

R082
8C214
Nov. '88

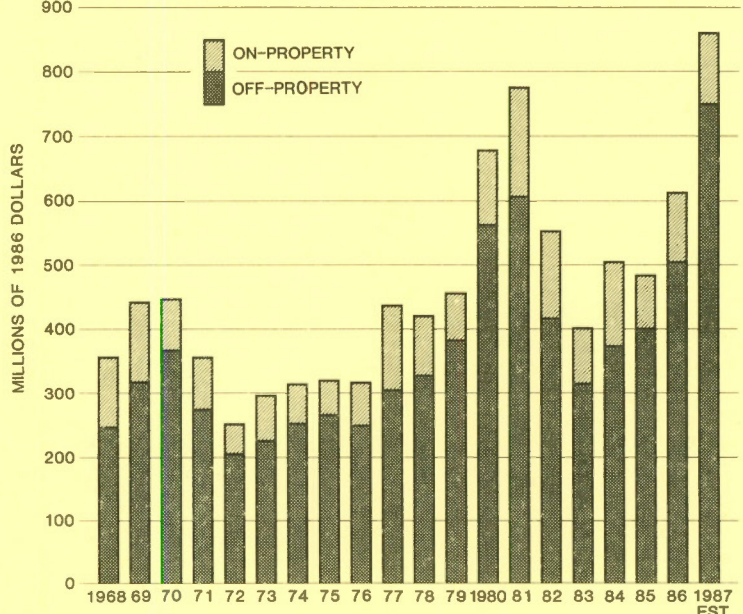
THE CANADIAN MINERAL INDUSTRY

MONTHLY REPORT

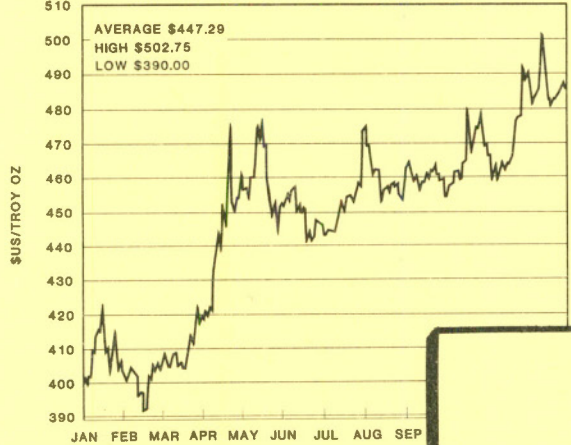
NOVEMBER 1988

LIBRARY / BIBLIOTHEQUE
JAN 23 1989
CENTRAL SURVEY
COMMISSION GEOLOGIQUE

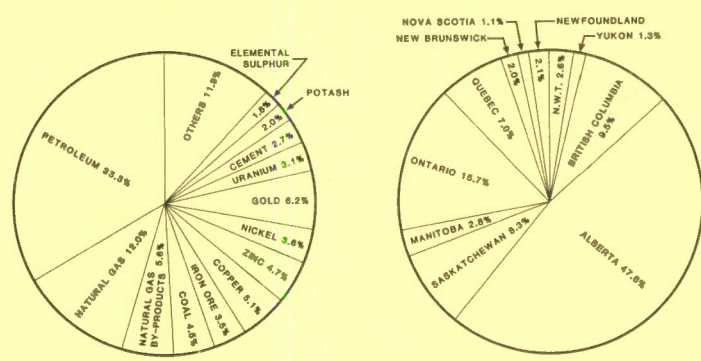
ANNUAL FIELD EXPENDITURES ON
OFF- AND ON-PROPERTY MINERAL EXPLORATION
IN CANADA



DAILY GOLD PRICES 1987
AVERAGE FIXES LONDON GOLD MARKET



CANADA, MINERAL PRODUCTION, 1987



This document was produced
by scanning the original publication.

Ce document est le produit d'une
numérisation par balayage
de la publication originale.

ISSN 0229-1908

THE CANADIAN MINERAL INDUSTRY

MONTHLY REPORT



**Energy, Mines and
Resources Canada**

**Énergie, Mines et
Ressources Canada**

PREFACE

This publication is prepared in the Mineral Policy Sector of the Department of Energy, Mines and Resources. It is compiled from many sources using the best information available to us. This report is intended to be a general review of the more important current developments that affect, or may affect the Canadian mineral industry. It should not be considered an authority for exact quotation or an expression of the official views of the Government of Canada.

Mineral Policy Sector
Department of Energy, Mines and Resources
580 Booth Street
Ottawa, Ontario K1A 0E4

CONTENTS

| | Page |
|----------------------------------------------------------------------------------------------|------|
| HIGHLIGHTS | 1 |
| ECONOMIC TRENDS | 2 |
| EMPLOYMENT TRENDS | 17 |
| METALLIC MINERALS AND PRODUCTS | 19 |
| Aluminum | 19 |
| Copper | 20 |
| Gold | 21 |
| Lead | 21 |
| Nickel | 22 |
| INDUSTRIAL MINERALS AND PRODUCTS | 23 |
| Cement | 23 |
| Gypsum | 23 |
| SPECIAL ITEMS | 24 |
| Concentrator Capacity Utilization at Canadian Base-Metal and Precious-Metal Mines in 1987 | 24 |
| Electronic Materials | 25 |
| Exploration for Platinum-Group Metals | 25 |
| Production-Sustaining Investment at Mines Sites | 26 |
| United Nations Conference on Trade and Development | 31 |

LIST OF TABLES

| | |
|--------------------------------------------------------------------------------------------------|----|
| 1. Canada, Production of Leading Minerals | 3 |
| 2. Canada, Real Gross Domestic Product at Factor Cost by Industry in 1981 Prices, Monthly | 4 |
| 3. Metal Prices, 1988 | 5 |
| 4. Canada, Crude Minerals Transported by Canadian Railways, 1984-86 | 6 |
| 5. Canada, Fabricated Mineral Products Transported by Canadian Railways, 1984-86 | 7 |
| 6. Canada, Crude and Fabricated Minerals Transported by Canadian Railways, 1956-86 | 8 |
| 7. Canada, Crude and Fabricated Minerals Transported Through the St. Lawrence Seaway, 1985-87 | 9 |
| 8. Canada, Crude and Fabricated Minerals Transported Through the St. Lawrence Seaway, 1957-87 | 10 |
| 9. Canada, Crude Minerals Loaded and Unloaded in Coastwise Shipping, 1987 | 11 |

| | Page |
|------------------------------------------------------------------------------------------------------------------------|------|
| 10. Canada, Fabricated Minerals Loaded and Unloaded in Coastwise Shipping, 1987 | 12 |
| 11. Canada, Crude and Fabricated Minerals Loaded at Canadian Ports in Coastwise Shipping, 1957-87 | 13 |
| 12. Canada, Crude Minerals Loaded and Unloaded at Canadian Ports in International Shipping Trade, 1985-87 | 14 |
| 13. Canada, Fabricated Mineral Products Loaded and Unloaded at Canadian Ports in International Shipping Trade, 1985-87 | 15 |
| 14. Canada, Crude and Fabricated Minerals Loaded at Canadian Ports in International Shipping Trade, 1957-87 | 16 |

THE CANADIAN MINERAL INDUSTRY FOR NOVEMBER

The following constitutes a brief summary of the Canadian mineral industry based on information that became available in November.

HIGHLIGHTS

1. Aluminum prices remained strong, with continuing buoyant demand and low inventory levels. The average LME cash price in November for high grade metal was US\$1.106/lb.
2. Alcan Aluminium Limited announced on November 24 that it was proceeding immediately with the construction of the fourth and final phase of its new 200 000 t/y aluminum smelter at Laterrière, Quebec.
3. Aluminerie de Bécancour Inc. (A.B.I.) was reported to be proceeding with a 50% expansion to its Quebec smelter.
4. Copper prices averaged US\$149.8¢/lb. on the LME during the month of November, while the COMEX price averaged about US\$152.3¢/lb. Between October 21 and November 25, the combined LME and COMEX stocks decreased from 89 168 t to 71 481 t.
5. Gold prices increased to US\$420/oz. from US\$406/oz. during the month of November. Much of this increase can be attributed to the drop in value of the US dollar on world money markets.
6. Lead prices on the LME rose from an average of US\$29.7¢/lb. in October to US\$31.3¢/lb. in November.
7. Nickel prices averaged US\$6.07/lb. (LME cash price) during November.
8. Hudson Bay Mining and Smelting Co., Limited (HBMS) and Outokumpu Oy officially opened the Namew Lake nickel-copper mine near Flin Flon, Manitoba on November 15. The mine and mill complex is expected to reach full production in the second quarter of 1989.
9. Miron Inc., a major cement producer in Quebec, announced plans to proceed with a \$100 million project to develop a new limestone quarry and cement plant to produce 600 000 t/y of cement, at Grondines.
10. Louisiana-Pacific Corporation, of Portland, Oregon, announced that it will build a \$65 million fibre-gypsum plant on Cape Breton Island.

ECONOMIC TRENDS

Table 1 provides a comparison of the volume of production of Canada's leading minerals for the months of August and September 1988, the corresponding months last year, as well as the year-to-date totals.

In the metals group: copper, gold, iron ore, nickel, silver and zinc showed gains in production during the first nine months of 1988 compared to last year. Lead, molybdenum and uranium experienced decreases in production on a year-to-date basis.

In the nonmetals group: asbestos, potash, lime and salt showed gains in production for the first nine months of 1988 compared to last year. Clay products, gypsum and cement experienced decreases on a year-to-date basis.

Table 2 provides information on Canada's Gross Domestic Product at factor cost by industry at 1981 prices. The data is also annualized and seasonally adjusted.

The annual rate shown for any given month is calculated by multiplying the figure for that month by twelve. It is important to note, however, that if a particular month has been influenced by special factors such as a strike, the annualized data will reflect this bias.

Factor cost refers to output which is valued exclusive of excise taxes and duties, and provincial and municipal sales tax. Factor cost does, however, include subsidies and other taxes which are not a function of the level of output or sale.

Seasonally adjusted data represent time-series data from which the effects of repetitive and clearly defined seasonal fluctuations have been removed. Such a practice permits the isolation of trends in the economy which might otherwise be obscured. Seasonal factors include such items as climate, trade practices and social institutions such as Christmas and Easter.

The GDP data are subject to ongoing revision.

GDP at Factor Cost at 1981 prices increased by 0.2% in September, following a 0.6% gain in August and no gain in July. On a month-to-month basis, the average growth rate for the first nine months of 1988 was 0.3%. Output of goods producing industries increased by 0.3% in September, while services producing industries grew by 0.2%.

Table 3 shows the prices of selected metals for August and September, 1988.

The remaining tables, 4 through 14, deal with the transportation, and loading and unloading of crude and fabricated materials. Tables 4, 5 and 6 provide information specific to the transportation of minerals by Canadian railways, while Tables 7 and 8 deal with minerals transported through the St. Lawrence Seaway. These tables show that minerals continue to account for a significant portion of total freight revenues, both rail and marine. Tables 9 through 14 provide detailed data pertaining to the loading and unloading of crude and fabricated minerals in both coastwise and international shipping.

TABLE 1. CANADA, PRODUCTION OF LEADING MINERALS ('000 TONNES EXCEPT WHERE NOTED)

| | | | 1987 | | | 1988 | | | Percentage Changes | | |
|-----------------------------|------------------------|--|----------|----------------------|-------------------|-----------------------|-----------|-------------------|----------------------------------|-------------------------------|------------------------------|
| | | | August* | September | Total 9 Months | August | September | Total 9 Months | September 1988 September 1987 | September 1988 August 1988 | 1st 9 months 1988 1987 |
| Metals | | | | | | | | | | | |
| Copper | | | 60.5 | 63.8 | 548.6 | 57.7 | 56.0 | 549.4 | -12.2 | -2.9 | 0.1 |
| Gold | kg | | 9 883.5 | 10 906.0 | 82 626.3 | 10 549.2 ^r | 11 084.4 | 92 924.3 | 1.6 | 5.1 | 12.5 |
| Iron ore | | | 3 256.8 | 3 403.0 ^r | 25 933.7 | 3 495.8 | 3 376.9 | 28 378.7 | -0.8 | -3.4 | 9.4 |
| Lead | | | 42.4 | 53.6 | 297.4 | 41.1 ^r | 38.0 | 270.2 | -29.1 | -7.5 | -9.1 |
| Molybdenum | t | | 963.8 | 881.5 ^r | 9 373.3 | 1 069.1 ^r | 866.6 | 8 918.8 | -1.7 | -18.9 | -4.8 |
| Nickel | | | 11.1 | 17.8 | 138.2 | 13.7 | 17.8 | 140.1 | 0.0 | 29.9 | 1.4 |
| Silver | t | | 80.0 | 131.1 | 881.0 | 143.4 | 121.3 | 1 087.4 | -7.5 | -15.4 | 23.4 |
| Uranium ¹ | t | | 1 047.6 | 922.6 | 9 154.3 | 665.9 | 1 137.9 | 9 024.5 | 23.3 | 70.9 | -1.4 |
| Zinc | | | 126.0 | 131.1 | 916.4 | 167.7 ^r | 153.0 | 1 010.1 | 16.7 | -8.7 | 10.2 |
| Nonmetals | | | | | | | | | | | |
| Asbestos | | | 58.3 | 56.0 | 485.9 | 66.8 | 60.9 | 526.3 | 8.7 | -8.8 | 8.3 |
| Clay products | \$000 | | 18 067.0 | 18 507.3 | 156 933.7 | 15 785.8 | 17 744.0 | 137 658.0 | -4.1 | 12.4 | -12.3 |
| Gypsum | | | 852.4 | 929.0 | 6 880.4 | 734.5 ^r | 845.9 | 6 537.7 | -8.9 | 15.2 | -5.0 |
| Potash K ₂ O | | | 425.1 | 617.8 | 5 627.4 | 622.0 | 638.6 | 6 175.9 | 3.4 | 2.7 | 9.7 |
| Cement | | | 1 378.1 | 1 307.7 ^r | 9 490.3 | 1 291.6 | 1 307.7 | 9 332.0 | 0.0 | 1.2 | -1.7 |
| Lime | | | 180.5 | 189.2 | 1 695.9 | 210.3 ^r | 215.7 | 1 859.6 | 14.0 | 2.6 | 9.7 |
| Salt | | | 762.0 | 826.0 | 6 890.2 | 872.2 | 868.6 | 7 521.4 | 5.2 | -0.4 | 9.2 |
| Fuels | | | | | | | | | | | |
| Coal | | | 4 645.9 | 5 479.2 | 43 672.2 | 5 795.7 | .. | .. | .. | .. | .. |
| Natural gas | million m ³ | | 7 168.0 | 7 182.0 ^r | 69 190.0 | 8 508.0 | .. | .. | .. | .. | .. |
| Crude oil and equivalent | 000 m ³ | | 8 442.0 | 7 835.0 ^r | 70 226.0 | 8 608.0 | .. | .. | .. | .. | .. |

¹ Tonnes uranium (1 tonne U = 1.2999 short tons U₃O₈).

^r Revised; .. Not available.

**TABLE 2. CANADA, REAL GROSS DOMESTIC PRODUCT AT FACTOR COST BY INDUSTRY, IN 1981 PRICES, MONTHLY
(SEASONALLY ADJUSTED AT ANNUAL RATES)**

| Industry Sector | 1987 | 1988 | | Percentage Change | |
|------------------------------------------|--------------|-----------|-----------|-------------------|----------------------------------|
| | September | July | August | September | September 1988 September 1987 |
| | (\$ million) | | | | |
| Total Economy | 384 165.0 | 395 810.2 | 398 213.2 | 399 191.4 | 3.9 |
| Primary Industries | | | | | |
| Agriculture | 11 352.6 | 10 054.3 | 9 980.7 | 10 030.2 | -11.6 |
| Forestry | 2 983.8 | 2 818.9 | 2 741.2 | 2 621.2 | -12.2 |
| Fishing and Trapping | 666.2 | 681.4 | 620.6 | 667.4 | 0.2 |
| Mines, Quarries and Oil Wells | 22 740.3 | 24 346.4 | 23 993.1 | 23 807.8 | 4.7 |
| Mining Industries | 8 402.1 | 8 519.6 | 8 471.1 | 8 150.4 | -3.0 |
| Gold Mines | 1 427.4 | 1 446.6 | 1 444.2 | 1 432.2 | 0.3 |
| Iron Mines | 624.8 | 715.0 | 693.3 | 634.5 | 1.6 |
| Other Metal Mines | 4 168.5 | 4 070.0 | 4 009.9 | 3 762.4 | -9.7 |
| Nonmetal Mines | 801.1 | 871.6 | 886.0 | 923.2 | 15.2 |
| Asbestos Mines | 163.4 | 161.0 | 170.4 | 174.0 | 6.5 |
| Mineral Fuels | | | | | |
| Coal Mines | 1 107.7 | 1 146.2 | 1 136.5 | 1 102.9 | -0.4 |
| Crude Petroleum and Natural Gas | 12 590.6 | 14 025.6 | 13 827.6 | 13 977.6 | 11.0 |
| Secondary Industries | | | | | |
| Manufacturing | 75 075.0 | 77 505.3 | 78 976.8 | 79 208.1 | 5.5 |
| Non-durable Manufacturing | 32 718.1 | 33 400.4 | 33 334.1 | 33 375.3 | 2.0 |
| Durable Manufacturing | 42 356.9 | 44 104.9 | 45 642.7 | 45 832.8 | 8.2 |
| Primary Metal Industries | 6 174.3 | 6 186.1 | 6 496.7 | 6 343.8 | 2.7 |
| Primary Steel Industries | 2 497.6 | 2 423.3 | 2 567.0 | 2 529.9 | 1.3 |
| Steel, Pipe and Tube Industry | 352.5 | 328.7 | 371.5 | 372.6 | 5.7 |
| Iron Foundries | 363.9 | 375.6 | 356.4 | 340.8 | -6.3 |
| Smelting and Refining | 2 262.1 | 2 306.6 | 2 455.8 | 2 334.3 | 3.2 |
| Nonmetallic Mineral Products | 2 389.7 | 2 438.5 | 2 446.9 | 2 439.7 | 2.1 |
| Clay Products Industry | 81.5 | 80.4 | 79.2 | 84.0 | 3.1 |
| Cement Industry | 317.9 | 328.8 | 325.2 | 321.6 | 1.2 |
| Ready-mix Concrete Industry | 466.9 | 454.9 | 458.5 | 476.5 | 2.1 |
| Construction Industry | 26 713.3 | 27 446.4 | 27 842.4 | 28 524.0 | 6.8 |
| Transportation and Storage | 17 558.7 | 18 517.2 | 18 698.4 | 18 667.2 | 6.3 |
| Communications | 11 314.5 | 12 064.8 | 12 092.4 | 12 148.8 | 7.4 |
| Other Utilities | 11 071.0 | 11 470.8 | 11 534.4 | 11 317.2 | 2.2 |
| Wholesale Trade | 21 885.4 | 22 297.2 | 22 657.2 | 22 628.4 | 3.4 |
| Retail Trade | 24 873.5 | 25 683.8 | 25 651.3 | 25 941.1 | 4.3 |
| Finance, Insurance and Real Estate | 55 637.8 | 58 407.6 | 58 732.8 | 58 993.2 | 6.0 |
| Community, Business and Personal Service | 38 750.1 | 40 162.5 | 40 320.3 | 40 228.1 | 3.8 |

TABLE 3. METAL PRICES - 1988

| | August | September |
|-----------------------------------------------------------|---------|-----------|
| Copper | | |
| Electrolytic, U.S. producer f.o.b. refinery, cents (U.S.) | 100.051 | 114.720 |
| Electrolytic, COMEX, 1st pos. plus 5¢, cents (C.) | 123.910 | 142.567 |
| Electrolytic, Standard, LME cash, cents (U.S.) | 96.183 | 105.127 |
| Lead | | |
| New York, cents (U.S.) | 36.000 | 38.000 |
| Montreal, cents (C.) | 44.500 | 47.000 |
| LME cash, cents (U.S.) | 27.254 | 27.629 |
| Silver | | |
| New York, cents (U.S.) per troy oz. | 670.809 | 636.481 |
| Toronto, cents (C.) per troy oz. | 850.795 | 809.614 |
| LME cash, cents (U.S.) per troy oz. | 668.148 | 633.545 |
| Zinc | | |
| St. Louis, H.G., cents (U.S.) | 66.463 | 68.255 |
| Montreal, Electrolytic, cents (C.) | 78.000 | 85.000 |
| LME cash, cents (U.S.) | 59.345 | 60.298 |
| Tin | | |
| New York, Straits, cents (U.S.) | 342.701 | 344.906 |
| Metals Week, composite, cents (U.S.) | 457.702 | 463.050 |
| Gold | | |
| London, p.m., US\$ per troy oz. | 431.295 | 413.473 |
| Average, (Sharps Pixley) US\$ per troy oz. | 431.170 | 413.447 |
| High, (Sharps Pixley) US\$ per troy oz. | 434.600 | 430.400 |
| Low, (Sharps Pixley) US\$ per troy oz. | 425.800 | 395.300 |
| Mercury | | |
| US\$ per flask | 364.348 | 333.571 |
| Nickel | | |
| New York, Dealers, cathode (U.S.) | 6.554 | 5.207 |
| LME cash, US\$ | 6.435 | 5.389 |
| Antimony | | |
| New York, dealers, cents (U.S.) | 101.304 | 105.000 |
| Platinum | | |
| New York, refined, US\$ per troy oz. | 600.000 | 600.000 |
| Cadmium | | |
| New York, producers US\$ | 9.300 | N/A |
| Aluminum | | |
| LME cash, cents (C.) | 150.004 | 132.804 |
| LME cash, cents (U.S.) | 122.522 | 108.278 |
| Cobalt | | |
| Shot/cathode/250 kg., US\$ | 7.500 | 7.500 |
| U.S. spot cathode, US\$ | 6.970 | 7.025 |
| Tungsten | | |
| LMB ore, low, US\$/MTU | 50.200 | 52.750 |
| GSA domestic, US\$/MTU | -LPS- | -LPS- |
| Molybdenum | | |
| M.W. dealer oxide, US\$ | 3.408 | 3.495 |
| Uranium | | |
| Nuexco, US\$ U ₃ O ₈ | 14.750 | 14.150 |

Average U.S. Exchange Rate for August = 1.2243, September = 1.22651.

Note: Prices are per pound unless otherwise stated.

LPS List Price Suspended, N/A non applicable.

TABLE 4. CANADA, CRUDE MINERALS TRANSPORTED BY CANADIAN RAILWAYS, 1984-86

| | 1984 | 1985 | 1986 |
|---------------------------------------------------------|----------------|----------------|----------------|
| | (kilotonnes) | | |
| Metallic minerals | | | |
| Iron ores and concentrates | 35 269 | 39 197 | 36 688 |
| Nickel-copper ores and concentrates | 4 228 | 4 161 | 4 084 |
| Alumina and bauxite | 3 523 | 3 227 | 3 503 |
| Copper ores and concentrates | 1 495 | 1 467 | 1 357 |
| Zinc ores and concentrates | 1 693 | 1 452 | 993 |
| Lead ores and concentrates | 1 507 | 604 | 912 |
| Metallic ores and concentrates, n.e.s. | 41 | 73 | 10 |
| Nickel ores and concentrates | - | - | - |
| Total metallic minerals | 47 756 | 50 181 | 47 547 |
| Nonmetallic minerals | | | |
| Potash (KC1) | 10 937 | 9 891 | 10 266 |
| Sulphur, n.e.s. | 5 948 | 6 355 | 5 831 |
| Gypsum | 5 449 | 5 492 | 5 512 |
| Limestone, n.e.s. | 2 832 | 2 312 | 2 997 |
| Phosphate rock | 2 102 | 1 838 | 1 612 |
| Sand, industrial | 927 | 879 | 888 |
| Sulphur, liquid | 1 989 | 1 529 | 839 |
| Salt, rock | 819 | 650 | 799 |
| Clay | 607 | 632 | 790 |
| Sodium carbonate | 492 | 485 | 560 |
| Limestone, industrial | 264 | 418 | 455 |
| Sodium sulphate | 440 | 386 | 385 |
| Nepheline syenite | 274 | 241 | 242 |
| Sand, n.e.s. | 319 | 321 | 227 |
| Nonmetallic minerals, n.e.s. | 168 | 181 | 177 |
| Limestone, agricultural | 94 | 85 | 128 |
| Salt, n.e.s. | 102 | 101 | 101 |
| Stone, n.e.s. | 72 | 70 | 57 |
| Asbestos | 99 | 81 | 31 |
| Abrasives, natural | 33 | 20 | 17 |
| Barite | 23 | 13 | 14 |
| Silica | 12 | 11 | 14 |
| Peat and other mosses | 27 | 22 | 10 |
| Total nonmetallic minerals | 34 029 | 32 013 | 31 951 |
| Mineral fuels | | | |
| Coal, bituminous | 37 577 | 41 539 | 40 386 |
| Coal, lignite | 1 627 | 1 336 | 1 236 |
| Coal, n.e.s. | 85 | 54 | 63 |
| Natural gas and other crude bituminous substances | 28 | 37 | 31 |
| Oil, crude | 4 | 5 | 8 |
| Total mineral fuels | 39 321 | 42 971 | 41 724 |
| Total crude minerals | 121 106 | 125 165 | 121 223 |
| Total revenue freight moved by Canadian railways | 254 581 | 250 608 | 249 786 |
| Percent crude minerals of total revenue freight | 47.6 | 49.9 | 48.5 |

n.e.s. Not elsewhere specified; - Nil.

TABLE 5. CANADA, FABRICATED MINERAL PRODUCTS TRANSPORTED BY CANADIAN RAILWAYS, 1984-86

| | 1984 | 1985 | 1986 |
|----------------------------------------------------------------------|--------------|--------------------|---------|
| | (kilotonnes) | | |
| Metallic minerals products | | | |
| Ferrous mineral products | | | |
| Iron and steel scrap | 2 272 | 2 533 | 1 926 |
| Sheets and strips, steel | 1 022 | 1 072 | 829 |
| Ingots, blooms, billets, slabs of iron and steel | 1 064 | 907 | 804 |
| Bars and rods, steel | 705 | 715 | 683 |
| Structural shapes and sheet piling, iron and steel | 441 | 495 | 523 |
| Plates, steel | 430 | 426 | 350 |
| Pipes and tubes, iron and steel | 285 | 334 | 190 |
| Castings and forgings, iron and steel | 139 | 106 | 94 |
| Rails and railway track material | 94 | 59 | 62 |
| Pig iron | 65 | 22 | 59 |
| Ferroalloys | 48 | 43 | 48 |
| Other primary iron and steel | 27 | 29 | 33 |
| Wire, iron or steel | 12 | 8 ^r | 10 |
| Total ferrous mineral products | 6 604 | 6 749 ^r | 5 611 |
| Nonferrous mineral products | | | |
| Aluminum and aluminum alloy fabricated material, n.e.s. | 781 | 889 | 1 041 |
| Zinc and alloys | 504 | 536 | 483 |
| Aluminum paste, powder, pigs, ingots, shot | 160 | 273 | 457 |
| Copper and alloys, n.e.s. | 467 | 407 | 401 |
| Lead and alloys | 149 | 170 | 143 |
| Nonferrous metal scrap | 105 | 98 | 86 |
| Other nonferrous base metals and alloys | 177 | 177 ^r | 74 |
| Slag, dross, etc. | 116 | 99 | 55 |
| Copper matte and precipitates | 526 | 4 | 4 |
| Total nonferrous mineral products | 2 985 | 2 653 ^r | 2 744 |
| Total metallic mineral products | 9 589 | 9 402 | 8 355 |
| Nonmetallic mineral products | | | |
| Fertilizers and fertilizer materials, n.e.s. | 2 195 | 1 815 | 2 143 |
| Portland cement, standard | 1 409 | 1 687 | 1 665 |
| Sulphur acid | 1 322 | 1 422 | 1 490 |
| Gypsum basic products, n.e.s. | 198 | 254 | 357 |
| Cement and concrete basic products, n.e.s. | 188 | 164 | 258 |
| Nonmetallic mineral basic products, n.e.s. | 271 | 224 | 197 |
| Natural stone basic products, chiefly structural | 202 | 160 | 172 |
| Lime, hydrated and quick | 155 | 139 | 104 |
| Dolomite and magnesite, calcined | 78 | 77 | 76 |
| Glass basic products | 57 | 47 | 40 |
| Fire brick and similar shapes | 46 | 28 | 23 |
| Bricks and tiles, clay | 8 | 12 | 18 |
| Refractories, n.e.s. | 10 | 5 | 10 |
| Plaster | 5 | 9 ^r | 5 |
| Asbestos and asbestos-cement basic products | 3 | 3 ^r | 5 |
| Total nonmetallic mineral products | 6 147 | 6 046 | 6 563 |
| Mineral fuel products | | | |
| Refined and manufactured gases, fuel type | 2 711 | 2 825 | 2 333 |
| Diesel fuel | 1 967 | 1 690 | 1 430 |
| Gasoline | 1 273 | 1 077 | 949 |
| Coke, n.e.s. | 663 | 672 | 732 |
| Fuel oil, n.e.s. | 843 | 680 | 725 |
| Other petroleum and coal products | 694 | 701 | 685 |
| Petroleum coke | 516 | 521 | 408 |
| Asphalts and road oils | 306 | 374 | 347 |
| Lubricating oils and greases | 372 | 337 | 312 |
| Total mineral fuel products | 9 345 | 8 877 | 7 922 |
| Total fabricated mineral products | 25 081 | 24 325 | 22 841 |
| Total revenue freight moved by Canadian railways | 254 581 | 250 608 | 249 786 |
| Fabricated mineral products as a percentage of total revenue freight | 9.9 | 9.7 | 9.1 |

n.e.s. Not elsewhere specified; ^r Revised.

TABLE 6. CANADA, CRUDE AND FABRICATED MINERALS TRANSPORTED BY CANADIAN RAILWAYS, 1956-86

| | Total Revenue Freight | Total Crude Minerals | Total Fabricated Minerals | Total Crude and Fabricated Minerals | Crude and Fabricated Minerals as Percent of Revenue Freight |
|------------------|-----------------------------|-------------------------|---------------------------------|-------------------------------------------|-------------------------------------------------------------------|
| (million tonnes) | | | | | |
| 1956 | 172.0 | 68.7 | 21.8 | 90.5 | 52.6 |
| 1957 | 157.9 | 64.2 | 17.1 | 81.3 | 51.5 |
| 1958 | 139.2 | 52.4 | 15.2 | 67.6 | 48.6 |
| 1959 | 150.6 | 68.2 | 15.3 | 78.1 | 51.9 ^r |
| 1960 | 142.8 | 57.1 | 14.5 | 71.6 | 50.1 |
| 1961 | 138.9 | 54.1 | 13.6 | 67.7 | 48.7 |
| 1962 | 146.0 | 60.3 | 13.8 | 74.1 | 50.8 |
| 1963 | 154.6 | 62.9 | 15.5 | 78.4 | 50.6 |
| 1964 | 180.0 | 74.6 | 15.9 | 90.5 | 50.3 |
| 1965 | 186.2 | 80.9 | 17.3 | 98.2 | 52.7 |
| 1966 | 194.5 | 80.6 | 17.8 | 98.4 | 50.6 |
| 1967 | 190.0 | 81.2 | 17.7 | 98.9 | 52.1 |
| 1968 | 195.4 | 86.7 | 18.8 | 105.5 | 54.0 |
| 1969 | 189.0 | 81.9 | 27.6 | 109.5 | 57.9 |
| 1970 | 211.6 | 97.5 | 28.4 | 125.9 ^r | 59.5 ^r |
| 1971 | 214.5 | 95.6 | 27.4 | 123.0 | 57.3 |
| 1972 | 215.8 | 89.4 | 27.6 | 117.0 | 54.2 |
| 1973 | 241.2 | 113.1 | 29.1 | 142.2 | 59.0 |
| 1974 | 246.3 | 115.3 | 30.9 | 146.2 | 59.4 |
| 1975 | 226.0 | 110.6 | 26.6 | 137.2 | 60.7 |
| 1976 | 238.5 | 116.6 | 25.5 | 142.1 | 59.6 |
| 1977 | 247.2 | 121.1 | 25.7 | 146.8 | 59.4 |
| 1978 | 238.8 | 107.7 | 26.2 | 133.9 | 56.1 ^r |
| 1979 | 257.9 | 127.2 | 26.6 | 153.8 | 59.6 |
| 1980 | 254.4 | 124.8 | 24.6 | 149.4 | 58.7 |
| 1981 | 246.6 | 120.7 | 26.4 | 147.1 | 59.7 |
| 1982 | 212.5 | 95.7 | 21.0 | 116.7 | 54.9 |
| 1983 | 222.8 | 95.3 | 22.7 ^r | 118.0 ^r | 53.0 ^r |
| 1984 | 254.6 | 121.1 | 25.1 | 146.2 | 57.4 |
| 1985 | 250.6 | 125.2 | 24.3 | 149.5 | 59.7 |
| 1986 | 249.8 | 121.2 | 22.8 | 144.1 | 57.7 |

^r Revised.

TABLE 7. CANADA, CRUDE AND FABRICATED MINERALS TRANSPORTED THROUGH THE ST. LAWRENCE SEAWAY¹, 1985-87

| | Montreal - Lake Ontario Section | | | Welland Canal Section | | |
|--------------------------------------------------------|------------------------------------|------------|------------|--------------------------|------------|------------|
| | 1985 | 1986 | 1987 | 1985 | 1986 | 1987 |
| | (tonnes) | | | | | |
| Crude minerals | | | | | | |
| Iron ore | 8 679 210 | 8 026 080 | 9 557 376 | 6 788 799 | 5 839 484 | 6 180 641 |
| Coal | 607 108 | 609 619 | 233 756 | 5 807 694 | 5 775 521 | 5 644 283 |
| Salt | 657 494 | 874 520 | 928 559 | 1 521 180 | 1 882 656 | 1 766 446 |
| Other crude minerals | 976 405 | 1 008 788 | 1 176 688 | 479 778 | 588 905 | 731 820 |
| Stone, ground or crushed | 258 745 | 271 945 | 231 637 | 815 313 | 1 005 726 | 889 303 |
| Aluminum ores and concentrates | 200 890 | 196 830 | 169 584 | 198 890 | 175 508 | 136 984 |
| Clay and bentonite | 162 410 | 161 366 | 164 766 | 162 410 | 161 366 | 164 766 |
| Sand and gravel | 1 | 16 009 | - | 176 291 | 82 436 | 89 372 |
| Phosphate rock | 23 522 | 28 730 | 47 223 | - | - | - |
| Stone, rough | 302 | 203 | 21 | 302 | 182 | - |
| Potash | 122 886 | 192 435 | 55 098 | 252 732 | 262 357 | 83 312 |
| Total crude minerals | 11 688 973 | 11 386 525 | 12 564 708 | 16 203 389 | 15 774 141 | 15 686 927 |
| Fabricated mineral products | | | | | | |
| Iron and steel, manufactured | 2 798 848 | 2 922 806 | 2 633 980 | 2 407 431 | 2 385 475 | 2 197 601 |
| Coke | 802 266 | 867 412 | 654 432 | 921 887 | 993 268 | 822 061 |
| Scrap iron and steel | 635 622 | 740 276 | 344 352 | 753 927 | 782 966 | 372 318 |
| Fuel oil | 558 770 | 641 156 | 481 049 | 628 613 | 603 625 | 569 051 |
| Iron and steel, bars, rods, slabs | 791 144 | 615 469 | 972 396 | 675 205 | 455 565 | 469 961 |
| Cement | 175 111 | 152 616 | 242 758 | 309 120 | 347 060 | 549 874 |
| Gasoline | 111 419 | 206 107 | 167 472 | 141 601 | 186 564 | 97 982 |
| Other petroleum products | 84 179 | 110 263 | 181 447 | 76 295 | 114 252 | 136 429 |
| Pig iron | 103 610 | 96 925 | 124 355 | 89 263 | 71 730 | 104 815 |
| Tar, pitch and creosote | 35 892 | 39 222 | 22 946 | 69 324 | 54 810 | 49 030 |
| Lubricating oils and greases | 41 964 | 25 850 | 59 826 | 41 962 | 15 290 | 27 119 |
| Iron and steel, nails, wire | 13 229 | 10 527 | 8 027 | 12 287 | 9 030 | 6 951 |
| Total fabricated minerals | 6 152 054 ^r | 6 428 629 | 5 893 040 | 6 126 915 | 6 019 635 | 5 403 192 |
| Total crude and fabricated minerals | 17 841 027 | 17 815 154 | 18 457 748 | 22 330 304 | 21 793 776 | 21 090 119 |
| Total, all products | 37 321 698 | 37 581 808 | 39 968 615 | 41 851 760 | 41 612 770 | 42 724 755 |
| Crude and fabricated minerals as a percent of total | 47.8 | 47.4 | 46.2 | 53.4 | 52.4 | 49.4 |

¹ Total cargo transported regardless of travel direction.

- Nil; ^r Revised.

TABLE 8. CANADA, CRUDE AND FABRICATED MINERALS TRANSPORTED THROUGH THE ST. LAWRENCE SEAWAY¹, 1957-87

| | Montreal - Lake Ontario Section | | | | Welland - Canal Section | | | |
|------|---------------------------------|----------------------|---------------------------|----------------------------------------------------------|-------------------------|----------------------|---------------------------|----------------------------------------------------------|
| | Total All Products | Total Crude Minerals | Total Fabricated Minerals | Crude and Fabricated Minerals as Percent of All Products | Total All Products | Total Crude Minerals | Total Fabricated Minerals | Crude and Fabricated Minerals as Percent of All Products |
| | (kilotonnes) | | | | (kilotonnes) | | | |
| 1957 | 11 059 | 4 439 | 1 392 | 52.7 | 20 296 | 11 305 | 2 421 | 67.6 |
| 1958 | 10 670 | 3 064 | 1 020 | 38.3 | 19 300 | 8 994 | 2 107 | 57.5 |
| 1959 | 19 252 | 7 725 | 2 197 | 51.5 | 24 953 | 12 117 | 2 246 | 57.6 |
| 1960 | 18 460 | 5 760 | 2 904 | 46.9 | 26 563 | 12 679 | 2 606 | 57.5 |
| 1961 | 21 212 | 6 706 | 2 358 | 42.7 | 28 490 | 12 599 | 2 378 | 52.7 |
| 1962 | 23 271 | 7 531 | 2 522 | 43.2 | 32 215 | 15 625 | 2 342 | 55.8 |
| 1963 | 28 198 | 9 507 | 2 804 | 43.7 | 37 490 | 18 094 | 2 524 | 55.0 |
| 1964 | 35 701 | 13 127 | 3 558 | 46.7 | 46 644 | 23 489 | 3 095 | 57.0 |
| 1965 | 39 352 | 13 788 | 6 024 | 50.3 | 48 477 | 23 555 | 4 933 | 58.8 |
| 1966 | 44 538 | 16 376 | 6 340 | 51.0 | 53 648 | 25 712 | 5 329 | 57.8 |
| 1967 | 39 918 | 17 800 | 6 430 | 60.7 | 47 945 | 26 010 | 5 459 | 65.6 |
| 1968 | 43 496 | 19 312 | 8 425 | 63.8 | 52 712 | 29 075 | 7 587 | 69.6 |
| 1969 | 37 256 | 12 682 | 8 263 | 56.2 | 48 601 | 25 090 | 6 715 | 65.4 |
| 1970 | 46 445 | 15 554 | 8 932 | 52.7 | 57 121 | 27 233 | 7 156 | 60.2 |
| 1971 | 48 069 | 14 204 | 9 263 | 48.8 | 57 205 | 23 903 | 7 914 | 55.6 |
| 1972 | 48 607 | 13 425 | 9 837 | 47.9 | 58 146 | 24 808 | 7 701 | 55.9 |
| 1973 | 52 285 | 17 111 | 9 639 | 51.1 | 60 958 | 26 907 | 7 718 | 56.8 |
| 1974 | 40 049 | 16 137 | 7 018 | 57.8 | 47 500 | 23 952 | 5 437 | 61.9 |
| 1975 | 43 554 | 15 698 | 6 071 | 50.0 | 53 387 | 26 100 | 5 129 | 58.5 |
| 1976 | 49 348 | 20 884 | 7 181 | 56.9 | 58 368 | 29 914 | 6 323 | 62.1 |
| 1977 | 57 456 | 23 008 | 9 918 | 57.3 | 65 079 | 30 459 | 8 933 | 60.5 |
| 1978 | 51 658 | 15 057 | 8 558 | 45.7 | 59 576 | 22 700 | 7 759 | 51.1 |
| 1979 | 50 187 | 16 408 | 8 104 | 48.8 | 60 023 | 24 851 | 7 940 | 54.6 |
| 1980 | 42 142 | 12 248 | 6 009 | 43.3 | 54 074 | 20 487 | 5 405 | 57.9 |
| 1981 | 45 876 | 15 453 | 5 711 | 46.1 | 53 389 | 22 132 | 5 529 | 51.8 |
| 1982 | 38 841 | 9 146 | 4 997 | 36.4 | 44 474 | 15 057 | 4 333 | 45.9 |
| 1983 | 45 061 | 12 443 | 5 422 | 39.6 | 50 145 | 17 412 | 5 618 | 45.9 |
| 1984 | 47 505 | 14 009 | 6 980 | 44.2 | 53 917 | 20 312 | 7 052 | 50.8 |
| 1985 | 37 322 | 11 689 | 6 152 | 47.8 | 41 852 | 16 203 | 6 127 | 53.4 |
| 1986 | 37 582 | 11 387 | 6 429 | 47.4 | 41 613 | 15 774 | 6 020 | 52.4 |
| 1987 | 39 969 | 12 565 | 5 893 | 46.2 | 42 725 | 15 687 | 5 403 | 49.4 |

¹ Total cargo transported regardless of travel direction.

TABLE 9. CANADA, CRUDE MINERALS LOADED AND UNLOADED IN COASTWISE SHIPPING, 1987^P

| | Loaded | | | | Unloaded | | | |
|-------------------------------------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| | Atlantic | Great Lakes | Pacific | Total | Atlantic | Great Lakes | Pacific | Total |
| | (tonnes) | | | | | | | |
| Metallic minerals | | | | | | | | |
| Iron ore and concentrates | 6 200 950 | 70 052 | 998 | 6 272 000 | 1 429 432 | 4 841 570 | 998 | 6 272 000 |
| Titanium ore | 2 124 142 | - | - | 2 124 142 | 2 124 142 | - | - | 2 124 142 |
| Metallic ores and concentrates, n.e.s. | 339 | 40 503 | - | 40 842 | 339 | 40 503 | - | 40 842 |
| Zinc ore and concentrates | - | - | 15 317 | 15 317 | - | - | 15 317 | 15 317 |
| Total metals | 8 325 431 | 110 555 | 16 315 | 8 452 301 | 3 553 913 | 4 882 073 | 16 315 | 8 452 301 |
| Nonmetallic minerals | | | | | | | | |
| Limestone | 381 | 3 193 433 | 1 651 209 | 4 845 023 | 381 | 3 193 433 | 1 651 209 | 4 845 023 |
| Salt | 1 072 952 | 1 405 856 | - | 2 478 808 | 1 778 633 | 700 176 | - | 2 478 809 |
| Gypsum | 1 034 472 | - | 7 593 | 1 042 065 | 719 145 | 287 329 | 35 591 | 1 042 065 |
| Sand and gravel | 229 549 | 69 279 | 622 410 | 921 238 | 229 549 | 69 279 | 622 410 | 921 238 |
| Stone, crude, n.e.s. | 53 | 198 624 | 6 540 | 205 217 | 53 | 198 624 | 6 540 | 205 217 |
| Potash | 73 | 129 341 | - | 129 414 | 41 083 | 88 331 | - | 129 414 |
| Quartz-silica | 49 629 | 42 181 | 553 | 92 363 | 26 | 91 784 | 553 | 92 363 |
| Sulphur crude and refined | 5 566 | - | 3 988 | 9 554 | 5 566 | - | 3 988 | 9 554 |
| Crude nonmetallic minerals, n.e.s. | 449 | - | 336 | 785 | 449 | - | 336 | 785 |
| Total nonmetals | 2 393 124 | 5 038 714 | 2 292 629 | 9 724 467 | 2 774 885 | 4 628 956 | 2 320 627 | 9 724 468 |
| Mineral fuels | | | | | | | | |
| Coal and peat for fuel | 81 358 | 2 344 137 | 56 873 | 2 482 368 | 81 358 | 2 344 137 | 56 873 | 2 482 368 |
| Petroleum, crude | 310 042 | - | - | 310 042 | 310 042 | - | - | 310 042 |
| Total mineral fuels | 391 400 | 2 344 137 | 56 873 | 2 792 410 | 391 400 | 2 344 137 | 56 873 | 2 792 410 |
| Total crude minerals | 11 109 955 | 7 493 406 | 2 365 817 | 20 969 178 | 6 720 198 | 11 855 166 | 2 393 815 | 20 969 179 |
| Total all commodities | 19 966 894 | 24 396 906 | 23 208 619 | 67 572 419 | 27 536 726 | 16 817 718 | 23 217 975 | 67 572 419 |
| Crude minerals as a percent of all commodities | 55.6 | 30.7 | 10.2 | 31.0 | 24.4 | 70.5 | 10.3 | 31.0 |

^P Preliminary; - Nil; n.e.s. Not elsewhere specified.
Note: Components may not add due to rounding.

TABLE 10. CANADA, FABRICATED MINERALS LOADED AND UNLOADED IN COASTWISE SHIPPING, 1987^P

| | Loaded | | | | Unloaded | | | |
|-------------------------------------------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| | Atlantic | Great Lakes | Pacific | Total | Atlantic | Great Lakes | Pacific | Total |
| | (tonnes) | | | | | | | |
| Metallic mineral products | | | | | | | | |
| Ferrous mineral products | | | | | | | | |
| Structural shapes, iron and steel | 359 | 168 906 | 25 005 | 194 270 | 359 | 168 906 | 25 005 | 194 270 |
| Plates and sheets, steel | 352 | 31 809 | 408 | 32 569 | 351 | 31 809 | 408 | 32 568 |
| Primary iron, steel | 21 288 | - | - | 21 288 | - | 21 288 | - | 21 288 |
| Rails and railway track material | 2 694 | 1 683 | - | 4 377 | 2 694 | 1 683 | - | 4 377 |
| Pipes and tubes, iron and steel | 759 | 1 319 | - | 2 078 | 759 | 1 319 | - | 2 078 |
| Castings and forgings, steel | 14 | - | 1 633 | 1 647 | 14 | - | 1 633 | 1 647 |
| Wire, iron and steel | 575 | - | - | 575 | 575 | - | - | 575 |
| Bars and rods, steel | 389 | - | - | 389 | 389 | - | - | 389 |
| Aluminum and aluminum products | 114 932 | - | - | 114 932 | 114 932 | - | - | 114 932 |
| Total metallic mineral products | 141 362 | 203 717 | 27 046 | 372 125 | 120 073 | 225 005 | 27 046 | 372 124 |
| Nonmetallic mineral products | | | | | | | | |
| Cement | 27 844 | 716 903 | 84 268 | 829 015 | 27 844 | 716 903 | 84 268 | 829 015 |
| Sulphuric acid | 3 440 | - | 21 079 | 24 519 | 3 440 | - | 21 079 | 24 519 |
| Cement basic products | 410 | 12 784 | 10 302 | 23 496 | 410 | 12 784 | 10 302 | 23 496 |
| Fertilizers and fertilizer material, n.e.s. | 15 029 | - | 52 | 15 081 | 15 029 | - | 52 | 15 081 |
| Other nonmetallic mineral products | 6 477 | - | - | 6 477 | 6 477 | - | - | 6 477 |
| Bricks, tiles and pipes, clay | 1 228 | - | - | 1 228 | 1 228 | - | - | 1 228 |
| Glass basic products | 349 | - | 454 | 803 | 349 | - | 454 | 803 |
| Asbestos basic products | - | - | - | - | - | - | - | - |
| Total nonmetals | 54 777 | 729 687 | 116 155 | 900 619 | 54 777 | 729 687 | 116 155 | 900 619 |
| Mineral fuel products | | | | | | | | |
| Fuel oil | 4 097 788 | 839 194 | 1 153 104 | 6 090 086 | 4 178 579 | 758 512 | 1 152 995 | 6 090 086 |
| Gasoline | 2 446 781 | 378 206 | 576 362 | 3 401 349 | 2 464 231 | 360 764 | 576 354 | 3 401 349 |
| Asphalts and road oils | 163 266 | 18 935 | - | 182 201 | 81 803 | 100 398 | - | 182 201 |
| Petroleum coke | - | 113 609 | - | 113 609 | 113 609 | - | - | 113 609 |
| Lubricating oils and greases | 29 467 | - | 426 | 29 893 | 893 | 28 574 | 426 | 29 893 |
| Other petroleum and coal products | 25 674 | 2 052 | - | 27 726 | 12 703 | 15 023 | - | 27 726 |
| Total mineral fuel products | 6 762 976 | 1 351 996 | 1 729 892 | 9 844 864 | 6 851 818 | 1 263 271 | 1 729 775 | 9 844 864 |
| Total fabricated mineral products | 6 959 115 | 2 285 400 | 1 873 093 | 11 117 608 | 7 026 668 | 2 217 963 | 1 872 976 | 11 117 607 |
| Total all commodities | 19 966 894 | 24 396 906 | 23 308 619 | 67 572 419 | 27 536 726 | 16 817 718 | 23 217 975 | 67 572 419 |
| Fabricated mineral products as a percent of all commodities | 34.9 | 9.4 | 8.1 | 16.5 | 25.5 | 13.2 | 8.1 | 16.5 |

^P preliminary; - Nil; n.e.s. Not elsewhere specified.
Note: Components may not add due to rounding.

TABLE 11. CANADA, CRUDE AND FABRICATED MINERALS LOADED AT CANADIAN PORTS IN COASTWISE SHIPPING, 1957-87

| | Total All Commodities | Total Crude Minerals | Total Fabricated Minerals | Crude and Fabricated Minerals as Percent of All Products |
|-------------------|-----------------------------|----------------------------|---------------------------------|----------------------------------------------------------------|
| | (kilotonnes) | | | |
| 1957 | 34 354 | 8 696 | 7 832 | 48.1 |
| 1958 | 34 808 | 7 673 | 7 258 | 42.9 |
| 1959 | 36 494 | 9 984 | 7 819 | 48.8 |
| 1960 | 37 058 | 8 786 | 8 229 | 45.9 |
| 1961 | 41 861 | 9 527 | 8 857 | 43.9 |
| 1962 | 39 763 | 8 361 | 9 768 | 45.6 |
| 1963 | 40 328 | 7 998 | 9 942 | 44.5 |
| 1964 | 47 171 | 8 522 | 11 194 | 41.8 |
| 1965 | 48 200 | 9 183 | 11 766 | 43.5 |
| 1966 | 55 122 | 10 155 | 12 653 | 41.4 |
| 1967 | 49 799 | 11 509 | 12 207 | 47.6 |
| 1968 | 50 921 | 13 698 | 13 245 | 52.9 |
| 1969 | 51 890 | 12 746 | 14 181 | 51.9 |
| 1970 | 57 301 | 14 415 | 14 818 | 51.0 |
| 1971 | 55 128 | 14 783 | 15 374 | 54.7 |
| 1972 | 55 326 | 14 197 | 15 290 | 53.3 |
| 1973 | 55 314 | 16 573 | 15 615 | 58.2 |
| 1974 | 53 633 | 11 723 | 16 575 | 52.8 |
| 1975 | 54 373 | 15 687 | 17 510 | 61.1 |
| 1976 | 53 882 | 15 924 | 16 208 | 59.6 |
| 1977 | 58 309 | 18 131 | 17 435 | 61.0 |
| 1978 | 60 668 | 18 318 | 16 619 | 57.6 |
| 1979 | 79 950 | 22 130 | 17 486 | 49.6 ^r |
| 1980 | 82 761 | 22 947 | 17 134 | 48.4 |
| 1981 | 71 271 | 17 849 | 16 669 | 48.4 |
| 1982 | 65 881 | 16 473 | 13 214 | 45.1 |
| 1983 | 67 598 | 21 248 | 12 025 | 49.2 |
| 1984 | 68 698 | 22 798 | 11 909 | 50.5 |
| 1985 | 61 717 | 19 867 | 10 291 | 48.9 |
| 1986 | 60 506 | 19 901 | 10 264 | 49.9 |
| 1987 ^P | 67 572 | 20 969 | 11 118 | 47.5 |

^P Preliminary; ^r Revised.

TABLE 12. CANADA, CRUDE MINERALS LOADED AND UNLOADED AT CANADIAN PORTS IN INTERNATIONAL SHIPPING TRADE, 1985-87

| | 1985 | | 1986 | | 1987 ^P | |
|-------------------------------------------------------------|--------------------|-------------------|--------------------|-------------------|--------------------|-------------------|
| | Loaded | Unloaded | Loaded | Unloaded | Loaded | Unloaded |
| (tonnes) | | | | | | |
| Metallic minerals | | | | | | |
| Iron ore and concentrates | 32 669 302 | 6 457 303 | 30 488 690 | 6 177 384 | 31 002 238 | 6 716 664 |
| Copper ores and concentrates | 1 179 258 | 224 479 | 1 359 875 | 92 763 | 1 601 356 | 155 112 |
| Other nonferrous ores, concentrates and metal scrap, n.e.s. | 108 701 | 67 347 | 1 391 039 | 346 100 | 1 342 230 | 252 384 |
| Zinc ore and concentrates | 655 418 | 160 | 645 143 | 403 | 994 894 | 629 |
| Lead ore and concentrates | 110 289 | 1 916 | 85 068 | 11 446 | 132 778 | 2 158 |
| Alumina, bauxite ore | 45 877 | 3 320 373 | 27 216 | 3 832 453 | 27 726 | 3 599 494 |
| Titanium ore | 1 032 233 | 3 782 | (2) | (2) | (2) | (2) |
| Manganese ore | 2 522 | 182 024 | (2) | (2) | (2) | (2) |
| Nickel ore and concentrates | 113 252 | 6 053 | (1) | (1) | (1) | (1) |
| Total metals | 35 916 852 | 10 263 527 | 33 997 301 | 10 463 549 | 35 101 222 | 10 726 441 |
| Nonmetallic minerals | | | | | | |
| Potash | 4 759 062 | 79 292 | 5 755 702 | 59 934 | 6 426 820 | 283 583 |
| Sulphur | 5 371 105 | - | 5 773 129 | 42 001 | 5 920 979 | - |
| Gypsum | 5 806 971 | 77 902 | 5 781 273 | 177 148 | 5 433 907 | 189 915 |
| Salt | 2 053 809 | 1 253 350 | 2 222 807 | 1 227 792 | 2 067 309 | 906 523 |
| Crude nonmetallic minerals, n.e.s. | 111 735 | 24 213 | 1 248 437 | 1 411 552 | 1 915 122 | 1 317 368 |
| Limestone | 1 090 691 | 861 734 | 1 114 655 | 1 232 261 | 1 421 705 | 1 188 278 |
| Clay materials, n.e.s. | 1 236 | 1 541 | 716 438 | 345 832 | 571 612 | 249 559 |
| Asbestos | 506 633 | 727 | 491 951 | 1 241 | 505 591 | 1 845 |
| Sand and gravel | 249 850 | 1 489 944 | 295 493 | 1 321 022 | 408 707 | 1 395 557 |
| Phosphate rock | 2 200 | 1 557 629 | 25 590 | 1 602 018 | 3 328 | 1 661 378 |
| Bentonite | 165 | 176 349 | (4) | (4) | (4) | (4) |
| China clay | 54 | 15 379 | (4) | (4) | (4) | (4) |
| Dolomite | 377 041 | 17 674 | (3) | (3) | (3) | (3) |
| Stone, crude, n.e.s. | 95 879 | 91 446 | (3) | (3) | (3) | (3) |
| Stone, crushed | 875 543 | 991 178 | (3) | (3) | (3) | (3) |
| Fluorspar | - | 114 081 | (3) | (3) | (3) | (3) |
| Barite | - | 8 012 | (3) | (3) | (3) | (3) |
| Total nonmetals | 21 301 974 | 6 760 451 | 23 425 475 | 7 420 801 | 24 675 080 | 7 194 006 |
| Mineral fuels | | | | | | |
| Coal, bituminous | 25 964 493 | 15 168 031 | 25 986 381 | 13 589 832 | 25 324 002 | 14 334 318 |
| Petroleum, crude | 694 576 | 9 693 288 | 1 306 998 | 12 414 057 | 980 908 | 14 810 357 |
| Fuels, n.e.s. | 343 | 2 565 | 3 401 | 37 | 3 734 | - |
| Total fuels | 26 659 412 | 24 863 884 | 27 296 780 | 26 003 926 | 26 308 644 | 29 144 675 |
| Total crude minerals | 83 878 238 | 41 887 862 | 84 719 556 | 43 888 276 | 86 084 946 | 47 065 122 |
| Total all commodities | 143 420 769 | 60 668 828 | 144 560 692 | 62 011 827 | 158 993 861 | 68 025 360 |
| Crude minerals as a percent of all commodities | 58.5 | 69.0 | 58.6 | 70.8 | 54.1 | 69.2 |

(1) Included with "Copper ores and concentrates". (2) Included with "Other nonferrous ores concentrates and metal scrap n.e.s.". (3) Included with "Crude nonmetallic minerals, n.e.s.". (4) Included with "Clay materials, n.e.s.".

- Nil; n.e.s. Not elsewhere specified; ^P Preliminary.

TABLE 13. CANADA, FABRICATED MINERAL PRODUCTS LOADED AND UNLOADED AT CANADIAN PORTS IN INTERNATIONAL SHIPPING TRADE, 1985-87

| | 1985 | | 1986 | | 1987 ^P | |
|-------------------------------------------------------------|--------------------|-------------------|--------------------|-------------------|--------------------|-------------------|
| | Loaded | Unloaded | Loaded | Unloaded | Loaded | Unloaded |
| | (tonnes) | | | | | |
| Metallic products | | | | | | |
| Iron and steel, other | | | 1 024 616 | 1 833 389 | 1 238 605 | 2 373 878 |
| bars and rods | 45 606 | 291 397 | (1) | (1) | (1) | (1) |
| castings and forgings | 43 478 | 129 390 | (1) | (1) | (1) | (1) |
| pipes and tubes | 28 105 | 316 062 | (1) | (1) | (1) | (1) |
| plates and sheets | 285 156 | 543 381 | (1) | (1) | (1) | (1) |
| rails and track material | 29 946 | 62 771 | (1) | (1) | (1) | (1) |
| structural shapes | 9 267 | 132 351 | (1) | (1) | (1) | (1) |
| wire and rope | 14 141 | 176 398 | (1) | (1) | (1) | (1) |
| Nonferrous metals, n.e.s. | 8 193 | 32 995 | 716 950 | 171 168 | 536 826 | 243 882 |
| Copper and alloys | 176 556 | 45 850 | (2) | (2) | (2) | (2) |
| Aluminum | 446 744 | 98 430 | (2) | (2) | (2) | (2) |
| Zinc and alloys | 124 582 | 2 692 | (2) | (2) | (2) | (2) |
| Ferroalloys | 45 026 | 39 117 | (2) | (2) | (2) | (2) |
| Nickel and alloys | 45 156 | 33 752 | (2) | (2) | (2) | (2) |
| Lead and alloys | 21 844 | 801 | (2) | (2) | (2) | (2) |
| Iron, pig | 425 065 | 109 793 | (1) | (1) | (1) | (1) |
| Iron and steel, primary | 561 992 | 2 339 | (1) | (1) | (1) | (1) |
| Total metals | 2 310 857 | 2 017 519 | 1 741 566 | 2 004 557 | 1 775 431 | 2 617 760 |
| Nonmetallic minerals | | | | | | |
| Cement | 1 051 549 | 69 216 | 1 849 287 | 410 446 | 1 875 476 | 515 100 |
| Nonmetallic mineral basic products | 26 383 | 365 818 | 130 378 | 353 237 | 289 902 | 389 752 |
| Building blocks, n.e.s. | 17 471 | 186 522 | (4) | (4) | (4) | (4) |
| Fertilizers, n.e.s. | 224 809 | 200 035 | (4) | (4) | (4) | (4) |
| Asbestos basic products | 1 972 | 630 | (4) | (4) | (4) | (4) |
| Sulphuric acid | 188 554 | 669 358 | (4) | (4) | (4) | (4) |
| Glass basic products | 8 698 | 46 786 | (4) | (4) | (4) | (4) |
| Cement basic products | 534 736 | 81 305 | (3) | (3) | (3) | (3) |
| Total nonmetals | 2 054 172 | 1 619 670 | 1 979 665 | 763 683 | 2 165 378 | 904 852 |
| Mineral fuel products | | | | | | |
| Fuel oil | 2 876 948 | 2 887 106 | 2 848 642 | 3 365 556 | 3 512 047 | 4 104 047 |
| Gasoline | 1 551 714 | 793 972 | 1 401 743 | 689 495 | 1 489 372 | 1 108 892 |
| Coke | 1 202 386 | 1 169 141 | 199 641 | 1 225 264 | 1 180 208 | 1 231 270 |
| Petroleum and coal products, n.e.s. | 790 650 | 154 065 | 131 530 | 310 045 | 365 073 | 783 366 |
| Asphalts, road oils | 12 777 | 58 778 | (5) | (5) | (5) | (5) |
| Lubricating oils and greases | 8 592 | 22 806 | (5) | (5) | (5) | (5) |
| Coal tar, pitch | 5 978 | 77 134 | (5) | (5) | (5) | (5) |
| Total fuels | 6 449 045 | 5 163 002 | 4 581 556 | 5 590 360 | 6 546 700 | 7 227 575 |
| Total fabricated mineral products | 10 814 074 | 8 800 191 | 8 302 787 | 8 358 600 | 10 487 509 | 10 750 187 |
| Total all commodities | 143 420 769 | 60 668 828 | 144 560 692 | 62 011 827 | 158 993 861 | 68 025 360 |
| Fabricated mineral products as a percent of all commodities | 7.5 | 14.5 | 5.7 | 13.5 | 6.6 | 15.8 |

(1) Included with "Iron and steel, other". (2) Included with "Nonferrous metals, n.e.s.". (3) Included with "Cement". (4) Included with "Nonmetallic mineral basic products". (5) Included with "Petroleum and coal products, n.e.s.".

^P Preliminary; n.e.s. Not elsewhere specified.

TABLE 14. CANADA, CRUDE AND FABRICATED MINERALS LOADED AT CANADIAN PORTS IN INTERNATIONAL SHIPPING TRADE, 1957-87

| | Total All Commodities | Total Crude Minerals | Total Fabricated Minerals | Crude and Fabricated Minerals as Percent of All Products |
|-------------------|-----------------------------|----------------------------|---------------------------------|----------------------------------------------------------------|
| | (kilotonnes) | | | |
| 1957 | 44 539 | 24 210 | 2 588 | 60.2 |
| 1958 | 35 559 | 16 602 | 1 642 | 49.9 |
| 1959 | 45 872 | 25 789 | 1 619 | 59.9 |
| 1960 | 45 872 | 24 671 | 2 039 | 58.2 |
| 1961 | 48 771 | 23 241 | 2 133 | 52.0 |
| 1962 | 54 676 | 30 446 | 2 296 | 59.9 |
| 1963 | 62 031 | 32 214 | 2 503 | 56.0 |
| 1964 | 75 760 | 42 087 | 2 602 | 59.0 |
| 1965 | 74 521 | 41 338 | 2 746 | 59.2 |
| 1966 | 76 192 | 41 374 | 3 350 | 58.7 |
| 1967 | 72 598 | 42 704 | 3 701 | 63.9 |
| 1968 | 78 663 | 48 680 | 2 960 | 65.6 |
| 1969 | 70 432 | 42 442 | 3 456 | 65.1 |
| 1970 | 95 807 | 55 849 | 4 965 | 68.5 |
| 1971 | 95 887 | 53 245 | 5 022 | 60.7 |
| 1972 | 98 988 | 51 912 | 9 091 | 61.6 |
| 1973 | 112 434 | 64 195 | 10 103 | 66.1 |
| 1974 | 106 110 | 64 093 | 9 041 | 68.9 |
| 1975 | 102 444 | 61 970 | 7 495 | 67.8 |
| 1976 | 114 815 | 71 527 | 6 108 | 67.6 |
| 1977 | 119 770 | 70 257 | 5 979 | 63.7 |
| 1978 | 116 522 | 62 291 | 7 556 | 59.9 |
| 1979 | 134 639 | 79 685 | 8 901 | 65.8 |
| 1980 | 138 161 | 67 898 | 11 770 | 57.7 |
| 1981 | 145 445 | 83 007 | 9 022 | 63.3 |
| 1982 | 125 282 | 65 594 | 7 115 | 58.1 |
| 1983 | 129 490 | 67 152 | 6 197 | 56.7 |
| 1984 | 145 322 | 82 752 | 7 986 | 62.4 |
| 1985 | 143 421 | 83 878 | 10 814 | 66.0 |
| 1986 | 144 561 | 84 720 | 8 303 | 64.3 |
| 1987 ^P | 158 994 | 86 085 | 10 488 | 60.7 |

^P Preliminary.

EMPLOYMENT TRENDS

Tables A, B and C provide updated information on employment in the mineral industry by commodity group and by province.

TABLE A. Canada, Employment by Mineral Industry¹

| | March 1986 | March 1987 | January 1988 | February 1988 | March 1988 |
|------------------------------------------|----------------|---------------|-----------------|------------------|---------------|
| | ('000 persons) | | | | |
| Metal mines | 46.0 | 45.0 | 46.1 | 46.4 | 46.5 |
| Nonmetal mines | 11.4 | 11.9 | 10.9 | 11.0 | 10.8 |
| Coal mines | 12.3 | 12.0 | 10.7 | 10.7 | 10.6 |
| Total mines | 69.7 | 68.9 | 67.7 | 68.1 | 67.9 |
| Primary metal industries ² | 97.8 | 97.6 | 98.8 | 99.1 | 101.3 |

Source: Statistics Canada 72-002: Employment, Earnings and Hours.

¹ Includes salaried and hourly paid employees in all provinces and territories. ² Includes iron and steel mills; steel pipe and tube mills; iron foundries; smelting and refining; aluminum rolling, casting and extruding.

TABLE B. Canada, Unemployment Rate by Occupation¹

| | March 1986 | March 1987 | January 1988 | February 1988 | March 1988 |
|------------------------------------------|---------------|---------------|-----------------|------------------|---------------|
| Unemployed as percent of labour force | | | | | |
| Mining and quarry- ing occupations | 13.7 | 18.9 | 12.4 | 10.6 | 10.3 |
| All occupations | 10.9 | 10.8 | 8.9 | 8.6 | 9.0 |

Source: Statistics Canada 71-001: The Labour Force.

¹ Unemployment in the Yukon and Northwest Territories is not included.

TABLE C. Canada, Employment by Province, March 1988

| | Metal Mines | Nonmetal Mines (¹ 000 employees) | Mines, Quarries, Oil Wells |
|-----------------------|-------------|-------------------------------------------------|-------------------------------|
| Newfoundland | .. | .. | 3.2 |
| Nova Scotia | .. | .. | 5.1 |
| New Brunswick | .. | .. | 3.2 |
| Quebec | 9.6 | 2.9 | 17.0 |
| Ontario | 19.6 | 1.4 | 30.0 |
| Manitoba | 3.1 | .. | 3.8 |
| Saskatchewan | .. | 3.6 | 8.4 |
| Alberta | .. | .. | 64.7 |
| British Columbia | 6.6 | .. | 15.2 |
| Yukon | .. | .. | .. |
| Northwest Territories | .. | .. | .. |
| Total Canada | 46.5 | 10.8 | 154.0 |

Source: Statistics Canada 72-002: Employment, Earnings and Hours.

.. Not available.

METALLIC MINERALS AND PRODUCTS

Aluminum

G. Bokovay (613) 992-4093

With continuing buoyant demand and low inventory levels, aluminum prices have remained strong. The average London Metal Exchange cash price in November for high grade metal was US\$1.106/lb. compared to \$1.068 in October and \$1.098 in September.

The International Primary Aluminum Institute (IPAI) has reported that total inventories of aluminum (including all forms of aluminum scrap, primary and secondary ingot, metal in process and finished mill products) decreased in September to 3.069 Mt from a revised total of 3.105 Mt in August. The IPAI also reported that non-socialist daily average primary aluminum production increased slightly in October to 37 600 t from a revised figure of 37 500 t in September.

On November 24, Alcan Aluminium Limited announced that it was proceeding immediately with the construction of the fourth and final phase of its new 200 000 t/y aluminum smelter at Laterrière, Quebec. It is expected that Laterrière will now be completed in March 1991, some 20 months earlier than originally scheduled.

While the new smelter will provide some new smelting capacity for the company, the bulk of the plant's output will be used to offset the permanent closure of 10 old Soderberg potlines at the Arvida Smelter. The total cost of the project is estimated at US\$600 million.

On November 30, it was reported that Aluminerie de Bécancour Inc. (A.B.I.) was proceeding with a 50% expansion to its Quebec smelter. The \$550 million project includes the addition of a third 120 000 t/y potline along with the expansion of anode and casting facilities. Construction is expected to begin in the spring of 1989 and be completed in 1991. ABI is owned by a consortium made up of Reynolds Metals Company, Pechiney S.A., Alumax Inc. and the Government of Quebec through Société générale de financement du Québec (SGF).

Also in November, Pechiney announced that it and Électricité de France were planning the construction of a new aluminum smelter at Dunkirk on the northern coast of France. It was also reported that Qatar had signed a memorandum of understanding with an international consortium to build a 240 000 t/y smelter. The consortium includes companies from the United States, United Kingdom, Qatar and the People's Republic of China.

In Jamaica, negotiations are continuing for the possible re-opening of the 1.1 Mt/y Alumina Partners of Jamaica (Alpart) alumina refinery in January 1989. The facility, which is owned equally by Kaiser Aluminum & Chemical Corporation and Reynolds Metals, has been closed since 1985. It has been reported that Reynolds is anxious to sell its interest in the facility. Hydro Aluminium A.S., which is known to be facing alumina shortages, is considered to be a potential buyer.

Copper

W. McCutcheon (613) 992-4403

Metal Prices - US Cents/lb.

| | London Metal Exchange (LME) Grade A Cash Settlement November 1-30 | Commodities Exchange, Inc. (COMEX) 1st Position November 1-29 |
|--------------|----------------------------------------------------------------------------|------------------------------------------------------------------------|
| High | 159.0 | 163.5 |
| Low | 138.6 | 142.3 |
| Average | 149.8 | 152.3 |
| Year-to-date | 114.4 | 110.4 |

Between October 21 and November 25 the combined LME and COMEX stocks decreased from 89 168 t to 71 481 t, of which only 5 231 t were in COMEX warehouses. For comparison, the inventory levels have been as low as 69 713 t on January 1 and as high as 145 691 t on August 19.

Afton Operating Corporation will bring the Ajax copper-gold property into production in early 1989 at a cost of \$12 million, pending successful completion of permitting. The 24.7 Mt 0.46% Cu, 0.01 oz/st Au orebody is located 10 km southeast of the Afton mill. Afton is currently milling low grade ore from stockpile and ore from the Comet-Davenport property.

At Gibraltar Mines Limited, striking employees voted 65% in favour of accepting the latest offer by Gibraltar Mines, ending the 6.5 month strike. The terms include an immediate cash payment of C\$2000 per employee and wage increases averaging 7.8% in the first year, 4% in each of the second and third years, and changes to the benefits. The previous collective agreement expired on March 31, 1988 and after negotiations aided by a government mediator failed, strike action began May 7. Management expects a return to full operations by December 2.

Olympic Dam was officially opened November 5 at a cost of over A\$750 million. The operation is a joint venture between Western Mining Corporation Holdings Limited (with 51% through its subsidiary Roxby Mining Corp. Pty. Ltd.), and BP Australia Ltd. (with 49% through its subsidiary BP Minerals (Roxby Downs) Pty. Ltd.). Located 520 km north of Adelaide, the mine will produce 1.5 Mt/y of ore from an orebody with in situ indicated reserves of 405 Mt of 2.5% Cu, 0.8 kg/t uranium oxide, 0.6 g/t Au and 6 g/t Ag. Annual output is scheduled to commence at about 45 000 t/y of refined copper, 1 500 t/y of uranium oxide, 17 t of silver and 840 kg of gold. A copper smelter and refinery are at the site.

Minnova Inc. received stage I approval for its Samatosum property from the British Columbia Government. The company will spend an estimated \$32 million to develop the project, located 25 km east of Barriere. The drill-established reserves are 773 600 t at 1.0% Cu, 1.4% Pb, 2.9% Zn, 831 g/t Ag, and 1.5 g/t Au. Production should commence in the fourth quarter of 1989 at a rate of 450 t/d. The three initial years of production will be from open pit.

Pending inspection by the Ministry of Environment for New South Wales, Electrolytic Refining & Smelting Co. of Australia Ltd. will install a Noranda reactor at Pt. Kembla. The new smelter will have a capacity of 80 000 t/y, or double the existing capacity. An acid plant, new tank

house and new anode casting plant will also be constructed in the A\$150 million project. The project is to be completed in 1990. Noranda Inc. has also proposed its reactor technology for smelters in Tianjin (China) and in Flin Flon.

Gold

D. Law-West (613) 992-4327

Gold prices increased to US\$420/oz. (C\$511) from US\$406 (C\$490) during the month. Much of this increase can be attributed to the drop in value of the U.S. dollar on world money markets.

Corona Corporation (30%) and International Mahogany Corp. opened the Jolu gold mine in the La Ronge region of northern Saskatchewan. The 400 t/d mine/mill complex will add about 1 700 kg/y of gold to the province's growing gold production. The operation, with reserves of 627 000 t grading 11.8 g/t, is expected to be finished within three years but there is a strong likelihood of additional reserves being found. Operating costs are expected to average US\$175/oz.

ERG Resources Inc. (owned 61.6% by Pamour Inc., which is in turn owned 67.5% by Giant Resources Limited of Australia) has officially opened its tailings reprocessing facility in Schumacher. Production in 1989 is expected to total 3 400 kg. Over 200 Mt of tailings are located in the Timmins area, sufficient for 17 years of production. The tailings project, brought into production at a cost of \$78 million, is the second such project for the Giant Yellowknife group (owned 41.8% by Pamour). The first, located at the Giant Yellowknife mine in the Northwest Territories, was commissioned in May 1988.

Lac Minerals Ltd. announced a \$20 million expansion of the Macassa mill from 450 t/d to 1 250 t/d. Mill feed will come 500 t/d from the Macassa mine and 750 t/d from the Lake Shore tailing recovery project. The tailings are mined from a floating dredge.

Australian gold production is expected to surge during the next two years until the industry loses its tax free status effective January 1, 1991. Industry analysts expect that there will be a negative impact on gold property development due to the longer capital recovery time.

Joint venture partners, Sikaman Gold Resources Ltd., Billiton B.V., and International Finance Corporation, plan to develop the Bogosu gold deposit in Ghana. The partners plan to spend some US\$67 million on the property with a potential to produce 100 000 oz./y at a cost of US\$147/oz., rising to an average of \$181 for the life of the project. Mineable reserves to date are 6.6 Mt grading .12 oz./t.

Lead

D. Law-West (613) 992-4327

LME lead prices rose from an average of US\$29.7¢/lb. in October to 31.3¢ in November. The United States domestic producers price also increased from an average 39.3¢ to 40.8¢.

The continued strength of replacement battery demand should keep the lead market tight well into 1989. The fall season for battery purchases opened strongly in September, with normal cyclical demand augmented by unusually strong sales of batteries during the summer months. If there is any unforeseen disruption in lead supply or at battery plants, further upward pressure on lead prices could occur.

Nickel

R. Telewiak (613) 992-4481

Nickel prices began to rise significantly during the last quarter of 1987 and ended the year at US\$4.22/lb. (LME cash price). The price rise accelerated in March, reaching a peak of \$10.84/lb., and then weakened slowly to about \$5.00 in September before rising again in October. The average price in November was \$6.07.

These higher prices have been welcomed by the Canadian producing industry from the perspective of improved earnings in the short term, but some industry representatives have expressed concern about potentially harmful impacts in the longer term, lest high and volatile prices encourage users to seek out substitute materials.

Accordingly, INCO Limited offered customers in Europe, the United States and the Far East longer term contracts based on current market prices but with built-in minimum and maximum limits for at least half the contracted quantities. At the end of November, Inco announced that it had signed three-year contracts to sell 100 million lb. of nickel under such contracts – about one quarter of its total production – at between \$2.50 and \$4.50/lb. Half will be sold within this range and half at actual market prices if the latter are outside the range.

On November 15, Hudson Bay Mining and Smelting Co., Limited (HBMS) and Outokumpu Oy officially opened the Namew Lake nickel-copper mine near Flin Flon, Manitoba. The \$70 million mine and mill complex is expected to reach full production in the second quarter of 1989. Annual production of 20.3 million lb. of nickel and 7.7 million lb. of copper, contained in concentrate, is planned.

The project is 60% owned by Hudson Bay and 40% by Outokumpu, with the concentrate apportioned accordingly. The nickel concentrate of Hudson Bay will be sent to Fort Saskatchewan, Alberta for refining by Sherritt Gordon Limited. Outokumpu will send its nickel concentrate to INCO Limited for refining at Thompson, Manitoba. The copper concentrate will be treated at Hudson Bay's Flin Flon smelter.

Proven and probable reserves at the mine total 2.55 Mt grading 2.44% nickel and 0.90% copper with small amounts of platinum group metals.

INCO announced the decision to proceed in Manitoba with development of the Thompson open pit south mine and the reactivation of the Birchtree mine at a cost of \$100 million. Development of the open pit south will permit the mining of the remaining portion of the Thompson crown pillar. This mine is expected to operate for five years starting in 1990 and to produce about 68 000 t of nickel.

The Birchtree mine had been placed on a standby basis in 1977. The ore will be mined by bulk mining methods and it is expected that the mine's productivity will be double that of the earlier operating period. Production at Birchtree is scheduled to resume in 1989 and the mine is expected to be in operation for more than 20 years.

The major recapitalization plan of INCO, announced in late October, is scheduled to be voted by shareholders on December 9. The plan includes a US\$1.05 billion special cash dividend to shareholders and features designed to protect shareholders from consolidated takeover attempts.

INDUSTRIAL MINERALS AND PRODUCTS

Cement

O. Vagt (613) 992-2667

Miron Inc., a major cement producer in Quebec, announced plans to proceed with a \$100 million project to develop a new limestone quarry and cement plant to produce 600 000 t/y of cement, including clinker, at Grondines. The project will replace the company's long-time source of raw material (the Montreal quarry) sold to the City of Montreal. Most work on the project is not expected to begin before 1990; meanwhile, purchases of clinker as well as cement are likely to continue from outside sources.

Gypsum

O. Vagt (613) 992-2667

Louisiana-Pacific Corporation, of Portland, Oregon, announced it will build a \$65 million fibre-gypsum board plant on Cape Breton Island. The plant will use recycled paper, gypsum and perlite producing about 240 million square feet of finished product a year. Output will mainly go to construction markets in the northeast and mid-Atlantic states marking the first time that a finished gypsum product, rather than crude gypsum, is exported from Nova Scotia.

SPECIAL ITEMS

Concentrator Capacity Utilization at Canadian Base-Metal and Precious-Metal Mines in 1987

Lo-Sun Jen (613) 992-0658

In 1987, Canada had a total ore concentrating capacity of 120 Mt for copper (the same as in 1986), 29 Mt for nickel (up 12%), 33 Mt for zinc (up 14%), 8 Mt for lead (same as in 1986), 22 Mt for molybdenum (up 10%), 3.5 Mt for silver (down 26%) and 24 Mt for gold (up 14% from 1986). As lead was produced only as a coproduct of zinc mines in Canada, its concentrator capacity utilization was linked with that of zinc.

The overall unadjusted capacity utilization at base-metal concentrators in 1987 was 82%, up from 67% in 1986 in reaction to stronger prices. Coincidentally, capacity utilization at precious-metal concentrators was also 82% in 1987, unchanged from 1986.

The concentrator capacity utilization for individual base metals is shown below.

| | % Concentrator Capacity Utilization | |
|------------|-------------------------------------|------|
| | 1987 | 1986 |
| Copper | 92 | 74 |
| Nickel | 53 | 53 |
| Lead | 70 | 80 |
| Zinc | 81 | 72 |
| Molybdenum | 69 | 68 |

Underutilized capacity in 1986 enabled producers to raise production significantly on short notice when demand and prices rose in 1987.

The relatively low and stable utilization of nickel concentrator capacity in spite of rising demand and prices, was mainly due to the SO₂ emission control ceiling imposed by the Ontario government. Both INCO Limited and Falconbridge Limited are in the process of adjusting their nickel concentrator capacities downward to reflect more realistically their overall delivery capability from 1989 onward.

A quick rise in demand of course leads to higher utilization of existing concentrator capacity, but sustained higher demand also encourages mining companies to bring on-stream new mines and concentrators, whose addition may lower overall capacity utilization. Capacity utilization is affected also by ore grades being mined, shutdowns because of major repairs, shortages of ore, strikes, and temporary problems with custom milling contracts.

The concentrators used most intensively in 1987 and 1986, by commodity are listed below.

| 1987 | | | 1986 | |
|------------|-----------------|-----|-------------------------|---------------|
| | % Utilization | | | % Utilization |
| Copper | Afton | 118 | Selbaie "B" ore circuit | 111 |
| Nickel | Strathcona | 57 | Strathcona | 82 |
| Zinc | Nanisivik | 99 | Myra Falls | 108 |
| Molybdenum | Endako | 43 | Brenda | 109 |
| Gold | Kidd Creek Gold | 139 | Page-Williams | 113 |
| Silver | Equity Silver | 111 | Equity Silver | 105 |

In 1986, seven gold concentrators operated above rated capacity; in 1987, eleven did. In 1987, the Kidd Creek Gold concentrator outdid all the others, operating at 139% of its designed capacity.

Electronic Materials G. Couturier (613) 992-3784

In October 1988, Vancouver-based Cominco Ltd. agreed to sell its Electronic Materials Division to Johnson Matthey Public Limited Company of the United Kingdom for \$40 million. The deal is to be approved by the Canadian regulatory authorities at the beginning of December 1988.

Cominco Electronic Materials Inc. comprises production and research and development facilities at three locations: Trail and Victoria in British Columbia, and Spokane in Washington State.

Cominco Electronic Materials Inc. in Trail is an important producer of high purity indium, germanium metal and oxide, and gallium arsenide, all of which are used in the production of semi-conductors and infra-red electronic devices. The Cominco subsidiary in Victoria is involved in advanced optical materials, while the Spokane location produces precision fabricated metal parts, bonding wire and ribbon, and vapour-deposition materials including sputtering targets.

Exploration for Platinum-Group Metals D. A. Cranstone (613) 992-4666

Until 1986 there was little exploration for the platinum-group metals (PGM) as such in Canada; PGM were generally considered as minor by-products of nickel-copper mining. Interest in PGM exploration increased in 1986 for at least three reasons: 1) new European legislation phasing in requirements for automotive air pollution control devices (which use PGM) in the European Economic Community, 2) uneasiness about heavy dependence for these metals on the world's prime supplier, the Republic of South Africa, and 3) rising PGM prices since 1985.

In 1986 and 1987, some 40 mineral exploration companies looked for PGM in at least 30 exploration projects in the Appalachian, Canadian Shield, and Cordilleran geological regions. Most of these projects involved re-examination of already known nickel-copper deposits and occurrences with a small PGM content, but some searched for PGM associated with chromite in ultramafic-mafic layered complexes, as well as in more exotic deposit types.

The PGM deposits found in Canada up to present are either of low grade or have low platinum to palladium ratios (economically less attractive because platinum is higher priced than palladium). Some of the deposits currently being explored or evaluated might turn out to be economically mineable, but only if their PGM content is combined with recoverable nickel, copper, cobalt, gold and silver.

Around the formerly mined Wellgreen orebody in the Yukon, an extensive halo of disseminated copper-nickel sulphides with PGM (mostly platinum) has been outlined. The large but low-grade Anaconda copper deposit near Marathon, Ontario, which also contains recoverable nickel, cobalt, gold and silver, has recently been re-examined for PGM (it was originally investigated during the 1960s). Both the Wellgreen and Anaconda deposits could be mined by open pit at relatively low cost. Feasibility studies are under way.

Some interesting occurrences such as the Big Trout Lake layered intrusion in Ontario (with significant intersections of chromite and PGM) and the Fox River sill in Manitoba, might with further drilling turn out to be sizeable orebodies. Various other nickel-copper sulphide deposits and occurrences are being explored for their PGM content as are several deposits of more exotic geological types. Exploration for PGM is still in its early stages in Canada. Much more work is needed before exploration success for these metals can be adequately evaluated.

To compete with South African PGM, it would be necessary to discover relatively high-grade, low-cost orebodies in Canada, because known reserves and resources of PGM in the Bushveld intrusion in the Republic of South Africa are very large indeed, amounting to 2 to 3 billion troy oz. of PGM (about 300 times world PGM production in 1987). These quantities of PGM are in the Merensky 'Reef', Lower Zone, Platreef and UG-2 zones which grade between 4 g and 12 g PGM/t. All have favourable ratios at higher priced platinum and rhodium to lower priced palladium.

The UG-2 Zone, which averages over 30% Cr_2O_3 , is rich in rhodium and is therefore especially attractive for production of platinum-rhodium catalytic converters needed to suppress emissions of acid-rain producing nitrous oxides. The Platreef and Lower Zone are amenable to low-cost open-pit or mechanized underground mining methods.

Thus, the Republic of South Africa has the ability to produce large quantities of PGM at production costs so low that most of Canada's PGM deposits currently being explored would be hard put to compete.

Production-Sustaining Investment at Mine Sites

A. Lemieux (613) 992-2709

During 1987, mining and exploration companies invested in total nearly \$5 billion in Canada. This covers all metals, nonmetals, construction materials, and coal, and excludes oil and gas.

Expenditures on exploration have been in the limelight since 1983 when flow-through shares became widely used as a mechanism for financing the search for new mineral deposits, especially gold. But even at the record level of some \$1.3 billion in exploration expenditures in 1987, this still amounts to only one quarter of all investments made by mining and exploration companies combined.

Production-sustaining mine site investments amounted to some \$3.6 billion in 1987. Exploration aimed at finding new deposits on these mining properties would add about \$100 million; some \$1.2 billion in mineral exploration in 1987 was conducted elsewhere.

Highlights of 1987

Of the \$3.6 billion of production-sustaining investments at mine sites in 1987 in Canada, 43% went into repairs (uncapitalized) of existing structures, machinery and equipment; 31% into outlining and preparing ore for production; 16% into installing new machinery and equipment; and 10% into constructing new buildings, underground installations, and tailings ponds.

Not surprisingly, almost 70% of these expenditures were made at mines located in Ontario, British Columbia, and Quebec, by far the country's leading producers (in that order) of the minerals under discussion (Figure 1).

Metal producers accounted for more than 60% of the total investments, gold producers alone for more than 20%. Among nonmetal producers, coal producers invested the most (Figure 2).

Investment Trends

Totals. Since 1981, overall production-sustaining investments at Canadian mine sites (in constant dollars) have declined almost 40% (Figure 3). Annual expenditures to maintain buildings, machinery and equipment in running order have levelled off; 1987 expenditures on new buildings and new machinery and equipment alone were roughly half of what they were in the early 1980s.

Nonmetallic. Annual production-sustaining mine site investments for nonmetallic production, which also includes coal, stone quarries, and sand and gravel pits, have been steadily falling, down some 45% in 1987 from the \$2.3 billion peak (in 1987 dollars) of 1982.

Metallic (except gold). Mine site investment for metallic minerals except gold has also been on the decline over the same period. Investment for these metals peaked in 1980, fell by almost 50% to 1983, and slowly declined since then.

Except for a slight rise in 1984-85, investment to sustain base-metal production has been essentially flat since 1983, the earliest year for which disaggregated data are available for base metals.

Gold. Mine site investments for gold have risen more than three-fold from \$260 million (in 1987 dollars) in 1981 to more than \$800 million in 1987, as many new gold discoveries have been put into production and as production capacity at some existing mines has been upgraded.

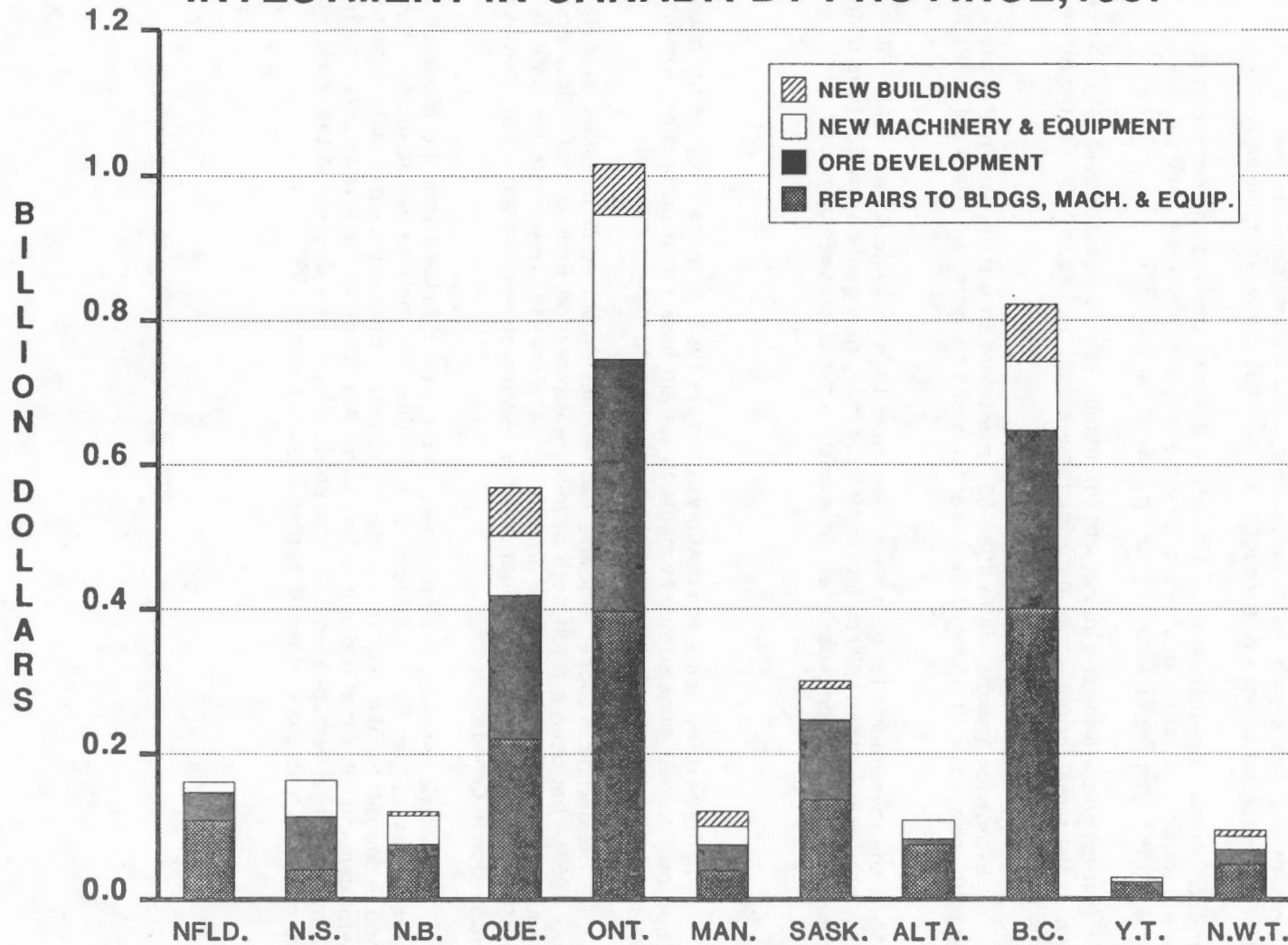
Discussion

In the next few years, and possibly as early as 1989, mine site investments to sustain gold production may surpass mine site investments to sustain base-metal production, something that probably last occurred in the 1930s, during the heyday of gold mining in Canada.

The decline in copper, zinc and lead reserves -- reported on in earlier issues (Sept. 1988 and Aug. 1987) -- has been a result both of meagre exploration finds and of a slow-down in ore development at mine sites. The lack of growth in total mine site investments for base metals from 1983 to 1987 illustrates even more dramatically the new investment needed in base metals to sustain their production in Canada.

It will be necessary to emphasize base metals and to keep annual exploration spending in Canada at least at the 1987 record level of \$1.3 billion for the foreseeable future if Canada is to find enough deposits to take over from those nearing exhaustion and keep up with expected growth in mineral demand. But that is only the first step. Annual mine site investments may have to be some 4 times as large, perhaps \$5-6 billion, to produce from these deposits at the levels required for Canada to hold on to its share of world markets beyond the mid-1990s.

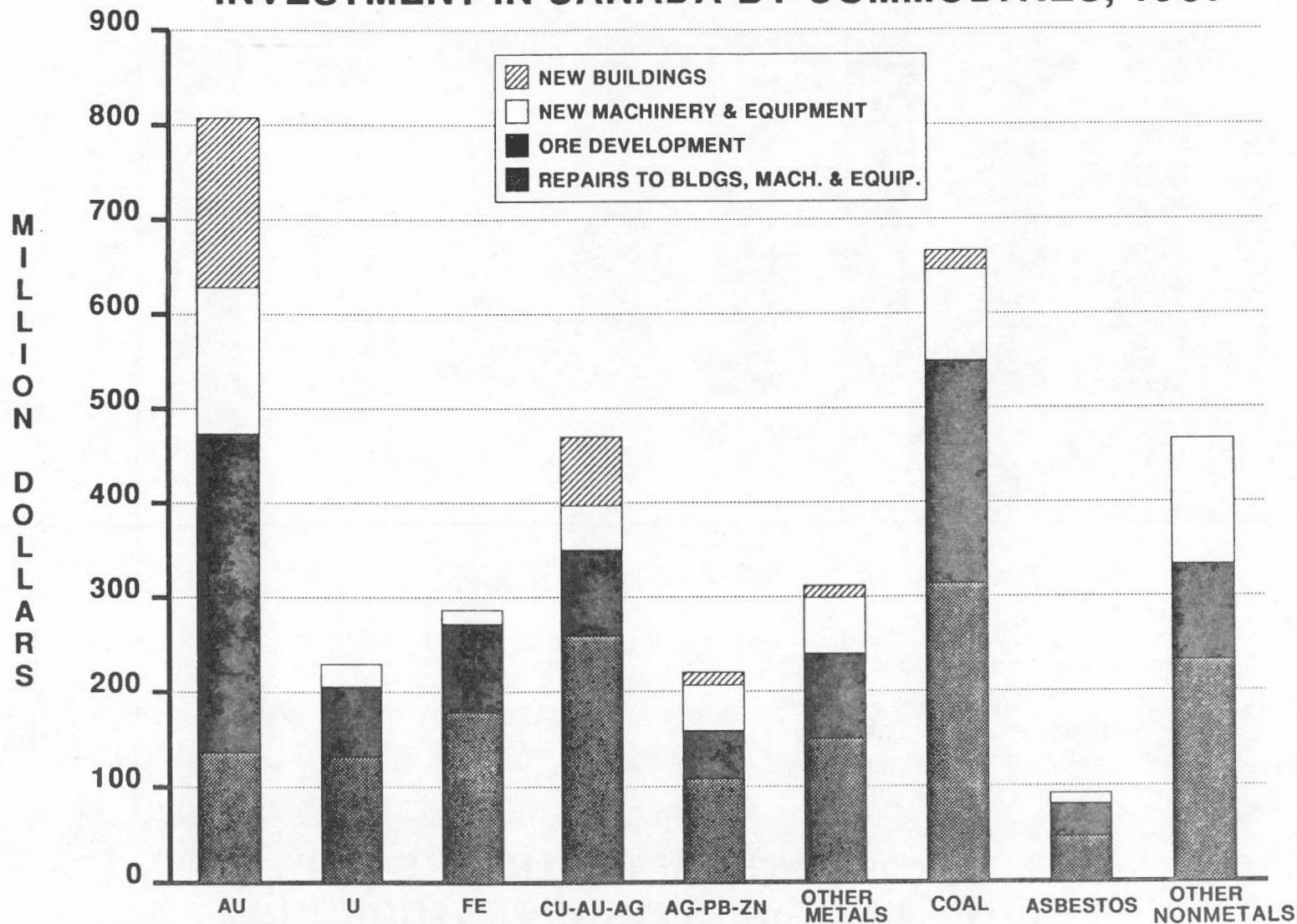
FIGURE 1
PRODUCTION-SUSTAINING MINE-SITE
INVESTMENT IN CANADA BY PROVINCE, 1987



SOURCE: Resource Evaluation Division, EMR. Based on Statistics Canada Surveys of Exploration, Development and Capital Expenditures for Mining.

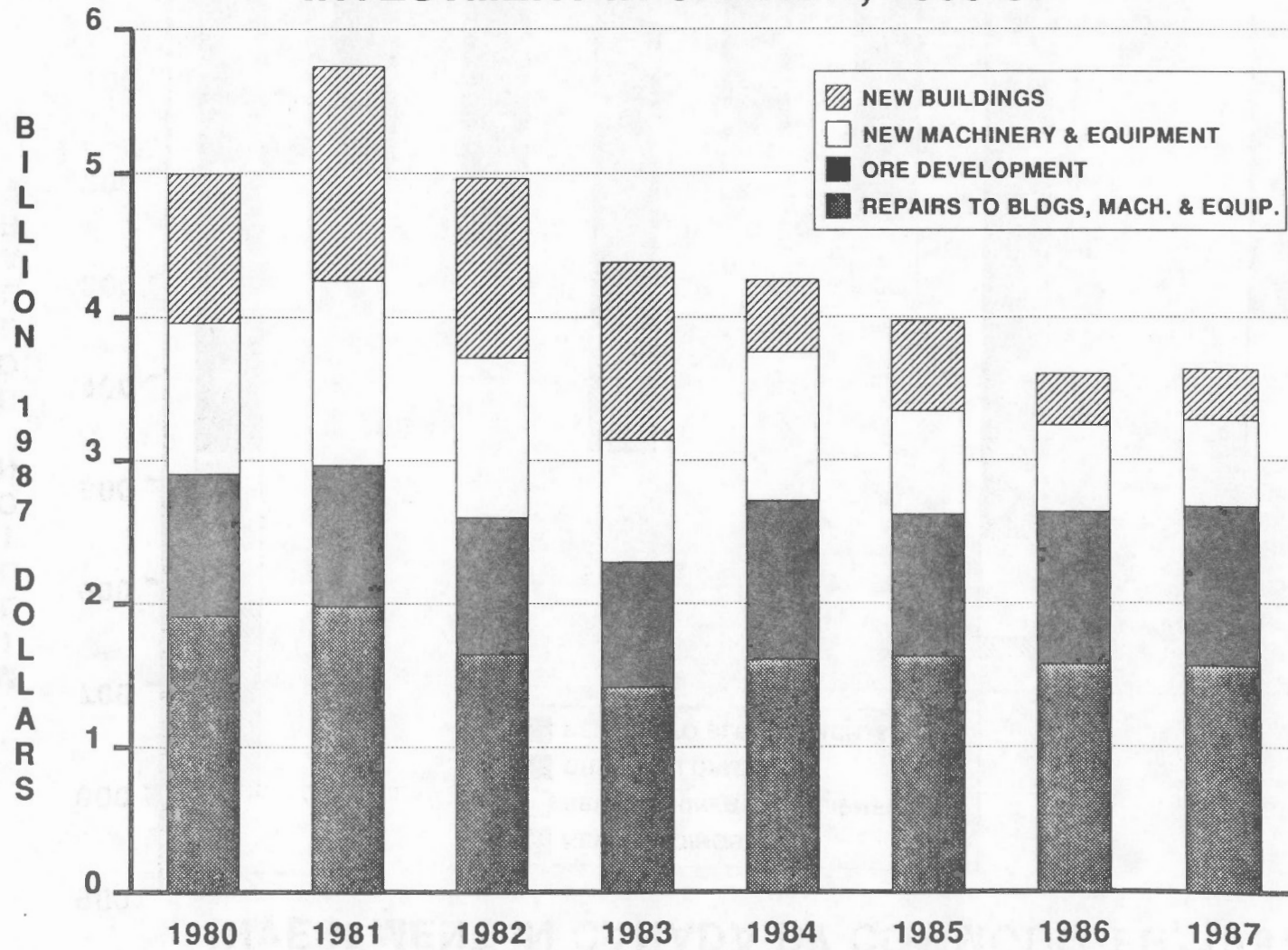
FIGURE 2

PRODUCTION-SUSTAINING MINE-SITE INVESTMENT IN CANADA BY COMMODITIES, 1987



SOURCE: Resource Evaluation Division, EMR. Based on Statistics Canada Surveys of Exploration, Development and Capital Expenditures for Mining.

FIGURE 3
PRODUCTION-SUSTAINING MINE-SITE
INVESTMENT IN CANADA, 1980-87



SOURCE: Resource Evaluation Division, EMR. Based on Statistics Canada Surveys of Exploration, Development and Capital Expenditures for Mining.

United Nations Conference on Trade and Development (UNCTAD)
Twentieth Session of the Committee on Tungsten
November 7-11, 1988
H. Martin (613) 992-4664

The UNCTAD Committee on Tungsten (COT) meets annually to monitor and improve the transparency of the market. At the November session, delegates from more than 22 countries that produce or consume tungsten, as well as representatives from several international agencies, reviewed the current market and outlook and discussed measures that could assist in preventing a recurrence of the tungsten price collapse of 1985 and 1986.

The following table summarizes world mine production and world consumption, as determined by COT:

Tungsten Contained in Ores and Concentrates

| Item | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 ^e |
|-------------|--------|--------|--------|----------|--------|--------|-------------------|
| | | | | (tonnes) | | | |
| Production | 43 769 | 41 512 | 49 313 | 48 254 | 43 946 | 37 886 | 39 000 |
| Consumption | 40 052 | 40 020 | 47 669 | 45 162 | 41 949 | 42 046 | 44 000 |
| Imports | 22 844 | 20 966 | 26 931 | 24 924 | 21 368 | 21 022 | 27 000 |
| Exports | 24 367 | 25 536 | 25 813 | 26 468 | 23 201 | 22 511 | 25 000 |

^e Estimated.

More than 60 mines have been closed in the past 6 years. China and the U.S.S.R. now account for some 70% of world mine production. Canada, which until 1985 was the world's third largest source, has not recorded any mine production since 1986, when low tungsten prices forced the closure of its only producer, the Cantung mine in the Northwest Territories.

World tungsten consumption is concentrated in four sections: metal products manufacturing, which accounts for well over half of world demand; the transport equipment industry; the mining equipment industry; and the construction industry.

The recent improvement in world economic growth, forecast at about 4.0% for 1988 compared with 3.1% in both 1986 and 1987, favours an increased demand for tungsten. However, this positive effect is neutralized in part by structural and technological changes affecting tungsten usage. Technological progress has led to a substantial reduction in the use of tungsten. For example, the greater use of coatings is prolonging tool life, downsizing and near-net shape techniques in metal fabrication are leading to lower tool requirements, and new materials such as ceramics and cermets (ceramic-metal composites) in tools are now competitors.

The ready availability of tungsten, also from inventories, has kept tungsten prices low, discouraging the re-opening of Cantung and other closed-down mines.

Consumer countries increasingly import tungsten in its intermediate products, such as ammonium paratungstate and ferrotungsten, rather than as tungsten ores and concentrates. Canada has no facilities for converting tungsten ores and concentrates into intermediate products. Some concentrate producers, especially China, offer intermediate products at highly competitive prices, which has contributed to lower domestic production of such products in consuming countries; the United Kingdom and France have entirely ceased production of intermediate products.

The near-term outlook for tungsten can be summarized as follows: firmer but still relatively low prices; stable demand, probably remaining at the present level; domestic production of intermediate products in consuming countries continuing to be reduced by low-priced imports of

these products; and structural and technological changes continuing to lower the requirements for tungsten.

The failure of tungsten to find significant new outlets despite the rapid expansion of industrial sectors prompted the COT to direct its Secretariat to undertake an in-depth analysis of substitution prospects with emphasis on ceramics and cermets. In addition, the Secretariat is to conduct a review of existing research and development programs to promote new applications for tungsten, and survey industry and government views on the need for additional programs. To improve market transparency, the Secretariat will compile and dispatch to Member States, on a quarterly basis, a collection of key statistics on tungsten.

This focus of the COT's future work on greater transparency through better statistical coverage and knowledge of tungsten production, processing, trade, consumption, competition from substitutes, and structural changes reflects the growing tendency of producers and consumers to try and achieve stability in commodity markets through international study groups.

