

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

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## INTRODUCTION

This review provides analytical highlights and describes mineral development activities from primary exploration to mine production in Canada during 1999 with emphasis on mineral exploration and deposit appraisal expenditures. Also briefly presented are preliminary estimates for total expenditures in 2000 and company spending intentions for 2001, as well as other exploration indicators such as drilling and claim-staking activity.

Total mineral development investment in Canada on the three work phases – mineral exploration, deposit appraisal, and mine complex development (including capital, and repair and maintenance expenditures) – fell by 23.0% from \$4.6 billion in 1998 to \$3.5 billion in 1999 (Tables 1 and 2a). Mineral development expenditures (excluding expenditures for capital and repair and maintenance) amounted to \$1.4 billion in 1999, a decrease of 16.2% from \$1.6 billion in 1998. Expenditures on the combined exploration and deposit appraisal work phases totaled \$504.3 million in 1999, a decrease of 23.1%, or \$151.6 million, from 1998. Some 62.4% of the 1999 spending, or \$314.7 million, was for the exploration work phase, of which \$270.2 million was for off-mine-site activity.

The 1999 decline in exploration and deposit appraisal expenditures reflects the slump in metal prices that began in 1996 and 1997. The average annual prices of gold, nickel, zinc, copper and lead were all lower in 1998 than in the previous two years, and this trend continued into 1999, except for nickel. Particularly important for Canada's exploration industry is the gold price. From an annual average of US\$388/oz in 1996, the price declined to US\$328/oz in 1997, US\$294/oz in 1998 and US\$278/oz in 1999, and then rose slightly to US\$279/oz in 2000. The weak com-

modity prices made marginal mines uneconomic, leading to 24 mine closures. Although 10 new mines came on stream in 1999, the number of closures continued to exceed that of openings for the second consecutive year. Corporate mergers and changes in corporate strategy may also have influenced the sharp reduction in exploration spending in 1999. At about the same time, the high-tech sector started to catch fire, thereby contributing to the reduction in investment and risk capital available to the mining industry. Another important factor is company commitments to exploration and development activities in other countries. But this downward trend in Canadian exploration activity is also mirrored in other mining countries. Despite a deteriorating situation, Canada remains second in the world as a recipient of exploration expenditures, and exploration activity is expected to more or less stabilize in 2000 and 2001 once the final results are confirmed.

Expenditures are compiled from the federal-provincial-territorial Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures, which is described in the Background section of this chapter. This annual survey of exploration and mining companies provides an accurate measure of mineral development activity in Canada. In 1999, survey results were compiled from the reports of 595 active company project operators and from some prospectors. Of these companies, 500 reported that they were active in exploration, 95 in deposit appraisal and 121 in mine complex development. (Note: Some companies may be involved in more than one work phase at the same time.) Detailed 1998 statistics for comparison purposes can be found in the 1999 edition of the *Canadian Minerals Yearbook*.

## MINERAL DEVELOPMENT EXPENDITURES, 1999

The wide spectrum of mineral development activities and their geographic dispersion across Canada require detailed and sophisticated indicators to measure activity levels. The information collected since 1997 by mineral development work phase permits a more complete monitoring of the activities of an

exploration project as it progresses toward the mine complex development stage (Table 16).

## Mineral Exploration

Of the \$1.4 billion in mineral development expenditures in 1999, the mineral exploration phase (which includes activities up to and including the first delineation of a previously unknown mineral deposit to establish its potential economic value [tonnage and grade]) accounted for \$314.7 million (23.2%) in 1999 compared to \$462.8 million (28.5%) in 1998 (Table 1). The exploration total for 1999 represents 62.4% of all exploration and deposit appraisal expenditures compared to 70.6% in 1998. In 1999, some 85.9% of spending in the mineral exploration phase was at off-mine-site locations, up slightly from 85.3% in 1998. Junior companies spent \$92.7 million in 1999 on exploration at off-mine-site locations while seniors spent \$177.5 million.

Off-mine-site exploration accounted for 82.4% (\$124.9 million) of the total decrease of \$151.6 million in exploration and deposit appraisal expenditures between 1998 and 1999. Junior companies accounted for 42% of the decrease while seniors accounted for 58%. Since the decrease in off-mine-site exploration expenditures was more significant, it had an impact on overall exploration and deposit appraisal expenditures and explains the decline in the exploration share of total expenditures (62.4%, compared to 70.6% in 1998).

In 1999, Quebec ranked first, followed by Ontario, in the receipt of exploration expenditures. These two provinces accounted for close to half of the total exploration expenditures (Tables 7, 9a and 9b). In 1998, this ranking was reversed. In 1999, exploration expenditures exceeded deposit appraisal expenditures in all provinces and territories except Saskatchewan (uranium) and the Northwest Territories (diamonds) where deposit appraisal was the main focus of expenditures (Figures 6a and 6b). Off-mine-site exploration was dominant over on-mine-site exploration in all provinces and territories. For off-mine-site exploration expenditures, Quebec was by far the leader while Ontario was well ahead of other jurisdictions for on-mine-site exploration expenditures, the same as in 1998.

In decreasing order of exploration expenditures by commodity group, precious metals rank first, followed closely by base metals and then diamonds (Table 13a). They accounted for \$114.6 million, \$110.5 million and \$51.9 million, respectively. The ranking of commodities sought for off-mine-site exploration was base metals first, followed by precious metals and then diamonds; for on-mine-site exploration, precious metals led followed by base metals. Looking at the dominant commodity groups in the provinces and territories, it is noteworthy that precious-metal explo-

ration was dominant in Ontario, Quebec, British Columbia and the Yukon; base metals were dominant in Manitoba, Newfoundland and New Brunswick; uranium, in Saskatchewan; diamonds, in the Northwest Territories, Nunavut and Alberta; and non-metals, in Nova Scotia (Figure 6a).

## Deposit Appraisal

For the deposit appraisal phase, which includes activities that bring a delineated deposit to the stage of detailed knowledge required for a production feasibility study, expenditures in 1999 totaled \$189.7 million (14.0%), down from \$193.1 million (11.9%) spent in 1998 (Table 1). The percentage of deposit appraisal expenditures spent on off-mine-site locations was 77.7% in 1999 and 68.1% in 1998. At off-mine-site locations, junior companies spent \$48.5 million on deposit appraisal activities in 1999 while seniors spent \$98.9 million.

In 1999, the Northwest Territories ranked first followed by Quebec and Saskatchewan in terms of deposit appraisal expenditures (Tables 7, 9a and 9b). They accounted for about 60% of the total deposit appraisal expenditures. Deposit appraisal at off-mine-site locations was dominant everywhere except in Quebec, Manitoba and New Brunswick where deposit appraisal at on-mine-site locations ranked first, attributable to precious metals for Quebec and base metals for the latter two. For deposit appraisal expenditures at off-mine-site properties, the Northwest Territories was first (well ahead) while Quebec ranked first for deposit appraisal at on-mine-site properties.

In decreasing order of deposit appraisal expenditures by commodity group, precious metals were closely followed by diamonds and then base metals (Table 13b). Respectively, they accounted for \$66.4 million, \$56.8 million and \$28.9 million of the \$189.7 million. When considering deposit appraisal at off-mine-site locations, the commodity trend is first, diamonds; second, precious metals; and third, uranium. For deposit appraisal at on-mine-site locations, precious metals and base metals are the dominant commodity groups.

Linking total deposit appraisal expenditures to the dominant commodity group in the provinces and territories, the distribution is the same as for exploration except for Alberta and Nunavut where, respectively, coal and precious metals lead instead of diamonds.

## Mine Complex Development

Expenditures on the mine complex development phase, which includes activities to define, block out and gain access to the ore, prepare it for production, and other field work to extend the current ore reserves, decreased to \$854.2 million in 1999 from

\$966.1 million in 1998, a decline of 11.6% (Table 1). By definition, all activities in the mine complex development phase are on-mine-site activities. At times, "mine development expenditures" is used to represent spending excluding capital and repair costs.

In 1999, as in 1998, Quebec was first, followed by Ontario, and together they represented 68.6% of all mine complex development expenditures (Table 9d), while Saskatchewan ranked third. Precious metals, the main commodity group sought, represented 32.4% of all expenditures for this work phase (Table 13d).

### Mineral Development Activity by Work Phase, 1999

The distribution pattern of the different activities reflects project evolution over time. Figure 4 shows graphically and quantitatively how the distribution of expenditures in the exploration work phase is different from those in the deposit appraisal work phase and the mine complex development phase.

In 1999, **exploration** work phase expenses included: drilling, 45.0% (87.5% surface drilling); geoscientific surveys, 34.5% (50% geology, followed by ground geophysics); rock work (including stripping), 4.1%; overhead and other costs, 13.0%; engineering, economic and feasibility studies, 2.0% (mainly engineering studies); environment, 0.9%; and land access, 0.5% (Table 9a).

The breakdown for **deposit appraisal** work phase expenditures was: drilling, 31.1% (66% surface drilling); geoscientific surveys, 5.1% (72% geology); rock work (including stripping), 23.8% (mainly rock work); overhead and other costs, 10.6%; engineering, economic and feasibility studies, 18.2% (mainly engineering studies); environment, 8.3%; and land access, 2.9% (Table 9b).

The distribution of expenditures in the **mine complex development** work phase was even more distinctive with expenditures of: drilling, 9.3% (58% underground drilling); geoscientific surveys, 1.5% (mainly geology); rock work (including stripping), 71.8%; overhead and other costs, 10.7%; engineering, economic and feasibility studies, 2.9% (mainly engineering studies); environment, 3.7%; and land access, 0.2% (Table 9d).

In summary, the exploration work phase is characterized mainly by surface drilling and geoscientific surveys that are used to discover a deposit and complete its first delineation. In the deposit appraisal work phase, the deposit is better defined by further surface and underground drilling and, in many cases, the beginning of important rock work. Ultimately, intense engineering studies are conducted and a feasibility study concludes this phase. If the feasibility study results are positive, a commitment

to go into production is usually made. The mine complex development phase is characterized by large-scale underground rock work and capital investment in order to build or extend the mine and its facilities.

### TOTAL MINERAL DEVELOPMENT INVESTMENT, 1999

Total mineral development investment in Canada, including capital and repair and maintenance expenditures, fell by 23.0% from \$4.6 billion in 1998 to \$3.5 billion in 1999 (Tables 1 and 2a). Capital, and repair and maintenance expenditures include spending for construction, machinery and equipment. Most of these expenditures (97.4%) were directed at mine complex development in 1999. For that year, \$875 million was spent on capital investment while \$1.3 billion was spent on repair and maintenance. The former represents about one quarter and the latter represents about one third of the total mineral development investment. Compared to 1998, capital investment decreased 30.7% and repair and maintenance costs decreased 23.8%.

As shown in Figure 1, Quebec, Ontario, Saskatchewan and British Columbia represented 76.2% of all mineral development investment. The highest level of capital investment was recorded in Saskatchewan (26.6%) and, together with Quebec and Ontario, they represented 69.1% of all capital expenditures. In Nova Scotia, spending on capital expenditures exceeded those of other mineral development expenditures in the province and are the result of sustained investment in industrial minerals mines. Furthermore, Nova Scotia ranked fifth as a recipient of capital investment. The smallest contribution of capital investment compared to the other mineral development investment for a single province or territory was recorded in Nunavut. Saskatchewan, Quebec and British Columbia received the biggest share of capital investment in 1998, and Saskatchewan was first in terms of capital investment received compared to other mineral development investment made in the province.

In 1999, investment in the environment (included in the above total investment) accounted for 3.2% (\$111.3 million) of all investment (Table 2b).

### HISTORICAL AND FUTURE PERSPECTIVE

Figure 2 shows the historical trend in exploration and deposit appraisal expenditures, mainly for field and overhead activities, adjusted to constant 2000 dollars (see also Tables 3a and 3b). After unprecedented peak levels of exploration and deposit appraisal

expenditures were reached in 1987 and 1988 (principally as a result of the Canadian Mining Exploration Depletion Allowance [MEDA]), activity fell to a low of \$434 million in 1992 (in constant 2000 dollars). From 1993 to 1996, higher metal prices and significant diamond and nickel-copper discoveries in the Northwest Territories (Lac de Gras) and Labrador (Voisey's Bay), respectively, caused the level of activity to rebound to \$945 million in 1996 and \$858 million in 1997. Subsequently, the Bre-X stock incident, the Asian financial and economic crisis, and lower metal prices afterward contributed to the beginning of a decline in expenditures. Most recent indications are that expenditures will likely continue to decrease again in 2000 and 2001, albeit at a much slower pace than what was first recorded under the Preliminary Estimate 2001 and Forecast 2000 Survey. The impact of the various federal and provincial tax credit measures recently put in place has not yet been determined and, at the time of writing, it was too early to speculate on the effects of the September 11 terrorist attack on the demand and supply of metals.

## PRELIMINARY ESTIMATES, 2000, AND SPENDING INTENTIONS, 2001

Preliminary estimates for 2000 show a further decline in mineral development expenditures to \$1.2 billion from \$1.4 billion in 1999 and, for 2001, company spending intentions are expected to remain at about \$1.2 billion (Table 2c).

Of these totals, mineral exploration and deposit appraisal expenditures are estimated at \$473 million for 2000 while company spending intentions for 2001 are estimated at \$458 million. The 2001 intentions are subject to change because some major companies had difficulty forecasting at the time of the survey. These estimates continue the downward trend in expenditures that followed the peak year of 1996 and are hopefully reaching the bottom of the slope. The situation could also be helped by the junior sector expenditures, which should increase to \$149 million and \$167 million, respectively, for 2000 and 2001, compared with \$141 million in 1999.

For total mineral development investment, the trend is the opposite with an estimate of \$3.6 billion for 2000, up from \$3.5 billion in 1999. Company spending intentions for 2001 are expected to reach \$3.8 billion. Larger capital investment for those two years more than offset the decreases recorded in the non-capital expenditures. In fact, the construction of a second diamond mine in the Northwest Territories, the Diavik diamond project, scheduled to begin production in 2003, has resulted in the beginning of large capital investment from the time the decision was made to be committed to production during the year 2000. The total mineral investment for diamonds was estimated to reach \$427.4 million in 2000 (Table 5).

## MORE ABOUT MINERAL DEVELOPMENT ACTIVITIES

Traditional indicators of exploration activity also include new mineral claims acquired and the total number of metres drilled (Figure 3); however, expenditures on mineral exploration and deposit appraisal have proven to be the most accurate indicator of mineral exploration and deposit appraisal activity. Later we will review highlights of the sum of exploration and deposit appraisal work phase expenditures (formerly called exploration, at large, in pre-1997 survey years).

### New Mineral Claims, 2000

New mineral claims staked or recorded in Canada in 2000 covered an area of 10.4 million hectares (ha), compared to 5.4 million ha in 1999. Alberta, Quebec and Manitoba accounted for about 60% of the total staking activity during the year (Tables 6a and 6b). For the fourth year in a row, Alberta was the leading province with over 2 million ha staked, accounting for nearly 23% of total new mineral claim activity. However, this was down significantly from the diamond claim staking that occurred in Alberta in recent years, most notably in 1997 when over 37 million ha were staked. Major increases were recorded in most provinces and territories, except for Nova Scotia, the Yukon and Nunavut. The area of new claims staked more than tripled in Saskatchewan and Manitoba as a result of a resurgent interest in diamond prospecting. Staking activity was concentrated, respectively, in the Fort à la Corne and Fox River Sill areas.

### Drilling Activity for Exploration and Deposit Appraisal, 1999

Total exploration and deposit appraisal drilling (both diamond and other types) amounted to 2.5 million metres (m) in 1999 (Tables 9c and 10), down from 2.6 million m in 1998. Of the 1999 total, diamond drilling accounted for 92.3%, or 2.3 million m. Surface exploration and deposit appraisal drilling totaled 1.8 million m, 89.9% being diamond drilling. Underground exploration and deposit appraisal drilling amounted to 0.69 million m, 98.6% of this being diamond drilling. The statistics reveal that 31.2% of all metres drilled were for on-mine-site exploration and deposit appraisal.

In terms of regional activity in 1999, Quebec, Ontario, Alberta, Newfoundland and Saskatchewan, in decreasing order of importance, were the busiest jurisdictions, accounting for 78.5% of all drilling (surface and underground) (Table 9c).

Of the 1.8 million m drilled for surface exploration and deposit appraisal, 46.0% was undertaken for precious metals, 28.0% for base metals, 8.0% for coal,

7.5% for diamonds, and 3.5% for uranium. Quebec at 39.7%, Ontario at 13.8% and Alberta at 8.1% were the leading jurisdictions for surface drilling in Canada during 1999 (Table 11a).

Of the 692 000 m drilled for underground exploration and deposit appraisal, precious metals activity accounted for 72.3% and base metals for 25.0%. Ontario accounted for 58.4% of total underground activity followed by Quebec with 29.4% (Table 11b).

### **On-Mine-Site and Off-Mine-Site Exploration and Deposit Appraisal Expenditures, 1999**

Exploration and deposit appraisal expenditures for off-mine-site activity were \$417.6 million in 1999 while on-mine-site activity totaled \$86.8 million (Table 1). These levels are down from 1998 when expenditures were \$526.5 million for off-mine-site work and \$129.4 million for on-mine-site work.

The Northwest Territories ranked first with 20.1%, followed by Quebec at 18.0% and Ontario at 13.1%, of the total off-mine-site exploration and deposit appraisal spending in 1999 (Table 7). In comparison, Quebec accounted for 44.4% while Ontario accounted for 37.8% of the total on-mine-site spending. There was no on-mine-site spending reported in the Northwest Territories and Nova Scotia.

Of the mineral commodities sought in 1999, precious metals accounted for 28.8% of off-mine-site expenditures followed by base metals at 27.7% and diamonds at 26.0%. On-mine-site expenditures on the search for precious metals amounted to 70.1% of the total, with base metals at 27.3% (Table 12). There were no on-mine-site expenditures for diamonds.

### **Exploration and Deposit Appraisal Activity by Province/Territory, 1999**

Across the country, with the exception of New Brunswick, which maintained the status quo, activity levels in 1999 were down from 1998. Only Quebec had expenditures in excess of \$100 million. The three leading jurisdictions in decreasing order of expenditures were Quebec, Ontario and the Northwest Territories, which accounted for 56.5% of Canada's total exploration and deposit appraisal expenditures during 1999. Significant declines (above 30%) in percentage terms occurred in Alberta, the Yukon and Newfoundland but, in dollar terms, the Northwest Territories and Nunavut together (they were not split in 1998), followed by Ontario and Saskatchewan, represented 52.8% (\$80.0 million) of the total decrease of \$151.6 million (Tables 8 and 9c).

### **Exploration and Deposit Appraisal Expenditures by Mineral Commodity Sought, 1999 and Previous Years**

Precious metals (including gold, silver and platinum group elements [PGE]), base metals (including copper, nickel, lead and zinc), and diamonds continued to be the principal targets of exploration and deposit appraisal activities in Canada in 1999 (Tables 12 and 13c, Figure 5).

Precious metals exploration and deposit appraisal expenditures declined by 25.5% to \$181.0 million in 1999, down from \$243.0 million in 1998 (Table 12). This type of exploration represented only 35.9% of total Canadian expenditures in 1999, which is comparable to 37.0% in 1998. Despite this decline, precious metals expenditures exceeded those for base metals, as has generally been the case with the exception of 1992 and the period prior to 1985.

Quebec was the leading recipient of exploration and deposit appraisal expenditures for precious metals at 34.0% (\$61.6 million) followed by Ontario at 29.2% (\$52.8 million) (Table 13c). The other leading jurisdictions were British Columbia at 13.9% and Nunavut at 9.6%. For all of these jurisdictions and the Yukon, precious metals were the dominant commodity group searched for. It is also worth noting that PGE expenditures were at a record level with \$21 million reported (most of it in Ontario). All jurisdictions were down from 1998 spending levels for precious metals, with the exception of Newfoundland, New Brunswick and Alberta (Figure 6c).

Base metals remained the second most sought-after commodity grouping in 1999. Base-metal exploration and deposit appraisal expenditures fell by 27.5% to \$139.3 million in 1999 from \$192.1 million in 1998 (Table 12). Prior to this, base-metal exploration and deposit appraisal had been buoyant, especially in 1996, and was mostly attributed to the overall impact of the late 1994 major nickel-copper discovery at Voisey's Bay in Labrador. Base-metal activities accounted for 27.6% of total Canadian exploration and deposit appraisal expenditures in 1999.

In 1999, Quebec was the leading recipient of base-metal exploration and deposit appraisal expenditures at 28.1% (\$39.1 million) (Table 13c, Figure 6c). The other leading jurisdictions were Ontario at 17.4% (\$24.2 million), Manitoba at 14.2% (\$19.7 million), and Newfoundland at 13.0% (\$18.1 million). For Newfoundland, New Brunswick and Manitoba, base metals were the main commodity group searched for.

The third most sought-after commodity was diamonds. Diamond exploration and deposit appraisal expenditures decreased slightly to \$108.7 million in 1999 from \$119.1 million in 1998 (Table 12). Progress continued towards a development decision during 2000 at the potential Diavik diamond mine in the Northwest Territories. Spending on diamonds accounted for 21.6% of all exploration and deposit appraisal expenditures in Canada during 1999. As in recent years, the largest amount of exploration and deposit appraisal spending on diamonds in Canada, \$79.7 million, or 73.3%, occurred in the Northwest Territories (Table 13c, Figure 6c). This was followed by Nunavut with \$11.0 million, and Alberta and Ontario, each with \$7.8 million. Most of the other provinces and territories received some diamond exploration expenditures, except for Nova Scotia, New Brunswick, British Columbia and the Yukon. Diamonds were the leading commodity sought in the Northwest Territories and Alberta only, accounting for 94.7% and 53.0% of their respective total exploration and deposit appraisal spending.

All other mineral commodities accounted for \$75.3 million of exploration and deposit appraisal expenditures in Canada during 1999, down from \$101.7 million in 1998 and constituting about 15.0% of total Canadian exploration and deposit appraisal expenditures (Table 13c, Figure 6c). They consist of uranium at 46.7%, other metals at 20.6%, nonmetals at 15.9%, coal at 10.9%, and iron at 5.8%. Most of the uranium expenditures were reported in Saskatchewan (97.3%), where uranium is the leading commodity sought. The nonmetals category totaled \$12.0 million, of which 42.9% of the expenditures were for salt, barite, fluorite and kaolin, about \$1 million each and up to \$2 million for kaolin. Nova Scotia, Quebec, British Columbia and Newfoundland represented 91.8% of all nonmetals expenditures, which remain the leading commodity group for Nova Scotia. Coal is primarily reported in Alberta and remained the second most sought-after commodity there for the second year in a row.

### Exploration and Deposit Appraisal by Range of Expenditures and by Type of Company (Juniors and Seniors), 1999

Companies active in exploration and deposit appraisal in Canada are classified into 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 in which it fits. Seniors are covered by groups 1, 2, 3, 4 and 6.

Exploration and deposit appraisal spending by senior companies declined from \$485.4 million in 1998 to \$363.2 million in 1999, while the same spending by junior companies declined from \$170.5 million in

1998 to \$141.2 million in 1999 (Table 4). The share of total spending by juniors was about the same as in 1998 at around 28%.

Of the 532 active company project operators (excluding prospectors) in 1999, 72 (spending more than \$1 million each) accounted for 82.7% of the total exploration and deposit appraisal expenditures of \$504.3 million (Table 4). This compares to 91 operators accounting for 84.1% in 1998. In 1999, 48 of these were senior companies (57 in 1998) representing 68.5% (\$345.3 million) of all Canadian expenditures, compared to 71.2% (\$467.0 million) in 1998; 24 were junior companies (34 in 1998), representing 14.3% (\$72.1 million), compared to 12.9% (\$84.4 million) in 1998. About 50% of the junior expenditures occurred in the expenditure ranges above \$1 million, compared to 95% for the seniors in the same expenditure ranges.

During 1999, there were fewer junior project operators in the expenditure ranges higher than \$1 million than in 1998, leading to decreased spending in these categories. Two junior companies spent more than \$10 million each in 1999, while much less was spent in the \$1 million-\$5 million and \$5 million-\$10 million ranges. The major decrease in number of junior project operators was for the \$100 000-\$200 000 range of expenditures, but it only had a very small impact on the overall junior spending (minus \$4.7 million). The majority of junior project operators (163) spend in the \$1-\$50 000 range of expenditures but, in total, they contribute less than 2% of all junior spending.

For the seniors, most of the decrease in expenditures was a result of fewer companies spending more than \$10 million (five less project operators for a decrease of \$107.4 million). The majority of senior project operators spend in the \$1 million-\$5 million range of expenditures but represent only 17.4% of all senior expenditures. There is also a significant number of senior project operators in the \$1-\$50 000 range of expenditures (23) representing less than 1% of the senior expenditures.

### Exploration and Deposit Appraisal Expenditures by Type of Company, 1999

Producing companies and their affiliates spent \$295.0 million, or 58.5%, of total exploration and deposit appraisal expenditures in Canada in 1999. On a provincial and territorial basis, these producers and their affiliates were the largest spending group in all provinces and territories with the exception of Nova Scotia, British Columbia, Nunavut and the Yukon, where junior companies were the largest spending group (Table 15c, Figure 7c). In 1999, producing companies and their affiliates directed 36.7% (\$108.4 million) of their \$295.0 million of exploration and deposit appraisal expenditures at

precious metals, 30.9% (\$91.1 million) at base metals, 14.2% (\$41.8 million) at diamonds, 10.7% (\$31.7 million) at uranium, 2.7% (\$7.9 million) at other metals, 2.6% (\$7.5 million) at coal, and 2.2% (\$6.4 million) at the total of iron and nonmetals (Table 14c, Figure 8c).

Of the \$141.2 million spent by juniors, Quebec, British Columbia and the Northwest Territories together contributed 52.7%, or \$74.5 million, with each spending between \$20 million and \$30 million. Juniors in 1999 directed 38.7% (\$54.7 million) of exploration and deposit appraisal expenditures at precious metals, 28.2% (\$39.8 million) at base metals and 19.4% (\$27.4 million) at diamonds.

The foreign mining company group spent about the same amount as in 1998, \$51.0 million, or 10.1% of the Canadian total. Of these expenditures, 81.0% was spent in the Northwest Territories, Nunavut and Ontario. Of their \$51.0 million of exploration and deposit appraisal spending in 1999, foreign companies targeted 71.0% (\$36.2 million) at diamonds, 20.6% (\$10.5 million) at precious metals, and 8.1% (\$4.1 million) at base metals.

Other companies (whose main income is from other business ventures, including producing mines outside of Canada) represent 3.2% (\$16.1 million) of the total exploration plus deposit appraisal expenditures. They are mainly involved in Quebec (62.3%). In decreasing order of expenditures, 87.3% of all the spending was reported for precious metals, base metals and diamonds. The contribution from oil companies is still at a very low level, less than 1%, and expenditures are reported under precious metals, base metals and coal. We are far from the record level of 1977 when they accounted for nearly one quarter of all non-petroleum mineral exploration expenditures in Canada.

## 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. These are compiled from the annual federal-provincial-territorial Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development

Expenditures. To protect the confidential data provided by respondents, only aggregate statistics are released.

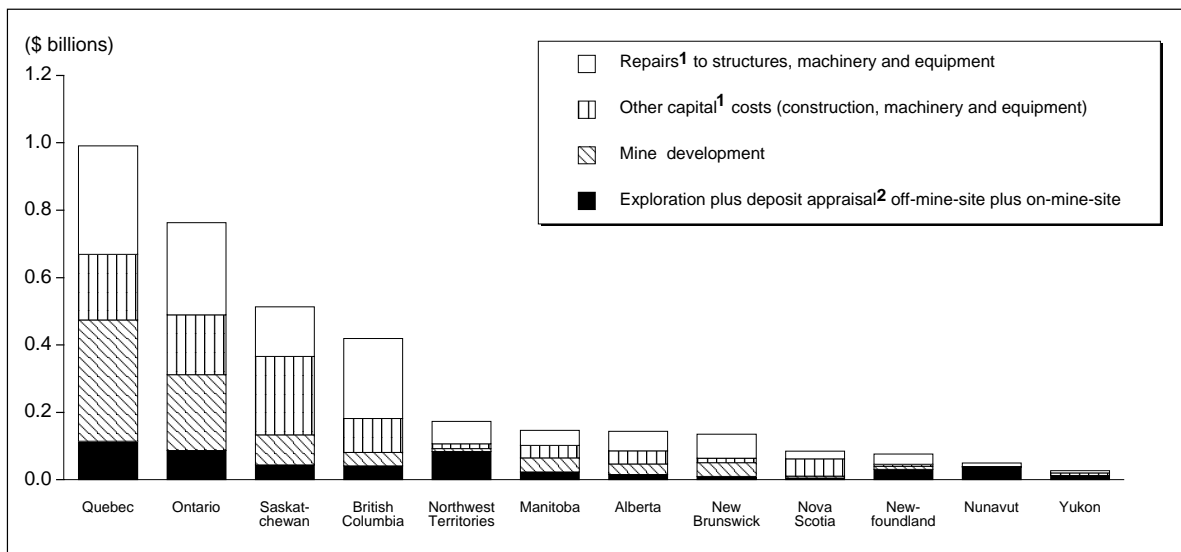
New definitions of work phases for mineral development were introduced in the 1997 survey. They provide a more complete and accurate coverage of mineral development expenditures in Canada from exploration to mine production. Table 16 describes the mineral development cycle upon which the new definitions are based. Specific definitions by category of expenditures are available on NRCan's exploration web site at <http://www.nrcan.gc.ca/mms/efab/mmsd/exploration/default.html>.

*Notes: (1) Information in this review was current as of June 1, 2001. (2) This and other reviews, including previous editions, are available on the Internet at [http://www.nrcan.gc.ca/mms/cmty/index\\_e.html](http://www.nrcan.gc.ca/mms/cmty/index_e.html).*

### Note to Readers

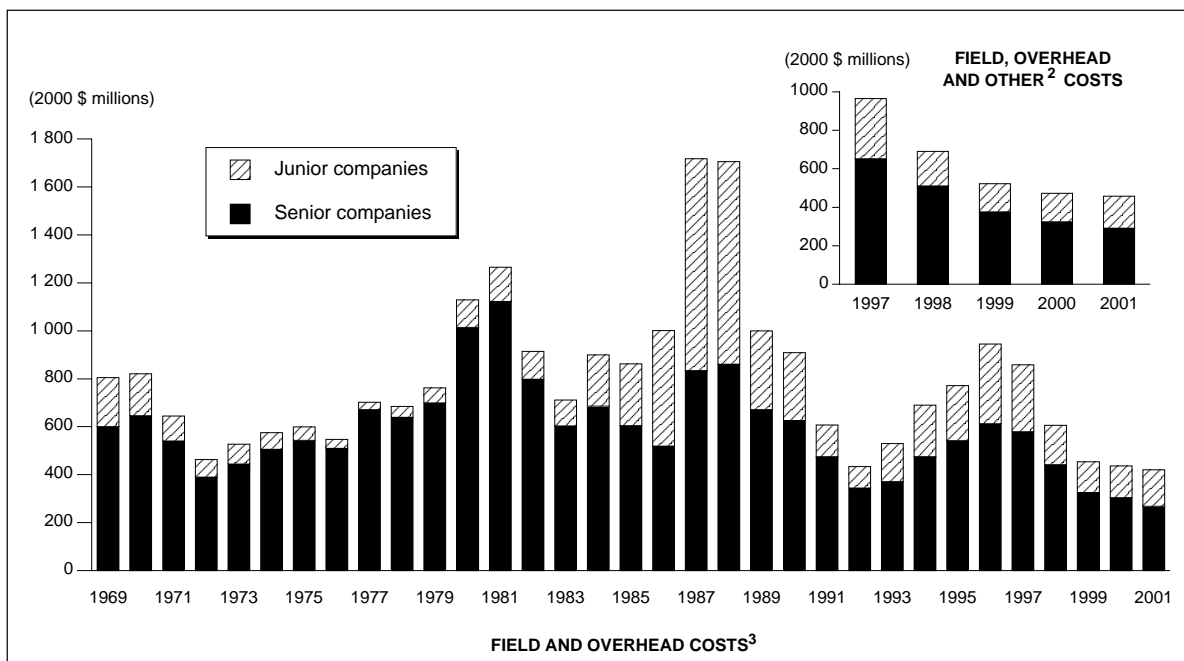
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**Figure 1**  
**Total Mineral Development Investment in Canada, by Province and Territory, 1999**  
**\$3.5 Billion**



Source: Natural Resources Canada, from a federal-provincial-territorial survey of mining and exploration companies.  
<sup>1</sup>Includes expenditures related to exploration, deposit appraisal and mine complex development (97.4%). <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.

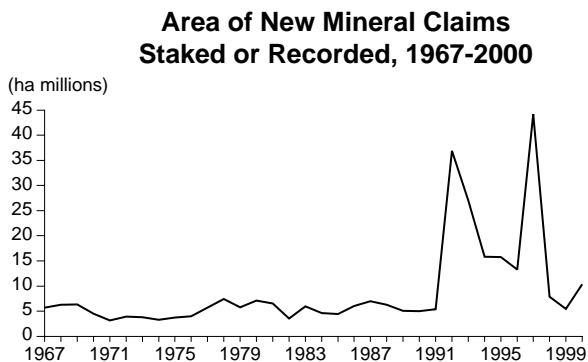
**Figure 2**  
**Exploration Plus Deposit Appraisal Expenditures,<sup>1</sup> by Junior and Senior Companies, 1969-2001**



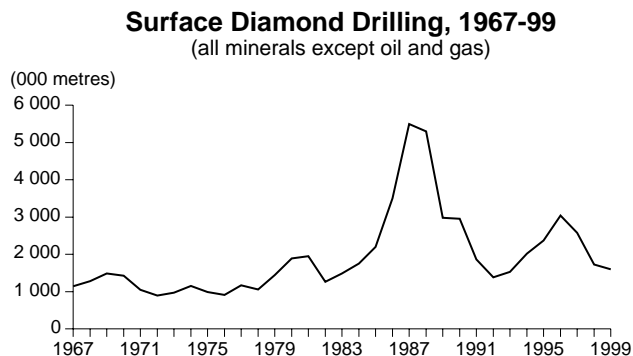
Source: Natural Resources Canada, from a federal-provincial-territorial survey of mining and exploration companies.  
<sup>1</sup>Includes on-mine-site plus off-mine-site activities. <sup>2</sup>Other costs include engineering, economic and pre- or production feasibility studies, environment, and land access. <sup>3</sup>Overhead costs include mineral leases, claims and property taxes, and project-related head office expenditures.  
 Notes: Total exploration expenditures for 1975-81 are overstated by an average of about 17% relative to earlier and later years because of changes to the methodology used by Statistics Canada over the years. Expenditures for 1997 to 2001 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). Data for 2000 are preliminary estimates; data for 2001 are company spending intentions.



**Figure 3**  
**Selected Measures of Exploration Activity**

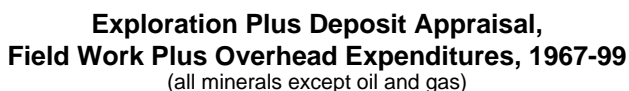


Source: Information obtained and compiled annually by Natural Resources Canada from provincial and territorial mining recorders.



Sources: 1967-84, Statistics Canada (cat. no. 26-201); 1985-99, from a federal-provincial-territorial survey of mining and exploration companies.

Note: Drilling statistics for 1967-84 are not strictly comparable to and may be understated relative to those for 1985-99.



Sources: 1967-84, Statistics Canada, *Exploration, Development and Capital Expenditures for Petroleum and Natural Gas Wells, Intentions* (cat. no. 61-216); 1985-99, from a federal-provincial-territorial survey of mining and exploration companies.

Notes: Adjusted to 1999 dollars using Gross Domestic Product deflator series. These expenditures do not include expenditures for oil and gas exploration. Expenditures for 1997-99 include 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). Off-mine-site and on-mine-site overhead expenditures for 1967-88 were estimated based on an average from the years 1989-96.



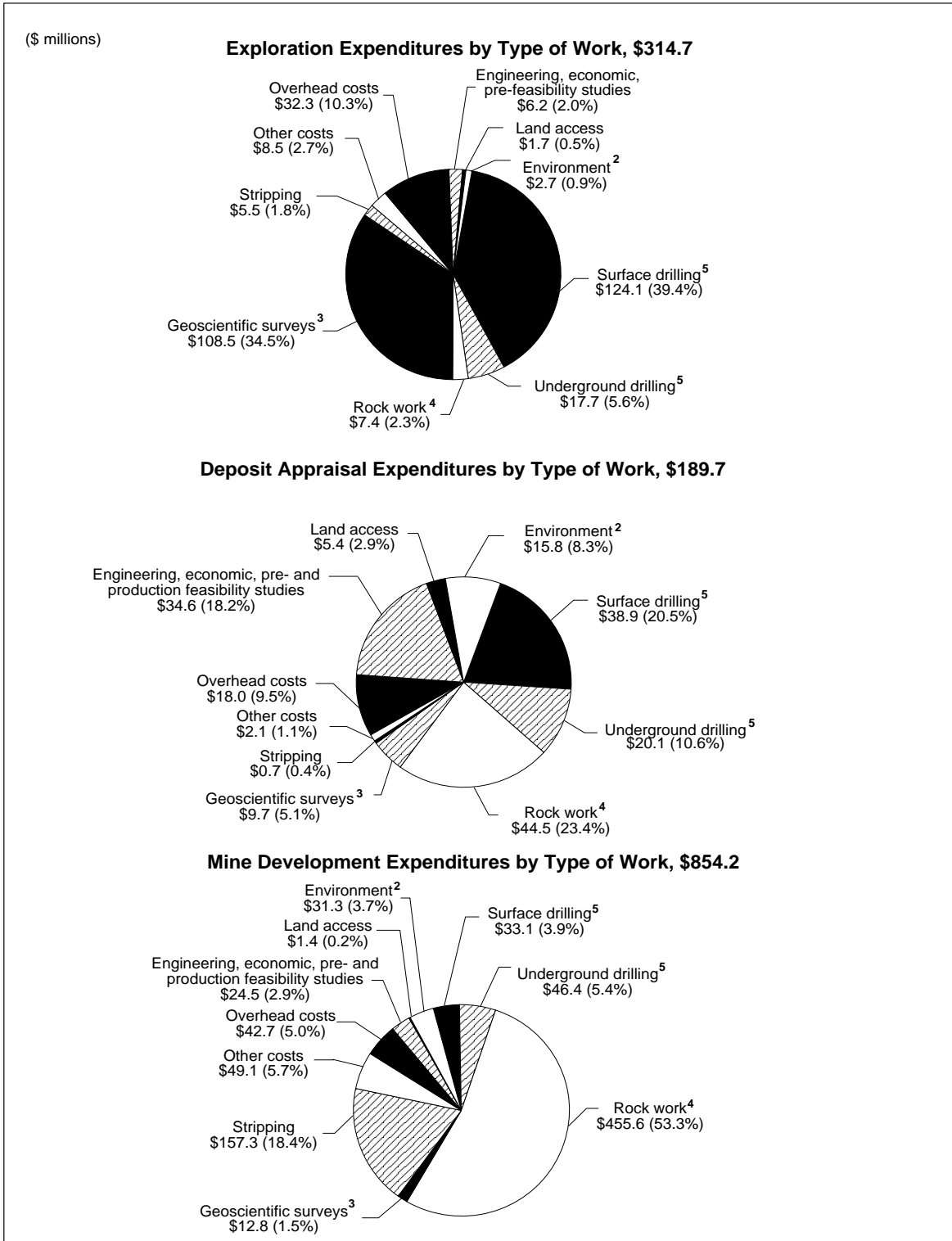
Source: Natural Resources Canada, from a federal-provincial-territorial survey of mining and exploration companies.

<sup>a</sup> Exploration, off-mine-site. <sup>b</sup> Deposit appraisal, off-mine-site. <sup>c</sup> Deposit appraisal, on-mine-site. <sup>d</sup> Exploration, on-mine-site.

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

Note: Data for 2000 are preliminary estimates and data for 2001 are company spending intentions

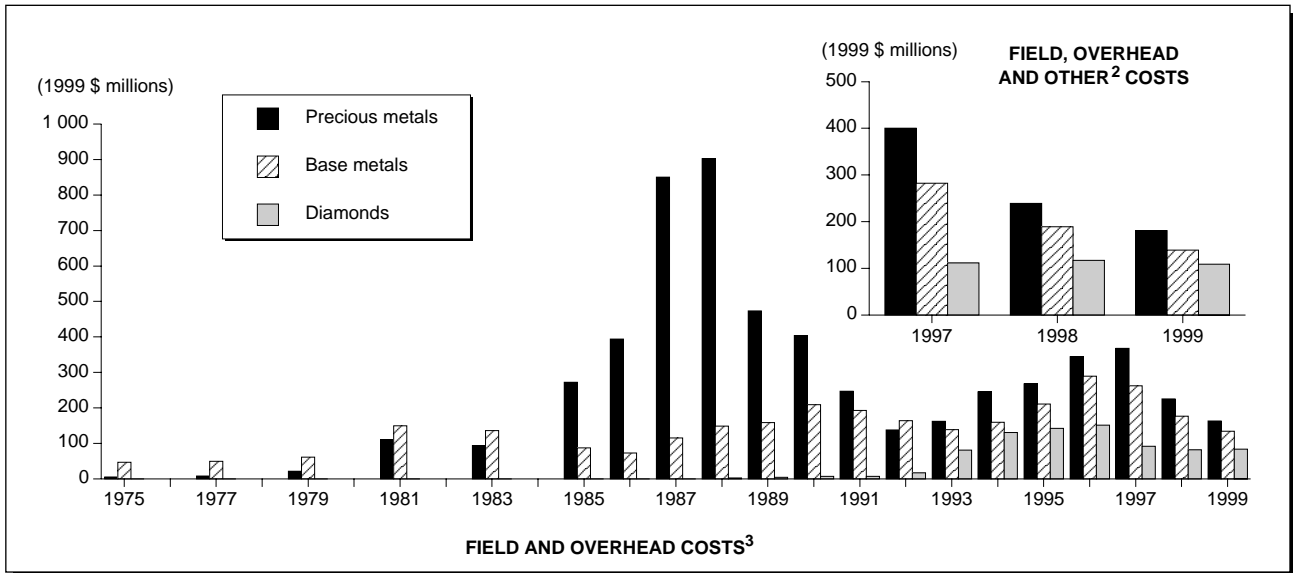
**Figure 4**  
**Exploration, Deposit Appraisal and Mine Development Expenditures,<sup>1</sup> by Type of Work, 1999**



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

<sup>1</sup> Includes 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 types of drilling.

**Figure 5**  
**Exploration Plus Deposit Appraisal Expenditures,<sup>1</sup> for Base Metals, Precious Metals and Diamonds, 1975-99**

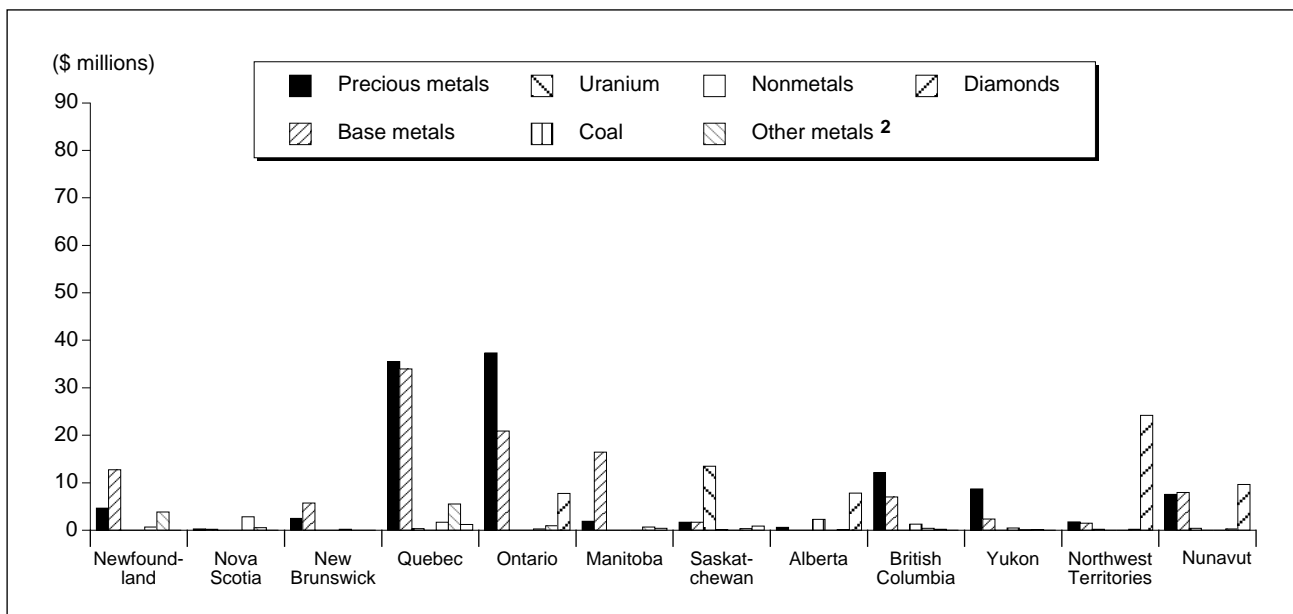


Sources: Natural Resources Canada and Statistics Canada, from a federal-provincial-territorial survey of mining and exploration companies.

<sup>1</sup> Includes on-mine-site plus off mine-site expenditures; 1997-99 expenditures 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 under exploration (broadly speaking). <sup>2</sup>Other costs include engineering, economic and pre- or production feasibility studies, environment, and land access. <sup>3</sup>Overhead costs include mineral leases, claims and property taxes, and project-related head office expenditures.

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

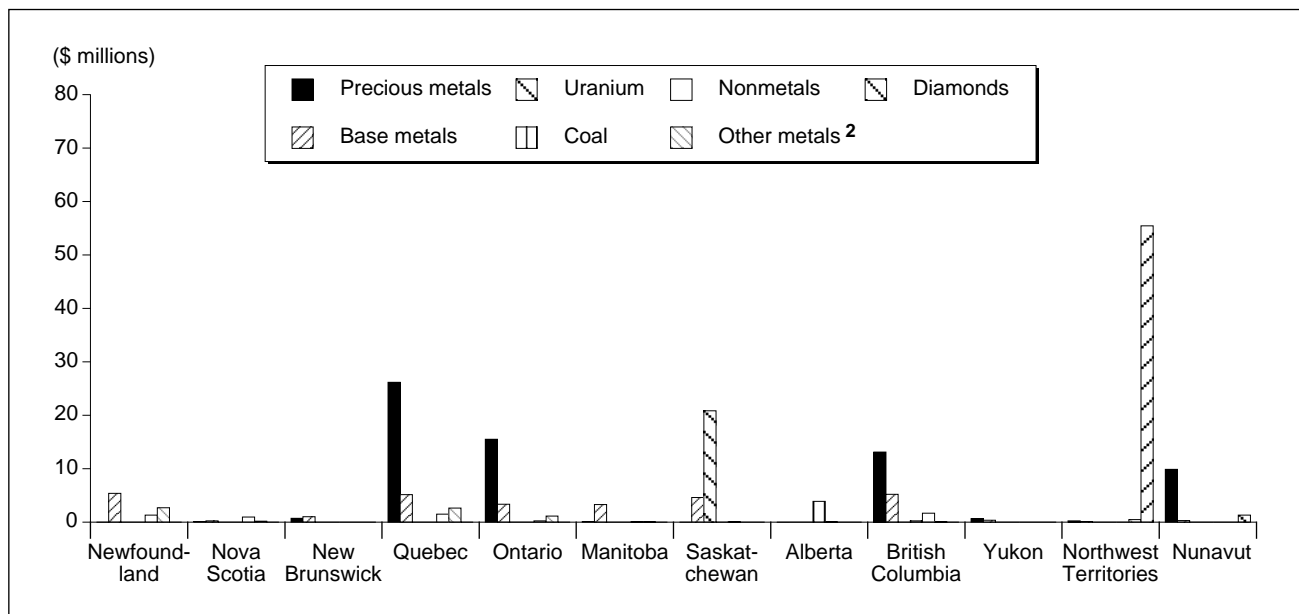
**Figure 6a**  
**Exploration Expenditures<sup>1</sup> by Province and Territory, by Mineral Commodity Sought, 1999**



Source: Natural Resources Canada, from a federal-provincial-territorial 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.

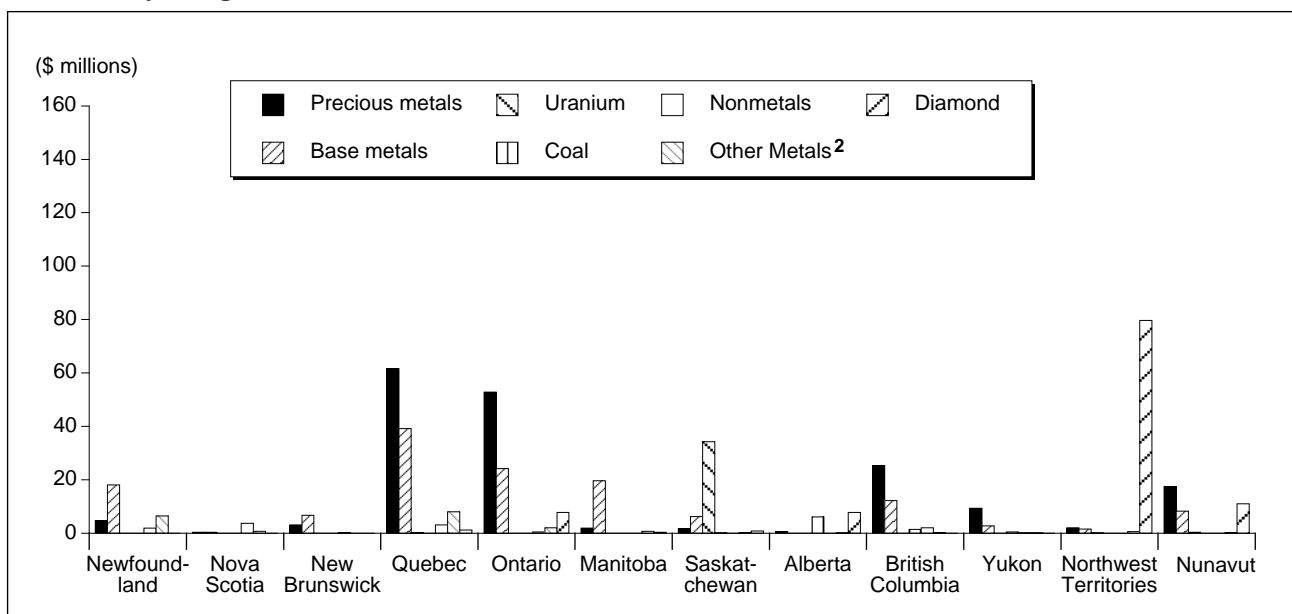
**Figure 6b**  
**Deposit Appraisal Expenditures<sup>1</sup> by Province and Territory, by Mineral Commodity Sought, 1999**



Source: Natural Resources Canada, from a federal-provincial-territorial 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.

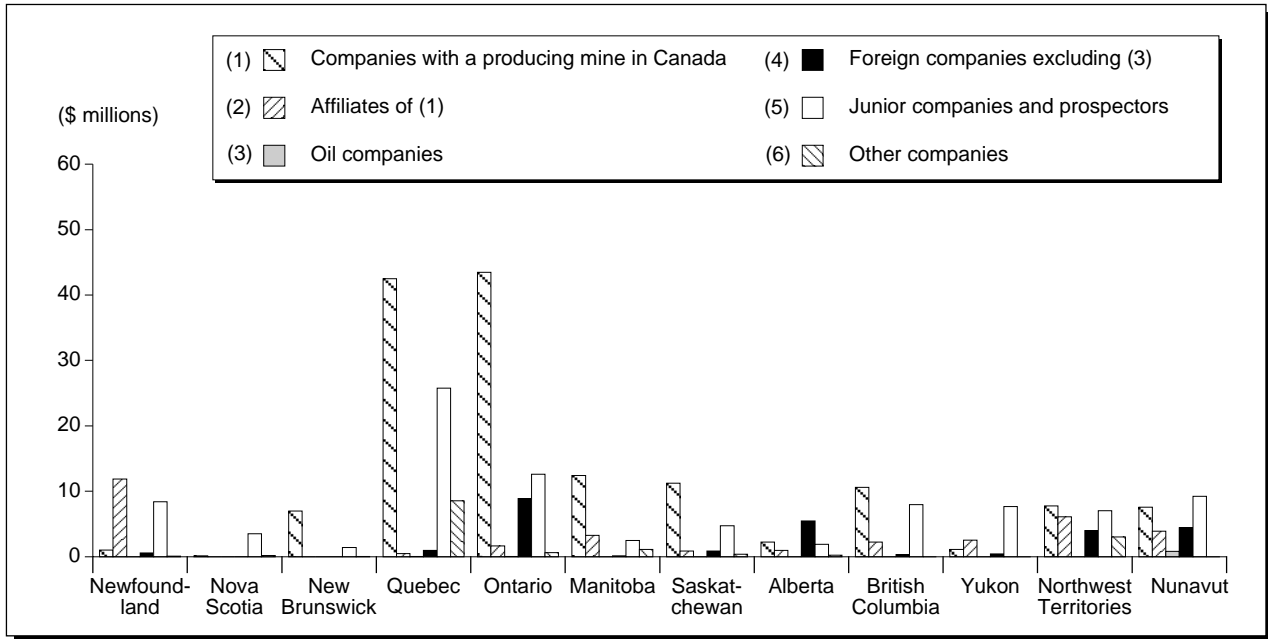
**Figure 6c**  
**Exploration Plus Deposit Appraisal Expenditures,<sup>1</sup> by Province and Territory, by Mineral Commodity Sought, 1999**



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

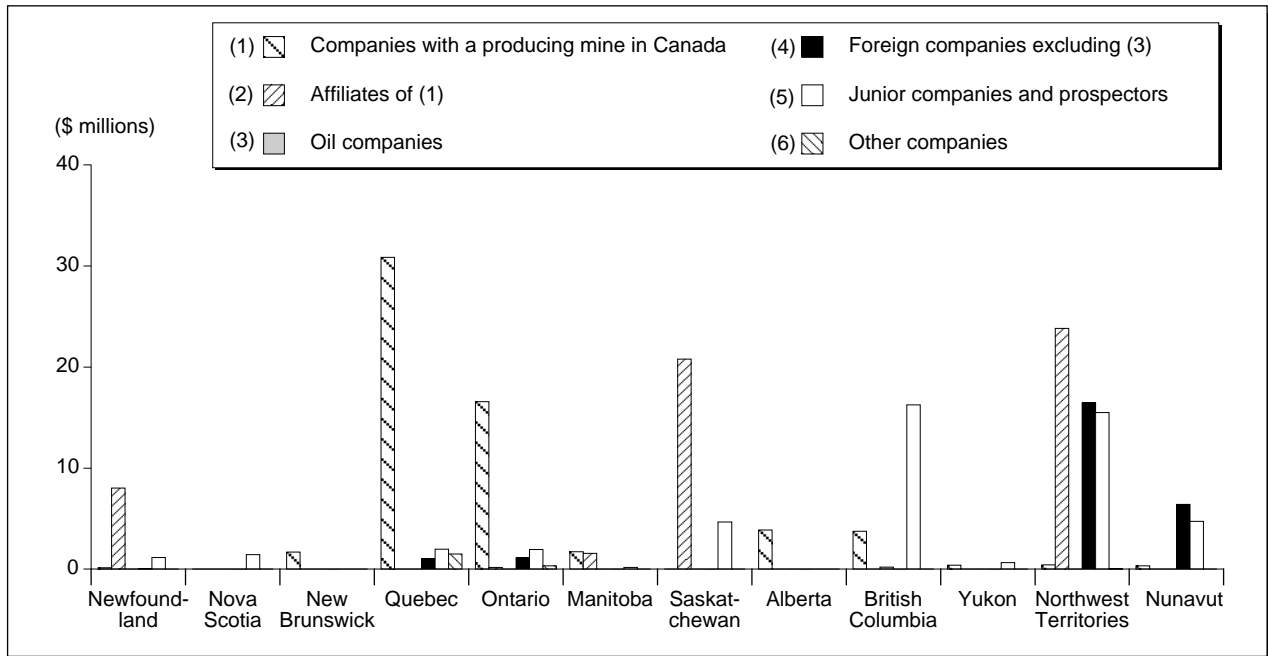
<sup>1</sup> Includes on-mine-site plus off-mine-site activities. Includes field work, overhead, engineering, economic and pre- or production feasibility studies, environment and land access expenditures. <sup>2</sup> Includes ferrous metals.

**Figure 7a**  
**Exploration Expenditures,<sup>1</sup> by Province and Territory, by Type of Company, 1999**



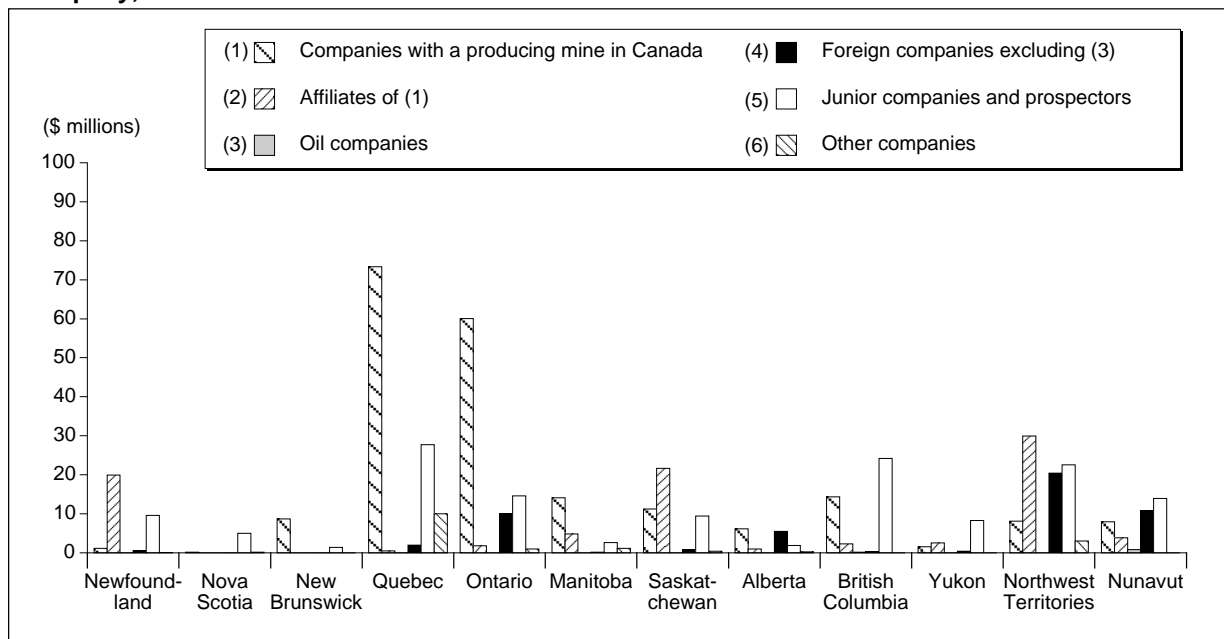
Source: Natural Resources Canada, from a federal-provincial-territorial survey of mining and exploration companies.  
<sup>1</sup> Includes on-mine-site plus off-mine-site activities. Includes field work, overhead, engineering, economic and pre-feasibility studies, environment and land access expenditures.

**Figure 7b**  
**Deposit Appraisal Expenditures,<sup>1</sup> by Province and Territory, by Type of Company, 1999**



Source: Natural Resources Canada, from a federal-provincial-territorial 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.

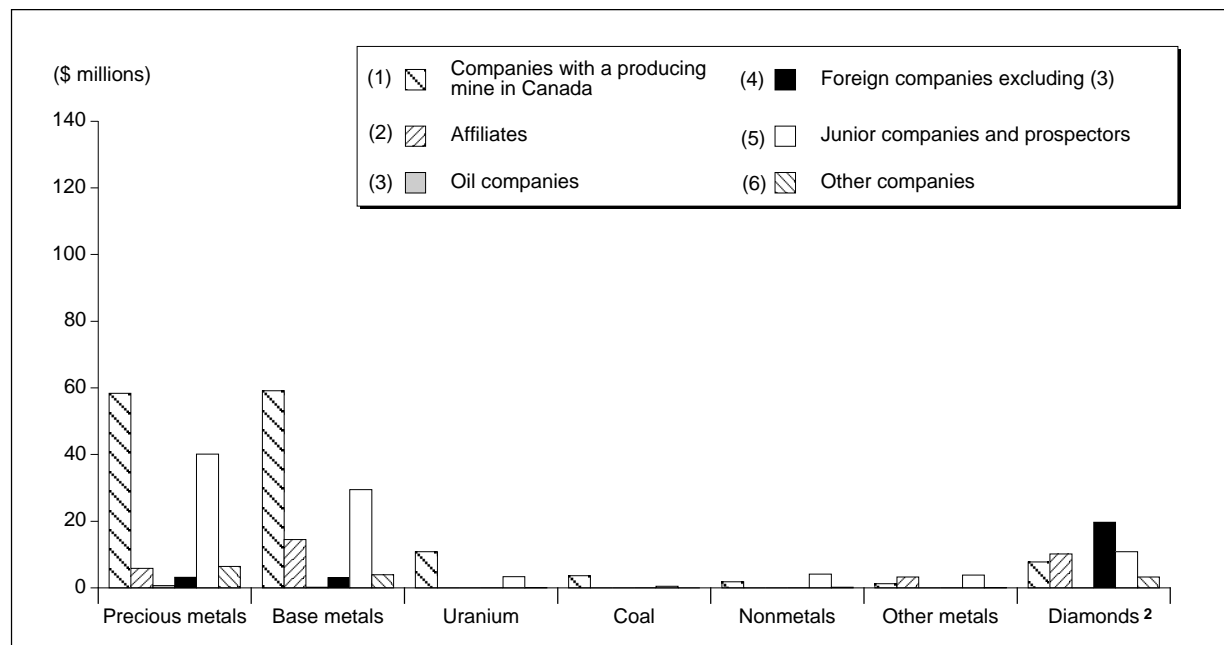
**Figure 7c**  
**Exploration Plus Deposit Appraisal Expenditures,<sup>1</sup> by Province and Territory, by Type of Company, 1999**



Source: Natural Resources Canada, from a federal-provincial-territorial 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.

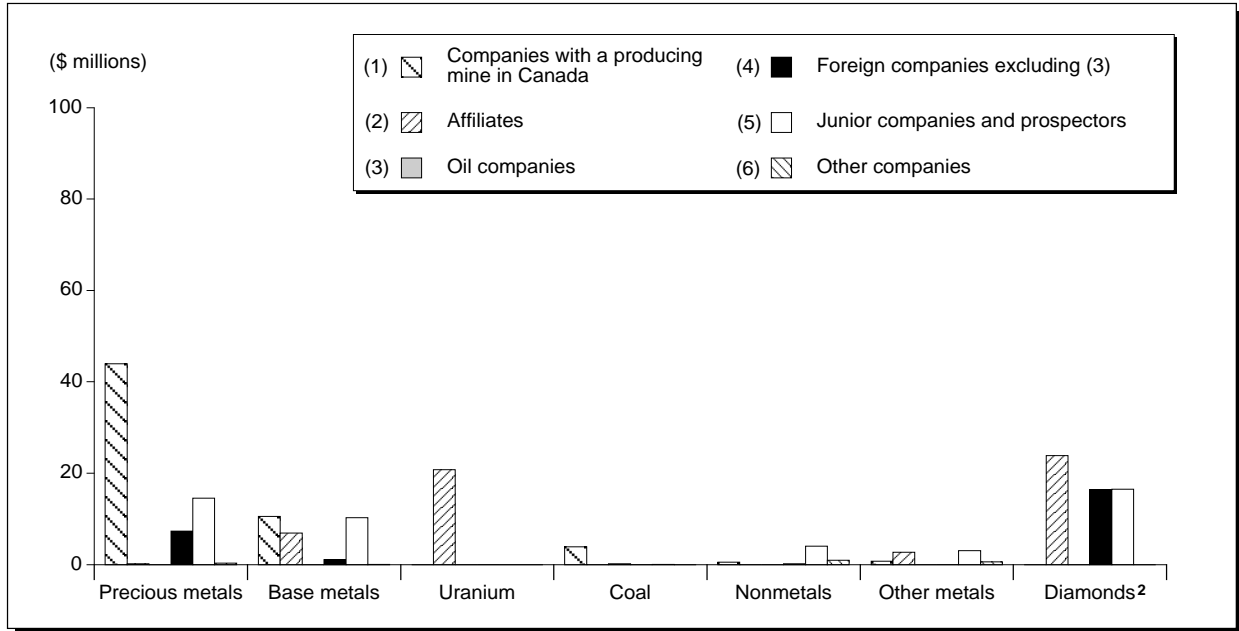
**Figure 8a**  
**Exploration Expenditures,<sup>1</sup> by Type of Company and Mineral Commodity, 1999**



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

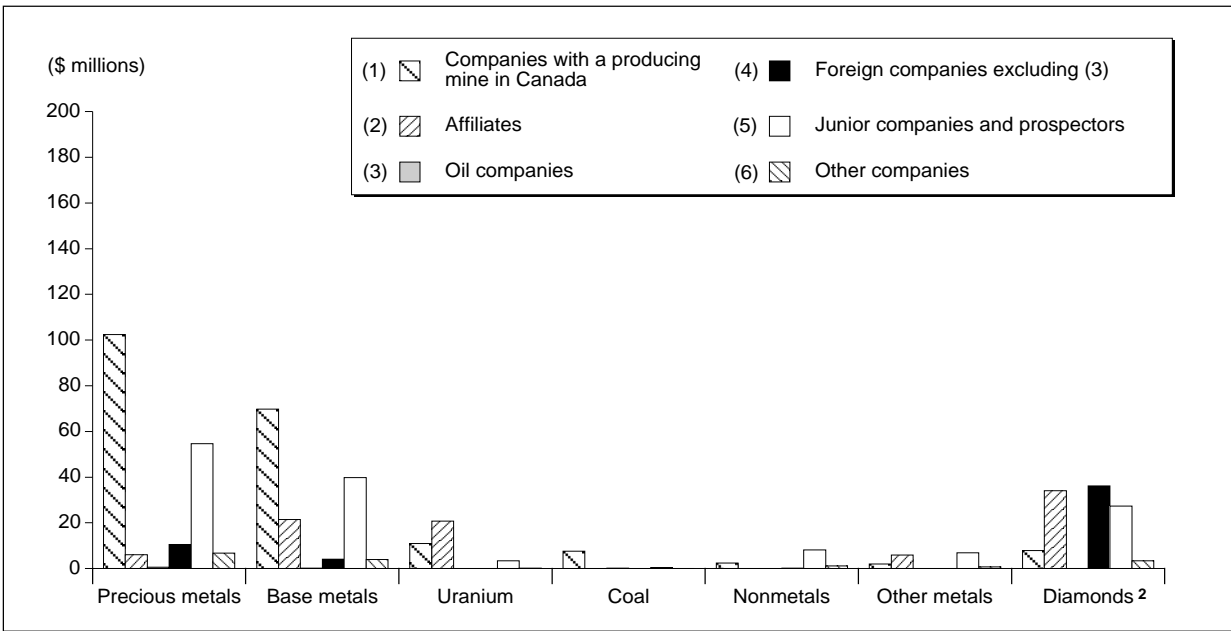
<sup>1</sup> Includes on-mine-site plus off-mine-site activities. Includes field work, overhead, engineering, economic and pre-feasibility studies, environment and land access expenditures. <sup>2</sup> Includes ferrous metals.

**Figure 8b**  
**Deposit Appraisal Expenditures,<sup>1</sup> by Type of Company and Mineral Commodity, 1999**



Source: Natural Resources Canada, from a federal-provincial-territorial 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, 1999**



Source: Natural Resources Canada, from a federal-provincial-territorial 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.

**TABLE 1. COMPARISON OF 1998 AND 1999 EXPENDITURES, 1 ON- AND OFF-MINE-SITE ACTIVITY FOR EXPLORATION, DEPOSIT APPRAISAL AND MINE COMPLEX DEVELOPMENT**

Expenditure Category	1998					1999				
	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	385.9	86.7	59.2	13.3	445.1	260.7	85.8	43.2	14.2	304.0
Engineering, economic and feasibility studies, environment, and land access	9.0	50.9	8.7	49.1	17.7	9.4	88.3	1.3	11.7	10.7
Subtotal	394.9	85.3	67.9	14.7	462.8	270.2	85.9	44.5	14.1	314.7
Capital <sup>2</sup>	7.8	80.4	1.9	19.6	9.7	4.0	80.7	1.0	19.3	4.9
Repair and maintenance <sup>2</sup>	1.2	25.2	3.6	74.8	4.8	2.3	48.2	2.5	51.8	4.8
<b>DEPOSIT APPRAISAL</b>										
Field work and overhead	73.2	55.9	57.7	44.1	130.9	96.0	71.7	37.9	28.3	133.9
Engineering, economic and feasibility studies, environment, and land access	58.4	93.8	3.9	6.2	62.3	51.4	92.0	4.4	8.0	55.8
Subtotal	131.6	68.1	61.5	31.9	193.1	147.4	77.7	42.3	22.3	189.7
Capital <sup>2</sup>	16.4	65.4	8.7	34.6	25.1	29.1	100.0	–	–	29.1
Repair and maintenance <sup>2</sup>	11.6	64.6	6.4	35.4	18.0	15.8	95.4	0.8	4.6	16.6
<b>EXPLORATION PLUS DEPOSIT APPRAISAL</b>										
Field work and overhead	459.1	79.7	116.8	20.3	575.9	356.8	81.5	81.1	18.5	437.9
Engineering, economic and feasibility studies, environment, and land access	67.4	84.3	12.6	15.7	80.0	60.8	91.4	5.7	8.6	66.5
Subtotal	526.5	80.3	129.4	19.7	655.9	417.6	82.8	86.8	17.2	504.3
Capital <sup>2</sup>	24.2	69.6	10.6	30.4	34.8	33.1	97.2	1.0	2.8	34.0
Repair and maintenance <sup>2</sup>	12.9	56.3	10.0	43.7	22.8	18.1	84.8	3.3	15.2	21.4
<b>MINE COMPLEX DEVELOPMENT</b>										
Field work and overhead	n.a.	n.a.	932.3	100.0	932.3	n.a.	n.a.	797.0	100.0	797.0
Engineering, economic and feasibility studies, environment, and land access	n.a.	n.a.	33.8	100.0	33.8	n.a.	n.a.	57.2	100.0	57.2
Subtotal	n.a.	n.a.	966.1	100.0	966.1	n.a.	n.a.	854.2	100.0	854.2
Capital <sup>2</sup>	n.a.	n.a.	1 226.3	100.0	1 226.3	n.a.	n.a.	840.5	100.0	840.5
Repair and maintenance <sup>2</sup>	n.a.	n.a.	1 671.6	100.0	1 671.6	n.a.	n.a.	1 269.7	100.0	1 269.7
Total	563.6	12.3	4 014.0	87.7	4 577.6	468.8	13.3	3 055.4	86.7	3 524.2

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

– Nil; n.a. Not applicable.

<sup>1</sup> Includes engineering, economic and pre- or production feasibility studies, environment and land access expenditures. <sup>2</sup> Includes construction, and machinery and equipment expenditures, as well as related environmental protection and restoration expenditures.

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



**TABLE 2a. EXPLORATION, DEPOSIT APPRAISAL AND MINE COMPLEX DEVELOPMENT EXPENDITURES, 1 1999**

Expenditure Category	Exploration	Deposit Appraisal	Exploration Plus Deposit Appraisal		Mine Complex Development	Total
			(\$000)			
Field work and overhead <sup>2</sup>	303 963	133 889	437 852 <sup>a</sup>		796 957	1 234 809
Engineering studies	3 498	26 478	29 976		21 407	51 383
Economic studies	397	904	1 301		62	1 363
Pre- or production feasibility studies	2 354	7 186	9 540		3 009	12 549
Environment	2 744	15 782	18 526		31 297	49 824
Land access	1 703	5 449	7 152		1 428	8 580
Subtotal	314 660	189 688	504 348		854 160	1 358 508
Off-mine-site <sup>3</sup>	270 188	147 386	417 575		n.a.	417 575
On-mine-site <sup>3</sup>	44 471	42 302	86 773		854 160	940 933
Capital <sup>4</sup>	4 929	29 107	34 035		840 541	874 576
Total	319 589	218 795	538 383		1 694 701	2 233 084
Repair and maintenance <sup>4</sup>	4 835	16 564	21 399		1 269 740	1 291 139
Grand total	324 423	235 359	559 782		2 964 441	3 524 223

Source: Natural Resources Canada, from a federal-provincial-territorial 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 property taxes, 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.

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

**TABLE 2b. SUMMARY OF ENVIRONMENT EXPENDITURES FOR EXPLORATION, DEPOSIT APPRAISAL AND MINE COMPLEX DEVELOPMENT, 1999**

Expenditure Category	Exploration		Deposit Appraisal		Exploration Plus Deposit Appraisal		Mine Complex Development		Grand Total <sup>1</sup>	
	(\$000)	(%)	(\$000)	(%)	(\$000)	(%)	(\$000)	(%)	(\$000)	(%)
Environment										
Characterization	1 519	55.2	3 937	23.6	5 455	28.1	1 791	1.9	7 246	6.5
Permits	158	5.8	5 857	35.1	6 015	31.0	941	1.0	6 956	6.2
Protection	97	3.5	2 629	15.8	2 726	14.0	19 648	21.4	22 374	20.1
Restoration	970	35.3	3 360	20.1	4 330	22.3	8 917	9.7	13 247	11.9
Subtotal	2 744		15 782		18 526		31 297		49 824	
Capital, share of environment	–	–	889	5.3	889	4.6	25 570	27.8	26 459	23.8
Repair and maintenance, share of environment	5	0.2	5	–	10	0.1	35 048	38.1	35 058	31.5
Total environment	2 749	100.0	16 676	100.0	19 425	100.0	91 915	100.0	111 341	100.0
Total environment as a percentage of grand total <sup>1</sup>		0.9		7.1		3.5		3.1		3.2

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

– Nil.

<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> 2000 AND 2001

Expenditure Category	Exploration		Deposit Appraisal		Exploration Plus Deposit Appraisal		Mine Complex Development		Grand Total	
	2000	2001	2000	2001	2000	2001	2000	2001	2000	2001
	(\$000)									
Field work and overhead <sup>2</sup>	309 465	312 136	126 744	107 758	436 209a	419 894a	711 721	659 430	1 147 930	1 079 325
Engineering, economic and pre- or production feasibility studies	5 656	4 753	20 680	20 941	26 336	25 693	41 120	31 487	67 456	57 181
Environment	3 055	2 821	4 910	5 862	7 965	8 682	13 589	16 196	21 554	24 878
Land access	1 414	1 628	1 444	1 837	2 858	3 465	9 964	847	12 823	4 311
Subtotal	319 590	321 338	153 778	136 397	473 368	457 734	776 394	707 960	1 249 762	1 165 695
Off-mine-site	284 891	289 965	106 534	96 814	391 425	386 778	n.a.	n.a.	391 425	386 778
On-mine-site	34 699	31 373	47 244	39 583	81 943	70 956	776 394	707 960	858 337	778 916
Capital <sup>3</sup>	1 418	2 093	20 688	33 810	22 106	35 903	1 124 740	1 439 510	1 146 846	1 475 414
\$ for environmental protection and restoration <sup>4</sup>	383	293	812	1 020	1 195	1 313	50 455	49 649	51 650	50 962
Repair and maintenance <sup>3</sup>	3 377	381	7 719	5 877	11 096	6 258	1 192 727	1 145 760	1 203 823	1 152 018
\$ for environmental protection and restoration <sup>4</sup>	29	51	2 068	3 830	2 097	3 881	62 079	65 486	64 177	69 367
Subtotal	4 795	2 474	28 407	39 687	33 202	42 162	2 317 467	2 585 270	2 350 669	2 627 432
Grand total	324 385	323 812	182 185	176 084	506 570	499 896	3 093 861	3 293 230	3 600 432	3 793 126
Total environment	3 467	3 164	7 790	10 711	11 257	13 876	126 123	131 331	137 380	145 207
Environment as a percentage of grand total	1.07	0.98	4.28	6.08	2.22	2.78	4.08	3.99	3.82	3.83

Source: Natural Resources Canada, from a federal-provincial-territorial 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 property taxes, and project-related head office expenditures. <sup>3</sup> Includes construction, and machinery and equipment expenditures. <sup>4</sup> As part of capital expenditures or repair and maintenance expenditures.

Notes: Numbers may not add to totals due to rounding. Data for 2000 are preliminary estimates; data for 2001 are company spending intentions.

TABLE 3a. EXPLORATION PLUS DEPOSIT APPRAISAL, FIELD WORK PLUS OVERHEAD EXPENDITURES,<sup>1</sup> BY JUNIOR AND SENIOR COMPANIES, 1969-2001

Year	Current Dollars				Constant 2000 Dollars			
	Share of Total		Total	% of Total Junior	Share of Total		Total	% of Total Junior
	Junior	Senior			Junior	Senior		
	(\$ millions)				(\$ millions)			
1969	44.4	130.5	174.9	25.4	204.2	600.3	804.5	25.4
1970	39.9	147.2	187.1	21.3	175.0	645.5	820.5	21.3
1971	24.5	127.5	152.0	16.1	103.8	540.2	644.0	16.1
1972	18.3	97.4	115.7	15.8	73.1	389.3	462.4	15.8
1973	22.5	121.6	144.1	15.6	82.3	444.9	527.3	15.6
1974	21.8	158.5	180.3	12.1	69.6	506.0	575.6	12.1
1975	19.5	187.8	207.3	9.4	56.4	542.7	599.0	9.4
1976	13.9	192.9	206.8	6.7	36.8	510.3	547.1	6.7
1977	12.5	271.0	283.5	4.4	31.0	671.2	702.2	4.4
1978	19.8	275.0	294.8	6.7	46.0	639.0	685.0	6.7
1979	29.4	329.5	358.9	8.2	62.4	699.3	761.7	8.2
1980	60.2	530.0	590.2	10.2	115.2	1 014.1	1 129.3	10.2
1981	83.0	651.2	734.2	11.3	143.0	1 122.2	1 265.2	11.3
1982	73.8	502.5	576.3	12.8	117.1	797.6	914.8	12.8
1983	71.2	400.6	471.8	15.1	107.3	603.6	710.9	15.1
1984	146.9	470.4	617.3	23.8	214.2	685.8	900.0	23.8
1985	181.1	424.7	605.8	29.9	257.8	604.3	862.0	29.9
1986	348.6	374.7	723.3	48.2	482.7	518.7	1 001.4	48.2
1987	668.2	631.8	1 300.0	51.4	882.8	834.7	1 717.6	51.4
1988	668.3	681.8	1 350.1	49.5	844.4	861.4	1 705.8	49.5
1989	272.6	555.3	827.9	32.9	329.3	670.8	1 000.0	32.9
1990	241.0	533.7	774.7	31.1	282.6	625.9	908.5	31.1
1991	116.1	415.6	531.8	21.8	132.6	474.6	607.2	21.8
1992	79.9	305.4	385.3	20.7	90.1	344.2	434.2	20.7
1993	142.7	334.5	477.3	29.9	158.5	371.4	529.9	29.9
1994	195.8	432.3	628.1	31.2	215.1	474.9	689.9	31.2
1995	213.4	504.2	717.6	29.7	229.3	541.7	771.0	29.7
1996	313.9	580.9	894.8	35.1	332.4	612.6	945.1	35.2
1997	266.7	553.4	820.2	32.5	279.1	579.2	858.3	32.5
1998	155.9	420.0	575.9	27.1	164.1	442.0	606.0	27.1
1999	123.1	314.8	437.9	28.1	127.5	326.1	453.5	28.1
2000 <sup>p</sup>	132.6	303.6	436.2	30.4	132.6	303.6	436.2	30.4
2001 <sup>f</sup>	152.3	267.6	419.9	36.3	152.3	267.6	419.9	36.3

Sources: Natural Resources Canada and Statistics Canada, from a federal-provincial-territorial 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 starting in 1997 include 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).

**TABLE 3b. EXPLORATION PLUS DEPOSIT APPRAISAL EXPENDITURES,<sup>1</sup> BY JUNIOR AND SENIOR COMPANIES, 1997-2001**

Year	Current Dollars				Constant 2000 Dollars			
	Share of Total		Total	% of Total	Share of Total		Total	% of Total
	Junior	Senior			Junior	Senior		
	(\$ millions)				(\$ millions)			
1997	298.0	623.0	921.0	32.4	311.8	651.9	963.7	32.4
1998	170.5	485.4	655.9	26.0	179.5	510.8	690.2	26.0
1999	141.2	363.2	504.3	28.0	146.2	376.2	522.4	28.0
2000 <sup>P</sup>	148.6	324.8	473.4	31.4	148.6	324.8	473.4	31.4
2001 <sup>f</sup>	166.6	291.2	457.7	36.4	166.6	291.2	457.7	36.4

Sources: Natural Resources Canada and Statistics Canada, from a federal-provincial-territorial 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. Includes field work, overhead, engineering, economic and pre- or production feasibility studies, environment and land access expenditures.

**TABLE 4. EXPLORATION PLUS DEPOSIT APPRAISAL EXPENDITURES,<sup>1</sup> BY RANGE OF EXPENDITURES AND BY JUNIOR AND SENIOR COMPANIES, 1998-2000**

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>1998</b>									
>10 million	–	–	–	15	298 116	61.4	15	298 116	45.4
5 million - 10 million	3	23 878	14.0	13	98 355	20.3	16	122 233	18.6
1 million - 5 million	31	60 521	35.5	29	70 573	14.5	60	131 094	20.0
500 000 - 1 million	48	33 083	19.4	15	10 881	2.2	63	43 964	6.7
200 000 - 500 000	91	29 145	17.1	15	4 786	1.0	106	33 931	5.2
100 000 - 200 000	82	12 290	7.2	12	1 811	0.4	94	14 101	2.1
50 000 - 100 000	50	3 940	2.3	5	413	0.1	55	4 353	0.7
1 - 50 000	174	3 142	1.8	21	452	0.1	195	3 594	0.5
Subtotal	479	165 999	97.3	125	485 387	100.0	604	651 387	99.3
Prospectors	43	4 544	2.7	–	–	–	43	4 544	0.7
Total 1998	522	170 544	100.0	125	485 387	100.0	647	655 931	100.0
<b>1999</b>									
>10 million	2	29 101	20.6	10	190 759	52.5	12	219 860	43.6
5 million - 10 million	1	5 234	3.7	12	91 230	25.1	13	96 464	19.1
1 million - 5 million	21	37 727	26.7	26	63 308	17.4	47	101 035	20.0
500 000 - 1 million	38	26 929	19.1	14	10 632	2.9	52	37 560	7.4
200 000 - 500 000	82	25 574	18.1	14	4 235	1.2	96	29 809	5.9
100 000 - 200 000	54	7 603	5.4	13	1 840	0.5	67	9 444	1.9
50 000 - 100 000	48	3 492	2.5	11	769	0.2	59	4 261	0.8
1 - 50 000	163	2 746	1.9	23	398	0.1	186	3 145	0.6
Subtotal	409	138 407	98.0	123	363 170	100.0	532	501 578	99.5
Prospectors	25	2 770	2.0	–	–	–	25	2 770	0.5
Total 1999	434	141 177	100.0	123	363 170	100.0	557	504 348	100.0
<b>2000<sup>P</sup></b>									
>10 million	1	17 596	11.8	7	149 352	46.0	8	166 948	35.3
5 million - 10 million	–	–	–	13	92 943	28.6	13	92 943	19.6
1 million - 5 million	32	65 528	44.1	29	68 399	21.1	61	133 926	28.3
500 000 - 1 million	39	25 767	17.3	9	6 128	1.9	48	31 895	6.7
200 000 - 500 000	73	23 470	15.8	17	4 938	1.5	90	28 408	6.0
100 000 - 200 000	55	7 348	4.9	14	1 889	0.6	69	9 237	2.0
50 000 - 100 000	48	3 188	2.1	13	879	0.3	61	4 068	0.9
1 - 50 000	131	2 162	1.5	16	232	0.1	147	2 394	0.5
Subtotal	379	145 058	97.6	118	324 760	100.0	497	469 819	99.3
Prospectors	32	3 549	2.4	–	–	–	32	3 549	0.7
Total 2000	411	148 608	100.0	118	324 760	100.0	529	473 368	100.0

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

– Nil; <sup>P</sup> Preliminary.

<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 5. SUMMARY OF TOTAL DIAMOND EXPLORATION, DEPOSIT APPRAISAL AND MINE COMPLEX DEVELOPMENT EXPENDITURES,<sup>1</sup> 1998-2000**

Expenditure Category	1998	1999	2000 <sup>P</sup>
	(\$ millions)		
Field work and overhead	148.9	83.9	141.6
Engineering, economic and pre- or production feasibility studies, environment and land access	36.7	25.0	56.5
Capital and repair <sup>2</sup>	161.4	76.0	229.3
<b>Total</b>	<b>347.1</b>	<b>185.0</b>	<b>427.4</b>

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

<sup>P</sup> Preliminary.

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

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

**TABLE 6a. AREA<sup>1</sup> OF NEW MINERAL CLAIMS STAKED OR RECORDED IN CANADA, 1993-2000**

Province/Territory	1993		1994		1995		1996		1997		1998		1999		2000	
	(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>10</sup>
Newfoundland	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	241 075	66.6	324 225	134.5
Nova Scotia	87 350	42.4	154 123	176.4	183 893	119.3	424 815	231.0	208 191	49.0	74 180	35.6	157 394	212.2	96 819	61.5
New Brunswick	37 616	68.3	63 680	169.3	60 464	94.9	93 760	155.1	53 760	57.3	40 000	74.4	28 336	70.8	49 344	174.1
Quebec	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	754 102	103.6	2 187 551	290.1
Ontario	426 416	85.7	734 400	172.2	668 832	91.1	903 488	135.1	855 584	94.7	577 632	67.5	604 096	104.6	874 896	144.8
Manitoba	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>t</sup>	48.6	386 243 <sup>b</sup>	118.7	475 634	123.1	566 571	119.1	1 832 577	323.5
Saskatchewan	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	161 083 <sup>c</sup>	23.7	523 440	325.0
Alberta	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	1 026 000	29.4	2 349 600	229.0
British Columbia	702 250 <sup>a</sup>	85.2	774 340	110.3	845 550	109.2	997 740	118.0	765 257	76.7	474 296	62.0	478 740	100.9	699 050	146.0
Yukon	114 817	84.5	280 171	244.0	376 844	134.5	514 483	136.5	459 507	89.3	131 221	28.5	152 731	116.4	52 675	34.5
Northwest Territories	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	563 378	68.1 <sup>9</sup>	891 419	158.2
Nunavut	..	..	..	..	..	..	..	..	..	..	..	..	710 092	..	498 230	70.2
<b>Total</b>	<b>27 348 450</b>	<b>81.0</b>	<b>16 248 659</b>	<b>59.4</b>	<b>16 231 892</b>	<b>99.9</b>	<b>13 385 337</b>	<b>82.5</b>	<b>44 216 690</b>	<b>330.3</b>	<b>7 860 668</b>	<b>17.8</b>	<b>5 443 598</b>	<b>69.3</b>	<b>10 379 826</b>	<b>190.7</b>

Source: Provincial and territorial mining recorders.

.. Not available.

<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>c</sup> Prior to 1999, Saskatchewan data do not include exploration permits.

<sup>1</sup> Excludes coal. <sup>2</sup> Percentage of 1993 over 1992. <sup>3</sup> Percentage of 1994 over 1993. <sup>4</sup> Percentage of 1995 over 1994. <sup>5</sup> Percentage of 1996 over 1995. <sup>6</sup> Percentage of 1997 over 1996. <sup>7</sup> Percentage of 1998 over 1997.

<sup>8</sup> Percentage of 1999 over 1998. <sup>9</sup> Percentage based on new claims staked in 1999 in the Northwest Territories and Nunavut combined. <sup>10</sup> Percentage of 2000 over 1999.

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, 1998-2000**

Province/Territory	1998		1999		2000	
	(hectares)	(%)	(hectares)	(%)	(hectares)	(%)
Newfoundland	361 900	4.6	241 075	4.4	324 225	3.1
Nova Scotia	74 180	0.9	157 394	2.9	96 819	0.9
New Brunswick	40 000	0.5	28 336	0.5	49 344	0.5
Quebec	728 142	9.3	754 102	13.9	2 187 551	21.1
Ontario	577 632	7.3	604 096	11.1	874 896	8.4
Manitoba	475 634	6.1	566 571	10.4	1 832 577	17.7
Saskatchewan	680 048	8.7	161 083 <sup>r</sup>	3.0	523 440	5.0
Alberta	3 490 000	44.4	1 026 000	18.8	2 349 600	22.6
British Columbia	474 296	6.0	478 740	8.8	699 050	6.7
Yukon	131 221	1.7	152 731	2.8	52 675	0.5
Northwest Territories	827 615	10.5	563 378 <sup>r</sup>	10.3	891 419	8.6
Nunavut	..	..	710 092 <sup>r</sup>	13.0	498 230	5.0
Total	7 860 668	100.0	5 443 598	100.0	10 379 826	100.0

Source: Provincial and territorial mining recorders.

.. Not available; <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, 1999 AND 2000**

Province/Territory	1999						2000 <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	21 858	91	9 228	127	31 086	218	17 320	281	7 285	46	24 605	327
Nova Scotia	3 812	–	1 446	–	5 258	–	2 825	33	180	100	3 005	133
New Brunswick	6 955	1 458	–	1 700	6 955	3 158	8 425	–	6	2 000	8 431	2 000
Quebec	66 632	11 591	8 403	26 921	75 035	38 512	58 857	9 353	6 400	25 957	65 257	35 310
Ontario	43 550	23 727	11 042	9 075	54 592	32 801	42 055	19 329	17 927	10 398	59 982	29 727
Manitoba	18 125	1 279	166	3 277	18 291	4 556	20 366	3 056	1 036	2 987	41 402	6 043
Saskatchewan	17 772	318	25 465	18	43 237	336	23 128	120	13 607	2 297	36 735	2 417
Alberta	10 772	78	3 181	707	13 953	785	7 779	–	–	21	7 779	21
British Columbia	17 066	4 031	20 158	55	37 224	4 086	25 886	2 175	4 111	2 657	29 997	4 832
Yukon	10 893	841	766	244	11 659	1 085	9 461	–	284	76	9 745	76
Northwest Territories	27 885	–	56 237	–	84 123	–	25 267	337	37 232	307	62 499	644
Nunavut	24 869	1 057	11 293	178	36 161	1 236	43 521	15	18 467	398	61 988	413
Total	270 188	44 471	147 386	42 302	417 575	86 773	284 891	34 699	106 534	47 244	391 425	81 943
Total (on- plus off-mine-site)	314 660		189 688		504 348		319 590		153 778		473 368	

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

– Nil; <sup>p</sup> Preliminary.

<sup>1</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 8. EXPLORATION PLUS DEPOSIT APPRAISAL EXPENDITURES,<sup>1</sup> BY PROVINCE AND TERRITORY, 1998-2001**

Province/Territory	1998		1999			2000 <sup>p</sup>			2001 <sup>f</sup>		
	(\$ millions)	(%)	(\$ millions)	(%)	1999 as a % of 1998 Expenditures	(\$ millions)	(%)	2000 as a % of 1999 Expenditures	(\$ millions)	(%)	2001 as a % of 2000 Expenditures
					(%)			(%)			(%)
Newfoundland	47.9	7.3	31.3	6.2	65.4	24.9	5.3	79.6	24.5	5.4	98.2
Nova Scotia	6.5	1.0	5.3	1.0	80.9	3.1	0.7	59.7	4.6	1.0	146.0
New Brunswick	10.1	1.5	10.1	2.0	100.1	10.4	2.2	103.2	10.3	2.2	98.7
Quebec	127.1	19.4	113.5	22.5	89.3	100.6	21.2	88.6	69.6	15.2	69.2
Ontario	114.8	17.5	87.4	17.3	76.1	89.7	19.0	102.6	99.0	21.6	110.4
Manitoba	29.9	4.6	22.8	4.5	76.4	27.4	5.8	120.1	30.5	6.7	111.0
Saskatchewan	62.1	9.5	43.6	8.6	70.2	39.2	8.3	89.9	41.2	9.0	105.3
Alberta	27.5	4.2	14.7	2.9	53.6	7.8	1.6	52.9	7.8	1.7	100.6
British Columbia	54.5	8.3	41.3	8.2	75.8	34.8	7.4	84.3	45.1	9.9	129.6
Yukon	20.1	3.1	12.7	2.5	63.4	9.8	2.1	77.1	10.7	2.3	109.4
Northwest Territories	155.6	23.7	84.1	16.7	54.1 <sup>a</sup>	63.1	13.3	75.1	60.1	13.1	95.2
Nunavut	n.a.	n.a.	37.4	7.4	n.a.	62.4	13.2	166.9	54.2	11.8	86.8
<b>Total</b>	<b>655.9</b>	<b>100.0</b>	<b>504.3</b>	<b>100.0</b>	<b>76.9</b>	<b>473.4</b>	<b>100.0</b>	<b>93.9</b>	<b>457.7</b>	<b>100.0</b>	<b>96.7</b>
Exploration	462.8	70.6	314.7	62.4	68.0	319.6	67.5	101.6	321.3	70.2	100.5
Deposit appraisal	193.1	29.4	189.7	37.6	98.2	153.8	32.5	81.1	136.4	29.8	88.7

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

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

<sup>a</sup> Data for 1999 Northwest Territories compares the sum of Northwest Territories and Nunavut expenditures in 1999 with the total Northwest Territories expenditure in 1998.

<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 9a. EXPLORATION ACTIVITY,<sup>1</sup> BY PROVINCE AND TERRITORY, BY TYPE OF WORK, 1999

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	83	10 894	1	32	489	3 033	2 823	330	368	1 410	224	40	23	2 267	10	6	21 950
Nova Scotia	14	1 563	2	151	255	750	290	7	74	61	40	35	116	390	56	24	3 812
New Brunswick	49	4 953	3	130	100	712	1 345	–	47	87	27	–	–	940	68	2	8 413
Quebec	715	35 816	12	451	2 227	16 173	5 676	1 977	2 776	1 775	1 181	168	2 084	7 413	484	22	78 222
Ontario	462	31 145	7	5 036	1 140	13 892	3 777	431	4 289	977	946	59	80	4 243	451	811	67 277
Manitoba	81	8 701	–	–	1 020	2 501	1 993	830	51	828	–	10	–	3 344	122	5	19 404
Saskatchewan	81	9 973	1	679	396	1 057	1 847	194	147	567	42	1	–	3 176	4	6	18 090
Alberta	8	1 935	20	686	833	1 132	1 087	1 142	235	715	495	–	–	1 571	736	284	10 850
British Columbia	87	7 135	7	539	1 052	5 204	762	67	3 260	384	193	–	17	2 111	328	44	21 097
Yukon	10	2 537	4	774	2 179	3 009	414	388	792	164	83	–	–	1 216	105	73	11 734
Northwest Territories	54	7 138	5	1 801	6 907	2 087	1 981	3 146	48	1 130	258	85	35	2 879	50	340	27 885
Nunavut	49	8 441	1	1 235	2 989	4 843	2 961	1 095	807	413	8	–	–	2 719	329	85	25 926
Total	1 693	130 233	62	11 514	19 588	54 392	24 956	9 607	12 894	8 511	3 498	397	2 354	32 269	2 744	1 703	314 660
Percentage of grand total	n.a.	41.4	n.a.	3.7	6.2	17.3	7.9	3.1	4.1	2.7	1.1	0.1	0.7	10.3	0.9	0.5	100.0

Source: Natural Resources Canada, from a federal-provincial-territorial 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, 1999

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	39	6 475	–	–	–	125	580	–	15	82	71	25	200	421	593	767	9 355
Nova Scotia	–	–	1	50	8	–	–	–	–	–	1 018	10	191	34	135	1	1 446
New Brunswick	33	1 700	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1 700
Quebec	181	8 794	...	13	138	824	245	88	17 652	139	1 669	330	1 324	1 186	2 493	431	35 325
Ontario	179	11 847	–	–	–	1 992	55	–	1 304	68	127	30	3 458	936	223	77	20 117
Manitoba	30	2 154	–	–	40	67	195	–	55	545	84	–	–	276	27	–	3 443
Saskatchewan	31	3 974	–	–	110	734	77	–	10 817	188	4 353	–	779	2 021	2 209	221	25 483
Alberta	–	–	115	1 030	–	167	122	–	–	168	169	168	–	587	1 478	–	3 888
British Columbia	19	1 420	–	–	2	475	7	–	9 887	114	3 852	232	557	966	1 593	1 108	20 213
Yukon	1	104	1	195	27	19	10	–	21	30	–	10	122	347	121	4	1 010
Northwest Territories	41	7 147	10	9 928	244	179	279	16	5 080	754	13 873	99	355	10 211	5 282	2 792	56 237
Nunavut	30	4 132	–	–	425	2 440	–	–	363	–	1 262	–	200	973	1 629	48	11 471
Total	583	47 747	127	11 215	994	7 020	1 570	104	45 193	2 088	26 478	904	7 186	17 958	15 782	5 449	189 688
Percentage of grand total	n.a.	25.2	n.a.	5.9	0.5	3.7	0.8	0.1	23.8	1.1	14.0	0.5	3.8	9.5	8.3	2.9	100.0

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

– Nil; ... Amount too small to be expressed; 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, 1999**

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)							(\$000)						
Newfoundland	122	17 369	1	32	489	3 158	3 404	330	383	1 492	295	65	223	2 688	604	773	31 305
Nova Scotia	14	1 563	3	201	262	750	290	7	74	61	1 058	45	307	424	191	25	5 258
New Brunswick	82	6 653	3	130	100	712	1 345	-	47	87	27	-	940	68	2	10 113	
Quebec	896	44 610	12	464	2 366	16 996	5 921	2 065	20 428	1 913	2 850	498	3 408	8 599	2 977	452	113 547
Ontario	642	42 993	7	5 036	1 140	15 884	3 832	431	5 592	1 044	1 073	89	3 538	5 179	674	888	87 393
Manitoba	111	10 855	-	-	1 060	2 568	2 187	830	106	1 373	84	10	-	3 620	149	5	22 847
Saskatchewan	112	13 947	1	679	506	1 791	1 925	194	10 965	755	4 395	1	779	5 197	2 213	227	43 573
Alberta	8	1 935	135	1 715	833	1 298	1 209	1 142	235	883	664	168	-	2 158	2 214	284	14 739
British Columbia	106	8 555	7	539	1 054	5 679	769	67	13 147	499	4 045	232	575	3 077	1 921	1 152	41 310
Yukon	11	2 642	5	969	2 207	3 028	424	388	813	194	83	10	122	1 563	226	77	12 744
Northwest Territories	95	14 285	15	11 729	7 151	2 266	2 260	3 162	5 128	1 884	14 131	184	390	13 090	5 332	3 132	84 123
Nunavut	79	12 573	1	1 235	3 414	7 282	2 961	1 095	1 170	413	1 270	-	200	3 692	1 958	133	37 397
Total	2 277	177 980	189	22 729	20 582	61 413	26 526	9 710	58 087	10 599	29 976	1 301	9 540	50 226	18 526	7 152	504 348
Percentage of grand total	n.a.	35.3	n.a.	4.5	4.1	12.2	5.3	1.9	11.5	2.1	5.9	0.3	1.9	10.0	3.7	1.4	100.0

Source: Natural Resources Canada, from a federal-provincial-territorial 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 DEVELOPMENT ACTIVITY,<sup>1</sup> BY PROVINCE AND TERRITORY, BY TYPE OF WORK, 1999**

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)							(\$000)						
Newfoundland	7	391	128	2 349	33	57	-	-	5 406	207	104	-	10	77	783	11	9 427
Nova Scotia	3	447	139	390	-	177	11	-	3 391	125	221	25	-	340	1 151	31	6 309
New Brunswick	136	5 562	212	8 380	31	31	578	-	25 848	-	-	-	59	88	200	40 778	
Quebec	230	16 469	31	1 839	109	2 355	28	-	263 342	27 984	14 142	-	2 750	21 390	9 277	631	360 316
Ontario	476	20 658	164	4 717	246	4 706	62	-	181 489	12	993	-	-	3 295	9 256	1	225 434
Manitoba	90	3 795	-	-	273	472	-	-	26 628	9 098	486	-	-	1 048	50	-	41 850
Saskatchewan	7	1 369	22	358	-	-	1 002	-	58 685	11 440	1 054	-	-	9 407	5 234	19	88 568
Alberta	2	173	37	1 079	-	117	10	-	23 999	174	312	37	54	3 681	2 169	42	31 845
British Columbia	76	6 044	107	5 406	574	1 268	-	-	18 592	-	3 677	-	195	1 481	2 747	495	40 479
Yukon	-	-	-	-	-	-	-	-	-	-	-	-	-	50	-	-	50
Northwest Territories	2	46	-	-	-	656	-	-	5 143	-	410	-	-	1 763	284	-	8 302
Nunavut	-	-	-	-	-	21	-	-	425	11	8	-	-	78	258	-	801
Total	1 027	54 955	839	24 518	1 265	9 859	1 691	-	612 948	49 051	21 407	62	3 009	42 671	31 297	1 428	854 160
Percentage of grand total	n.a.	6.4	n.a.	2.9	0.1	1.2	0.2	-	71.8	5.7	2.5	...	0.4	5.0	3.7	0.2	100.0

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

- Nil; . . . Amount too small to be expressed; n.a. Not applicable.

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

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



**TABLE 10. SUMMARY OF DRILLING ACTIVITY IN CANADA, 1999**

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	1 229 513	97.1	142 069	33.3	186 672	63.0	36 537	12.7	1 594 791
Underground	36 841	2.9	284 893	66.7	109 600	37.0	250 645	87.3	681 979
Subtotal	1 266 354	100.0	426 962	100.0	296 272	100.0	287 182	100.0	2 276 770
Percentage of off- plus on-mine-site diamond drilling	74.8		25.2		50.8		49.2		
Other drilling									
Surface	42 945	100.0	9 251	49.1	91 191	100.0	35 958	100.0	179 345
Underground	–	0.0	9 603	50.9	–	0.0	–	0.0	9 603
Subtotal	42 945	100.0	18 854	100.0	91 191	100.0	35 958	100.0	188 948
Percentage of other drilling for off- plus on-mine-site	69.5		30.5		71.7		28.3		
Total	1 309 299		445 816		387 463		323 140		2 465 718

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

– Nil.

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, 1999**

Province/Territory	Metals					Nonmetals	Diamonds	Coal	Total
	Base	Precious	Iron	Uranium	Other				
	(000 metres)								
Newfoundland	53	34	–	–	18	17	–	–	122
Nova Scotia	...	3	1	–	1	11	–	–	17
New Brunswick	45	20	–	–	–	3	–	–	68
Quebec	153	491	50	–	2	6	1	–	704
Ontario	89	145	–	–	2	2	8	–	245
Manitoba	71	7	–	–	1	–	–	–	79
Saskatchewan	36	12	...	62	1	–	1	–	112
Alberta	–	1	–	–	...	–	7	135	144
British Columbia	26	45	–	–	1	4	–	5	81
Yukon	3	11	–	–	–	–	–	2	15
Northwest Territories	3	3	–	–	1	–	103	–	110
Nunavut	18	44	–	1	1	–	13	–	77
Total	496	817	51	63	28	44	133	142	1 774

Source: Natural Resources Canada, from a federal-provincial-territorial 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. 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, 1999**

Province/Territory	Metals					Nonmetals	Diamonds	Coal	Total
	Base	Precious	Iron	Uranium	Other				
(000 metres)									
Newfoundland	–	–	–	–	–	–	–	–	–
Nova Scotia	–	–	–	–	–	–	–	–	–
New Brunswick	10	6	–	–	–	–	–	–	17
Quebec	45	151	–	–	–	8	–	–	204
Ontario	80	317	–	–	7	–	–	–	404
Manitoba	31	–	–	–	–	–	–	–	31
Saskatchewan	..	–	–	1	–	–	–	–	1
Alberta	–	–	–	–	–	–	–	–	–
British Columbia	4	25	–	–	–	3	–	–	31
Yukon	–	–	–	–	–	–	–	–	–
Northwest Territories	–	–	–	–	–	–	–	–	–
Nunavut	2	1	–	–	–	–	–	–	3
<b>Total</b>	<b>173</b>	<b>500</b>	<b>–</b>	<b>1</b>	<b>7</b>	<b>11</b>	<b>–</b>	<b>–</b>	<b>692</b>

Source: Natural Resources Canada, from a federal-provincial-territorial 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. 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, 1999**

Mineral Commodity	1998 Expenditures	1999 as % of 1998 Expenditures	1999 Expenditures			Percentage of Canadian Total
			On-Mine-Site	Off-Mine-Site	On-Mine-Site Plus Off-Mine-Site	
	(\$ millions)	(%)	(\$ millions)			(%)
Base metals <sup>2</sup>	192.1	72.5	23.7	115.7	139.3	27.6
Precious metals <sup>3</sup>	243.0	74.5	60.8	120.2	181.0	35.9
Iron ore	0.1	3 187.1	–	4.4	4.4	0.9
Uranium	51.5	68.3	–	35.2	35.2	7.0
Other metals	23.7	65.6	0.7	14.8	15.5	3.1
Nonmetals	12.8	93.3	0.8	11.1	12.0	2.4
Diamonds	119.1	91.3	–	108.7	108.7	21.6
Coal	13.2	62.4	0.8	7.4	8.2	1.6
Unspecified mineral commodities	0.4	–	–	–	–	–
<b>Total</b>	<b>655.9</b>	<b>76.9</b>	<b>86.8</b>	<b>417.6</b>	<b>504.3</b>	<b>100.0</b>

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

– Nil.

<sup>1</sup> Includes field work, overhead, engineering, economic and pre- or production feasibility studies, environmental and land access costs. <sup>2</sup> Includes copper, nickel, lead and zinc. <sup>3</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, 1999**

Province/Territory	Metals					Nonmetals	Diamonds	Coal	Total
	Base	Precious	Iron	Uranium	Other				
(\$000)									
Newfoundland	12 717	4 677	11	–	3 841	677	27	–	21 950
Nova Scotia	187	290	167	–	360	2 803	–	5	3 812
New Brunswick	5 713	2 467	–	–	–	233	–	–	8 413
Quebec	34 000	35 486	4 000	314	1 500	1 702	1 220	–	78 222
Ontario	20 915	37 343	15	–	961	286	7 756	–	67 277
Manitoba	16 424	1 879	–	–	675	16	410	–	19 404
Saskatchewan	1 659	1 695	157	13 451	157	–	858	113	18 090
Alberta	8	605	–	–	160	2	7 813	2 264	10 850
British Columbia	7 029	12 114	–	–	215	438	–	1 301	21 097
Yukon	2 365	8 708	–	–	115	96	–	449	11 734
Northwest Territories	1 490	1 765	–	192	232	–	24 206	–	27 885
Nunavut	7 970	7 580	–	435	282	–	9 658	–	25 926
<b>Total</b>	<b>110 476</b>	<b>114 610</b>	<b>4 350</b>	<b>14 392</b>	<b>8 499</b>	<b>6 253</b>	<b>51 948</b>	<b>4 132</b>	<b>314 660</b>

Source: Natural Resources Canada, from a federal-provincial-territorial 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 13b. DEPOSIT APPRAISAL EXPENDITURES,<sup>1</sup> BY PROVINCE AND TERRITORY, BY MINERAL COMMODITY SOUGHT, 1999**

Province/Territory	Metals					Nonmetals	Diamonds	Coal	Total
	Base	Precious	Iron	Uranium	Other				
(\$000)									
Newfoundland	5 351	8	13	—	2 675	1 309	—	—	9 355
Nova Scotia	201	105	39	—	143	959	—	—	1 446
New Brunswick	1 020	680	—	—	—	—	—	—	1 700
Quebec	5 135	26 128	—	—	2 596	1 466	—	—	35 325
Ontario	3 305	15 494	—	—	1 103	214	—	—	20 117
Manitoba	3 292	69	—	—	32	50	—	—	3 443
Saskatchewan	4 617	—	—	20 800	—	66	—	—	25 483
Alberta	—	—	—	—	—	13	—	3 875	3 888
British Columbia	5 209	13 126	—	—	35	1 641	—	201	20 213
Yukon	348	661	—	—	—	—	—	—	1 010
Northwest Territories	96	232	—	—	443	—	55 466	—	56 237
Nunavut	277	9 873	—	—	—	—	1 321	—	11 471
<b>Total</b>	<b>28 851</b>	<b>66 376</b>	<b>52</b>	<b>20 800</b>	<b>7 027</b>	<b>5 718</b>	<b>56 787</b>	<b>4 076</b>	<b>189 688</b>

Source: Natural Resources Canada, from a federal-provincial-territorial 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 13c. EXPLORATION PLUS DEPOSIT APPRAISAL EXPENDITURES,<sup>1</sup> BY PROVINCE AND TERRITORY, BY MINERAL COMMODITY SOUGHT, 1999**

Province/Territory	Metals					Nonmetals	Diamonds	Coal	Total
	Base	Precious	Iron	Uranium	Other				
(\$000)									
Newfoundland	18 067	4 685	24	—	6 516	1 986	27	—	31 305
Nova Scotia	387	395	206	—	503	3 761	—	5	5 258
New Brunswick	6 733	3 147	—	—	—	233	—	—	10 113
Quebec	39 135	61 614	4 000	314	4 096	3 168	1 220	—	113 547
Ontario	24 221	52 837	15	—	2 064	500	7 756	—	87 393
Manitoba	19 716	1 948	—	—	707	66	410	—	22 847
Saskatchewan	6 276	1 695	157	34 251	157	66	858	113	43 573
Alberta	8	605	—	—	160	15	7 813	6 139	14 739
British Columbia	12 238	25 240	—	—	250	2 080	—	1 502	41 310
Yukon	2 714	9 370	—	—	115	96	—	449	12 744
Northwest Territories	1 586	1 998	—	192	674	—	79 672	—	84 123
Nunavut	8 247	17 453	—	435	282	—	10 979	—	37 397
<b>Total</b>	<b>139 328</b>	<b>180 986</b>	<b>4 401</b>	<b>35 193</b>	<b>15 526</b>	<b>11 971</b>	<b>108 735</b>	<b>8 208</b>	<b>504 348</b>

Source: Natural Resources Canada, from a federal-provincial-territorial 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 13d. MINE DEVELOPMENT EXPENDITURES,<sup>1</sup> BY PROVINCE AND TERRITORY, BY MINERAL COMMODITY SOUGHT, 1999**

Province/Territory	Metals					Nonmetals	Diamonds	Coal	Total
	Base	Precious	Iron	Uranium	Other				
(\$000)									
Newfoundland	—	1 470	7 510	—	—	447	—	—	9 427
Nova Scotia	—	—	—	—	—	2 650	—	3 659	6 309
New Brunswick	23 238	14 763	—	—	—	2 777	—	—	40 778
Quebec	118 213	86 323	93 484	—	14 761	47 535	—	—	360 316
Ontario	66 185	153 324	—	—	2 488	3 438	—	—	225 434
Manitoba	33 684	7 817	—	—	233	116	—	—	41 850
Saskatchewan	4 863	4 000	—	75 084	—	4 275	—	346	88 568
Alberta	—	—	—	—	17	639	—	31 188	31 845
British Columbia	1 951	1 104	—	—	4 188	703	—	32 534	40 479
Yukon	17	33	—	—	—	—	—	—	50
Northwest Territories	—	8 072	—	—	—	—	230	—	8 302
Nunavut	615	186	—	—	—	—	—	—	801
<b>Total</b>	<b>248 765</b>	<b>277 092</b>	<b>100 994</b>	<b>75 084</b>	<b>21 687</b>	<b>62 580</b>	<b>230</b>	<b>67 728</b>	<b>854 160</b>

Source: Natural Resources Canada, from a federal-provincial-territorial 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.

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

**TABLE 14a. EXPLORATION EXPENDITURES,<sup>1</sup> BY TYPE OF COMPANY AND MINERAL COMMODITY, 1999**

Type of Company	Metals					Nonmetals	Diamonds	Coal	Total
	Base	Precious	Iron	Uranium	Other				
(\$000)									
1. Companies with a producing mine in Canada	59 178	58 373	4 000	10 896	1 259	1 883	7 799	3 672	147 060
2. Affiliates of group 1	14 509	5 878	–	–	3 258	–	10 198	–	33 844
3. Oil companies	222	652	–	–	–	–	–	–	874
4. Foreign companies (excluding group 3)	3 057	3 163	–	–	–	–	19 738	–	25 958
5. Junior companies and prospectors	29 514	40 139	298	3 343	3 883	4 151	10 892	460	92 680
6. Other companies	3 996	6 404	51	153	99	220	3 321	–	14 245
Total all classes	110 476	114 610	4 350	14 392	8 499	6 253	51 948	4 132	314 660

Source: Natural Resources Canada, from a federal-provincial-territorial 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, 1999**

Type of Company	Metals					Nonmetals	Diamonds	Coal	Total
	Base	Precious	Iron	Uranium	Other				
(\$000)									
1. Companies with a producing mine in Canada	10 540	43 984	–	–	756	566	–	3 875	59 721
2. Affiliates of group 1	6 921	155	–	20 800	2 675	–	23 842	–	54 394
3. Oil companies	–	–	–	–	–	–	–	191	191
4. Foreign companies (excluding group 3)	1 075	7 349	–	–	–	147	16 450	–	25 021
5. Junior companies and prospectors	10 301	14 558	52	–	3 018	4 064	16 495	10	48 498
6. Other companies	15	330	–	–	578	941	–	–	1 863
Total all classes	28 851	66 376	52	20 800	7 027	5 718	56 787	4 076	189 688

Source: Natural Resources Canada, from a federal-provincial-territorial 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, 1999**

Type of Company	Metals					Nonmetals	Diamonds	Coal	Total
	Base	Precious	Iron	Uranium	Other				
(\$000)									
1. Companies with a producing mine in Canada	69 718	102 357	4 000	10 896	2 014	2 449	7 799	7 547	206 781
2. Affiliates of group 1	21 430	6 033	–	20 800	5 933	–	34 040	–	88 237
3. Oil companies	222	652	–	–	–	–	–	191	1 065
4. Foreign companies (excluding group 3)	4 131	10 512	–	–	–	147	36 188	–	50 979
5. Junior companies and prospectors	39 815	54 697	350	3 343	6 901	8 215	27 387	470	141 177
6. Other companies	4 011	6 734	51	153	677	1 160	3 321	–	16 108
Total all classes	139 328	180 986	4 401	35 193	15 526	11 971	108 735	8 208	504 348

Source: Natural Resources Canada, from a federal-provincial-territorial 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 15a. EXPLORATION EXPENDITURES<sup>1</sup> BY PROVINCE AND TERRITORY, BY TYPE OF COMPANY, 1999**

Province/Territory	(1) Companies With a Producing Mine in Canada	(2) Affiliates of (1)	(3) Oil Companies	(4) Foreign Companies Excluding (3)	(5) Junior Companies and Prospectors	(6) Other Companies	Total
(\$000)							
Newfoundland	1 026	11 861	–	548	8 415	100	21 950
Nova Scotia	126	–	–	–	3 520	166	3 812
New Brunswick	6 983	–	–	5	1 400	25	8 413
Quebec	42 483	486	25	942	25 757	8 529	78 222
Ontario	43 484	1 644	20	8 897	12 604	628	67 277
Manitoba	12 416	3 266	–	125	2 490	1 108	19 404
Saskatchewan	11 238	869	–	843	4 744	397	18 090
Alberta	2 258	971	–	5 476	1 914	233	10 850
British Columbia	10 603	2 252	–	309	7 934	–	21 097
Yukon	1 130	2 513	–	416	7 672	3	11 734
Northwest Territories	7 741	6 107	–	3 977	7 024	3 037	27 885
Nunavut	7 571	3 876	829	4 422	9 208	20	25 926
<b>Total</b>	<b>147 060</b>	<b>33 844</b>	<b>874</b>	<b>25 958</b>	<b>92 680</b>	<b>14 245</b>	<b>314 660</b>

Source: Natural Resources Canada, from a federal-provincial-territorial 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, 1999**

Province/Territory	(1) Companies With a Producing Mine in Canada	(2) Affiliates of (1)	(3) Oil Companies	(4) Foreign Companies Excluding (3)	(5) Junior Companies and Prospectors	(6) Other Companies	Total
(\$000)							
Newfoundland	137	8 026	–	30	1 163	–	9 355
Nova Scotia	–	–	–	–	1 446	–	1 446
New Brunswick	1 700	–	–	–	–	–	1 700
Quebec	30 844	–	–	1 011	1 969	1 501	35 325
Ontario	16 575	155	–	1 117	1 955	315	20 117
Manitoba	1 706	1 571	–	–	166	–	3 443
Saskatchewan	18	20 800	–	–	4 665	–	25 483
Alberta	3 888	–	–	–	–	–	3 888
British Columbia	3 734	–	191	–	16 270	18	20 213
Yukon	377	–	–	–	632	–	1 010
Northwest Territories	405	23 842	–	16 450	15 510	30	56 237
Nunavut	337	–	–	6 413	4 721	–	11 471
<b>Total</b>	<b>59 721</b>	<b>54 394</b>	<b>191</b>	<b>25 021</b>	<b>48 498</b>	<b>1 863</b>	<b>189 688</b>

Source: Natural Resources Canada, from a federal-provincial-territorial 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, 1999**

Province/Territory	(1) Companies With a Producing Mine in Canada	(2) Affiliates of (1)	(3) Oil Companies	(4) Foreign Companies Excluding (3)	(5) Junior Companies and Prospectors	(6) Other Companies	Total
(\$000)							
Newfoundland	1 163	19 887	–	578	9 577	100	31 305
Nova Scotia	126	–	–	–	4 966	166	5 258
New Brunswick	8 683	–	–	5	1 400	25	10 113
Quebec	73 328	486	25	1 953	27 726	10 030	113 547
Ontario	60 059	1 799	20	10 014	14 560	943	87 393
Manitoba	14 122	4 836	–	125	2 656	1 108	22 847
Saskatchewan	11 256	21 669	–	843	9 409	397	43 573
Alberta	6 146	971	–	5 476	1 914	233	14 739
British Columbia	14 337	2 252	191	309	24 204	18	41 310
Yukon	1 508	2 513	–	416	8 304	3	12 744
Northwest Territories	8 146	29 949	–	20 427	22 534	3 067	84 123
Nunavut	7 907	3 876	829	10 835	13 930	20	37 397
<b>Total</b>	<b>206 781</b>	<b>88 237</b>	<b>1 065</b>	<b>50 979</b>	<b>141 177</b>	<b>16 108</b>	<b>504 348</b>

Source: Natural Resources Canada, from a federal-provincial-territorial 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 16. GENERALIZED MODEL OF THE MINERAL RESOURCE DEVELOPMENT AND MINING PROCESS

PHASE	MINERAL RESOURCE ASSESSMENT	MINERAL EXPLORATION					MINERAL DEPOSIT APPRAISAL				MINE COMPLEX DEVELOPMENT	MINE PRODUCTION	ENVIRONMENTAL RESTORATION
		GRASSROOTS EXPLORATION					DA-1	DA-2	DA-3	DA-4			
STAGE	MRA	EX-1	EX-2	EX-3	EX-4	EX-5	DA-1	DA-2	DA-3	DA-4	MCD	MP	ER
		Various surveys, research and synthesis.	Exploration planning.	Regional reconnaissance and surveys.	Prospecting and ground surveys of anomalies.	Verification of anomalies and showings.	Discovery and delimitation of a mineral deposit.	Mineral deposit definition.	Project engineering.	Project economics.	Feasibility study, production decision.	Mine development, construction of processing plant and infrastructure.	Production, marketing and renewal of reserves.
OBJECTIVES	Supply information and tools required to develop the mineral potential of the nation for economic benefit, in the perspective of sustainable development.	Select target commodities. Establish exploration objectives and strategies. Select target areas and sites. Acquire claims or permits if appropriate.	Seek anomalies of interest over wide areas by various survey methods. Select the more promising targets. Acquire claims or permits.	Confirm the presence, exact location and characteristics of anomalies. Acquire claims, leases and properties.	Investigate the cause of anomalies. Find mineral showings. Acquire additional claims, leases and properties.	Discover, delimit and interpret grade quality and tonnage of a new mineral deposit. Determine if it constitutes a mineral resource of "potential economic interest", to justify more intensive and detailed work.	Define the limits, controls and internal distribution of grades, mineralogy and mineral processing characteristics of the deposit. Acquire all data required for project engineering and cost estimation.	Determine, in an iterative fashion, the design, plans, schedules, capital cost and operating cost estimates for all aspects of the project. Establish technical feasibility and costs thoroughly and realistically.	Obtain all the information required and determine, based on corporate objectives, parameters for the economic, financial and social-political evaluation of the project.	Diligently validate and integrate project data, interpretations, estimations, plans and evaluations to achieve MCD and production objectives. Decide on whether to undertake the mining project. Obtain permits and financing.	Complete mine development and construction on schedule and within budgets and specifications. Ensure efficient and timely mine complex start-up according to schedule, specifications and cash flow forecasts.	Achieve commercial production on schedule and meet cash flow forecasts and quality specifications. Achieve mine profitability and company survival in the perspective of sustainable development.	Restore mine site, outside plant and infrastructure to environmentally acceptable condition. Ensure the future quality of the environment.
EVALUATION METHODS	Geoscientific, mineral and economic surveys, research, compilations and synthesis by governments, research institutes, universities and industry.	Metal and mineral market research. Review of geological and ore deposit information and of the legal, fiscal and socio-political context in various areas.	Remote sensing, aerial photography and airborne geophysics. Prospecting, geology and geochemistry. Appraisal, rating and selection of anomalies.	Ground, geological, geochemical and geophysical prospecting and surveys. Compilation, appraisal and selection of significant anomalies.	Geological mapping and other surveys. Trenching, drilling and sampling. Appraisal of results, recommendations for further work, and selection of new targets.	Stripping, trenching, mapping, sampling, drilling and down-hole geophysics. Initial mineral processing tests. Environmental and site surveys. Mineral resource estimation and inventory.	Detailed mapping, sampling and drilling on surface or from underground. Systematic mineralogy and mineral processing tests. Detailed environmental and site surveys. Pre-feasibility studies.	Pilot tests, engineering design and planning. Capital and operating costs for mining, mineral processing, infrastructure, environmental protection and restoration. Technical risk analysis. Pre-feasibility studies.	Market, prices, product development and financial studies. Environmental, economic, financial, and socio-political risk analysis. Pre-feasibility studies.	Exhaustive due diligence review of all data, interpretations, plans and estimates. Evaluation of profitability, given the geological, technical, financial and qualitative risks, and the up-side factors.	Project management methods in a quality assurance perspective. Training program for personnel and detailed start-up plan to meet the requirements of this demanding period.	Production management methods to ensure continuous quality and efficiency improvements. Exploration, deposit appraisal and development of new zones or deposits on-mine-site and off-mine-site.	Mine closure and decommissioning. Environmental restoration and monitoring.
RESULTS	Maps, data bases, tools and models.	Exploration projects.	Regional anomalies.	Local anomalies.	Mineral showings.	Mineral deposit.	Deposit appraisal project.			Mining project.	Mining complex.	Mineral production.	Restored site.
MINERAL INVENTORY	UNDISCOVERED MINERAL POTENTIAL					INFERRED RESOURCE	DELIMITED MINERAL RESOURCE				MINERAL RESERVE		
	SPECULATIVE		HYPOTHETICAL				INDICATED	INDICATED AND MEASURED			PROVEN AND PROBABLE		
ESTIMATION ERROR (targeted margin of error of tonnage/grade estimates at the 90% confidence level)						± 100%	± 50%	Indicated: ± 50 to ± 30% Measured: ± 20 to ± 10% (often several sample grid dimensions are used in each category)			Proven (feasibility: ± 10%; mining: ± 5%)		
INVESTMENTS	Moderate	Low, but increasing multiple investments.				Larger and increasing multiple investments.				Very large industrial investment.		Full compliance	
RISK LEVEL	Low	Very high, but decreasing risk of failure and financial loss.				High, but decreasing risk of failure.				Moderate to low industrial risk.			

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 and 5. Revised by M. Vallée and G. Bouchard, January 2001.