listed on Canadian stock exchanges held about 550 mineral properties in the United States (Figure 3), down by roughly 20% from about 675 at the end of the previous year. In 2000, they had projects located in 22 states, but their efforts were concentrated mainly in the western part of the country in Nevada, Alaska, California, Arizona, Montana, Idaho, Wyoming, Colorado, Washington, Utah and South Dakota.[11] That year, Nevada alone accounted for more than 250 of their mineral properties, or almost 40% of the total Canadian portfolio in the United States.

Although Canadian companies have considerably expanded their activities in Latin America, Africa and Asia since the early 1990s (Figure 3), the United States is likely to remain, for the foreseeable future, the foreign country where they hold their largest portfolio of mineral properties. At the end of 2001, the United States accounted for over 20% of all properties held abroad by companies of all sizes listed on Canadian stock exchanges.

Of all the Canadian-based companies, Teck Cominco Limited,[12] Placer Dome Inc., Barrick Gold Corporation,[13] Formation Capital Corporation, and Kinross Gold Corporation planned the largest mineral exploration programs in the United States during 2001. Together these companies planned to spend over $95 million, equivalent to 85% of the value of all Canadian programs for that country.

In 2001, Teck Cominco planned to spend more than $30 million in the United States. The company's budget represents the largest program planned by domestic and foreign companies operating in that country. The company planned to spend much of its U.S. budget at the Pogo gold deposit and at the Red Dog zinc-lead-silver mine, both in Alaska, at the White Earth titanium deposit in Colorado, at the Pend Oreille zinc-lead deposit in the state of Washington, and at the Mesaba copper-nickel deposit in Minnesota.

Placer Dome planned to spend about two-thirds of its $25 million exploration budget for the United States in Nevada, much of it at the Cortez (South Pipeline) gold mine and at Getchell (Getchell, Turquoise Ridge and N Zone gold deposits).

Barrick planned to spend much of its almost $23 million budget for the United States on further exploration for gold at the Goldstrike operation (Betze-Post and Meikle mines, and Rodeo deposit), the Marigold mine, the Pinson mine, the Round Mountain mine, the Ruby Hill mine, the Rossi deposit, and the Dee property, all in Nevada.

Kinross planned to spend much of its $8 million U.S. budget in the vicinity of the Fort Knox open-pit gold mine in Alaska.

## Latin America and the Caribbean

In 2001, the larger-company mineral exploration market in Latin America and the Caribbean was valued at $790 million (Figure 4), or over 30% of the $2.5 billion larger-company market worldwide. During 2001, the larger Canadian-based companies planned to spend over $190 million in the region, down by $30 million, or 14%, compared with 2000.

After Canada, Latin America is the region of the world where Canadian companies have become the most active in mineral exploration. However, from 1995 to 1999, Canadian companies spent more on mineral exploration in Latin America and the Caribbean than in Canada.

In 2001, Canadian companies held roughly one-quarter of the larger-company market in Latin America and the Caribbean. Canadian budgets stood a close second to those of companies based in the region. The share of the exploration market held by local companies increased to 32% in 2001, up from 29% the previous year; in 1994, local companies held less than 15% of the market in the region.

At the end of 2001, companies of all sizes listed on Canadian stock exchanges held interests in about 975 mineral properties in Latin America and the Caribbean, down by roughly 20% from almost 1200 in 2000. Since 1996, the total number of mineral properties held by Canadian companies in the region has exceeded the number held in the United States (Figure 3).

### Mexico

In 2001, the larger-company mineral exploration market in Mexico was valued at $106 million, or 4% of the $2.5 billion larger-company market worldwide. Larger-company budgets for Mexico were almost 20% lower than those of the previous year.

Mexico ranks third in Latin America, and eighth in the world, in terms of countries where Canadian companies are the most active in mineral exploration (Figure 6). Only two of the larger Canadian-based companies planned exploration programs in Mexico in 2001. These companies planned to spend, in total, about $30 million there. Nonetheless, the programs of these two companies represent over 20% of the market.

Teck Cominco planned to spend roughly 60% of its more than $20 million budget for Mexico at the San Nicholas copper-zinc-gold-silver deposit located in the state of Zacatecas. Towards the end of 2001, the company completed a feasibility study that estimated the capital cost of building a 15 000-t/d open-pit mine at San Nicholas at US$245.6 million. Reserves are estimated at 65 Mt grading 1.32% copper, 2.04% zinc, 0.53 g/t gold and 32.1 g/t silver. However, San Nicholas is unlikely to produce until prices for zinc and copper improve significantly. Teck Cominco's budget for Mexico was the second largest after that of the domestic company, Grupo Mexico. The latter company planned to spend almost $30 million on mineral exploration there.

At the end of 2001, companies listed on Canadian stock exchanges held interests in almost 250 properties in Mexico, down from about 300 in 2000.[11]

### South America

In 2001, the larger-company mineral exploration market in South America was valued at more than $645 million, or over one-quarter of the $2.5 billion larger-company market worldwide. Since the early 1990s, over $5 billion (current U.S. dollars) has been spent by all of the world's mining companies on mineral exploration in South America.

In 2001, fourteen of the larger Canadian-based companies planned to spend, in total, over $155 million in the region. This represents roughly one-quarter of the mineral exploration market there. Canadian companies held the dominant share of the market in both Argentina and Chile.

As a result of the merger of California-based Homestake Mining Company with Toronto-based Barrick,[13] Argentina has become the country of South America where Canadian-based companies budget the most for mineral exploration (Figure 6). Argentina also ranks third in the world in terms of countries where Canadian companies are the most active in mineral exploration.

In 2001, Barrick planned to spend almost $58 million in Argentina. The company's program accounted for more than half of all programs planned for that country. Barrick planned to allocate most of that budget to drill the Veladero gold-silver deposit and the Lama portion of the Pascua-Lama gold-silver deposit, which straddles the Chile-Argentina border. Barrick recently announced that it is planning to develop Pascua-Lama and Veladero as a single operation.

In Chile, Barrick planned to spend much of its $18 million budget for that country on the Pascua portion of the Pascua-Lama deposit. The company also planned to spend about $2 million at the Agua de la Falda gold mine. Barrick's mineral exploration budget for Chile was the second-largest for the country. The domestic company, Corporación Nacional del Cobre de Chile (CODELCO), planned to spend about twice as much.

In Peru, Barrick planned to spend roughly $11 million on grass-roots exploration on the Pierina gold belt and at other locations in the country.

At the end of 2001, companies of all sizes listed on Canadian stock exchanges held over 600 mineral properties throughout South America, down from more than 750 at the end of the previous year. They held about 140 properties in Argentina, almost 130 in Peru, more than 75 in each of Brazil and Chile, and over 25 in each of Bolivia, Guyana and Ecuador (Figure 8).

### Central America

In 2001, the larger-company mineral exploration market in Central America was valued at over $9 million, or less than 1% of the $2.5 billion larger-company market worldwide.

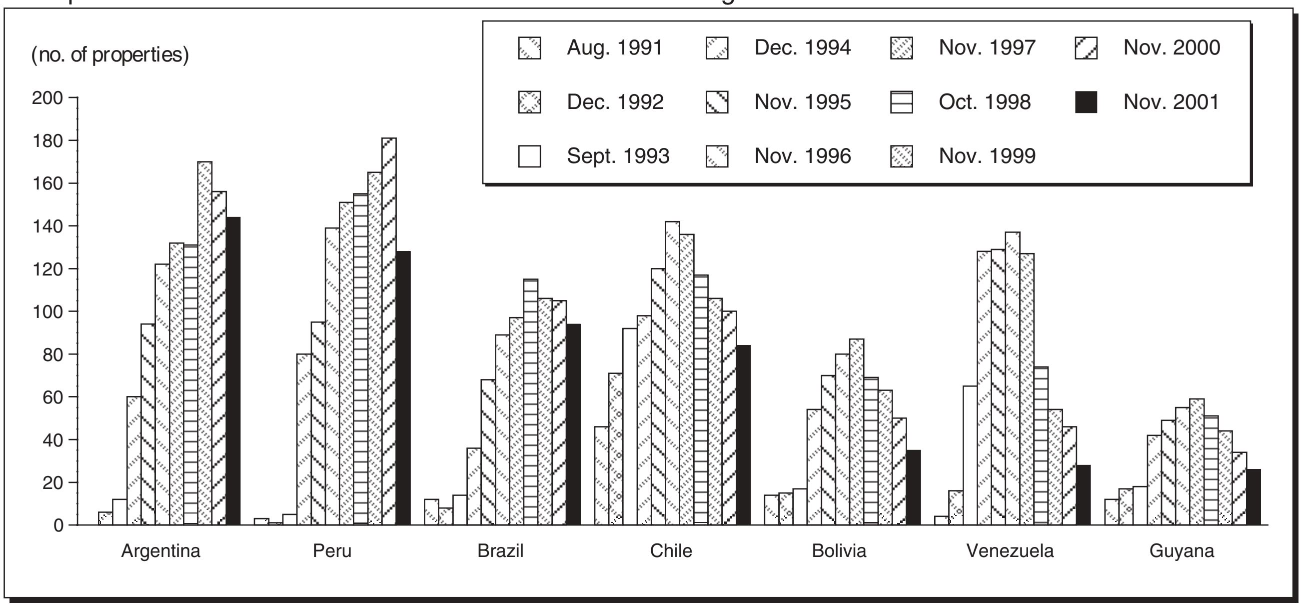
Vancouver-based Radius Explorations Ltd. is the only larger Canadian-based company that reported an exploration program for the region. The company planned to spend $5 million drilling the El Tambor gold prospect in Guatemala.

At the end of 2001, companies of all sizes listed on Canadian stock exchanges held about 90 mineral properties throughout Central America. They held 15 or more in each of Honduras, Guatemala and Panama (Figure 9).

### Caribbean

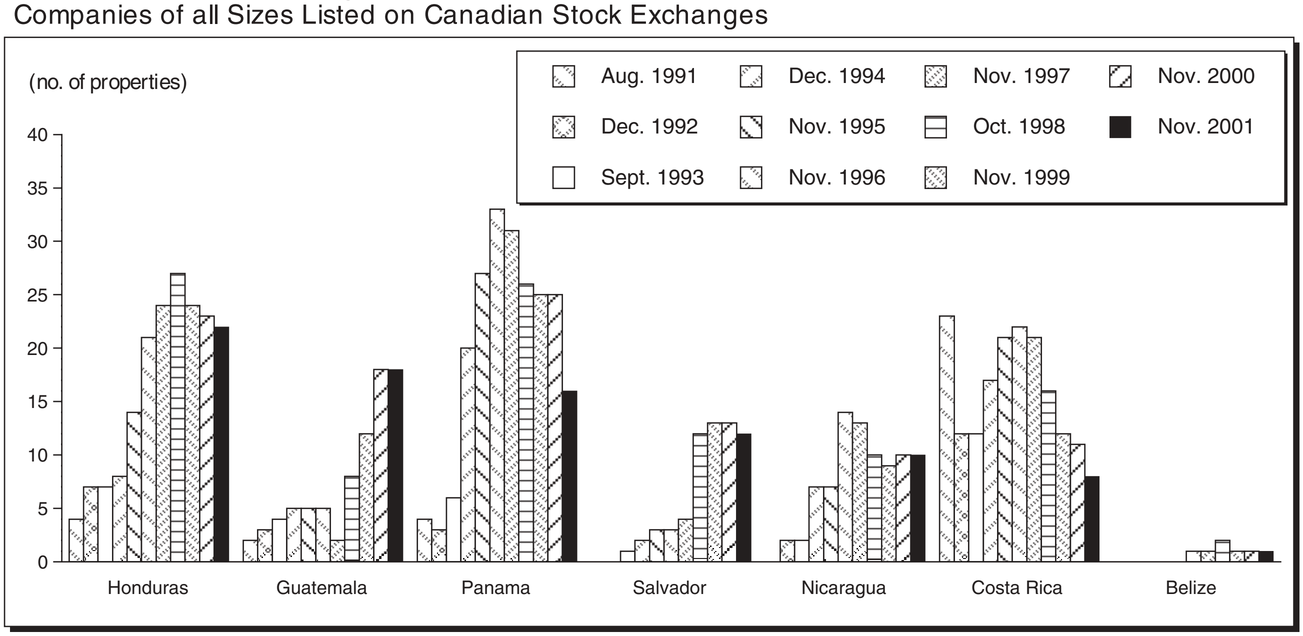
In 2001, the larger-company mineral exploration market in the Caribbean was valued at about $0.3 million, or less than 1% of the $2.5 billion larger-company market worldwide.

**Figure 8**
**Canadian Mineral Property Portfolio in South America, 1991-2001**
**Countries Accounting for 90% of Canadian Holdings in 2001**
Companies of all Sizes Listed on Canadian Stock Exchanges




Source: Natural Resources Canada, based on *MIN-MET CANADA* for 1991-97 and InfoMine db for 1998-2001, Robertson Info-Data Inc., Vancouver, British Columbia, and used under licence.

**Figure 9**
**Canadian Mineral Property Portfolio in Central America, 1991-2001**
Companies of all Sizes Listed on Canadian Stock Exchanges




Source: Natural Resources Canada, based on *MIN-MET CANADA* for 1991-97 and InfoMine db for 1998-2001, Robertson Info-Data Inc., Vancouver, British Columbia, and used under licence.

Northern Orion Explorations Ltd. (majority owned by Miramar Mining Corporation) is the only larger Canadian-based company that reported an exploration program for the Caribbean. The company has a 50% interest in the Mantua copper-gold deposit, which is located in Cuba. The deposit contains a resource of 7.5 Mt grading 2.74% copper.

At the end of 2001, companies of all sizes listed on Canadian stock exchanges held about 40 mineral properties in the Caribbean, most of them in the Dominican Republic and Cuba.

## Europe and the Former Soviet Union

In 2001, the larger-company mineral exploration market in Europe and the Former Soviet Union (FSU) was valued at $135 million (Figure 4), or slightly more than 5% of the $2.5 billion larger-company market worldwide. The larger Canadianbased companies planned to spend almost $50 million in the region, equivalent to roughly 40% of the market.

At the end of 2001, companies of all sizes listed on Canadian stock exchanges held almost 200 mineral properties in Europe and the FSU (Figure 3).

### *Western Europe*

In 2001, the larger-company mineral exploration market in western Europe was valued at almost $65 million, or slightly more than 2% of the $2.5 billion larger-company market worldwide. The larger Canadian-based companies planned to spend almost $15 million there, equivalent to more than 20% of the market. Canadians held the dominant share of the market in Greenland and Norway.

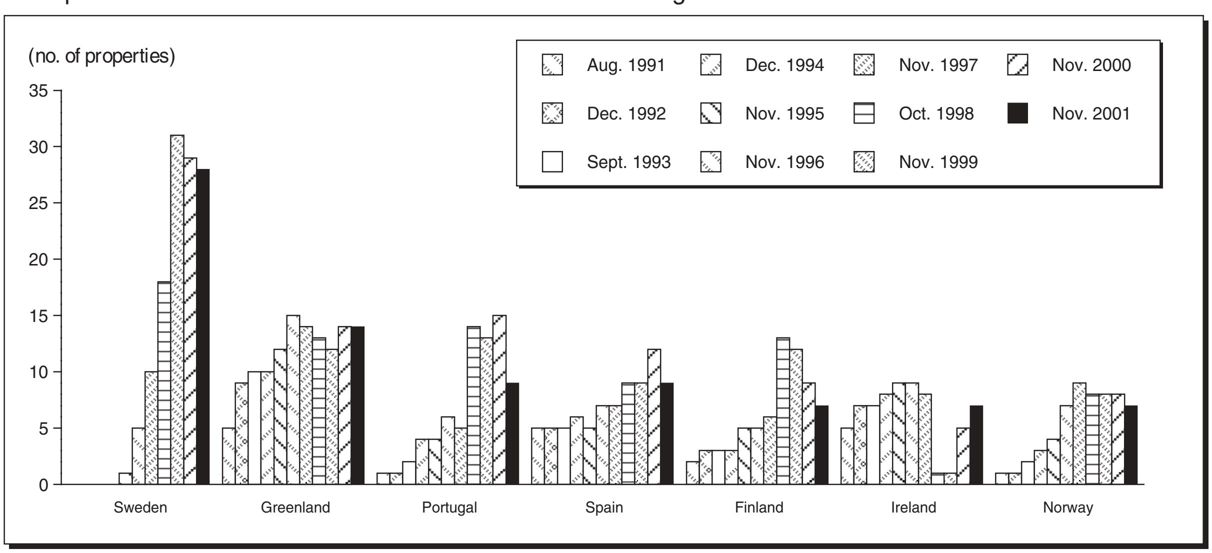
In Greenland, Crew Development Corporation planned to spend almost $10 million on advanced exploration at the Nalunaq high-grade narrow-vein gold deposit, the largest program in that country. Measured and indicated resources at Nalunaq are estimated at 360 000 t grading 25 g/t gold. A pre-feasibility study completed in early 1999 estimated the cost of a 500-t/d underground mine producing 148 000 oz of gold annually at US$20 million. The results of a bankable feasibility study were expected to be released in mid-2002.

In Norway, Crew planned to spend roughly $0.5 million at the Røros zinc-copper complex. Falconbridge Limited planned to spend about $0.3 million evaluating new prospects.

In Finland, CMQ Resources Inc. planned to spend $0.8 million on grass-roots exploration for platinum group metals at the Kuusamo property. Noranda Inc. planned to spend $1.8 million exploring for lead and zinc deposits.

At the end of 2001, companies of all sizes listed on Canadian stock exchanges held almost 90 mineral properties in western Europe. They held roughly 30 in Sweden, more than 15 in Greenland, and 10 in each of Portugal and Spain (Figure 10).

**Figure 10**
**Canadian Mineral Property Portfolio in Western Europe, 1991-2001**
**Countries Accounting for 90% of Canadian Holdings in 2001**
Companies of all Sizes Listed on Canadian Stock Exchanges




Source: Natural Resources Canada, based on *MIN-MET CANADA* for 1991-97 and InfoMine db for 1998-2001, Robertson Info-Data Inc., Vancouver, British Columbia, and used under licence.

### *Eastern Europe*

In 2001, the larger-company mineral exploration market in eastern Europe was valued at over $28 million, or about 1% of the $2.5 billion larger-company market worldwide. The larger Canadian-based companies planned to spend $20 million in eastern Europe, equivalent to almost 70% of the market. Canadian-based companies held the dominant share of the market in Romania and Turkey.

In Romania, Gabriel Resources Limited planned to spend over $4 million, about 80% of it to continue to assess the feasibility of bringing the Rosia Montana gold-silver deposit into production. In 2001, the capital cost of building a 13-Mt/y conventional open-pit mine at Rosia Montana was estimated at US$258 million. The deposit contains proven and probable reserves estimated at over 200 Mt grading 1.56 g/t gold and 7.8 g/t silver. The mine is expected to produce for over 16 years. The company planned to proceed with basic engineering and permitting for the project. Production could begin by 2005. Also in Romania, European Goldfields Ltd. planned to spend $6 million, more than half of it on the Certej gold-silver deposit.

In Turkey, Eldorado Gold Corporation planned to spend roughly $5 million on advanced exploration for gold, mainly at the Kisladag and Efemçukuru deposits. At Kisladag, a revised pre-feasibility study prepared during 2001 estimated the cost of building a 3.4-Mt/y heap-leach open-pit mine at $30 million. The initial plant would be expanded at a later date.

At the end of 2001, companies of all sizes listed on Canadian stock exchanges held almost 60 mineral properties in eastern Europe. They held almost 30 in Turkey and over 10 in Slovakia (Figure 11).

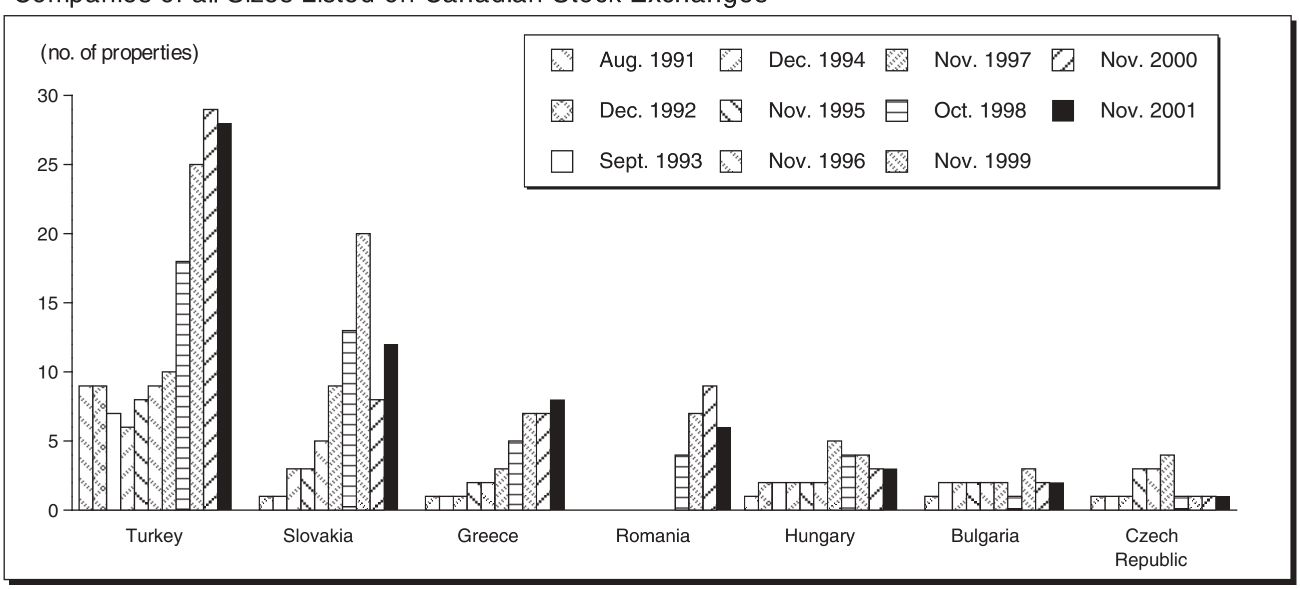
### *Former Soviet Union*

In 2001, the larger-company mineral exploration market in the countries of the FSU was valued at almost $37 million,[14] or more than 1% of the $2.5 billion larger-company market worldwide. The larger Canadian-based companies planned to spend about $15 million in these countries, about twice as much as in 2000.

At the end of 2001, companies of all sizes listed on Canadian stock exchanges held interests in about 50 mineral properties in five countries of the FSU (Figure 12), down from almost 70 at the end of the previous year.

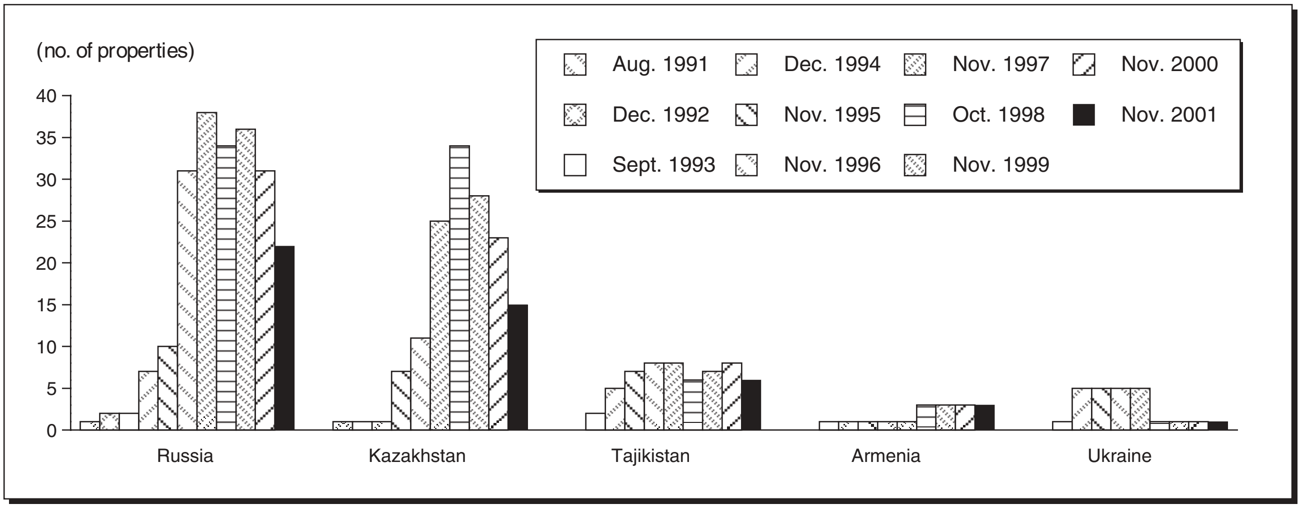
Although Canadian-based companies planned to carry out regional exploration programs in the FSU, Russia is where they planned to undertake most of their exploration programs in 2001. They expected to spend roughly $14 million on exploration in that country, equivalent to over 60% of the market.

**Figure 11**
**Canadian Mineral Property Portfolio in Eastern Europe, 1991-2001**
**Countries With Canadian Holdings in 2001**
Companies of all Sizes Listed on Canadian Stock Exchanges




Source: Natural Resources Canada, based on *MIN-MET CANADA* for 1991-97 and InfoMine db for 1998-2001, Robertson Info-Data Inc., Vancouver, British Columbia, and used under licence.

**Figure 12**
**Canadian Mineral Property Portfolio in the Former Soviet Union, 1991-2001**
**Countries with Canadian Holdings in 2001**
Companies of all Sizes Listed on Canadian Stock Exchanges




Source: Natural Resources Canada, based on *MIN-MET CANADA* for 1991-97 and InfoMine db for 1998-2001, Robertson Info-Data Inc., Vancouver, British Columbia, and used under licence.

In Russia, Kinross planned to spend over $5 million at the Birkachan gold prospect and at other sites, all within a 50-km radius of the Kubaka open-pit gold-silver mine.

Placer Dome planned to spend $1.4 million at the Nevyansk gold deposit located in the Urals and at other properties in the country. Falconbridge planned to spend $1.5 million on mapping and geophysics at the Khabarovskkrai nickel-copper property and elsewhere in the Russian Far East.

The number of properties held in Russia by companies of all sizes listed on Canadian stock exchanges stands at over 20.

## Africa and the Middle East

In 2001, the larger-company mineral exploration market in Africa and the Middle East was valued at more than $370 million (Figure 4), or almost 15% of the $2.5 billion larger-company market worldwide. That region of the world is one of the few that did not experience a significant decrease, both in absolute terms and in percentage terms, in exploration activity from 2000 to 2001.

### *Africa*

In 2001, the larger-company mineral exploration market in Africa was valued at over $360 million (Figure 4), or more than 14% of the $2.5 billion larger-company market worldwide. The larger Canadian-based companies planned to spend more than $70 million there, equivalent to almost 20% of the market on that continent.

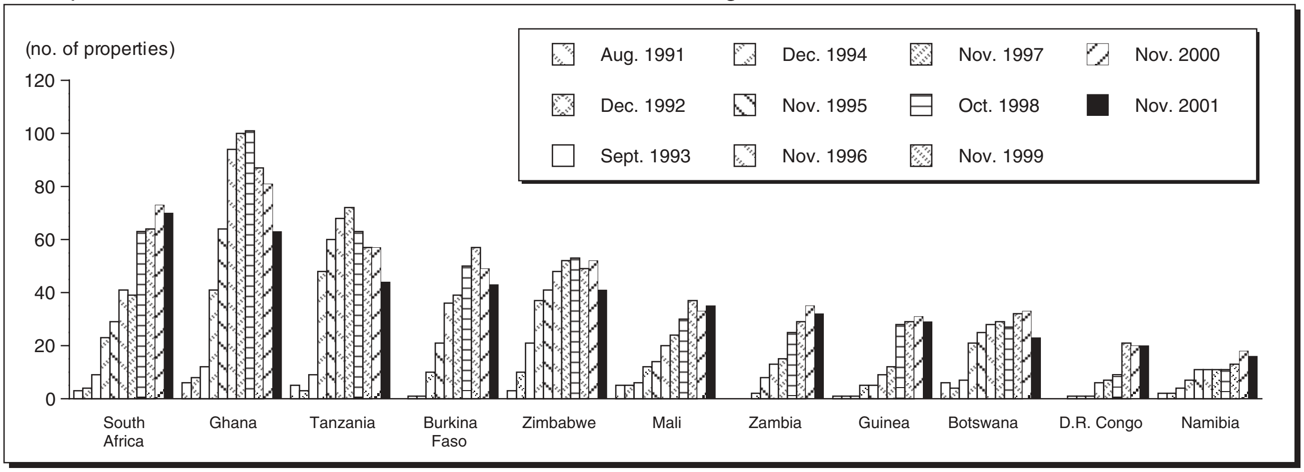
In 2001, Canadian mineral exploration budgets for Africa increased by $10 million compared with those of the previous year. The larger Canadian-based companies were expected to finance the largest share of the mineral exploration programs planned for Senegal and Tanzania.

In Senegal, IAMGOLD Corporation planned to spend over $1.8 million on grass-roots exploration for gold at the Bambadji property.

Barrick planned to spend more than $45 million looking for gold in Tanzania. The company planned to spend more than $25 million of that amount to increase reserves at the Bulyanhulu underground mine where production started in April 2001. It also planned to spend almost $17 million on the Tulawaka property where a resource of 1 million oz of gold has been identified. Barrick's budget for Tanzania represents one of the largest company exploration programs for a single country.

At the end of 2001, companies of all sizes listed on Canadian stock exchanges held interests in over 550 mineral properties in 39 countries on the African continent. This represents a decrease of about 100 properties since the end of 2000. At the end of 2001, Canadian companies held interests in 50 or more properties in each of South Africa and Ghana (Figure 13).

**Figure 13**
**Canadian Mineral Property Portfolio in Africa, 1991-2001**
**Countries Accounting for 75% of Holdings in 2001**
Companies of all Sizes Listed on Canadian Stock Exchanges




Source: Natural Resources Canada, based on *MIN-MET CANADA* for 1991-97 and InfoMine db for 1998-2001, Robertson Info-Data Inc., Vancouver, British Columbia, and used under licence.

### *Middle East*

In 2001, the larger-company mineral exploration market in the Middle East was valued at $9 million. The larger Canadian-based companies planned to spend $0.2 million there, equivalent to less than 2% of the market in that region.

## Asia-Pacific

In 2001, the larger-company mineral exploration market in Asia-Pacific was valued at $620 million (Figure 4), or almost one quarter of the $2.5 billion larger-company market worldwide.

Exploration budgets for the region were $140 million less than those proposed in 2000. Activity was expected to be down by over $70 million in Australia, which represents the second largest year-over-year decline for a single country after the one that was expected to occur in the United States. Exploration activity was also expected to be down by $40 million in Papua New Guinea and down by $25 million in Indonesia.

The larger Canadian-based companies planned to spend $114 million in the region, equivalent to over 18% of the market. Their budgets for Asia-Pacific in 2001 were maintained at the same level as in 2000.

At the end of 2001, companies of all sizes listed on Canadian stock exchanges held interests in over 350 mineral properties in Asia-Pacific (Figure 3), down by over 20% from about 460 at the end of the previous year.

### *Southeast Asia*

In 2001, the larger-company mineral exploration market in Southeast Asia was valued at almost $135 million, or slightly more than 5% of the $2.5 billion larger-company market worldwide. The larger Canadian-based companies planned to spend $37 million in the region, equivalent to more than one-quarter of the market there.

In Indonesia, Weda Bay Minerals Inc. planned to spend over $20 million to continue to assess the feasibility of bringing the Halmahera Island lateritic nickel-cobalt deposit into production. In June 2001, the company completed a pre-feasibility study for a pressure acid-leach plant that would produce 48 500 t/y of nickel and 4600 t/y of cobalt. The company is examining alternatives for processing the resource, which is estimated at over 200 Mt grading 1.37% nickel and 0.11% cobalt.

In Papua New Guinea, Placer Dome planned to spend $4 million to increase reserves at the Porgera open-pit gold mine. That operation produced over 761 000 oz of gold in 2001.

In the Philippines, Crew planned to spend more than $4 million on advanced exploration at the Mindoro lateritic nickel-cobalt deposit. In 1998, the company completed a pre-feasibility study for an open-pit mine there that would produce 40 000 t/y of nickel and 3000 t/y of cobalt over a 30-year period. Resources at Mindoro are estimated at over 200 Mt grading 0.92% nickel and 0.08% cobalt.

In Myanmar, Ivanhoe Mines Ltd. planned to spend $1.5 million looking for gold at the Modi Tuang property.

In Vietnam, Falconbridge planned to spend $1 million at the Ban Phuc nickel-copper deposit. Ban Phuc contains an indicated resource estimated at 2.6 Mt grading 1.85% nickel, 0.6% copper and 0.056% cobalt.

At the end of 2001, companies of all sizes listed on Canadian stock exchanges held over 150 mineral properties in Southeast Asia, down from over 200 at the end of the previous year. They held about 80 properties in Indonesia and more than 40 in the Philippines (Figure 14).

### East Asia

In 2001, the larger-company mineral exploration market in east Asia, which includes China, Japan, Mongolia and South Korea, was valued at $33 million,[14] or slightly more than 1% of the $2.5 billion larger-company market worldwide. The larger Canadian-based companies planned to spend over $9 million in the region, equivalent to roughly 30% of the market.

Since the early 1990s, there has been considerable Canadian interest in the mineral potential of China. In 2001, Placer Dome, Teck Cominco, Falconbridge and Noranda planned exploration programs in China. Placer Dome planned to spend $1.4 million on grass-roots exploration for gold in that country. In late 2001, companies of all sizes listed on Canadian stock exchanges held interests in about 50 mineral properties in China (Figure 14).

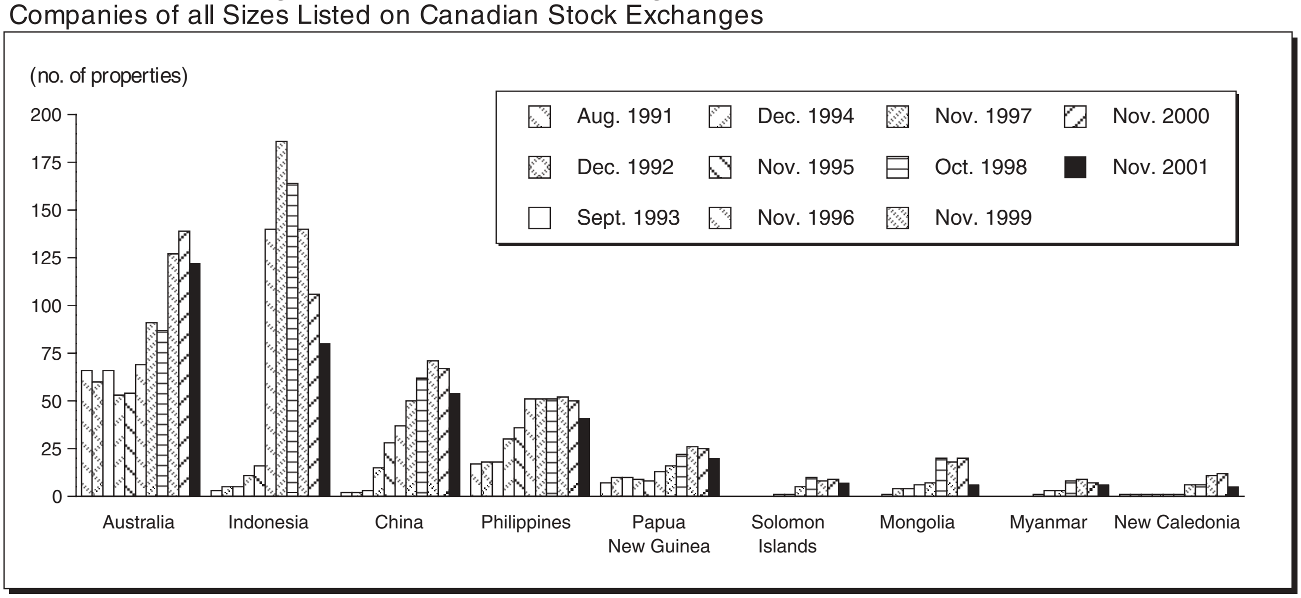
In South Korea, Ivanhoe planned to spend about $3 million on exploration for gold. In Mongolia, the company planned to spend $1.5 million on grass-roots exploration for gold and base metals at the Oyu Tolgoi (Turquoise Hill) property; Cameco Corporation planned to spend over $2 million on exploration for gold in the country.

### South Pacific

In 2001, the larger-company mineral exploration market in the South Pacific was valued at over $440 million, or more than 17% of the $2.5 billion larger-company market worldwide. Australia accounted for over 90% of that market. The larger Canadian-based companies planned to spend almost $68 million in the region.

In New Caledonia, Falconbridge planned to spend over $30 million for advanced exploration at the Koniambo lateritic nickel deposit. Inferred resources at Koniambo are estimated at 151 Mt grading 2.58% nickel. A pre-feasibility study for a 60 000-t/y ferronickel plant is currently under way. Falcon-

**Figure 14**
**Canadian Mineral Property Portfolio in Asia-Pacific, 1991-2001**
**Countries Accounting for 95% of Canadian Holdings in 2001**
Companies of all Sizes Listed on Canadian Stock Exchanges




Source: Natural Resources Canada, based on *MIN-MET CANADA* for 1991-97 and InfoMine db for 1998-2001, Robertson Info-Data Inc., Vancouver, British Columbia, and used under licence.

bridge's budget for Koniambo in 2001 is among the largest for a single Canadian project abroad. The deposit could be in production by 2003.

In early 2001, Inco Limited announced that it planned to build, at Goro, also in New Caledonia, a US$1.4 billion open-pit mine and processing plant that would use hydro-metallurgical and solvent extraction processes. The operation would have a capacity of 54 000 t/y of nickel and 5400 t/y of cobalt. Production is planned for 2004.

Barrick planned to spend $16 million on mineral exploration in Australia. The company planned to spend about 70% of its budget for that country to increase reserves at the Plutonic, Darlot-Centenary and Lawlers gold mines. It planned to spend the rest of its budget on grass-roots exploration for gold on the Plutonic Well greenstone belt, at Warrida Well, and elsewhere in the country. Placer Dome planned to spend almost 80% of its more than $9 million budget for Australia to increase reserves at the Granny Smith and the Kidston gold mines, and at the Osborne copper mine. Noranda planned to spend almost half of its more than $6 million budget for Australia at the Lady Loretta zinc-lead-silver deposit. Reserves at Lady Loretta are estimated at 11.5 Mt grading 15.2% zinc, 5.4% lead and 90 g/t silver.

At the end of 2001, companies of all sizes listed on Canadian stock exchanges held almost 140 properties in the South Pacific, of which over 90% are located in Australia (Figure 14).

### *South Asia*

In 2001, the larger-company mineral exploration market in South Asia, which includes India, Pakistan and Sri Lanka, was valued at about $10 million, or less than 1% of the $2.5 billion larger-company market worldwide. The larger Canadian-based companies reported no exploration programs for that region of the world.

## SUMMARY AND OUTLOOK

In 2001, the larger Canadian-based companies planned to conduct, in Canada and elsewhere around the world, mineral exploration programs valued at almost $760 million. Canadians were expected to undertake 30% of the $2.5 billion in exploration programs planned by all of the world's larger companies. The share of the global mineral exploration market controlled by Canadian companies is the largest, by far.

More than 14% of the world's larger-company mineral exploration activity was expected to occur in Canada in 2001, the same proportion as in 2000. Canada ranks second in terms of countries where the world's mineral exploration companies are the most active.

During 2001, and for the second year in a row, Canadians planned to conduct more mineral exploration in Canada than in all of Latin America. Canadian companies planned to conduct the largest share of exploration programs, not only in Canada, but also in the United States, the Caribbean, eastern Europe, and Southeast Asia. Although Canadian companies have diversified their portfolio of mining assets to well over 100 countries, Canada remains the country where they continue to be, by far, the most active.

Mineral commodity prices remain relatively low and this affects the amount of revenue that can be reinvested in mineral exploration. Financing exploration projects for many of the smaller companies continues to be difficult. As a result, many of these smaller companies are inactive. Canadian companies are focussing their efforts on their most promising assets. This is reflected in a 10% decrease in the number of mineral properties held in Canada and abroad from more than 6300 at the end of 2000 to less than 5700 at the end of 2001.

The larger-company exploration market is becoming increasingly concentrated. The number of companies spending the equivalent of US$3 million per year on exploration (C$4.6 million in 2001) has decreased significantly since the late 1990s. In the case of Canadian companies, the number has fallen from an all-time high of 141 in 1997 when financing was readily available to only 32 in 2001.

Globalization of the mining industry is continuing. In Canada, the share of the mineral exploration market controlled by foreign companies has increased from 20% in 1992 to over 40% in 2001. Mergers and acquisitions have become a frequent occurrence in the mining industry. The merger of California-based Homestake with Toronto-based Barrick in late December 2001 propelled Barrick to the rank of second-largest gold producer in the world. Not only did Homestake contribute a significant number of mineral properties to Barrick's portfolio of exploration and producing assets, it also increased Barrick's total Canadian exploration budget worldwide to over $180 million. As a result, Barrick became the company with the largest mineral exploration budget in the world.

Although Canadian companies tend, on average, to have smaller exploration budgets than their competitors, they are considerably more numerous than companies based elsewhere. As a result, Canadians are likely to continue, for the near future at least, to dominate mineral exploration worldwide.

# REFERENCES

[1] All currencies in this review are expressed in Canadian dollars unless otherwise indicated.

[2] Most of the data on the larger-company mineral exploration market worldwide are based on *Corporate Exploration Strategies: A Worldwide Analysis*, published annually by Metals Economics Group, Halifax, Nova Scotia (tel. [902] 429-2880).

[3] Keith Brewer and André Lemieux, *Canada's Global Position in Mining - Canadian Financing of the International Mining Industry*, Metals Finance 4th International Conference, Toronto, May 7-9, 1997, Natural Resources Canada, Ottawa, 53 pp. (tel. [613] 995-4577).

[4] For more information on various aspects of the relationship between exploration budgets and exploration expenditures for the larger Canadian-based companies, see André Lemieux, "Canada's Global Mining Presence," in the 1998 edition of the *Canadian Minerals Yearbook*, Natural Resources Canada, Ottawa, pp. 7.1 and 7.2 (www.nrcan.gc.ca/mms/cmy/content/1998/08.pdf). See also André Lemieux, "Canada's Global Mining Presence," in the 1999 edition of the *Canadian Minerals Yearbook*, Natural Resources Canada Ottawa, pp. 7.1 and 7.3 (www.nrcan.gc.ca/mms/cmy/content/08.pdf).

[5] Most of the data for 1991 through 1997 on the mineral property portfolio of companies of all sizes listed on Canadian stock exchanges are derived from MIN-MET CANADA; for 1998 through 2001, they are derived from InfoMine db. These databases are products of Robertson Info-Data Inc. of Vancouver, British Columbia (tel. [604] 683-2037).

[6] For trends in mineral deposit appraisal activity in Canada over the interval 1982-97, and for a list of projects at the deposit appraisal stage in the late 1990s, see André Lemieux, "Canada's Global Mining Presence," in the 1996 edition of the *Canadian Minerals Yearbook*, Natural Resources Canada, Ottawa, pp. 8.9 and 8.11-8.22 (www.nrcan.gc.ca/mms/cmy/content/1996/08.pdf).

[7] BHP Billiton was formed from the merger, in June 2001, of BHP Limited and Billiton Plc. The company is listed on the London Stock Exchange as BHP Billiton Plc; it is also listed on the Australian Stock Exchange as BHP Billiton Limited. The corporate headquarters of BHP Billiton are located in Melbourne, Australia.

[8] In November 2001, Boliden Limited changed its domicile from Toronto to Stockholm, Sweden. Boliden remains listed on the Toronto Stock Exchange.

[9] For a list of mines, smelters, refineries and other advanced mineral development projects in which companies based in Canada had an interest in mid-2001, see André Lemieux, "Canada's Global Mining Presence," in the 2000 edition of the *Canadian Minerals Yearbook*, Natural Resources Canada, Ottawa, pp. 7.16-7.19 (www.nrcan.gc.ca/mms/cmy/content/08.pdf).

[10] For a discussion of the global market for mining goods and services and the role played by Canadian companies, see André Lemieux, *Canadian Suppliers of Mining Goods and Services: Links Between Canadian Mining Companies and Selected Sectors of the Canadian Economy*, Natural Resources Canada, Ottawa, September 2000, 84 pp. (www.nrcan.gc.ca/mms/pubs/services- mines-e.pdf).

[11] For a geographic distribution of mineral properties in which Canadian companies have an interest in the United States and in Mexico, see André Lemieux, "Canada's Global Mining Presence," in the 2000 edition of the *Canadian Minerals Yearbook*, Natural Resources Canada, Ottawa, pp. 7.5 and 7.7 (www.nrcan.gc.ca/mms/cmy/content/08.pdf).

[12] Vancouver-based Teck Corporation and Cominco Ltd. merged effective July 20, 2001. The name of the company was changed, in September 2001, to Teck Cominco Limited. The exploration budget of Teck Cominco discussed in this review refers to the combined budgets of the merged companies.

[13] California-based Homestake Mining Company merged with Toronto-based Barrick Gold Corporation on December 14, 2001. As a result, Barrick Gold Corporation, the successor company, became the second-largest gold producer in the world. The exploration budget of Barrick discussed in this review refers to the combined budgets of the merged companies.

[14] The size of the mineral exploration market in certain regions of the world is probably underestimated because there are few data available on the extent of exploration programs undertaken by some state agencies.

*Notes: (1) Information in this review was current as at July 2002. (2) This and other reviews, including previous editions, are available on the Internet at www.nrcan.gc.ca/mms/cmy/index_e.html.*

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