

# Mineral Exploration, Deposit Appraisal and Mine Complex Development Activity in Canada

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## NEW DEFINITIONS

To provide more complete and accurate coverage of mineral development expenditures in Canada from exploration to mine production, new definitions of work phases for mineral development were introduced in the 1997 federal-provincial survey of the mineral industry. Major changes include replacing the former exploration phase (broadly speaking) with the exploration (strictly speaking) and deposit appraisal phases and expanding the categories of expenditures covered.

The exploration phase now extends to the discovery and delineation of a mineral resource of potential economic interest. The deposit appraisal phase brings the delineated deposit to the stage of detailed knowledge required for a production feasibility study to support a production decision and undertake the mine complex development phase. Mine complex development includes mine development activities carried out to delineate the ore in detail, to gain access to and prepare it for production, and also to extend known reserves. An integrated survey format has been developed to collect statistical information for these three work phases.

In addition, new categories of engineering, economic and feasibility studies, and environment and land access expenditures have been added to field work and related overhead expenditures. Capital expenditures for construction, machinery and equipment, and associated repair and maintenance expenditures are now collected for all three phases instead of just for the mine development phase.

This year, to reconcile data for 1997 with previous statistical series, the data are adjusted to the old

survey definitions by removing the new categories of expenditures. This review both compares the adjusted 1997 data with 1996 data and provides a detailed analysis of the 1997 data based on the new definitions. Tables 1a and 1b are the main reference tools provided to reconcile the 1997 data with those of 1996.

## HIGHLIGHTS OF MINERAL DEVELOPMENT EXPENDITURES, 1997

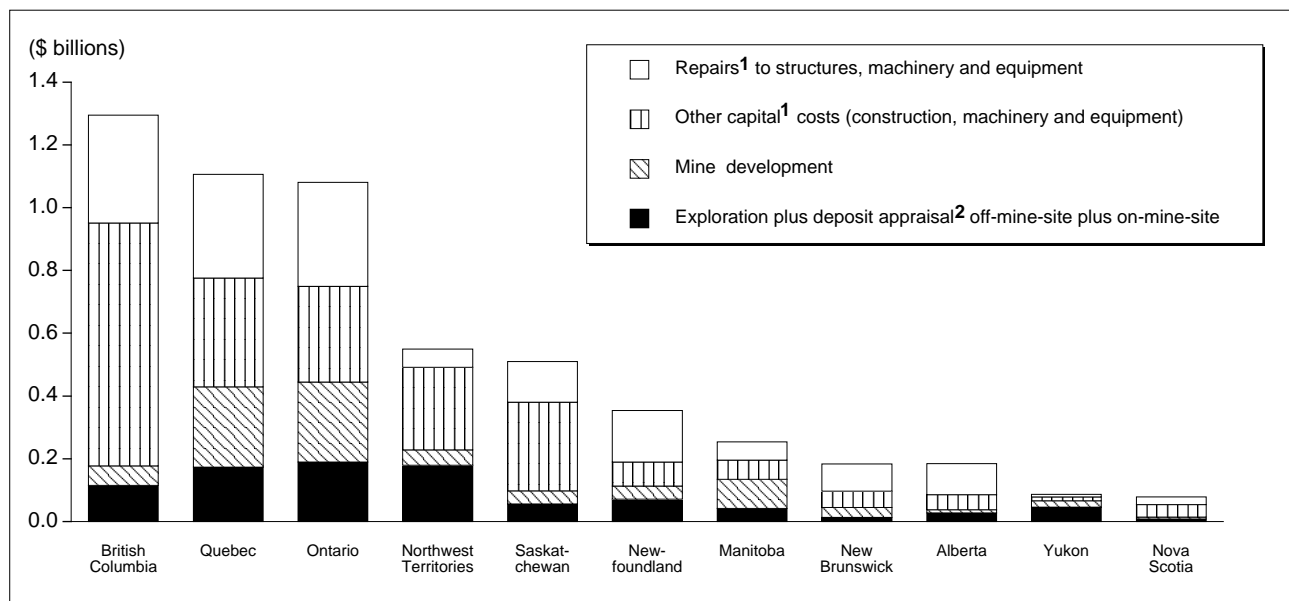
In 1997, 753 project operators reported expenditures of \$4.1 billion on the full spectrum of activities that are part of the exploration, deposit appraisal and mine complex development phases, as well as \$1.6 billion on associated repairs and maintenance, for a total of \$5.7 billion (Table 2a, Figure 1).

The new categories of expenditures, collected for the first time in 1997, accounted for \$361 million in expenditures, or 7% of the \$5.7 billion total for 1997 (Tables 1a and 1b). The exclusion of these new categories from the 1997 data would have resulted in a total expenditure estimate of \$5.3 billion, an increase of \$300 million from 1996 and \$600 million from 1995.

Exploration and deposit appraisal expenditures in Canada in 1997 amounted to \$921 million. Exploration expenditures (strictly speaking) accounted for \$634 million (69%) of this total and deposit appraisal expenditures were \$287 million (31%) (Tables 1a and 2a). Total off-mine-site expenditures were \$753 million (82%) and on-mine-site expenditures amounted to \$168 million (18%).

To compare the 1997 exploration and deposit appraisal total with the 1996 exploration (broadly speaking) figures of \$101 million of previously unrecorded expenditures on engineering, economic and feasibility studies, the environment and land access expenditures must be removed. These exclusions would result in \$820 million for field and overhead expenditures for 1997, down from the corresponding 1996 exploration total of \$895 million. This constitutes a reduction of \$75 million, or 8.3%, from 1996 to 1997 (Table 8). As shown in Table 2c, further declines are expected for 1998 and 1999.

**Figure 1**  
**Total Mineral Development Expenditures in Canada, by Province and Territory, 1997**  
**\$5.7 Billion**



Source: Natural Resources Canada, from a federal-provincial survey of mining and exploration companies.

<sup>1</sup>Include expenditures related to exploration, deposit appraisal and mine complex development. <sup>2</sup>Exploration and deposit appraisal activities include only the search for and appraisal of deposits and do not include work for extensions of known reserves.

Junior companies were responsible for one third of the exploration and deposit appraisal field and overhead expenditures in 1997 (Table 3). Sixty-four of these companies spent more than \$1 million, contributing 62% of the combined exploration and deposit appraisal expenditures for juniors (Table 4). Field and overhead expenditures by junior companies decreased by 15% from \$315 million in 1996 to \$267 million in 1997.

The search for diamonds has accounted for 10-20% of Canadian exploration and deposit appraisal expenditures annually from 1993 to 1998. Recently, field and overhead expenditures for diamonds have declined from \$154 million in 1996 to \$92 million in 1997 and to \$77 million in 1998 (Table 5a). This decrease in diamond expenditures can be partially explained by a shift in spending from exploration to mine complex development at projects such as BHP Diamonds Inc.'s Ekati mine in the Northwest Territories, which began production in October 1998.

Mine development expenditures totaled \$866 million in 1997. With the new categories of expenditures totaling \$32 million removed, this total is reduced to \$834 million, a decline of 6% from the \$884 million recorded in the 1996 survey.

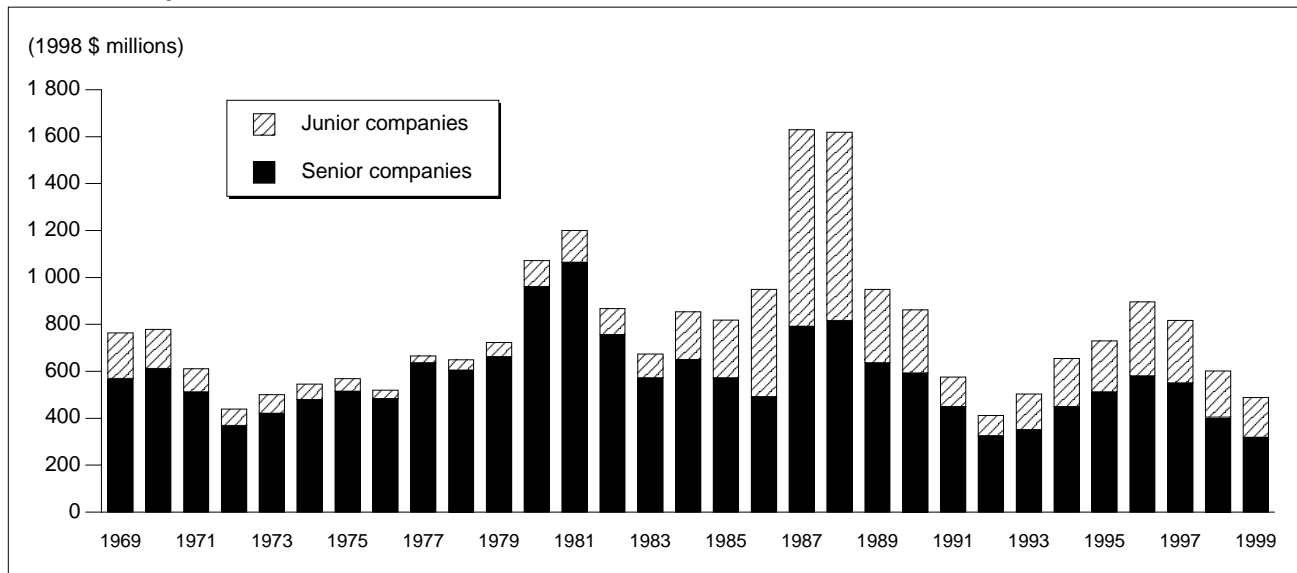
Environment-related expenditures are now collected in field expenditures and in capital and repair and maintenance expenditures (Table 2b). By phase, the

percentages of total expenditures directed to the environment in 1997 were about 3% in the exploration phase, 5% in the deposit appraisal phase, and 2% in the mine complex development phase.

## HISTORICAL PERSPECTIVE

Figure 2 depicts the historical trend in exploration plus deposit appraisal expenditures adjusted in constant 1998 dollars (see also Table 3). After peak levels of exploration expenditures were reached in 1987 and 1988 (a result of the Mining Exploration Depletion Allowance), exploration (broadly speaking) field and overhead expenditures in Canada fell to a low of \$412 million in 1992 (in constant 1998 dollars). From 1993 to 1996, higher metal prices and diamond and nickel-copper discoveries caused the level of activity to rebound by 118% to reach \$896 million in 1996. While recent survey data indicate lower expenditure levels of \$816 million for 1997 and \$601 million for 1998, these amounts represent a level of activity comparable to that of 1991.

The upward surge in expenditures since 1993 has been driven by important discoveries, especially of diamond deposits in the Northwest Territories. In addition, the announcement of the nickel-copper-cobalt discovery at Voisey's Bay, Labrador, in late 1994 resulted in a flurry of exploration activity in the area and increased expenditures in 1995, 1996 and

**Figure 2****Exploration Plus Deposit Appraisal for Field Work Plus Overhead Expenditures,<sup>1</sup> by Junior and Senior Companies, 1969-99**

Sources: Natural Resources Canada and Statistics Canada, from a federal-provincial survey of mining and exploration companies.

<sup>1</sup> Includes on-mine-site plus off-mine-site activities.

Notes: Expenditures for 1997, 1998, and 1999 include both exploration plus deposit appraisal as per new definitions; up to and including 1996, most of the expenditures now included in the deposit appraisal work phase were reported under exploration (broadly speaking). Data for 1998 are preliminary; data for 1999 are forecast.

1997. Intensive assessment drilling continues on mineralized zones at Voisey's Bay in Labrador. In August 1999, the project was released from further environmental assessment requirements following the review and revision of its environmental impact assessment.

The Bre-X incident in early 1997 had an adverse effect on exploration project financing. This event both preceded and accentuated the strong negative impact on expenditures caused by the Asian financial crisis and the dramatic drops in the prices of most metals that occurred at the end of 1997. In the first half of 1999, the persistence of these conditions and announcements of gold reserve sales by central banks depressed the price of gold to the US\$250/troy oz level. However, the announcement in September 1999 of control measures on the sale of gold reserves by central banks should improve the outlook for the price of gold and may cause exploration expenditures to increase. Despite the bad mineral economic conditions, Canada remains one of the world's top targets for mineral exploration.

## PRELIMINARY ESTIMATES, 1998, AND SPENDING INTENTIONS, 1999

Exploration and deposit appraisal field and overhead expenditures declined by 27% to \$601 million in 1998

from \$820 million in 1997 (Table 8). Total expenditures in 1998, including the new categories, amounted to \$678 million, compared to \$921 million in 1997. Industry spending intentions (forecast) for 1999 show further declines to \$489 million for field and overhead expenditures and to \$581 million for total expenditures (Table 2c).

Exploration and deposit appraisal expenditures by junior companies in 1998 declined by 26% to \$196 million (field and overhead expenditures only) from their 1997 levels and are expected to decline by a further 14% to \$169 million in 1999. Senior operators reported expenditures of \$405 million in 1998, a decline of 27% from the \$553 million reported in 1997.

Mine development expenditures in 1998 amounted to \$1 billion, a figure that includes \$32 million in expenditures in the new categories. This constitutes an increase of 16% from the \$866 million reported in 1997.

Total field work, overhead and new expenditures on the three work phases amounted to \$1.7 billion in 1998, 6% less than 1997 expenditures of \$1.8 billion. Industry spending intentions for 1999 totaled \$1.5 billion in expenditures, a further decrease of 11%.

(Note: The data presented in this section pertaining to 1998 and 1999 were collected between September and December of 1998.)

## ANALYSIS OF MINERAL DEVELOPMENT ACTIVITIES

Traditional indicators of exploration activity include the area of new mineral claims acquired and the total number of metres drilled (Figure 3). Over the years, annual expenditures on mineral exploration have been the best indicator of mineral exploration activity. The wide spectrum of activities and the geographic dispersion across Canada require detailed and sophisticated indicators to measure activity levels. Additional information now collected by work phase will give a better and more complete monitoring of activities for an exploration project as it progresses toward the mine development stage.

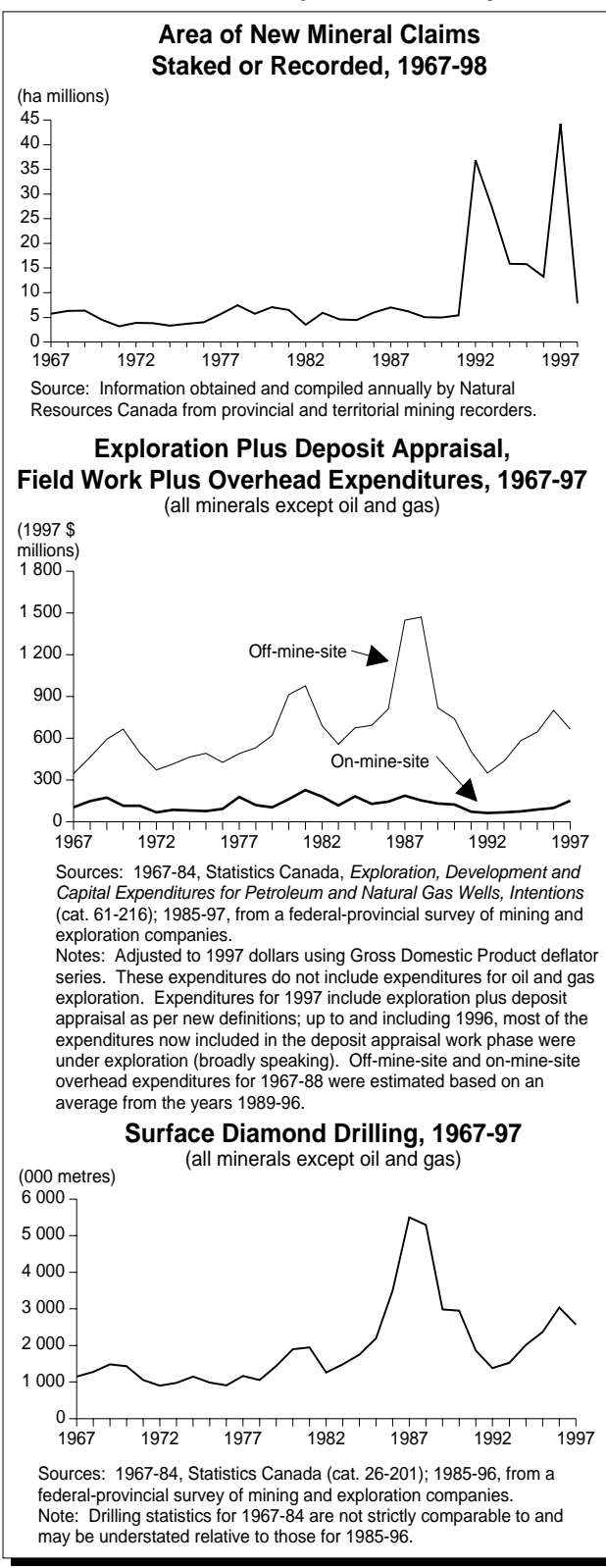
### New Mineral Claims, 1998

In 1998, a total of 7.9 million ha of new mineral claims were staked or acquired across Canada, compared to 44.2 million ha in 1997 (Table 6a). However, the 1998 figure is still above levels prior to 1992 when staking increased significantly with the discovery of diamonds in the Northwest Territories and the discovery of base metals at Voisey's Bay. Altogether, Alberta, the Northwest Territories, Quebec and Saskatchewan accounted for 73% of the total staking activity (Table 6b). Declines have occurred in most provinces and territories, but most noticeably in Alberta (-91%), the Yukon (-72%), British Columbia (-38%), Ontario (-33%), Quebec (-31%) and Saskatchewan (-28%). Increases were recorded in Manitoba (up 89 000 ha, an increase of 23%) and in Newfoundland (up 28 000 ha, an increase of 8%). The significant drop in area staked in Alberta can be attributed to the slowing of the staking rush for diamonds. The generally depressed investment climate resulting from lower commodity prices has certainly had an impact on the level of staking activity in 1998.

### On-Mine-Site and Off-Mine-Site Expenditures, 1997

Total on-mine-site exploration and deposit appraisal expenditures were \$168 million in 1997, while the corresponding number for off-mine-site exploration and deposit appraisal was \$753 million. When adjusted to reflect only field and overhead expenditures, on-mine-site and off-mine-site exploration and deposit appraisal expenditures amounted to 19% (\$153 million) and 81% (\$667 million) of the \$820 million total, respectively (Tables 1a and 7). In comparison, on-mine-site and off-mine-site exploration (broadly speaking) expenditures in 1996 amounted to 11% (\$100 million) and 89% (\$795 million), respectively, of the \$895 million total. In previous years, on-mine-site exploration (broadly speaking) normally accounted for between 10 and 15% of total exploration expenditures. The change of survey definitions may have contributed to some adjustment in

Figure 3  
Selected Measures of Exploration Activity



the reporting of expenditures, leading to the relatively high percentage of on-mine-site exploration and deposit appraisal expenditures (19%) reported in 1997.

On-mine-site exploration and deposit appraisal expenditures of \$153 million in 1997 represented an increase of 54% compared to 1996 (Table 1a). Quebec ranked first with 39% of total expenditures, followed by Ontario with 30% (Table 7).

Off-mine-site exploration and deposit appraisal expenditures in 1997 decreased by 16% compared to 1996 (Table 1a). The Northwest Territories ranked first in off-mine-site exploration and deposit appraisal activity with 22% of total expenditures, followed by Ontario with 19% and Quebec with 14% (Table 7).

On-mine-site exploration represented 10% and off-mine-site exploration represented 90% of total on- and off-mine-site exploration expenditures of \$634 million in 1997. In comparison, on-mine-site deposit appraisal expenditures accounted for 37% and off-mine-site for 63% of the \$287 million in expenditures for this work phase (Table 1a).

In 1997, precious metals accounted for 60% of total on-mine-site expenditures followed by base metals with 23% and diamonds with 6%. In comparison, precious metals accounted for 40% of total off-mine-site expenditures, followed by base metals with 33% and diamonds with 14% (Table 12).

### Exploration and Deposit Appraisal Activity by Province/Territory, 1997

Exploration and deposit appraisal expenditures in Canada in 1997 amounted to \$921 million under the new definitions. When the new categories of expenditures are removed (Table 1a), the \$820 million in exploration expenditures is \$75 million below the 1996 exploration field and overhead expenditures total of \$895 million.

On a provincial/territorial basis, and restricted to the same expenditure categories as in 1996, exploration and deposit appraisal field and overhead expenditures increased in Quebec by \$31 million and in Alberta by \$10 million; they declined slightly in Nova Scotia, Saskatchewan and Manitoba, and diminished markedly in the remaining provinces and territories. The largest decreases occurred in the Northwest Territories (by \$44 million), Newfoundland (by \$34 million), Ontario (by \$18 million), and British Columbia (by \$9 million) (see Table 8 for variations in terms of percentages). Ontario (\$189 million), the Northwest Territories (\$179 million), Quebec (\$173 million) and British Columbia (\$115 million) accounted for 71% of all exploration and deposit appraisal expenditures (including new expenditures) in Canada in 1997 (Tables 9a, 9b and 9c).

### Exploration and Deposit Appraisal Activity by Type of Work, 1997

Canadian exploration and deposit appraisal expenditures (field and overhead) in 1997 can be broken down by type of activity as follows (Table 9c): drilling, 45.0%; rock work including trenches, pits and underground workings, 15.2%; geology, 11.2%; airborne and ground geophysics, 8.9%; geochemistry, 5.7%; and other costs, mineral leases and rental, and overhead, 14.0%.

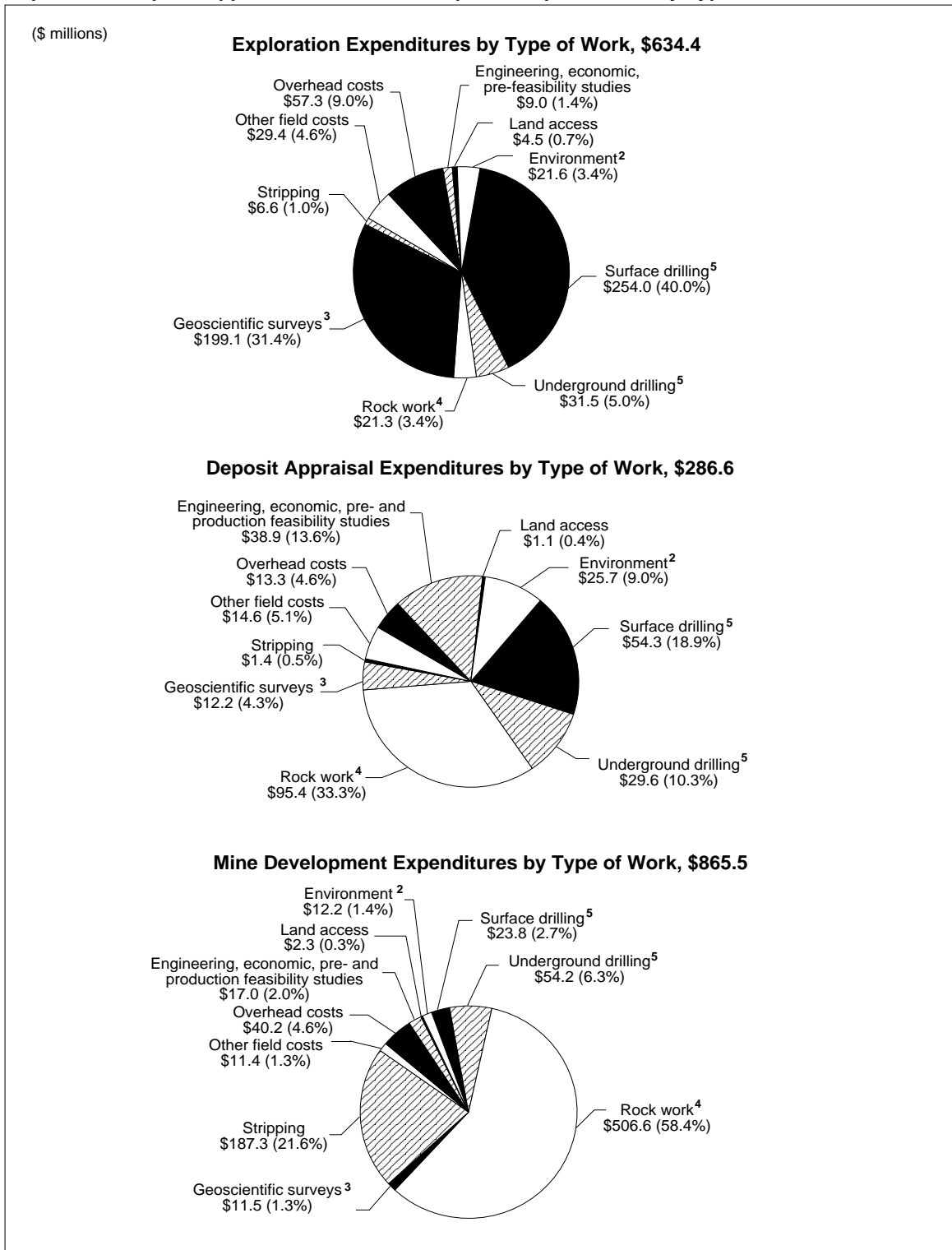
When adjusted to include the new categories of expenditures, the percentages of expenditures by type of activity are: drilling, 40.1%; rock work including trenches, pits and underground workings, 13.6%; geology, 10.0%; airborne plus ground geophysics, 7.9%; geochemistry, 5.1%; other costs, mineral leases and rental, and overhead, 12.5%; engineering, economic and pre- and production feasibility studies, 5.2%; environment, 5.1%; and land access, 0.6% (Table 9c).

Figure 4 shows graphically and quantitatively that the distribution of expenditures on activities in the deposit appraisal phase is quite different from that for the exploration phase. In summary, in 1997, exploration expenditures involved: drilling (including support costs), 45.0%; rock work, 3.4%; geoscientific surveys, 31.4%; engineering, economic and prefeasibility studies, 1.4%; and environment-related expenditures, 3.4%. Deposit appraisal involved drilling, 29.2%; geoscientific surveys, 4.3%; rock work, 33.3%; engineering, economic and pre- and production feasibility studies, 13.6%; and environment, 9.0%. The distribution of expenditures on mine development is even more different with 9% expended on drilling, 1.3% on geoscientific work, 58.4% on rock work, 21.6% on stripping, 2.0% on engineering, economic and pre- and production feasibility studies, and 1.4% on environment (Table 9d).

As a project progresses towards the production feasibility study, less intensive drilling and geotechnical surveys are necessary. Once delineated, more underground work is necessary to evaluate the deposit itself. This allows the accumulation of data to complete the feasibility study and other related types of studies. A mine in development is characterized by intensive underground rock work to gain access to the ore.

In 1997, exploration expenditures (broadly speaking) for airborne geophysics were \$21.7 million, a decrease of 26.0% from the 1996 peak of \$29.2 million. This level was, however, still 2.7 times the \$8 million spent in 1992. During 1997, 50.0% of this amount was spent in the Northwest Territories (\$10.9 million), 14.0% in Alberta (\$3.0 million), and 12.1% in Quebec (\$2.6 million). In the Northwest Territories and Alberta, the increased use of airborne geophysics

**Figure 4**  
**Exploration, Deposit Appraisal and Mine Development Expenditures<sup>1</sup> by Type of Work, 1997**



Source: Natural Resources Canada, from a federal-provincial survey of mining and exploration companies.

<sup>1</sup> On-mine-site plus off-mine-site activities. <sup>2</sup> Environment includes characterization, permitting, protection, monitoring and restoration. <sup>3</sup> Geoscientific surveys include geology, geochemistry, ground geophysics and airborne geophysics. <sup>4</sup> Rock work activity includes shaft work, drifts, cross-cuts, raises, declines, rock sampling and dewatering costs. <sup>5</sup> Drilling includes diamond and other type of drilling.

reflects the use of airborne surveys in the search for diamondiferous kimberlite intrusions.

Geochemical exploration expenditures in the Northwest Territories of \$25.2 million (55.3% of the total) are the highest of all provinces and territories (Table 9a). Again, this also reflects the intensive search for diamond-bearing kimberlites.

### **Drilling Activity for Exploration and Deposit Appraisal, 1997**

In 1997, 2.9 million metres (m) of surface exploration and deposit appraisal drilling (both diamond and other types) were carried out in Canada (Tables 10 and 11a). This is down by 10% from the 3.2 million m drilled in 1996. Diamond drilling (2.6 million m) constituted 90% of the total metres of surface drilling (Table 12a), while other drilling accounted for the remaining 10%. Other drilling normally constituted 5% of all drilling in previous years. Ontario, Quebec, British Columbia and the Northwest Territories, in decreasing order of importance, were the busiest provinces and territories accounting for 69% of total surface drilling activity.

Underground exploration and deposit appraisal drilling totaled 931 402 m in 1997, an increase of 7% from the 872 968 m drilled in 1996. This may indicate that underground diamond drilling responds less rapidly than surface drilling to an overall decrease in activity. Ontario (581 710 m, or 63%) and Quebec (189 990 m, or 20%) accounted for 83% of total underground exploration and deposit appraisal drilling (Tables 10 and 11b).

Of the total metres of surface drilling, 48% was conducted mainly in the search for precious metals, 33% for base metals, 8% for coal, 5% for nonmetals (including diamonds), and 3% for uranium. As shown in Tables 10 and 11b, most of the underground drilling was carried out in the search for precious metals (55%) and base metals (37%).

### **Analysis of Mine Development Expenditures, 1997**

Compared to \$884 million in 1996 and \$836 million in 1995, mine development expenditures were \$823 million in 1997 (a 5.7% decrease from 1996). In the peak years of 1990 and 1991, those expenditures had reached \$1.1 billion. The definitions for this work phase remain largely unchanged, except for the explicit provision of new sub-categories such as engineering, economic, pre- and production feasibility studies, environment, and land access. Mine development expenditures totaled \$866 million in 1997 when the new categories of expenditures are included (Tables 1a and 2a).

In 1997, mine development expenditures increased in the Northwest Territories by \$30 million, in the Yukon by \$16 million, in Saskatchewan by \$14 million, in Alberta by \$5 million, and in New Brunswick by \$4 million over 1996 levels. However, these expenditures declined by \$48 million in Manitoba, by \$35 million in Quebec, by \$28 million in Ontario, and by \$7 million in Newfoundland. Ontario (\$256 million), Quebec (\$255 million) and Manitoba (\$93 million) accounted for 70% of Canada's total mine development expenditures in 1997 (Tables 9d and 13e, Figure 1). Half of the mine development expenditures in the Northwest Territories are being spent on developing the first diamond mine in Canada.

Precious metals accounted for 36% of total expenditures in the mine complex development phase, followed by base metals with 30% and iron ore with 13% (Table 13e).

### **Expenditures by Commodity Sought, 1997**

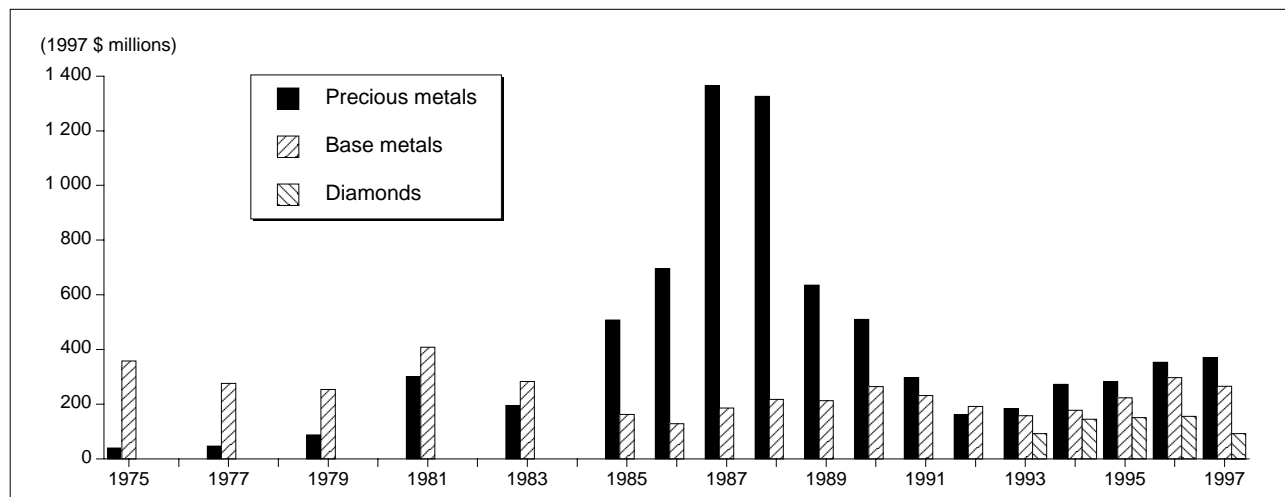
Precious metals, base metals and diamonds remained the principal targets of Canadian exploration and deposit appraisal activities in 1997 (Tables 12 and 13c, Figure 5). Base metals include copper, nickel, lead and zinc. Precious metals include silver, gold and platinum group metals.

Precious metals exploration and deposit appraisal expenditures increased by 6% to \$371 million in 1997 from \$351 million in 1996. Precious metals accounted for 45% of Canadian expenditures in 1997 (Table 13d) compared to 39% in each of 1996 and 1995. This is the fifth year in a row in which exploration expenditures for precious metals have exceeded those for base metals. The data revealed that 38% of precious metals expenditures were dedicated to deposit appraisal (Table 13b).

Base-metal exploration and deposit appraisal expenditures decreased during 1997 (Table 13d) to \$265 million from the 1996 peak of \$295 million, ending an upward trend that began in 1994. Base-metal exploration accounted for 32% of total Canadian exploration and deposit appraisal expenditures in 1997, compared to 33% in 1996. Deposit appraisal activity accounted for 19% of base-metal expenditures (Table 13b).

Diamond exploration and deposit appraisal field and overhead expenditures in 1997 amounted to \$92 million, compared to \$154 million in 1996 and \$147 million in 1995. Expenditures totaled \$112 million for 1997 with the new categories of expenditures included. Exploration and deposit appraisal expenditures for diamonds were lower in 1997 in part because money spent by BHP Diamonds Inc. was redirected from exploration (broadly speaking) to mine development at the Ekati diamond project.

**Figure 5**  
**Exploration plus Deposit Appraisal, Field Work Plus Overhead Expenditures,<sup>1</sup> for Base Metals, Precious Metals and Diamonds, 1975-97**



Sources: Natural Resources Canada and Statistics Canada, from a federal-provincial survey of mining and exploration companies.

<sup>1</sup> Includes on-mine-site plus off mine-site expenditures; 1997 expenditures include both exploration plus deposit appraisal as per new definitions; up to and including 1996, most of the expenditures now included in the deposit appraisal work phase were under exploration (broadly speaking).

Note: Data have not been compiled for the years 1976, 1978, 1980, 1982 and 1984.

Expenditures on deposit appraisal were responsible for 27% of Canadian spending on diamonds (Tables 5a, 13a, 13b and 13c).

Other mineral commodities accounted for \$92 million of exploration and deposit appraisal expenditures in Canada (11% of field and overhead expenditures for all minerals), down from \$95 million in 1996. Expenditures increased by 12% for uranium, by 17% for coal, and by 24% for iron. Exploration and deposit appraisal for nonmetals, excluding diamonds, accounted for \$11 million in 1997 (Table 13d), compared to \$12 million in 1996 (a decrease of 13%) and \$12 million in 1995. Deposit appraisal expenditures on other minerals accounted for 41% of total expenditures for this group of mineral commodities.

An amount between \$1 million and \$7 million was spent on the search for each of the following commodities: platinum group metals, stone (granite, gabbro, marble, etc.), kaolin, molybdenum, niobium, rare earths and fluor spar.

### Provincial and Territorial Expenditures by Commodity Sought, 1997

Precious metals, primarily gold, remained the most sought-after commodity in Canada. Ontario was the leading recipient of exploration and deposit appraisal expenditures at 31% (\$124 million) (Table 13c, Figure 6c). The other leading jurisdictions for precious metals were Quebec at 26%, British Columbia and the Northwest Territories at 15% each, and the

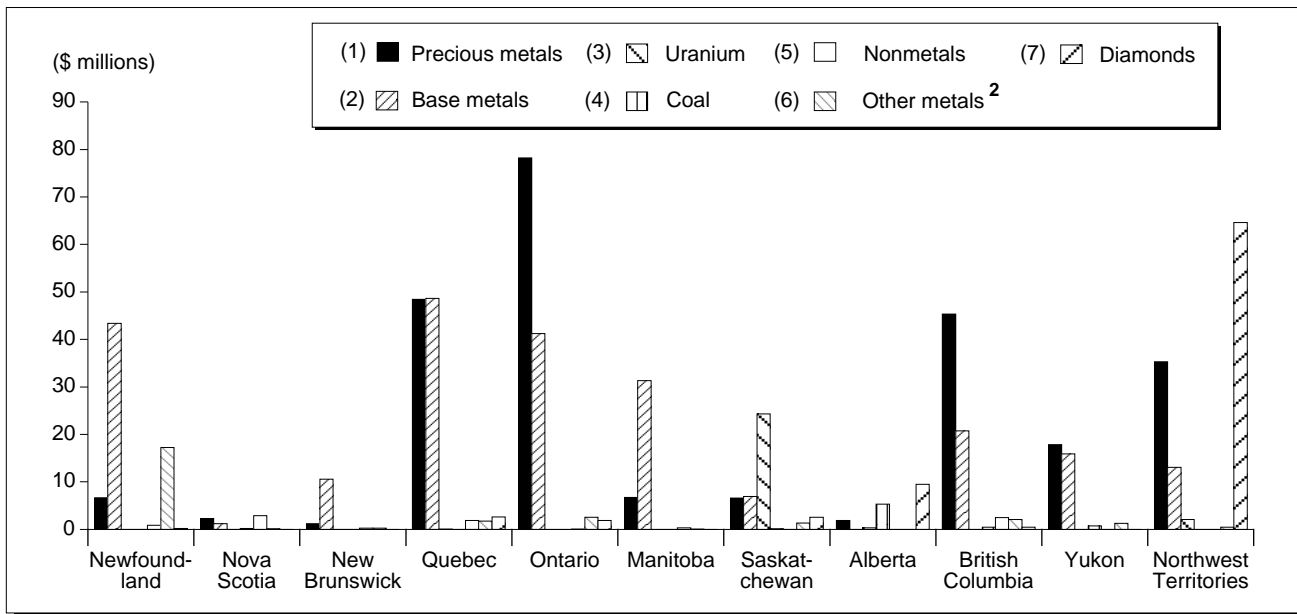
Yukon at 6%. The largest expenditure increase, from \$81 million to \$105 million, occurred in Quebec (Table 13d). Exploration expenditures on precious metals represented 63% of spending for Ontario and British Columbia, 50% for the Yukon and 47% for Quebec (Table 13a, Figure 6a). Quebec is the leading jurisdiction when considering deposit appraisal expenditures of 38% for precious metals (Table 13b, Figure 6b).

Base metals remained the second most sought-after commodity in Canada during 1997, and Ontario was the leading recipient of exploration and deposit appraisal expenditures at 20% (\$58 million) (Table 13c, Figure 6c). The other leading jurisdictions for base metals included Quebec at 19%, Newfoundland at 15%, British Columbia at 13%, and Manitoba at 12%. Exploration expenditures on base metals represented 86% of spending in New Brunswick, 81% in Manitoba, 63% in Newfoundland, and 44% in the Yukon (Table 13a, Figure 6a). Ontario was the leading province, followed by British Columbia, for spending on deposit appraisal for base metals with 32% and 29%, respectively (Table 13b, Figure 6b).

The third most sought-after commodity was diamonds. Most of the spending on diamonds during 1997 occurred in the Northwest Territories where they were the leading target for exploration and deposit appraisal activities with expenditures of \$95 million (84%). Other leading jurisdictions for expenditures on diamonds were Alberta at 8% and Quebec, Saskatchewan and Ontario at 2% each. In



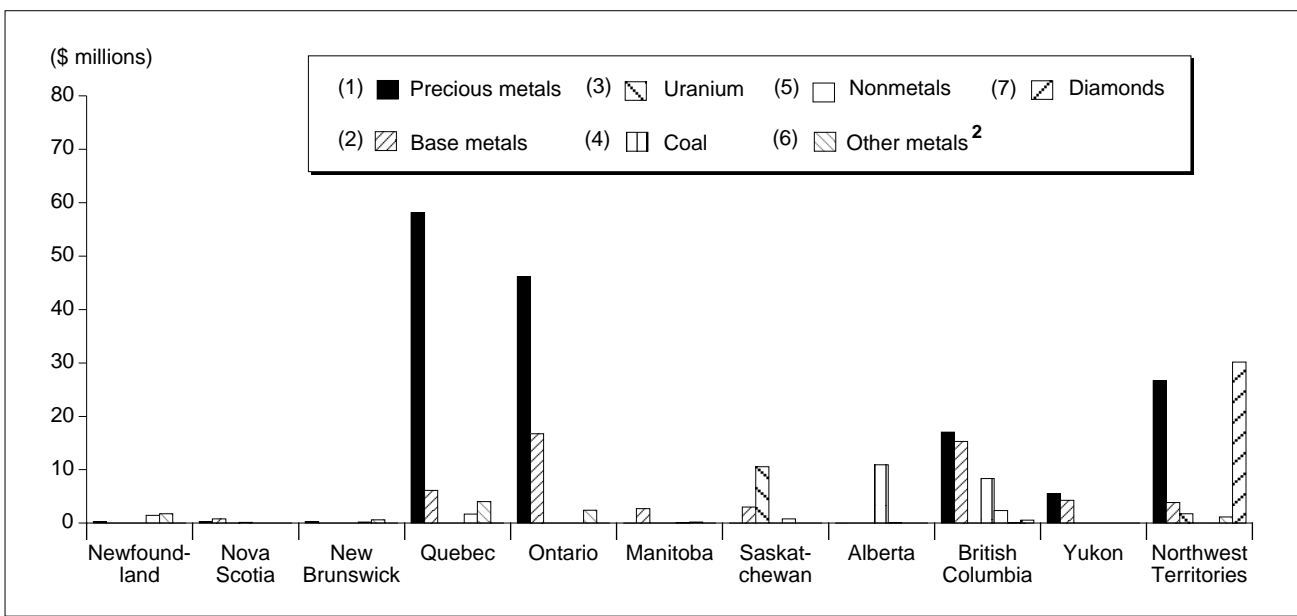
**Figure 6a**  
**Exploration Expenditures<sup>1</sup> by Province and Territory, by Mineral Commodity Sought, 1997**



Source: Natural Resources Canada, from a federal-provincial survey of mining and exploration companies.

<sup>1</sup> Includes on-mine-site plus off-mine-site activities. Includes field work, overhead, engineering, economic and pre-feasibility studies, environment and land access expenditures. <sup>2</sup> Includes ferrous metals.

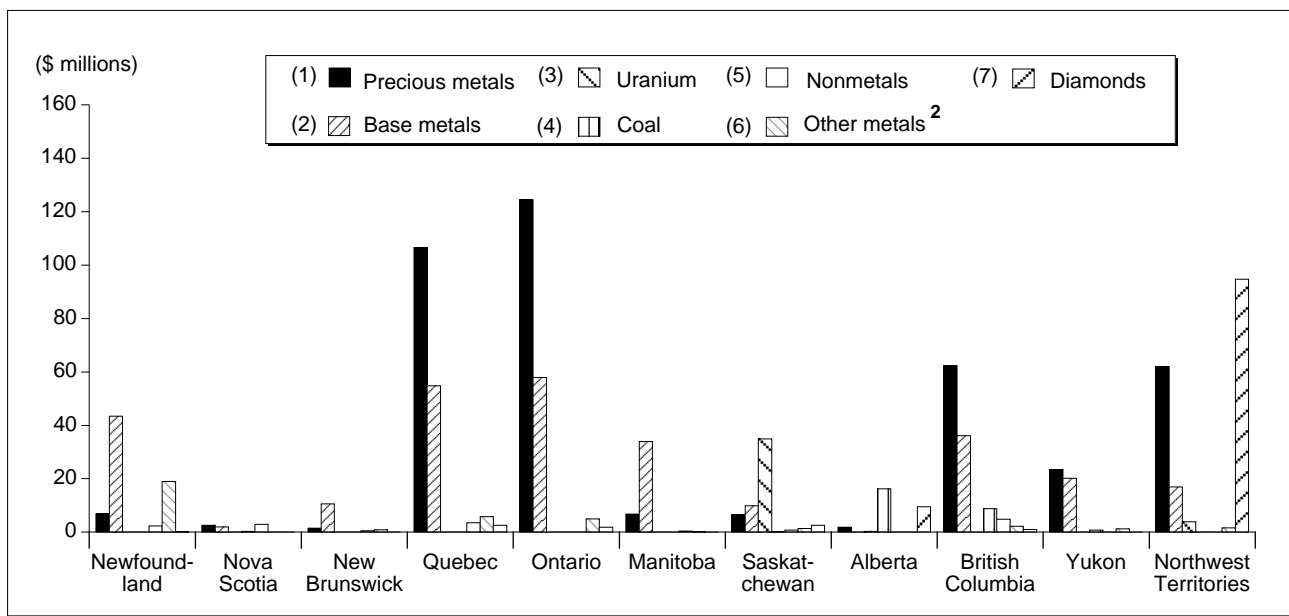
**Figure 6b**  
**Deposit Appraisal Expenditures<sup>1</sup> by Province and Territory, by Mineral Commodity Sought, 1997**



Source: Natural Resources Canada, from a federal-provincial survey of mining and exploration companies.

<sup>1</sup> Includes on-mine-site plus off-mine-site activities. Includes field work, overhead, engineering, economic and pre- or production feasibility studies, environment and land access expenditures. <sup>2</sup> Includes ferrous metals.

**Figure 6c**  
**Exploration plus Deposit Appraisal Expenditures<sup>1</sup> by Province and Territory, by Mineral Commodity Sought, 1997**



Source: Natural Resources Canada, from a federal-provincial survey of mining and exploration companies.

<sup>1</sup> Includes on-mine-site plus off-mine-site activities. Includes field work, overhead, engineering, economic and pre- or production feasibility studies, environment and land access expenditures. <sup>2</sup> Includes ferrous metals.

terms of exploration, diamonds were the leading mineral in Alberta. Almost all deposit appraisal spending on diamonds was reported for the Northwest Territories.

Most of the expenditures on uranium, another leading target for exploration and deposit appraisal expenditures, occurred in Saskatchewan where almost \$35 million was spent, accounting for over 89% of Canada's total for uranium. The next leading destination was the Northwest Territories with \$4 million in expenditures, or 10% of Canada's uranium total (Table 13c, Figure 6c). Exploration and deposit appraisal for uranium represented 61% of 1997 expenditures in Saskatchewan, up from 54% in 1996 (Table 13d).

Almost 62% of the \$26 million of exploration and deposit appraisal expenditures for coal in 1997 went to Alberta (\$16 million); 33% went to British Columbia (\$9 million) (Table 13c, Figure 6c). The diamond-staking rush in 1997 reduced the prominence of coal in Alberta's exploration and deposit appraisal spending from 72% in 1996 to 44% in 1997, despite a 14% increase in coal expenditures over 1996 (Table 13d). In Alberta, diamond expenditures became the main exploration target in 1997, accounting for 56% of the exploration activity (Table 13a). The portion of expenditures on coal in British Columbia moved slightly higher from 6% in 1996 to 7% in 1997.

In the nonmetals category (excluding diamonds), British Columbia at 31%, Quebec at 23% and Nova Scotia at 19% accounted for most of the \$15 million in expenditures in 1997 (Table 13c, Figure 6c). Nonmetals accounted for only a small portion of the expenditures in British Columbia and Quebec, but were the leading target for exploration expenditures in Nova Scotia at 37%. Most of these expenditures were directed at the search for kaolin clay in central Nova Scotia. British Columbia was the leading destination for expenditures on deposit appraisal for nonmetals.

### Range of Expenditures by Type of Company, 1997

Companies active in exploration and deposit appraisal in Canada are classified into the following six groups: (1) producers, (2) affiliates of producing mining companies, (3) oil companies, (4) foreign companies, (5) junior companies and prospectors, and (6) other companies. A company is classified into the first of these groups into which it fits. Seniors are members of groups 1, 2, 3, 4 and 6, and juniors form group 5.

The 685 companies acting as project operators in 1997 represent an increase of 7% from the 1996 total of 629 companies. In 1997, 129 companies each spent more than \$1 million on exploration and deposit

appraisal field and overhead expenditures for a total of \$699 million, or 85% of the \$820 million total (Table 4). In 1996, 141 companies spent a total of \$782 million, or 87% of the \$894 million total.

In 1997, 64 junior companies each spent more than \$1 million on exploration and deposit appraisal for a total of \$167 million. This represented 63% of junior spending and 20% of overall spending. The largest group of junior companies (32%), ranked by spending category, reported expenditures of less than \$50 000 each, for a total of \$3.2 million.

In comparison, the 65 senior companies each spending more than \$1 million accounted for \$532 million, or 96% of all senior company expenditures, and for 65% of all Canadian exploration and deposit appraisal expenditures.

### Provincial and Territorial Expenditures by Type of Company, 1997

In 1997, producing companies and their affiliates spent \$452 million (Table 15d), a decrease of \$49 million from the \$501 million spent in 1996, but were still responsible for over 50% of spending. They were the principal exploration and deposit appraisal spenders in most provinces and territories, except in British Columbia, Nova Scotia and the Yukon where junior companies accounted for most of the 1997 expenditures.

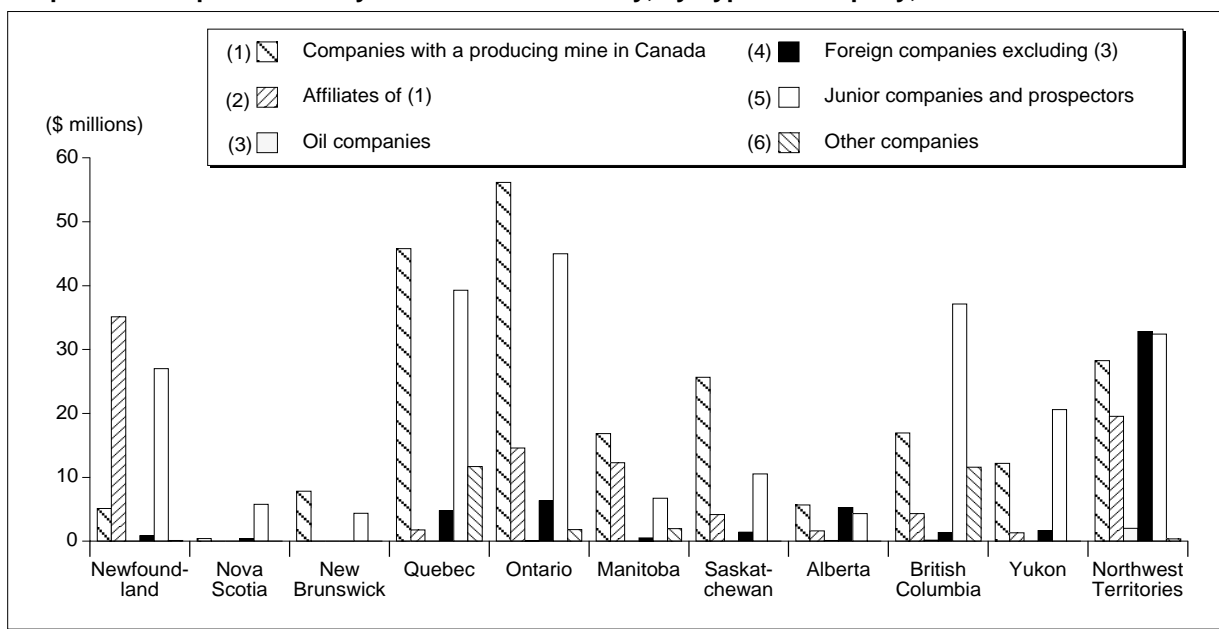
Exploration and deposit appraisal field and overhead expenditures by junior companies in 1997 accounted for 33% of the grand total, compared to 35% in 1996. However, junior company spending declined from \$315 million in 1996 to \$267 million in 1997. Expenditures by junior companies decreased significantly in all provinces and territories in 1997, except for a small increase in New Brunswick and minor declines in Quebec and Ontario.

Foreign mining companies spent \$62 million in Canada in 1997, compared to \$48 million in 1996. Their exploration and deposit appraisal activities increased significantly in the Northwest Territories, Alberta and the Yukon, but declined in other jurisdictions. Foreign companies accounted for 19% of exploration expenditures (broadly speaking) in Canada in 1977, but their share has decreased gradually to 8% in 1997.

The low levels of exploration and deposit appraisal expenditures by oil companies continued the downward trend that began in the late 1970s. In 1977, oil companies accounted for 24% of all non-petroleum mineral exploration expenditures in Canada. This has declined to around 1% and has continued at that level.

Figures 7a, 7b and 7c show the expenditure trends in 1997 by work phase.

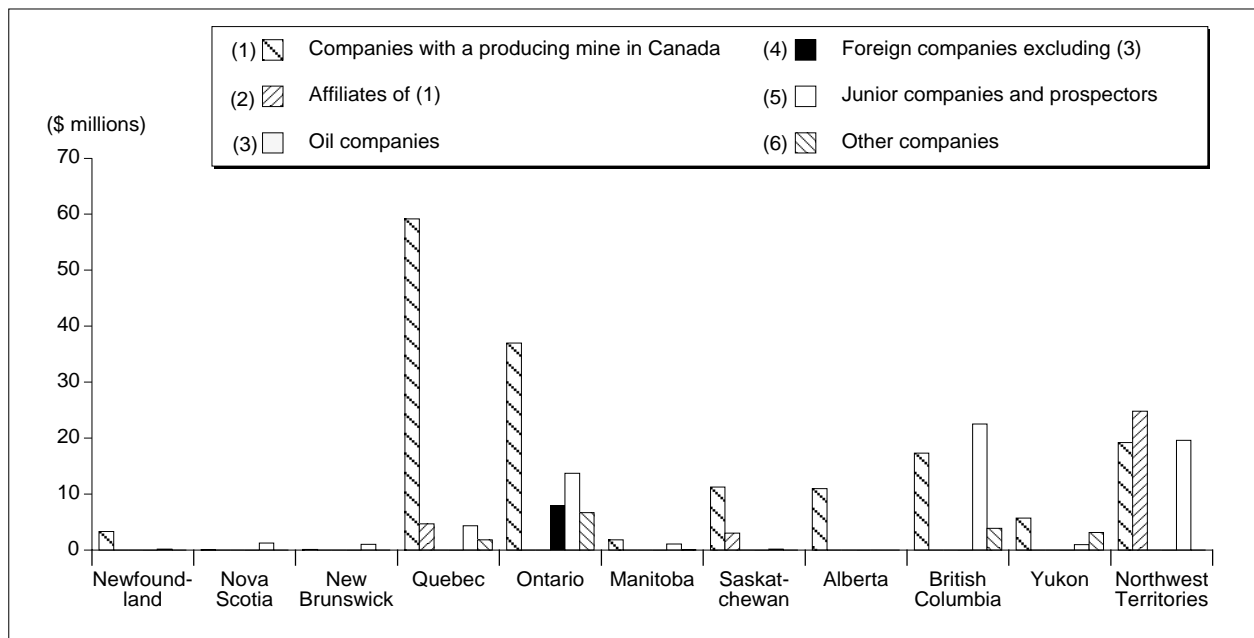
**Figure 7a**  
Exploration Expenditures<sup>1</sup> by Province and Territory, by Type of Company, 1997



Source: Natural Resources Canada, from a federal-provincial survey of mining and exploration companies.

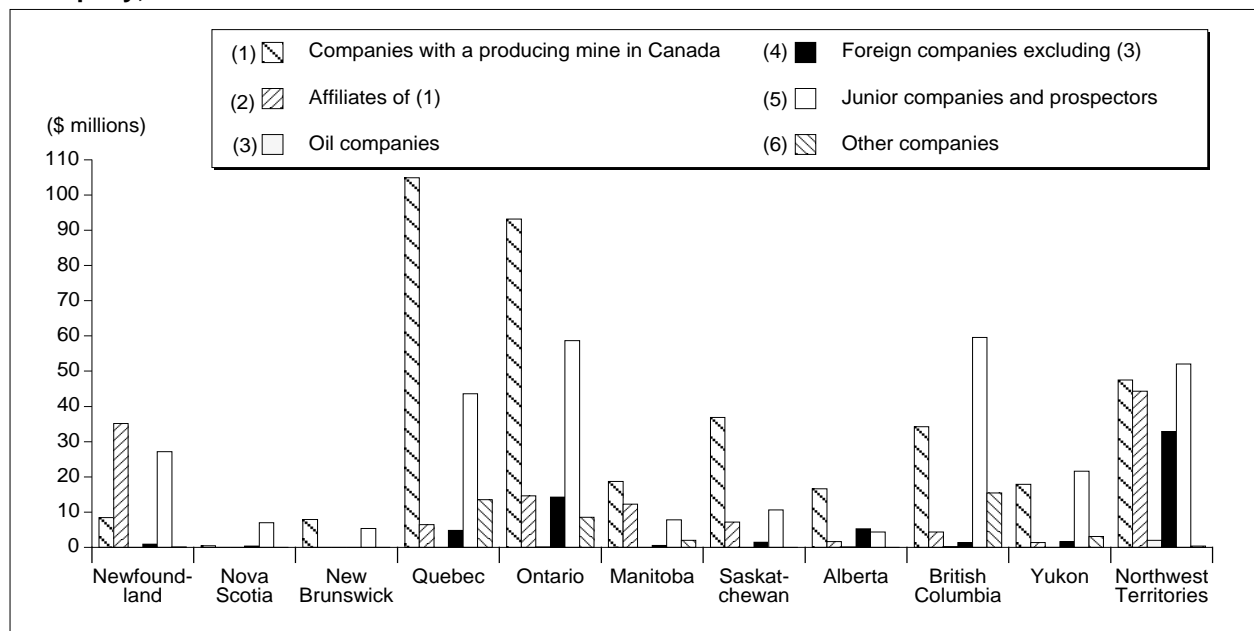
<sup>1</sup> Includes on-mine-site plus off-mine-site activities. Includes field work, overhead, engineering, economic and pre-feasibility studies, environment and land access expenditures.

**Figure 7b**  
**Deposit Appraisal Expenditures<sup>1</sup> by Province and Territory, by Type of Company, 1997**



Source: Natural Resources Canada, from a federal-provincial survey of mining and exploration companies.  
<sup>1</sup>Includes on-mine-site plus off-mine-site activities. Includes field work, overhead, engineering, economic and pre- or production feasibility studies, environment and land access expenditures.

**Figure 7c**  
**Exploration Plus Deposit Appraisal Expenditures,<sup>1</sup> by Province and Territory, by Type of Company, 1997**



Source: Natural Resources Canada, from a federal-provincial survey of mining and exploration companies.  
<sup>1</sup>Includes on-mine-site plus off-mine-site activities. Includes field work, overhead, engineering, economic and pre- or production feasibility studies, environment and land access expenditures.

### Expenditures by Type of Company and Commodity, 1997

Producing companies and their affiliates in 1997 directed 40% (\$181 million) of their exploration and deposit appraisal expenditures at precious metals, 36% (\$163 million) at base metals, 10% (\$44 million) at diamonds, 7% (\$31 million) at uranium and 3% (\$14 million) at other metals (Table 14d). In comparison, in 1996, these companies directed their expenditures as follows: 35% (\$174 million) at precious metals, 38% (\$191 million) at base metals, 23% (\$94 million) at diamonds, and 6% (\$29 million) at uranium.

In 1997, junior companies directed 55% (\$146 million) of their exploration and deposit appraisal expenditures at precious metals, 28% (\$76 million) at base metals, 8% (\$21 million) at diamonds, and 5% (\$14 million) at other metals. In comparison, junior companies in 1996 directed 46% (\$145 million) of field and overhead expenditures at precious metals, 26% (\$83 million) at base metals, 21% (\$65 million) at diamonds, and 6% (\$18 million) at other metals.

In 1997, foreign companies directed 34% (\$22 million) of their total exploration and deposit appraisal expenditures to the search for precious metals, 32%

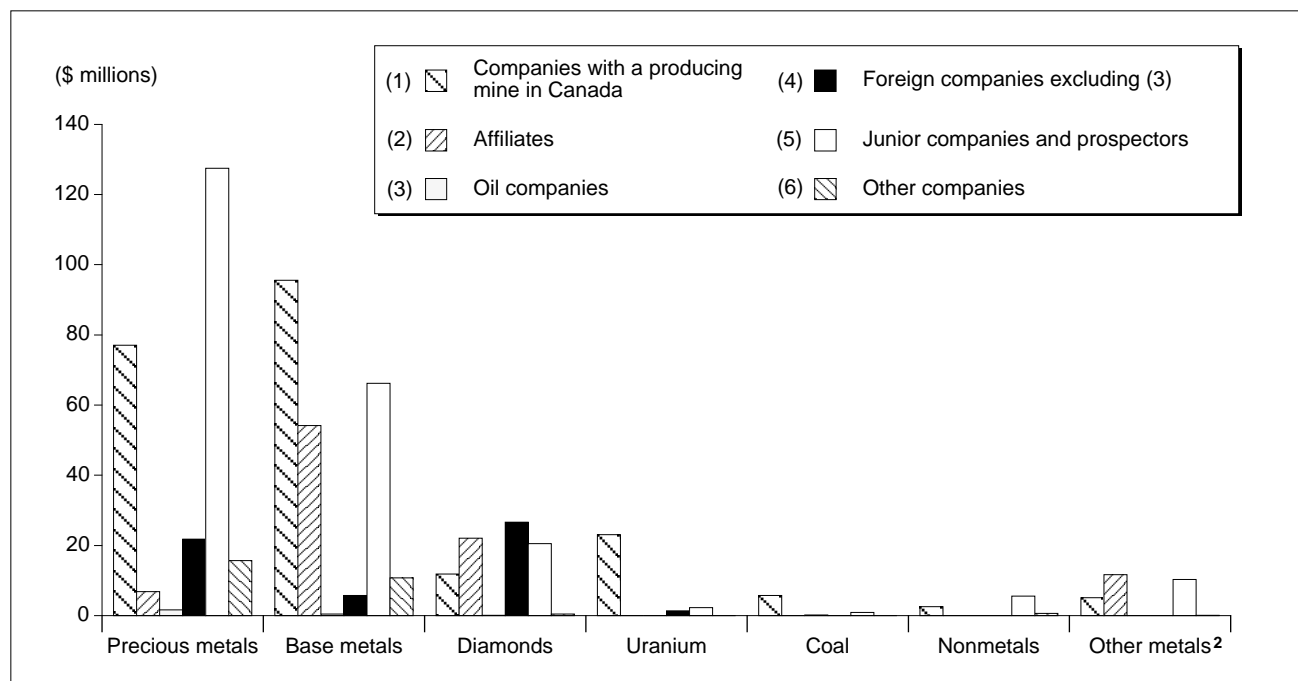
(\$21 million) to diamonds, 13% (\$8 million) to base metals, and 4% (\$2 million) to uranium. In comparison, in 1996, they directed 30% (\$14 million) of their field and overhead expenditures to precious metals, 28% (\$13 million) to base metals, 38% (\$18 million) to diamonds, and 4% (\$2 million) to uranium.

Figures 8a, 8b and 8c depict the expenditure trends in 1997 by work phase.

### BACKGROUND INFORMATION ON MINERAL DEVELOPMENT STATISTICS

Natural Resources Canada (NRCan) coordinates the collection of all statistics for off-mine-site and on-mine-site expenditures for the exploration and deposit appraisal phases and the mine complex development phase. Statistics Canada coordinates the collection of detailed on-mine-site statistics on capital, repair and maintenance expenditures reported by producers at the mine complex development phase. NRCan and Statistics Canada cooperate with the provinces and territories to collect, assemble and publish the comprehensive national mineral development statistics presented in this review. To protect

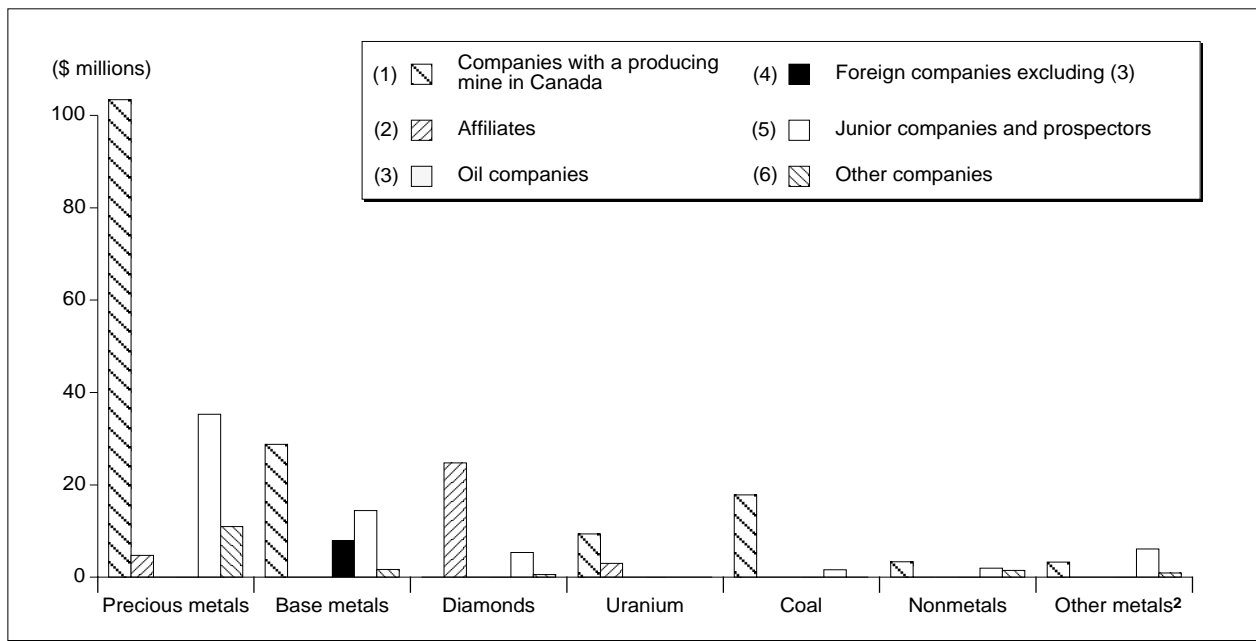
**Figure 8a**  
Exploration Expenditures<sup>1</sup> by Type of Company and Mineral Commodity, 1997



Source: Natural Resources Canada, from a federal-provincial survey of mining and exploration companies.

<sup>1</sup> Includes on-mine-site plus off-mine-site activities. Includes field work, overhead, engineering, economic and pre-feasibility studies, environment and land access expenditures. <sup>2</sup> Includes ferrous metals.

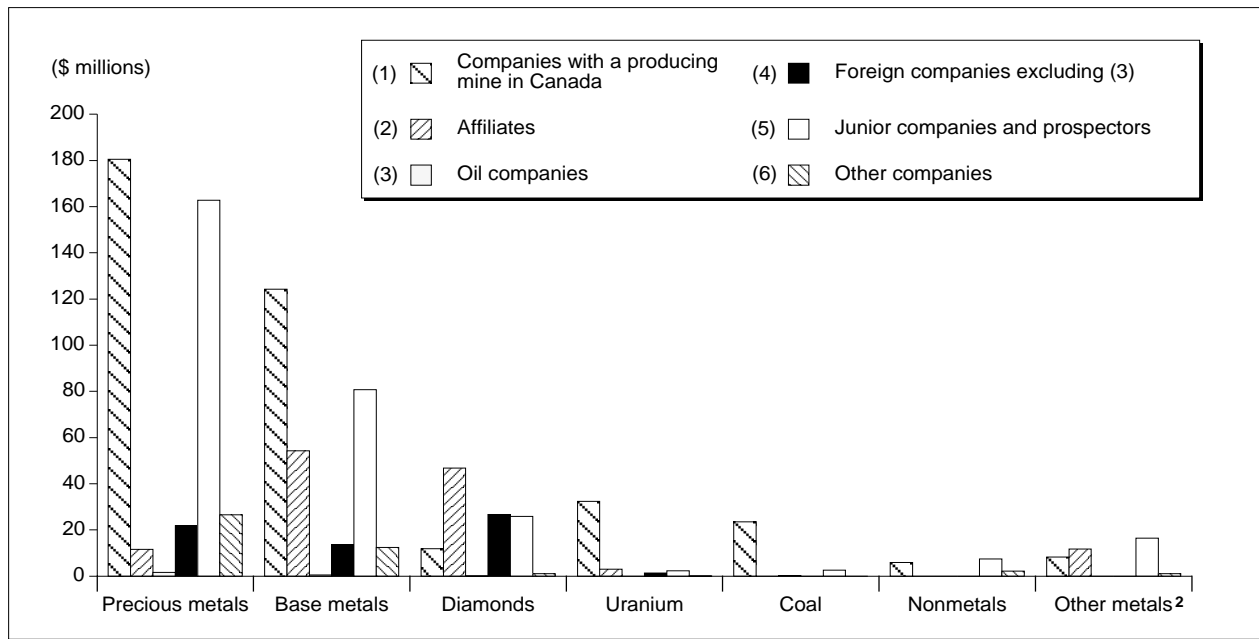
**Figure 8b**  
**Deposit Appraisal Expenditures<sup>1</sup> by Type of Company and Mineral Commodity, 1997**



Source: Natural Resources Canada, from a federal-provincial survey of mining and exploration companies.

<sup>1</sup> Includes on-mine-site plus off-mine-site activities. Includes field work, overhead, engineering, economic and pre- or production feasibility studies, environment and land access expenditures. <sup>2</sup> Includes ferrous metals.

**Figure 8c**  
**Exploration Plus Deposit Appraisal Expenditures,<sup>1</sup> by Type of Company and Mineral Commodity, 1997**



Source: Natural Resources Canada, from a federal-provincial survey of mining and exploration companies.

<sup>1</sup> Includes on-mine-site plus off-mine-site activities. Includes field work, overhead, engineering, economic and pre- or production feasibility studies, environment and land access expenditures. <sup>2</sup> Includes ferrous metals.

the confidential data provided by respondents, only aggregate statistics are released. However, specific project information may be published when such information has already entered the public domain.

Beginning with the survey year 1997, the annual survey of Canadian mineral exploration expenditures was redesigned to better describe the full mineral development and mining process (Table 16) to provide more comprehensive measures of investment in the Canadian minerals and metals industry. This survey is now called the *Annual Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures*.

As discussed previously, when comparing the new survey data and historical statistical series, the new categories of expenditures have been excluded. These categories are included for the analysis of 1997 data. Eventually, the historical time series will be adjusted in accordance with the new definitions. Information about the new definitions is available on NRCan's Minerals and Mining Statistics Division's web site at <http://www.nrcan.gc.ca/mms/efab/mmsd/exploration/default.html#definitions>.

*Note: Information in this review was current as of October 29, 1999.*

**TABLE 1a. COMPARISON OF 1996 AND 1997 EXPENDITURES,<sup>1</sup> ON- AND OFF-MINE-SITE ACTIVITY FOR EXPLORATION, DEPOSIT APPRAISAL AND MINE COMPLEX DEVELOPMENT**

Expenditure Category	1996					1997				
	Off-Mine-Site		On-Mine-Site		Total	Off-Mine-Site		On-Mine-Site		Total
	(\$ millions)	(%)	(\$ millions)	(%)	(\$ millions)	(\$ millions)	(%)	(\$ millions)	(%)	(\$ millions)
<b>EXPLORATION</b>										
Field work and overhead	n.a.	n.a.	n.a.	n.a.	n.a.	543.3	90.6	56.0	9.4	599.3
New expenditures <sup>2</sup>	n.a.	n.a.	n.a.	n.a.	n.a.	28.7	81.9	6.3	18.1	35.1
Subtotal	n.a.	n.a.	n.a.	n.a.	n.a.	572.0	90.2	62.4	9.8	634.4
Capital <sup>3</sup>	n.a.	n.a.	n.a.	n.a.	n.a.	25.2	97.9	0.5	2.1	25.7
Repair and maintenance <sup>3</sup>	n.a.	n.a.	n.a.	n.a.	n.a.	5.1	100	–	–	5.1
<b>DEPOSIT APPRAISAL</b>										
Field work and overhead	n.a.	n.a.	n.a.	n.a.	n.a.	123.8	56.1	97.1	43.9	220.8
New expenditures <sup>2</sup>	n.a.	n.a.	n.a.	n.a.	n.a.	57.2	87.0	8.5	13.0	65.7
Subtotal	n.a.	n.a.	n.a.	n.a.	n.a.	181.0	63.1	105.6	36.9	286.6
Capital <sup>3</sup>	n.a.	n.a.	n.a.	n.a.	n.a.	134.5	91.3	12.9	8.7	147.4
Repair and maintenance <sup>3</sup>	n.a.	n.a.	n.a.	n.a.	n.a.	23.0	45.3	27.8	54.7	50.8
<b>EXPLORATION PLUS DEPOSIT APPRAISAL</b>										
Field work and overhead	795.2	88.9	99.6	11.1	894.8	667.1	81.3	153.1	18.7	820.2
New expenditures <sup>2</sup>	n.a.	n.a.	n.a.	n.a.	n.a.	85.9	85.2	14.9	14.8	<b>100.8</b>
Subtotal	n.a.	n.a.	n.a.	n.a.	n.a.	753.0	81.8	168.0	18.2	921.0
Capital <sup>3</sup>	n.a.	n.a.	n.a.	n.a.	n.a.	159.7	92.2	13.4	7.8	<b>173.2</b>
Repair and maintenance <sup>3</sup>	n.a.	n.a.	n.a.	n.a.	n.a.	28.1	50.2	27.8	49.8	<b>55.9</b>
<b>MINE COMPLEX DEVELOPMENT</b>										
Field work and overhead	n.a.	n.a.	884.2	100	884.2	n.a.	n.a.	834.0	100	834.0
New expenditures <sup>2</sup>	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	31.5	100	<b>31.5</b>
Subtotal	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	865.5	100	865.5
Capital <sup>3</sup>	n.a.	n.a.	1 463.3	100	1 463.3	n.a.	n.a.	2 089.6	100	2 089.6
Repair and maintenance <sup>3</sup>	n.a.	n.a.	1 765.9	100	1 765.9	n.a.	n.a.	1 578.3	100	1 578.3
Total	n.a.	n.a.	5 007.6	100	5 007.6	n.a.	n.a.	5 683.5	100	5 683.5

Sources: Natural Resources Canada and Statistics Canada, from a federal-provincial survey of mining and exploration companies.

– Nil; n.a. Not applicable.

<sup>1</sup> Up to and including 1996, most of the expenditures now included in the deposit appraisal work phase were reported under exploration (broadly speaking). <sup>2</sup> Includes engineering, economic and pre- or production feasibility studies, environment and land access expenditures. <sup>3</sup> Includes construction, and machinery and equipment expenditures, and related environmental protection and restoration expenditures.

Notes: Numbers may not add to totals due to rounding. Numbers in bold are the summary of newly collected data.

**TABLE 1b. SUMMARY OF 1997 EXPENDITURES NOT PREVIOUSLY RECORDED**

Expenditure Category	Total
	(\$ millions)
<b>EXPLORATION PLUS DEPOSIT APPRAISAL</b>	
Environment	47.3
Engineering, economic and pre- or production feasibility studies	47.9
Land access	5.6
Subtotal	100.8
Capital	173.2
Repair and maintenance	55.9
Total	329.9
<b>MINE COMPLEX DEVELOPMENT</b>	
Environment	12.2
Engineering, economic and pre- or production feasibility studies	17.0
Land access	2.3
Total	31.5
Grand total	361.3 <sup>a</sup>

Source: Natural Resources Canada, from a federal-provincial survey of mining and exploration companies.

<sup>a</sup> May be underestimated if some environment expenditures in the capital, repair and maintenance categories were newly reported in 1997.

Note: See Tables 1a and 2a for more information.

**TABLE 2a. EXPLORATION, DEPOSIT APPRAISAL AND MINE COMPLEX DEVELOPMENT EXPENDITURES<sup>1</sup>, 1997**

Expenditure Category	Exploration	Deposit Appraisal	Exploration Plus Deposit Appraisal	Mine Complex Development	Total
			(\$000)		
Field work and overhead <sup>2</sup>	599 336	220 839	820 175 <sup>a</sup>	834 040	1 654 215
Engineering studies	3 617	25 872	29 489	15 997	45 486
Economic studies	1 069	1 450	2 519	42	2 561
Pre- or production feasibility studies	4 290	11 614	15 904	981	16 885
Environment	21 560	25 726	47 286	12 193	59 479
Land access	4 538	1 058	5 596	2 288	7 885
Subtotal	634 410	286 560	920 970	865 542	1 786 511
Off-mine-site <sup>3</sup>	572 027	180 951	752 979	n.a.	752 979
On-mine-site <sup>3</sup>	62 383	105 608	167 991	865 542	1 033 532
Capital <sup>4</sup>	25 716	147 435	173 151	2 089 640	2 262 792
Total	660 126	433 995	1 094 121	2 955 182	4 049 303
Repair and maintenance <sup>4</sup>	5 071	50 831	55 902	1 578 291	1 634 193
Grand total	665 197	484 826	1 150 023	4 533 473	5 683 496

Source: Natural Resources Canada, from a federal-provincial survey of mining and exploration companies.

n.a. Not applicable.

<sup>a</sup> This total can be compared to some extent with exploration expenditures prior to 1997.

<sup>1</sup> Includes on-mine-site plus off-mine-site activities; exploration and deposit appraisal activities include only the search for and appraisal of deposits and do not include work for extensions of known reserves. <sup>2</sup> Overhead expenditures include mineral leases, claims and rental costs, and project-related head office expenditures. <sup>3</sup> Amount of expenditures dedicated to off-mine-site and on-mine-site activities. <sup>4</sup> Includes construction and machinery and equipment expenditures.

Notes: Refer to Table 1b for the summary of expenditures not previously recorded. Numbers may not add to totals due to rounding.



**TABLE 2b. SUMMARY OF ENVIRONMENT EXPENDITURES FOR EXPLORATION, DEPOSIT APPRAISAL AND MINE COMPLEX DEVELOPMENT, 1997**

Expenditure Category	Exploration		Deposit Appraisal		Exploration Plus Deposit Appraisal		Mine Complex Development		Grand Total	
	(\$000)	(%)	(\$000)	(%)	(\$000)	(%)	(\$000)	(%)	(\$000)	(%)
Environment										
Characterization	14 339	66.2	8 606	33.2	22 945	48.2	1 109	1.6	24 055	20.9
Permits	1 024	4.7	8 191	31.6	9 214	19.4	449	0.7	9 663	8.4
Protection	1 133	5.2	4 936	19.0	6 069	12.8	6 882	10.2	12 951	11.2
Restoration	5 064	23.4	3 994	15.4	9 057	19.0	3 752	5.5	12 810	11.1
Subtotal	21 560		25 726		47 286		12 193		59 479	
Capital, share of environment	81	0.4	126	0.5	207	0.4	27 034	40.0	27 241	23.6
Repair and maintenance, share of environment	5	0.0	98	0.4	102	0.2	28 392	42.0	28 494	24.7
Total environment	21 646	100.0	25 949	100.0	47 595	100.0	67 619	100.0	115 214	100.0
Total environment as a percentage of grand total <sup>1</sup>		3.3		5.4		4.1		1.5		2.0

Source: Natural Resources Canada, from a federal-provincial survey of mining and exploration companies.

<sup>1</sup> Grand total refers to Table 2a.

Note: Numbers may not add to totals due to rounding.

**TABLE 2c. EXPLORATION, DEPOSIT APPRAISAL AND MINE COMPLEX DEVELOPMENT EXPENDITURES,<sup>1</sup> 1998 AND 1999**

Expenditure Category	Exploration		Deposit Appraisal		Exploration Plus Deposit Appraisal		Mine Complex Development		Grand Total	
	1998	1999	1998	1999	1998	1999	1998	1999	1998	1999
	(\$000)									
Field work and overhead <sup>2</sup>	469 800	378 189	131 340	110 379	601 140 <sup>a</sup>	488 568 <sup>a</sup>	972 062	872 514	1 573 202	1 361 082
Engineering, economic and pre- or production feasibility studies	7 002	4 681	39 753	56 719	46 755	61 400	14 229	22 371	60 984	83 771
Environment	14 257	7 214	11 556	11 144	25 813	18 358	16 871	17 100	42 684	35 458
Land access	2 016	1 430	2 150	11 655	4 166	13 085	1 156	1 847	5 322	14 932
Subtotal	493 075	391 512	184 799	189 897	677 874	581 409	1 004 318	913 832	1 682 192	1 495 242
Off-mine-site <sup>3</sup>	425 641	334 504	94 575	137 945	520 216	472 449	n.a.	n.a.	520 216	472 449
On-mine-site <sup>3</sup>	67 433	57 009	90 224	51 952	157 657	108 961	1 004 318	913 832	1 161 976	1 022 793
Capital <sup>4</sup>	1 901	2 567	80 801	64 152	82 702	66 719	1 103 426	1 069 908	1 186 128	1 136 627
\$ for environmental protection and restoration <sup>5</sup>	59	12	303	287	362	299	27 254	28 452	27 617	28 752
Repair and maintenance <sup>4</sup>	227	1 001	24 342	25 570	24 569	26 571	1 207 515	1 165 195	1 232 084	1 191 766
\$ for environmental protection and restoration <sup>5</sup>	123	165	704	704	827	869	88 190	142 958	89 017	143 827
Subtotal	2 128	3 569	105 143	89 722	107 271	93 291	2 310 941	2 235 103	2 418 212	2 328 393
Grand total	495 202	395 081	289 942	279 619	785 144	674 700	3 315 260	3 148 935	4 100 404	3 823 635
Total environment	14 439	7 391	12 563	12 135	27 002	19 526	132 316	188 511	159 318	208 037
Environment as a percentage of grand total	2.9	1.9	4.3	4.3	3.4	2.9	4.0	6.0	3.9	5.4

Source: Natural Resources Canada, from a federal-provincial survey of mining and exploration companies.

n.a. Not applicable.

<sup>a</sup> This total can be compared to some extent with exploration expenditures prior to 1997.

<sup>1</sup> Includes on-mine-site plus off-mine-site activities; exploration and deposit appraisal activities include only the search for and appraisal of deposits and do not include work for extensions of known reserves. <sup>2</sup> Overhead expenditures include mineral leases, claims and rental costs, and project-related head office expenditures. <sup>3</sup> Amount of exploration and deposit appraisal expenditures dedicated to off-mine-site and on-mine-site activities. <sup>4</sup> Includes construction, and machinery and equipment expenditures. <sup>5</sup> As part of capital expenditures or repair and maintenance expenditures.

Note: Numbers may not add to totals due to rounding.

**TABLE 3. EXPLORATION PLUS DEPOSIT APPRAISAL, FIELD WORK PLUS OVERHEAD EXPENDITURES,<sup>1</sup> BY JUNIOR AND SENIOR COMPANIES, 1969-99**

Year	Current Dollars			% of Total Junior	Constant Dollars		
	Share of Total		Total		Share of Total		Total
	Junior	Senior			Junior	Senior	
	(\$ millions)				(\$ millions)		
1969	44.4	130.5	174.9	25.4	193.7	569.4	763.1
1970	39.9	147.2	187.1	21.3	166.0	612.3	778.2
1971	24.5	127.5	152.0	16.1	98.5	512.4	610.9
1972	18.3	97.4	115.7	15.8	69.4	369.2	438.6
1973	22.5	121.6	144.1	15.6	78.1	422.0	500.1
1974	21.8	158.5	180.3	12.1	66.0	480.0	546.0
1975	19.5	187.8	207.3	9.4	53.5	514.8	568.2
1976	13.9	192.9	206.8	6.7	34.9	484.1	518.9
1977	12.5	271.0	283.5	4.4	29.4	636.7	666.1
1978	19.8	275.0	294.8	6.7	43.6	606.1	649.8
1979	29.4	329.5	358.9	8.2	59.2	663.3	722.5
1980	60.2	530.0	590.2	10.2	109.3	961.9	1 071.2
1981	83.0	651.2	734.2	11.3	135.7	1 064.4	1 200.1
1982	73.8	502.5	576.3	12.8	111.1	756.6	867.7
1983	71.2	400.6	471.8	15.1	101.8	572.5	674.3
1984	146.9	470.4	617.3	23.8	203.2	650.5	853.7
1985	181.1	424.7	605.8	29.9	244.5	573.2	817.7
1986	348.6	374.7	723.3	48.2	457.8	492.0	949.9
1987	668.2	631.8	1 300.0	51.4	837.4	791.8	1 629.2
1988	668.3	681.8	1 350.0	49.5	800.9	817.1	1 617.9
1989	272.6	555.3	827.9	32.9	312.3	636.2	948.6
1990	241.0	533.7	774.7	31.1	268.1	593.7	861.8
1991	116.1	415.6	532.0	21.8	125.8	450.2	576.2
1992	79.9	305.4	385.3	20.7	85.4	326.5	411.9
1993	142.7	334.5	477.3	29.9	150.3	352.3	502.6
1994	195.8	432.3	628.1	31.2	204.0	450.4	654.4
1995	213.4	504.2	717.6	29.7	217.1	512.8	729.9
1996	814.7	580.0	894.8	35.2	315.3	581.1	896.4
1997	266.7	553.5	820.2	32.5	265.5	550.9	816.4
1998 <sup>P</sup>	196.5	404.6	601.1	32.7	196.5	404.6	601.1
1999 <sup>f</sup>	168.9	319.7	488.6	34.6	168.9	319.7	488.6

Sources: Natural Resources Canada and Statistics Canada, from a federal-provincial survey of mining and exploration companies.

<sup>f</sup> Forecast; <sup>P</sup> Preliminary.

<sup>1</sup> Includes on-mine-site plus off-mine-site activities.

Note: Expenditures for 1997, 1998 and 1999 include both exploration plus deposit appraisal as per new definitions; up to and including 1996, most of the expenditures now included in the deposit appraisal work phase were reported under exploration (broadly speaking).

**TABLE 4. EXPLORATION PLUS DEPOSIT APPRAISAL, FIELD WORK PLUS OVERHEAD EXPENDITURES,<sup>1</sup> BY RANGE OF EXPENDITURES AND BY JUNIOR AND SENIOR COMPANIES, 1997 AND 1998**

Range of Expenditures	Junior			Senior			Total		
	Companies	Expenditures	Percentage of Total Expenditures	Companies	Expenditures	Percentage of Total Expenditures	Companies	Expenditures	Percentage of Total Expenditures
(\$)	(number)	(\$000)	(%)	(number)	(\$000)	(%)	(number)	(\$000)	(%)
<b>1997</b>									
>10 million	–	–	–	20	362 954	65.6	20	362 954	44.3
>5 million - 10 million	5	36 476	13.7	13	87 965	15.9	18	124 441	15.2
>1 million - 5 million	59	130 166	48.8	32	81 391	14.7	91	211 557	25.8
>500 000 - 1 million	63	44 035	16.5	14	10 432	1.9	77	54 467	6.6
>200 000 - 500 000	98	32 502	12.2	26	8 287	1.5	129	40 788	5.0
>100 000 - 200 000	79	11 637	4.4	4	520	0.1	85	12 157	1.5
>50 000 - 100 000	52	4 103	1.5	17	1 340	0.2	71	5 443	0.7
0 - 50 000	176	3 231	1.2	27	554	0.1	194	3 785	0.5
Subtotal	532	262 150	98.3	153	553 442	100.0	685	815 593	99.4
Prospectors	53	4 582	1.7	–	–	–	53	4 582	0.6
Total 1997	585	266 732	100.0	153	553 442	100.0	738	820 175	100.0
<b>1998<sup>P</sup></b>									
>10 million	2	24 928	12.7	10	179 101	44.3	12	204 029	33.9
>5 million - 10 million	1	7 900	4.0	16	124 462	30.8	17	132 362	22.0
>1 million - 5 million	39	78 620	40.0	34	85 303	21.1	73	163 923	27.3
>500 000 - 1 million	47	32 227	16.4	10	7 852	1.9	57	40 079	6.7
>200 000 - 500 000	99	32 557	16.6	16	4 974	1.2	115	37 531	6.2
>100 000 - 200 000	51	7 718	3.9	13	1 944	0.5	64	9 662	1.6
>50 000 - 100 000	57	4 475	2.3	7	603	0.1	64	5 077	0.8
0 - 50 000	184	3 260	1.7	23	425	0.1	207	3 685	0.6
Subtotal	480	191 684	97.6	129	404 663	100.0	609	596 347	99.2
Prospectors	42	4 792	2.4	–	–	–	42	4 792	0.8
Total 1998	522	196 477	100.0	129	404 663	100.0	651	601 140	100.0

Source: Natural Resources Canada, from a federal-provincial survey of mining and exploration companies.

– Nil; <sup>P</sup> Preliminary.

<sup>1</sup> Includes on-mine-site plus off-mine-site activities.

Note: Numbers may not add to totals due to rounding.

**TABLE 5a. DIAMOND EXPLORATION PLUS DEPOSIT APPRAISAL EXPENDITURES,<sup>1</sup> BY PROVINCE AND TERRITORY, 1996-98**

Province/Territory	1996		1997		1998	
	Field work and overhead expenditures	Total expenditures <sup>2</sup>	Field work and overhead expenditures	Total expenditures <sup>2</sup>	Field work and overhead expenditures	Total expenditures <sup>2</sup>
Northwest Territories	138.8	n.a.	74.9	94.7	54.2	90.4
Alberta	0.9	n.a.	9.3	9.5	16.0	16.2
Quebec	2.9	n.a.	2.6	2.6	2.7	2.7
Ontario	5.3	n.a.	1.8	1.9	1.9	2.0
Saskatchewan	4.5	n.a.	2.5	2.5	1.0	1.0
Others	1.9	n.a.	1.2	1.2	0.8	0.9
Total	154.3	n.a.	92.2	112.4	76.7	113.2

Source: Natural Resources Canada, from a federal-provincial survey of mining and exploration companies.

n.a. Not applicable.

<sup>1</sup> Includes on-mine-site plus off-mine-site activities. <sup>2</sup> Includes field work, overhead, engineering, economic and pre- or production feasibility studies, environment and land access expenditures.

Note: Numbers may not add to totals due to rounding.

**TABLE 5b. SUMMARY OF TOTAL DIAMOND EXPLORATION, DEPOSIT APPRAISAL AND MINE COMPLEX DEVELOPMENT EXPENDITURES,<sup>1</sup> 1997 and 1998**

Expenditure Category	1997	1998
	(\$ millions)	
Field work and overhead	116.2	168.7
Engineering, economic and pre- or production feasibility studies environment and land access	20.2	36.8
Capital and repair <sup>2</sup>	281.7	160.9
Total	418.1	366.4

Source: Natural Resources Canada, from a federal-provincial survey of mining and exploration companies.

<sup>1</sup> Includes on-mine-site plus off-mine-site. <sup>2</sup> Includes construction, and machinery and equipment expenditures.

**TABLE 6a. AREA<sup>1</sup> OF NEW MINERAL CLAIMS STAKED OR RECORDED IN CANADA, 1991-98**

Province/Territory	1991		1992		1993		1994		1995		1996		1997		1998	
	(hectares)	(%) <sup>2</sup>	(hectares)	(%) <sup>3</sup>	(hectares)	(%) <sup>4</sup>	(hectares)	(%) <sup>5</sup>	(hectares)	(%) <sup>6</sup>	(hectares)	(%) <sup>7</sup>	(hectares)	(%) <sup>8</sup>	(hectares)	(%) <sup>9</sup>
Newfoundland	127 748	78.1	96 423	75.5	127 282	132.0	513 903	403.8	6 106 617	1188.3	417 575	6.8	334 075	80.0	361 900	108.3
Nova Scotia	126 833	71.8	205 941	162.4	87 350	42.4	154 123	176.4	183 893	119.3	424 815	231.0	208 191	49.0	74 180	35.6
New Brunswick	73 136	104.8	55 104	75.3	37 616	68.3	63 680	169.3	60 464	94.9	93 760	155.1	53 760	57.3	40 000	74.4
Quebec	456 810	94.5	555 323	121.6	691 915	124.6	840 922	121.5	1 474 196	175.3	954 967	64.8	1 050 629	110.0	728 142	69.3
Ontario	317 568	75.7	497 800	156.8	426 416	85.7	734 400	172.2	668 832	91.1	903 488	135.1	855 584	94.7	577 632	67.5
Manitoba	108 415 <sup>b</sup>	85.1	1 015 086 <sup>b</sup>	936.3	831 168 <sup>t</sup>	81.9	1 391 641 <sup>b</sup>	167.4	670 316 <sup>b</sup>	48.2	325 452 <sup>b</sup>	48.6	386 243 <sup>b</sup>	118.7	475 634	123.1
Saskatchewan	274 242	148.3	897 315	327.2	2 257 219	251.6	1 815 997	80.5	340 881	18.8	469 040	137.6	950 253	202.6	680 048	71.6
Alberta	4 400	0.5	22 300 000	506 818.2	10 260 000	46.0	6 750 000	65.8	1 665 000	24.7	5 328 000	320.0	37 200 000	698.2	3 490 000	9.4
British Columbia	1 510 850 <sup>a</sup>	75.0	824 200 <sup>a</sup>	54.6	702 250	85.2	774 340	110.3	845 550	109.2	997 740	118.0	765 257	76.7	474 296	62.0
Yukon	128 081	65.6	135 854	106.1	114 817	84.5	280 171	244.0	376 844	134.5	514 483	136.5	459 507	89.3	131 221	28.5
Northwest Territories	2 213 337	622.9	7 178 000	324.3	11 812 417	164.6	2 929 482	24.8	3 839 299	131.1	2 956 017	77.0	1 953 191	66.1	827 615	42.4
Total	5 341 420	106.9	33 761 046	632.1	27 348 450	81.0	16 248 659	59.4	16 231 892	99.9	13 385 337	82.5	44 216 690	330.3	7 860 668	17.8

Source: Provincial and territorial mining recorders.

<sup>a</sup> Not strictly comparable to 1990 and earlier years because the total is the area of claims recorded and not the area of claims staked. <sup>b</sup> Data for Manitoba are revised.

<sup>1</sup> Excludes coal. <sup>2</sup> Percentage increase 1991 over 1990. <sup>3</sup> Percentage increase 1992 over 1991. <sup>4</sup> Percentage increase 1993 over 1992. <sup>5</sup> Percentage increase 1994 over 1993. <sup>6</sup> Percentage increase 1995 over 1994.

<sup>7</sup> Percentage increase 1996 over 1995. <sup>8</sup> Percentage increase 1997 over 1996. <sup>9</sup> Percentage increase 1998 over 1997.

Note: Numbers may not add to totals due to rounding.

**TABLE 6b. AREA<sup>1</sup> OF NEW MINERAL CLAIMS STAKED OR RECORDED IN CANADA, 1997 AND 1998**

Province/Territory	1997		1998	
	(hectares)	(%)	(hectares)	(%)
Newfoundland	334 075	0.8	361 900	4.6
Nova Scotia	208 191	0.5	74 180	0.9
New Brunswick	53 760	0.1	40 000	0.5
Quebec	1 050 629	2.4	728 142	9.3
Ontario	855 584	1.9	577 632	7.3
Manitoba	386 243 <sup>r</sup>	0.9	475 634	6.1
Saskatchewan	950 253	2.2	680 048	8.7
Alberta	37 200 000	84.1	3 490 000	44.4
British Columbia	765 257	1.7	474 296	6.0
Yukon	459 507	1.0	131 221	1.7
Northwest Territories	1 953 191	4.4	827 615	10.5
Total	44 216 690	100.0	7 860 668	100.0

Source: Provincial and territorial mining recorders.

<sup>r</sup> Revised.

<sup>1</sup> Excludes coal.

Note: Numbers may not add to totals due to rounding.

**TABLE 7. EXPLORATION AND DEPOSIT APPRAISAL, OFF-MINE-SITE AND ON-MINE-SITE EXPENDITURES,<sup>1</sup> BY PROVINCE AND TERRITORY, 1997 AND 1998**

Province/Territory	1997						1998 <sup>p</sup>					
	Exploration		Deposit Appraisal		Exploration Plus Deposit Appraisal		Exploration		Deposit Appraisal		Exploration Plus Deposit Appraisal	
	Off-Mine-Site	On-Mine-Site	Off-Mine-Site	On-Mine-Site	Off-Mine-Site	On-Mine-Site	Off-Mine-Site	On-Mine-Site	Off-Mine-Site	On-Mine-Site	Off-Mine-Site	On-Mine-Site
	(\$000)											
Newfoundland	67 309	973	629	2 841	67 938	3 814	40 487	9 475	147	760	40 634	10 235
Nova Scotia	6 585	25	1 225	20	7 810	45	5 304	400	188	117	5 492	517
New Brunswick	9 199	3 054	1 066	49	10 265	3 103	7 293	1 629	100	22	7 393	1 651
Québec	92 342	10 947	16 242	53 771	108 585	64 718	84 254	6 912	4 858	40 983	89 112	47 895
Ontario	104 951	19 008	34 578	30 752	139 529	49 759	68 847	16 874	26 365	20 184	95 212	37 058
Manitoba	33 625	4 781	1 127	1 832	34 752	6 613	20 571	6 191	779	2 907	21 351	9 098
Saskatchewan	41 204	568	13 743	634	54 947	1 202	35 552	1 952	3 100	17 164	38 652	19 116
Alberta	15 032	1 991	5 103	5 883	20 135	7 874	19 911	2 584	130	3 427	20 041	6 011
British Columbia	65 256	6 268	36 634	7 059	101 890	13 327	33 533	6 287	15 828	2 542	49 361	8 829
Yukon	33 352	2 459	7 260	2 537	40 613	4 996	12 214	2 073	1 325	1 382	13 539	3 455
Northwest Territories	103 172	12 309	63 343	231	166 514	12 540	97 674	13 057	41 755	736	139 429	13 793
<b>Total</b>	<b>572 027</b>	<b>62 383</b>	<b>180 951</b>	<b>105 608</b>	<b>752 979</b>	<b>167 991</b>	<b>425 641</b>	<b>67 433</b>	<b>94 575</b>	<b>90 224</b>	<b>520 216</b>	<b>157 657</b>
Total (on- plus off-mine-site)	634 410		286 559		920 970		493 075		184 799		677 874	

Source: Natural Resources Canada, from a federal-provincial survey of mining and exploration companies.

<sup>p</sup> Preliminary.

<sup>1</sup> Data include field work, overhead, engineering, economic and pre- or production feasibility studies, environment, and land access expenditures.

Note: Numbers may not add to totals due to rounding.

**TABLE 8. EXPLORATION PLUS DEPOSIT APPRAISAL, FIELD WORK PLUS OVERHEAD EXPENDITURES,<sup>1</sup> BY PROVINCE AND TERRITORY, 1996-99**

Province/Territory	1996			1997			1998 <sup>p</sup>			1999 <sup>f</sup>	
	(\$ millions)	1996 as a % of 1995 Expenditures		(\$ millions)	1997 as a % of 1996 Expenditures		(\$ millions)	1998 as a % of 1997 Expenditures		1999 as a % of 1998 Expenditures	
		(%)	(%)		(%)	(%)		(%)	(%)	(%)	
Newfoundland	92.5	10.3	130.1	58.4	7.1	63.1	49.7	8.3	85.1	36.2	7.4
Nova Scotia	6.9	0.8	246.4	6.7	0.8	97.1	5.7	0.9	85.1	5.5	1.1
New Brunswick	14.8	1.7	116.5	12.2	1.5	82.4	8.6	1.4	70.5	7.4	1.5
Quebec	137.2	15.3	111.2	168.6	20.5	122.9	131.6	21.9	78.1	105.7	21.6
Ontario	194.9	21.8	150.3	176.5	21.5	90.6	124.3	20.7	70.4	105.4	21.6
Manitoba	41.2	4.6	126.4	40.3	4.9	97.8	30.0	5.0	74.4	28.3	5.8
Saskatchewan	50.6	5.7	115.5	49.9	6.1	98.6	48.9	8.1	98.0	28.7	5.9
Alberta	10.8	1.2	101.9	20.5	2.5	189.8	24.8	4.1	121.0	22.0	4.5
British Columbia	104.9	11.7	132.1	95.8	11.7	91.3	49.4	8.2	51.6	50.6	10.4
Yukon	46.4	5.2	118.1	40.6	5.0	87.5	15.5	2.6	38.2	12.6	2.6
Northwest Territories	194.5	21.7	113.0	150.7	18.4	77.5	112.9	18.8	74.9	86.3	17.7
Total	894.8	100.0	124.7	820.2	100.0	91.7	601.1	100.0	73.3	488.6	100.0
Exploration	n.a.	n.a.	n.a.	599.3	73.1	73.1	469.8	78.2	78.2	378.2	77.4
Deposit appraisal	n.a.	n.a.	n.a.	220.8	26.9	26.9	131.3	21.8	21.8	110.4	22.6

Source: Natural Resources Canada, from a federal-provincial survey of mining and exploration companies.

<sup>f</sup> Forecast; n.a. Not applicable; <sup>p</sup> Preliminary.

<sup>1</sup> Includes on-mine-site plus off-mine-site activities. Data for 1997, 1998 and 1999 include both exploration plus deposit appraisal as per the new definitions; up to and including 1996, most of the expenditures now included in the deposit appraisal work phase were reported under exploration (broadly speaking).

Note: Numbers may not add to totals due to rounding.

TABLE 9a. EXPLORATION ACTIVITY<sup>1</sup> BY PROVINCE AND TERRITORY, BY TYPE OF WORK, 1997

Province/Territory	Drilling (Surface and Underground)				Geochemical	Geology	Geophysical		Rock Work <sup>2</sup>	Other Field Costs	Engineering Studies	Economic Studies	Pre- or Production Feasibility Studies	Mineral Lease and Head Office	Environment	Land Access	Grand Total
	Diamond		Other				Ground	Airborne									
	Metres	Cost	Metres	Cost													
	(000)	(\$000)	(000)	(\$000)													
Newfoundland	146	28 351	–	–	1 446	6 724	6 381	1 286	277	6 192	1 217	472	149	5 308	8 621	1 860	68 282
Nova Scotia	24	2 206	1	103	363	1 533	771	–	417	302	76	28	40	502	214	54	6 610
New Brunswick	100	7 187	2	128	574	1 934	1 053	68	435	268	21	2	115	369	99	–	12 253
Quebec	561	46 406	4	224	5 318	20 903	9 463	2 643	2 540	4 135	479	327	40	10 227	381	206	103 290
Ontario	890	66 968	9	1 859	2 316	14 507	7 622	385	12 078	2 875	398	45	261	9 558	4 304	783	123 959
Manitoba	199	22 517	1	82	1 282	3 441	3 614	46	681	2 197	110	–	–	4 226	111	100	38 406
Saskatchewan	175	20 591	2	461	1 348	3 574	5 525	922	870	2 731	109	2	–	5 639	–	–	41 772
Alberta	15	4 475	110	3 386	769	1 453	1 142	2 983	–	77	94	–	–	1 438	1 156	50	17 022
British Columbia	276	31 642	10	595	3 941	12 247	2 740	1 253	6 839	3 843	750	94	32	5 702	1 686	158	71 524
Yukon	83	14 049	11	1 572	3 282	6 361	2 280	1 083	2 297	1 434	65	–	3	2 780	473	133	35 811
Northwest Territories	200	29 159	6	3 500	25 239	10 883	7 570	10 878	1 542	5 360	297	100	3 650	11 591	4 516	1 196	115 480
Total	2 670	273 552	157	11 910	45 878	83 559	48 161	21 548	27 973	29 415	3 617	1 069	4 290	57 340	21 560	4 538	634 410
Percentage of grand total	n.a.	43.1	n.a.	1.8	7.2	13.2	7.6	3.4	4.4	4.6	0.6	0.2	0.7	9.1	3.4	0.7	

Source: Natural Resources Canada, from a federal-provincial survey of mining and exploration companies.

– Nil; n.a. Not applicable.

<sup>1</sup> Includes on-mine-site plus off-mine-site activities. <sup>2</sup> Includes stripping, trenching, shaft work, drifts, cross-cuts, raises, declines, rock sampling and de-watering costs.

Note: Numbers may not add to totals due to rounding.

TABLE 9b. DEPOSIT APPRAISAL ACTIVITY,<sup>1</sup> BY PROVINCE AND TERRITORY, BY TYPE OF WORK, 1997

Province/Territory	Drilling (Surface and Underground)				Geochemical	Geology	Geophysical		Rock Work <sup>2</sup>	Other Field Costs	Engineering Studies	Economic Studies	Pre- or Production Feasibility Studies	Mineral Lease and Head Office	Environment	Land Access	Grand Total
	Diamond		Other				Ground	Airborne									
	Metres	Cost	Metres	Cost													
	(000)	(\$000)	(000)	(\$000)													
Newfoundland	10	1 039	–	–	5	255	–	–	863	122	220	–	699	191	75	–	3 470
Nova Scotia	3	156	–	324	–	–	–	–	1	25	472	20	7	22	194	25	1 245
New Brunswick	1	108	–	–	–	4	–	–	25	–	684	–	–	10	284	–	1 115
Quebec	130	9 791	14	471	135	833	188	–	52 654	2 157	818	63	2 138	495	266	5	70 013
Ontario	373	24 022	96	4 495	29	915	1 690	72	22 860	2 983	915	–	5 607	1 226	455	62	65 330
Manitoba	18	1 355	–	–	–	106	–	–	575	–	251	109	–	159	405	–	2 959
Saskatchewan	5	1 390	–	–	–	601	278	–	3 697	–	4 310	82	120	2 306	1 318	275	14 377
Alberta	16	258	48	3 746	–	54	–	–	8	474	2 408	770	–	207	2 861	200	10 986
British Columbia	47	10 570	52	3 402	135	4 041	427	152	4 841	1 157	6 437	366	639	2 296	8 967	263	43 693
Yukon	3	300	13	1 300	–	101	–	–	2 377	845	906	–	951	528	2 489	–	9 797
Northwest Territories	128	14 456	16	6 691	668	1 331	213	–	8 903	6 869	8 452	40	1 454	5 857	8 412	228	63 574
Total	734	63 445	239	20 430	972	8 240	2 795	224	96 803	14 632	25 872	1 450	11 614	13 297	25 726	1 058	286 560
Percentage of grand total	n.a.	22.2	n.a.	7.1	0.3	2.9	1.0	0.1	33.8	5.1	9.0	0.5	4.1	4.6	9.0	0.4	

Source: Natural Resources Canada, from a federal-provincial survey of mining and exploration companies.

– Nil; n.a. Not applicable.

<sup>1</sup> Includes on-mine-site plus off-mine-site activities. <sup>2</sup> Includes stripping, trenching, shaft work, drifts, cross-cuts, raises, declines, rock sampling and de-watering costs.

Note: Numbers may not add to totals due to rounding.



TABLE 9c. EXPLORATION PLUS DEPOSIT APPRAISAL ACTIVITIES,<sup>1</sup> BY PROVINCE AND TERRITORY, BY TYPE OF WORK, 1997

Province/Territory	Drilling (Surface and Underground)				Geochemical	Geology	Geophysical		Rock Work <sup>2</sup>	Other Field Costs	Mineral Lease and Head Office	Total	Engineering Studies	Economic Studies	Pre- or Production Feasibility Studies	Environment	Land Access	Grand Total
	Diamond		Other				Ground	Airborne										
	Metres	Cost	Metres	Cost														
	(000)	(\$000)	(000)	(\$000)	(\$000)													
Newfoundland	156	29 390	0	0	1 451	6 979	6 381	1 286	1 140	6 314	5 499	58 411	1 437	472	847	8 696	1 860	71 752
Nova Scotia	27	2 362	2	427	363	1 533	771	0	418	327	524	6 726	548	48	47	408	79	7 855
New Brunswick	101	7 295	2	128	574	1 938	1 053	68	460	268	379	12 162	705	2	115	383	0	13 368
Quebec	691	56 197	18	695	5 453	21 735	9 651	2 643	55 193	6 291	10 722	168 581	1 297	390	2 178	646	211	173 303
Ontario	1 263	90 990	105	6 354	2 345	15 422	9 311	457	34 938	5 859	10 784	176 460	1 312	45	5 868	4 759	845	189 289
Manitoba	217	23 872	1	82	1 282	3 546	3 614	46	1 256	2 197	4 385	40 279	361	109	0	516	100	41 365
Saskatchewan	179	21 981	2	461	1 348	4 175	5 803	922	4 567	2 731	7 945	49 933	4 419	84	120	1 318	275	56 149
Alberta	32	4 732	159	7 132	769	1 507	1 142	2 983	8	551	1 645	20 470	2 502	770	0	4 017	250	28 009
British Columbia	323	42 213	62	3 997	4 077	16 288	3 167	1 405	11 680	5 000	7 999	95 826	7 187	460	671	10 653	420	115 217
Yukon	87	14 349	24	2 872	3 282	6 462	2 280	1 083	4 673	2 279	3 309	40 588	971	0	954	2 963	133	45 608
Northwest Territories	328	43 615	21	10 191	25 908	12 213	7 783	10 878	10 444	12 229	17 448	150 709	8 749	140	5 104	12 928	1 424	179 054
Total	3 404	336 996	396	32 340	46 850	91 799	50 956	21 772	124 776	44 047	70 637	820 175	29 489	2 519	15 904	47 286	5 596	920 970
Percentage of total	n.a.	41.09	n.a.	3.94	5.71	11.19	6.21	2.65	15.21	5.37	8.61	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Percentage of grand total	n.a.	36.59	n.a.	3.51	5.09	9.97	5.53	2.36	13.55	4.78	7.67	89.06	3.20	0.27	1.73	5.13	0.61	100

Source: Natural Resources Canada, from a federal-provincial survey of mining and exploration companies.

– Nil; n.a. Not applicable.

<sup>1</sup> Includes on-mine-site plus off-mine-site activities. <sup>2</sup> Includes stripping, trenching, shaft work, drifts, cross-cuts, raises, declines, rock sampling and de-watering costs.

Note: Numbers may not add to totals due to rounding.

TABLE 9d. MINE COMPLEX DEVELOPMENT ACTIVITY,<sup>1</sup> BY PROVINCE AND TERRITORY, BY TYPE OF WORK, 1997

Province/Territory	Drilling (Surface and Underground)				Geochemical	Geology	Geophysical		Rock Work <sup>1</sup>	Stripping	Other Field Costs	Engineering Studies	Economic Studies	Pre- or Production Feasibility Studies	Mineral Lease and Head Office	Environment	Land Access	Grand Total
	Diamond		Other				Ground	Airborne										
	Metres	Cost	Metres	Cost														
	(000)	(\$000)	(000)	(\$000)	(\$000)													
Newfoundland	5	293	–	–	–	94	–	–	2 700	37 476	489	–	–	–	454	9	100	41 616
Nova Scotia	2	134	3	201	19	24	120	–	3 600	1 249	5	45	10	15	131	419	21	5 993
New Brunswick	136	4 549	238	6 391	32	193	–	–	14 665	4 000	–	1 113	–	32	52	54	47	31 128
Quebec	184	7 343	19	1 000	146	1 894	41	–	132 780	81 939	6 695	3 722	–	–	10 126	9 872	–	255 557
Ontario	370	18 305	202	5 956	75	2 633	3	–	216 606	2 295	3 300	2 358	–	121	2 151	563	982	255 349
Manitoba	144	6 511	–	–	254	660	2	–	77 174	1 991	224	4 901	–	500	962	–	–	93 179
Saskatchewan	32	2 054	51	4 501	43	1 408	1 001	–	25 515	–	–	–	–	89	6 787	127	626	42 150
Alberta	5	265	38	2 443	20	433	–	5	202	3 356	324	616	27	83	1 276	316	25	9 390
British Columbia	75	5 067	415	10 250	137	1 517	60	–	15 270	22 885	30	2 420	5	27	3 175	489	465	61 798
Yukon	–	–	–	–	–	16	–	–	108	20 000	15	27	–	114	63	116	–	20 458
Northwest Territories	46	2 044	13	663	–	713	–	–	16 942	12 153	355	795	–	–	15 007	228	22	48 922
Total	999	46 565	980	31 404	726	9 586	1 227	5	505 562	187 344	11 438	15 997	42	981	40 183	12 193	2 288	865 542
Percentage of grand total	n.a.	5.4	n.a.	3.6	0.1	1.1	0.1	0.0	58.4	21.6	1.3	1.8	0.0	0.1	4.6	1.4	0.3	

Source: Natural Resources Canada, from a federal-provincial survey of mining and exploration companies.

– Nil; n.a. Not applicable.

<sup>1</sup> Includes shaft work, drifts, cross-cuts, raises, declines, rock sampling and de-watering costs.

Note: Numbers may not add to totals due to rounding.

**TABLE 10. SUMMARY OF DRILLING ACTIVITY IN CANADA, 1997**

Drilling Activity	Exploration				Deposit Appraisal				Exploration Plus Deposit Appraisal On- Plus Off-Mine-Site (metres)
	Off-Mine-Site		On-Mine-Site		Off-Mine-Site		On-Mine-Site		
	(metres)	(% of subtotal)	(metres)	(% of subtotal)	(metres)	(% of subtotal)	(metres)	(% of subtotal)	
Diamond drilling									
Surface	1 964 460	92.8	257 143	46.5	286 021	71.7	69 267	20.7	2 576 892
Underground	152 879	7.2	295 429	53.5	113 142	28.3	265 667	79.3	827 116
Subtotal	2 117 339	100.0	552 572	100.0	399 163	100.0	334 934	100.0	3 404 008
Percentage of off- plus on-mine-site diamond drilling	79.3		20.7		54.4		45.6		
Other drilling									
Surface	119 769	100.0	33 238	88.9	51 718	100.0	86 935	46.5	291 660
Underground	64	—	4 158	11.1	—	—	100 064	53.5	104 286
Subtotal	119 833	100.0	37 396	100.0	51 718	100.0	186 999	100.0	395 946
Percentage of other drilling for off- plus on-mine-site	76.2		23.8		21.7		78.3		
Total	2 237 172		589 968		450 882		521 933		3 799 954

Source: Natural Resources Canada, from a federal-provincial survey of mining and exploration companies.

Note: Numbers may not add to totals due to rounding.

**TABLE 11a. EXPLORATION PLUS DEPOSIT APPRAISAL, SURFACE DRILLING,<sup>1</sup> BY PROVINCE AND TERRITORY, BY MINERAL COMMODITY SOUGHT, 1997**

Province/Territory	Metals					Nonmetals	Diamonds	Coal	Total
	Base	Precious	Iron	Uranium	Other				
	(000 metres)								
Newfoundland	89	15	9	—	40	—	—	—	154
Nova Scotia	10	9	—	—	—	9	—	—	29
New Brunswick	64	5	—	—	—	3	—	—	72
Quebec	200	264	—	—	25	28	2	—	520
Ontario	187	589	—	—	6	—	4	—	786
Manitoba	142	34	—	—	—	1	—	—	178
Saskatchewan	33	32	—	84	7	—	4	—	160
Alberta	—	2	—	—	—	—	11	176	189
British Columbia	131	173	—	—	9	5	1	50	369
Yukon	47	49	—	—	5	—	—	2	102
Northwest Territories	30	198	—	5	9	—	68	—	309
Total	935	1 370	9	89	101	46	90	227	2 869

Source: Natural Resources Canada, from a federal-provincial survey of mining and exploration companies.

— Nil.

<sup>1</sup> Includes on-mine-site plus off-mine-site activities. Drilling includes diamond and other types of drilling.

Note: Numbers may not add to totals due to rounding.

**TABLE 11b. EXPLORATION PLUS DEPOSIT APPRAISAL, UNDERGROUND DRILLING,<sup>1</sup> BY PROVINCE AND TERRITORY, BY MINERAL COMMODITY SOUGHT, 1997**

Province/Territory	Metals					Nonmetals	Diamonds	Coal	Total
	Base	Precious	Iron	Uranium	Other				
(000 metres)									
Newfoundland	-	2	-	-	-	-	-	-	2
Nova Scotia	-	-	-	-	-	-	-	-	-
New Brunswick	23	8	-	-	-	-	-	-	31
Quebec	46	143	-	-	-	1	-	-	190
Ontario	232	300	-	-	49	-	-	-	582
Manitoba	40	-	-	-	-	-	-	-	40
Saskatchewan	-	1	-	19	-	-	1	-	21
Alberta	-	-	-	1	-	-	-	-	1
British Columbia	3	12	-	-	-	1	-	-	16
Yukon	-	9	-	-	-	-	-	-	9
Northwest Territories	2	38	-	-	-	-	-	-	40
<b>Total</b>	<b>347</b>	<b>513</b>	<b>-</b>	<b>20</b>	<b>49</b>	<b>2</b>	<b>1</b>	<b>-</b>	<b>931</b>

Source: Natural Resources Canada, from a federal-provincial survey of mining and exploration companies.

- Nil.

<sup>1</sup> Includes on-mine-site plus off-mine-site activities. Drilling includes diamond and other types of drilling.

Note: Numbers may not add to totals due to rounding.

**TABLE 12. EXPLORATION PLUS DEPOSIT APPRAISAL EXPENDITURES,<sup>1</sup> BY MINERAL COMMODITY SOUGHT, 1997**

Mineral Commodity	1997	1997 as % of 1996 Expenditures	Total Expenditures <sup>2</sup>			Percentage of Canadian Total <sup>2</sup>
	Field Work and Overhead Expenditures		On-Mine-Site	Off-Mine-Site	On Mine-Site Plus Off-Mine-Site	
	(\$ millions)	(%)	(\$ millions)			(%)
Base metals <sup>3</sup>	264.7	89.9	38.9	246.6	285.6	31.0
Precious metals <sup>4</sup>	371.1	105.8	101.1	303.5	404.6	43.9
Iron ore	1.7	123.8	1.7	0.3	2.1	0.2
Uranium	34.4	111.9	-	39.1	39.1	4.2
Other metals	28.6	80.1	4.1	31.1	35.3	3.8
Nonmetals	10.7	87.7	3.5	11.9	15.4	1.7
Diamonds	92.2	59.8	9.8	102.6	112.4	12.2
Coal	16.4	116.7	8.7	17.6	26.3	2.9
Unspecified mineral commodities	0.2	21.4	-	0.2	0.2	...
<b>Total</b>	<b>820.2</b>	<b>91.7</b>	<b>168.0</b>	<b>753.0</b>	<b>921.0</b>	<b>100.0</b>

Source: Natural Resources Canada, from a federal-provincial survey of mining and exploration companies.

- Nil; ... Amount too small to be expressed.

<sup>1</sup> Includes on-mine-site plus off-mine-site activities. <sup>2</sup> Includes field work, overhead, engineering, economic and pre- or production feasibility studies, environmental and land access expenditures. <sup>3</sup> Includes copper, nickel, lead and zinc. <sup>4</sup> Includes silver, gold and platinum group metals.

Note: Numbers may not add to totals due to rounding.

**TABLE 13a. EXPLORATION EXPENDITURES,<sup>1</sup> BY PROVINCE AND TERRITORY, BY MINERAL COMMODITY SOUGHT, 1997**

Province/Territory	Metals					Nonmetals	Diamonds	Coal	Unspecified Mineral Commodity	Total
	Base	Precious	Iron	Uranium	Other					
	(\$000)									
Newfoundland	43 338	6 618	–	–	17 253	833	189	–	51	68 282
Nova Scotia	1 171	2 297	–	–	97	2 872	–	173	–	6 610
New Brunswick	10 516	1 145	–	–	275	265	–	–	53	12 253
Quebec	48 616	48 458	–	36	1 720	1 858	2 602	–	–	103 290
Ontario	41 217	78 239	–	–	2 566	66	1 857	13	–	123 959
Manitoba	31 285	6 736	–	–	22	318	1	–	44	38 406
Saskatchewan	6 884	6 535	–	24 321	1 311	–	2 528	141	51	41 772
Alberta	3	1 852	–	331	–	–	9 495	5 342	–	17 022
British Columbia	20 775	45 361	–	–	2 049	2 459	433	447	–	71 524
Yukon	15 926	17 865	–	–	1 270	–	–	751	–	35 811
Northwest Territories	13 040	35 274	–	2 078	487	–	64 601	–	–	115 480
Total	232 771	250 380	–	26 767	27 049	8 671	81 706	6 867	199	634 410

Source: Natural Resources Canada, from a federal-provincial survey of mining and exploration companies.

– Nil.

<sup>1</sup> Includes on-mine-site plus off-mine-site activities. Includes field work, overhead, engineering, economic and pre-feasibility studies, environment and land access expenditures.**TABLE 13b. DEPOSIT APPRAISAL EXPENDITURES,<sup>1</sup> BY PROVINCE AND TERRITORY, BY MINERAL COMMODITY SOUGHT, 1997**

Province/Territory	Metals					Nonmetals	Diamonds	Coal	Unspecified Mineral Commodity	Total
	Base	Precious	Iron	Uranium	Other					
	(\$000)									
Newfoundland	–	272	1 735	–	–	1 462	–	–	–	3 470
Nova Scotia	807	245	–	–	–	20	–	173	–	1 245
New Brunswick	–	280	–	–	618	217	–	–	–	1 115
Quebec	6 120	58 119	338	–	3 720	1 716	–	–	–	70 013
Ontario	16 749	46 122	–	–	2 443	15	–	–	–	65 330
Manitoba	2 690	6	–	–	181	82	–	–	–	2 959
Saskatchewan	3 003	3	–	10 590	–	781	–	–	–	14 377
Alberta	–	–	–	–	–	75	–	10 912	–	10 986
British Columbia	15 291	17 014	–	–	107	2 390	552	8 339	–	43 693
Yukon	4 289	5 508	–	–	–	–	–	–	–	9 797
Northwest Territories	3 839	26 681	–	1 772	1 142	–	30 140	–	–	63 574
Total	52 789	154 251	2 073	12 362	8 211	6 758	30 693	19 424	–	286 560

Source: Natural Resources Canada, from a federal-provincial survey of mining and exploration companies.

– Nil.

<sup>1</sup> Includes on-mine-site plus off-mine-site activities. Includes field work, overhead, engineering, economic and production feasibility studies, environment and land access expenditures.**TABLE 13c. EXPLORATION PLUS DEPOSIT APPRAISAL EXPENDITURES,<sup>1</sup> BY PROVINCE AND TERRITORY, BY MINERAL COMMODITY SOUGHT, 1997**

Province/Territory	Metals					Nonmetals	Diamonds	Coal	Unspecified Mineral Commodity	Total
	Base	Precious	Iron	Uranium	Other					
	(\$000)									
Newfoundland	43 338	6 890	1 735	–	17 253	2 295	189	–	51	71 752
Nova Scotia	1 978	2 542	–	–	97	2 892	–	346	–	7 855
New Brunswick	10 516	1 425	–	–	893	481	–	–	53	13 368
Quebec	54 736	106 578	338	36	5 439	3 573	2 602	–	–	173 303
Ontario	57 966	124 362	–	–	5 009	81	1 857	13	–	189 289
Manitoba	33 975	6 742	–	–	203	401	1	–	44	41 365
Saskatchewan	9 887	6 538	–	34 911	1 311	781	2 528	141	51	56 149
Alberta	3	1 852	–	331	0	75	9 495	16 253	–	28 009
British Columbia	36 066	62 375	–	–	2 156	4 849	985	8 786	–	115 217
Yukon	20 215	23 373	–	–	1 270	–	–	751	–	45 608
Northwest Territories	16 879	61 955	–	3 850	1 629	–	94 742	–	–	179 054
Total	285 559	404 631	2 073	39 129	35 259	15 430	112 399	26 291	199	920 970

Source: Natural Resources Canada, from a federal-provincial survey of mining and exploration companies.

– Nil.

<sup>1</sup> Includes on-mine-site plus off-mine-site activities. Includes field work, overhead, engineering, economic and pre- or production feasibility studies, environment and land access expenditures.

**TABLE 13d. EXPLORATION PLUS DEPOSIT APPRAISAL, FIELD WORK PLUS OVERHEAD EXPENDITURES,<sup>1</sup> BY PROVINCE AND TERRITORY, BY MINERAL COMMODITY SOUGHT, 1997**

Province/Territory	Metals					Nonmetals	Diamonds	Coal	Unspecified Mineral Commodity	Total
	Base	Precious	Iron	Uranium	Other					
	(\$000)									
Newfoundland	35 125	6 789	1 702	–	13 264	1 340	185	–	37	58 441
Nova Scotia	1 627	2 247	–	–	83	2 606	–	163	–	6 726
New Brunswick	10 387	1 144	–	–	191	388	–	–	53	12 162
Quebec	54 300	105 279	42	36	4 011	2 331	2 582	–	–	168 581
Ontario	56 778	113 012	–	–	4 818	22	1 817	13	–	176 460
Manitoba	33 209	6 531	–	–	128	367	1	–	44	40 279
Saskatchewan	8 615	6 427	–	30 545	1 311	315	2 528	141	51	49 933
Alberta	3	1 841	–	331	–	74	9 293	8 929	–	20 470
British Columbia	28 943	53 974	–	–	2 145	3 264	968	6 532	–	95 826
Yukon	19 099	19 640	–	–	1 246	–	–	603	–	40 588
Northwest Territories	16 653	54 214	–	3 530	1 447	–	74 865	–	–	150 709
<b>Total</b>	<b>264 737</b>	<b>371 098</b>	<b>1 744</b>	<b>34 442</b>	<b>28 642</b>	<b>10 707</b>	<b>92 237</b>	<b>16 382</b>	<b>185</b>	<b>820 175</b>

Source: Natural Resources Canada, from a federal-provincial survey of mining and exploration companies.

– Nil.

<sup>1</sup> Includes on-mine-site plus off-mine-site activities.

Note: Numbers may not add to totals due to rounding.

**TABLE 13e. MINE DEVELOPMENT<sup>1</sup> EXPENDITURES, BY PROVINCE AND TERRITORY, BY MINERAL COMMODITY SOUGHT, 1997**

Province/Territory	Metals					Nonmetals	Diamonds	Coal	Unspecified Mineral Commodity	Total
	Base	Precious	Iron	Uranium	Other					
	(\$000)									
Newfoundland	–	77	37 213	–	2 405	1 920	–	–	–	41 616
Nova Scotia	–	–	–	–	–	2 354	–	3 639	–	5 993
New Brunswick	22 325	7 442	–	–	–	1 362	–	–	–	31 128
Quebec	69 537	54 583	72 367	–	8 406	50 664	–	–	–	255 557
Ontario	80 414	163 700	809	–	10 049	376	–	–	–	255 349
Manitoba	58 299	34 880	–	–	–	–	–	–	–	93 179
Saskatchewan	–	15 035	–	21 743	–	4 404	–	968	–	42 150
Alberta	–	–	–	–	–	2 620	–	6 770	–	9 390
British Columbia	8 569	15 646	–	–	2 979	1 360	–	33 244	–	61 798
Yukon	20 000	458	–	–	–	–	–	–	–	20 458
Northwest Territories	2 287	22 644	–	–	–	–	23 991	–	–	48 922
<b>Total</b>	<b>261 432</b>	<b>314 465</b>	<b>110 390</b>	<b>21 743</b>	<b>23 839</b>	<b>65 061</b>	<b>23 991</b>	<b>44 621</b>	<b>–</b>	<b>865 542</b>

Source: Natural Resources Canada, from a federal-provincial survey of mining and exploration companies.

– Nil.

<sup>1</sup> Includes field work, overhead, engineering, economic and pre- or production feasibility studies, environment and land access expenditures.

**TABLE 14a. EXPLORATION EXPENDITURES,<sup>1</sup> BY TYPE OF COMPANY AND MINERAL COMMODITY, 1997**

Type of Company	Metals					Nonmetals	Diamonds	Coal	Unspecified Mineral Commodity	Total
	Base	Precious	Iron	Uranium	Other					
	(\$000)									
1. Companies with a producing mine in Canada	95 448	77 006	–	23 038	5 066	2 536	11 895	5 745	138	220 872
2. Affiliates of group 1	54 205	6 869	–	–	11 646	–	22 048	–	–	94 769
3. Oil companies	440	1 660	–	–	–	–	118	187	–	2 405
4. Foreign companies (excluding group 3)	5 709	21 788	–	1 387	–	–	26 650	–	–	55 535
5. Junior companies and prospectors	66 210	127 417	–	2 305	10 262	5 531	20 511	935	60	233 231
6. Other companies	10 759	15 640	–	36	74	604	484	–	1	27 599
<b>Total all classes</b>	<b>232 771</b>	<b>250 380</b>	<b>–</b>	<b>26 767</b>	<b>27 049</b>	<b>8 671</b>	<b>81 706</b>	<b>6 867</b>	<b>199</b>	<b>634 410</b>

Source: Natural Resources Canada, from a federal-provincial survey of mining and exploration companies.

– Nil.

<sup>1</sup> Includes on-mine-site plus off-mine-site activities. Includes field work, overhead, engineering, economic and pre-feasibility studies, environment and land access expenditures.

Note: Numbers may not add to totals due to rounding.

**TABLE 14b. DEPOSIT APPRAISAL EXPENDITURES,<sup>1</sup> BY TYPE OF COMPANY AND MINERAL COMMODITY, 1997**

Type of Company	Metals					Nonmetals	Diamonds	Coal	Unspecified Mineral Commodity	Total
	Base	Precious	Iron	Uranium	Other					
(\$000)										
1. Companies with a producing mine in Canada	28 786	103 374	1 735	9 366	1 502	3 328	—	17 799	—	165 889
2. Affiliates of group 1	5	4 694	—	2 996	—	—	24 775	—	—	32 470
3. Oil companies	—	—	—	—	—	—	—	—	—	—
4. Foreign companies (excluding group 3)	7 923	—	—	—	—	—	—	—	—	7 923
5. Junior companies and prospectors	14 419	35 256	338	—	5 795	1 932	5 365	1 624	—	64 730
6. Other companies	1 656	10 927	—	—	914	1 499	552	—	—	15 547
<b>Total all classes</b>	<b>52 789</b>	<b>154 251</b>	<b>2 073</b>	<b>12 362</b>	<b>8 211</b>	<b>6 758</b>	<b>30 693</b>	<b>19 424</b>	<b>—</b>	<b>286 560</b>

Source: Natural Resources Canada, from a federal-provincial survey of mining and exploration companies.

— Nil.

<sup>1</sup> Includes on-mine-site plus off-mine-site activities. Includes field work, overhead, engineering, economic and pre- or production feasibility studies, environment and land access expenditures.

Note: Numbers may not add to totals due to rounding.

**TABLE 14c. EXPLORATION PLUS DEPOSIT APPRAISAL EXPENDITURES,<sup>1</sup> BY TYPE OF COMPANY AND MINERAL COMMODITY, 1997**

Type of Company	Metals					Nonmetals	Diamonds	Coal	Unspecified Mineral Commodity	Total
	Base	Precious	Iron	Uranium	Other					
(\$000)										
1. Companies with a producing mine in Canada	124 234	180 379	1 735	32 404	6 567	5 864	11 895	23 545	138	386 761
2. Affiliates of group 1	54 210	11 563	—	2 996	11 646	—	46 823	—	—	127 239
3. Oil companies	440	1 660	—	—	—	—	118	187	—	2 405
4. Foreign companies (excluding group 3)	13 632	21 788	—	1 387	—	—	26 650	—	—	63 458
5. Junior companies and prospectors	80 628	162 673	338	2 305	16 058	7 463	25 876	2 559	60	297 961
6. Other companies	12 415	26 567	—	36	988	2 103	1 036	—	1	43 146
<b>Total all classes</b>	<b>285 559</b>	<b>404 631</b>	<b>2 073</b>	<b>39 129</b>	<b>35 259</b>	<b>15 430</b>	<b>112 399</b>	<b>26 291</b>	<b>199</b>	<b>920 970</b>

Source: Natural Resources Canada, from a federal-provincial survey of mining and exploration companies.

— Nil.

<sup>1</sup> Includes on-mine-site plus off-mine-site activities. Includes field work, overhead, engineering, economic and pre- or production feasibility studies, environment and land access expenditures.

Note: Numbers may not add to totals due to rounding.

**TABLE 14d. EXPLORATION PLUS DEPOSIT APPRAISAL, FIELD WORK PLUS OVERHEAD EXPENDITURES<sup>1</sup> BY TYPE OF COMPANY AND MINERAL COMMODITY, 1997**

Type of Company	Metals					Nonmetals	Diamonds	Coal	Unspecified Mineral Commodity	Total
	Base	Precious	Iron	Uranium	Other					
(\$000)										
1. Companies with a producing mine in Canada	117 350	169 091	1 702	29 029	6 382	3 748	7 299	14 433	138	349 172
2. Affiliates of group 1	45 947	11 365	—	1 684	7 678	—	36 385	—	—	103 060
3. Oil companies	440	1 660	—	—	—	—	118	187	—	2 405
4. Foreign companies (excluding group 3)	13 020	21 001	—	1 387	—	—	26 228	—	—	61 637
5. Junior companies and prospectors	75 631	145 562	42	2 305	14 442	5 754	21 188	1 762	46	266 732
6. Other companies	12 349	22 418	—	36	141	1 205	1 019	—	1	37 169
<b>Total all classes</b>	<b>264 737</b>	<b>371 098</b>	<b>1 744</b>	<b>34 442</b>	<b>28 642</b>	<b>10 707</b>	<b>92 237</b>	<b>16 382</b>	<b>185</b>	<b>820 175</b>

Source: Natural Resources Canada, from a federal-provincial survey of mining and exploration companies.

— Nil.

<sup>1</sup> Includes on-mine-site plus off-mine-site activities.

Note: Numbers may not add to totals due to rounding.

**TABLE 15a. EXPLORATION EXPENDITURES<sup>1</sup> BY PROVINCE AND TERRITORY, BY TYPE OF COMPANY, 1997**

Province/Territory	(1)	(2)	(3)	(4)	(5)	(6)	Total
	Companies With a Producing Mine in Canada	Affiliates of (1)	Oil Companies	Foreign Companies Excluding (3)	Junior Companies and Prospectors	Other Companies	
(\$000)							
Newfoundland	5 111	35 121	–	897	27 016	137	68 282
Nova Scotia	419	–	–	382	5 798	11	6 610
New Brunswick	7 825	–	–	–	4 403	25	12 253
Quebec	45 775	1 785	–	4 797	39 264	11 669	103 290
Ontario	56 171	14 611	49	6 326	44 996	1 805	123 959
Manitoba	16 866	12 277	–	538	6 735	1 989	38 406
Saskatchewan	25 644	4 160	12	1 441	10 514	–	41 772
Alberta	5 677	1 607	119	5 266	4 353	–	17 022
British Columbia	16 934	4 312	186	1 400	37 113	11 579	71 524
Yukon	12 205	1 334	–	1 657	20 615	–	35 811
Northwest Territories	28 243	19 561	2 038	32 830	32 423	385	115 480
<b>Total</b>	<b>220 872</b>	<b>94 769</b>	<b>2 405</b>	<b>55 535</b>	<b>233 231</b>	<b>27 599</b>	<b>634 410</b>

Source: Natural Resources Canada, from a federal-provincial survey of mining and exploration companies.

– Nil.

<sup>1</sup> Includes on-mine-site plus off-mine-site activities. Includes field work, overhead, engineering, economic and pre-feasibility studies, environment and land access expenditures.

Note: Numbers may not add to totals due to rounding.

**TABLE 15b. DEPOSIT APPRAISAL EXPENDITURES<sup>1</sup> BY PROVINCE AND TERRITORY, BY TYPE OF COMPANY, 1997**

Province/Territory	(1)	(2)	(3)	(4)	(5)	(6)	Total
	Companies With a Producing Mine in Canada	Affiliates of (1)	Oil Companies	Foreign Companies Excluding (3)	Junior Companies and Prospectors	Other Companies	
(\$000)							
Newfoundland	3 311	–	–	–	159	–	3 470
Nova Scotia	20	–	–	–	1 225	–	1 245
New Brunswick	119	–	–	–	996	–	1 115
Quebec	59 154	4 694	–	–	4 338	1 827	70 013
Ontario	37 000	–	–	7 923	13 709	6 698	65 330
Manitoba	1 832	–	–	–	1 094	33	2 959
Saskatchewan	11 228	2 996	–	–	153	–	14 377
Alberta	10 986	–	–	–	–	–	10 986
British Columbia	17 333	5	–	–	22 491	3 864	43 693
Yukon	5 698	–	–	–	974	3 125	9 797
Northwest Territories	19 208	24 775	–	–	19 591	–	63 574
<b>Total</b>	<b>165 889</b>	<b>32 470</b>	<b>–</b>	<b>7 923</b>	<b>64 730</b>	<b>15 547</b>	<b>286 560</b>

Source: Natural Resources Canada, from a federal-provincial survey of mining and exploration companies.

– Nil.

<sup>1</sup> Includes on-mine-site plus off-mine-site activities. Includes field work, overhead, engineering, economic and pre- or production feasibility studies, environment and land access expenditures.

Note: Numbers may not add to totals due to rounding.

**TABLE 15c. EXPLORATION PLUS DEPOSIT APPRAISAL EXPENDITURES,<sup>1</sup> BY PROVINCE AND TERRITORY, BY TYPE OF COMPANY, 1997**

Province/Territory	(1)	(2)	(3)	(4)	(5)	(6)	Total
	Companies With a Producing Mine in Canada	Affiliates of (1)	Oil Companies	Foreign Companies Excluding (3)	Junior Companies and Prospectors	Other Companies	
	(\$000)						
Newfoundland	8 422	35 121	—	897	27 175	137	71 752
Nova Scotia	439	—	—	382	7 023	11	7 855
New Brunswick	7 944	—	—	—	5 399	25	13 368
Quebec	104 929	6 479	—	4 797	43 602	13 496	173 303
Ontario	93 171	14 611	49	14 249	58 706	8 502	189 289
Manitoba	18 698	12 277	—	538	7 829	2 023	41 365
Saskatchewan	36 872	7 156	12	1 441	10 668	—	56 149
Alberta	16 663	1 607	119	5 266	4 353	—	28 009
British Columbia	34 268	4 317	186	1 400	59 604	15 443	115 217
Yukon	17 903	1 334	—	1 657	21 590	3 125	45 608
Northwest Territories	47 451	44 336	2 038	32 830	52 014	385	179 054
<b>Total</b>	<b>386 761</b>	<b>127 239</b>	<b>2 405</b>	<b>63 458</b>	<b>297 961</b>	<b>43 146</b>	<b>920 970</b>

Source: Natural Resources Canada, from a federal-provincial survey of mining and exploration companies.

— Nil.

<sup>1</sup> Includes on-mine-site plus off-mine-site activities. Includes field work, overhead, engineering, economic and pre- or production feasibility studies, environment and land access expenditures.

Note: Numbers may not add to totals due to rounding.

**TABLE 15d. EXPLORATION PLUS DEPOSIT APPRAISAL, FIELD WORK PLUS OVERHEAD EXPENDITURES,<sup>1</sup> BY PROVINCE AND TERRITORY, BY TYPE OF COMPANY, 1997**

Province/Territory	(1)	(2)	(3)	(4)	(5)	(6)	Total
	Companies With a Producing Mine in Canada	Affiliates of (1)	Oil Companies	Foreign Companies Excluding (3)	Junior Companies and Prospectors	Other Companies	
	(\$000)						
Newfoundland	7 259	23 216	—	897	26 932	136	58 441
Nova Scotia	247	—	—	382	6 085	11	6 726
New Brunswick	7 770	—	—	—	4 368	25	12 162
Quebec	103 725	6 370	—	4 777	41 946	11 764	168 581
Ontario	87 654	14 253	49	13 639	52 389	8 475	176 460
Manitoba	18 588	12 277	—	538	6 887	1 989	40 279
Saskatchewan	32 154	5 844	12	1 441	10 482	—	49 933
Alberta	9 327	1 607	119	5 088	4 328	—	20 470
British Columbia	25 340	4 272	186	1 395	50 298	14 334	95 826
Yukon	16 831	1 322	—	1 657	20 728	50	40 588
Northwest Territories	40 277	33 898	2 038	31 823	42 288	385	150 709
<b>Total</b>	<b>349 172</b>	<b>103 060</b>	<b>2 405</b>	<b>61 637</b>	<b>266 732</b>	<b>37 169</b>	<b>820 175</b>

Source: Natural Resources Canada, from a federal-provincial survey of mining and exploration companies.

— Nil.

<sup>1</sup> Includes on-mine-site plus off-mine-site activities.

Note: Numbers may not add to totals due to rounding.



**TABLE 16. GENERALIZED MODEL OF THE MINERAL DEVELOPMENT AND MINING PROCESS**

PHASES	MINERAL RESOURCE ASSESSMENT	MINERAL EXPLORATION					MINERAL DEPOSIT APPRAISAL				MINE COMPLEX DEVELOPMENT	MINERAL PRODUCTION	ENVIRONMENTAL RESTORATION
	MRA	EX-1	EX-2	EX-3	EX-4	EX-5	DA-1	DA-2	DA-3	DA-4	MCD	MP	ER
STAGES	Surveys, research, synthesis.	Exploration planning.	Regional reconnaissance and surveys.	Prospecting and ground survey of anomalies.	Verification of anomalies and showings.	Discovery and delimitation.	Deposit definition.	Project engineering.	Project economics.	Feasibility study, Production decision.	Mine development. Infrastructure, plant, equipment.	Production, marketing, new development.	Mine closure. Site reclamation and restoration.
OBJECTIVES	Supply information and tools required to develop the mineral potential of the nation for economic benefit, in the perspective of sustained development.	Select target commodities. Establish exploration objectives and strategies. Select target areas.	Find regional and more localized anomalies. Select significant targets.	Acquire properties. Confirm presence, exact location and characteristics of anomalies.	Acquire additional properties as required. Investigate anomalies. Find mineral showings.	Discover, delimit a mineral deposit of potential economic interest. Appraise current technical and economic data to justify a deposit appraisal program.	Define the limits, internal grade distribution and controls, mineralogy and mineral processing character of the deposit. Acquire data for engineering planning.	Establish technical feasibility. Obtain realistic plans, schedules, investment costs and operating cost estimates for all aspects of the project.	Obtain all the parameters required and carry out economic, financial and social-political evaluation of the project.	Ensure the validity of project data, assumptions and evaluation results to achieve mine complex development and production objectives. Decide whether or not to undertake the project. Obtain the required permits.	Complete mine development and construction on schedule and within budget. Ensure efficient and timely mine and concentrator start-up according to schedule, forecasts and specifications.	Achieve planned rate and specifications of commercial production on schedule and within budget. Achieve mine profitability, company survival and sustained development.	Restore mine site to an environmentally acceptable condition.
EVALUATION METHODS	Geoscientific, mineral and economic surveys, research, compilations and synthesis by governments, research institutes and universities.	Metal and mineral market research. Review of geological and ore deposit information for various areas. Review of legal and political contexts.	Remote sensing aerial photography and airborne geophysics. Prospecting, geology and geochemistry. Appraisal, rating and selection of anomalies.	Ground-based geological, geochemical and geophysical prospecting and surveys. Review and selection of significant anomalies.	Geological mapping and other surveys. Trenching and sampling. Review of results and selection of targets.	Stripping, trenching, detailed mapping, sampling, drilling and down-hole geophysics. Preliminary deposit inventory and evaluation. Environmental characterization and site surveys.	Detailed mapping, sampling and drilling on surface or from underground. Systematic mineral processing tests. Detailed environmental and site surveys.	Pilot tests and engineering studies. Design, cost estimation for mining, mineral, metal processing, infrastructure, environmental protection and restoration.	Market, price, cost and other financial studies. Technical, environmental, economic, financial, social and political risk analysis.	Exhaustive due diligence review of the geological, engineering, environmental, economic, legal and site data. Evaluation of the profitability, risks and up-side factors.	Project and quality management methods. Training program for personnel and detailed start-up plan.	Production management using continuous quality improvement methods. Exploration, appraisal and development of new ore zones, both on the mine site and off-property.	Mine closure and decommissioning. Environmental restoration and monitoring.
RESULTS	Geoscientific, mineral and economic databases, maps and models.	Exploration projects.	Regional anomalies.	Local anomalies.	Mineral showings.	Mineral deposit.	Deposit appraisal project.			Mining project.	Mining Complex.	Mineral production.	Restored site.
FEASIBILITY STUDIES Expected margin of error of estimates at the 90% confidence level							Expected margin of error of estimates at the 90% confidence level:						
							± 100%	± 60%	± 40%	± 20%	± 10%	± 5%	Full compliance
INVESTMENT RISK LEVEL	Low /moderate Moderate	Low but increasing investments. Very high, but decreasing risk of failure and financial loss.					Much larger and increasing investments. High, but decreasing risk of failure.				Large to very large industrial investment. Low to moderate industrial type risk.		
MINERAL INVENTORY	Undelimited mineral resources					Inferred	Delimited mineral resources				Ore reserves		
	Speculative	Hypothetical				Inferred	Indicated and measured				Proven and probable		

Sources: Modified by D.A. Cranstone, A. Lemieux and M. Vallée, February 25, 1994, from M. Vallée, 1992, *Guide to the Evaluation of Gold Deposits*, CIM Special Volume 45, p. 4, and *SOQUEM Annual Report*, 1976-77, pp. 4-5. Revised July 23, 1999.