GEOLOGICAL SURVEY OF CANADA

DEPARTMENT OF ENERGY, MINES AND RESOURCES

ECONOMIC GEOLOGY REPORT No. 29

NIOBIUM (COLUMBIUM) AND TANTALUM IN CANADA

K. R. Dawson

Price $4.50

Ottawa
Canada
1974

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Artwork by GSC CARTOGRAPHIC UNIT

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Price: $4.50 Catalogue No. M43-29

Price subject to change without notice

Information Canada
Ottawa, 1974

PREFACE

An objective of certain of the studies carried out by the Geological Survey of Canada is to estimate the potential abundance and probable distribution of the mineral and fuel resources available to Canada. Results of detailed studies of specific minerals of economic importance are published as Economic Geology reports and in this publication all known Canadian deposits of niobium and tantalum are described.

Although niobium and tantalum were discovered in the first years of the nineteenth century, it was not until the 1930s that their use in metallurgy became widespread. At present Canada ranks second to Brazil in the production in the non-Communist world of the two elements.

In this report, Dr. Dawson describes the more than 256 known Canadian deposits in terms of geology, mineralogy and geochemistry, presents a classification of Canadian deposits and suggests prospecting techniques and target areas to assist those interested in the search for these elements. It is an up-to-date compilation of published and unpublished data on niobium deposits, the first published compilation on tantalum deposits in Canada, and replaces Economic Geology Report 18 published in 1958 in which Canadian niobium deposits were first described.

D. J. McLaren,
Director.

Ottawa, October 16, 1973

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NIOBIUM (COLUMBIUM) AND TANTALUM IN CANADA

ABSTRACT

The history of the discovery and development of the niobium (columbium) and tantalum resources of Canada has spanned ninety years (1882-1972) during which these minerals advanced from being mineral curiosities, through the stage of being the byproduct of other commodity searches and are now the main product of two mines. Occurrences and deposits of niobium and tantalum have been reported from most provinces and territories of Canada. At least 256 deposits are known and of these 12 have published reserves of niobium and 3 estimates for tantalum: 172 of the deposits are pegmatitic, 64 are alkaline syenite-carbonatite complexes, 3 are placers, and 17 are undefined types. The complexes have become the most promising source of future mining production since their geological characteristics were first recognized in the early 1950's. Niobium (pyrochlore) concentrates have been mined at Oka, Quebec by the St. Lawrence Columbium and Metals Corporation from an alkaline syenite-carbonatite complex since 1961. Tantalum (wodginite) has been recovered from a large zoned granite pegmatite at Bernic Lake, Manitoba by the Tantalum Mining Corporation of Canada since 1969.

RÉSUMÉ

L'histoire de la découverte et de la mise en valeur des ressources en niobium (columbium) et en tantale s'étend sur quatre-vingt-dix années (1882-1972) pendant lesquelles ces minéraux sont passés de curiosités minérales à l'étape de sous-produits de la prospection d'autres matières premières pour en arriver aujourd'hui à être le principal produit de deux mines. Des venues et des gisements de niobium et de tantale ont été signalés dans la plupart des provinces et territoires du Canada. Au moins 256 gisements sont connus et des réserves de niobium ont été déclarées pour 12 d'entre eux et probablement 3 pour le tantale: 172 des gisements sont pegmatitiques, 64 sont des complexes alcalins de syénite et de carbonatite, 3 sont des gisements alluvionnaires et 17 sont d'un type indéfini. Les complexes sont devenus les sources les plus prometteuses de production minière de l'avenir depuis que leurs caractéristiques géologiques ont été définies au début des années 1950. Des concentrés de niobium (pyrochlore) sont exploités à Oka (Québec) par la St. Lawrence Columbium and Metals Corporation depuis 1961 à partir d'un complexe alcalin à syénite et à carbonatite. La Tantalum Mining Corporation of Canada exploite du tantale (wodginite) depuis 1969 à partir d'une importante zone de granite à pegmatite à Bernic Lake, au Manitoba.

CHAPTER I

INTRODUCTION

The elements niobium and tantalum have some chemical similarities, they commonly occur together in the same minerals although in varying proportions but they have different economic uses. The term niobium will be used in the text rather than columbium the term favoured by mining circles. Occurrences and deposits of niobium and tantalum have been reported from most of the provinces and territories of Canada except for Alberta, New Brunswick, and Prince Edward Island, the Yukon Territory and the District of Keewatin see Map. These include numerous occurrences of tantalum in pegmatites and relatively few of niobium in alkaline syenite-carbonatite complexes but the latter hold more promise of production. Most occurrences are accessible by several modes of transportation, but some are so distant from potential markets or have other characteristics that they are uneconomical to mine at present. In Canada niobium production from pyrochlore also faces strong competition from the pyrochlore-rich soils overlying the alkaline syenite-carbonatite complex at Araxa, Brazil.

Niobium minerals are being mined from the St. Lawrence Columbium and Metals mine Oka, Quebec see Fig. 1a, 1b, that commenced operation as an open pit mine in 1961 to mine pyrochlore from an alkaline syenite-carbonatite complex. Bulk samples of niobium ores have been taken for metallurgical tests and feasibility studies from the Nova Beaucage property at North Bay, Ontario; the Multi-Minerals property in Lackner-McNaught Townships, Ontario; the Bugaboo placers near Golden, B. C.; and the Alpha-A orebody on South Bluff Creek property of Consolidated Morrison Explorations Ltd., near Moosonee, Ontario. Plans have been announced to do the same at the St-Honoré property of SOQUEM, near Chicoutimi, Quebec, see Fig. 3a, 3b. Numerous niobium occurrences related to alkaline syenite-carbonatite complexes have been discovered in Ontario and Quebec, but relatively few contain proven reserves of pyrochlore mineralization.

Stanniferous tantalite (wodginite) has been mined since 1969 by the Tantalum Mining Corporation of Canada from the Montgary pegmatite, Bernic Lake, Manitoba see Fig. 2a, 2b. Granite pegmatites, which have been identified in many areas of Canada, may contain columbite-tantalite, and a few dykes may contain sufficient amounts to permit mining for that mineral alone. Although tantalite concentrates were produced in the Yellowknife-Beaulieu River area, District of Mackenzie, it may prove feasible to mine the mineral only as part of an integrated operation recovering also one or more of spodumene, beryl, or pollucite from some Canadian pegmatites.

This report is intended as an up-to-date state of development report on the occurrence and production of niobium and tantalum that complements the report by Rowe (1958). It also presents a summary of data on domestic and world production, uses, and consumption of niobium and tantalum over a period of years to outline trend projections and forecasts. This report has been compiled mainly by a search of the extensive literature on the subject in Canadian and foreign journals. Visits were made to the producing mines in

Original manuscript submitted: April 19, 1972
Final version approved for publication: July 11, 1972

1971 to observe the deposits at first hand. A file was produced that contains an up-to-date data base for the 256 known occurrences and deposits in Canada see appendix A, B. A parallel file was also produced that describes 54 foreign past and present producers of the two elements.

HISTORY

The history of the discovery and development of the niobium and tantalum resources of Canada has spanned ninety years (1882-1972). Niobium-tantalum minerals have advanced through the curiosity stage, to the byproduct of other commodity searches, and now are the main resource of at least two mines. For many years the search was restricted to granite-pegmatites, more recently extended to some Cordilleran placer deposits, and now commercial production has been won from the alkaline syenite-carbonatite complex in the Oka area and the zoned pegmatites at Bernic Lake, Manitoba.

The first report of Nb-Ta minerals in Canada was an identification of samarskite and a chemical analysis by Hoffman (1882) from a specimen collected from the Maisonneuve pegmatite in Berthier County, Quebec. The mineral's identity was later confirmed by Ellsworth (1932) who also reported niobium-tantalum minerals from numerous other pegmatites in southeastern Ontario and southwestern Quebec.

The period starting in the late 1920's was characterized by an intensive search for commercial deposits of tin in Canada. As a result pegmatites were examined at Bernic Lake, Manitoba and in the Yellowknife-Beaulieu River area, District of Mackenzie, see Fig. 8. Commercial deposits of tin were not developed but niobium-tantalum minerals were identified in some of these pegmatites.

Between 1940 and 1945 the Second World War denied access to the overseas sources of tungsten, and the increased demand initiated an intensive search for this element in Canada, Jolliffe (1944), Lord (1951). This resulted in the first discovery of potentially ore-grade tantalum-bearing pegmatites in the Yellowknife-Beaulieu River area, District of Mackenzie and by 1943 these pegmatites were being investigated as sources of tantalum. Minor quantities of tantalite concentrates and other materials were produced between 1946 and 1948, resulting in a total production of 5 tons from the properties of the De Staffany Tantalum Beryllium Mines Limited; Peg Tantalum Lines Limited; and Freda No. 1 Claim.

From 1947, changes in the Federal laws, a good market, and the availability of commercially produced Geiger and scintillation counters created a great surge of interest in the search for uranium across the country, resulting in the re-examination of countless pegmatites, Lang, 1952. The Grenville province, particularly the Parry Sound and Bancroft areas, see Fig. 11, is characterized by abundant pegmatites associated with the granitic rocks that intrude the rocks of the Grenville Group.. These pegmatitic bodies have been long exploited for the feldspar, mica, and to a lesser degree for quartz crystals. The rush to find new deposits of uranium resulted in the discovery of many occurrences of niobium-tantalum minerals (Lang, et al., 1961, and Row, 1958) both in outcrops and waste dumps on these sites but none, however, resulted in the commercial production of niobium-tantalum concentrates.

Relatively little work was done in the Nemegos area until 1949 when radioactivity was discovered on the McVittie claims, Nickel, 1955, 1956. It

was subsequently discovered that the radioactivity was caused by pyrochlore, a titano-columbate of calcium and rare-earths that commonly contains minor amounts of uranium, and further development work blocked out reserves of niobium-tantalum ore in an alkaline syenite-carbonatite complex.

In late 1952, Mr. F. Manny, a farmer from Oka, Quebec, sent samples of radioactive magnetite-bearing rocks to the Geological Survey of Canada. The presence of thorium and a mineral of the pyrochlore-microlite series was noted. Britholite, a rare-earth phosphate mineral was identified in another sample sent during 1953 to the Provincial Mines Department Laboratory in Montreal. Encouraged by the uranium boom and the discovery of a radioactive vein on Dufresne Hill, much of the surrounding area was staked during the rush of 1954. Since then St. Lawrence Columbium and Metals Corporation developed the Oka mine and went into production in 1961 as the world's largest producer of niobium concentrates, later surpassed by the Araxa mine in Brazil.

Mr. James Strohl, Tunkhannock, Pennsylvania discovered radioactivity exceeding the average for the area late in 1952 in some outcrops of an alkaline syenite-carbonatite complex on the Manitou Islands in Lake Nipissing. Specimens were collected and submitted for assay and both the Mines Branch, Ottawa and the Ontario Department of Mines reported from 0.01 to 0.12 uranium oxide equivalent. Subsequent mineralogical study at the Geological Survey of Canada resulted in the identification of the niobium-tantalum mineral pyrochlore-microlite. In February 1953, Beaucage Mines Limited was formed to take over the Manitou Islands property of Messrs. Kenmey and VanClief. A shaft was sunk, a large sample was taken for ore dressing research, reserves were outlined, but the property was closed down to await market developments.

The increasingly widespread use of airborne magnetometers has identified several magnetic anomalies in Ontario and Quebec that have been related to alkaline syenite-carbonatite complexes. Airborne surveys made by Dominion Gulf Limited located the Nemegos and Lackner Lake complexes in Ontario and the joint Ontario-Federal Government survey of the James Bay lowlands located complexes south of Moosonee. An airborne survey made by SOQUEM north of Chicoutimi located the St-Honoré complex in that area of Quebec and other complexes have been identified elsewhere by this procedure.

Geological ground surveys have confirmed the presence of pyrochlore mineralization at all of the above complexes. The Nemegos property of the Multi-Minerals Corporation and the James Bay lowlands north complex (South Bluff Creek), property of Consolidated Morrison Explorations Limited have outlined reserves large enough to become economic under suitable market conditions.

The continued uranium search also led to the discovery of radioactive placer deposits in the Golden area of southern British Columbia and possible pyrochlore-bearing carbonatites at Manson Creek, Ice River, and Blue River in the same province. None of these proved to have sufficient reserves to become economic to mine at the present time.

In October 1966, Chemalloy Minerals Limited requested the firm of A.C.A. Howe International Limited to determine the tantalum potential of the Montgary pegmatite sill, Bernic Lake, Manitoba. As a result of this study and the arrangement of financing the property was readied and went into production in January 1969 at 500 tpd. (160 tons of Ta_2O_5 per year) to become Canada's only tantalum producing mine.

ACKNOWLEDGMENTS

The Geological Survey of Canada and the writer personally wish to thank the mining companies holding niobium and tantalum properties in Canada for making information available and for the courtesies extended.

The writer acknowledges with gratitude information received from F. E. Hall and H. R. Stockford of Consolidated Morrison Explorations Limited; A. C. A. Howe, C. T. Williams, and J. Hayward of Tantalum Mining Corporation of Canada Limited; Gaston Gagnon, St. Lawrence Columbium and Metals Corporation Limited; M. Vallee, Gilles Gagnon. and Jules LeMieux of SOQUEM and Copperfields Mining Corporation; S. B. Lumbers of the Ontario Department of Mines and Northern Affairs and J. Gittins of the University of Toronto.

G. P. Wigle of the Mineral Resources Branch, Department of Energy, Mines and Resources, Ottawa did the research and contributed the information used in Chapter II.

CHAPTER II

RESERVES, PRODUCTION AND USES

This chapter presents a summary of data on domestic and world production, uses, and consumption of niobium and tantalum over a period of years to outline trend projections and forecasts.

PRODUCTION AND RESERVES

The principal commercial mineral of niobium and tantalum was formerly columbite-tantalite derived from pegmatites, and more recently residual soils and placer deposits. Both elements are byproducts of tin mining from alluvial deposits, notably in Nigeria where concentrates containing 60 per cent or more of the combined oxides of niobium and tantalum are recovered. The major sources of niobium in recent years however has been pyrochlore from the carbonatite rock complexes in Canada, Brazil, Zaïre, and Norway, (see Tables 1a, 1b, 1c, 2).

Depending upon the geological nature of the ore deposits, the availability of labour, and power supplies, mining methods range from hand labour through large alluvial dredging operations, to mechanized open-pit, and underground mining operations. Where low cost bulk mining methods can be used the exploitation of very low-grade deposits containing as little as one pound of combined tin and niobium per ton of material may be profitable, but many small, rich deposits mined and washed by hand methods also contribute to world production.

Canada's only producer of niobium-bearing concentrates, St. Lawrence Columbium and Metals Corporation near Oka, Quebec, is a low-cost operation that began production by open-pit methods. Open-pit mining continued during the first four years of production, followed by a combination of open-pit and underground mining, and finally complete conversion to underground methods in 1967. The mine produced about 2,000 tons of ore a day in 1970 which yielded 4.9 million pounds of niobium pentoxide (Nb_2O_5) in pyrochlore concentrates containing a minimum of 50 per cent Nb_2O_5 and a maxium of 1 per cent of tantalum pentoxide (Ta_2O_5), at the end of 1970. The company's proven ore reserves to a depth of 1,000 feet were 2,300,000 tons grading 0.488 per cent (9.76 pounds per ton) Nb_2O_5. Ore extensions below 1,000 feet, partly explored by diamond drilling, are calculated as 2,950,000 tons of additional reserves grading 0.514 per cent (10.28 pounds a ton) Nb_2O_5. Production and cost data for 1966-70 are shown in Table 3.

Canada's first commercial production of tantalum began in 1969 at Bernic Lake, Manitoba, mine of the Tantalum Mining Corporation of Canada Limited. Concentrates were first shipped in the second half of 1969 and the company announced a price of U.S. $7 per pound of Ta_2O_5 in concentrates containing 50 per cent Ta_2O_5, f.o.b. the mine, for contracted deliveries through 1970. The approximately 315,000 pounds of tantalum pentoxide shipped in 1970, the first full production year, supplied about 47 per cent of United States imports of tantalum and became the principal United States supplier followed by Zaïre (18 per cent) and Brazil (18 per cent).

TABLE 1A

World Production of Niobium (Nb) and Tantalum (Ta) Concentrates[1], 1962-64 (thousands of pounds, gross weight)

Country	Types of Concentrates								
	1962			1963			1964		
	Nb	Ta	Nb-Ta	Nb	Ta	Nb-Ta	Nb	Ta	Nb-Ta
Argentina[2]	-	3	-	-	5	-	-	-	-
Australia	-	-	43	-	-	30	-	-	33
Brazil: Nb-Ta[3]	38	323	-	43	231	-	25	181	-
Pyrochlore	225	-	-	-	-	-	712	-	-
Canada: Pyrochlore	1,909	-	-	2,693	-	-	4,222	-	-
French Guiana	-	-	-	-	-	5	-	-	2
Malagasy Republic	-	-	21	-	-	38	-	-	8
Malaysia	246	-	-	197	-	-	125	-	-
Mozambique: Nb-Ta	-	-	347	-	-	338	-	-	417
Microlite	-	160	-	-	131	-	-	..	-
Nigeria	5,607	38	-	4,507	34	-	5,239	22	-
Norway	769	-	-	783	-	-	410	-	-
Portugal[2]	43	96	-	4	73	-	22	32	-
Rhodesia	-	160	-	-	151	-	-	141	-
Rwanda[2]	(included in Zaïre through 1963)						8	2	-
South Africa, Rep. of	-	8	-	-	64	-	-	14	-
South West Africa	1	10	-	0.4	4	-	0.4	1	-
Spain[2]	-	3	-	-	-	-	15	-	-
Uganda	-	-	29	-	-	20	-	-	13
Zaïre[4]	56	228	-	163	147	-	-	101	-
Total	8,354	1,029	440	8,390	840	431	10,778	494	473

Source: United States Bureau of Mines, Minerals Yearbooks.

[1] Concentrates containing both elements are shown under Nb-Ta when composition data are insufficient.
[2] U.S. imports. [3] Exports. [4] Zaïre also produced Nb-Ta-bearing tin concentrate; contained pentoxides averaging about 10 per cent combined Nb-Ta.
- Nil;

TABLE 1B

World Production of Niobium (Nb) and Tantalum (Ta) Concentrates[1], 1965-67 (thousands of pounds, gross weight)

Country	Concentrates 1965 Nb	1965 Ta	1965 Nb-Ta	1966 Nb	1966 Ta	1966 Nb-Ta	1967 Nb	1967 Ta	1967 Nb-Ta
Argentina	-	1	-	-	-	13	-	-	7
Australia	-	26	-	-	11	-	-	51	-
Brazil: Nb-Ta[2]	88	364	-	131	352	-	227	459	-
Pyrochlore	2,637	-	-	10,527	-	-	10,199	-	-
Canada: Pyrochlore	4,542	-	-	5,148	-	-	4,408	-	-
French Guiana	-	-	2	-	-	2	-	-	2
Malagasy Republic	-	-	9	-	-	1	-	-	0.1
Malaysia	101	-	-	152	-	-	196	-	-
Mozambique: Nb-Ta	-	-	303	-	-	299	-	-	351
Microlite	-	189	-	-	175	-	-	166	-
Nigeria	5,707	29	-	4,986	27	-	4,310	43	-
Norway: Pyrochlore	331	-	-	-	-	-	-	-	-
Portugal[3]	-	48	-	27	67	-	18	99	-
Rhodesia	-	77	-	-	60	-	..	..	..
Rwanda	-	-	109	-	-	55	-	-	69
South Africa, Rep. of	-	-	7	-	-	4	-	-	11
South West Africa	1	-	1	-	-	2	..	..	..
Spain[3]	-	14	-	10	13	-	-	11	-
Thailand[4]	-	-	-	-	-	-	-	-	101
Uganda	-	-	18	-	-	25	-	-	60
Zaïre[3,4]	44	160	-	127	993	-	66	368	-
Total	13,451	908	449	21,108	1,698	401	19,424	1,192	601

Source: United States Bureau of Mines, Minerals Yearbook.

[1] Concentrates containing both elements are shown under Nb-Ta when composition data are insufficient.
[2] Exports. [3] U.S. imports. [4] Zaïre also produced Nb-Ta- bearing tin concentrate.

- Nil; .. Not available

TABLE 1C

World Production of Niobium (Nb) and Tantalum (Ta) Concentrates[1,2], 1968-70 (thousands of pounds, gross weight).

Country[3]	Type of Concentrate 1968 Nb	1968 Ta	1968 Nb-Ta	1969 Nb	1969 Ta	1969 Nb-Ta	1970[e] Nb	1970[e] Ta	1970[e] Nb-Ta
Argentina	-	-	..	-	-	..	-	-	..
Australia	-	-	231	-	-	95	-	-	..
Brazil: Nb-Ta[4]	138	599	-	..	..	..	..	..	..
Pyrochlore	11,021	-	-	19,099	-	-	20,000	-	-
Canada: Pyrochlore	4,363	-	-	6,021	-	-	6,500	-	-
Tantalite	-	-	-	-	400	-	-	600	-
French Guiana	-	-	..	-	-	..	-	-	..
Ivory Coast	-	-	1	-	-	0.5	-	-	..
Malagasy Republic	-	-	3	-	-	..	-	-	..
Malaysia	-	-	114	-	-	132	-	-	145
Mozambique: Nb-Ta	-	-	136	-	-	132	-	-	141
Microlite	-	199	-	-	..	-	-	..	-
Nigeria	2,528	25	-	3,340	13	-	3,500	15	-
Portugal[6]	-	-	26	-	-	21	-	-	..
Rwanda	-	-	62	-	-	48	-	-	..
South Africa, Rep. of	-	40	-	-	13	-	-	..	..
Thailand	-	-	88	-	-	57	-	-	..
Uganda	-	-	20	-	-	..	-	-	..
Zaïre[5]	-	-	249	-	-	220	-	-	115
Total	18,050	863	930	28,460	426	705	30,000	615	401

Source: United States Bureau of Mines, annual publications.

[1]Excludes Niobium and tantalum-bearing tin slag. [2]Concentrates containing both elements are shown under Nb-Ta when composition data are insufficient. [3]Niobium and tantalum mineral concentrates are also produced in Spain, South West Africa, Rhodesia, USSR. [4]Exports. [5]Zaïre also produced Nb-Ta-bearing tin concentrate; 1968 output was 176,370 pounds containing about 10 per cent combined pentoxides. [6]As reported.

[e]Estimated; - Nil; .. Not available

TABLE 2

Principal Niobium Reserves by Country

Country	Niobium Content (million pounds)	Type of Occurrence
Brazil	9,000	Pyrochlore in weathered alkalic rocks and carbonatite, major. Columbite in pegmatites and placers, minor.
Canada	2,000	Pyrochlore in alkalic rocks and carbonatite, major. Other occurrences, minor.
Nigeria	650	Tin mining byproducts, placer and eluvial, major. Pegmatites, minor.
Uganda	550	Pyrochlore-bearing carbonatites, major. Columbite pegmatites, minor.
Tanzania	350	Pyrochlore-bearing carbonatites, eluvial and bedrock, major.
United States	320	Pyrochlore carbonatite, large, low grade. Placer, minor. Niobium in bauxite, titanium deposits, aluminum plant wastes; U.S. reserves are classified as a potential resource only.
Kenya	250	Pyrochlore in weathered carbonatite, eluvial.
Norway	50	Pyrochlore-bearing carbonatite dykes.
Zaïre	50	Pyrochlore in carbonatite (open-pit mining); major. Columbite in pegmatites and tin mining byproduct, major.
Other[1]	100	Placer and eluvial, largely by-product, carbonatite and pegmatite.

Source: United States Bureau of Mines Bulletin 650, Columbium.

[1] Rwanda and other African countries, Malaysia, Thailand, Uganda.

TABLE 3

St. Lawrence Columbium and Metals Corporation,
Production and Cost Data, 1966-70

	1966	1967	1968	1969	1970
	Fiscal Years Ended September 30				
Tons milled	406,698	369,642	360,194	475,201	724,345
Pounds of Nb_2O_5 produced	2,647,667	2,368,225	2,005,989	3,059,052	4,886,957
Value of production	$3,188,114	2,799,982	1,966,937	3,107,514	5,310,634
Cost of production	$1,928,236	2,170,411	1,614,581	2,450,469	3,417,707
Administrative and selling expenses, interest and mining duties, taxes	$ 321,046	286,771	228,187	219,464	335,920
Profits before depreciation and amortization	$ 929,259	342,799	124,169	437,580	1,557,007
Depreciation and amortization	$ 474,964	323,505	256,511	332,220	499,930
Net profit for the year	$ 454,295	19,294	(132,342)	105,360	1,057,077
Pounds Nb_2O_5 produced per ton milled	6.51	6.41	5.57	6.44	6.75
Value per ton milled	$7.84	7.57	5.46	6.54	7.33
Production cost per ton milled	$4.74	5.87	4.48	5.16	4.71
Value per pound Nb_2O_5 produced	$1.20	1.18	0.98	1.01	1.09
Production cost per pound Nb_2O_5 produced	$0.73	0.92	0.80	0.80	0.70
Total cost per pound Nb_2O_5 produced	$1.03	1.17	1.05	0.98	0.87

Source: St. Lawrence Columbium and Metals Corporation.

Tantalum Mining Corporation's operating costs before interest payments and outside exploration charges in 1970 averaged $9.66 per ton of ore milled or $3.47 per pound of tantalum pentoxide produced. Tonnage mined and milled during the year was 152,478 or 560 tons a working day, which was beneficiated to 312 tons of concentrate containing 51.55 per cent or 321,672 pounds of Ta_2O_5. Ore reserves at the end of 1970 were 1,643,742 tons grading 0.23 per cent Ta_2O_5, of which an estimated 467,839 tons would remain in pillars. Production in 1971 was expected to be about 430,000 pounds of tantalum pentoxide. The company increased its price of tantalum pentoxide from $7.00 to $8.00 per pound in 1971.

The following descriptions of two Canadian pyrochlore deposits are included to indicate the grade and relative size of ore occurrences that currently (1970-71) warrant the undertaking of the extensive and costly preproduction programs required prior to completion of feasibility studies of the scale and economics of production proposals.

Quebec Mining Exploration Company (SOQUEM) has entered into an agreement with the Copperfields Mining Corporation Limited for joint exploration and development of the St-Honoré pyrochlore-bearing property of SOQUEM about 8 miles north of Chicoutimi, Quebec. Estimates based on diamond drilling of the occurrence suggest a deposit of pyrochlore-bearing carbonatite in the order of 60,000,000 tons with an average grade of 0.65 per cent niobium pentoxide. The participating companies were reported (1971) to be arranging for sale of concentrates and tentatively planning for production on a basis related to the volume of sales that could be confidently expected.

Imperial Oil Enterprises Limited, Consolidated Morrison Exploration Limited, and associated companies control a large pyrochlore property in the James Bay lowlands area 31 miles south of Moosonee, Ontario. It was reported that drilling indicated about 80,000 tons of ore per vertical foot averaging 0.52 per cent niobium pentoxide (Nb_2O_5). Production decisions were under study in 1971.

WORLD PRODUCTION

Non-communist world production of niobium and tantalum concentrates is shown in Tables 1a, 1b, and 1c, for 1962-70. Production in 1970 was about 16,000 tons of concentrates of columbite, tantalite, and pyrochlore. Production in 1969 was approximately 14,250 tons.

Brazil

Brazil has maintained its position as the leading producer of pyrochlore concentrates since 1966, Leonardus, 1956. The world's largest producer of niobium is Companhia Brasileira de Metalurgia e Mineração (CBMM) from its mine near Araxa, Brazil. The ore occurs as a large high-grade deposit (3-4 per cent Nb_2O_5) of pyrochlore. The company's production of pyrochlore concentrate increased from 1.4 million pounds (Nb_2O_5 content) in 1965 to 11.3 million pounds in 1969. Plant capacity was increased in 1969-70 and production in 1970 was 17 million pounds of contained Nb_2O_5. CBMM is jointly owned by Brazilian interests (50.5 per cent), Molybdenum Corporation of America (33 per cent) and Pato Consolidated Gold Dredging Limited. Molybdenum

Corporation announced the development of a new process for making high purity niobium oxide; a small plant was constructed in Brazil for operation in 1971.

Nigeria

Nigeria was the world's leading producer of niobium from 1933, when production started, to 1965. In contrast to the recent producers of niobium from pyrochlore, its niobium and tantalum concentrates are a byproduct of tin mining where the niobium occurs in the mineral columbite.

Other Sources

Niobium and tantalum are also recovered from slags produced in the smelting of cassiterite (SnO_2) concentrate for the recovery of tin. Separation methods leave some columbite and tantalite in cassiterite concentrates; in the subsequent smelting of the tin concentrate a high proportion of the niobium and tantalum remains in the smelter slag. The combined pentoxide content of the slags ranges from about 4 to 20 per cent and these slags are sold to companies specializing in the extraction and refining of niobium and tantalum. A substantial contribution to the overall supply of these metals and their products comes from the slags derived from the smelting of tin concentrates from: Zaïre, Malaysia, Nigeria, Portugal, Singapore, Thailand and Brazil.

NIOBIUM

Consumption

The major part of Canada's production of pyrochlore concentrates is exported to the United States, Britain, and Europe. The principal competitor for foreign markets is Brazil. Canada's limited consumption of ferrocolumbium is shown in Table 4 from 1966 to 1970 are listed with imports of alloys and niobium production.

The United States is the largest consumer of niobium but produces only very small amounts of niobium mineral concentrates, and depends on imported niobium raw materials (see Table 5). It is the leading producer of ferrocolumbium and niobium oxide from duty-free imports of concentrate and tin slags. United States consumption of niobium in the form of high purity metal was 179,446 pounds in 1969 compared with the annual average consumption of 105,000 pounds over the period of 1965 to 1969.

Consumption of niobium in ferroalloys was 3.3 million pounds in 1969 compared with the annual average of 2.9 million pounds during 1965 to 1969. The consumption of ferrocolumbium (Fe, Nb) during 1969, by major use category was: alloy steel other than stainless steel and heat-resistant alloys, 36 per cent; superalloys, 24 per cent; carbon steels, 21 per cent; and stainless and heat-resistant steels, 16 per cent.

Pyrochlore concentrates from Brazil and Canada amounted to 48 per cent of non-communist world production of niobium in 1965 and increased to 85 per cent of the estimated 31 million pounds produced in 1970.

TABLE 4

Canada, Niobium and Tantalum Production and Trade, 1966-1970

	Unit	1966	1967	1968	1969	1970
Production: (Nb_2O_5 content of products shipped)	lb	2,637,997	2,159,557	2,181,304	3,414,495	4,919,000
	$	3,182,170	2,404,475	2,036,315	3,172,845	5,303,600
Tantalite (Ta_2O_5 content)	lb	-	-	-	..	321,672[4]
Imports[1] from United States						
Niobium and niobium alloys wrought	lb	-	185	375	1,178	-
	$	-	21,024	24,128	21,983	-
Niobium ores and concentrates	lb	-	-	-	-	-
	$	-	-	-	-	-
Tantalum and tantalum alloys wrought n.e.s.	lb	1,533	1,245	1,972	1,871	854
	$	180,326	195,086	117,240	105,095	54,408
Tantalum and tantalum alloys unwrought waste and scrap	lb	-	34,914	3,433	4,405	1,870
	$	-	498,508	30,590	18,310	15,988
Tantalum and tantalum alloy powder	lb	2,730	1,155	1,830	7,488	2,480
	$	99,939	33,527	59,443	158,607	77,274
Tantalum ores and concentrates	lb	-	-	-	-	-
	$	-	-	-	-	-
Tantalum metal and alloys in crude form and scrap	lb	-	-	-	-	-
	$	-	-	-	-	-
Tantalum semi-fabricated forms	lb	-	-	-	-	-
	$	-	-	-	-	-
Exports[2] to United States						
Niobium ore and concentrate	lb	1,524,279	890,884	295,333	919,577	1,270,362
	$	869,678	481,792	156,970	472,836	668,983
Consumption[3] by the steel industry						
Ferrocolumbium and ferrotantalum columbium (Nb and Ta-Nb content)	lb	40,000	78,000	288,000	244,000	293,000
	$	..	..	..	..	..

Source: Dominion Bureau of Statistics (Statistics Canada); and company annual reports.

[1] From U.S. Department of Commerce, Exports of Domestic and Foreign Merchandise, Report FT 410. Values in U.S. currency.
[2] From U.S. Department of Commerce, Imports of Merchandise for consumption, Report FT 135. Values in U.S. currency.
[3] 1961 to 1963 inclusive gross weight. 1964 to 1970 Nb and Ta-Nb content of ferroalloy material used. [4] 312 tons 51.55% Ta_2O_5.

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

TABLE 5

United States Imports, for Consumption, of Niobium-Mineral Concentrates by Countries, 1966-69 (thousands of pounds, gross weight)

Country	1966	1967	1968	1969
Angola	-	-	33	22
Argentina	-	11	2	-
Australia	-	-	-	-
Belgium-Luxembourg[1]	12	33	-	41
Brazil	4,995	3,536	2,163	2,462
Burundi-Rwanda	-	15	8	48
Canada	1,524	891	295	920
Finland	2	-	-	-
Gabon	-	-	7	-
Germany, West	-	80	-	-
Ivory Coast	15	-	-	-
Kenya	7	-	6	-
Malagasy Republic	-	7	-	-
Malaysia	74	202	133	59
Mozambique	-	11	18	4
Netherlands[1]	-	-	13	69
Nigeria	2,421	2,519	737	423
Peru	14	-	-	-
Portugal	28	18	16	-
Rhodesia	-	8	3	-
South Africa, Rep. of	11	-	-	-
Spain	10	-	9	20
Switzerland[1]	22	-	-	-
Uganda	15	4	7	3
United Kingdom	-	18	-	-
Western Africa, n.e.c.	-	11	-	-
Zaïre	128	66	207	90
Total	9,278	7,431	3,657	4,161

Source: United States Bureau of Mines, Minerals Yearbook.

[1] Country of transshipment.

- Nil.

The two countries supplied a total of 104 million pounds of pyrochlore concentrates, 70 per cent from Brazil, and 30 per cent from Canada, in the six years 1965 to 1970. United States imports of niobium-mineral concentrates in 1965 to 1969 were 29.4 million pounds of which Brazil supplied 47 per cent and Canada 19 per cent. Details of the United States niobium imports are shown in Table 5.

Demand

Consumption of niobium in significant amounts occurs principally in countries that have developed an advanced metallurgical industry. Incomplete consumption data and allowance for contingencies result in demand projections with a very wide range between high and low forecast figures (Griffith and Sheridan, 1970). The forecast range of demand for niobium in the year 2000 in the United States is between 15.8 and 22.5 million pounds. The median of the range is 19.15 million pounds, corresponding to an annual growth rate from 1968 consumption of 4.85 per cent compounded.

The demand in the rest of the world, under contingency assumptions, may reach 38.4 million pounds or could be as low as 13.3 million pounds in the year 2000, equal to an annual growth rate from 1968 of about 7 per cent to 3.5 per cent.

Prices

Columbite concentrates containing significant amounts of tantalum are sold on the basis of 65 per cent combined pentoxides (Nb_2O_5 plus Ta_2O_5). Published price quotations generally state a specific oxide ratio (Nb_2O_5 to Ta_2O_5) of 10 to 1 or 8 to 1. Thus in August 1971 the price of columbite concentrate, ratio 10 to 1 c.i.f. United States ports, was 85 to 90 cents per pound of combined oxides.

Pyrochlore containing a minimum of 50 per cent Nb_2O_5 and not more than 1 per cent Ta_2O_5, f.o.b. Canadian producers' plant, contract sales only, was priced $1.15 to $1.20 a pound contained Nb_2O_5, in August 1971. Brazilian pyrochlore at the time was priced at $1.15 a pound contained Nb_2O_5, f.o.b. shipping point.

Ferrocolumbium is marketed in low-alloy standard grades and high purity grades that contain from 50 per cent to more than 70 per cent niobium. Prices are based on the niobium content and in ton lots, f.o.b. shipping point ranged in August 1971 from $2.45 to $2.65 a pound of contained niobium in the standard grades and from $4.12 to $6.81 a pound of niobium in the high-purity grades.

Niobium metal is available in many grades and forms ranging from 95 per cent to over 99 per cent pure. It is marketed in ingots, billets, bars, plate, sheet, foil, wire, powder, tubing, and in fabricated shapes. Good quality niobium metal powder, reactor grade 99.5 to 99.8 per cent Nb currently (August 1971) sells for $12 to $23 a pound, and metallurgical powder for $11 to $24 a pound. Ingot ranged from $16 to $28 a pound in reactor grade and metallurgical grade.

TANTALUM

Consumption

Canada imports minor amounts of tantalum metal, alloys, and alloy powder, from the United States. Production and export of tantalum concentrates began late in 1969 (see Table 6).

The United States is the largest user of tantalum and domestic production has been negligible in comparison with consumption. The United States depends on imported tantalum but is the leading producer and a new exporter of primary tantalum products (powder, sponge, and carbides). Tantalum metal consumption in the United States in 1968 was 423,063 pounds (see Table 5). About 60 to 65 per cent of that consumption was in electronic applications, 25 to 30 per cent in the chemical industry, and 5 to 10 per cent as carbides.

Consumption of ferrotantalum-niobium (FeTa-Cb) was about 1 per cent of total FeCb consumption. The uses of FeTa-Cb in 1968 were in the production of stainless and heat-resistant steel (53 per cent), and other alloys steels (9 per cent), miscellaneous and unspecified uses (38 per cent).

Demand

Based on assumptions for various end uses, tantalum requirements of the United States are expected to increase substantially during the next three decades, reaching a forecast range of 3.4 to 5.1 million pounds by the year 2000, compared with a demand for 1.04 million pounds in 1968. This represents average annual growth rates of 3.75 and 5.1 per cent during 1968-2000. A straight line projection of U.S. demand based on the past 5 years shows an annual demand of 5.45 million pounds by 2000, while a projection based on the past 20 years shows an annual demand of 3.0 million pounds by 2000.

It is expected that the forecast range of requirements for tantalum in the rest of the world will be from 3 to 5 million pounds by 2000. Although presently known (annual) consumption in all other countries is only about 750,000 pounds, requirements, particularly those of the highly industrialized countries such as Japan and those of Europe, should increase at rates slightly higher than the forecast growth in the United States. The rest of the free world is estimated to have consumed 250,000 pounds of tantalum in 1968, with the USSR accounting for most of the remaining 500,000 pounds (Griffith and Sheridan, 1970).

Prices

Tantalite concentrate prices are based on the tantalum pentoxide content. Quotations are published irregularly and usually on a basis of 60 per cent contained tantalum pentoxide. In August 1971 published prices for tantalum ore containing about 60 per cent combined niobium and tantalum pentoxide, c.i.f. United States ports, were $6.75 to $7.50 per pound of Ta_2O_5. Canadian tantalite concentrate containing a minimum of 50 per cent Ta_2O_5 and a maximum of 1 per cent Nb_2O_5 was priced at $8.00 per pound of contained tantalum pentoxide at the producers' plant site.

Tantalum metal prices vary with the grade of the metal and the form in which the metal is produced. Published prices in August 1971, per pound of metal f. o. b. shipping point, depending on size of lot, ranged from $28.50 to $38.50 for tantalum metal powder, $36 to $60 for sheet, and $36 to $50 for rod.

TABLE 6

United States Imports, for Consumption, of Tantalum-Mineral Concentrates by Countries, 1966-69 (thousands of pounds, gross weight)

Country	1966	1967	1968	1969
Argentina	10	3	7	-
Australia	29	58	71	75
Belgium-Luxembourg[1]	27	60	15	30
Brazil	287	356	342	253
Burundi-Rwanda	20	45	62	31
Canada	-	-	-	220
Central African Republic	-	5	-	-
Cyprus	-	-	1	-
French Guiana	1	-	-	-
Germany, West	109	-	22	-
Kenya	27	21	5	-
Malagasy Republic	1	15	-	-
Malaysia	36	33	15	25
Mozambique	175	241	306	77
Netherlands[1]	166	42	41	-
Nigeria	40	135	20	8
Portugal	67	99	24	-
Rhodesia	16	41	17	-
South Africa, Rep. of	8	18	14	19
Spain	13	11	14	27
Tanzania	-	-	-	9
Thailand	89	138	-	22
Uganda	7	24	12	-
Uruguay	2	-	-	-
Western Africa, n. e. c.	-	17	-	-
Angola	20	-	-	-
Zaïre	993	313	242	179
Total	2,143	1,675	1,230	975

Source: United States Bureau of Mines, Minerals Yearbooks.

[1] Country of transshipment.

- Nil.

Stockpiling

The United States government has stockpiles of niobium in the form of niobium concentrates, niobium oxide, ferrocolumbium, niobium metal, and niobium carbide. Stockpile objectives for niobium are: ferrocolumbium, 930,000 pounds; niobium metal, 45,000 pounds; and niobium carbide powder, 20,000 pounds. The excess at the end of June 1971, was an additional 7.7 million pounds of contained niobium in concentrates, 363,305 pounds of ferrocolumbium, and 85,826 pounds of niobium oxide powder.

The stockpile objectives for tantalum are: tantalum carbide powder, 26,750 pounds; tantalum metal, 300,000 pounds; tantalum mineral concentrates, 2.9 million pounds. The excess in the tantalum stockpile at the end of June 1971 was approximately 965,000 pounds in concentrates.

CHAPTER III

GEOLOGY, MINERALOGY AND GEOCHEMISTRY

TYPES OF DEPOSITS

Eluvia

Eluvia or soils produced in situ from deeply weathered bedrock are widespread in the tropical areas of the world whereas the soils of the temperate zones are often unaltered and because of mass transport may have no genetic relationship to the subjacent bedrock. Tropical eluvial deposits include bauxites and laterites that form cappings overlying columbite-tantalite or pyrochlore-bearing crystalline rocks. Tropical weathering processes dissaggregate the host rock and may alter it to a depth of 300 feet, although the thickness of the eluvia does not often exceed 100 feet. Maximum concentrations of niobium and tantalum minerals are usually found in the top 30 feet in the form of columbite, pyrochlore, or secondary titanium minerals bearing niobium and tantalum with apatite and magnetite. The first two might be classed as resistates the last as recrystallized species.

The surface part of the eluvial capping may not resemble the source rock that lies beneath except for the resistant accessory minerals that are freed and left behind. In most cases there is a gradation downwards through more recognizable, less altered material to consolidated rock at depth. This succession may be locally modified by chemical enrichment or by the effect of local surface drainage patterns.

Nb-Ta deposits may be produced by the deep tropical weathering of biotite-albite- or biotite-albite-riebeckite granites, granite pegmatites, alkaline syenites and syenite pegmatites, and alkaline syenite-carbonatite complexes. The process dissolves the silicates leaving such resistant accessories as cassiterite, columbite, and pyrochlore. Bauxites derived from alkaline syenites may contain near-economic deposits of niobium and tantalum held in the lattices of resistant titanium minerals.

The physical properties of eluvia assist in the search for niobium and tantalum deposits due to the association between these elements and thorium and concentrations of magnetite. The first association makes it possible to search for these deposits using either airborne or ground radiometric surveys, while the association between magnetite and the niobium-tantalum minerals make magnetometer surveys another valuable procedure for the identification of these deposits. Prospecting using test pits combined with panning the samples utilizes the high specific gravity of these minerals as indicators of potential orebodies.

Examples of eluvial deposits can be seen in the bauxites of Arkansas that overlie alkaline syenites. Regoliths overlying carbonatites are mined or are potential mines at Araxa, Brazil and Tororo, Uganda and regoliths overlying granite pegmatites are sources of niobium in West Australia.

Placers

Until 1961 the main source of niobium and tantalum was columbite concentrates recovered as byproducts from the tin placers in Malaysia, Burma, Thailand, and the Jos Plateau of Nigeria. There is still sufficient production (1971) from this source as mineral concentrates and from the tin smelter slags, to cause stiff competition to pyrochlore producers from the alkaline syenite complexes in Canada and the eluvia of Brazil.

The placers form in areas where the combination of suitable source rocks, the weathering process, and water transportation are optimal. Such rocks as albite-biotite-columbite- and albite-riebeckite-pyrochlore granite, and/or granite and syenite pegmatites are the primary source of the ore minerals. The combination of chemical and mechanical weathering processes required to produce sands and gravels containing columbite and pyrochlore are more typical of tropical areas and are much less common in temperate climates like that of the Cordillera of western Canada, although the flow of water and gradient changes necessary to concentrate the ore minerals into economically interesting pay streaks are more common in the latter. Modern unconsolidated placers of tin and niobium minerals suggest that fossil placers in sandstones and conglomerates will be found and exploited.

The mineralogy of niobium-bearing placers is diverse and such minerals as ilmenite, rutile, zircon, pyrochlore, cassiterite, columbite-tantalite, samarskite, euxenite, and monazite have been described. Ilmenite, rutile, zircon, and pyrochlore placers are related to nepheline syenites and alkaline granites, whereas cassiterite, columbite-tantalite, samarskite, euxenite, and monazite are derived from granites and granite pegmatites.

Placer development requires stream gradients steep enough to move the products of weathering and gradient variations that will serve as 'riffles' to separate the 'lights' from the 'heavies'. These conditions are found in streams and in coastal currents along shorelines. Hence, genesis of placer deposits is dependent on the presence of niobium and tantalum minerals in the source rock, a combination of physical and chemical weathering conditions, and sufficient topographic relief to contribute to the transportation and beneficiation of the ore minerals.

Placer deposits have traditionally been discovered by the combination of test pitting and panning, one of the oldest and most reliable tests for these deposits. More recently the discovery of the association between niobium, uranium and thorium has made it possible to search using radioactivity measurements, and the common occurrence of magnetite in placers suggests that anomalous magnetic effects over gravels should be checked for the presence of niobium-tantalum values.

Cassiterite-columbite placers have been most productive in Nigeria and east Asia; samarskite placers have been reported in Altai, USSR; ilmenite placers in the Ukraine; euxenite placers in Bear Valley, Idaho and Bugaboo, B.C.; zircon placers in Sukulu, Uganda, and ilmenite-rutile placers in the Urals, USSR.

Carbonatites

Carbonatites, with or without alkaline syenites, typically occur in Precambrian continental shields. There has been a lengthy controversy related to their genesis. The extreme points of view hold that they are products of the intrusion and differentiation of a primary carbonatite magma, or that they are remobilized sedimentary limestones. The current concensus favours the first point of view. Carbonatites have been known for several hundred years and in this time they have been the source of several commodities. Lime has been mined at Alnö since the 16th century and magnetite in the period between 1754 and 1879. Hematite has been mined in the Fen District, Norway, Bergston and Svinndal, 1960, since 1652 and the first pyrochlore mine commenced operation there in 1953. Pyrochlore has been mined from carbonatite at Kaiserstuhl 1935-36 and 1949-52 and on the Kola Peninsula, USSR 1941-45. Iron ores have been prospected at Gunnison, Colo., 1883; Iron Mountain, Colo., 1873 and have been mined at Impanema, Brazil since the 16th century. More recently carbonatite complexes have been a source of lime for the cement industry and apatite for fertilizer. Since technological developments in the ferrous metallurgy and electronics industries have enlarged the market for niobium and tantalum, it has become profitable to mine pyrochlore from the Oka complex in Canada and, more recently, the Araxa complex in Brazil.

Alkaline syenite-carbonatite complexes commonly occur in stable crustal areas, like the Canadian Precambrian Shield south of Hudson Bay. They have a spatial relationship to fault lineaments like the Kapuskasing-Moosonee high, the St. Lawrence River fault system or the marginal fault of the East African rift system. In East Africa several complexes also relate to alkaline volcanism with such obvious features as cones, pyroclastics and lava flows. Elsewhere, the relationship is less obvious; at Oka for example the volcanic features are restricted to some breccia-filled pipes and the annular structure. Elsewhere the connection is even less well supported by the field evidence. The complexes are generally less than five miles in diameter, circular to elliptical in plan section and consist of a central plug of breccia, carbonatite or syenite surrounded by annular rings of alternating rock types that dip inward as ring dykes or outward as cone sheets. Superimposed on these structures are dykes and veins of carbonatite, lamprophyre or breccia and faults or shear zones. The structural characteristics vary greatly in detail from one occurrence to the next.

The rock succession from core to periphery varies from complex to complex. Some complexes have cores or plugs of carbonatite whereas others are one of the alkaline syenites. These are followed by one or more concentric rings of syenitic contact rocks or breccia, carbonatite breccia, pyroxenitic fenites, with or without magnetite, garnet, wollastonite, alkalic fenitized gneiss and gneiss.

The genesis of the complexes has been attributed to the intrusion of a primary carbonatite magma, or a magma contaminated by the incorporation of lime and carbon dioxide from sedimentary limestones. A third alternative suggests the carbonatite solutions were instrumental in creating carbonatite dykes and stocks.

The mineralogy of these complexes is involved, commonly including a large number of rare mineral species; complex oxides of niobium, the rare-earths, uranium, thorium, and titanium have been reported. Of these pyrochlore is the Nb-bearing species of current economic interest but niobium

perovskite, betafite, and niocalite are commonly associated with Nb-bearing silicates, oxides, and sulphides. Other silicates include aegirine, amphibole, pyroxene, mica, and chlorite. Apatite, fluorite, magnetite, and fluo-carbonates are commonly present along with the sulphides pyrite and pyrrhotite.

Pyrochlore exhibits certain lithological affinities and characteristically reaches peak abundance in sovites (calcite carbonatite), although it has been reported in most rock types of the alkaline-syenite-carbonatite complexes and even rarely reported in fenites. It occurs as fine-grained irregular disseminations in sovite, rauhaugite (dolomitic carbonatite), ankerite, and carbonatites and some limited parts of sovite may reach ore grade.

The orebodies vary in size, shape, and distribution. They may be restricted to one lithological unit, transgress more than one unit, or be controlled by structural features. For example concentrations may be related to geological features, central plugs, or ring dykes, and ore shoots may vary from regular to irregularly shaped bodies.

The association of thorium with these deposits has made it practical to prospect using scintillometer surveys. The St-André and St-Honoré bodies were first detected by this procedure, whereas the discovery of the Oka deposits was made using a portable scintillometer. A number of the complexes are sufficiently enriched in magnetite that magnetometer surveys are a useful means for the discovery of new complexes or the delineation or rock units within the body. Gravimetric surveys have proven a useful aid to the discovery of complexes as well as the delineation of general shape. The ring structure can be identified from aerial photographs and this procedure provides a means to detect these bodies.

Syenite and Syenite Pegmatite

Niobium minerals have been reported in nepheline syenites and their pegmatites but they have not been found in commercial quantities. The niobium mineral loparite has been reported in the urtites, lujarvite and juvites of the Lovozero massif in the USSR. Pyrochlore has been reported in nepheline syenites in the Vishnevye Mountains, USSR and in the Bancroft area of Ontario. The minerals occur as disseminations in stocks and dykes of nepheline syenites and nepheline syenite pegmatites bearing niobium minerals. Occurrences of the last type have been reported from the Kola Peninsula, USSR.

The deposits have been interpreted as differentiation products of nepheline syenite magma or the metasomatic replacement of limestone beds, remobilized and later intruded. It is not known whether or not these occurrences have physical properties that lend themselves to detection by geophysical surveys. Other examples of occurrences in nepheline syenite and pegmatite have been reported from the Ilmensky Mountains and the Kola Penninsula of the USSR.

Granite and Granite Pegmatite

Until mining of the alkaline syenite-carbonatite complex at Oka, Quebec started in 1961, the main sources of niobium and tantalum were mines and pits in columbite-tantalite pegmatites, their eluvial cappings, and the placers derived from them. Niobium-rich alkaline granites have been known

for many years but production from this source has been limited to tropical areas where exogenic cappings and placers beneficiate the source deposit to an economic level. These exogenic deposits and pegmatites continue to be a major source of tantalum.

Accessory columbite-tantalite, xenotime, helvite, and fergusonite are commonly found in alkaline granites with biotite and albite; pyrochlore occurs less commonly in biotite and/or riebeckite albite granites, and rarely pyrochlore and columbite have been identified in other alkaline granites. Columbite-tantalite, commonly associated with one or more of spodumene, lepidolite, beryl, cassiterite, and pollucite appears in certain complex pegmatites. Wodginite, a tin-bearing variety of tantalite, forms a commercial deposit at the Bernic Lake, Manitoba mine and occurs in other pegmatites in West Australia. Fergusonite, samarskite, eschynite, and pyrochlore have been reported in mineral occurrences from pegmatites, granite porphyries, and aplites in several areas of Canada.

These deposits and occurrences are related to the internal and external structures and lithological units of areas of acid and alkaline crystalline rocks. The contacts of such stocks and batholiths, related fracture systems occupied by vein and pegmatitic materials, contact breccia zones, and metamorphic aureoles are some of the structures to search. Pegmatites should be specially studied taking into consideration the effects of textural and structural variations, variations in size, shape, grain size and the complexity of the internal zonation due to differentiation or replacement processes. Zoned granitic pegmatites at Wogina, West Australia, and Bikita, Rhodesia have proven highly productive sources of tantalum.

The lithological succession in batholiths is important because columbite and pyrochlore crystallize as independent mineral species only in the alkaline differentiates of granite magmas. Such rock facies as biotite-albite or biotite-riebeckite albite granites, granite pegmatites, albitic aplites, as well as albitized or greisenized zones are prime prospecting areas. Granite pegmatites, particularly the internally zoned bodies, are characterized by a symmetrical to asymmetrical succession of lithological zones. These are products of normal differentiation, interrupted differentiation, and replacement processes and such zones have been named the contact zone, wall zone, one or more intermediate zones, and the core zone. These are distinguished mineralogically and texturally by criteria including grain size variations and secondary alteration effects.

The primary genesis of these sources of niobium and tantalum have been ascribed to the final stages of differentiation of deep seated granite magmas which may have been derived from deeply buried sedimentary rocks or may have had a primary origin from the base of the crust. The products of magmatic differentiation have been locally enriched in niobium and tantalum by such processes as albitization or greisenization. Placer deposits derived from such concentrations have been reported from the temperate zones but are most abundant in tropical areas where the lack of recent glaciation and intense weathering processes have produced eluvial and alluvial deposits that are a continuing major souce of the elements. The alkaline and acid intrusive rocks commonly become economic only as a result of such secondary enrichment.

The physical properties of the alkaline granites and pegmatites have not been widely exploited by the use of geophysical prospecting techniques. The low content of ferromagnetic minerals makes it relatively difficult to

separate these rocks from sedimentary rocks or gneisses having similar properties. The high content of alkalis and radioactive mineral constituents could be exploited however to discover new areas of these rocks which are potential sources of niobium and tantalum. The low specific gravity of these rocks may be utilized increasingly in gravimetric studies to delineate potential buried stocks or pay zones within stocks or batholiths. Searches of aerial photographs for white outcrops, linear dyke-shaped outcrop forms, and resistant ridges near stocks or batholiths might facilitate the discovery of related tantalite-bearing pegmatites.

Because of the association of tantalite-bearing pegmatites and alkaline granites, the distribution of the latter may have an economic significance. Examples of niobium-tantalum bearing granites are not abundant but are widely distributed. Biotite granites with accessory columbite outcrop on Jos Plateau, Nigeria; euxenite-bearing granites outcrop near Golden, B.C., euxenite-fergusonite bearing granites outcrop in the Idaho batholith, U.S.A., and Longonyukan, Urals, Korovikhinski, Altai, Kazakhstan, Erzin in the USSR. Simple pegmatites bearing columbite outcrop near the Preissac-Lacorne batholith in Quebec; samarskite, euxenite, eschynite occur in many other Canadian pegmatites; complexly zoned and altered pegmatites with lithium minerals and tantalite and microlite outcrop at Harding, New Mexico, Bernic Lake, Manitoba, Yellowknife-Beaulieu River, District of Mackenzie, and Bikita, Rhodesia.

MINERALOGY

Major Mineral Species

Betafite

Composition: $8(Na, Ca, U)_2 (Nb, Ti, Ta)_2 (O, {}_6F)$ cubic, commonly metamict. A uranium-titanium-bearing pyrochlore; as redefined by Hogarth (1961) contains 15 per cent of more U. Part of the pyrochlore-betafite series Nb_2O_5 = 10-50 per cent; Ta_2O_5 up to 20 per cent. Minerals of the series are found typically with euxenite, fergusonite, allanite, metamict zircon, or beryl in granite pegmatites and in detrital deposits, and less commonly in alkalic rocks and carbonatites.

Physical properties: Occurs as masses, grains, and octahedral crystals. Fracture is conchoidal. Brittle. Hardness 4 to 5 1/2. Specific gravity 3.7 to 5, with low values probably due to alteration. Commonly metamict.

Optical properties: Colour yellow, brown, greenish brown, reddish brown, black. Lustre waxy to vitreous to submetallic. Transmits light in thin fragments. Colour in thin sections: colourless, brown, reddish brown. Isotropic. High relief.

Varieties: Blomstrandite, ellsworthite, mendeleyevite are synonyms. Ellsworthite is allied to hatchettolite which is an uranian-tantalian-titanian variety of pyrochlore. Rare-earth betafite near obruchevite and yttrohatchettolite in composition. Samiresite is the plumboan variety. Tantalobetafite is the tantalian variety. Titanobetafite is the titanian variety. Zirconium betafite is the zirconian variety.

Columbite

Composition: Niobium-rich members of the columbite-tantalite series are called columbite. The general formula is (Fe, Nm) $(Nb, Ta)_2O_6$. Orthorombic. Part of the columbite-tantalite isomorphous series, Nb greater than Ta; includes ferro-columbite with Fe greater than Mn and mangano-columbite with Mn greater than Fe. The Nb_2O_5 content ranges from 47.22 to 78.88 per cent. Columbite-tantalite mineralization is abundant and widespread. The mineral occurs as accessory minerals in granite; in granite pegmatites, particularly those with albite or lithium minerals; and in derived detrital deposits.

Physical properties: Columbite-tantalite occurs as grains, subhedral crystals and orthorhombic crystals ranging from short prismatic to thin tabular. May occur in groups of parallel, subparallel, or radiating crystals. Heart-shaped contact and penetration twins occur, and may be repeated giving pseudohexagonal trillings. Brittle. Cleavage (010) distinct, (100) less distinct. Fracture subconchoidal to uneven. Hardness varies from 6 to 7 as the Ta_2O_5 content increases in the series. Specific gravity of members of the series ranges from 5.12 to 8.20 increasing with tantalum content. Some varieties are magnetic resulting from the iron content, its valency and position in the individual crystals. Some varieties are radioactive because of U^4 or Th^4 in Fe^2 positions in the lattice or in mechanical mixtures with columbite. It occurs widely in granites and granite pegmatites.

Optical properties: Colour black to greyish black to brownish black, with reddish brown internal reflections (especially in the manganian varieties). Commonly tarnished, irridescent. Streak dark red to black. Colour in thin section: red, reddish yellow, reddish brown. Some varieties are strongly pleochroic; in polished section, grey-white with brownish tint, red or reddish brown internal reflections.

Varieties: Baierine (baierite), dianite, ferro-ilmenite, greenlandite, and hermannolite are synonyms. Magno-columbite, the magnesian analogue of columbite occurs in pegmatite that has assimilated dolomite.

Tantalite

Composition: (Fe, Mn) $(Ta, Nb)_2O_6$ is orthorhombic. It forms part of the columbite-tantalite isomorphous series, Ta >Nb; includes ferro-tantalite with Fe >Mn and manganotantalite with Mn> Fe. Ta_2O_6 = 86.1 per cent (theoretical end member). Found in granitic pegmatites, especially late-stage albitic pegmatites containing Li and Be.

Varieties: Alvarolite (managanoan), harttantalerz, ildefonsite and siderotantalite are synonyms for tantalite. Calciotantalite may be a synonym for tantalite or a mixture of tantalite and microlite.

Eschynite - Priorite Series

Composition: (Ce, Ca, Fe, Th) $(Ti, Nb)_2O_6$ orthorhombic and naturally metamict. It is the cerium-dominant member of the eschynite-priorite series. Nb_2O_5 content ranges from 15.08 to 36.68 per cent. Ta is low or absent. It occurs in granite pegmatite and nepheline syenites. Eschynite is found most often in nepheline syenite with zircon and samarskite. Priorite occurs in granite pegmatites with euxenite, zircon, monazite, and other rare-earth minerals. Both minerals have been found in placers.

Physical properties: Occurs as grains, masses, and prismatic to tabular orthorhombic crystals. Cleavage (100). Fracture conchoidal. Brittle. Hardness 5 to 6. Specific gravity 4.95 to 5.19. Commonly radioactive.

Optical properties: Colour yellow, brown, black. Streak reddish yellow to brown to almost black. Lustre resinous to waxy to submetallic, commonly dulled by alteration. Colour in thin section light brown to reddish brown. Isotropic (metamict).

Varieties: Lyndochite (a niobian-thorian variety of eschynite?). Sinicite uranian variety. Priorite the yttrian part of the eschynite-priorite series. Blomstrandine (blomstrandite) synonym for priorite.

Euxenite - Polycrase

Composition: (Y, Ca, Ce, U, Th) $(Nb, Ti, Ta)_2O_6$ orthorhombic naturally metamict. Part of the euxenite-polycrase series, Ti; (Nb + Ta) lie between 2:3 and 1:1 Nb_2O_5 = about 21-34 per cent. From granitic rocks and pegmatites and placers derived from them. These minerals sometimes occur in close association with columbite and monazite. Polycrase (Y, Ca, Ce, U, Th) $(Ti, Nb, Ta)_2O_6$ part of the series; ratios Ti: (BNb + Ta) lie between 1:1 and 3:1.

Physical properties: Occurs as grains, masses, stout prismatic and flattened orthorhombic crystals, and parallel, subparallel and radial aggregates of crystals. Twinning is common on (201), rare on (101) and (013). Fracture subconchoidal to conchoidal. No cleavage. Hardness 5 1/2 to 6 1/2. So weakly magnetic the property is useless for ore beneficiation. Specific gravity 4.29 to 5.90. Generally radioactive.

Optical properties: Colour black, commonly with a greenish or brownish tint, amber, mottled amber and black. Streak yellowish, greyish, reddish brown. Transparent in thin splinters. Lustre, greasy to vitreous to submetallic. Colour in thin section brown, yellowish brown, reddish brown. Isotropic.

Varieties: Eschwegeite; synonym for tanteuxenite. Nuolaite, a variable mixture of euxenite and obruchevite. Oliveiraite an alteration product of euxenite. Tanteuxenite a variety of euxenite with Ta substitution for Nb. Wiikite variable mixtures of euxenite and obruchevite. Tantalopyrocrase is a variety of polycrase in which Ta replaces Nb.

Fergusonite

Composition: (Y, Er, Ce, Fe) (Nb, Ta, Ti)O_4 tetragonal naturally metamict. Part of the fergusonite-formanite series; Nb>Ta and Y>Er. Contains up to 8 per cent U and Th in substitution for Y and Er. Nb_2O_5 = 54.1 per cent of the theoretical end member. Fairly common accessory mineral in granite pegmatites, particularly those rich in rare-earth elements, niobium, tantalum, and beryllium, and in placers derived from such rocks. Formanite (Y, Er, U, Th, Ca) (Ta, Nb, Ti)O_4 is also tetragonal and naturally metamict. Ta>Nb. Ta_2O_6 = 66.2 per cent the theoretical end member.

Physical properties: Occurs as grains, prismatic to pyramidal tetragonal crystals, and irregular dense masses. Cleavage distinct (001) poor along (111). Fracture subconchoidal. Brittle. Hardness of members of the series ranges from 5 1/2 to 6 1/2. Specific gravity of members of the series ranges from 5.6 to 5.8, increasing with increasing Ta content. Commonly radioactive. Magnetic susceptibility is too low for ore beneficiation.

Optical properties: Colour grey, yellow, brown, dark brown. Streak greenish grey, yellowish brown, brown. Lustre vitreous to submetallic on fresh surfaces. Colour in thin section, light brown to dark brown. Uniaxial, negative. Metamict material is isotropic. Weak pleochroism.

Varieties: Adelpholite (altered mossite?), alpha-fergusonite, (naturally occurring nonmetamict fergusonite), bragite, kochelite, sipylite and tyrite are synonyms for fergusonite. Arrhenite an altered fergusonite. Beta-fergusonite a naturally occurring nonmetamict monoclinic polymorph of fergusonite. Risörite a naturally metamict titanian variety of fergusonite. Rutherfordite an altered fergusonite.

Pyrochlore

Composition: $(Na, Ca, Ce)_2$ $(Nb, Ti, Ta)_2$ $(O, OH, F)_7$ cubic part of the pyrochlore-microlite series. Nb_2O_5 = 73.05 per cent the theoretical end member. From pyrochlore typically occurs associated with alkalic rocks in pegmatites, nepheline syenite, various alkalic dyke rocks, carbonatites associated with alkalic intrusives, extrusive alkalic rocks, greisen, and in decomposition products of these rocks. Typically in albitized parts of granite pegmatites, frequently with associated columbite or tantalite. Microlite $(Ca, Na)_2$ $(Ta, Mb, Ti)_2$ $(O, OH, F)_7$ the cubic part of the pyrochlore-microlite series. Ta_2O_5 = 82.1 per cent of the theoretical end member.

Physical properties: Occurs as grains, octahedral crystals, subhedral crystals, and irregular masses. Spinel law twins, twin plane (111), are rare. Cleavage (or parting?) octahedral, usually not distinguishable but may be distinct in thin section. Fracture subconchoidal to uneven to splintery. Brittle. Specific gravity of members of the series ranges from 4.2 to 6.4, increasing with the increasing Ta content. Hardness of members of the series ranges from 5 to 5 1/2. Commonly radioactive. Magnetic susceptibility is too low for ore beneficiation.

Optical properties: Colour white, grey, pale yellow, honey yellow, pale brown, brown, reddish brown, black. Lustre vitreous, resinous, submetallic. Streak light brown, yellowish brown. Isotropic, but nonmetamict material may have weak anomalous birefringence. Relief high. Colour in thin section colourless, grey, pale brown, brown, reddish brown, dark brown to opaque. Zonal structure common.

Varieties: Azor-pyrrhite, columbomicrolite, fluochlore, hydrochlore, niobpyrochlore, pyrrhite, are synonyms for pyrochlore. Chalcolamprite (a variety or a mixture of minerals?). Endeiolite altered pyrochlore. Koppite the cerian-ferrian variety. Marignacite altered cerian variety. Priazovite uranian pyrochlore rich in Y, synonymous with obruchevite. Scheteligite the titaniferous pyrochlore rich in Mn, Y, and Sb. Urnaopyrochlore, uranian pyrochlore are near hatchettolite in composition. Yttrobetafite intermediate between pyrochlore and obruchevite. Yttrohatchettolite a yttrium-uranium bearing pyrochlore with Nb and Ta in nearly equal amounts. Bismuthomicrolite the bismuthian variety of microlite (Bi_2O_3 = 3.25 per cent). Djalmite uranoan microlite or tantalian betafite. Haddamite, metasimpsonite, neotantalite and uranmicrolite are synonyms of microlite.

Niocalite

Composition: Niobium calcium silicate. CaO 46.8; Na_2O 0.7; Nb_2O_5 16.8; rare-earths and Al_2O_3 2.0; SiO_2 26.8; H_2O 0.2 and F 1.7 per cent.

Physical properties: Occurs as grains and elongate orthorhombic crystals that are four-sided in section parallel to the c-axis. Specific gravity 3.3. Hardness 5 to 6.

Optical properties: Colour yellow. Lustre vitreous. Streak colourless. Colourless in thin section. Relief moderate. Under crossed nicols the mineral shows very complex twinning. Sections parallel or almost parallel to the long axis give lemon-yellow, grey, and blue-grey interference colours, and sections perpendicular to the long axis give red and blue colours.

Related species: Wöhlerite, hiortdahlite, and låvenite. Niocalite occurs in the carbonatites of the Oka, Quebec area.

Samarskite

Composition: The formula is probably AB_2O_6 with A = Y, Er, Ce, La, U, Ca, Fe^2, Pb, Th; and B = Nb, Ta, Ti, Sn, W, Zr ?. The Nb_2O_5 content ranges from 27.77 to 46.44 per cent and the Ta_2O_5 content ranges from 1.81 to 27.03 per cent. Orthorhombic. Commonly altered by hydration to yellowish or brownish material. The mineral is found in granite pegmatites often in close association with columbite, and in derived detrital deposits.

Physical properties: Occurs as grains, masses and prismatic to tabular orthorhombic crystals. Clevage (010) indistinct?. Fracture conchoidal. Brittle. Hardness 5 to 6. Specific gravity 5.69 to 6.2. Commonly radioactive.

Optical properties: Colour velvet black, commonly with a brownish tint; grain and crystal surfaces commonly brown to yellowish brown due to alteration. Lustre vitreous to resinous to submetallic to splendent; commonly dull on grain and crystal surfaces. Streak dark reddish brown to black; grey to yellowish brown on altered material. Transparent in thin splinters. Colour in thin section light brown to dark brown. Generally metamict and isotropic.

Varieties: Ampangabeite, ånnerödite, eytlandite, nuevite, uranniobite, uranotantal and yttroilmenite are synonyms for samarskite. Calciosamarskite is related to obruchevite. Hydrosamarskite is an altered samarskite. Ishikawaite is a U- and Fe-rich variety. Khlopinite (chlopinite, hlopinite) is a titanian variety. Nohlite is a mineral mixture in part samarskite. Plumboniobate a plumboan variety. Rogersite an altered variety. Vietinghofite a ferroan variety.

Other Niobium-Tantalum Minerals

In addition to the niobium and tantalum minerals described above there are less common species of the ABX_4, AB_2X_6, $A_mB_nX_p$ types; a few titanium or tin minerals containing columbium types A_2X_3., AX_2, and ABX_3, and two silicates. ABX_4 type include schetelegite, yttrotantalite, polymignite, ishikawaite, loranskite, stibiotantalite, stibiocolumbite, bismuthotantalite, and simpsonite. The AB_2X_6 type includes tapiolite, fersmanite, and thoreaulite. The $A_mB_nX_p$ type including djalmaite, and ampangabeite. The titanium and tin minerals that contain niobium including: ilmenite, rutile, cassiterite, anatase, brookeite, perovskite, sphene, and fersmannite.

GEOCHEMISTRY

	NIOBIUM (COLUMBIUM) Nb	TANTALUM Ta
at. wt.	92.906	180.948
at. no.	41.	73
valence	2, 3, 4?, 5	2?, 3, 4?, 5
m. p.	2468° ± 10°C	2996°C
b. p.	4927°C	5425 ± 100°C
s. g.	8.57 (20°C)	16.6 (20°C)
crustal abundance	20 ppm	2 ppm

lithophile, shiny, white, soft, ductile, bluish after exposure to air at room temperature, starts to oxidize in air at 200°C	lithophile, grey, heavy, very hard, ductile, very strong, chemically inert below 150°C except in fluoride or sulphur trioxide solutions
alloy additive to carbon and other steels and to nonferrous metals to increase strength and improve other properties	oxide films are highly stable and valued for electronic components
used in the manufacture of welding rods for stainless steel	metal is used to manufacture a wide variety of chemical and other equipment where high strength, chemical inertness, and creep resistance at high temperatures is desirable
combined with Zr in the manufacture of electronic superconductors	additive to glasses to produce high index types for photographic lens components. Hampel, 1961, 1968.

Niobium was first discovered by C. Hatchett in 1801 in an ore from Connecticut, and called columbium (Columbia = America in early nineteenth century usage) Weeks, 1956. In 1802 the element tantalum was identified in a Swedish ore by A. G. Ekeberg who also named it. Wollaston, in 1809 claimed to have proven that Nb and Ta were identical and as a result the separate identities were debated by chemists for many years. In 1844, the German chemist H. Rose demonstrated conclusively the separate identities of the two elements. It was not until 1950 that the International Union of Pure and Applied Chemistry moved to accept niobium rather than columbium as the officially accepted name for the element. Economic geologists of North America have continued the use of the name columbium.

Berzelius in 1824 obtained an impure form of the metal tantalum but the pure ductile form was not obtained until 1903 by W. Bolton. Impure niobium was first obtained by C. W. Blomstrand in 1866 and in purer forms later by Moissan and Goldschmidt using other procedures.

Niobium occurs most abundantly in the minerals columbite-tantalite, pyrochlore, and euxenite. The main source of tantalum is the mineral columbite-tantalite. The separation of the two elements, which have strong chemical affinities, is technically difficult. There is a large literature describing research into the technical uses of the two elements and a variety of new applications have been found that add substantially to the size of the market for niobium and tantalum. Many of the geochemical data for the elements have been determined but further work will be necessary before the geochemistry is fully understood. The information given is a summary based on original research reported by Rankama and Sahama (1949); Goldschmidt (1954); Kuzmenko (1959); and Parker and Fleischer (1968).

Niobium and tantalum have been detected in the igneous, metamorphic and sedimentary rocks of the earth's crust, in sea water, meteorites, and the atmosphere of the sun. The crustal abundance of niobium and tantalum is currently estimated at 20 and 2 ppm respectively. The abundances vary in a complex manner from rock type to rock type. The ratio of Nb:Ta of the individual mineral species is relatively constant in one rock type but varies

markedly between rock types. Tantalum accompanies the niobium in the same ratio as the crustal abundance and is much less in some cases. Minerals, for example, occurring in nepheline syenite are niobium-rich whereas those in lithium pegmatites are tantalum-rich. Niobium is most abundant in alkalic rocks such as nepheline syenite, syenite, alkalic mafic and ultrabasic rocks, and sodic or alkalic granite.

Both elements occur together in nature with great regularity and commonly substitute for each other in minerals because of similar ionic radii and charge (tri- and pentavalent). They are characteristically oxyphile, forming a number of complex minerals or they enter isomorphously into minerals of iron, manganese, titanium, rare-earths, uranium, thorium, zirconium, tungsten, tin, bismuth and antimony. Tantalum shows a closer relationship to zirconium, tin, uranium, the rare-earths of the yttrium subgroup, and lithium. Niobium shows a closer relationship to titanium, tungsten, thorium, the rare-earths of the cerium subgroup, and sodium.

From the viewpoint of mineralogy, ninety minerals are known in which these elements are the main constituents. They are mainly oxides, a few silicates, and rarely hydroxyls, fluorides, chlorides, and one borate. Many oxide, phosphate, tungstate, and silicate minerals of other elements which contain minor to trace amounts of niobium and tantalum in isomorphous substitution for titanium, tungsten, tin, zirconium, and hafnium, commonly coexist in the same minerals or in the same rocks with the elements uranium, thorium, rare-earths, iron, magnesium, bismuth and other elements. Niobium and tantalum substitute to a very limited extent for zirconium, tungsten and tin in their minerals because of chemical differences.

According to the rules of Goldschmidt and Ringwood, ions with charges greater than three combine with oxygen, hydroxyl, fluorine, chlorine and other anions to form chemical complexes that maintain their identity during the magmatic differentiation and crystallization processes. The ionic potential of niobium and tantalum is sufficiently high to form normally stable tetrahedral and octahedral complexes. Such complexes crystallize as independent mineral species when sufficiently abundant in the magma or if not sufficiently abundant they are scavanged as minor or trace constituents within the lattices of titanium or titanium-iron accessory minerals. In the second case the traces of niobium and tantalum may be freed by late albitization or greisenization, beneficiated and remobilized to crystallize as independent species.

In general niobium and tantalum are most enriched in the residua of crystallizing alkaline magma, less so for acid magmas and least for the ultrabasic magmas. The frequent identification of pyrochlore in fenites surrounding alkaline intrusions indicates that niobium is enriched relative to tantalum and deposited as an independent mineral species by the hydrothermal solutions derived from such magmas. This feature has not been developed in the wall-rocks of either acid or ultrabasic intrusions.

Independent mineral phases of niobium and tantalum rarely occur in granites; for example in monazite-bearing granites containing accessory ilmenite and rutile, the niobium and tantalum have been scavanged by biotite. Granites containing accessory allanite, sphene, and magnetite have niobium and tantalum concentrated in the sphene with only traces in the biotite. In hornblende granite the two elements are concentrated in the hornblende and apparently in each of these cases the substitutions are in titanium positions. The two elements accumulate in the late differentiates of the granite magma with the tantalum content increased relative to the niobium content by the

imposition of either the albitization or the greisenization process. The separation of the two elements and the beneficiation of tantalum relative to niobium is also attributed to changes in the alkalinity of the magma during differentiation.

The granite pegmatites, particularly those containing albite, lithium and fluorine-bearing minerals, are the only magmatic product in which tantalum far exceeds the niobium content. The granitic pegmatites and especially the complex zoned pegmatites have high concentrations of niobium and tantalum either as discrete mineral species or bound up in the mica, garnet, tourmaline, ilmenite, zircon and other minerals. Autometasomatism within such pegmatites, the latest possible magmatic stage, beneficiates tantalum relative to the niobium content to a greater degree.

In nepheline syenites niobium is notably enriched with respect to tantalum the ratio in some Russian occurrences being Nb:Ta = 12.1. Elsewhere the tantalum content is much less. In the miaskitic nepheline syenites ($K_2O + Na_2O$: Al_2O_3 less than 1) the two elements occur in the independent Ti and Zr minerals in the late magmatic rocks but in the post-magmatic derivatives they form independent minerals. In the agpaitic nepheline syenites ($K_2O + Na_2O$: Al_2O_3 = 1 or more) the two elements are scavanged by titanium and zirconium minerals and the niobium content commonly exceeds that found in the former type of nepheline syenite.

Alkalic-ultramafic complexes typically consist of multiple phases in concentric distributions of such rock types as: jacupirangite, melteigite, perovskite-titano-magnetite and nepheline bearing types, melteigite-ijolite-urtite and others. The magmatic crystallization products are characterized by niobium and tantalum in the titanium-bearing iron-magnesium silicate and oxide minerals. The alkalic pegmatites are characterized by niobium and tantalum in the titanium and zirconium minerals and in independent mineral phases. In carbonatites associated with such complexes, the two elements are concentrated in a variety of independent minerals such as pyrochlore, lueschite, dysanalyte, etc. Post-magmatic processes including the alteration of pyroxenes tend to enrich the products of the system in niobium relative to tantalum.

The alkaline syenite-carbonatite complexes typified by low temperature calcite, biotite, and mixed carbonate-micaceous formations shows extreme variability in the niobium and tantalum content. The elements in such environments crystallize as pyrochlore or are isomorphously bound in titanium minerals. The original solutions were high in carbonate and sodium with traces of Nb-Ta but as a result of the metasomatic replacement of the wall-rocks the sodium content is depleted and enriched in niobium, tantalum, magnesium, and iron. The high temperature titanium minerals in the wall-rocks are replaced and niobium and tantalum crystallize from the solution as minerals of the pyrochlore group. In the related carbonatites niobium and tantalum are fixed in minerals of the pyrochlore group or form complex minerals with zirconium.

Weathering processes dissolve the niobium and tantalum to form hydrolyzates and an appreciable amount is carried into the oceans from which they precipitate into manganese nodules and marine clays. Niobium is enriched relative to tantalum both in marine clays and in the clays produced in more arid continental environments. Hydrolyzates formed by the weathering of niobium-rich rocks are enriched in the two elements as well.

In sedimentary rocks niobium is enriched in the manganese nodules of the marine environment, in sedimentary rocks and bauxites; tantalum is enriched in marine clays and bauxites. Some of the more stable minerals of niobium are columbite-tantalite, euxenite and less commonly pyrochlore, accumulate in placer deposits associated with rutile, ilmenite, cassiterite. and wolframite. The niobium-tantalum minerals accumulate in eluvia and alluvia, fluvioglacial and marine placers, and in bauxite and kaoline resulting from the weathering of alkaline rocks. The contents of the two elements may be increased several times by these processes.

CHAPTER IV

CLASSIFICATION OF DEPOSITS AND EXAMPLES

Classification proposals for niobium and tantalum deposits have been presented on several occasions and they have been either bivariate or multivariate schemes using such variates as the source rock, genetic process, crustal zone, or chronological relationship to stages of differentiation of the source magma. Such parameters are not mutually exclusive and several are subjective conclusions based upon unspecified sets of basic parameters. They are open to differing interpretations and consequently are difficult to apply consistently.

Among the basic parameters are doubtless included the dominant ore mineral; the associated suite of minerals; the identities of the host rocks; the structural environment; morphology of the deposit or occurrence; the distribution of the ore mineral and the genetic process. Some of these are subjective having limited value for quantitative study, the remainder are objective and can be treated in a quantitative manner providing unique criteria for a classification scheme. The host rocks of these deposits are commonly one of: carbonatite; alkaline syenite; pegmatite; soil or gravel. The genetic processes recognized include those related to magmatic differentiation; pegmatite formation; pneumatolytic-hydrothermal activity; contact metasomatism; magmatic metasomatism and exogenesis. The structural environments include ore concentrations in pegmatite zones; mineralogical bands; shoots, pods, or lenses that crosscut lithological units; similar shaped bodies that occupy faults or fracture systems; and conformable planar or tabular bodies like the pay streaks of placers or parallel the banding in alkaline complexes.

Rowe (1958) in his report on niobium deposits in Canada proposed a classification scheme that is analagous to the granite and alkaline syenite columns of the Kuz'menko (1959) classification. The column for the granite source rocks has been subdivided into deposits in granitic rocks, in granite pegmatite, eluvial and placer deposits. The column for alkaline syenite source rocks is subdivided into deposits in the alkaline rocks, carbonate rocks, syenitic pegmatites, in fenites, and eluvial deposits. Canadian deposits were not identified to illustrate all classes.

De Kun (1962) proposed a classification scheme for seven types of niobium and tantalum deposits that combined crustal zones, implied source rock types, and processes by which the deposits were formed. The types in turn have been subdivided into as many as six subclasses some of which appear in more than one of the main types. Consequently, this classification has a less direct relationship to the Kuz'menko (see below) and Rowe classifications. It is not as convenient to use as one would hope to find.

Heinrich (1966) classified only those deposits that have a spatial association with carbonatites basing his treatment on the assumption that carbonatites are the source rock, in effect proposing an additional parameter not listed by the others. The basic subdivision offered is chronological related to the stages of differentiation and intrusion of the carbonatite magma: pre-carbonate deposits; carbonatite deposits; post-carbonatite deposits and supergene deposits.

The classification of niobium and tantalum deposits published by Kuz'menko (1959) is the most comprehensive. It treats known deposits with the exception of the niobium-rich manganese nodules collected from some areas of the deep sea floor, Parker and Fleischer (1968). The source rocks which range from acid to ultramafic are displayed from left to right along the horizontal axis of the table. The genetic processes, which range from magmatic to exogenic from top to bottom along the vertical axis of the table, are displayed. It is well illustrated with examples reported from all parts of the world (Table 6) including Canada.

The granite and alkaline syenite columns of the Kuz'menko scheme are the most practical classification scheme for use in the Canadian context, at least until more of the basic facts have been accumulated that would permit the evaluation of a multi-variable scheme. When the Canadian deposits and occurrences have been located in appropriate positions in the table (Table 7) and the foreign examples have been removed, some significant gaps occur in the alkaline granite and alkaline ultramafic columns. The lack of such Canadian deposits may be more apparent than real and future field work may identify new deposits in Canada that will fall into these classes. At present there are several sites attributed to granite source rocks; one placer derived from granite stocks; magmatic deposits related to nepheline and nepheline syenites; contact- and magmatic metasomatic deposits related to the same host rocks and one occurrence that is related to alkaline mafic or ultramafic rocks.

CANADIAN EXAMPLES

Since the publication of Rowe's report (1958), Canada has become a producer of both niobium and tantalum and there are now twelve properties for which estimates of ore reserves have been published. All of these combined with 244 occurrences are described in summaries in Appendices A and B. The two producing mines and two other properties with large reserves of ore grade material are described in greater detail. They include the Oka, Quebec complex, the Montgary pegmatite from which wodginite is mined and the South Bluff Creek, Ontario and St-Honoré, Quebec complexes that are potential producers of pyrochlore concentrates.

Oka, Quebec Complex

Location and Accessibility

The complex and mine lie on the north shore of Lake of Two Mountains, 20 miles west of Montreal in the parishes of St-Joseph-du-Lac and L'Annoncion. It can be reached by all weather highway 29 and is within 13 miles of rail transportation at St-Eustache (See Figs. 1a, 1b, 4).

TABLE 7

CLASSIFICATION OF DEPOSITS OF NIOBIUM AND TANTALUM
KUZ'MENKO (1959)

	GRANITES	ALKALIC GRANITES	NEPHELINE AND NEPHELINE SYENITE	ALKALIC ULTRAMAFIC ROCKS
Magmatic	Biotite granites with columbite (Jos Plateau, Nigeria)	Alkaline granites with riebeckite and pyrochlore (Nigeria, Mount Rosa, Colo.)	Agpaite-urtites, lujarvite, juvites with loparite (Lovozero massif, USSR)	Pyroxenites and olibinites with perovskite (Afrikander massif, USSR)
	Granites with euxenite, fergusonite (Idaho batholith, Idaho) (Longon-Yugan, Urals, Korovikhinski, Altai.)		Miaskites with pyrochlore (Vishnevye Mountains, USSR)	
Pegmatite	Simple pegmatites with columbite-tantalite (Preissac-Lacorne, Quebec)	Pegmatites with columbite-tantalite, astrophyllite (Mount Rosa, Colo.)	Nepheline syenite pegmatite (Urals and Kola Peninsula)	Rutile-brookite pegmatites (Magnet Cove, Ark.)
	Complexly zoned and replaced pegmatites with lithium minerals, tantalite, microlite, etc. (Harding, N.M., Bernic Lake Man., Yellowknife-Beaulieu, NWT)			
Pheumatolytic-hydrothermal	Feldspar-quartz veins	Feldspar-quartz veins	Albitites with pyrochlore	Feldspar-calcite veins (Magnet Cove, Ark.)
	Greisen veins		Biotite-calcite veins with pyrochlore	Carbonatites with knopite (Magnet Cove, Ark.)
		Albitized zones		Carbonatites with pyrochlore and hatchettolite (Sukulu, Uganda)
	Albitized zones		Albitized zones with pyrochlore	Natrolite-biotite zones in ijoilite with knopite (Oka, Quebec)
	Greisen zones		Carbonatized zones with pyrochlore	Carbonatized zones with pyrochlore.
Contact-metasomatic			Albitized, nephelinized zones with perovskite, pyrochlore, at contact of alkalic rocks and carbonatites (Oka, Quebec)	
Magmatic-metasomatic	Columbite granites (Kazakhstan, Erzin USSR)		Large stocklike carbonate masses with pyrochlore (Iron Hill, Colo.)	
Exogenic	Cassiterite, columbite-tantalite (Nigeria)	Zircon, pyrochlore, placers (Sukulu, Uganda)	Zircon, pyrochlore placers (Sukulu, Uganda)	
	Samarskite placers (Altai, USSR)	Ilmenite-rutile placers (Urals)	Ilmenite-rutile placers (Urals)	
	Ilmenite placers (Ukraine)		Bauxites (Arkansas)	
	Euxenite placers (Bear Valley, Idaho, Bugaboo, B.C.)			

TABLE 8

CLASSIFICATION OF DEPOSITS OF NIOBIUM AND TANTALUM MODIFIED FROM KUZ'MENKO (1959) FOR CANADIAN DEPOSITS

	GRANITES	ALKALIC GRANITES	NEPHELINE AND NEPHELINE SYENITE	ALKALIC ULTRAMAFIC ROCKS
Magmatic	Bugaboo and Horsethief Stocks Disseminated euxenite		Urtite-ijolite-melteigites (Lackner Lake, Ont.) Miaskites with pyrochlore (Haliburton-Bancroft, Ont., Oka, Quebec)	Natrolite-biotite zones in ijolite with knopite (Oka, Quebec)
Pegmatite	Simple pegmatites with columbite-tantalite (Preissac-Lacorne, Quebec) Complexly zoned and replaced pegmatites with lithium minerals, tantalite, microlite, etc. (Bernic Lake, Man., Yellowknife-Beaulieu River, NWT)		Nepheline syenite pegmatite (Nemegosenda Lake, Ont.)	
Pneumatolytic-hydrothermal				
Contact-metasomatic			Albitized, nephelinized zones with perovskite, pyrochlore, at contact of alkalic rocks and carbonatites (Oka, Quebec)	
Magmatic-metasomatic			Large stocklike carbonatite masses with pyrochlore (Firesand River, Ont., St-Honoré, Quebec)	
Exogenic	Euxenite placers (Bugaboo, B.C.)			

Regional Setting

The carbonatite-alkaline syenite complex lies within a Precambrian inlier completely surrounded by Paleozoic Trenton limestone and Utica shale, Gold and Vallee, 1969. The inlier is an exposure of quartz-feldspar gneiss, granulite, anorthosite, gabbro, and quartzite ten miles long from east to west and five miles wide consisting mainly of paragneisses of the Grenville Group and the Morin anorthosite. Structurally these two formations trend northeast with characteristic complex folding. The carbonate-alkaline syenite complex, a body 4 1/2 miles long by 1 1/2 miles wide, intrudes these rocks in a northwest-trending elliptical area near the north end of the Beauharnois axis, which runs in a southeasterly direction from the Laurentians to the Adirondacks in northern New York State but is largely overlain by the Paleozoic rocks of the St. Lawrence Lowlands. The land surface tends to be hilly at the borders of the complex with a pronounced valley overlying the centre of the structure. Outcrop occurs on the hill tops but the valley floor is buried by as much as 400 feet of Pleistocene glacial tills and gravels. The rocks of the inlier exhibit regional northeasterly trends on the magnetic, gravimetric and radiometric survey maps with a well developed anomaly overlying the complex and trending northwest. The northwest end of the complex intruded the Morin anorthosites whereas the southeast end intrudes the folded quartzofeldspathic paragneisses of the Grenville Group. The complex is dated as post-Trenton because associated breccias contain fragments of that formation and the radiometric age has been determined at 114 million years by the K/Ar procedure on a biotite concentrate from one of the nearby breccia pipes, Gittins et al., 1967.

Detailed Description

The complex is an elliptical body consisting of carbonate rocks, okaite-jacupirangite, ijolite, and alnoite-lamprophyre intrusions having a discontinuous aureole of fenite. There are two circular structures within the complex, a larger one at the north end and a smaller one at the south end. These result from the annular distribution of lenses and layers of the alkaline silicate rocks and carbonatites. The structures, which are illustrated by magnetic and radiometric survey maps of the complex, contain anomalies spatially related to the complex and the internal distribution of magnetic and radiometric minerals, Gold, Vallee, Charette, 1966. Both rings are characterized by annular litho-structural units with outward dips resembling ring dykes, transgressive inward dipping bands interpreted as cone sheets, and central carbonatite plugs. Relict inclusions of quartzofeldspathic gneiss in ijolite show varying degrees of pyroxenitization. Carbonatite transgresses and locally intrudes the massive ijoilite. Elsewhere ijolite dykes have been broken and deformed into boudins that retain a planar distribution in the remobilized carbonatite. There are outcrops of alnoite breccia that have gradational contacts with gneissic wall-rocks, contain recognizable fragments of gneiss and Paleozoic limestones, and may be intruded in turn by carbonatite dykes. These have been interpreted as diatremes that occur in the surrounding Precambrian rocks. Basic lamprophyre dykes, some of which are brecciated, are also associated with the complex. The wall-rocks of the complex have been fractured, veined and a nearly continuous fenite zone has been identified.

Lithology

The rocks of the complex are highly variable in composition. They include carbonatites, members of the okaite-jacupirangite series, ijolites, replacement of alteration rocks and alnoites and basic lamprophyres. According to Gold and Vallee (1969), the carbonatites can be subdivided into as many as nine varieties but for the sake of convenience these have been consolidated into four: (1) the early, coarse-grained calcitic variety with minor to accessory amounts of pyroxene, biotite, magnetite, and monticellite; (2) the niobium-rich phase (middle phase) with pyroxene, biotite, magnetite, pyrochlore and/or perovskite or tremolite, magnetite, melilite, and niocalite; (3) the early to middle phase dolomitic type in the north ring or the calcitic type in the south ring with pyroxene, magnetite, biotite and pyrochlore, and (4) the rare-earth (late phase) carbonatites consisting mainly of calcite with rare-earth carbonates, pyrite, and galena.

The rocks of the okaite-jacupirangite series (see Rowe, 1958) consist mainly of melilite at one end of the series and titanaugite at the other end with nepheline, zeolites, magnetite, ilmenite, apatite, biotite, and calcite as varietal minerals.

The ijolite-jacupirangite series consist of essential nepheline and aegirine. They vary from mesocratic to melanocratic depending upon the abundance of the principal constituents. Locally wollastonite and melanite become varietal minerals. At the south side of the complex the rocks are characteristically aphanitic.

The replacement and alteration rocks are the product of the replacement of mafic silicates by biotite or chlorite in shear zones and along faults. Characteristically they also contain vugs mineralized with pyrite, galena, and calcite. They occur in zones or tabular bodies in the complex.

Alnoites and basic lamprophyres occur as dykes and as polymict breccias in diatremes (Harvie, 1909; Grimes-Graeme, 1935). Mineralogically they differ from true kimberlites because they do not contain pyrope garnet, enstatite, and diopsidic pyroxenes as varietal minerals. The alnoites and alnoite breccias intrude the enclosing Precambrian rocks as well as rocks in the complex.

Montgary Pegmatite, Bernic Lake, Manitoba

Location and Accessibility

The mine site is situated 115 miles by road northeast of Winnipeg in the Lac du Bonnet Mining Division of southeastern Manitoba. The town of Lac du Bonnet is the nearest point for rail shipments on a Canadian Pacific Railway line to Winnipeg (see Figs. 2a, 2b, 5).

History of Development

The mine development has a history going back to 1929 when Jack Nutt Tin Mines Limited investigated cassiterite showings and sank a 140-foot shaft on the shore of Bernic Lake. The following year diamond drilling done

by Consolidated Tin Mining Company Limited, identified the pegmatite sill and the presence of spodumene. In 1954 the property was taken over by Montgary Explorations Limited, now Chemalloy Minerals Limited which proceeded with an extensive drilling program for spodumene and sank a 3-compartment shaft to 305 feet. In 1957 American Metal Company Limited (now American Metals Climax) took an option on the property, ran a drilling program and commissioned a study of the lithium market that resulted in the dropping of the option. Between 1959 and 1961 Chemalloy Minerals deepened the shaft to 339 feet and investigated the ore zones of the sill by more than 6,000 feet of drifting. In the same period the Noble-Knight claims adjoining to the west of the property were acquired and drilled from the surface. The equipment was hoisted from the shaft and the property lay dormant from 1962 to 1966. In October 1966 Chemalloy requested the firm of A.C.A. Howe International Limited to determine the tantalum potential of the sill, Howie, 1968. Bulk samples were taken and analyzed and on the basis of the results an agreement was concluded in March 1967 with the Goldfield Corporation of New York to provide funds for development and commencing production. This was accomplished and production of tantalum concentrate at 500 tpd. was started in January 1969. Plans are being considered (1971) to produce lithium concentrates and the pegmatite is potentially a source of caesium and beryllium.

Regional Setting

The Montgary pegmatite, in the English River fold belt of the Superior Province of the Canadian Shield, is situated in the east-trending volcanics division of the Archean Rice Lake Group and is surrounded by granite batholiths of major dimensions, Davis, 1955, 1957; Wright 1961. The volcanic rocks now represented by amphibolites strike east-west and dip steeply south and in turn have been intruded by numerous pegmatite dykes and sills that contain a variety of minerals of potential economic interest. Massive pink granite of Archean age outcrops on the west shore of Bernic Lake and extends within a few hundred feet of the main sill. The Montgary pegmatite, over 3,500 feet long in a westerly direction, 1,500 feet wide and 280 feet thick, occupies an irregular subhorizontal fracture or fracture system that cuts across the amphibolites.

Detailed Description

The Montgary pegmatite has been studied over a period of 40 years and its form, size, attitude, and internal zonation are reasonably well delineated. The pegmatite exhibits several asymmetrical mineralogical zones that have resulted from differentiation and to a lesser extent from replacement. These zones include: (1) a wall zone containing microcline, quartz, beryl, and some tourmaline; (2) a spodumene zone containing spodumene, feldspars, quartz, and coarse-grained muscovite; (3) a lepidolite zone which replaces part of the microcline-quartz zone; (4) an almost pure pollucite zone; (5) the tantalite zone consisting of a quartz-microcline assemblage containing tantalite and beryl; (6) a pure quartz core; and (7) an aplitic assemblage containing tantalite.

The wall zone which is thickest along the floor of the sill also occurs at the top and varies in thickness from 1 to 50 feet. Beryl is the only mineral of potential economic interest in this zone which consists of perthite, plagioclase, quartz, and muscovite, with accessory black tourmaline, apatite, topaz, beryl, and tantalite.

The spodumene zone forms two main layers within the sill; one thicker than the other, and richer in spodumene, occurs near the roof; a second layer occurs close to the floor of the body. The upper zone varies from 15 to 90 feet in thickness with a wide range of mineral composition depending upon the relative amounts of spodumene, perthite, plagioclase, quartz, and muscovite. It is estimated to contain 6,288,300 short tons that can be beneficiated to yield 2.29 per cent Li_2O from an average thickness of 30 feet.

The lepidolite assemblage occupies discontinuous areas in the upper part of the pegmatite sill replacing parts of the microcline-quartz zone. Two lenses occur having a maximum thickness of 38 feet and containing 107,700 short tons of lepidolite averaging 2.24 per cent Li_2O.

The pollucite assemblage occurs in three thin lenses, the largest, in the southeast quarter of the sill, having a maximum thickness of 54 feet. The bodies are estimated to contain 300,000 short tons averaging 20.4 per cent Cs_2O. The lenses are elongated parallel to the long axis of the sill. The pollucite is either clear and glassy resembling quartz or cloudy white resembling one of the feldspars.

The tantalite zone occupies the medial part of the sill and it is characterized by three mineral assemblages: microcline-quartz; the pure quartz core; and an aplitic albite assemblage. The microcline-quartz assemblage is the main host for the disseminated tantalite (wodginite) and it occurs in two zones separated laterally by 50 feet and conforming in plan and vertical section to the outlines of the whole sill. Some areas of this zone have been replaced by lepidolite or beryl mineralization. The tenor of the tantalite relates to the degree of alteration of the microcline.

The quartz core, which at one point in the northern part of the sill, reaches a thickness of 80 feet also occurs in smaller and more irregular bodies. The quartz core consists of massive clear to white quartz with minor amblygonite, spodumene and perthite.

The albitic assemblage, up to 80 feet thick below the core of the sill, occurs between the core and the outer zones, and is characterized mainly by saccharoidal albite, especially beneath areas of lepidolite and quartz. Tantalite occurs in the upper section of the assemblage and is concentrated at the upper contact decreasing in tenor with depth.

The Montgary pegmatite is a complex zoned granitic pegmatite displaying a varied mineralogy in which mineral assemblages change geographically within the sill. The most abundant minerals are quartz, feldspar, mica, spodumene, and pollucite, associated with minor amounts of amblygonite, beryl, tantalite, and lepidolite. The tantalite is either the common variety $(Ta, Nb)_2 (Mn, Fe)O_6$, or more commonly wodginite (Nickel et al., 1963) the stanniferous variety $(Ta, Nb, Sn_{2x}) (Mn, Fe, Sn_x)O_6$. Rubidium (up to 5.1 per cent) occurs in micas, microcline, and pollucite, and tantalum and tin occur mainly in the wodginite.

Alpha-B Deposit, Southbluff Creek, Ontario

Location and Accessibility

The Alpha-B deposit, 50° 52'N, 80° 37'W is approximately 30 miles south of Moosonee, Ontario on South Bluff Creek, and 23 miles east of Renison, the nearest point on the Ontario Northlands Railway to Moosonee. Access is mainly by air.

History of Development

During 1963-64 the governments of Canada and Ontario jointly sponsored airborne magnetometer surveys over a large area of northeastern Ontario. These showed a number of anomalies including a series of linear anomalies along a line drawn between Moosonee and Kapuskasing, Ontario that were sufficient relief to warrant more detailed investigation. A consortium of companies - Argor Explorations Limited; Consolidated Morrison Explorations Limited, and Goldray Mines Limited were successful applicants for three licenses of occupation each for 64,000 acres along the lineament in an area 60 miles long varying width from 3 to 7 miles. Imperial Oil Enterprises Limited provided the initial exploration funds for the program that identified the Alpha-B deposit in January 1966, the only mineralization of economic importance discovered (see Fig. 6). When the licenses expired in 1968, the holdings were reduced to 10 square miles surrounding the Alpha-B deposit. The deposit was developed with a detailed drilling program, a test shaft, and metallurgical research on a bulk sample. Subsequently it was decided to delay preproduction development of a mine until conditions became more favourable.

Regional Setting

The Alpha-B orebody on Southbluff Creek lies in a structural lineament (the Kapuskasing high) that strikes south 23 degrees west from Moosonee on James Bay to Kapuskasing, Ontario and is characterized by irregular linear magnetic highs that are attributed to lenses of basic to ultrabasic rocks or concentrations of magnetite. The rocks within the lineament and those immediately to the east and west are Precambrian in age, but the Precambrian rocks to the northwest are covered by flat-lying Paleozoic sedimentary rocks. Some younger basic intrusive dykes or sills intrude the feature.

The Precambrian rocks east of the structure consist of metamorphosed volcanic and sedimentary rocks that outcrop in a low gently undulating plateau. The abundant metavolcanics represent basic to intermediate flows in which the vesicules and pillows can be identified along with interbanded tuff and sedimentary beds, although metamorphism has selectively altered some beds to amphibolite or garnet amphibolite grade. There are also high grade quartz-feldspar-hornblende gneisses and granulites as well as gneissic granite associated with the volcanic rocks. These rocks exhibit a uniform magnetic response pattern 500 gammas lower than the main linear feature except for one band 300 gammas higher that is produced by a basic or ultrabasic band in the sequence.

The Precambrian rocks west of the structure consist mainly of banded gneisses and granite that strike east-west. Included in the series are quartz-feldspar-hornblende gneisses and weakly foliated granite. The magnetic response of these rocks more nearly resembles that of the lineament being less uniform in appearance as a result of erratic distribution of magnetite in the granite.

The Kapuskasing high itself is underlain by gneisses that exhibit local folds with reversals of dip particularly in the area southwest of the orebody. At the north end, the central band of garnetiferous gneiss strikes northeast whereas the hornblende and granite gneisses at either side are variable in strike. On the Alpha-B concession an overturned fold, exposed north of Kiasko River, strikes east across the northeast trend and the south and north limbs which strike east and dip 30 to 60 degrees north, are cut by northeast-trending faults. On the east side, the trends have been truncated by volcanic rocks that have been bent around to the north with dips 60 to 80 degrees south changing to the west.

Detailed Description

A geological survey of the Alpha-B orebody and its immediate surroundings showed that it consists of pyroxene hornblendite, amphibole and/or biotite carbonatite, gneisses, dykes or sills of metadiorite and gabbro, and carbonatites bearing pyrochlore and less commonly columbite (see Fig. 6).

The pyroxene hornblendite is a medium- to coarse-grained rock consisting of hornblende, diopside, augite, and carbonate in varying proportions with accessory amounts of sphene, apatite, titaniferous magnetite and sulphides. Zircon is frequently found where the carbonate content of the hornblendite increases noticeably. Locally carbonatite has intruded this rock and the resulting brecciation has produced a hybrid zone. At the Precambrian surface the rock has undergone more or less complete chloritization to a depth of 100 feet. The pyroxene hornblendite occurs as bands near the west side of the body and as a narrow band against the gneiss along the southeast side, a band that continues on to the south beyond the carbonatite.

The amphibole-biotite carbonatite consists mainly of coarse-grained, massive to well banded calcite showing either a granitoid or gneissoid texture. The hornblende phase occurs in the marginal zone whereas the sodic variety of amphibole occurs in the core zone. The minor constituents include apatite, titano-magnetite, and biotite and/or phlogopite the latter being associated with the sodic amphibole. Accessory zircon, pyrrhotite, and olivine have been identified. Feldspar occurs in hybrid zones and accessory, reddish brown pyrochlore occurs in the sodic amphibole phase. The rock has been altered at the Precambrian surface to a maximum of 150 feet beneath the structure. As a result the carbonates become rotten and the ferromagnesian minerals have been replaced by chlorite.

The rocks surrounding the Alpha-B deposit are gneisses that consist mainly of quartz and plagioclase with minor amounts of biotite and hornblende. The accessory constituents include sericite, carbonate, magnetite, zircon, sphene, apatite, garnet, pyrite, and pyrrhotite. Locally the ferromagnesian minerals have been chloritized and calcite or epidote veins were formed. Zones of crushing or mylonitization occur in the gneiss along the southeast contact of the carbonatite body.

The metadiorites and gabbros consist mainly of labradorite and hornblende in nearly equal amounts with minor augite and garnet. The accessory constituents are quartz, magnetite, sphene, apatite, chlorite, calcite, and pyrite. They occur as dyke or sill intrusions in the gneissic wall-rocks of the Alpha-B orebody.

The niobium-bearing carbonatites which are combined as a single map-unit in Figure 6 can be subdivided into four units on the basis of texture, structure and mineralogy; a deformed dolomitic carbonatite; a calacitic and/or dolomitic carbonatite; a calcitic variety low in mafic minerals; and a crushed dolomitic carbonatite. These rocks vary from grey to pale pink in colour. Dolomite is more common than calcite as the major constituent of these rocks. The minor constituents include the minerals; riebeckite, apatite, phlogopite and magnetite or the second carbonate. The accessory minerals include pyrrhotite, pyrochlore (0.5 to 3%), zircon, epidote, molybdenite, feldspar, apatite, pyrite, and olivine. Locally, the mafic minerals are altered to chlorite, the carbonates to a rotten appearance, dolomite is replaced by siderite and the magnetite by hematite. This is particularly true immediately beneath the Precambrian surface and the alteration is related to joint and fracture patterns in the carbonatites. Texturally the carbonatites show some degree of foliation or cataclastic deformation. This ranges from a spotted appearance resulting from disseminated aggregates of coarse-grained magnetite; a streaked appearance due to elongated and oriented aggregates of riebeckite, apatite, and mica; a brecciated phase with rounded fragments in a matrix of the same minerals; to a crushed dolomite carbonatite. Micaceous aggregates up to several feet across, rounded or spindle shaped, occur near the centre of the body.

The Paleozoic sedimentary rocks of the Sextant Formation overlie the Precambrian basement on the Alpha-B property and this cover thickens to the north and northwest. The rocks are Early Devonian in age and consist of loosely consolidated conglomerate, and interbedded mudstone, siltstone, and sandstone. They were deposited on the irregular Precambrian surface and vary in thickness from 40 to 150 feet at the north end of the property.

Compact Pleistocene glacial till consisting of grey silty sand with minor clay and gravel overlies the Paleozoic sedimentary rocks. The shaft sinking operation demonstrated the presence throughout the till layer of numerous boulders of sandy limestone (Paleozoic), or granitic rocks. The thickness of the till increases from zero in the north to approximately 40 feet near the south end of the orebody.

Recent waterlogged muskeg 3 to 4 feet thick overlying the boulder till is widespread near the property.

Structural Geology

There is evidence of both regional and local faults on the property. Aeromagnetic trends suggest a major northeast-southwest trending structure interpreted as a rift fault related to the body of granulite. The Alpha-B orebody occurs at the intersection of the rift with a north-south fault that modifies the strike of the rift. Local faulting is indicated by a narrow chloritic zone parallel to the east contact of the carbonatite and dipping east 70 to 85 degrees. Elsewhere crushed dolomite and the development of distorted sodic amphibole at the south end of the orebody may identify another fault that has offset the south extension of the orebody to the west. A small fault, mapped in the

crosscut, strikes north, dips 55 degrees east and is characterized by a pink coloured zone extending 2 feet into the walls on either side.

A moderate amount of fracturing was observed in the carbonatite exposed in the shaft and crosscut. The main set was nearly horizontal and a minor set strikes 112 degrees and dips steeply north.

The Alpha-B orebody is lenticular in plan, sharply truncated at its south end and plunges north at 60 degrees.

St-Honoré Alkaline Syenite-Carbonatite Complex

Location and Accessibility

The St-Honoré alkaline syenite-carbonatite complex (Figs. 3a, 3b, 7) is situated in Simard township, 8 miles north of Chicoutimi, Quebec. An all weather road which comes within 4 miles of the property provides access to railway facilities and a marine terminal at Chicoutimi.

History of Development

SOQUEM made airborne surveys in 1967 that covered an area of 20,000 acres radiometrically and 30,000 acres by magnetometer in the St-Honoré area. The resulting anomalies were sufficiently interesting that a ground radiometric survey was done on an area of 2 acres, 430 feet of trenches were excavated, 325 gravimetric stations were established and two diamond-drill holes totalling 185 feet were drilled. The results were promising and in 1968, 135 miles of lines were cut, 28,000 acres were prospected and mapped, an additional 1,152 gravimetric stations were established, 54 ground magnetometer stations were established, and 13 holes totalling 6,928 feet were drilled. In 1969 a further 3 miles of magnetometer lines were run and 5 holes were drilled totalling 4,900 feet. In 1970 Copperfields Mining Corporation became associated with SOQUEM in the development of the deposit. Between July 1970 and July 1971 a total of 70,272 feet of drilling was completed, 5,512 feet of which was for exploration purposes, the remainder being to outline two pyrochlore-bearing orebodies. In the same period milling tests were commenced using drill core. In August 1971 an 18 per cent decline was started, initially planned to be 2,400 feet long to intersect the top of orebody "1" and penetrate orebody "2" at a vertical depth of 475 feet. Milling tests will be facilitated by the large bulk samples obtained from the decline. It is hoped that plans to mine the deposit will be finalized in 1972.

Regional Setting

The geological section in the vicinity of the St-Honoré complex consists of the overlying unconsolidated post-glacial sediments; the flat-lying Paleozoic shales and limestones; the rocks of the complex and the enclosing rocks of the Precambrain Grenville Group. As a result of a post-glacial incursion of the sea into the area there were deposited thick layers of clay and sand, but these are only a few feet thick in the vicinity of the St-Honoré

orebodies. The Paleozoic formations are part of an inlier, 15 miles from north to south by 4 to 5 miles from east to west, of thick, horizontally bedded fossiliferous limestones (Lowville, Middle Ordovician) with a few shale partings, overlain by thin black shales believed by Sinclair (1953) to be equivalent to the Gloucester Formation in age. The sedimentary rocks were deposited on an irregular Precambrian surface and the basal beds locally contain fine-grained disseminated pyrite or detritus from the underlying carbonatite.

The Precambrian rocks of the Grenville Group surrounding the St-Honoré complex include syenite, syenite breccia, granite gneiss, granite, and anorthosite. The syenite is a pink medium- to coarse-grained massive rock that consists mainly of orthoclase and plagioclase with accessory chlorite, apatite, zircon, siderite, and magnetite. The syenite which outcrops north and east of the complex can be further subdivided into two units on the basis of the magnetite content, and in the northeast quarter of Simard Township, it is cut by narrow dykes of fine-grained carbonatite. The syenite breccia having a chloritic matrix, may be an explosion breccia that is developed locally. The granite gneiss-granite unit is a pink medium- to coarse-grained rock having microcline, quartz, biotite, and plagioclase as the major constituents with minor amounts of magnetite and amphibole. Layering in this unit varies from weak to strong and is the result of mafic bands. The anorthosite, which is grey coloured with less than 15 per cent mafic minerals, outcrops north of the complex in the south half of Falardeau Township, and as three narrow bodies in the syenite. A gabbro anorthosite stock has been identified on the Shipshaw River to the northeast and a few outcrops indicate the presence of anorthosite on the west side of the complex.

Detailed Description

The St-Honoré alkaline syenite-carbonatite complex, Vallee and Dubuc (1970) lies near the east side of the Saguenay graben and consists of dolomitic, sideritic, and calcitic carbonatites, urtite, diorite, and nepheline syenite. The central core is typically coarse-grained dolomitic carbonatite surrounded by an outer ring of fine-grained foliated dolomitic and/or calcitic carbonatite. The white to buff to reddish rare-earth carbonatite is a coarse-grained massive dolomitic variety with accessory black hydrocarbon, pyrite, fine-grained monazite, bastnaesite, pyrrhotite, molybdenite, chalcopyrite, and huttonite. A zone at the west side of this unit is characterized by fragments of chloritized urtite. The barren carbonatite is coarse grained and white having insignificant amounts of Nb and rare-earth oxides. The periphery of the central core contains ore zones "One" and "Two", the low grade dolomitic carbonatite, the monticellite carbonate and the barren carbonatite. The main ore zone consists of banded white to brick red dolomitic carbonatite, with minor apatite, magnetite, hematite, accessory pyrochlore, columbite, pyrite monazite, bastnaesite, and traces of sphalerite, chalcopyrite, pyrrhotite, barite, chlorite, biotite, quartz, and fluorite. The banding strikes 90 degrees and dips 75 degrees north. The north half of the ore zone is red dolomitic carbonatite with magnetite-rich bands and the south half is white with a low silicate content that increases at its edge to 20 per cent pyroxene plus feldspar with sporadic Nb values. The "number two" ore zone consists of fine- to medium-coarse-grained foliated pink calcitic pyroxene carbonatite with accessory garnet, apatite, nepheline and pyrochlore. The dolomitic carbonatite which

has a low content of rare-earth oxides and niobium is fine grained, foliated white to red in colour with accessory pyrite, hydrocarbons, pyrochlore, monazite, euxenite, and huttonite. The monticellite carbonatite is a medium coarse-grained, clacitic to dolomitic variety with accessory pyrochlore. The barren carbonatite varies from white to pink, is foliated, and consists mainly of dolomite, and locally abundant fragments of variably chloritized urtite.

The alkaline rocks in the complex include urtite, nepheline garnet syenite, and diorite. The pale grey urtite, which consists mainly of nepheline and aegirine-augite with minor andradite garnet, has been intruded by dykes or sills of carbonatite and locally occurs as chloritized fragments in the carbonatites. The grey to greenish nepheline garnet syenite is a medium- to coarse-grained rock consisting mainly of nepheline, cancrinite and aegirine-augite, with accessory biotite, carbonate, apatite, sphene, zircon, melanite, plagioclase, opaque minerals and schorlomite garnet. It is intruded by numerous 5- to 12-inch-wide diabase dykes. The diorite, which occurs in two masses east and southwest of the core respectively, consists mainly of plagioclase, aegirine-augite, biotite with minor carbonate, magnetite, and apatite. The highest magnetite content occurs in the southwestern body.

Structural Geology

The structural geology of the St-Honoré alkaline syenite-carbonatite complex and its surroundings is incompletely known. Surface exposures are few and the few foliation determinations in the surrounding syenite tend to parallel the contacts of the main complex. On the north side these dip inwards at 20 to 30 degrees whereas those at the south and east are more nearly horizontal. Attitudes elsewhere in the area are sparse. One fault, which has been identified in the northeastern quarter of Simard Township, strikes south 80 degrees east.

CHAPTER V

CHOICE OF TARGET AREAS AND EXPLORATION TECHNIQUES

Geological hypotheses continue as the main working hypotheses guiding the search for new orebodies. They define likely environments in which to search, serve as the basis for the interpretation of a variety of technical survey results, and as a guide for extending developmental work, Derry (1969). For example, experience has shown that alkaline syenite-carbonatite complexes are probable sources of new niobium orebodies; that pegmatites are probable sources of new tantalum deposits and that radioactive placers may be sources of both elements. The first and second environments should be sought particularly in the Superior Province of the Canadian Shield and the last in the western Cordillera. Recognition of Recent marine sediments, Pleistocene glacial deposits, or deeply weathered regoliths has a bearing on identification of new deposits and the choice of procedures suitable for use in developing deposits hidden beneath such overburden. Geology, petrology, and mineralogy are all essential to the recognition of individual orebodies. Climate and topography both influence the economic factors and the development procedures in the search for new mines. The relationships between the results of geophysical surveys and niobium and tantalum deposits are of great value in their discovery and development into producing mines.

The alkaline syenite-carbonatite complexes are believed to have the greatest potential for the discovery and development of new niobium orebodies. Such complexes and their immediate surroundings, should be carefully prospected not only for niobium, but also for tantalum, uranium, beryllium, rare-earths, zirconium, apatite, barite, iron, molybdenite, and fluorite. They occur along fault lines in Precambrian Shield areas; tend to be circular or cresceutric in plan and commonly give rise to distinctive closed magnetic or radiometric anomalies. The distinctive petrology of such complexes, which include a variety of alkaline silicate rocks, carbonatites, fenites, breccias, and lamprophyre dykes coupled with the occurrence of the minerals nepheline, alkaline pyroxene, carbonates, and accessory pyrochlore, euxenite, betafite, apatite, magnetite, etc. make positive identification a simple matter. Pyrochlore which is the mineral of economic interest occurs in the carbonatites, fenites, and alkaline syenites that make up the complexes.

Two thirds of the known Canadian deposits and occurrences are granite or syenite pegmatites. Consequently known areas of pegmatite dyke swarms in the Appalachians, Precambrian Shield, and the western Cordillera will bear continued investigation and some effort should be expended to find new areas. Granite pegmatites displaying complex internal zonation either magmatic in origin or modified by autometamorphism should be examined with care. The minerals tantalite or wodginite are likely to be the ore minerals as these are the most widespread species in which tantalum exceeds the niobium content. Several associations of minor or accessory minerals provide useful clues; the association of lithium and beryllium without molybdenite; betafite, allanite and biotite; euxenite, and monazite with beryl and less commonly with muscovite; and samarskite with columbite and fergusonite. Airborne

geophysical procedures have not been used in the search for pegmatite dykes. Aeromagnetic surveys are unlikely to be helpful but radiometric surveys may measure positive responses over high potash or thorium rich pegmatites and contribute to the discovery of new pegmatite swarms.

The presence of a reserve of euxenite in the placers of the Bugaboo and Vorster Creeks in southeastern British Columbia commends the continued examination of this type of deposit for the elements in question. Related geophysical anomalies, in particular radiometric anomalies, increase the probability of the discovery of such ore minerals. This also commends the search for fossil placers in sedimentary terrains that were derived from areas of acid to alkaline intrusive rocks. None of these have been reported in Canada but locally radioactive clastic sedimentary rocks like those of Carboniferous age in the Maritime Provinces, the Precambrian sediments north of the Grenville Break and in the Slave and Churchill Provinces are potentially interesting. Both modern and fossil placers merit mineralogical examination because they represent a largely unexplored resource of niobium and tantalum.

The alkaline granites that outcrop in the Bugaboo and Horsethief stocks of southeastern British Columbia are low potential primary sources of niobium in the mineral euxenite. However, when combined with suitable weathering processes and appropriate topography they become the probable source of placers in the nearby valleys. In the tropics deeply weathered alkaline granites in the Jos Plateau of Nigeria have produced a regolith in which niobium and tantalum minerals have been enriched. The regolith is the source of the development of downstream placers many times enriched relative to the abundance of the minerals in the source granite. This type of occurrence has not been reported in Canada because the activity of Pleistocene glaciers has transported any earlier regolith from its source areas leaving varying thicknesses of fresh till in contact with largely unaltered bedrock. Nepheline syenites may also undergo the same treatment as the Jos granites and give rise to analagous type deposits.

NB-TA DISTRIBUTION IN THE TECTONIC PROVINCES OF CANADA

General Statement

Niobium and tantalum deposits and occurrences are distributed across Canada (Map 1354A) with the greatest number occurring in the tectonic provinces of the Canadian Shield: the Bear Province has one occurrence; the Slave Province has a cluster east of Yellowknife; the Churchill Province has a few related to the uranium occurrences at Uranium City and La Ronge, Saskatchewan; The Superior Province has a large number and the Grenville Province has a still larger number. Most of the remainder occur in the Western Cordilleran Region and one has been identified in Nova Scotia.

Slave Province

The occurrences in the Slave Province east of Yellowknife (see Fig. 8) are in the hundreds of pegmatites many of which exceed lengths of 1,000 feet and widths that exceed 100 feet outcrop in an area underlain by granites that intrude the metasedimentary bedded rocks and a small area of volcanic rocks near Upper Ross Lake that belong to the Yellowknife Supergroup (Archean). The sedimentary rocks are mainly greywacke and slates that have been metamorphosed into nodular quartz biotite gneiss and impure quartzite in the aureoles of the younger pegmatitic granites. The nodules consist of accumulations of cordierite-andalusite and staurolite. The beds, which strike parallel to the contacts with the granite intrusions but dip outwards, are closely folded isoclinally with steep dips and overturned tops in many places. Cross-folds with north- to northwest-trending axes have been observed and the younger pegmatitic granites are believed to have been emplaced along the axes of these folds. The rare-element pegmatites that characterize the area often strike northeast across the cross-folds and are most abundant in the aureoles of the younger coarse-grained granitic intrusions. Locally the beryllium-niobium-tantalum bearing pegmatites are concentrated in zones closer to the granite intrusions than other pegmatites characterized by the occurrence of spodumene. Internally zoned rare-element pegmatites occur most frequently adjacent to Hearne Channel and these commonly exhibit a lithium-rich inner zone and an outer intermediate or wall zone enriched in beryllium-niobium-tantalum. All rocks of the area have been intruded by late diabase dykes of Proterozoic age.

Superior Province

Tantalum-bearing pegmatites outcrop in the Cross Lake, Quetico and Abitibi Belts of the Superior Province whereas the pyrochlore-bearing and barren alkaline syenite-carbonatite complexes outcrop in the Kapuskasing Belt and less frequently in the Cross Lake and Wabigoon Belts. Several tantalum-bearing pegmatites in the Bird River area (see Figure 5) of southeastern Manitoba in the English River Belt where the bedrock consists of the Rice Lake Group and intrusive rocks that include minor ultrabasic rocks, granitic intrusions and granitic pegmatites. The rocks of the Rice Lake Group which include the metavolcanic and metasedimentary rocks outcrop in two easterly trending belts in the area of the figure; the first extending from Bird River to the south shore of Bernic Lake; the second along the Winnipeg River above Lamprey Falls. The Bird River-Bernic Lake Belt is an east-trending syncline having granitic intrusions along the fold axis, a major fault along the Bird River and several north- to northwest-trending faults that offset the contacts of the belt. There are local shear and silicified zones, and pegmetites outcrop in the vicinity of the granite intrusions. The granites vary from gneissic to massive in texture and in composition from diorites through pink or grey microcline granites to coarse-grained pink albitic granite. The latter south of the Winnipeg River are intricately folded with aplitic bands in which there may be concentrations of muscovite or red garnet.

Tantalum-bearing pegmatites also outcrop in the Cross Lake, Quetico and Abitibi Belts. Test drilling has been done in the Georgia Lake area of the Quetico Belt southeast of Lake Nipigon and on the dykes in the aureole of the Preissac-Lacorne batholith in the Abitibi Belt (see Fig. 9). In the

Preissac-Lacorne area, Dawson (1966), the dykes, which vary from simple to complex, crosscut metasedimentary rocks of the Kewagama Group or amphibolites of the Malartic Group. Spodumene has been produced from one swarm but tantalite is generally a mineralogical curiosity. The dykes drilled in the Georgia Lake area (Pye, 1965; Mulligan, 1965) have not been proven to contain mineable quantities of tantalite. The dykes intrude Archean metasedimentary rocks that include biotite quartzite, and quartz-biotite schist and granites that outcrop along the southeast side of the area. Diabase dykes and sills intrude the rocks of the area and some pegmatite dykes have been cut off at depth by diabase sills adversely affecting the economic prospects of the area.

Alkaline complexes, some of which contain ore grade pyrochlore deposits, occur mainly along the axis of the Kapuskasing Belt or near the south end of that structure. These complexes consist of alkaline syenites and/or carbonatites forming small elliptical bodies that cut granitic gneiss, basic volcanic rocks, or pyroxene-bearing gneiss. Characteristically the complexes exhibit structural features that include carbonatite cores surrounded by annular zones of nepheline syenite and/or pyroxenite, and pyroxene carbonatites. Elsewhere in the Superior Province one such body intrudes the east end of the Wabigoon Belt and two others the east end of the Cat Lake Belt.

Grenville Province

The Grenville Province has numerous pegmatite occurrences near its west end (see Figs. 10 and 11) and alkaline complexes, many of which contain pyrochlore and are distributed along the south side particularly near the Ottawa River and Saguenay River fault systems. The niobium and tantalum minerals occur in the southeastern part of Ontario and southwestern Quebec in granite pegmatites, less so in syenite pegmatites, coarse-grained granites, calcite veins and lense systems. They outcrop most frequently in the felsic map-unit consisting of granite, granite syenite, nepheline syenite, gneiss and metamorphic equivalents. Fewer deposits occur in the metasedimentary rock unit that consists of crystalline limestone, dolomite, quartzite, conglomerate, amphibole, paragneiss, and schist. Other occurrences are sparsely distributed in similar map-units elsewhere in the area.

The Bancroft occurrences that reach peak abundance in the vicinity of the Cardiff batholith (see Fig. 11) are concentrated along the northeasterly trending belt of carbonatites, nepheline and alkalic syenites that outcrop from Green Mountain in Glamorgan Township on the west to Colton Lake in Admaston Township on the east, a distance of 110 miles. Niobium and tantalum minerals have also been identified in an association with uranium in the mines southwest of Bancroft. Structurally, this belt is characterized by strike faults at its west end and several northwesterly trending cross faults at its east end. The peak abundance of deposits is reached near the west end of the feature where lengthy faults have not been mapped.

Western Cordillera

Known Nb-Ta deposits in British Columbia are concentrated in the south end of the Omineca tectonic belt just north of the International Boundary with one exception at Manson Creek to the north (see Map). Two others lie in

the south end of the Intermontane Belt and none have been reported either in the Marginal or the Coast Crystaline Belts. They also occur in the mineralized zone that crosses the tectonic belts near the International Boundary.

The Omineca Belt is composed mainly of lower Paleozoic and older metasedimentary rocks, derived gneisses, and a minor amount of volcanic rocks. Gneiss domes are common in this belt and small batholiths and stocks, dominantly quartz monzonite of Cretaceous age, make up 10 per cent of the area. The belt is characterized by intense multiple folding, thrusting, and high angle faulting. Some small alkaline syenite-carbonatite complexes occur along the east side of the belt.

The deposits of the Omineca Belt consist of three types distributed from south to north, three pegmatitic occurrences, the Bugaboo placers, and four alkaline syenite carbonatite complexes between 52 and 56 degrees north. The Manson Creek occurrence and two pegmatites in the south are spatially related to the occurrence of cratonic fractures (Sutherland Brown et al., 1971), otherwise there is no apparent relationship to major crustal structures. They are spatially related to mineralized zones in the southern and central parts of the province.

The Intermontane Belt is composed mainly of upper Paleozoic, Triassic, and Jurassic eugeosynclinal volcanics and clastic rocks. The known deposits are concentrated in the mineralized area south of the Tertiary lava cover. Batholith-size Jurassic and stock-size Tertiary plutons occupy 15 per cent of the belt. The Intermontane Belt is moderately folded with transcurrent faults, boundary faults, thrusting and normal faulting. Two pegmatitic occurrences occur in the south side of the mineralized area, and neither is related to a cratonic fracture in that area.

EXPLORATION TECHNIQUES

The choice of exploration techniques for searches for niobium and tantalum deposits should be influenced by the more traditional considerations related to the target areas including accessibility, topography, the local climate, the type of deposit sought, the regional geology, and the vegetative cover. Obviously the search should be started with a careful study of the available geological and geophysical reports and a photogrammetric study of the target area. This preliminary study will reduce the size of the search area and commend the best combination of traditional prospecting and geophysical procedures to be used.

Local Climate

The local climate has a strong influence on the mining costs as well as exploration costs. In northern Canada it presents problems with permafrost, seasonal snow cover, special construction requirements, and transportation difficulties. In other parts of the world it contributes to a heavy vegetative cover and/or deep weathering that makes it difficult to find exposures although the deep weathering process also serves to beneficiate niobium and tantalum in the regolith.

Topography

The topography of search areas has an influence on the accessibility of areas and geophysical procedures that can be used. High relief may handicap or prevent airborne geophysical surveys and also make surface access to an area very costly. On the other hand, moderate to high relief coupled with suitable source rock and run-off will provide an area in which placers are likely to occur. In areas of lower relief landforms like circular, crescentic and linear depressions point to the probable existence of hitherto unrecognized alkaline syenite-carbonatite complexes or in the last case to major faults along which complexes are likely to occur. Landforms may also facilitate the discovery of pegmatite dykes either in batholiths or around the margins of such bodies.

Photogrammetry

Photogrammetry provides a useful aid to the search for niobium and tantalum deposits. Many carbonatites are circular in plan and such features may be recognizable in aerial photographs and the association with major linear features such as the St. Lawrence rift system or the Kapuskasing High may come to have an economic significance. New pegmatite areas or extensions to known ones can be surmised from aerial photographs in shield areas where pegmatites may form recognizable topographic features standing above the enclosing alkaline intrusive rocks or the rocks of the metamorphic aureole. Colour differences in outcrops have proven useful means to distinguish between pegmatite dykes and their host rocks.

Magnetic Surveys

Regional aeromagnetic surveys have facilitated the discovery and delineation of several carbonatite bodies in Ontario and Quebec such as the Oka, St-Honoré, South Bluff Creek and others. The association of magnetite with these bodies has been most helpful and the resulting contoured maps exhibit spatially related closed anomalies with a significant magnetic relief. Both government and private aeromagnetic surveys have been used successfully in Canada to identify unknown alkaline syenite-carbonatite complexes, George et al. (1967). Ground magnetic surveys, on the other hand have been disappointing in cases where the glacial overburden is thick enough to mask the effect of bedrock and misleading in cases where the overburden contains large boulders rich in ferromagnetic constituents. Maps reporting the results of airborne aeromagnetic surveys have shown small closed anomalies that have been related to alkaline syenite-carbonatite complexes. Such projects as the Roads to Resources Project in western Ontario, and the James Bay Lowlands Project resulted in the discovery of the Big Beaverhouse, Schryburt Lake complexes in the first area and the Alpha-B orebody in the latter.

Radiometric Surveys

The aerial radiometric survey of the St-Honoré area at a 200-foot elevation and 600-foot line spacing identified that alkaline syenite-carbonatite complex for the first time. This is attributed to the common association between thorium and niobium-tantalum minerals which results in recognizable positive anomalies caused by the presence of thorium. This natural association combined with the continued improvement of detection equipment has encouraged the extension of use of such surveys in the search for niobium-tantalum deposits. These surveys have been made with success as a follow-up on aeromagnetic surveys along lineaments or faults in the Superior and Grenville Provinces. All radiometric anomalies should be carefully evaluated mineralogically and geologically to verify the presence or absence of Nb-Ta mineralization and confirm the anomaly is caused by bedrock rather than thorium-rich boulders embedded in glacial till.

Geochemical Surveys

A variety of geochemical procedures are in use at the present and these include sampling the trace element content of stream waters, stream sediments, soil samples taken from beneath vegetative cover, and samples of growing vegetation. These methods are used most widely in the search for copper, lead, and zinc deposits but have not been used in the search for niobium and tantalum. The procedures are most effective in or above a residual soil derived from the underlying bedrock and undisturbed by mass glacial transport or major climactic changes. The soils of most mining camps in Canada do not fall into this category so the techniques have a questionable merit. However, sampling of sediment trains in glacial tills and gravels offers one of the more hopeful geochemical procedures for the discovery of unknown deposits of niobium and tantalum in Canada, although none of the known deposits were discovered by means of geochemical prospecting.

Gravimetric Surveys

Local gravimetric surveys have been used both in the Oka and St-Honoré areas to assist in the delineation of those alkaline syenite-carbonatite complexes. In the first area an anomaly was measured showing a closed relief of 15 milligals spatially related to the complex. Seismic surveys have been used at Oka in conjunction with churn drilling to estimate the depth of the unconsolidated overburden where the rocks of the complex have not been exposed.

Figure 1A. Oka Niobium Mine, St. Lawrence Columbium and Metals Corporation – headframe and offices viewed from south across open-pit A2.

Figure 1B. Oka Niobium Mine, offices and mill viewed from the south across open-pit A1.

Figure 2A. Bernic Lake, Manitoba, tantalum mine, Tantalum Mining Corporation of Canada – surface plant viewed from the northeast 1971.

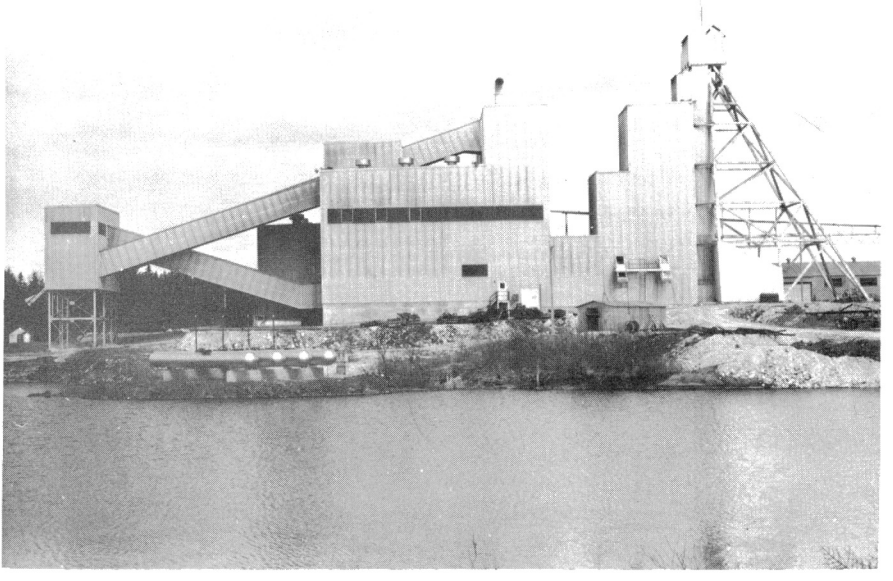

Figure 2B. Mill and headframe viewed from the south 1971.

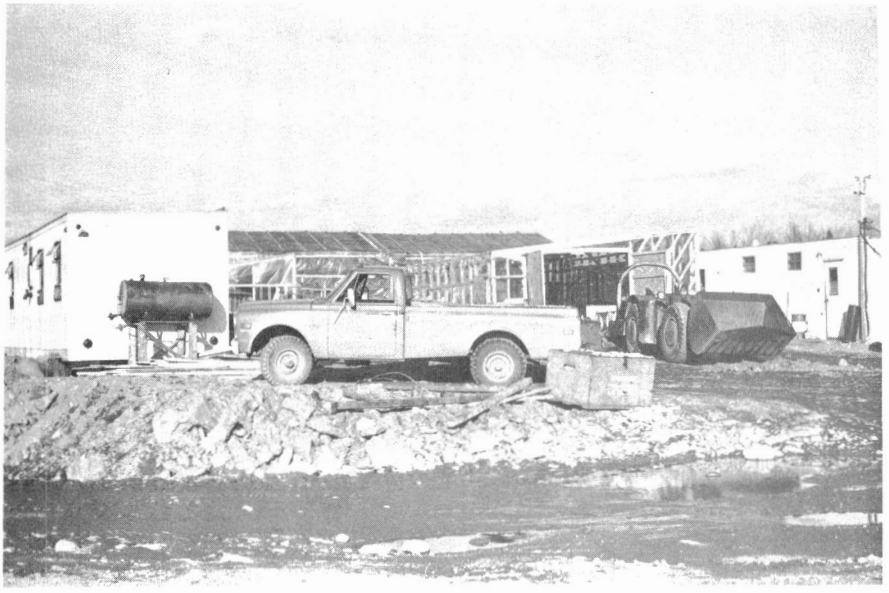

Figure 3A. St-Honoré Niobium Property Camp – October 1971 – office, machine shop, and dry, Simard Township, Dubuc County, Quebec.

Figure 3B. St-Honoré Niobium Property Camp – portal to the 20 per cent decline to develop orebodies 1 and 2.

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APPENDICES A and B

APPENDIX A

DESCRIPTION OF DEPOSITS

```
                MD D870     1
4NB       0470KRD
BC                      KAMLOOPS AREA        5035  12015   92I 9
CLMB
 GPGM  2 2
CORDILLERAN REGION
PEGMATITE
GSC MAP 932A
1932ELLSWORTH P. 137
1958ROWE P. 90

                MD D870     4
4NB       0470KRDKELOWNA OCC
BC 15 MI E OF KELOWNA                        49    119     82F14
FRGS
 PGMT5 2 2
O HILL KELOWNA
CORDILLERA REGION
PEGMATITE
GSC MAP 932A
1952LANG P. 45
1958ROWE P. 90

                MD D870     5
4NB U     0470KRDLEMON CR-TRYAGAIN CL
BC                      LEMON CR             4942  11725   82F11
FRGS                                ALNT
 GPGM  2 2
D EAIN
JACKSON BASIN MCL
JACKSON MINES LTD 55
BROWNISH BLACK SUBCONCHOIDAL FRACTURE VITREOUS LUSTRE MIXED RED
FELDSPAR METAMICT
TEST PITTED RADIOMETRIC SURVEY .051 U308
CORDILLERA REGION
PEGMATITE
GSC MAP 932A
1953THOMPSON P. 546
1962LANG ET AL P. 233

                MD D870     6
3NB U     0470KRDFORSTER CR PLACERS
BC W OF BRISCO          FORSTER CR           5048  11637   82K15
PCLR     EXNT                       URNN
 SAND 2  2
                        111
ST EUGENE MNG CORP LTD 55
DILLINGHAM CORP CANADA LTD
RADIOMETRIC SURVEY TR TF 68 BLACK PLACER SAND
CORDILLERA REGIONQUATERNARY
PLACER
GSC MAP 932A
1958ROWE P. 28

                MD D870069  7
3NB       0470KRDBUGABOO CR PLACERS                    CUEMETINC 35
BC SPILLIMACHEEN        BUGABOO CR           5049  11638   82K 9
PCLR     EXNT                       URNN     URNR     ALNT
 SAND 2  2
```

111
QUEBEC METALLURGICAL INDUSTRIES LTD 53
VENTURES LTD
PLACER BLACK SAND ASSOCIATED EUXENITE URANINITE ALLANITE
ANDALUSITE APATITE EPIDOTE FLUORITE GARNET HEMATITE ILMENITE
MAGNETITE PYRITE SPHENE ZIRCON RECENT DERIVED FROM BUGABOO
GRANITE STOCKS CHURN DRILLED 55 BULK SAMPLED OP 55 56
RESERVES 5100 T NB2O5 65M CUBIC YDS .11 LB PER CUBIC YD
CORDILLERA REGIONQUATERNARY
PLACER
GSC MAP 932A
1957JONES P. 1-56
1958ROWE P. 28

MD 0870 8
4NE 0470KROVERITY MILL CLAIMS
BC 23 MI E OF BLUE R 5215 11910 830 6
PCLR CLMB ZRCN URNN
CRBT 3 2 SCST
ST EUGENE MINING CORP LTD 52
FALCONBRIDGE NICKEL 62
RED BROWN CRYSTALS LAYERED CARBONATE ROCK .08E PC NB2O5
MINERAL ANALYSIS STRIPPED TR TO .04 PC U3O8
BANDS LENSES CRBT 150FT THICK CONFORMABLE IN QUARTZ MICA SCHIST
AND QUARTZ HORNBLENDE SCHIST FELSITE DYKES AND SILLS CLT CRBT
CORDILLERA REGION
STRATIFORM
GSC MAP 932A
1654MCCAMMON P. 111
1958ROWE PP. 31-35
1961HOGARTH PP. 610-633

MD 0870069 17
4NE TA 0470KROLONNIE GRANITE CR
BC 5 MI S OF MANSON CR VILLAGE 5541 12422 93N 9
1 NB 16 NB 23
PCLR CLMB ZRCN
CRBT 3 SYNT 2 2 FNIT GNSS
WOLVERINE COMPLEX
NORTHWESTERN EXPLORATION LTD 54 OP 54-55
HOST CALCITE PYROXENE ROCK PCLR IN SYNT .79PC NB2O5 LOW IN CB
ZONE 1620X50FT .21NB2O5 PYROXENE CRBT AND FELDSPAR ROCK
STRIPPING AND TRENCHING DEFORMATION FORCEFUL INTRUSION
CORDILLERA REGION
STRATIFORM
GSC MAP 932A
1949ARMSTRONG PP. 26-31
1957JONES PP. 19-20
1958ROWE P. 29-30

MD 0870069184
4BE NB 0971KROLINDA CLS BENNETT H 58
BC 3 MI S ST MARY L HELLROARING-ANGUS CR4934 11611 82F 9
CLMB BRYL GLEN PYRT
GPGM
ALDRIDGE FM
H BENNETT OWNER
AGE 700 MY
CORDILLERAN REGION

PEGMATITE
1957LEECH
1968MULLIGAN F 62

MD 0870069193
4NB U 0670KRODEMON COLTI CLAIMS
BC HEAD MCOSE CR SE YCHC NATIONAL FK 5112 1166803 82N01
KNPT SDLT
IJLT SPGM JCPG FNIT
ICE R ALKALINE CCMPL
ALKALINE COMPLEX INTRUDES LMSN OF CAMBRIAN CTTERTAIL FM
SHEARED CARBCNATITE PEGMATITE WITH COMPLEX
WR AGE BICTITE PYROXENITE K/AR 392 10 MY
BOTT AGE BICTITE PEGMATITE K/AR 333 5 MY
BOTT AGE MINETTE SILL K/AR 327 5 MY
TRACE NB LA SR EA HIGH IN CARBONATITE LOW IN LMSN
LOW U ASSAYS TRACES TO .08PC NB205
CORDILLERA REGICN
IRREGULAR
GSC MAP 932A
1954MCCAMMON PP. 150-151
1957JONES P. 20
1966GITTINS PP. 524-525

MD 0870069200
4NB U 0670KRCLUCKY ECY 1-5 GRP
BC 1 MI S SLOCAN R .5 M W CRESCENT V RADIO 4927401173536 82F03
FRGS SMRK THRT MNZT
PGMT 2 2 GNSS
F ESOVCLOFF THRLMS BC
CORDILLERA REGICN
PEGMATITE
GSC MAP 932A
1956EASTWOOD P. 77
1962LANG P 234

MD 0870069201
4TA 0670KRC CDD CLAIM
BC RUSH L E OF RANGE CR 50 120 92I01
CLMB
GPGM
CORDILLERA REGICN
PEGMATITE
GSC MAP 932A

MD 0870069202
4NB TA 0670KRDPARADISE
BC 4 MI S OF LEMPRIERE STA 52 119 83D
PCLR
CRBT
ST EUGENE MNG CORP
4MI S OF LEMPRIERE RY STA METASOMATIC ORIGIN OPERATED 1950-53
PITTED RADICMETER SURVEY
CORDILLERA REGICN
IRREGULAR
GSC MAP 932A
1954MCCAMMON P. 111
1962LANG P 235

MD DB70069204
3NB U 0570KRDVOWELL CR PLACERS
BC SPILLIMACHEEN 20 MI W VOWELL CR 5049 11638 82K15
PCLR
GRVL
DILLINGHAM CORP CANADA LTD 70
RADIOMETRIC TP TR 68
CORDILLERA REGICNQUATERNARY
PLACER
GSC MAP 932A
1952LANG P. 44
1958ROWE PP. 28-29

MD DB70069234
3BE TA 0671KRDBOY SCOUT CLS H BENNETT 68
BC RIDGE BETWEEN HELLRCARING-ANGUS CRS 4934 11611 82F09

GPGM5 2 1
ALDRIDGE FM 2
H BENNETT CRANBRCOK BC
SEGREGATIONS NOZCNES SURFACE EXPLORATION K/AR AGE 700 MY
CORDILLERAN REGICN
PEGMATITE
GSC MAP 932A
1961LOWDON P. 6

MD DB70069242
4NB TA U 0271KRD
FRABAFFIN ISLAND BARNES ICE SHEET 6930 7145 27C
CLMB

CHURCHILL PROVINCE
1962LANG MAP

MD DB70 13
4NB 0470KRDJCL GROUP RADLUMINC
MAC ROSS L AREA 6242 11316 85I11
CLMB BRYL
PGMT5 2 2 GROR
YELLOWKNIFE GRP
RADIUM LUMINOUS INDUSTRIES LTD DISCOVERY 43
MARGINS OF QUARTZ PERTHITE CORES WELL ZCNED PGMT
ARCHAEAN AGE
SLAVE PROVINCE
PEGMATITE
GSC MAP 1055A ML 13 GRANODIORITE
1951LORD P. 190
1955HUTCHISCN P. 15

MD DB70 14
3TA BE SN 0470KRDCOTA GRP
MACYELLOWKNIFE BEAULIEUBLAISDELL LAKE 6247001133500 85I13
CLMB BRYL CSRT AMBG
GPGM5 2 2 BSCS 33
YELLOWKNIFE GRP 2 3
COLUMBIA EXPLORATIONS LTD 61
50 DYKES MAX 2000FTL X 10FTW SCME ZCNED DYKES 1-2 W SIDE LAKE
ARCHAEAN AGE

SLAVE PROVINCE
PEGMATITE
GSC MAP 1055A MU 4 NODULAR QUARTZ-BIOTITE SCHIST
1951LORD PP. 85-86
1958ROWE P. 89

MD D870 15
3NB 0470KRDVIC NO4 CLAIM YELLOWKNIF
MACMARIAN R DISTRICT 6304 11621 85N 1
FRGS
GRNTS 2 2
YELLOWKNIFE URANIUM CORP NL 70
FRACTURES IN GRANITE
SLAVE PROVINCE
VEIN
GSC MAP 1055A
1958ROWE P. 89

MD D870069 35
MACYELLOWKNIFE BEAULIEUPROSPEROUS LAKE 6231301140900 85J 9
CLMB
GPGM 2
YELLOWKNIFE GRP
INTRUDES CHIASTOLITE AND/OR GARNET META GREYWACKE
YELLOWKNIFE GRP ALONG VEGA FAULT S OF PROSPEROUS LAKE
ARCHAEAN AGE
SLAVE PROVINCE
PEGMATITE
GSC MAP 1055A MU 4 NODULAR QUARTZ-BIOTITE SCHIST
1941JOLLIFFE

MD D870069 53
4TA 0670KRDMACKAY LAKE
MAC MACKAY LAKE 64 7 110 7 76D
CLMB
GPGM 2
YELLOWKNIFE GRP
FEW GRAINS IN PGMT INTRUDING RX YELLOWKNIFE GREYWACKE
SLAVE PROVINCE
PEGMATITE
GSC MAP 1055A MU 4 NODULAR QUARTZ-BIOTITE SCHIST
1947FOLINSBEE

MD D870 99
1BE LI TA 0470KRDPEG CLAIMS TANTALUMRES8
MACYELLOWKNIFE BEAULIEURCSS LAKE 6245 11306 85J16
.954647
CLMB SPDM BRYL
GPGM5 2 2 GRDR 3
YELLOWKNIFE GRP
PEG TANTALUM MINES LTD 43-
TANTALUM REFINING AND MINING CORP AMERICA LTD
NATION WIDE MINERALS LTD LC 65
BARRINGTON EXPORATION LTD 66
BIBIS TIN MINES LTD 66
50 TPD MILL 46 CRE DRESSING TEST MB
NO 1 DYKE 110FTL X 8FTW S N55E D 45SE
NO 3 DYKE 200FTL X 21FTW S N D 50E

DISCOVERY 43 MILLED FALL 46 SUMMER 47 94LT ROCK 3750LBS CLME
ARCHAEAN AGE
SLAVE PROVINCE
PEGMATITE
GSC MAP 1055A MU 4 NODULAR QUARTZ-BIOTITE SCHIST
1944JOLLIFFE P. 9
1951LORD PP. 231-235
1952ROWE PP. 29-30
1958ROWE P. 89
1968MULLIGAN P. 66-67

MD D870 100
3NB 047LKRDEIG HILL CLAIMS BCREALRARE58
MACYELLOWKNIFE BEAULIEUHEARNE CHANNEL 6208301122000 85I 1
CLMB
 GPGM 2 2
YELLOWKNIFE GRP
BOREAL RARE METALS LTD 58 NL 70
DESTAFFANY TANTALUM BERYLLIUM MINES LTD 52 NL 70
BEAUPORT HOLDINGS LTD 56
ASSAY FOR SN AND NB SEE 101 104 106 ACQUIRED 45
ARCHAEAN AGE
SLAVE PROVINCE
PEGMATITE
GSC MAP 1055A MU 4 NODULAR QUARTZ-BIOTITE SCHIST
1952ROWE P. 27
1958ROWE P. 89

MD D870 101
3TA BE 047QKRDMCOSE GRP DYKES 1-2 BOREALRARE58
MACYELLOWKNIFE BEAULIEUHEARNE CHANNEL 6211001121300 85I 1
 .34748 47NB TA
 1 647 LI
CLMB SPDM24 CSRT ERYL
 GPGM 2 2 GRCK 2 3
YELLOWKNIFE GRP 1 2
DESTAFFANY TANTALUM BERYLLIUM MINES LTD
BOREAL RARE METALS LTD NL 70
NO 1 DYKE 900FTL X 34FTW 4800FT W OF NO 2
NO 2 DYKE 1400FTL X 15-20FTW IRREGULAR ZONES
DEVELOPMENT 40FT SHAFT ON NO 2 DDH STAKED 42
PRODUCTION MILL 25TPD ENLARGED TO 12STPD OF 53-54
CONCENTRATE ASSAY 35.03PC TA205 35.03PC NB205 .3PC SN
AMBG IN PODS QUARTZ CORE BRYL IN INTERMEDIATE ZONES
ARCHAEAN AGE
SLAVE PROVINCE
PEGMATITE
GSC MAP 1055A MU 4 NODULAR QUARTZ-BIOTITE SCHIST
1951LORD P. 119-120
1952ROWE PP. 22-24
1958ROWE P. 89
1968MULLIGAN PP. 68-69

MD D870 102
2TA BE LI047QKRCLIT 1-2 CLS LITA CAMPBELL PEGMAFROBISHER 58
MACYELLOWKNIFE BEAULIELBLCKHAM LAKE 6226001123930 85I10
CLMB SPDM ERYL AMBG
 GPGM GRCK
YELLOWKNIFE GRP 2 3

FROBISHER EXPLORATION COMPANY LTD 52 FORMERLY FROBISHER LTD
FRCBEX 62
STAKED 43 5 OUTCROPS
NO. 1 200FTL X 15FTW S N10E D W70-75
NO. 2 190FTL X 5-6FTW S N40E D 70NW
NO. 3 ARCUATE SHAPE D 80W
ARCHAEAN AGE
SLAVE PROVINCE
PEGMATITE
GSC MAP 1055A MU 4 NODULAR QUARTZ-BIOTITE SCHIST
1952ROWE P. 27
1958ROWE P. 89
1968MULLIGAN P. 67

MD 0870 103
3NB 0470KRCFREDA NO1 CLAIM E SUTHERLA58
MACYELLOWKNIFE BEAULIEUFREDA LAKE 6239001132800 85I11
CLMB CSRT AMBG BRYL
GPGM5 2 2 BSCS 33
YELLOWKNIFE GRP 2
E SUTHERLAND GRANITE PGMT DISCOVERED 44
297FTL X 7-16FTW S S83E - S48E D 10-33S
ARCHAEAN AGE
PROSPECTED 1945 SMALL MILL ERECTED 1946 CONCENTRATED 500LB
TANTALITE 46.19PC TA2O5 31.18PC NB2O5 1.83PC SNO2 0.57PC TIO2
ZONED
SLAVE PROVINCE
PEGMATITE
GSC MAP 1055A MU 4 NODULAR QUARTZ-BIOTITE SCHIST
1951LORD PP. 152-154
1958ROWE P. 89

MD 0870 104
3NB TA LI 0470KRCBEST BET DYKE NO 1 BOREAL RAR58
3BE
MACYELLOWKNIFE BEAULIEUDREUER LAKE 6213301121830 85I 1
.01 47 47NB TA
CLMB SPOM19 W AMBG12 W BRYL
GPGM 2 2 GRCK 2 3
YELLOWKNIFE GRP 2
DESTAFFANY TANTALUM BERYLLIUM MINES LTD 52
BOREAL RARE MINERALS 58
BEAUPORT HOLDINGS LTD 56
ASSAY OF COLUMBITE SEE 101 106 SILL 290FTL X 25FTW
CONFORMABLE S N30 D NW
TA2O5 .09PC NB2O5
WELL ZONED MINERALIZED QUARTZ PODS QUARRY 260FTL X 20-26FTW
X 27FTD PIT 50FTL
ARCHAEAN AGE
SLAVE PROVINCE
PEGMATITE
GSC MAP 1055A MU 4 NODULAR QUARTZ-BIOTITE SCHIST
1951LORD P. 121
1952ROWE PP. 24-25
1958ROWE P. 89
1968MULLIGAN P. 67

MD DB70 105
3TA BE LI 0470KRDWACO PEGMATITE SILL
MACYELLOWKNIFE BEAULIEUTHOMPSON LAKE 6237001132900 85I12
CLMB SPDM 5 V BRYL 5 V AMBG
GPGM5 2 2 BSCS5 33
YELLOWKNIFE GRP 2 3
415FTL X 20-35FTW CONFORMABLE S N55W POORLY ZONED
NO 2 DYKE 80OFTL X 40FTW NOT ZONED BERYL ONLY
ARCHAEAN AGE
SLAVE PROVINCE
PEGMATITE
GSC MAP 1055A MU 4 NODULAR QUARTZ-BIOTITE SCHIST
1951LORD P. 287-288
1958ROWE P. 89
1968MULLIGAN P. 66

MD DB70069106
3LI SN TA0470KRDTAN GRP BUDDY TAN CLSNO 3 PEGMATITE
BE
MACYELLOWKNIFE BEAULIEUBLATCHFORD LAKE 6210301122200 85I 1
CLMB SPDM CSRT BRYL
GPGM5 2 2 GRCK 2 3
YELLOWKNIFE GRP 2 3
DESTAFFANY TANTALUM BERYLLIUM MINES LTD 52
BEAUPORT HOLDINGS LTD 56
BOREAL RARE METALS LTD 58
4CLAIMS SEE 101 COLUMBITE ASSAY 4 DYKES -300FTL X 15FTW
NO. 1 265FTL X 5FTW S N20E D90
NO. 2 275FTL X 10FTW S N25E D85NW
NO. 3 TWO PIECES 160FTL 125FTL N50W D55-60NE ZONED
NO. 4 Y-SHAPE 120FTL X 10-20FTW D60W ZONED
ARCHAEAN AGE
SLAVE PROVINCE
PEGMATITE
GSC MAP 1055A MU 4 NODULAR QUARTZ-BIOTITE SCHIST
1952ROWE PP. 25-26
1958ROWE P. 89
1968MULLIGAN P. 67

MD DB70 107
3NB 0470KRDBCRE CLAIMS
MACYELLOWKNIFE BEAULIEUSPROULE LAKE 6244001132900 85I13
BE
CLMB BRYL 13V SPDM CSRT
GPGM5 2 2 BSCS 33
YELLOWKNIFE GRP 2 3
RADIUM LUMINOUS INDUSTRIES LTD 44 DISCOVERY 43
S N45W D 30-70SW DYKE SWARM 1700FTL X 200FTW BULK SAMPLE
SEVERAL DYKES WELL ZONED RENAMED TACO 55
ARCHAEAN AGE
SLAVE PROVINCE
PEGMATITE
GSC MAP 1055A MU 4 NODULAR QUARTZ-BIOTITE SCHIST
1944JOLIFFE P. 20-22
1952ROWE PP. 32-33
1958ROWE P. 89
1968MULLIGAN P. 66

MD D870 108
3TA BE LI 0470KRDRAMONA GRP LIT 3 CL MCDONALD PEG BOREALRARE58
MACYELLOWKNIFE BEAULIEUBUCKHAM LAKE 6218001124600 85I10
4 75043SPD TA 18 %
CLMB SPDM BRYL LPLT
GPGM GRC5
YELLOWKNIFE GRP 2 3
FROBISHER EXPLORATION CO LTD 40
DESTAFFANY TANTALUM BERYLLIUM MINES LTD 47- NL 70
BOREAL RARE METALS LTD 58- NL 70
DISCOVERED 40 ZONED S N80W D 60S 400FTL X 25FTW
ARCHAEAN AGE CONFORMABLE WITH RELICT BEDS IN ESCS
SLAVE PROVINCE
PEGMATITE
GSC MAP 1055A MU 4 NODULAR QUARTZ-BIOTITE SCHIST
1951LORD PP. 122-123
1952ROWE P. 28
1958ROWE P. 89
1968MULLIGAN F. 67

MD D870 109
3BE NB 0470KRDDIKE LILY RIBER FROBISHER 43
MACYELLOWKNIFE BEAULIEUPRELUDE LAKE 6239001135800 85I 5
CLMB BRYL 4V
GPGM5 2 2 BSCS 33
YELLOWKNIFE GRP 2 3
FROBISHER EXPLORATION CO 43 REPLACED BY FROBEX LTD 62
SWARM 100 PEGMATITES IRREGULAR FORM ZONED
LILY PGMT 110FTL X 10FTW WELL ZONED
RIBER PGMT 180FTL X 45FTW WELL ZONED
ARCHAEAN AGE
SLAVE PROVINCE
PEGMATITE
GSC MAP 1055A MU 4 NODULAR QUARTZ-BIOTITE SCHIST
6951LORD P. 244-245
1952ROWE PP. 30-31
1958ROWE P. 89

MD D870069185
4BE LI NB 1071KRDLIT 1,2 CLS LITA5,6CAMPBEL
MACYELLOWKNIFE BEAULIEUBUCKHAM L 6220 11240 85I W
CLMB BRYL SPDM
SCST 33 GPGM 2 2
YELLOWKNIFE FM
CAMPBELL PEGMATITES NO 2 PGMT
ZONE 2400 FT ALONG N SHORE BUCKHAM LAKE
SLAVE PROVINCE
PEGMATITE
1968MULLIGAN F. 67

MD D870069208
2NB 0970KRDBIGSPRUCE LAKE GIANTYELLO70
MACMACKENZIE DISTRICT BIGSPRUCE LAKE 6333 11557 85012
CRBT
GIANT YELLOWKNIFE DD70
NB MINERALIZATION BIG SPRUCE LAKE CARBONATITE BODY
SLAVE PROVINCE
IRREGULAR

MD D870069241
4NB BE 271KRDT AND B GROUP CM+S 43
MACYELLOWKNIFE MD MAC L
CLMB SPDM BRYL
GPGM5 2 2 BSCS 33
YELLOWKNIFE GRP 2 3
CONSOLIDATED MINING AND SMELTING
FOUND 38 ARCHAEAN AGE
SLAVE PROVINCE
PEGMATITE
GSC MAP 1055A MU 4 NODULAR QUARTZ-BIOTITE SCHIST
1951LORD PP. 278-279

MD D870069 2
4TA NB 0670KRDGORMAN LAKE
MAN GORMAN LAKE 2 5305 9450 53E
CLMB TRMN MLBD
GPGM 2 2 GNSS
WHITE PEGMATITE ALBITE FLDR CLMB BARREN PEGMATITES RED PFDP
RICH
SUPERICR PRCVINCE CAT LAKE BELT
PEGMATITE
1956QUINN

MD D870069 9
4NE 047UKRDTIN IS SHATFORD L CONTACTML
MANWINNIPEG R AREA TP16 R15 L33 502312 952830 52L16
CLMB EXNT CSRT BRYL MNZT
PGMT5 2 2 AMFB 33
RICE LAKE SERIES 3 3
K E MILLER DISCOVERY 20
MANITOBA TIN COMPANY 28-29
CONTACT MINERALS LTD
TP E OF LAKE ALSC S SHORE OF LAKE SEVERAL 100FTL X 60-100FTW
SURFACE WORK 110 FTC SHAFT TIN ISLANC CROSSCUT 60FT CRIFT
SUPERICR PRCVINCE WABIGCON BELT
PEGMATITE
1932WRIGHT PP. 99-105
1957DAVIES PP. 23-24

MD D870069 10
4NB SN 0470KRCHURON CL WINNIREGRTC
MANWINNIPEG R AREA TP16 R16 L17 502100 952100 52L 6
CLMB BRYL LPDL
GPGM 2 1 VLCC 3 3 GRNT 2 3
WINNIPEG RIVER TIN MINES 29
DALHART BERYLLIUM MINES AND METALS CORP LTC 57
BERYLLIUM MINES AND METALS CORP LTD 57
2 PEGMATITE BCDIES HURCN + GRACE RENAMED DALHART BULK SAMPLES
7DDH 2530FT PRODUCED FELDSPAR COLUMBITE
SUPERICR PRCVINCE WABIGCON BELT
PEGMATITE
1932ELLSWORTH P. 166
1957DAVIES PP. 17-18
1958ROWE P. 91

MD D870 11
3LI NB 0470KRDBEAR-BCE CL SILVERLEAF
MANWINNIPEG R AREA TP16 R16 L17 502106 952136 52L
CLMB SPDM BRYL LMMC

GPGM5 2 2 VLCC 3 3
SILVER LEAF MINING SYND (CANADA)1928 LTD
MINERAL REDUCTION PROCESSES LTD 1930
LITHIUM CORP CANADA LTD 54
LUSTROUS BK CRYSTALS DDH TR-TP MINERAL ANALYSIS
SPODUMENE PROD DYKE 525FTL X 100FTW MULTIPLE ZONES DDH
LEPIDOLITE PRODUCTION
SUPERIOR PROVINCE WABIGOON BELT
PEGMATITE
1931WALKER P. 11
1932ELLSWORTH PP. 148-157
1932WRIGHT PP. 114-120
1957DAVIES PP. 22-23
1958ROWE P. 91

MD D870 12
4NB SN 0470KRCRUSH L DDD CL JACKNUTTML
MANWINNIPEG R AREA TP17 R16 L19 502624 952242 52L
CLMB CSRT BRYL SPDM
GPGM 2 2 AMPB 33 TUFF 4 3
JACK NUTT MINES LTD 29-
1300FTL X 250FTW S 90 D 75S ZONED SEVERAL AMPHIBOLITE INCLUSION
SECOND SIMILAR DYKE 1000FT TO NE
SUPERIOR PROVINCE WABIGOON BELT
PEGMATITE
1932WRIGHT PP. 106-107

MD D870069 22
2SA TA 0571KRDODD CL TANTALUMMOO
MANWINNIPEG R AREA TP17R16L20 502700 952136 52L
CLMB TRMN CSRT
GPGM 2 1 BGNS 33 BSCS 33
RICE LAKE SERIES 1 3
NORTHERN TIN MINES LTD 40-
NARROW FG TO MG ALBITITE 320FTL X 4.7FTW DISCOVERED 28
600FD DDH 40 DEPT MINES AND RESOURCES DRILLED 9 DDH 42 2200FT
DRILLED BY TMOO
SUPERIOR PROVINCE WABIGOON BELT
PEGMATITE
1954DAVIES P. 43

MD D870069 29
2BE TA 0571KRDGRACE CL DALHARTMCL
MANWINNIPEG R AREA TP16 R16 L15 502018 951854 52L
CLMB BRYL TRMN
GPGM5 2 2 GRGS 2 3
RICE LAKE SER 2
DALHART MINERALS CORP LTD
400FTL X 25FTW PROD 25T HAND COBBED BERYL SEE NO 6352
SUPERIOR PROVINCE WABIGOON BELT
PEGMATITE
1957DAVIES PP. 18-19

MD D870069 87
2BE TA 0571KRDDYKE CLS CONTACTML
MANWINNIPEG R AREA TP16 R15 L33 502342 952754 52L
CLMB EXNT ZNWD LMMC BRYL
GPGM5 2 1 VLCC 3 3

J J PAPINEAU
CONTACT MINERALS LTD
PEGMATITE 1500FTL CG TR
COLUMBITE IN FRACTURED QUARTZ FELDSPAR
SUPERIOR PROVINCE WABIGOON BELT
PEGMATITE
1957DAVIES PP. 19-20

MC DB70069164
1TA 0570KREMONTGARY PEGMATITE TANTALUM ZONE TANTALUM M67
2CS POLLUCITE ZONE
2LI SPODUMENE ZONE
2LI LEPIDOLITE ZON
2BE WALL ZONE
MANWINNIPEG R AREA TP17 R15 L15 502548 952712 52L06
1 18717UTA 23
1 300 CS2204
1 628870LI 229
1 10769LI2 224
1 1000698E 22
CLMB QRT* MCCL BRYL
PLCT
SPDM FRTH PLGC
LPDL MCCL QRT*
BRYL QRT* FRTH

GPGM 2 2 APLT AMPE
RICE LAKE GRP 3 3 3
JACK NUTT TIN MINES LTD 29-30
CONSOLIDATED TIN MINING COMPANY 30-34
MONTGARY EXPLORATIONS LTD 54-57
AMERICAN METAL CO LTD 57-59
CHEMALLOY MINERALS LTD 59-62
TANTALUM MINING CORP OF CANADA LTD 67-
GENTLY DIPPING SHEET IN AMPHIBOLITIZED GREENSTONE NEAR GRANITE
3 LENSES MAX 45FTT ELONGATED PARALLEL TO MAIN PGMT MAINLY PLCT
MEDIAL PART OF SILL MCCL-QRT* ASSEMBLAGE PARTLY REPLACED BYLPDL
AREAS NEAR TOP OF SILL REPLACES MCCL-QTZ* ZONE TWO LENSES MAX
2-LAYERS IN SILL ONE NEAR ROOF OTHER NEAR FLOOR UPR 15-90FTT
BERNIC L 1500FTW 2500FTL 250FT MAX THICKNESS CONVEX UP APEX
ZONE 85PC MCCL 15PC QRT* DISSEMINATED TANTALITE SOME BRYL
38FT UNDER LAKE UNDULATING LENS WELL ZONED ASYMMETRIC WALL
SPDM LPDL POLLUCITE AND TANTACITE ZONES
PROD 500TPD SEPT 69- 190 LONGTPY 58PC TA205 70PC RECOVERY
SUPERIOR PROVINCE WABIGOON BELT
PEGMATITE
1932WRIGHT PP. 105-106
1959HUTCHISON PP. 1525-1542
1961NICKEL
1968HOWE PP. 39-49

MC DB70069243
4NE BE 0271KROTEN MILE LAKE FROBEX
NFLLABRADOR TEN MILE LAKE 5420 6157 13L 8
1 10 BEO 35
PGLR BRYL NEPL
MGMT 43 SYNT 2 3 PRGS 33 ANDS 3 3
LETITIA GRP
IRREGULAR
1962LANG MAP
1968MULLIGAN PP.192-93

MC DB70 16
2NE BE 0470KRCLAVERS MINE
NS LUNENBURG COUNTY NEW ROSS 4444 6427 21A11
CLMB BRYL AMBG LPOL
PGMT5 2 2
MEGUMA FM
LARGE CRYSTALS
APPALACHIAN REGICN
PEGMATITE
1907FARIBAULT PP. 81-82
1923WALKER PARSONS P. 35
1932ELLSWORTH P. 257

MC DB70069 3
3NE 1271KRDCONTINENTAL OCCUR
ONTSUDBURY DISTRICT CHEWETT TP C3 L11N2 480000 8305 41004E
PCLR FLOR AGRN
PGMT 2 2
1960 CONTINENTAL WOOD PRODUCTS
DYKE 4FTW DISSEMINATED ACCESSORY MINERALS
SUPERICR PROVINCE
PEGMATITE
1961PARSONS P. 50
1971FERGUSON P. 52

MC DB70 18
4NE 0470KRD 58
ONTPARRY SOUND DISTRICTHENVEY TP CAL4 4548 8035 41H15
EXNT
GPGM 2 2
H S SPENCE
DYKE 150FTL X 25FTW
GRENVILLE PROVINCE
PEGMATITE
1952LANG P. 146
1958ROWE P. 93

MC DB70 19
4U NB 0470KRDHOGAN PPTY SOUTH ZONE HALO U ML
ONTHALIBURTCN CCUNTY CARCIFF TP C15L6-7 450015 780900 31E 1
BTFT PCLR URNN URNR
SPGM 2 2 GNSS 33 GPGM 2 2
STRATHMAT LTD CP 53-54
AMALGAMATED RARE EARTH MINING CO OP 53-56
HALO URANIUM MINES LTD ACQUIRED 54 NL 70
CONSOLIDATED HALO URANIUM MINES LTD OP 57-
BETAFITE CCCURS IN CALCITE VEINS MINERAL ANALYSIS
DIAMOND DRILLED NORTHWEST LAKE PYROXENITE SOUTH BALD MTN
ORE ZONES DDH GECLCGY ADITS CALCITE FLUORITE VEINS
PEGMATITE DYKES 23 DDH 9441FT RADIOMETRIC SURVEY
GRENVILLE PROVINCE
VEIN
1955SATTERLY AND HEWITT PP. 33-34
1956SATTERLY P. 62
1961HOGARTH P. 615
1962LANG ET AL P. 263
1967HEWITT P. 54

MD 0870 20
1 L NB T 0470KRDBICROFT U MINES LTD CENTRE LAKE MACASSA GM
ONTHALIBURTON COUNTY CARDIFF TP C11L27-28450015 780200 31E 1
53634 2808 U
PCLR BTFT URNN URNR ALNT
GRNT 2 3 GPGM 2 1 GNSS 33 AMPB 33 SGNS 33
CONSOLIDATED RANWICK URANIUM MINES LTD 53-54
BICROFT URANIUM MINES LTD CP 55-61
MACASSA GOLD MINES LTD 61
WRIGHTHARGREAVES 70
STR TR 30 DDH 14242FT ADIT 2 SHAFTS NO 2 626FT 11393FTD
10446FTC 2953FTR SMALL INTERSTITIAL CALCITE MASSES IN
GRANITE OR SYENITE GNEISS
UR PRODUCTION 44MILLION DOLLARS
GRENVILLE PROVINCE
PODS
MU 3 MARBLE DOLOMITE CALCSILICATE ROCKS
1956SATTERLY P. 30-36
1962LANG P. 108,180
1967HEWITT P. 54
1971FERGUSON P. 46

MD 0870 21
4NE TA 0470KRDRICHARDSON MINE FISSION ML56
ONTHALIBURTON COUNTY CARDIFF TP C21L4-7 450315 781100 31E 1
PCLR BTFT ALNT URNR ZRCN
SPGM 2 2 VEIN 2
W.M. RICHARDSON DISCOVERED 22
ONTARIO RADIUM CORP LTD 29
INTERNATIONAL RADIUM AND RESOURCES LTD 31
WILBERFORCE MINERALS LTD 37
FISSION MINES LTD NL70
PRODUCTION 29-32 46-48 55
SURFACE WORK GEOLOGY DDH ADIT BULK SAMPLES
CALCITE-FLUORITE-APATITE DYKES AND SYENITE PEGMATITE
GRENVILLE PROVINCE
PEGMATITE
MU 2 AMPHIBOLITE PARAGNEISS QUARTZITE
1930SPENCE AND CARNOCHAN PP. 34-73
1952LANG PP. 142-45
1956SATTERLY P. 56-57

MD 0870 23
4U NB TA 0470KRD
ONTHALIBURTON COUNTY CARDIFF TP C7-8L10 445615 780600 31C14
ELSR PCLR
CRBT
CRYSTALS IN BLACK MICA AND APATITE CALCIT VEIN YELLOW BROWN
ALTER MINERAL ANALYSIS
GRENVILLE PROVINCE
VEIN
MU 2 AMPHIBOLITE PARAGNEISS QUARTZITE
1927ELLSWORTH P. 48
1932ELLSWORTH P. 227

MD 0870 24
1NE FLS 0470KRDCANADA RADIUM MINE CANADARADI
ONTHALIBURTON COUNTY CARDIFF TP C12L7-10 445815 780800 31D16
C13L7-8

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ELSR      PCLR      MCRL                URNN      URNR
 GPGM  2 2 MSDM   33 AMPB   33
CANADA RADIUM MINES LTD NL70 26 OP 32-36  40-42
CANADA RADIUM CORPORATION LTD 54 OP 54-56
BELCROFT RADIUM MINES LTD
SHAFT 400FT PILOT MILL 55 SCINTILLOMETER MAGNETOMETER
GEOLOGICAL SURVEYS 900DH 48184FT PEGMATITES S N45W OR
N45E D D 65E PCLR IN CALCITE VEINS
GRENVILLE PROVINCE
VEIN
MU 8 GRANITE G-GNEISS G-PEGMATITE
1952LANG P. 138
1956SATTERLY PP. 41-42
1958ROWE P. 92
1967HEWITT P. 64
1970TRAILL P. 444
1971FERGUSON P. 46

                  MD 0870    25
1FLDNB    0470KRDFLUNKETT MINE                          AMMCLY
ONTHASTINGS COUNTY      MONTEAGLE TP C6L20  450920 774930 31F 4
EXNT      ELSR      PCLR      MCRL      FLOR      SPHN      FLRT
 GPGM  2 2 FRGS   33 MRBL   33 AMPB   33 PRXN   33
AMERICAN MOLYBDENITE CO
S CRSER 27
ZONED GRANITE PEGMATITE OPERATED 1921, 1927
DYKE 175FTL X 20-25FTW  N55E D90 2CARS FELDSPAR
GRENVILLE PROVINCE
PEGMATITE
MU 8 GRANITE G-GNEISS G-PEGMATITE
1954HEWITT P. 40
1967HEWITT P. 64
1971FERGUSON P. 47

                  MD 0870    26
1NB U  FLD0470KROMCDONALD MINE                          FMACDONALD
ONTHASTINGS COUNTY      MONTEAGLE TP C7L18194509300 775000 31F 4
    341535          FLD
ELSR      MCTL                          ALNT      URNR
 GPGM  2 2 MSDM   33 SGNS   33 GRGS  2 3
P MACDONALD HYBLA CNT  19-35 FELDSPAR
PENNSYLVANIA FELDSPAR CO  19
VERONA MINING CO.
GENESEE FELDSPAR CORP
PHILLIPS-DOUBT GRUBSTAKE SYNDICATE  56
CLOUDMONT MINES LTD 56
HOLT SMALL NODULAR MASSES INTERGROWN WITH SPHN AND CYRTOLITE
MAIN DYKE S90 D60-70N 550X700X1200FT 3 ZONES CALCITE PODS
ELWR NODULAR MASSES IN CALCITEAND QUARTZ AMBER YELLOW OR DARK
BROWN RADIAL SHATTER PATTERNS
CHEMICAL ANALYSIS ABANDONED FELDSPAR MINE OPERATED 1919-35
GRENVILLE PROVINCE
PEGMATITE
MU 8 GRANITE G-GNEISS G-PEGMATITE
1922WALKER AND PARSONS P. 13
1930SPENCE P. 443
1932ELLSWORTH PP. 200-209
1955SATTERLY AND HEWITT PP. 55-57
1956SATTERLY PP. 138-140
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1958ROWE P. 95
1967HEWITT P. 55
1971FERGUSON P. 48

MC 0870 27
ONTHASTINGS COUNTY MONTEAGLE TP C8L17 451030 775900 31F 4
42123 FLD
CLMB PCLR SMRK FLDR ZRCN
GFGM 2 2 LCGR 2 3 GRGS 33
FELDSPAR MINES CORP.
METRO MINERALS AND URANIUM ML.
NORTHERN URANIUM MINES LTD 1948-49
ONE BLACK AND OTHER AMBER CLMB WITH RED FELDSPAR CYRTOLITE
CALCIOSAMARSKITE IN ZONED GRANITE PEGMATITE COLUMBITE PRODUCT
1921-23 COLUMBITE CHEMICALLY ANALYSED
OLD FELDSPAR MINE 70DH 1472FT S N60E D 90 330FTL
30-35FTW
GRENVILLE PROVINCE
PEGMATITE
MU 8 GRANITE G-GNEISS G-PEGMATITE
1923WALKER AND PARSONS P. 35
1932ELLSWORTH P. 209-213
1954HEWITT P. 50-51
1958ROWE P. 95
1970TRAILL P. 161,446,478
1971FERGUSON P. 48

MC 0870 28
1MSCFELNB 0470KROON.B.DAVIS OCCUR
ONTNIPISSING DISTRICT DICKENS TP C5L27 4535 7753 31F12
ELSR EXNT PCLR MCRL MNZT
GFGM5 2 2
CAN FLINT AND SPAR CO OPERATED 1943
GRANITE PEGMATITE SILL WORKED FOR FELDSPAR AND MICA
GRENVILLE PROVINCE
PEGMATITE
1944SATTERLY P. 122
1952LANG P. 142
1958ROWE P. 93
1970TRAILL P. 206,447
1971FERGUSON P. 49

MC 0870 30

4NE TA 0470KnLGRIFFITH PPTY
ONTHASTINGS COUNTY FARADAY TP C16L31 450300 783200 31E 1
PCRL MCRL
GFGM 2 1
J h GRIFFITH TORONTO
PGMT INTRUDING PARAGNEISS NEAR GRANITE CONTACT RADIOACTIVITY
SPCTTY
GRENVILLE PROVINCE
PEGMATITE
MU 8 GRANITE G-GNEISS G-PEGMATITE
1952LANG P. 142
1958ROWE P. 93

MC 0870069 31
4U NB 1070KROPACEMAKER PACEMAKER
ONTHASTINGS COUNTY FARADAY TP C10L12-3 450130 782330

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PCLR                                        URNN      URNR
 GFGM  2 2 MREL    33 PGNS    33 AMPB    33
PACEMAKER MINES AND OILS 55
3DDH 2047FT TWO NARROW PEGMATITES
GRENVILLE PROVINCE
PEGMATITE
MU 3 MARBLE DOLOMITE CALCSILICATE ROCKS
1956SATTERLY PP. 121-122
1960ROSE P. 37

                    MD 0870     32
4CB TA     047CKRD
ONTHASTINGS COUNTY      FARADAY TP C3L14     445730 782230 31C13
PCLR
 SPGM5 2 2
IN HORNBLENDE SYENITE PGMT
GRENVILLE PROVINCE
PEGMATITE
MU 8 GRANITE G-GNEISS G-PEGMATITE


                    MC 0870     33
4U  NB  TA0470KRDSOUTH GROUP                              GREYHAWKUR
ONTHASTINGS COUNTY      FARADAY TP C12L9-11 450240 782320 31C14
                                   C11L4-11
                                   C10L10-11
                                   C9L10
          1    800  U  .395%
PCLR      FRGS                      URNN      URNR      ALNT
 GRNT  2 2 MGBR    33 AMPB    33 PGNS    33 MREL    33
GOLDHAWK PORCUPINE ML 54-55
GREYHAWK URANIUM MINES LTD 55-56
METAL MINES LTD 57-59
SCINTILLOMETER GEOLOGICAL SURVEYS PEGMATITE ZONE 3000FT
SURFACE 114DDH 42299FT UNDERGROUND 76DDH 10542FT
VERTICAL SHAFT 402FT 5965FTD 5965FTC U PROD $834889
RADIOACTIVE PEGMATITES IN AMPHIBOLITE S NE D 45-80SE
ORE TYPES MAGNETITE PEGMATITE QUARTZ LEUCOGRANITE
GRENVILLE PROVINCE
PEGMATITE
MU 8 GRANITE G-GNEISS G-PEGMATITE
1956SATTERLY P. 117-121
1962LANG P. 262
1967HEWITT P. 64
TRAILL P. 209,443
FERGUSON P. 47

                    MD 0870     34
3NB TA U  047CKRDBONVILLE GOLD M LTD                      BONVILLEGO
ONTHASTINGS COUNTY      FARADAY TP CAL21-24 450220 785830 31C04W
                                   CEL23
PCLR      MORL      ELSR              URNR
 SPGM  2 2 MREL    33 NPLS    33 GNSS    33
BONVILLE GOLD MINES LTD
HYDRA EXPLORATIONS LTD 59
GEOPHYSICAL SURVEY 1000OD STR TP ORE IN PEGMATITE AND
CALCITE VEINS
GRENVILLE PROVINCE
PEGMATITE
```

1955SATTERLY AND HEWITT P. 49
1956SATTERLY PP. 107-108
1967HEWITT P. 54
1970TRAILL P. 443
1971FERGUSON P. 47

MD 0870 36
4NB TA 0470KRD
ONTHASTINGS COUNTY FARADAY TP C15L6 450206 782300 31F 4
BTFT
PGMT 2 3 HBDG 33
IN CALCITE VEIN IN GRANITE PEGMATITE AND HORNBLENDE GNEISS
BROWN CRYSTALS SINGLY IN CALCITE VEINS OR MICA BOOKS
GRENVILLE PROVINCE
VEIN
MU 8 GRANITE G-GNEISS G-PEGMATITE
1956SATTERLY P. 170
1970TRAILL P. 447
1971FERGUSON P. 47

MD 0870 37
4NB TA 0470KRDWHYTOCK PPTY
ONTFRONTENAC COUNTY MILLER TP L15SWR 450036 770154 31F 3
PCLR
PGMT 2 2 GRNT 2 3
ZONED PEGMATITE SOFTL ANALYSIS AND DIFFRACTION PATTERN FOR
PYROCHLORE ELONGATE ROUNDED OR IRREGULAR MASSES WITH
MUSCOVITE
DIFFRACTION PATTERN
GRENVILLE PROVINCE
PEGMATITE
MAP UNIT FELSIC ROCKS
1956SATTERLY P. 20
1967SATTERLY P. 64
1970TRAILL P. 445
1971FERGUSON P. 45

MD 0870 38
4NB TA 0470KRDRANEY PPTY W RANEY 58
ONTPARRY SOUND DISTRICTCHAPMAN TP C8L3 454330 793045 31E12
CLMT PCLR MCRL
GFGM 2 2
W RANEY SR SUNDRIDGE
GRENVILLE PROVINCE
PEGMATITE
1958ROWE P. 92
1962LANG ETAL P. 256
1967HEWITT P. 68
1970TRAILL P. 445
1971FERGUSON P. 50

MD 0870 39
4NB TA 0470KRD
ONTNIPISSING DISTRICT BLTT TP C9L5 454145 790545 31E11
7 NB 125 U 32
PCLR MCLR FRGS ESCN PRTT
GFGM5 2 2
DELDONA GOLD MINES LTD
PCLR ANALYSIS BULK SAMPLE

GRENVILLE PROVINCE
PEGMATITE
1958ROWE P. 91

MD DB70 40
NB TA 0470KROMELISSA OCCURRENCE INTERNATCMC
ONTMUSKOKA DISTRICT CHAFFEY TP C5L23 452200 791500 3LE06E
PRCL MCRL
GPGM 2 2
INTERNATICNAL CERAMIC MINING CO.
OPERATED 1948
GRENVILLE PROVINCE
PEGMATITE
1967HEWITT P. 65
1970TRAILL P. 445
1971FERGUSON P. 48

MD DB70 41
4NB TA U 0470KROPETER ROCK MNG LTD
ONTHASTINGS COUNTY HERSCHEL TP C8L39-40450320 780400 31E 1
BTFT PCLR MCRL EXNT URNR ALNT
GFGM 2 2 LCGR 2 3 GRGS 33
PETER ROCK MINING CO. OPERATED 1955
SMALL GRAINS CUBO OCTAHEDRAL CRYSTALS BLACK TO REDDISH BROWN
SPEC ANALYSIS PEGMATITE 430FTL 1-11FTW ZONED RADIOMETRIC
SURV STR TR 300H
GRENVILLE PROVINCE
PEGMATITE
MU 8 GRANITE G-GNEISS G-PEGMATITE
1956SATTERLY P. 135
1958ROWE P. 93
1967HEWITT P. 54
1970TRAILL P. 47
1971FERGUSON P. 47

MD DB7J. 42
4NB TA 0470KROBROWN OCCURRENCE CABRCWN 58
ONTHASTINGS COUNTY HERSCHEL TP C1L3J 45J600 780100 31E 1
PCLR MCRL
PGMT5 2 1
D A BROWN FORT WILLIAM
ZONED GRANITE PEGMATITE
GRENVILLE PROVINCE
PEGMATITE
1952LANG P. 137
1958ROWE P. 93
1970TRAILL P. 445
1971FERGUSON P. 47

MD DB70 43
4NB 0470KROBLUE ROCK CERIUM RAREEARTHM
ONTHALIBURTON COUNTY MCNMOUTH TP C6L19-2344562J 781500 31D16
C8L20
FRGS ALNT URNR URNN UREN
GFGM 2 2 AMPB 33 MRBL 33 MGBR 2 3
AMALGAMATED RARE EARTH MIN CORP OF 54-56
CONFORMABLE GRANITE PEGMATITE LENSES IN GNEISSES AND
AMPHIBOLITES THREE BODIES SURFACE WORK DDH
GRENVILLE PROVINCE

PEGMATITE
MU 2 AMPHIBOLITE PARAGNEISS QUARTZITE
1956SATTERLY P. 96-99
1959ROSE P. 39
1962LANG P. 271
1967HEWITT P. 54

MD DB70 44
4NE TA U 0470KRDCAN ALL METALS EXPLO CANALLMET
ONTHALIBURTON COUNTY MCNMCUTH TP C8L5-8 445700 781900 31D16
C9L5-9
PCLR MCRL BTFT
MRBL5 31 QRZT 33 PRGS 33
CANADIAN ALL METALS EXPLORATION LTD
8 CL 8000FT DD 1200FT DR ACIT SPEC ANALYSIS
SALMON PINK CALCITE MASSES IN METAPYROXENITE
COARSE-GRAINED CALCITE BIOTITE ROCK
GRENVILLE PROVINCE
PODS
MU 2 AMPHIBOLITE PARAGNEISS QUARTZITE
1956SATTERLY P. 20
1962LANG P. 270

MD DB70069 45
3U NB 107UKRCRARE EARTH AMALREMCCR
ONTHALIBURTON COUNTY MCNMCUTH TP C8L20 445720 781500 31C14
FRGS URNR URNN CRIT
GFGM 2 2 GRNT 2 2 AMFB 33 QRZT 33 MREL 33
LEAD URA MINES LTD 48
RARE EARTH MINING CORP OF CANADA 51
BLUE ROCK CERIUM ABSORBED 56
AMALGAMATED RARE EARTH MINING COMPANY LTD 56
PRODUCTION 1948-56 6-SHOWING NO 1 SHAFT 657FT ACIT
DDH 4900FT GRANITIC DYKES
GRENVILLE PROVINCE
PEGMATITE
MU 2 AMPHIBOLITE PARAGNEISS QUARTZITE
1956SATTERLY P. 92-96

MD DB70 46
4U NB TA 0470KRC CROMWELL PPTY
ONTPETERBOROUGH COUNTY CAVENDISH TP C5L14 444415 782115 31D 9
C6L13
BTFT URNP URNR ALNT
PGMT 2 2 MREL 33 GBER 2 3
DISSEMINATED MINERALIZATION MINERAL ANALYSIS 30PC NB205
GRENVILLE PROVINCE
PEGMATITE
MU 2 AMPHIBOLITE PARAGNEISS QUARTZITE
1956SATTERLY P. 20
1962LANG P. 255
1970TRAILL P. 443
1971FERGUSON P. 50

MD DB70069 47
4NE FE 1271KRCALBANY FORKS KEEVILMGL 69
ONTCOCHRANE DISTRICT ALBANY FORKS 5106 845230 42N02W
PCLR MGNT
CRBT 11

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                MD D87C    49
4NB U     0470KRCCUBAR URANIUM M LTD                CUBARURANI58
ONTSUDBURY DISTRICT    CILL TP   C2L2      462245 804945 41I 7
                  FLP
PCLR      BTFT      EXNT      ELSR      FLJR      ALNT
 GFGM  2 2
NORTHERN FELDSPAR MINES LTD
CUEAR URANIUM MINES LTC NL 70
GRANITE PEGMATITE FELDSPAR PRODJCTICN 25FTW PINK SPAR
BICTITE MUSCCVITE
SUPERIOR PRCVINCE  COBALT PLATE
PEGMATITE
1958ROWE P. 93
1962LANG ET AL P. 258
1967HEWITT P. 65
1971FERGUSON P. 52
1967HEWITT P. 65

                MD D87J    5J
4NE       0470KRC                      AMABLE DU FOND
ONTNIPISSING DISTRICT  CALVIN TP C2L15-17  461408 785330 31L 7
PCLR      EXNT
 PGMT5 2 2
ZONED GRAITE PEGMATITES MINERALIZED BORDER PHASE
GRENVILLEPRCVINCE
PEGMATITE
1962HEINRICH P. 314
1970TRAILL P. 447
1971FERGUSON P. 49

                MD D87J    51
1NB U     0470KRCNCVA BEAUCAGE M LTC NEWMAN IJ
ONTNIPISSING DISTRICT                      4615   793J   31L 5
          1  1893560  .049 NB   86
          1  2962  U  .041 NB   69
KEEVIL MINING GRCUP LTD 69
140FT OVERBURDEN 590FT PALAEOZOIC LS DOLOMITE CARBONATITE
BANDS NON-TITANIFEROUS MAGNETITE WEAK PYROCHLORE MIN GRCUND
MAGNETIC ANOMALY 5000FT NW 3200FT W RELIEF 110006 DDH 1203FT
HUDSON BAY LOWLANDS
STRATIFORM
1971FERGUSON P. 45

                MD D87J    48
4NE TA U  0470KRC
ONTSUDBURY DISTRICT    CILL TP C3L4        462345 805100 41I 7
                  FLP
TDCT      PCLR                      FLDR      GRN*
 GFGM  2 2
ONE CARLOAD FELDSPAR PEGMATITE JYKE 10JFTL X 40FTW
TOCDITE TO .25IN
SUPERIOR PRCVINCE  COBALT PLATE
PEGMATITE
1932ELLSWORTH P. 171
1952LANG P. 142
1958ROWE P. 93
1970TRAILL P. 161
1971FERGUSON P. 52
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CALDER                                  5FT    .11          .48 10FT
GRENVILLEPROVINCE
IRREGULAR
1954ROWE P. 5-7
1971FERGUSON PP. 37-39
1971LUMBERS PP.51-52,81-83

                  MD DB70    52
3TA NB    0470KRD                                          ORCHAN URA56
ONTTHUNDER BAY DISTRICTMANITOUWADGE AREA   4908   8548   420 9


SEE ORCHAN MINES LTD NL70
SUPERIOR PROVINCE  WAWA BELT
IRREGULAR


                  MD DB70    54
4NB TA    0470KRDERIGNALL                                  OPECNGCMNG58
ONTPARRY SOUND DISTRICTCONGER TP C10L7     452430 795130 31E 4
     42325          FLD
EXNT      CLMB      SMRK                MNZT
 GPGM  2 2
MCGUIRE AND RCEINSCN 1923-25
OPECNGC MINING CCMPANY 1946-47
CONGER FELDSPAR MINING CO LTD
TR 4DDH 765FT SMALL PEGMATITES S N45W D 65-90W
COLUMBITE AND EUXENITE CRYSTALS TC 1IN WITH MUSCCVITE GARNET
IN LENTICULAR ZONE FELDSPAR PROD 1923-25
GRENVILLEPROVINCE
PEGMATITE
1932ELLSWORTH P. 187
1942SATTERLY P. 57
1952LANG P. 141
1958ROWE P. 93
1960ROSE P. 22
1967HEWITT P. 54
1970TRAILL P. 161
1971FERGUSON P. 50
PCLR                                    URNN
 SYNT      PRXN      FNIT      CRBT
NOVA BEAUCAGE MILES LTD 52-56
COMINCO
NORD INTEREX LTD 71-
EUHEDRAL TO SUBHEDRAL DISSEMINATED URANIAN PYRCCHLORE IN
PYROXENITE PILOT MILL WORK DONE SHAFT 2-LEVELS RESERVE 41190
T NB205 IDLE SINCE 56 AGE 565 MY K/AR BOTT
STOCK 8000FTW X 10000FTL CORE ALKALINE SYENITE-AND PYROXENITE
RING AEGIRINE-POTASSIC FELDSPAR FENITE 500-1300FTW MINOR CRBT
INTRUSIONS RING QUARTZ FENITE CAP PALAEOZOIC LS MINERALIZED
SHOOTS IN FIRST RING FROM CORE MAGNETIC ANOMALY OVER STOCK
NEWMAN DEPOSIT 1953-56 GREAT MANITOU DEPOSIT 1953 CALDER DEPOS
IT 1953 MANITOU ISLANDS DEPOSIT 1971
NEWMAN ABOVE 300FT LEVEL 3MT              .042% U308 0.613%NB205
       BELOW              2.7MT 6990T/VFT .042%       0.69%
                          1.8   4560      .05          .88
                           .6   1540      .075        1.06
GT MANITOU               .027             .10          .38
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                MD D870    55
1BE FLDNE 057CKR1.E.COLDWELL OCCUR                    CANBERYL
ONTRENFREW CCUNTY       LYNDOCH TP C15L23    452015 775645 31F 6
EXNT      CLMB      LNDC      SMRK      MNZT
 GPGM  2 2 GRGS    32
T B CALDWELL 26
CAN BERYLLIUM MINES AND ALLOYS
FELDSPAR PRODUCTION 1926 1939
GNEISSES S N30-70E D 20-60SE CONFORMABLE PEGMATITES
DYKE 245FTL X 4-34FTW S N59E D 90 WELL ZONED
COLUMBITE MASSES .5IN TO .5 X 12IN PLATES NB-ANATASE
GRENVILLEPROVINCE
PEGMATITE
MU 8 GRANITE G-GNEISS G-PEGMATITE
1915JOHNSTON P. 196
1953HEWITT P. 36-42
1958ROWE P. 95
1959ROSE P. 38
1967HEWITT P. 65
1970TRAILL P. 205
FERGUSON P. 51

                MD D870069 56
1U  NB    0470KRDCAMERON LAKE                         CANBERYL
ONTRENFREW CCUNTY       LYNDOCH TP C15L30    451945 775545 31F 6
     13549          FLD
      50            BRL
CLMB      FRGS      EXNT              BRYL      MCCL      ALBT
 GPGM  2 1
RENFREW MINERALS LTD 35-36
CAN BERYLLIUM MINES AND ALLOYS
OPERATED 1935-6 1949 OPEN PITS
DYKE S N70E 600FTL X 100-150FTW  STRONGLY ZONED
1948-50 300T FELDSPAR 57100LBS BERYL COLUMBITE EUXENITE AND
MAGNETITE ARE ASSOCIATED IN DYKE
GRENVILLEPROVINCE
PEGMATITE
MU 8 GRANITE G-GNEISS G-PEGMATITE
1944SATTERLY PP. 97-99
1953HEWITT P. 42-46
1958ROWE P. 94
1967HEWITT P. 65
1970TRAILL P. 161
1971FERGUSON P. 51

                MD D870069 57
2FE NB    1271KRDCLAY TP
ONTCOCHRANE DISTRICT    CLAY TP NW4          494830 8206    42G16E
         1        FE 70    SI  2    AL  125 S     06 NE
                                    MGNT      GRN*
 CRBT      SYNT      GNSS
1954 LUNDBERG EXPLORATIONS LTD
1955 MATTAGAMI MINING CO LTD
AEGIRINE SYENITE STOCK 8MIO INTRUDES GNEISSIC TERRAIN CRBT ZONE
150 FTT DIP IN 70NW AEROMAG ANOMALY 1.8MIL X 1.3MIW RELIEF 3300
GAMMAS LOW RADIOACTIVITY K/AR AGE 1010MY
SUPERIOR PROVINCE
IRREGULAR
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1967GITTINS P. 653
1971FERGUSON PP. 32-33

MD 0870 58
4NB TA 0470KRDMAVIS L LUNECHOGML
ONTSUDBURY DISTRICT CRYDEN TP 4630 8045 52F15
CLMB
PGMT5 2 2
LUN ECHO GOLD MINES LTD
SURFACE WORK 2000 FT DD
SUPERICR PRCVINCE COBALT PLATE
PEGMATITE

MD 0870 59
1FLDNB 0470KRDAMBEAU MINE WANUPFELD

12627 FLD
ESCN EXNT
GPGM 2 2
WANUP FELDSPAR MINES LTD
PEGMATITE 25FTW DISSEMINATED MINERALIZATION PRCDUCED FELDSPAR
1926-27
GRENVILLEPRCVINCE
PEGMATITE
1960ROSE P. 18
1967HEWITT P. 65
1970TRAILL P. 203,207
1971FERGUSON P. 51

MC 0870 60
4NB 0470KRCWINDOVER PPTY SILANCC MC
ONTPETERBORCUGH CCUNTY CAVENDISH TP C3L3 444220 782330 31C 9
FRGS MGNT ZRCN URNR
GPGM 2 2 GRNT 2 3 SYNT 2 3
SILANCC MINING ANC REFINING CO
SURFACE WORK 9DDH 3766FT DISSEMINATED MINERALIZATICN
GRENVILLEPROVINCE
PEGMATITE
MU 2 AMPHIBCLITE PARAGNEISS QUARTZITE
1956SATTERLY P. 23
1962LANG ET AL P. 255
1967HEWITT P. 55
1970TRAILL P. 209
1971FERGUSON P. 51

MD 0870 61
4U NB 0470KRCW.STEWART CCCURRENCE
ONTNIPISSING DISTRICT CALVIN TP C1L11-12 461345 785145 31L 7
FRGS
GPGM5 2 2
W STEWART EAU CLAIRE CNT
GRENVILLEPRCVINCE
PEGMATITE
1952LANG P. 138
1958ROWE P. 91
1970TRAILL P. 209
1971FERGUSON P. 49

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                MD 0870    62
1NB FLDGRT0470KRDJ.G.GOLE MINE                          D.L.ROSE
ONTNIPISSING DISTRICT  MURCHISON TPC4L14-15453130 780030 31E 9
     93844          QTZ
     23844          FLOR

 PGMT5 2 2
J.G. GOLE D.L. ROSS
D.L.ROSE AND CO = MADAWASKA FELDSPAR 1938-44
OPERATED 1937-44
GRENVILLEPROVINCE
PEGMATITE
1944SATTERLY P. 120
1952LANG P. 147
1970TRAILL P. 209
1971FERGUSON P. 49

                MD 0870    63
1U  NB    0470KRDMCQUIRE MINE                           MCQUIREROB
ONTPARRY SOUND DISTRICTCONGER TP C9 L9-10  451345 795200 31E 4
      25          FLD
SMRK                                  URNN     TCLT     CRLT
 PGMT  2 2
MCGUIRE ROBINSON
PRODUCED 618T FELDSPAR 1925 SMALL PIT ON LOT LINE MUSCOVITE
PROSPECT
GRENVILLEPROVINCE
PEGMATITE
1942SATTERLY P. 57
1952LANG P. 141
1958ROWE P. 92
1960ROSE P. 35
1962LANG ET AL P. 256
1967HEWITT P. 55
1970TRAILL P. 478
1971FERGUSON P. 50

PCLR     PRVK     BTFT              APTT     CLOT
                MD 0870069 78
3BE NB    0771KRD
ONTNIPISSING DISTRICT  MATTAWAN TP C9 L19-
                                      20
BRYL     EXNT     PCLR
 GFGM
GRENVILLE PROVINCE
PEGMATITE
1899BARLOW
1932ELLSWORTH PP. 189-191
1968MULLIGAN P. 86

                MD 0870069 84
3NB       1271KRDCANADA ALL METALS                     CANADAAMEX
ONTHALIBURTON COUNTY   MONMOUTH TP C9 L7N2 4455   781830 31C16W
PCLR

CANADIAN ALL METALS EXPLORATION LTD
CALCITE VEINLETS WITH PYROCHLORE
GRENVILLE PROVINCE
VEIN
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1970TRAILL P. 444
1971FERGUSON P. 47

MD D870069 86
2FLDTA 0670KRC MCLYCCREAM
ONTNIPISSING DISTRICT CALVIN TP C8L21-22 461730 785700 31L 7
2526 FLD
7 U TR TA 15
CLMB EXNT SMRK ALNT
GPGM 2 2
OBRIEN AND FOWLER
MOLYBDENUM CORP AMERICA
3 DYKES 20FTW MAX 1000FTL BULK SAMPLT TR U3C8
OPERATED 1955 ON BCND AND ECBJO CLAIM GRPS FELDSPAR PRODUCTION
25-26
GRENVILLEPROVINCE
PEGMATITE
1932SPENCE P. 51
1952LANG P. 147
1960ROSE P. 21
1967HEWITT P. 68

MD D870069 92
4U NB 0770KRCBLUE ROCK OCCUR RAREEARMCL
ONTHALIBURTON COUNTY MONMOUTH TP C5-6L18-445600 781435 31D16
20
FRGS URNN URPN URNR
GPGM 2 2 MRBL 33
RARE EARTH MINING CO LTD 54-56
NO2 SHAFT 440FT THREE LEVELS 56761 FT SURFACE DD 16817 FT
UNDERGROUND DD BLACK RESINOUS GRAINS IN GRANITE PEGMATITE
GRENVILLEPROVINCE
PEGMATITE
MU 2 AMPHIBOLITE PARAGNEISS QUARTZITE
1970TRAILL P. 209
1971FERGUSON P. 46

MD D870069 94
2NB U 1271KRCFISSION OCCURRENCE
ONTHALIBURTON COUNTY CARDIFF TP C21 L5 452020 781012 31E01E
BTFT EXNT URNN

ONTARIO RADIUM CORP INTERNATIONAL RADIUM AND RESOURCES 29-33
WILBERFORCE MINERALS LTD 37
FISSION MINES LTD 46-55
SURFACE AND UNDERGROUND EXPLORATION
GRENVILLE PROVINCE
VEIN
1970TRAILL P. 444
1971FERGUSON P. 46

MD D870069116
3NB U 1271KRC
ONTHALIBURTON COUNTY CARDIFF TP C18L4-5 440640 781030 31D16E
PCLR

GRENVILLE PROVINCE
IRREGULAR
1970TRAILL P. 444
1971FERGUSON P. 46

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                MD D870   121
1FLDNB    0570KRDORSER-KRAFT                          S ORSER   58
ONTLANARK COUNTY       S SHLRBROOKE TPC5L13444740 763120 31C15
                                     C6
          7         TH   14
     31623          FLD
EXNT                                  FLOR     TRMN
 GPGM  2 2 GBBR  2 2 GRNT  2 2
ORSER KRAFT FELDSPAR CO
FELDSPAR PRODUCTION GPGM 75X200FTL ZONED.
BULK SAMPLE TO MB 21 OPERATED 1916-23
GRENVILLEPROVINCE
PEGMATITE
MAP UNIT MAFIC ROCK-FELSIC ROCK CONTACT
1952LANG P. 146
1958ROWE P. 96
1960ROSE P. 26
1967HEWITT P. 65

                MD D871   122
4NB       0570KRD                                   GRAHAMLAKE58
ONTSUDBURY DISTRICT    SERVOS TP C6L6      461530 804430 41I 2
EXNT      ESCN
 GPGM  2 2
1952 THE GRAHAM LAKE MINING SYNDICATE
BULKS TO ODM GSC DISSEMINATED MINERALIZATICN RADIOACTIVE
GRENVILLEPROVINCE
PEGMATITE
1952LANG P. 149
1958ROWE P. 96
1962LANG ET AL P. 277
1967HEWITT P. 65

                MD D870069123
3NBTA U  0470KRDCBASIN PPTY                           SILVER CRAT
ONTHASTINGS COUNTY     FARADAY TP C15L30-31450250 783120 31E 1
BTFT      PCLR      EXNT      ELSR      APTT      PYRT
 MRBL   12 GNSS   3  GPGM  2 2
ORSER-WILSON  OF 25 MICA
BANCROFT MICA AND STONE PRODUCTS LTD OP 47-49 MICA
SILVER CRATER MINES LTD. NL70 OP 53-55 U
BTFT SPEC ANALYSIS 41.5PC NB205 1.4PC TA205 21.4PC U308
OPEN PIT FOR MICA LENSE COARSE-GRAINED CALCITE BIOTITE ROCK
400FTL X 500FTW X 350FT DOWN DIP S N20-30E ADIT N63W 435FTL
2500H 5500FT ROCK 70-80PC CALCITE ACC BIOTITE 50DA HORNBLENDE
ZONES BETAFITE
GRENVILLE PROVINCE
PEGMATITE
MU 8 GRANITE G-GNEISS G-PEGMATITE
1943THOMPSON P. 59
1956SATTERLY PP. 123-132
1957JONES P. 24
1958ROWE P. 93
1961HOGARTH P. 615
1962LANG P. 260
1970TRAILL P. 444
1971FERGUSON P. 47
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                MD D870   124
1FLDNB    0570KRDMAHONEY AND MORIN
ONTNIPISSING DISTRICT  SABINE TP C1L28-29  445900 780300 31E 8
     2425         FLD
ESCN     EXNT                        FLDR
 GPGM  2 2
MAHONEY AND MORIN
FELDSPAR PRODUCTION OPERATED 1924-25 DYKE 20FTW
EUXENITE IN MASSES TO 4IN 200T FELDSPAR PRODUCED
GRENVILLEPROVINCE
PEGMATITE
MU 8 GRANITE G-GNEISS G-PEGMATITE
1932SATTERLY P. 53
1952LANG P. 149
1958ROWE P. 96
1962LANG ET AL P. 277
1967HEWITT P. 65
1970TRAILL P. 205
1971FERGUSON P. 50

                MD D870   125
4U  NB    0570KRD                                    SABINEURAN58
ONTNIPISSING DISTRICT  SABINE TP C1L2,8    444920 781000 31E 8
ESCN
 GPGM5 2 1
SABINE URANIUM MINES LTD
SURFACE RADIOMETRY GEOLOGY
GRENVILLEPROVINCE
PEGMATITE
MU 8 GRANITE G-GNEISS G-PEGMATITE
1958ROWE P. 96
1971FERGUSON P. 50

                MD D870   126
4NB       0570KRD                                  E BETZ
ONTRENFREW COUNTY      RICHARDS TP C14L2   454515 772945 31F11
FRGS     ESCN                        URNN

E BETZ TORONTO
GRENVILLEPROVINCE
PEGMATITE
1958ROWE P. 96
1959ROSE P. 39
1971FERGUSON P. 52

                MD D870   127
1CRMNB    0570KRDCRAIGMONT MINE
ONTRENFREW COUNTY      RAGLAN TPC18L3-4    4515   7730   31F 5
    120046         CRN
EXNT                                CRDM     ALNT     URNN
 SPGM  2 2 MREL   33
CANADA CORUNDUM COMPANY 1899-1908
MANUFACTURERS CORUNDUM COMPANY 1909-1913
CORUNDUM LTD 1919-21
WARTIME METALS CORP 1944-46
TRENCHING GEOLOGICAL RADIOMETRIC SURVEYS 2CDH 601FT ADIT 220FT
DRIFT 220FTL CORUNDUM PROD FROM PITS S AND W SIDES RCBILLARC MT
SYENITE PEGMATITE INTRUDES NEPHELINE SYENITE
GRENVILLEPROVINCE
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PEGMATITE
MAP UNIT META-SEDIMENTARY ROCKS
1952LANG P. 141
1953HEWITT PP. 56-59
1958ROWE P. 95
1959ROSE P. 39
1962LANG P. 277
1967HEWITT P. 55
1971FERGUSON P.51

MD 0870 129
4NE 0570KRDF.G. QUINN OCCURRENC
ONTFRONTENAC COUNTY OLDEN TP C7L8 444220 764320 31C15
EXNT
BSLT 1 2 MRBL 33
GRENVILLEPROVINCE
IRREGULAR
MU META VOLCANIC ROCKS CRYSTALLINE LS CONTACT
1958ROWE P. 95
1971FERGUSON P. 45

MD 0870 130
4NE 0570KRDJ.P.QUINN OCCURRENCE ORSER-KRAF
ONTLANARK COUNTY NORTH BURGESS C6L23 444500 762000 31C15
PCLR EXNT
GPGM MRBL 33
J P QUINN STANLEYVILLE
ORSER-KRAFT FELDSPAR CO.
GRENVILLEPROVINCE
PEGMATITE
MAP UNIT SEDIMENTARY ROCKS
1932ELLSWORTH P. 262
1952LANG P. 146
1958ROWE P. 95
1970TRAILL PP. 204-205
1971FERGUSON P. 48

MD 0870 131
1FLPNB 0570KRDJ G GOLE MADAWASKA 58
ONTNIPISSING DISTRICT MURCHISON TP C4L15 453130 780030 31E 9
C4L14
103744 FLD QTZ TA
FRGS FLDR QRT* ALNT
GPGM 2 2
J G GOLE D L ROSS OPERATED 1937-44
MADAWASKA FELDSPAR CO
FELDSPAR AND QUARTZ PRODUCTION TO 44
GPGM 15-60FTW90DFTL15-30FTD FRGS ASSOCIATED WITH BLACK MICA
GRENVILLEPROVINCE
PEGMATITE
1944SATTERLY P. 120
1952LANG P. 147
1958ROWE P. 95
1962LANG ET AL P. 274
1967HEWITT P. 65

MD 0870069132
4NE 1271KRDC.E. EARLE
ONTHALIBURTON COUNTY CARDIFF TP C12-13L104450 780730 31D16E
ELSR BOTT AFTT

CALCITE VEIN BKMICA APATITE ELLSWORTHITE
GRENVILLE PROVINCE
VEIN
1970TRAILL P. 443
1971FERGUSON P. 46

MD DB70 133
4NE FLP U5705RDCAMERCN MINE KEYSTONECC58
ONTNIPISSING DISTRICT MURCHISON TP C8L22 453230 780400 31E 9
64051 FLD
EXNT FLDR ALNT
GPGM 2 2
KEYSTONE CONTRACTORS LTD WINDSCR
K BOWSEY 1957
FELDSPAR PRODUCTION 1942-43
GRENVILLEPROVINCE
PEGMATITE
1944SATTERLY P. 121
1952LANG P. 138
1958ROWE P. 95
1962LANG ET AL P. 275
1967HEWITT P. 65
1971FERGUSON P. 49

MD DB70069134
4NE U FLP0570KRDGENESEE NO2 W JESSUP 58
ONTHASTINGS COUNTY MONTEAGLE TP C7 L14 451020 775800 31F 4
2631 FLD
PCLR EXNT FLDR
GPGM 2 2 PRGS 33 AMPB 33 LMSN 3 3 BRCC 3
GENESEE FELDSPAR CO 26-31
D. VARCY W. JESSUP 48-51 28467 FELDSPAR
ZONED GRANITE PEGMATITE
FELDSPAR PRODUCTION
GRENVILLEPROVINCE
PEGMATITE
MU 8 GRANITE G-GNEISS G-PEGMATITE
1952LANG P. 145
1954HEWITT P. 48-49,69
1958ROWE P. 95
1970TRAILL P. 205,446
1971FERGUSON P. 48

MD DB70069135
3NE U 1070KRDGUIRK J QUIRK
ONTHASTINGS COUNTY MONTEAGLE TP C4L11124500 774630 31F09
ELSR URNR THRT
GPGM 2 2 PRGS 33 AMPB 33 PRXN 33 GRNT 2 3
H QUIRK J E QUIRK PROSPECTED 55
SEVERAL SMALL OCCURRENCES STR TR RADIOMETRIC SURV
SMALL IRREGULAR CARBONATE BODIES
PITS TRENCHES REC HORNBLENDE GRANITE PEGMATITE
GRENVILLE PROVINCE
PEGMATITE
MU 8 GRANITE G-GNEISS G-PEGMATITE
1954HEWITT P. 70
1956SATTERLY P. 140-141
1962LANG ET AL P. 272
1967HEWITT P. 64
1971FERGUSON P. 47

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                MD 0870   136
4NB       0570KRDSOVEREIGN PPTY                    FAIRLEYRED58
ONTHALIBURTON COUNTY   MONMOUTH TP C3L3-5  445935 781820 31C16
                                   C4L2-4,5
EXNT                                URNR     URPN     ALNT
 GPGM  2 2 MRBL   33
FAIRLEY RED LAKE GOLD MINES LTD 55-56 SURFACE AND DDH
CASSIAR RAINBOW GOLD MINES LTD 62
TR 8DDH 483FT SCINTILLOMETER SURVEY
GRENVILLEPROVINCE
PEGMATITE
MU 8 GRANITE G-GNEISS G-PEGMATITE
1956SATTERLY PP. 88-89
1958ROWE P. 95
1962LANG P. 270
1971FERGUSON P. 46

                MD 0870   137
1NE FLD   0570KRDOBRIEN FOWLER
ONTNIPISSING DISTRICT  MATTAWAN TP C3 L29  461915 784715 31L 7
      2526          FLD
EXNT
 GPGM  2 2 SGNS
O"BRIEN AND FOWLER LTD 1925-26
MOLYBDENUM CORP OF AMERICA
300FTL X 18-25FTW S 270 D 60W BULK SAMPLE TO MB 50
EUXENITE IN MASSES FROM .25-5.0 INCHES
FELDSPAR PRODUCTION PGMT 18-25FTW
GRENVILLEPROVINCE
PEGMATITE
1932ELLSWORTH PP. 189-191
1952LANG P. 148
1958ROWE P. 94
1962LANG ET AL P. 268
1967HEWITT P. 65
1970TRAILL P. 206
1971FERGUSON P. 49

                MD 0870   138
4U  NB    0570KRDC.PALANGIC OCCUR                              58
ONTNIPISSING DISTRICT  MATTAWAN TP C2 L29  461852 784715 31L 7
EXNT
 GPGM  2
C PALANGIO NORTH BAY
GRENVILLEPROVINCE
PEGMATITE
1952LANG P. 147
1958ROWE P. 94
1962LANG ET AL P. 268
1967HEWITT P. 65
1971FERGUSON P. 49

                MD 0870   139
4NB       0570KRDC                                  ORCHANURAN58
ONTCOCHRANE DISTRICT   MARATHON TP          4856   8021   42A15
PCLR
 SYNT      NPLS
ORCHAN ML
ORCHAN URANIUM MINES LTD
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SUPERIOR PROVINCE ABITIBI BELT
IRREGULAR
1958ROWE P. 96

MD 0870 140
4NB U 0570KROMCOMBE PPTY MACGREGOR COV JGMCCOMBE 58
ONTALGOMA DISTRICT TP 28 R12 4718 8436 41N10
PCLR ELSR ALNT
GRNT 2 PGMT 2 DIBS 2
J.G. MCCOMBE AND ASSOCIATES
MINERALS FROM MINERALIZED FRACTURES IN GRANITE AND PEGMATITE
NEAR DIABASE DYKE
PEGMATITE
SUPERIOR PROVINCE
PEGMATITE
1952LANG P. 130
1958ROWE P. 96
1970TRAILL P. 447
1971FERGUSON P. 45

MD 0870 142
4NE U 0570KROCHAICH PROPERTY UNIVERSALL58
ONTRENFREW COUNTY LYNDOCH TP C15L25 452000 772400 31F 6
CLMB EXNT LNDC ALNT ERYL MNZT
GFGM 2 2 MRBL 33
UNIVERSAL LIGHT METALS CC NL70
OPEN PIT NO PRODUCTION
GRENVILLEPROVINCE
PEGMATITE
MU META-SEDIMENTARY ROCKS
1952LANG P. 146
1953HEWITT PP. 83-84
1958ROWE P. 94
1971FERGUSON P. 51

MD 0870 143
1FLDNB U 0570KROOFOXTON 58
ONTFRONTENAC COUNTY LOUGHBOROUGH TPC9L114426 7632 31C 7
12021 FLD
EXNT FLDR GDLN ALNT
GFGM 2 2 MRBL 33
M J OBRIEN LTD
OBRIEN FOWLER S CRSER
FELDSPAR PRODUCTION 1920-1921 2 DYKES 30FTL N30E ZONED
PROD 1250T FELDSPAR
GRENVILLEPROVINCE
PEGMATITE
MU META-SEDIMENTARY ROCKS
1932SPENCE P. 39
1952LANG P. 146
1958ROWE P. 94
1960ROSE P. 4
1970TRAILL P. 204
1971FERGUSON P. 45

MD 0870 144
4NB U 0570KROPATTERSON OCCURRENCE 58
ONTHASTINGS COUNTY HERSCHEL TP C16L1718451130 780130 31E 1
ESCN EXNT

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 GPGM  2 2 GRGS   33 AMPE   33
W A PATTERSON 56
STRIPPED TR RADIOMETRIC SURV COARSE GRAPHIC GRANITE
PEGMATITE 400FTL 25-40FTW ZONED S N60E
GRENVILLEPROVINCE
PEGMATITE
MU 3 MARBLE DOLOMITE CALCSILICATE ROCKS
1956SATTERLY P. 134
1958ROWE P. 93
1967HEWITT P. 64
1970TRAILL P. 205
1971FERGUSON P. 47

                MD D870669145
4NB U     057UKRDGRIFFITH                                          58
ONTHASTINGS COUNTY     HERSCHEL TP C1 L32- 4509   7759   31E 1
                                    33


JW GRIFFITH TORONTO
GRENVILLEPROVINCE
MU 8 GRANITE G-GNEISS G-PEGMATITE
1952LANG P. 142
1958ROWE P. 93

                MD D870   146
4NB U     057UKRDAMBEAUFFTY
ONTPARRY SOUND DISTRICTHENVEY TP CAL4      4548   8035   31H05E
EXNT                                FLOR     TCLT     URNN
 GPGM  2 2
WANUP FELDSPAR MINES LTD
FELDSPAR PRODUCTION OPERATED 1926-27
GRENVILLEPROVINCE
PEGMATITE
1932ELLSWORTH P. 173
1952LANG P. 136
1958ROWE P. 93

                MD D870   147
4NB U     057UKRDBESSNER MINE                          RMCLARKLEV58
ONTPARRY SOUND DISTRICTHENVEY TP  CBL5.    4548   8035   41H15
FRGS     EXNT                       TCLT     URNN     ALNT
 GPGM  2 2
FELDSPAR PRODUCTION
GRENVILLEPROVINCE
PEGMATITE
1932ELLSWORTH P. 171-173
1952LANG P. 137
1958ROWE P. 93

                MD D870   148
3NB       057UKRDLUN-ECHO OCCUR                        LUNECHOML 58
ONTPETERBOROUGH COUNTY GALWAY TP C8 L26    444020 782630 31D10E
POLR
 MRBL   33
LUN-ECHO GOLD MINES LTD 1956
GRENVILLEPROVINCE
IRREGULAR
MU 8 GRANITE G-GNEISS G-PEGMATITE
1958ROWE P. 93
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MD 0870 149
4NE 0570KRD MCMILLAN
ONTRAINY RIVER DISTRICTELI LAKE 4859 9229 52C16
BTFT

M MCMILLAN NORTH BAY
SUPERIOR PROVINCE NIPIGON PLATE
1958ROWE P. 96

MD 0870 150
4NE 0570KRD 58
ONTNIPISSING DISTRICT DICKENS TP C2L2 453340 774730 31F12
FLD
EXNT FLDR
GPGM 2 2
J C CUNNINGHAM-DUNLOP
FELDSPAR PRODUCTION
GRENVILLEPROVINCE
PEGMATITE
1952LANG P. 142
1958ROWE P. 93

MD 0870 151
4NE 0570KRDF.G.ARMSTRONG OCCUR
ONTNIPISSING DISTRICT DICKENS TP C13L9 453900 775230 31F12
PCLR EXNT SMRK GRNT MNZT
GPGM 2 2
GRANITE PEGMATITE SOFTW
GRENVILLEPROVINCE
PEGMATITE
1932ELLSWORTHITE PP. 192-194
1952LANG P. 142
1958ROWE P. 93
1971FERGUSON P. 49

MD 0870 152
4NE 0570KRD 58
ONTPETERBOROUGH COUNTY CAVENDISH TP C8-9L15444600 782200 31D16
FRGS
GRNT 2 2
OPERATED 1932-6 1940-2
GRENVILLEPROVINCE
IRREGULAR
MU 8 GRANITE G-GNEISS G-PEGMATITE
1956SATTERLY P. 41
1958ROWE P. 92
1971FERGUSON P. 51

MD 0870 153
3BE SN NB 0570KRDLEACH AND JOHNS REDCRE 58
ONTSUDBURY DISTRICT CARTER TP MI98 CNR 4749 8150 41P13
BE SN NB TA
EXNT
GPGM 2 2
REDORE MINING CO
SUPERIOR PROVINCE ABITIBI BELT
PEGMATITE
1952LANG P. 150
1968MULLIGAN P. 79
1971FERGUSON P. 52

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                MD 0870   154
2U  NB    1070KRDMINDUS OCCURRENCE                    MINDUS OCR
ONTHALIBURTON COUNTY   CARDIFF TP C14L11S2 450005 780730 31E01
ELSR                                  URNN     URNR     ALNT
 GPGM  2 2 GRNT  2 3 GNSS   33 SYNT  2 3
MINDUS CORP LTD CF 53-55
MINDUSTRIAL CORP LTD 55-56
GEOLOGICAL MAP 53
GRENVILLE PROVINCE
PEGMATITE
MU 8 GRANITE G-GNEISS G-PEGMATITE
1956SATTERLY P. 67
1962LANG P 253

                MD 0870069155
3NB U     0470KRDCENTRE LAKE                          CENTRELAKE58
ONTHALIBURTON COUNTY   CARDIFF TP C9-13    445915 780300 31D16
                                    L23-30
PCLR
 PGMT5 2 2
CENTRE LAKE URANIUM MINES LTD
GRENVILLEPROVINCE
PEGMATITE
MU 8 GRANITE G-GNEISS G-PEGMATITE
1955SATTERLY AND HEWITT P. 21

                MD 0870   156
4U  NB    0470KRDCYND SOUTH GRP      B-ZONE          CYNCMINESL59
ONTHALIBURTON COUNTY   CARDIFF TP C8L12-14 445902 780603 31D16
    .45460          U3C8
HCTL     PCLR                         URNN     URNR     ALNT
 GPGM  2 2 AMPE   33 GRNL   33 GNSS   33
DYNO MINES LTD NL70
CANADIAN DYNO MINES LTD 50
OPERATED 1954-60 UNDERGROUND $ 8792331 PROD U3C8
DDH 58653FT B-ZONE SHAFT 997FT 1700FTD 165FTR 1000TPD MILL
NUMEROUS GRANITE PEGMATITE BODIES
GRENVILLEPROVINCE
PEGMATITE
MU 8 GRANITE G-GNEISS G-PEGMATITE
1956SATTERLY PP. 43-45
1958ROWE P. 92
1962LANG P. 259
1967HEWITT P. 54
1971FERGUSON P. 45

                MD 0870   157
1FLDU  NB 0470KRDMOLYBDENUM CORP CCCU              MOLYCORPAM
ONTNIPISSING DISTRICT  CALVIN TP C9L19-22  46     78     31L 7
CLMB     EXNT                         ALNT     FLDR
 GPGM5 2 2
A.RYAN 1900
BOBJO MINES LTD
MOLYBDENUM CORPORATION OF AMERICA 1950
ZONED GRANITE PEGMATITE 20FTW 4 DYKES FELDSPAR PRODUCTION
SEE 6428, 6787
GRENVILLEPROVINCE
PEGMATITE
1932ELLSWORTH P. 189
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1952LANG P. 147
1958ROWE P. 91
1960ROSE PP. 21-22
1970TRAILL P. 256
1971FERGUSON P. 49

MD 0870 158
4 0470KRD
ONTNIPISSING DISTRICT CALVIN TP C4 L22 461445 785630 31L 7
EXNT SMRK ALNT
GPGM5 2 2
J W MACFARLANE TORONTO
GRENVILLEPROVINCE
PEGMATITE
1952LANG P. 147
1958ROWE P. 92
1962LANG ET AL P. 251
1967HEWITT P. 65
1971FERGUSON P. 49

MD D871C69159
4NB U 1070KRDCAMERON-ALECK OCC CAMERON
ONTNIPISSING DISTRICT MURCHISON TP C6L17 453200 780230 31E09
24953 FLD
FRGS ALNT
GPGM 2 2 GRNT 2 2
CAMERON AND ALECK
OPERATED 1949-53
GRENVILLE PROVINCE
PEGMATITE
MU FELSIC ROCKS
1967HEWITT P. 65

MD D870 160
3NB 0470KRDYANKEE CAM OCCURRENC FOLKLER 58
ONTNIPISSING DISTRICT BUTT TP C9L5 4543 79 31E11
PCLR FRGS ESCN
GPGM5 2 2
E K FOCKLER
GRENVILLEPROVINCE
PEGMATITE
1958ROWE P. 91
1970TRAILL P. 445
1971FERGUSON P. 49

MD D870 161
2FLDNB 0470KRDC.INNES OCCURRENCE
ONTLANARK COUNTY BATHURST TP C9L22 445630 762320 31C15
EXNT FRGS FLDP CRLT
GPGM5 2 2 GRNT 2 2
W ENNIS
GPGM MINED FOR FELDSPAR OPERATED 1922
GRENVILLEPROVINCE
PEGMATITE
MU FELSIC ROCKS
1952LANG P. 137
1958ROWE P. 91
1960ROSE P. 20-21
1962LANG P. 248

1967HEWITT P. 65
1970TRAILL P. 205
1971FERGUSON P. 48

MD D870 162
2U NE 0470KROCH.G.WALTON
ONTTIMISKAMING DISTRICTALLO TP C4 SE4 S2L5 4133 8004 41P09E
FRGS
APLT 2 2
1956-57 H.G.WALTON
2DCH TR NARROW APLITES IN DIABASE RADIOACTIVE
SUPERIOR PROVINCE ABITIBI BELT
PEGMATITE
1958ROWE P. 91
1971FERGUSON P. 53

MD D870 163
4NE 0470KROCK.MCCOSHEN OCCUR
ONTRENFREW COUNTY ALICE TP C15L13 454845 771630 31F14
EXNT
GPGM5 2 2
RMCCOSHEN SUDBURY
MINERALIZATION DISSEMINATED IN GRANITE PEGMATITE
GRENVILLEPROVINCE
PEGMATITE
1952LANG P. 136
1958ROWE P. 91
1962LANG ET AL P. 130
1967HEWITT P. 65
1970TRAILL P. 206
1971FERGUSON P. 51

MD D870 165
2NE U RE 0570KROONEMOGOSENDA LAKE DOMINION 655
ONTSUDBURY DISTRICT CHEWETT TP C6 L8 480000 830600 42B03E
COLLINS TP C1 L9-10
120000 NB 47%
PCLR AGRN MGNT AFTT
FNIT CRET
1954-62 DOMINION GULF COMPANY
35000 FT DD 600FT ADIT CRE DRESSING RESEARCH
STOCK ALKALIC SYENITES 900FTW X 1300FTL PARTIAL RINGS OF
SYENITIC CONTACT ZONE PYROXENE FENITE RED ALKALIC FENITE
LATE MAFIC AND PORPHYRY DYKES MINOR CARBONATITE & POTENTIAL
ORE ZONES 40T FOR METALLURGICAL TESTS 90PC RECOVERY
1010MY K/AR AGE
D ZONE 800FTL 600FTW 600FTD 20MT RESERVES .47% NB2O5
A 300 CORE 38FTL .45
B 1700 17 .43
E 11 .43
F 1500 56 .37
G 400
GROUND GEOMAG RADIOACTIVITY
SUPERIOR PROVINCE KAPUSKASING BELT
IRREGULAR
1961PARSONS P. 46-50
1967GITTINS ET AL P. 653
1971FERGUSON PP. 41-42

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                MD D870   166
2NB       0570KRDZONE 8                                    MULTI MINE70
ONTSUDBURY DISTRICT     MCNAUGHT TP C2-3L1  4748   8306   41C14
                        LACKNER TP  C2-3L12                41014
          1 3700070APP213  MAG137  COL 198 NB
          1  502466CB .173 RE  272
          1 8000066NB   25
PCLR                                  APTT2133 MGNT1373 CLMB
                                      MGNT696  APTT219
 IJLT      MLGN      CRBT      GRGS      NFLS
NEMEGOS ALK COMPLEX
1949 A.BURTON AND M. BURTON
1951 NEMEGOS URANIUM CORP
1953-59 MULTI-MINERALS LTD
1965-70 KLOCKNER-HUMBOLT-DEUTZ AKTIENGESELLSCHAFT
1970 FETIC INDUSTRIAL DEVELOPMENTS LTD
NO3 1600FTL  80FTW
NO4 1500     75    COMBINED 37MT 21.3%MGNT 13.7%APTT .198%NB205
NO5  600    100
NO6  800    150    (MAIN)  + 5MT 69.6      21.9      .173
NO8 1500                    80MT                      .25
    CALCITE                .88MT                      .9
                           .76MT                      .23
NPLS CORE 17000FTW X 19000FTL PARTIAL AGRS RING PARTLY BRECCIAT
ED ZONES STRIKE CONCENTRICALLY DIP STEEP IN LMFP DYKES DIP OUT
7 FAULTS 5 STRIKE NW 2 STRIKE NE 1010MY K/AR AGE
MAG SURVEY CD  METALLURGICAL TESTS GEOLOGICAL MAP 58
MAJOR NB MINERALIZATION REPORTED 54  W SIDE COMPLEX 66000 COH
SEVERAL ANOMALIES
SUPERICR PROVINCE KAPUSKASING BELT
IRREGULAR
1958ROWE PP. 35-45
1961PARSONS P. 61-68
1961HODDER P. 65-67
1971FERGUSON PP. 39-41

                MD D870   167
4NB       0570KRCLEBRASSEURCERRAUGHMA
ONTSUDBURY DISTRICT     LACKNER TP          4748   8303   41C14
          7         NB  1
PCLR                                  APTT      MGNT
 SYNT  2 2 CRBT
LEBRASSEUR LACKNER INC CERRAUGH LACKNER INC MACDONNELL LACKNER
MAG SURVEY 4DDH1007FT SMALL RADIOACTIVE PODS MAGNETITE-APATITE
1PC NB205 NARROW PCLR-BEARING SYENITE DYKES
SUPERICR PRCVINCE KAPUSKASING BELT
IRREGULAR
1961PARSONS P. 61
1971FERGUSON P. 52

                MD D870   168
4NB FE P  0570KRC                                     DOMINION G51
ONTSUDBURY DISTRICT     LACKNER TP          4748   8303   41014
          6   20L  FE 39   P   5   NB   15
                                      APTT      MGNT
 NFLS   1  CRBT   1
1952-54 DOMINION GULF COMPANY
```

1959 FALCONBRIDGE NICKEL MINES LTD
GEOLOGICAL CD AEROMAG ONE SECTION 200FT 39PCFE 5PCP .15PCNB2O5
30DH 1988FT LOW LINEAR ANOMALIES OVER GRANULAR MAGNETITE-
APATITE E SIDE COMPLEX HOLE MAGNETIC SURVEY FALCONBRIDGE CO
SUPERIOR PROVINCE KAPUSKASING BELT
IRREGULAR
1961PARSONS P. 60

MC D870 169
4NE 0570KRDCLAYMAC CLAIMS CLAYMAC ML54
ONTSUDBURY DISTRICT LACKNER TP 4748 8303 41014
6 71 NB 13

CRBT
CLAYMAC MINES LTD 54
900H 2700FT GNDMAGNETOMETER SURV ONE LINEAR ANOMALY OVER FG
IJOLITE N-NE SIDE COMPLEX HOLE 6 .13PC NB2O5 ACROSS 71FT
SUPERIOR PROVINCE KAPUSKASING BELT
IRREGULAR
1961PARSONS P. 60
1971FERGUSON P. 52

MC D87. 170
4NB 0570KRDAPAMAG CLAIMS APAMAG ML 55
ONTSUDBURY DISTRICT LACKNER TP 4748 8303 41014

CRBT
APAMAG MINES LTD 55
1955 MAGNETIC SURVEY DOMINION GULF 5DDH 2130FT APAMAG LTD
SUPERIOR PROVINCE KAPUSKASING BELT
IRREGULAR
1961PARSONS P. 60
1971FERGUSON P. 52

MC D870 171
4NE 0570KRDNEMOGOSENDA LAKE CONTINENTA61
ONTSUDBURY DISTRICT MCGEE TP C3L2 4758 8311 41014
1 NB
PCLR
FNIT GPGM 2 2
CONTINENTAL WOOD PRODUCTS
SUPERIOR PROVINCE KAPUSKASING BELT
IRREGULAR
1961PARSONS P. 50

MC D870 172
2NE TI 0570KRDSEABROOK LAKE TARBUTTML
ONTALGOMA DISTRICT TP 5E R12 470100 831600 410 3
PCLR MGNT
IJLT SYNT 2 2 CRBT FNIT
1955 W. BOUSSINEAU
1957 TARBUTT MINES LTD
1964 F.R. JOUBIN
IJOLITE .03PC NB2O5 MAFIC BRECCIA CALCIC CARBONATITE .01-.33PC
NB2O5 GEOMAG SURVEY 1103MY K/AR AGE BOTT 12DDH 998FT TR SAMPL
SOIL SURVEY
DOLOMITE CRBT CORE 1200FTD CALCITE RING MAFIC BRECCIA RING
3000FTD TONGUE IJOLITE 5280FTL X 500FTW OUTCROPS TO S FENITE
ZONE IN GRANITE

SUPERICR PRCVINCE ABITIBI BELT
IRREGULAR
1961PARSCNS P. 11-22
1971FERGUSON PP. 31-32

MD 0870 173
3NB 057CKRCGIBSCN IRCN CLAIMS ALGCMA CRE61
ONTALGCMA DISTRICT TP 28-29 R 23 4743 8318 41C11
PCLR HMTT MGNT
CRBT FNIT VLCC GRNT SYNT
ALGOMA ORE PROPERTIES LTD
DD GEOPHYSICAL SURVEY PYROCHLORE ASSAY 1048 MY K/AR BCTT
90CH 4509FT TC EXPLORE FE HOLES 10-22 7700FT EXPLORE NE
1960 PROSPECTED AND TRENCHED
DOLOMITE CARBONATE CORE 5400FTL X 3500FTW CALCITE CARBONATE
RING MAX D 9300FT LOCAL MAFIC BANDS WALLROCKS VOLCANICS GRANITE
SYENITE DIABASE DYKE PYROCHLORE IN CALCITE CRBT MAGNETIC ANOMAL
Y 2.5 MIC LOW RADICACTIVITY NB205 VALVES .24-.30PC
K/AR AGE 1048MY 22DDH 1951-58 HOLES 1-9 FE 4509FT 10-22 7700FT
FOR NB 6 SHORT HOLES 197FT
FIRESAND R CARBONATITE
SUPERIOR PROVINCE WAWA BELT
IRREGULAR
1961PARSONS P. 23-32
1971FERGUSON PP. 30-31

MD 087[illegible] 174
2NB 057CKRCALPHA-8 JAMES BAY N CONMCREXPL66
ONTCOCHRANE DISTRICT SOUTH BLUFF CR AREA 5052 8037 42I15
1 8000068NB 52
4 100007UNB 52%
1 6200[illegible]7JNB 52
PCLR CLMB APTT
CRBT PRXN HELD
KAPUSKASING GRANULIT
CONSOLIDATED MORRISON EXPLORATIONS LTD
IMPERIAL OIL ENTERPRISES LTD
EXPLORATION START 65 AEROMAG AND EM LINES .25 APART 65
HELICOPTER GEOLOGY 65 142 DDH 83894FT 65-70 133 SHAFT 68
100FT CROSSCUT 68 250T BULK SAMPLE METALLURGICAL TESTS
EST 325TT NB2O5
K/AR AGE BOTT 1655MY
IN KAPUSKASING GRANULITE COMPLEX BENEATH SEDIMENTARY ROCKS
IN KAPUSCASING GRANULITE COMPLEX BENEATH SEDIMENTS OF SEXTANT F
OF SEXTANT FM
SUPERICR PROVINCE KAPUSKASING BELT
POOS
1967GEORGE ET AL P. 135
1967GITTINS ET AL PP. 651-655
1970STOCKFORD PP. 1-34
1971FERGUSON PP. 33-35

MD 087[illegible] 175
3 057CKRLHEEDEN FORTAGE CHYKA ML 54
ONTSUDBURY DISTRICT LACKNER TP 475000 830300 41O14

IOLT GPGM GNSS
ONTARIO RARE METALS LTD 1954-55
CHYKA MINES LTD

1951-54 MAGNETIC SURVEY 31DDH 11358FT PORTAG COMPLEX SUBSIDIARY
MANY FAULTS TRACES NB2O5 IN CORE BIOTITE PYROXENITE WIDTHS
TO 15FT .17PC NB2O5 55.8FT .69PC NB2O5
SUPERIOR PROVINCE KAPUSKASING BELT
IRREGULAR
1961PARSONS PP. 68-69
1971FERGUSON P. 52

MC D870 176
3NE 057OKRDSILVERMAN CLAIMS MSILVERMAN61
ONTSUDBURY DISTRICT MCNAUGHT TP C1-3L1-64748 8303 41C14
6 5 NB 29
PCLR MGNT
NPLS CRBT
M SILVERMAN 54
MAGNETOMETER SURVEY 54 14DDH 4117FT 54 SEVERAL ANOMALIES E
SIDE DUE TO MAGNETITE IN NPLS OR CONTACTS BETWEEN MAFIC RX
NPLS FOLIATED MAFIC ROCKS .07-.14PC NB2O5
SUPERIOR PROVINCE KAPUSKASING BELT
IRREGULAR
1961PARSONS P. 68
1971FERGUSON P. 52

MC D87O 177
3NE 057OKRDONTARIO RARE METALS ONTRAREMET55
ONTSUDBURY DISTRICT MCNAUGHT TP SE 4748 8303 41C14
NB T

GNSS 1 DIBS 2 CRBT
MAGNETOMETER SURVEY 5DDH 2281FT BEDROCK GNEISSES DIABASE DYKES
SUPERIOR PROVINCE KAPUSKASING BELT
IRREGULAR
1961PARSONS P. 68

MC D87O069180
3NB APT 70KRDSCHRYBURN OCCURENCE MANYLAKES
ONTKENORA DISTRICT SCHRYBURN LAKE 523040 893040 53A
PCLR APTT MGNT
CRBT NPLS BRCC
MANY LAKES EXPLORATION CO 1960
CALCITE CARBONATITE MASSIVE TO MASSIVE APATITE SOME MAGNETITE
BANDS SEVERAL FT
SUPERIOR PROVINCE CAT LAKE BELT
IRREGULAR
1963JENESS PP. 43-44
1966HEINRICH P. 398
1967GITTINS ET AL PP. 651-655
1971FERGUSON P. 48

MC D87O069181
4NB 057OKRDSEABROOK LAKE
ONTALGOMA DISTRICT TP 5G R 12 4701 8317 41G 3
PCLR
SCVT BRCC LMPF IJLT PRXN
CIRCULAR .5MI 1119 MY K/AR BOTT
SUPERIOR PROVINCE ABITIBI BELT
IRREGULAR
1967GITTINS ET AL PP. 651-655

MC D870069182
4NB 0570KRC
ONTKENORA DISTRICT PRAIRIE LAKE 5103 9432 52M 2
NB
PCLR MGNT ECTT FRX*
IJLT FNIT GNSS JUVT CRET
1112 MY K/AR BOTT
CIRCULAR SYENITE-CARBONATITE COMPLEX IJOLITE CORE
CARBONATITE RING BIOTITE ZONES BETWEEN PRXN AND CRBT
COUNTRY ROCK GNEISSES WEAKLY FENITIZED INTRUSIVE ORIGIN
SUPERIOR PROVINCE WABIGOON BELT
IRREGULAR
1967GITTINS ET AL PP. 651-655

MD D870069183
4NB 0570KRCFIRESAND R
ONTALGOMA DISTRICT TP 29 R22 475500 844200 41N15
NB
BRIT PCLR MGNT FRTT AGRN
FNIT CRBT SOVI
WALLROCK FO GREENSTONES 1.5ACROSS BASIC ALKALINE ROCK DIKES
RING INTRUSIONS. 1048 MY K/AR BOTT
SUPERIOR PROVINCE ABITIBI BELT
IRREGULAR
1967GITTINS ET AL PP. 651-655

MD D870069186
4NB 1271KRC
ONTHASTINGS COUNTY HERSCHEL TP C16 L31 451006 780530 31E01E
PCLR
GPGM 2 1
ZONED GRANITE PEGMATITE
GRENVILLE PROVINCE
PEGMATITE
1971FERGUSON P. 47

MD D870069190
4NB 0570KRDGOLDRAY JAMES BAY S GOLDRAY
ONTCOCHRANE DISTRICT JAMES BAY S 5024 8102 42I 6
PCLR
CRBT
1695 MY K/AR ECTT
TRACE ELEMENTS NE LA SR BA MORE ABUNDANT IN CARBONATITE NOT IN
LMSN SHEARED CARBONATITE PEGMATITE WITH COMPLEX
WR AGE BIOTITE PYROXENITE K/AR 392 10MY
BIOTITE AGE PEGMATITE K/AR 333 5 MY MINETTE SILL K/AR 327 5 MY
ASSAYS LOW U TR TO .08PC NB2O5
SUPERIOR PROVINCE KAPUSKASING BELT
IRREGULAR
1967GEORGE ETAL P. 135
1967GITTINS ET AL PP. 651-655

MC D870069191
4NB 0570KRC TP 107
ONTSUDBURY DISTRICT TP 107 4635 8144 41I12
PCLR
CRBT
1560 MY K/AR ECTT
SUPERIOR PROVINCE COBALT PLATE

IRREGULAR
1967GITTINS MACINTYRE AND YORK PP.651-655

MD 0870069192
4NB 0570KRO
ONTCOCHRANE DISTRICT CARGILL TP 491800 825000 42G 2

CRBT
CONTINENTAL COPPER CORP
KENNCO
1740 MY K/AR BOTT
SUPERICR PROVINCE KAPUSKASING BELT
IRREGULAR
1967GITTINS ET AL PP. 651-655
1967GEORGE ET AL P. 135

MD 0870069193
2NB CU 0570KRCCHIPMAN LAKE
ONTTHUNDER BAY DISTRICTO'MEARA TP 495430 861200 42E16E
PCLR MGNT APTT CLCP
CRBT AKLS GNSS BSLT
1955 THE MINING CORP OF CANADA
1961 KIMBERLY-CLARK PULP AND PAPER CO
1966 CONSOLIDATED MORRISON EXPLORATIONS LTD
ALKALIC SYENITE STOCK 2MID TO N HORNBLENDE GNEISS INTRUDED
BY DYKE OF SYENITE AND CARBONATITE TO 15FTW SULPHIDE ZONES TO
EAST AEROMAGNETIC ANOMALY CIRCULAR 2MID RELIEF 500G WEAK RADIO
ACTIVITY TWO PARALLEL SULFIDE ZONES CU VALUES
SUPERICR PROVINCE WABIGOON BELT
IRREGULAR
1967GITTINS ET AL PP. 651-655
1971FERGUSON PP. 42-43

MD 0870069194
2NB CU APT 0570KRCBIG BEAVERHOUSE MANYLAKES
ONTKENORA DISTRICT BIG BEAVERHOUSE POST525030 895030 53A13
PCLR APTT PRTT CLCP
CRBT
1961-62 MANY LAKES EXPLORATION CO.
SHORE CAMP LAKE DRBT DYKE S NW D 45NE 130FTL X 30FTW IN FENIT
GNEISS CALCITE DRBT MAFIC BANDS .25-.50 OF DRILL CORE
AEROMAGNETIC ANOMALY ROUND 3.2MID RELIEF 6700G ONE CENTRAL PEAK
LOW RADIOACTIVITY K/AR AGE 1005MY 9DDH 2847FT
SUPERIOR PROVINCE CAT LAKE BELT
IRREGULAR
1967GITTINS ET AL PP. 651-655
1971FERGUSON PP. 36-37

MD 0870069195
4NB 0670KRDTIFFANY CLAIMS
ONTPARRY SOUND DISTRICTBETHUNE TP 4534 7907 31E11
7 TA 527 NB 162
CLMB
GPGM 2
TIFFANY CLAIMS = RAVENSWORTH
GRENVILLEPROVINCE
PEGMATITE

MD 0870069196
4NB U 0670KRC VCOLAVECCI
ONTSUDBURY DISTRICT SCOLLARD TP 4603 8018 41I 9
PCLR

V COLAVECCHIO FAIRPORT HARBOUR OHIO
GRENVILLEPRCVINCE

MD 0870069197
4NB 0670KRCMINTERN GRP JAYEEXPLOR
ONTNIPISSING DISTRICT E FERRIS N HIMSWORTH4614 7916 31L 6
CLMB

JAYE EXPLORATION LTD
GRENVILLEPRCVINCE

MD 0870069198
4NB 0670KRC PLEXTERREM
ONTSUDBURY DISTRICT LOUGHRIN TP 4635 8029 41I 9
EXNT PLCR
GPGM 2 2
PLEXTERRE MINING CORP
GRENVILLEPRCVINCE
PEGMATITE
1959ROSE P. 39

MD 0870069199
4NB U 0670KRCWAWA L ALGOMA ORE
ONTALGOMA DISTRICT 480000 843642 42C02
PCLR

SUPERICR PRCVINCE WAWA BELT

MD 0870069203
2LI TA 0571KRCJEAN L NO 4 PAROLE L JEANLLITML56
ONTTHUNDER BAY DISTRICTALLD TP 492400 875030 42C05
1 170056LI 13
CLMB SPDM
GPGM5 2 1 ESCS 33
JEAN LAKE LITHIUM MINES LTD 56-57
TOWAGMAC EXPLORATION LTD 56-57
S 90 D STEEP UNZONED MC GREEN SPODUMENE 100FTL X 12FTW STRONG
CROSS BANDING DRILLED LENGTH 1200FT 1095FTD DISCOVERED 55
S 90 D 80-85S 28DDH 16053FT 55-56 DRILLED TO DEPTH 1100FT
SUPERIOR PROVINCE
PEGMATITE
1965PYE P. 76-77
1965MULLIGAN PP. 57-58
1971FERGUSON P. 53

MD 0870069206
1NB TA 0870KRC
ONTCOCHRANE DIST STEELE TP C5 L5 490200 794555 32D04
CLMB SPDM PLCT BRYL
GPGM 2 1 MSDM 2 3
CASE BATHOLITH
CANADIAN JOHNS-MANVILLE

ZONED GPGM 825FTLX100FTW 10-15PC SPDM CRYSTALS TO 3FTL
ONE SAMPLE .37PC BEO
SUPERIOR PROVINCE ABITIBI BELT
PEGMATITE
1962LUMBERS P. 30
1967HEWITT P. 68
1968MULLIGAN P. 68
1971FERGUSON P. 45

MD 0870069207
4NE TA 0870KRO REDORE MCO
ONTSUDBURY DISTRICT WHALEN TP 4749 8156 41P13
CLMB
GPGM 1 1
1940 REDORE MINING CO.LTD
COLUMBITE-TANTALITE IN GRANITE PEGMATITE
SUPERIOR PROVINCE
PEGMATITE
1967HEWITT P. 68.
1971FERGUSON P. 53

MD 0870069219
2LI TA 0571KROBRINK CLAIMS AUMACHCRML56
ONTTHUNDER BAY DISTRICTBLAY LAKE 491800 880900 420 5
1 76056LI2 163
1 9656LI2 1.5
CLMB SPDM25 APTT TRMN
GPGM5 2 1 GRNT 2 3 BSCS 33
1955-56 AUMACHC RIVER MINES LTD
DYKE 150FTL X 5-12FTW PINCHES SWELLS AND SPLITS CHILL ZONES
SILL S90 D75-80N 500FTW GRANITE CONTAINS PGMT MINEABLE DEPOSIT
UNZONED 5 DYKES DD MILL TESTS FAVOURABLE
SUPERIOR PROVINCE
PEGMATITE
1965PYE P. 62-64
1965MULLIGAN PP. 59-60
1971FERGUSON P. 53

MD 0870069220
4U NE 1070KRDYORK RIVER OCCURRENC YORK R U
ONTHASTINGS COUNTY FARADAY TP CEL4N2 4500 7756 31F04
PCLR
SPGM 2 2
YORK RIVER URANIUM MINES
OPERATED 1957
GRENVILLE PROVINCE
PEGMATITE
MU 3 MARBLE DOLOMITE CALCSILICATE ROCKS
1967HEWITT P. 64
1971FERGUSON P. 47

MD 0870069221
3NE U 1070KRDREASOR G L REASOR
ONTHASTINGS COUNTY FARADAY TP C16L31-32450240 783210 31F04
PCLR URNN URNR
SPGM 2 2 GRNT 2 3 AMPE 33 MRBL 33 SYNT 2 3
OPERATED 1954-5 STR TF
GRENVILLE PROVINCE

PEGMATITE
MU 8 GRANITE G-GNEISS G-PEGMATITE
1956SATTERLY P. 122
1967HEWITT P. 54

MD 0870069222
1FLDNB 1070KRDR CORMACK SHOWING
ONTHASTINGS COUNTY MONTEAGLE TR C6L24N2450845 775030 31F03
ELSR ALNT MGNT FLDR
P J DWYER
DYKE N40E D60NW 90FTL X 12FTW ZONED
DYKE 12FTW AMAZONITE PERISTERITE FELDSPAR PROP 26
OPERATED 1926
GRENVILLE PROVINCE
PEGMATITE
MU 8 GRANITE G-GNEISS G-PEGMATITE
1954HEWITT P. 42
1967HEWITT P. 64
1971FERGUSON P. 47

MD 0870069223
1FLDNB 1070KRDCAIRNS MINE FELDSPARML
ONTHASTINGS COUNTY MONTEAGLE TP C7L21 450945 775000 31F03
ELSR FLDR SPHN MGNT
GPGM 2 2 AMPB 33
DILLON AND MILLS
FELDSPAR MINES CORP P J DWYER
OPERATED 1920-24 2 CARS FELDSPAR DYKE S N50E D NW 30FT
GRENVILLE PROVINCE
PEGMATITE
MU 8 GRANITE G-GNEISS G-PEGMATITE
1954HEWITT P. 47
1967HEWITT P. 64
1971FERGUSON P. 48

MD 0870069224
MSCNB U 1070KRDD"ELDONA MICA L OCCU D"ELDONAGML
ONTNIPISSING DISTRICT BUTT TP C7L13 S2 4543 7900 31E11E
EXNT CLMB FRGS ALNT URNN MSCV
GPGM 2 2
D"ELDONA GOLD MINES LTD 1955
MICA PIT 40FTL X 4FTW X 7FTD
GRENVILLE PROVINCE
PEGMATITE
1958ROWE P. 91
1962LANG P. 35
1971FERGUSON P. 49

MD 0870069225
4CB 1070KRDJ.G.MCLENNAN OCCUR
ONTNIPISSING DISTRICT PECK TP C3-4L6 452815 784500 31E11
PCLR
GPGM 2 2 GRNT 2 2
J G MCLENNAN
OPERATED 1956
GRENVILLE PROVINCE
PEGMATITE
MU FELSIC ROCKS
1958ROWE P. 96
1971FERGUSON P. 50

MD D870069226
1U NB 1070KRDGAL-WOOD CCCUR GAL-WCCDML
ONTNIPISSING DISTRICT SABINE TP C15L32S2 445830 780530 31E08
EXNT
GPGM 2 2 GRNT 2 2
GALWOOD MINES LTD
OPERATED 1956 OPEN CUT 25FTW X 30FTL COARSE GRAINED PEGMATITE
GRENVILLE PROVINCE
PEGMATITE
MU 8 GRANITE G-GNEISS G-PEGMATITE
1967HEWITT P. 65
1971FERGUSON P. 50

MD D870069227
4NB 1070KRDCONGER TP CCCUR
ONTPARRY SOUND DISTRICTCONGER TP C9L10 4512 7952 31E04W
CCMK ALNT URNN
GPGM 2 2
GRENVILLE PROVINCE
PEGMATITE
1962LANG P. 256
1971FERGUSON P. 50

MD D870069228
4REONB 1070KRDANSON CARTWRIGHT
ONTPARRY SOUND DISTRICTFOLEY TP C2L13 451600 795345 31E13
FRGS ALNT
PGMT 2 2
ANSON CARTWRIGHT ISAACS
GRENVILLE PROVINCE
PEGMATITE
1959ROSE P. 37

MD D870069229
4U NB 1070KRDBRITT STA
ONTPARRY SOUND DISTRICTHENVEY TP C1 L6 4548 8035 41H15E

GPGM 2 2
.25MI SE BRITT STA
PEGMATITE DYKE DISSEMINATED MINERALIZATION SURFACE WORK DDH
1960
GRENVILLE PROVINCE
PEGMATITE
1960ROSE P. 38
1971FERGUSON P. 50

MD D870069230
4NE 1070KRDKEY PICKERAL RIVERS R M CLARKE
ONTPARRY SOUND DISTRICTHENVEY TP 4548 8035 41H15
FRGS ALNT
GPGM 2 2
R M CLARKE LEVACK
OPERATED 58
GRENVILLE PROVINCE
PEGMATITE
1958ROWE P. 94

MD D870069231
4NB U 1070KRDWALL ISLAND

ONTPARRY SOUND DISTRICTMCNTEITH TP 4525 7937 31E 5
PCLR URPN
GPGM 2 2
G MACBETH
OPERATED 1954
GRENVILLE PROVINCE
PEGMATITE
1967HEWITT P. 65

MD 0870069232
3U TA 1070KRC CCNURCCRP54
ONTPETERBCRCUGH CCUNTY CHANDOS TPC16L9S2 445115 783430 31C16
ALNT URNR BSNS
GPGM 2 2 MRBL 33
CONSOLIDATED URANIUM CORP LTD
OPERATED 1954 RADIOACTIVE SHOWINGS IN PEGMATITE 6DDH STR TR
GRENVILLE PROVINCE
PEGMATITE
MU 8 GRANITE G-GNEISS G-PEGMATITE
1956SATTERLY P. 170

PEGMATITE
MD 0870069236
4NB 1070KRDMCKERRAL
ONTSUDBURY DISTRICT HAGAR TP C3L10 465900 803100 41I09
PRTT
GPGM 2 2
E A MCKERRAL
GRENVILLE PROVINCE
PEGMATITE
1959ROSE P. 37

MD 0870069237
3LI BE TA 1070KRCMNW DEPOSIT CM AND S
ONTTHUNDER BAY DISTRICTCCSGRAVE LAKE 491400 880030 52H08
CLMB SPDM BRYL CSRT
GPGM5 2 2 GRNT 2 3
CONSOLIDATED MINING AND SMELTING CO
DISCOVERED 55 S 75-80W PINCHES AND SWELLS TABULAR SHAPE
WELL ZONED 5-UNITS 400FTL X 30FTW 1400H 2499FT 1500FTL X 45FTW
SAMPLED FOR LI BE CS NOT ECONOMIC
PROSPECTED BY MOSCHUK NEBORAC WILSON
SUPERICR PROVINCE
PEGMATITE
1965PYE PP. 84-85
1971FERGUSON P. 53

MC 0870069238
2LI TA 1070KRCFINE PORTAGE LUNECHOGML
ONTTHUNDER BAY DISTRICTFORGAN LAKE 492000 871630 52H08
CLMB SPDM AFTT
GPGM5 2 2 BSCS 33 DIBS 2 3
LUN ECHO GOLD MINES LTD
6 SPDM GPGM DYKES TESTED SPDM ALTERED BY DIABASE DYKE BENEATH
3900H 10561FT DISCOVERY 55 META SEDIMENTS S N40-45E C55-70SE
N01 S40W D 65-70SE 600FTL X 15-46.5FTW 30PC SPDM
N02 150FTL X 45FTW
N03 1050FTL X 30FTW 25PC SPDM ALTERED
N04 800FTL X 15-20FTW 10-15PC SPDM ALTERED

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N05 550FTL X 5-15FTW 20FC SPOM ALTERED
N06 2050FTL X 30FTW LOW SPODUMENE
COLUMBITE TC 1.5 INCHES RANDOM DIST
SUPERIOR PROVINCE
PEGMATITE
1965PYE P. 80
1971FERGUSON P. 53

                MC 0870069239
3 NB  L VA037CKRCVALENTINE                              CCNMCREXPL70
ONTCOCHRANE DISTRICT   VALENTINE TP          501215 812448 42I11
PCLR                                  APTT10
 CRBT      PRXN      NPLS
CONSOLIDATED MCRRISCN EXPL LTD
IMPERIAL CIL ENTERPRISES LTD
ARGOR EXPLORATIONS LTD
COMPLEX LITHOLOGY MINERALOGY CONE SHEET 450 PALAEOZOIC OVERBLR-
DEN PCLR IN STRINGERS TRACES OF U TH V
2 CDH 2362 AND 2000 FT CARBONATITES INTERBANDED WITH SYENITE
410 TO 500 FT VERTICAL 2ND HOLE .22PC N8205 1738-1995 FT
SUPERIOR PROVINCE
CARBONATITE
1970STOCKFORD PP. 33-34

                MC 0870069240
3U  NB    1271KRCU.k.MACFARLANE OCCUR
ONTNIPISSING DISTRICT  CALVIN TP           4615   7845   31L07W
EXNT                                  ALNT
 GPGM  2 1
RADIOACTIVE GRANITE PEGMATITE
GRENVILLE PROVINCE
IRREGULAR
1952LANG P. 137
1971FERGUSON P. 49

                MC 0870069244
3FLDNB    0271KRC                                       CBRIENPCWL
ONTNIPISSING DISTRICT  CALVIN TP C10L19-21 461745 785645 31L 7
EXNT     CLMB                         ALNT
SEE 6428


                MC 0870069245
1FLDNB    1271KRCCAMERON AND ALECK                     CAMERCNALE
ONTNIPISSING DISTRICT  MURCHISON TP C11L17 453320 780330 21E09E
     24953          FLD
FRGS                                  FLDR      ALNT
 GPGM  2 1
CAMERON AND ALECK
GRENVILLE PROVINCE
PEGMATITE
1971FERGUSON P. 49

                MC 0870069246
1MSCNB    1271KRCMICA CC OF CANADA                     MICACCCANA43
ONTNIPISSING DISTRICT  CLRIG TP CCL1S2      462030 785500 31LG7W
                 MSC
EXNT                                  MSCV      TRMN
 GPGM  2 2
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MICA COMPANY OF CANADA LTD 1943
PEGMATITE BFTW
GRENVILLE PROVINCE
PEGMATITE
1944SATTERLY PP. 32-33
1971FERGUSON P. 49

MD D870069247
3U NB 1271KRDBURRITT ISLAND OCCUR
ONTNIPISSING DISTRICT BURRITT ISLAND 4618 7944 31L05E
FE P NB
PCLR AGRN MGNT APTT
CRBT 11 FNIT 13 GRNT 2 3 LMPP 2 4
DISSEMINATED RADIOACTIVE PYROCHLORE IN CARBONATITE MAFICBANDS
BRECCIA LAMPROPHYRE DYKES POTASSIC FENITE
GRENVILLE PROVINCE
IRREGULAR
1971FERGUSON P. 50
1971LUMBERS P. 51,81

MD D870069248
2NB 1271KRDIRON ISLAND OCCUR
ONTNIPISSING DISTRICT IRON ISLAND 4616 7953 31K05W
FE NB CU SN NI
PCLR MGNT PYRT APTT
CRBT 1 APLS 2 3 IJLT 2 3 LMPP
1948 DOMINION GULF
1951-53 NIPIRON MINES LTD
26DDH 21300FT HOLE 13 NB2O5 .3PC U3O8 .03-.1PC
TITANIFEROUS MGNT MAINLY IN DOLOMITIC CRBT DISSEMINATED SULPHID
ES IN ALL INTRUSIVE PHASES PCLR MAINLY IN SILICO CRBT AND
IJOLITE .14 TO .3PC NB2O5 ACROSS 10FT SECTIONS APATITE 20PC IN
SILICO CRBT FLUORITE-BARITE LATE VEINS COMPLEX 1.5MIL X 1MIN
FENITE AUREOLE LOCALLY BRECCIATED
GRENVILLE PROVINCE
IRREGULAR
1971LUMBERS PP. 50-51,79-81
1971FERGUSON P. 50

MD D870069249
4LI NB 1271KRDMAVIS LAKE
ONTKENORA DISTRICT BROWNRIDGE TP S M L 4949 9239 52F15E
SPDM CLMB
GPGM 2 1
GRANITE PEGMATITES
SUPERIOR PROVINCE
PEGMATITE
1970TRAILL P. 161
1971FERGUSON P. 48

MD D870069250
2NB CE LA 1271KRDCARB LAKE LARANDONA
ONTKENORA PATRICIA DISTCARB LAKE 544042 920000 53J13W
PCLR APTT VMCL SNCS
MGNT PYRT BOTT

AEROMAGNETIC ANOMALY ODM-GSC AEROMAGNETIC AND RADIOMETRIC
GROUND MAGNETOMETER 4DDH 1849FT CENTRE CORE CALCITE DOLO CRBT
BRECCIA ZONES MGNT ZONES CIRCULAR ANOMALY 1.75MID RADIOMETRIC

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ANOMALY DISPLACED .25MI SOUTH
SUPERIOR PROVINCE
IRREGULAR
1971FERGUSON PP. 35-36

                MD 0870069251
3U  NB    1271KROWALL ISLAND OCCUR
ONTPARRY SOUND DISTRICTCARLING TP          4557   8013
PCLR                                  URPN
 GPGM  2 2
RADIOACTIVE GRANITE PEGMATITE
GRENVILLE PROVINCE
PEGMATITE
1971FERGUSON P. 50

                MD 0870069252
4NB       1271KRCCALLANDER BAY OCCUR
ONTPARRY SOUND DISTRICTNORTH HIMSWORTH TP  4610   7925   31L03W
                  FE      CU      NB      AU      AG
PCLR                                  MGNT    PYRT    PRRT
 CRBT   22 NPLS  2 3 LMPP  2 3
BEAUCAGE MINES LTD 1956
MIN-ORE MINES LTD 1966-67
4DDH 645FT 56  7DDH 1190FT 66 MAGNETIC AND ELECTROMAGNETIC SURV
CARBONATITE OTC MCPHERSON ISLAND NB2O5 .03-.05PC
GRENVILLE PROVINCE
IRREGULAR
1971LUMBERS P. 52-53,83-85
1971FERGUSON P. 51

                MD 0870069253
4NB       1271KRCNEMAG LAKE OCCUR
ONTSUDBURY DISTRICT    NEMAG L S-SIDE IR-6 4622   8114   41I06W
NBRL
 GPGM  2 2
CIRCULAR MAFIC INTRUSION CUT BY GRANITE PEGMATITE DYKES 6INW
SUPERIOR PROVINCE
PEGMATITE
1971FERGUSON P. 53

                MD 0870069254
ONTTHUNDER BAY DISTRICTPRAIRIE LAKE N-SIDE 4902   8613   42C02E
PCLR                                  MGNT    WLSN
 CRBT      NPLS      PRXN
CARBONATITE-ALKALIC COMPLEX 1MIC OUTER RING CRBT CORE NPLS
K/AR AGE 1112MY PCLR IN MASSIVE CARBONATITE AND CALCITE LENSES
PCLRCONTAINS 25-65PC NB2O5 1-30PC U
SUPERIOR PROVINCE
PEGMATITE
1971FERGUSON P. 53

                MD 0870069255
4NB       1271KRCMARTISON LAKE                      FALCONBRID66
FE P  SR
ONTCOCHRANE DISTRICT   MARTISON L          502020 831000 42J06W
MGNT
 GSSN   21
FALCONBRIGE NICKEL MINES
URANIUM RIDGE MINES LTD
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MATACHEWAN CONSOLIDATED MINES LTD
AIRBORNE EM ANOMALY MAGNETIC ANOMALY DDH 544 FT OVERBURDEN
GOSSAN OVER CARBONATITE MAGNETITE APATITE NIOBIUM STRONTIUM
HUDSON BAY LOWLANDS
IRREGULAR
1971FERGUSON P. 45

MD D870069 64
4TA 0670KRC
QUEABITIBI COUNTY PREISSAC TP R7L55-604823 7814 32D 8
TA
CLMB
GFGM 2 2
PREISSAC GRANITE
CUTS LAMOTTE GRANITE 500X20FT BRANCHING BRAIDED ISOLATED
CRYSTALS ORE SHOOT 60X1FT AT EAST END DYKE BANDING 70LBS TO MB
LAB ANALYSIS
SUPERIOR PROVINCE ABITIBI BELT
PEGMATITE
1945NORMAN P. 8
1965MULLIGAN P. 42

MD D870 65
2NB 047OKRDMANNY ZONE KENNECOTT 61
QUETWO MOUNTAINS CTY L'ANNONCIATION PAR 453106 740312 31G 8
25000 NB 35
PGLR PRVK NCLT
CRBT 2 IJLT 2 CKIT 2
MOLYBDENUM CORP
KENNECOTT COPPER
QUEBEC COLUMBIUM LTD
CONTACT GRENVILLE LS MONTEREGIAN IJOLITE THC ZONES BOND SW
MANNY NE
EXTENIVE DD METALLURGICAL TESTS LARGE TONNAGE 2 ZONES HOLDING
MARKET IMPROVEMENT
GRENVILLE PROVINCE
STRATIFORM
1957MAURICE P. 1-9
1958ROWE P. 86-87
1960NICKEL

MD D870 66
1NB TA 0470KRDSTLAWRENCE RIVER MINES LTD STLAWRRMIN70
QUETWO MOUNTAINS CTY L'ANNONCIATION PAR 4530 740154 31G 8
1 298068NB 48%
13656668 NB
1 500071NB
MRBL3 11 IJLT3 2 1
1
ST LAWRENCE RIVER MINES LTD
LAKE SUPERIOR IRON LTD
ST LAWRENCE COLUMBIUM AND METALS CORP LTD
MONTROSE SECURITIES TAKEN OVER
OKA COLUMBIUM AND METALS LTD TAKEN OVER 63
RADIOMETRIC SURVEY 56DDH 32000FT 20 ORE SHOOTS
WORKINGS 2 OPEN PITS NO 1 180FTD NO 2 300FTD PRODUCED 61-65
ADVANCED TO OPEN PIT+ADIT 65
ADVANCED TO 4-COMP SHAFT 1335FTD 6-STA ALL PROD FROM SHAFT 69-
PRODUCTION 500TPD 61 1000TPD 62 1300TPD 65 15-1700TPD 70 TO

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2300TPD 69  3059052LBS 68  2006389LES 69  2368225LBS 69
RESERVES 9-69  3125000T .487PC ABOVE 1000FT  2000000T BELOW
STRUCTURE PART OF NORTH RING BODIES S N20E D 80W
MINERALOGY  A-ZONE DISSEMINATED POLR IN BOTT-PRX*-MNOL-CRBT
RARELY SODA AMP* OR PRVR-MNOL-CRBT .11PC N2O5
VARIABLE GRADE WITHIN ORE BODIES BECAUSE POLR TYPE ALTERATION
BIOTITE K/AR AGE 114 MY CARLETON UNIV
GRENVILLE PROVINCE
STRATIFORM
1958ROWE P. 88
1959ROWE P. 46
1969GOLD AND VALLEE PP. 1-37

                MO D870069 67
28E TA MO 0470KROMASSILOTTE CLS                          VALORLIMINES
QUEABITIBI COUNTY      LACORNE TP R8L16-17 482445 775230 32O 5
CLMB                                  BRYL      MLBO      GRN*
 GPGM5 2 1 AOML  2 3
PREISSAC-LACORNE BAT
DISCOVERY 48 3 DYKES A AND B STRIKE N80 A17FTW B8-15FTW DYKE C
S 80E 100FTW 550FTL
SUPERIOR PROVINCE ABITIBI BELT
PEGMATITE
1950TREMBLAY P. 89
1953ROWE P. 16
1965MULLIGAN P. 48-49

                MO D870    68
2NB        047OKROOOULEE HEADWAY       OOLLEEHEADWAY
QUETWO MOUNTAINS COUNTYOKA AREA             4530   7403   31G 8
            1500058NB   39
POLR      PRVK      BTFT
 MRBL       IJLI       LMPP       BROO
COULEE LEAD AND ZINC MINES LTD
HEADWAY RED LAKE GOLD MINES LTD
17OOHS SPRING 55 ZONE 1200L 250W 5000 FT
GRENVILLE PROVINCE
STRATIFORM
1958ROWE P. 86
1959PICKETT D.E.
1959MTS MB IR59-20

                MO D870069 69
2LI TA    0470KROSCHUBB CLS                              LITHOORPAM57
QUEABITIBI COUNTY      LACORNE TP R2L11    481821 775642 32O 5
CLMB                                  SPOM      BRYL      ESMN
 GPGM  2 1 GROR  2 3
PREISSAC-LACORNE BAT
F W SCHUBB DISCOVERY 1944
GREAT LAKES CARBON CORP 47-
LITHIUM CORPORATION OF AMERICA
3 DYKES A 100LFTL X 5-18FTW S N50W 20PC SPODUMENE NO ZONING
        B           4-6FTW  S N50W 15PC SPODUMENE
        C  750FTL X 4-18FTW S N50W                  WEAK ZONING
8OOH 7 INTERSECTED DYKES A-B AT 300FT NO8 CUTS DYKE C SPOM
VALUES DROP AT DEPTH DYKE WIDTHS CONSTANT DYKES SPLIT AT DEPTH
OR ALONG STRIKE LOCALLY SPOM REPLACED BY FG MSCV
SUPERIOR PROVINCE ABITIBI BELT
PEGMATITE
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1950TREMBLAY P. 74
1957MULLIGAN PP.12-13

                MC 0870    70
3NB             ADVANCE RED LAKE                                    58
QUETWO MOUNTAINS CTY   ST JOSEPH DU LAC PAR453154 740354 31G 8
          1  3500SNB   31%REO  39%AP   91%
PCLR
 DLMT      LMPP
ADVANCE RED LAKE GOLD ML OP 55
GRENVILLE PROVINCE
STRATIFORM
1958ROWE P. 84-85

                MC 0870    71
3NB       04    BOND ZONE                          MOLYBD CORP
QUETWO MOUNTAINS CTY   L"ANNONCIATION PAR  453012 740312 31G 8
PRCL     BTFT     NCLT     PRVK
 MRBL      IJLT     OKIT
GRENVILLE LIMESTONE
MOLYBDENUM CORPN AMERICA
QUEBEC COLUMBIUM LTD
RADIOMETRIC AND MAGNETIC SURVEYS 45DDHS
30000FT EXTRACTION TESTS BOND ZONE SEVERAL ORE SHOOTS
BIOTITE K/AR AGE 114 MY CARLETON UNIV
GRENVILLE PROVINCE
STRATIFORM
1954ROWE P. 1-18
1958ROWE P. 86-87

                MC 0870069 83
4NB       0670KRC
QUEPAPINEAU COUNTY     PORTLAND TP R5L2    4535   7535   31G
EXNT                                FLDR     MNZT
 GPGM  2 2
MONAZITE
GRENVILLE PROVINCE
PEGMATITE
1952LANG P. 154

                MC 0870    73
 TA NB          BOUSCADILLAC PROPERTY              BOUSCADILL58
QUETWO MOUNTAINS CTY   ST BENOIT PAR       453154 740400 31G 8
          1  3800  NB   31
PCLR     PRVK

GRENVILLE LIMESTONE
BOUSCADILLAC GOLD MINES LTD
TERREX MINING CO LTD
4539 FT DDH BY CCT 31/55 BRECCIA
IJOLITE OKAITE LAMPROPHYRE DEPOSIT 1200FT LONG 200FT WIDE
LARGE TONNAGE .20PC NB2O
GRENVILLE PROVINCE
STRATIFORM
1958ROWE P. 85-86

                MC 0870    74
 TA NB          MAIN CKA PROPERTY
QUETWO MOUNTAINS CTY   L"ANNONCIATION PAR  453018 740200 31G 8
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PCLR     PRVK
 MRBL      PRXN      IJLT      FNIT      BRCC
MAIN OK MINING CORP
SEISMIC SURVEY 14DDHS10000FT PCLR IN MARBLE PRVK IN PRXN
GRENVILLE PROVINCE
STRATIFORM
1958ROWE P. 86

                  MD D870    75
 TA NB            CKA RARE METALS MINI
QUETWO MOUNTAINS CTY   ST JOSEPH DU LAC PAR4534   7403   31G 8
              20057NB    6%REO  10%TH   26%
PRVK

MORIN SERIES
OKA RARE METALS MNG CO
GEOPHYSICAL SURVEYDDHS 23 SHAFT 450FT
LEVELS 150 375FT METALLURGICAL TESTING NL70
GRENVILLE PROVINCE
STRATIFORM
1957MAURICE P. 10
1958ROWE P. 97

                  MD D870    76
4U                LARIVIERE CUNNINGHAM
QUETIMISCAMINGUE COUNTYVILLEDIEU TWP       4649   7826   31L16
PCLR     BTFT     MCRL
 PGMT5 2 2
GRANITE PGMT
GRENVILLE PROVINCE
PEGMATITE
1958ROWE P. 98

                  MD D870    77
2U  NB    0570KRCQUEBEC NICKEL                        QUEBEC NI
QUEPONTIAC COUNTY      GRAND CALUMET TP    454342 764306 31F10
                                  R9 L11-12
URNN     PCLR     URNR     ZRCN     TRMN
 GPGM  2 1 GNSS   33 MRBL   33 GBBR  2 3
PRECAMBRIAN GNEISSE
QUEBEC NICKEL CORP 54-
DYKES N 35 E 18-75SE 830FTL X 5-60FTW 200FTL X 40FTW OTHERS
DDH 5749FT 54 TR TR
GRENVILLE PROVINCE
VEIN
1956GITTINS PP. 772-783

                  MD D870    79
4U  CB TA 0570KRC                                          61
QUEGATINEAU COUNTY     HULL TP R9L22 N/2   453034 755204 31G12
                              R10L22
PCLR     BTFT
 GRNT  2 3 SYNT  2 3
                          12
HARRIS H H
MINERALIZED BICTITE-APATITE BRECCIA
GRENVILLE PROVINCE
IRREGULAR
1960ROSE P. 40
1961HOGARTH P. 615
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                    MD 0870     80
4U  NB TA 0470KRDMEACH LAKE GRP
QUEGATINEAU COUNTY      HULL TP R10L27 N/2  453118 755438 31G12
                                R12L23-28
BTFT                            URNN
 GRNT       SYNT
                           12
MEACH LAKE GRP  H H HARRIS ARFVEDSONITE PGMT
AMPHIBOLE VEIN WITH BETAFITE
GRENVILLE PROVINCE
VEIN
1961HOGARTH P. 615

                    MD 0870     81
4U  NB TA 0470KRD                                                   61
QUEGATINEAU COUNTY      HULL TP R11L27 N/2  453206 755448 31G12
PCLR
 GRNT  2 3 SYNT  2 3
CALCITE VEIN WITH BETAFITE
GRENVILLE PROVINCE
VEIN
1961HOGARTH P. 615

                    MD 0870     82
4U  NB TA 0470KRD
QUEGATINEAU COUNTY      BASKATONG TP R2L22244645   7555   31J13
                                R2L2531
PCLR      ELSR                  URNR      THRT
 MRBL
                           12
GATINEAU URANIUM MINES LTD CO
GRENVILLE PROVINCE
VEIN
1958ROWE P. 97
1962LANG P. 284

                    MD 0870     83
2TA NB     0470KRDMAISONNEUVE MINE
QUEBERTHIER COUNTY      MAISONNEUVE TP R2L1  4648   760620 31J16
SMRK      EXNT      FRGS              URNN
 PGMTS 2 2
LAURENTIAN GNEISS      1 1
SOUTH STATE URANIUM MINES LTD
10M N ST MICHEL DES SAINTS GRANITE PGMT
PGMT 400FTLX100FTW N75DEGE 60DEGN INTRUDES HORNBLENDE GARNET
GNSS REC PRODUCTION 35FT SHAFT DRIFTS
GRENVILLE PROVINCE
PEGMATITE
1952LANG P.153
1958ROWE P. 98
1960ROSE P. 59-10
1962LANG P. 286

                    MD 0870     85
3TA NB     0570KRD
QUEBERTHIER COUNTY      BRASSARD TOWNSHIP   4642   7358   31J 9
SMRK

GRENVILLE PROVINCE
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PEGMATITE
1880HOFFMAN
1917MILLER AND KNIGHT P. 316
1932ELLSWORTH P. 248

MD D870069 88
3LI BE TA 0570KRD LACORNELIML
QUEABITIBI COUNTY LAMOTTE TP R10L64 482445 775951 32D 8
CLMB SPDM BRYL GRN*
GPGM5 2 1 GRDR 2 3 DORT 2 3 BSCS 33
LACORNE LITHIUM MINES LTD 50-
E AND NE STRIKING DYKES TR 10952FT DD 55-56 LOTS 60-63 1200FTL X 20FTW LOT 59 1000FTL X 5FTW LOTS 61-62 6 NE DYKES 800FTL X 20-85FTW
SUPERIOR PROVINCE ABITIBI BELT
PEGMATITE
1950TREMBLAY P. 76
1965MULLIGAN P. 47

MD D870069 89
3TA LI 0570KRD LITHCORPAM
QUEABITIBI COUNTY FIGLERY TP R2L14 482657 781054 32D 8
R2L36 482709 780548
CLMB SPDM20 GRN* TRMN
GPGM5 2 1 BSCS 33
KEWAGAMA GRP 2 3
MONETA PORCUPINE MINES LTD
LITHIUM CORP AMERICA
STR TR DD 600FTL X 30FTW WEAK ZONING LOW S DIP
SUPERIOR PROVINCE ABITIBI BELT
PEGMATITE
1953ROWE P.
1957MULLIGAN P. 11
1965MULLIGAN PP. 47-48

MD D870069 90
1LI TA 0571KRD QUELITHCORP
QUEABITIBI COUNTY LOCORNE TP R9L52-53 482445 774823 32C 5
1 1500357LI 125
CLMB ML80 BSMN BRYL
GPGM5 2 1 GRDR 2 3 AMPB 33
PREISSAC-LACORNE BAT 2
LITHIUM EXPLORATION CO
VENTURES LTD
QUEBEC LITHIUM CORPORATION
ZONE OF DYKE AT NORTH CONTACT OF LACORNE MASSIF 10-12 SUBPARALLEL OR OVERLAPPING DYKES S N76W D 50-75S EXTEND 1100 FT INTO GRANODIORITE PRODUCED SPODUMENE FELDSPAR MICA CONCENT MILL 1000TPD PRODUCTION 55-59 RESUMED MINING 60- CHEM PLANT HI SPODUMENE 600FT ABOVE 2000FT BELOW CONTACT.
SUPERIOR PROVINCE ABITIBI BELT
PEGMATITE
1950TREMBLAY P. 76
1965MULLIGAN P. 43-46

MD D870069 91
2TA NB 0470KRDALDOUS TANTALUM PROS
QUEABITIBI COUNTY PREISSAC TP R7L53-4 482306 781451 32D 8
CLMB BRYL

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 GPGM5 2 1 ADML  2 3
PREISSAC LACORNE BAT
SUPERICR PROVINCE AEITIBI BELT
PEGMATITE
1965MULLIGAN P. 42

                  MD D87U    93
 TA NB W  0570KRDSLADEN DISCOVERY
QUEABITIBI COUNTY      PREISSAC TOWNSHIP   4830   781830 32D 8
CLMB
 PGMT
SUPERICR PROVINCE AEITIBI BELT
PEGMATITE


                  MD D870    95
4NB TA    0470KRD                                          06
QUECHARLEVOIX COUNTY   LAC PIED DES MONTS  4724   7651   21M16
SMRK     FRGS     EXNT              URNN
 GPGM  2 2
GRENVILLE PROVINCE
PEGMATITE
1960BALSKI P. 42
1959ROSE P. 41

                  MD D870    96
4U  MO NB 0470KRD                                  SISIMECNUR
QUECHARLEVOIX EST COUNTCALLIERES TWP R1 L114735   6955   21N13
FRGS                              URNN     MLBD     PYRT
 PGMT5 2 2
ST SIMECN URANILM CORP
BULK SAMPLED
GRENVILLE PROVINCE
PEGMATITE
1952LANG P. 152

                  MD D87U    97
4NB TA    0470KRD                                   CONSTSIMEC
QUECHARLEVOIX EST COUNTCALLIERES TP R2 3L 84735   6955   21N13
FRGS
 PGMT5 2 2
CONSOLIDATED ST SIMECN
TRENCHED AND DRILLED
GRENVILLE PROVINCE
PEGMATITE
1958SHAW P. 21
1962LANG P. 285

                  MD D870    98
4NB       0470KRD                                    CPAWICA EX
QUEGATINEAU COUNTY     KENSINGTON TP       4625   7550   31J 5
FRGS     ESCN     PCLR              URNN
 GPGM  2 2
CPAWICA EXPLORERS LTD L F SMITH
GRENVILLE PROVINCE
PEGMATITE
1958SHAW P. 42
1959ROSE P. 40
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MD 0870069115
4LI TA BE 0470KRC QUELITHCORP
QUEABITIBI COUNTY LACORNE TP R9L57 482445 774715
CLMB BTFT SPDM BRYL GRN*
GPGM5 2 1 GRDR 2 3 MNZN 2 3
PREISSAC-LACORNE BAT 2
LACORNE LITHIUM MINES
VENTURES
QUEBEC LITHIUM CORPORATION
SEE 6432 MULTIPLE DYKE ZONE S S75E C 60S 8000FTL X 200FTW
SUPERIOR PROVINCE ABITIBI BELT
PEGMATITE
1950TREMBLAY P. 76
1957MULLIGAN PP. 10-11
1965MULLIGAN PP. 43-46

MD 0870069117
4LI BE TA 0470KRC CANLITHMC 57
QUEABITIBI COUNTY LANDRIENNE TP R1L26 482554 775430 32C12
R1L25
CLMB MCRL SPDM BRYL GRN*
GPGM5 2 1 BSCS 33
KENAGAMA GRP 2 3
CANADIAN LITHIUM MINING CORP 57
DYKE 900FTL X 250FTW S N70W WEAKLY ZONED
LEPIDOLITE-SPODUMENE DYKE EXPOSED 5FTW X 50FTL
SUPERIOR PROVINCE ABITIBI BELT
PEGMATITE
1950TREMBLAY P. 77
1957MULLIGAN P. 12
1965MULLIGAN PP. 46-47

MD 0870 118
4NB TA 0470KRC CHESSURANI
QUEBOUVILLE COUNTY ST HILAIRE L301-330 4530 7320 31H11
PGLR
GBBR 2 NPLS
CHESS URANIUM CORP
ST LAWRENCE LOWLANDS
IRREGULAR
1958ROWE P. 97

MD 0870 119
4NB 0470KRDMACGREGOR L
QUEGATINEAU COUNTY TEMPLETON TP R12L20 4540 7540 31G 5
EXNT
PGMT
W M WALLINGFORD
GRENVILLE PROVINCE
PEGMATITE
1952LANG P. 153
1959ROSE P. 41

MD 0870 120
4NB U 0470KRC OLEARYMINE58
QUEGATINEAU COUNTY WAKEFIELD TP R3L25 4540 7550 31G 5
EXNT PLCR URNN
PGMT 2 2
O"LEARY MINES LTD GRANITE PGMT TRENCHED
GRENVILLE PROVINCE

PEGMATITE
1958ROWE P. 98
1962LANG P. 293

MC 0870069128
3 LI TA 0571 KRD CANLITHMC 57
QUEABITIBI COUNTY LACORNE TP R10L38 482506 775154 32C 5
CLMB SPDM
GPGM5 2 1 GRDR 2 3
PREISSAC-LACORNE BAT 2
CANADIAN LITHIUM MINING CORP 57
DYKE S N65W DDH INTERBANDED PEGMATITE AND APLITE
PEGMATITE
1950TREMBLAY MAP
1957MULLIGAN P. 12
1965MULLIGAN P. 47

MC 0870069141
38E TA 0571KRD CANLITHMC 57
QUEABITIBI COUNTY LACORNE TP R9L1-2 482400 775915 32C 5
CLMB BRYL
GPGM5 2 1 GRDR 2 3
PREISSAC LACORNE BAT 2
CANADIAN LITHIUM MINING CORP 57
SUPERIOR PROVINCE ABITIBI BELT
PEGMATITE
1950TREMBLAY MAP
1957MULLIGAN P. 46

MD 0870069178
2LI TA 0571KRDAMOSLITHIUM AMOSLITHCORP
QUEABITIBI COUNTY LACORNE TP R3L7-8 481857 775818 32C 5
CLMB SPDM BRYL
GPGM 2 1 GRDR 2 3 BSCS 33 VLCC 2 3
KEWAGAMA GRP 2 3
AMOS LITHIUM CORP 55-57
3 DYKES SOUTH DYKE 400FTL X 12FTW S N45W VAGUE ZONING 14DDH
3280FT 55-56 CENTRE DYKE 800FTL X 45FTW S N45W NORTH DYKE
S N30W NEAR VERTICAL 30FTW 500H 1554FT
SUPERIOR PROVINCE ABITIBI BELT
PEGMATITE
1957MULLIGAN P. 12
1965MULLIGAN P. 50

MD 0870069179
3TA 0571KRD CANLITHMC 57
QUEABITIBI COUNTY LACORNE TP R10L1-2 482500 775854 32C 5
R9L1-6 482406 775900
CLMB
GPGM5 2 1 GRDR 2 3
PREISSAC LACORNE BAT 2
DYKE DD
SUPERIOR PROVINCE ABITIBI BELT
PEGMATITE
1950TREMBLAY MAP
1951MULLIGAN P. 12
1965MULLIGAN PP. 46-47

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                MD D870069187
3NB       0570KRDST HCNCRE                                    SOQUEM    67
QUEDUBUC COUNTY         SIMARD TP R7          4833   7112   21D11
          1  500070NB   86 REO 45  ZN   35 MO   03
          1 4500070NB   48 ZN 3500 MO  290
          1 1500070NB   66
          1 6000071NB   65(
PCLR                                    MLBD      MNZT
 DLMT 3    CRBN      NFLS 32 2 DCRT  2 2
SOQUEM 67 COPPERFIELDS MCL 1970 AGREEMENT 25PC INTEREST
AIRBORNE RADICMETRIC AERCMAG GRAVIMETRIC GRCUND MAG 12000 CD
650 MY K/AR RELATED TC HYPCTHETICAL ST LAWRENCE RIFT SYSTEM
ROCKAND MINERAL ANALYSES BCDY 1000FT 8J0FT 600FT D
ZONE 2400FTW X 1800FTL X 850FTD CD 70000FT 2ZONES NC1 ZONE
34000000T .63PC NB2C5 NC2 180000000T .8PC NB205
DISCOVERED BY AIRBORNE RADICMETRY CCNFIRMED BY GND SURVEYS
2400FT 18PC DECLINE TC SAMPLE ZONES 1 AND 2 STARTED JULY71
METALLURGICAL TESTS 75PC PCLR 53PC NB205 NO2 ORE FG DIFFICULT
TO PROCESS PRCDUCTION TARGET 73
GRENVILLE PRCVINCE
IRREGULAR
1970 PRELIM METALLURGICAL TESTS SUCCESSFUL
1970VALLEE AND DUBUC PP. 1-35
                MD D870069188
3NB       0570KRDST SCHCLASTIQUE
QUETWO MOUNTAINS COUNTYST SCHOLASTIQUE     453630 7406   31G 9
PCLR

GRENVILLE PROVINCE
IRREGULAR


                MD D870069189
3NB       0570KRDST ANDRE EST
QUEARGENTEUIL CCUNTY   ST ANDRE EST        4534   7420   31G 9
          1  4500069NB   57 F   22
PCLR     BRIT                        FLRT
 CRBT
SOQUEM 70
AIRBORNE RADICMETRIC 59MI 70 MAPPING 4MISQ GND RADIOMETRIC 10MI
GRAVITY 98STA DDH 18 8268FT DDASSAYS 1196
GRENVILLE PROVINCE
IRREGULAR
1969       P. 1-18

                MD D870069205
4NB ZR    0670KRD
QUEMONTREAL ISLAND     ST-MICHEL          4530   7330   31H
PCLR                                  DSNT      WLGN      ZRCN
 LMSN
SILL 4 TO 8FTT IN FLAT-LYING ORDOVICIAN LMSN PCLR .09PC ZRC2
ST LAWRENCE LOWLANDS
IRREGULAR
1969STEACY AND JAMBCR PP.
1971FERGUSON P. 24

                MD D870069209
4NB       1070KRD
QUEGATINEAU CCUNTY     LYTTCN TP R1L26     4640   7605   31K09
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EXNT
 GPGM 2 2
GRENVILLE PROVINCE
PEGMATITE
1959ROSE P. 40

MD D870069210
4NE 1070KRD
QUEMANIWAKI COUNTY PINE CHUTES DESERT R4623 7558 31J05
EXNT ALNT URNN
 GPGM 2 2
GRENVILLE PROVINCE
PEGMATITE
1959ROSE P. 40

MD D870069211
4NE U 1070KRDBATTLE LAKE
QUEGATINEAU COUNTY TEMPLETON TP P13L5 4540 7540 31G11
EXNT URNN MNZT
 GPGM 2 2
W M WALLINGFORD
GRENVILLE PROVINCE
PEGMATITE
1960ROSE P. 41

MD D870069212
3U NE 1070KRDTP P-68 OCCURRENCE COPPERURAN
QUEGATINEAU COUNTY TP P-68 4658 7611 31K16
EXNT MNZT ALNT URNN
 GPGM 2 2
COPPER URANIUM LTD
GRENVILLE PROVINCE
PEGMATITE
1952LANG P. 152
1962LANG P. 293

MD D870069213
4U NE 1070KRDPOPE L OCCURRENCE
QUELABELLE COUNTY POPE TP 4640 7540 31J12
ELSR ALNT
 GPGM 2 2
A DUQUETTE MONT LAURIER
5 MI FROM LEPINE DEPOT TRENCHED
GRENVILLE PROVINCE
PEGMATITE
1962LANG P. 291

MD D870069214
4NE U 1070KRDARBIC OCCURRENCE P ARBIC
QUELABELLE COUNTY ROBERTSON TP 4630 7540 31J12
ELSR ALNT URNN URNR
 GPGM 2 2
P ARBIC MONT LAURIER
GRENVILLE PROVINCE
PEGMATITE
1952LANG P. 151
1962LANG P. 290

MD 0870069215
1FLDNB 1070KRDEACK MINE
QUEPAPINEAU CCUNTY DERRY TP R2L14 454333 752841 31G13
FLD
EXNT ALNT URNN TCLT
GFGM 2 2
CANADA FLINT AND SPAR FRCDUCED FELDSPAR
GRENVILLE PROVINCE
PEGMATITE
1959ROSE P. 40

MD 0870069216
4NB 1070KRDGLEN ALMOND
QUEPAPINEAU CCUNTY DERRY TP P2L3-4 454352 752601 31G13
EXNT
GFGM 2 2
GRENVILLE PROVINCE
PEGMATITE
1959ROSE P. 40

MD 0870069217
4U NB 1070KFDHOULE CCC A HCULE
QUEST MAURICE CCUNTY ST CATHERINE TP R1-247 7330 31P04
FRGS URNN TCLT ALNT
GFGM 2 2
A HCULE LCTS 60-71N R1-2
GRENVILLE PROVINCE
PEGMATITE
1960ROSE P. 41

MD 0870069218
4NE 1070KRDLAC MASSON OCC R CHARTIER
QUETERREBCNNE CCUNTY WEXFORD TP 4605 7405 31J01
EXNT
GFGM 2 2
R CHARTIER
GRENVILLE PROVINCE
PEGMATITE
1959ROSE P. 41

MD 0870069233
1FLDYT NB 0571KRDEVANS MINE EVANS LCU PGMT
QUEPAPINEAU CCUNTY W PCRTLAND TP R6 L28454624 754206 31G13
253852 FLD QTZ
FRGS ALNT WKFC
GFGM5 2 2 QZDR 2 3 QRZT 33 MRBL 33
CANADA FLINT AND SPAR LTC.38-52
FELDSPAR QUARRY38-52 QRT* CCRE 40FTL X 20FTW WEAKLY ZONED
DYKE 400FTL X 85FTW S D E 85 WNUMERCUS ACCESSCRY MINERALS Y NB
BI VTH U ASSOCIATED WITH QUARTZ CCRE
GRENVILLE PROVINCE
1971MILES ET AL PP. 385-410
1932SPENCE P. 77

MD 0870069235
2NE 0671KRD MCNTRCSESL69
QUETWO MCUNTAINS CCUNTYL"ANNONCIATION PAR 452930 740048 31G 8
PCLR
CRBTS 1 SOVT 3
MONTROSE SECURITIES LTD
DDH TRENCHES PCLR IN CARBONATITE

GRENVILLE PROVINCE
IRREGULAR
1969GOLD AND VALLEE P. 28

MD 0870 110
3NB 0470KRONISTONIAK GRP LARONGEURA58
SSKLAC LA RONGE AREA LARONGE VILLAGE 5506 10517 73H 3
PCLR CRLT
GPGM5 2 2
LARONGE URANIUM MINES LTD -NL70
PILOT MILL INSTALLED
CHURCHILL PROVINCE
PEGMATITE
1958ROWE P. 90

MD 0870 111
3NB 0470KROBESS GROUP
SSKCAMSELL PORTAGE AREAHAZELTON LAKE 5948 10955 74N13
EXNT PCLR
SCST 2 GRNT
C M KILBREATH G W MACDONNELL
CHLCRITIC SHEAR ZONES COARSE GRAINED GRANITE
CHURCHILL PROVINCE
VEIN
1958ROWE P. 90

MD 0870 112
3NB 0470KROKK CONCESSION 58
SSKGOLDFIELDS REGION VIKING LAKE 5935 10815 74N10
FRGS
GSSN
GOSSAN CAPPING
CHURCHILL PROVINCE
GOSSAN
1952LANG P. 82
1955ROBINSON P. 69

MD 0870 113
3NB 0470KROLCR GRP AMERICAN-C58
SSKGOLDFIELDS REGION VIKING LAKE 5935 10815 74N10
FRGS
PGMT5 2 2 GRGS
AMERICAN-CANADIAN MINES LTD NL 70
PGMT OR FRACTURE IN GRANITE GNEISS
CHURCHILL PROVINCE
PEGMATITE
1958ROWE P. 90

MD 0870 114
3U NB 0470KROVIKING LAKE DEPOSIT LORADO URA58
SSKGOLDFIELDS REGION VIKING LAKE 5935 10815 74N10
PCLR URNN MNZT PCBD
GPGM 2 2 AMPB 33 GRGS 33
LORADO URANIUM MINES LTD
INTERNATIONAL MOGUL MINES LTD
DD COMPLEX RADIOACTIVE PEGMATITE DYKE WEAKLY ZONED SODIC PLAG
SHEARED HYDROTHERMAL ALTERATION
CHURCHILL PROVINCE
PEGMATITE
1955ROBINSON PP. 35-36
1958ROWE P. 90

APPENDIX B

NUMBER	N.T.S. BLOCK	LATITUDE	LONGITUDE	PROVINCE	COUNTY OR DISTRICT	TOWNSHIP OR PARISH	TYPE OF DEPOSIT	NB-TA MINERALS
1	92I 9	50 35	120 15	BC		KAMLOOPS AREA	PEGMATITE	COLUMBITE
2	82F14	49	119	BC	15 MI E OF KELOWNA		PEGMATITE	FERGUSONITE
3	82F11	49 42	117 25	BC		LEMON CR	PEGMATITE	FERGUSONITE
4	82K15	50 48	116 37	BC	W OF BRISCO	FORSTER CR	PLACER	PYROCHLORE EUXENITE
5	82K 9	50 49	116 38	BC	SPILLIMACHEEN	BUGABOO CR	PLACER	PYROCHLORE EUXENITE
6	83J 6	52 15	119 18	BC	23 MI E OF BLUE R		STRATIFORM	PYROCHLORE COLUMBITE
7	93N 9	55 41	124 22	BC	5 MI E OF ROWE, B.C.		STRATIFORM	PYROCHLORE COLUMBITE
8	82F 9	49 34	116 11	BC	3 MI S ST MARY L	HELLROARING-ANGUS CR	PEGMATITE	COLUMBITE
9	82N01	51 12	116 68 03	BC	HEAD MOOSE CR SE OF	YOHO NATIONAL PK	IRREGULAR	KNOPITE
10	82F03	49 27 40	117 35 30	BC	1 MI S SLOCAN R .5 M	W CRESCENT W RADIO	PEGMATITE	FERGUSONITE SAMARSKITE
11	92I01	50	120	BC	RUSH L E OF RANGE CR		PEGMATITE	COLUMBITE
12	83D	52	119	BC	4 MI S OF LEMPRIERE	STA	IRREGULAR	PYROCHLORE
13	82K15	50 49	116 38	BC	SPILLIMACHEEN 20 MI	W WOWELL CR	PLACER	PYROCHLORE
14	82F09	49 34	116 11	BC	RIDGE BETWEEN	HELLROARING-ANGUS CR	PEGMATITE	
15	27C	69 30	71 45	FRA	BAFFIN ISLAND	BARNES ICE SHEET	PEGMATITE	COLUMBITE
16	85I11	62 42	113 16	MAC		ROSS L AREA	PEGMATITE	COLUMBITE
17	85I13	62 47 00	113 35 00	MAC	YELLOWKNIFE BEAULIEU	BLAISDELL LAKE	PEGMATITE	COLUMBITE
18	85N 1	63 04	116 21	MAC	MARIAN R DISTRICT		VEIN	FERGUSONITE
19	85J 9	62 31 30	114 09 00	MAC	YELLOWKNIFE BEAULIEU	PROSPEROUS LAKE	PEGMATITE	COLUMBITE
20	76D	64 7	110 7	MAC		MACKAY LAKE	PEGMATITE	COLUMBITE
21	85J16	62 45	113 06	MAC	YELLOWKNIFE BEAULIEU	ROSS LAKE	PEGMATITE	COLUMBITE
22	85I 1	62 08 30	112 20 00	MAC	YELLOWKNIFE BEAULIEU	HEARNE CHANNEL	PEGMATITE	COLUMBITE

NUMBER	OTHER MINERALS	WALL-ROCKS	REFERENCES
1		GRANITE PEGMATITE	1932 ELLSWORTH P. 137 1958 ROWE P. 90
2		PEGMATITE	1952 LANG P. 45 1958 ROWE P. 90
3	ALLANITE	GRANITE PEGMATITE	1953 THOMPSON P. 546 1962 LANG ET AL P. 233
4	URANINITE	SAND	1958 ROWE P. 28
5	URANINITE URANOTHORITE ALLANITE	SAND	1957 JONES P. 1-56 1958 ROWE P. 28
6	ZIRCON URANINITE	CARBONATITE SERICITE SCHIST	1954 MCCAMMON P. 111 1958 ROWE PP. 31-35 1961 HOGARTH PP. 610-633
7	ZIRCON	CARBONATITE SYENITE FENITE GNEISS	1949 ARMSTRONG PP. 26-31 1957 JONES PP. 19-20 1958 ROWE P. 29-30
8	BERYL GALENA PYRITE	GRANITE PEGMATITE	1957 LEECH 1968 MULLIGAN P 62
9	SODALITE	IJOLITE SYENITE PEGMATITE JACUPIRANGITE FENITE	1954 MCCAMMON PP. 150-151 1957 JONES P. 20 1966 GITTINS PP. 524-525
10	THORITE MONAZITE	PEGMATITE GNEISS	1956 EASTWOOD P. 77 1962 LANG P 234
11		GRANITE PEGMATITE	
12		CARBONATITE	1954 MCCAMMON P. 111 1962 LANG P 235
13		GRAVEL	1952 LANG P. 44 1958 ROWE PP. 28-29
14		GRANITE PEGMATITE	1961 LONDON P. 6
15			1962 LANG MAP
16	BERYL	PEGMATITE GRANODIORITE	1951 LORD P. 190 1955 HUTCHISON P. 15
17	BERYL CASSITERITE AMBLYGONITE	GRANITE PEGMATITE BIOTITE SCHIST	1951 LORD PP. 85-86 1958 ROWE P. 89
18		GRANITE	1958 ROWE P. 89
19		GRANITE PEGMATITE	1941 JOLLIFFE
20		GRANITE PEGMATITE	1947 FOLINSBEE
21	SPODUMENE BERYL	GRANITE PEGMATITE GRANODIORITE	1944 JOLLIFFE P. 9 1951 LORD PP. 231-235 1952 ROWE PP. 29-30 1958 ROWE P. 89 1968 MULLIGAN P. 66-67
22		GRANITE PEGMATITE	1952 ROWE P. 27 1958 ROWE P. 89

NUMBER	N.T.S. BLOCK	LATITUDE	LONGITUDE	PROVINCE	COUNTY OR DISTRICT	TOWNSHIP OR PARISH	TYPE OF DEPOSIT	NB-TA MINERALS
23	85I 1	62 11 00	112 13 00	MAC	YELLOWKNIFE BEAULIEU	HEARNE CHANNEL	PEGMATITE	COLUMBITE
24	85I10	62 20 00	112 39 30	MAC	YELLOWKNIFE BEAULIEU	BUCKHAM LAKE	PEGMATITE	COLUMBITE
25	85I11	62 39 00	113 28 00	MAC	YELLOWKNIFE BEAULIEU	FREDA LAKE	PEGMATITE	COLUMBITE
26	85I 1	62 13 30	112 18 30	MAC	YELLOWKNIFE BEAULIEU	DREUER LAKE	PEGMATITE	COLUMBITE
27	85I12	62 37 00	113 29 00	MAC	YELLOWKNIFE BEAULIEU	THOMPSON LAKE	PEGMATITE	COLUMBITE
28	85I 1	62 10 30	112 22 00	MAC	YELLOWKNIFE BEAULIEU	BLATCHFORD LAKE	PEGMATITE	COLUMBITE
29	85I13	62 44 00	113 29 00	MAC	YELLOWKNIFE BEAULIEU	SPROULE LAKE	PEGMATITE	COLUMBITE
30	85I10	62 18 00	112 46 00	MAC	YELLOWKNIFE BEAULIEU	BUCKHAM LAKE	PEGMATITE	COLUMBITE
31	85I 5	62 39 00	113 58 00	MAC	YELLOWKNIFE BEAULIEU	PRELUDE LAKE	PEGMATITE	COLUMBITE
32	85I	62 20	112 40	MAC	YELLOWKNIFE BEAULIEU	BUCKHAM L	PEGMATITE	COLUMBITE
33	85O12	63 33	115 57	MAC	MACKENZIE DISTRICT	BIGSPRUCE LAKE	IRREGULAR	
34				MAC	YELLOWKNIFE MD	MAC L	PEGMATITE	COLUMBITE
35	53E	53 05	94 50	MAN		GORMAN LAKE 2	PEGMATITE	COLUMBITE
36	52L16	50 23 12	95 28 30	MAN	WINNIPEG R AREA	TP16 R15 L33	PEGMATITE	COLUMBITE EUXENITE
37	52L 6	50 21 00	95 21 00	MAN	WINNIPEG R AREA	TP16 R16 L17	PEGMATITE	COLUMBITE
38	52L	50 21 06	95 21 36	MAN	WINNIPEG R AREA	TP16 R16 L17	PEGMATITE	COLUMBITE
39	52L	50 26 24	95 22 42	MAN	WINNIPEG R AREA	TP17 R16 L19	PEGMATITE	COLUMBITE
40	52L	50 27 00	95 21 36	MAN	WINNIPEG R AREA	TP17R16L20	PEGMATITE	COLUMBITE
41	52L	50 20 18	95 18 54	MAN	WINNIPEG R AREA	TP16 R16 L15	PEGMATITE	COLUMBITE
42	52L	50 23 42	95 27 54	MAN	WINNIPEG R AREA	TP16 R15 L33	PEGMATITE	COLUMBITE EUXENITE
43	52L06	50 25 48	95 27 12	MAN	WINNIPEG R AREA	TP17 R15 L15	PEGMATITE	COLUMBITE
44	13L 8	54 20	61 57	NFL	LABRADOR	TEN MILE LAKE	IRREGULAR	PYROCHLORE NICBOPHYLLITE

NUMBER	OTHER MINERALS	WALL-ROCKS	REFERENCES
23	SPODUMENE CASSITERITE BERYL	GRANITE PEGMATITE GREYWACKE	1951 LORD P. 119-120 1952 ROWE PP. 22-24 1958 ROWE P. 89 1968 MULLIGAN PP. 68-69
24	SPODUMENE BERYL AMBLYGONITE	GRANITE PEGMATITE GREYWACKE	1952 ROWE P. 27 1958 ROWE P. 89 1968 MULLIGAN P. 67
25	CASSITERITE AMBLYGONITE BERYL	GRANITE PEGMATITE BICTITE SCHIST	1951 LORD PP. 152-154 1958 ROWE P. 89
26	SPODUMENE AMBLYGONITE BERYL	GRANITE PEGMATITE GREYWACKE	1951 LORD P. 121 1952 ROWE PP. 24-25 1958 ROWE P. 89 1968 MULLIGAN P. 67
27	SPODUMENE BERYL AMBLYGONITE	GRANITE PEGMATITE BIOTITE SCHIST	1951 LORD P. 287-288 1958 ROWE P. 89 1968 MULLIGAN P. 66
28	SPODUMENE CASSITERITE BERYL	GRANITE PEGMATITE GREYWACKE	1952 ROWE PP. 25-26 1958 ROWE P. 89 1968 MULLIGAN P. 67
29	BERYL SPODUMENE CASSITERITE	GRANITE PEGMATITE BIOTITE SCHIST	1944 JOLIFFE P. 20-22 1952 ROWE PP. 32-33 1958 ROWE P. 89 1968 MULLIGAN P. 66
30	SPODUMENE BERYL LITHIOPHILITE	GRANITE PEGMATITE BIOTITE SCHIST	1951 LORD PP. 122-123 1952 ROWE P. 28 1958 ROWE P. 89 1968 MULLIGAN P. 67
31	BERYL	GRANITE PEGMATITE BIOTITE SCHIST	6951 LORD P. 244-245 1952 ROWE PP. 30-31 1958 ROWE P. 89
32	BERYL SPODUMENE	SERICITE SCHIST GRANITE PEGMATITE	1968 MULLIGAN P. 67
33		CARBONATITE	
34	SPODUMENE BERYL	GRANITE PEGMATITE BIOTITE SCHIST	1951 LORD PP. 278-279
35	TOURMALINE MOLYBDENITE	GRANITE PEGMATITE GNEISS	1956 QUINN
36	CASSITERITE BERYL MONAZITE	PEGMATITE AMPHIBOLITE	1932 WRIGHT PP. 99-105 1957 DAVIES PP. 23-24
37	BERYL LEPIDOLITE	GRANITE PEGMATITE VOLCANICS GRANITE	1932 ELLSWORTH P. 166 1957 DAVIES PP. 17-18 1958 ROWE P. 91
38	SPODUMENE BERYL LITHIUM MICA	GRANITE PEGMATITE VOLCANICS	1931 WALKER P. 11 1958 ROWE P. 91 1932 ELLSWORTH PP. 148-157 1932 WRIGHT PP. 114-120 1957 DAVIES PP. 22-23
39	CASSITERITE BERYL SPODUMENE	GRANITE PEGMATITE AMPHIBOLITE TUFF	1932 WRIGHT PP. 106-107
40	TOURMALINE CASSITERITE	GRANITE PEGMATITE BICTITE GNEISS BIOTITE SCHIST	1954 DAVIES P. 43
41	BERYL TOURMALINE	GRANITE PEGMATITE GRANITE GNEISS	1957 DAVIES PP. 18-19
42	ZINNWALDITE LITHIUM MICA BERYL	GRANITE PEGMATITE VOLCANICS	1957 DAVIES PP. 19-20
43	ZINNWALDITE MICROCLINE BERYL	GRANITE PEGMATITE APLITE AMPHIBOLITE	1932 WRIGHT PP. 105-106 1959 HUTCHISON PP. 1525-1542 1961 NICKEL 1968 MCWE PP. 39-49
44	BERYL	MIGMATITE SYENITE PARAGNEISS ANDESITE	1962 LANG MAP 1968 MULLIGAN PP.192-93

NUMBER	N.T.S. BLOCK	LATITUDE	LONGITUDE	PROVINCE	COUNTY OR DISTRICT	TOWNSHIP OR PARISH	TYPE OF DEPOSIT	NB-TA MINERALS
45	21A11	44 44	64 27	NS	LUNENBURG COUNTY	NEW ROSS	PEGMATITE	COLUMBITE
46	41O04	48 00 00	83 05	ONT	SUDBURY DISTRICT	CHEWETT TP C3 L11N2	PEGMATITE	PYROCHLORE
47	41H15	45 48	80 35	ONT	PARRY SOUND DISTRICT	MENVEY TP CAL4	PEGMATITE	EUXENITE
48	31E 1	45 00 15	78 09 00	ONT	HALIBURTON COUNTY	CARDIFF TP C15L6-7	VEIN	BETAFITE PYROCHLORE
49	31E 1	45 00 15	78 02 00	ONT	HALIBURTON COUNTY	CARDIFF TP C11L27-28	PODS	PYROCHLORE BETAFITE
50	31E 1	45 03 15	78 11 00	ONT	HALIBURTON COUNTY	CARDIFF TP C21L4-7	PEGMATITE	PYROCHLORE BETAFITE
51	31C14	44 56 15	78 06 00	ONT	HALIBURTON COUNTY	CARDIFF TP C7-8L10	VEIN	ELLSWORTHITE PYROCHLORE
52	31D16	44 58 15	78 08 00	ONT	HALIBURTON COUNTY	CARDIFF TP C12L7-10 C13L7-8	VEIN	ELLSWORTHITE PYROCHLORE MICROCLITE
53	31F 4	45 09 20	77 49 30	ONT	HASTINGS COUNTY	MONTEAGLE TP C6L20	PEGMATITE	EUXENITE ELLSWORTHITE PYROCHLORE MICROLITE
54	31F 4	45 09 30	77 50 00	ONT	HASTINGS COUNTY	MONTEAGLE TP C7L1819	PEGMATITE	ELLSWORTHITE HATCHETTOLITE
55	31F 4	45 10 30	77 59 00	ONT	HASTINGS COUNTY	MONTEAGLE TP C8L17	PEGMATITE	COLUMBITE PYROCHLORE SAMARSKITE
56	31F12	45 35	77 53	ONT	NIPISSING DISTRICT	DICKENS TP C5L27	PEGMATITE	ELLSWORTHITE EUXENITE PYROCHLORE MICROLITE
57	31E 1	45 03 00	78 32 00	ONT	HASTINGS COUNTY	FARADAY TP C16L31	PEGMATITE	ELLSWORTHITE MICROLITE
58		45 01 30	78 23 30	ONT	HASTINGS COUNTY	FARADAY TP C10L12-3	PEGMATITE	PYROCHLORE
59	31C13	44 57 30	78 22 30	ONT	HASTINGS COUNTY	FARADAY TP C3L14	PEGMATITE	PYROCHLORE
60	31C14	45 02 40	78 23 20	ONT	HASTINGS COUNTY	FARADAY TP C12L9-11 C11L4-11 C13L10-11 C9L10	PEGMATITE	PYROCHLORE FERGUSONITE
61	31C04	45 02 20	78 58 30	ONT	HASTINGS COUNTY	FARADAY TP CAL21-24 C8L23	PEGMATITE	PYROCHLORE MICROLITE ELLSWORTHITE
62	31F 4	45 02 00	78 23 00	ONT	HASTINGS COUNTY	FARADAY TP C15L6	VEIN	BETAFITE
63	31F 3	45 00 30	77 01 54	ONT	FRONTENAC COUNTY	MILLER TP L15SWR	PEGMATITE	PYROCHLORE
64	31E12	45 43 30	79 30 45	ONT	PARRY SOUND DISTRICT	CHAPMAN TP C8L3	PEGMATITE	PYROCHLORE PYROCHLORE MICROLITE
65	31E11	45 41 45	79 05 45	ONT	NIPISSING DISTRICT	BUTT TP C9L5	PEGMATITE	PYROCHLORE PYROCHLORE FERGUSONITE ESCHYNITE
66	31E06	45 22 30	79 15 00	ONT	MUSKOKA DISTRICT	CHAFFEY TP C5L23	PEGMATITE	PYROCHLORE MICROLITE

NUMBER	OTHER MINERALS	WALL-ROCKS		REFERENCES
45	BERYL AMBLYGONITE LEPIDOLITE	PEGMATITE		1907 FARIBAULT PP. 81-82 1923 WALKER PARSONS P. 35 1932 ELLSWORTH P. 257
46	FELDSPAR AEGIRINE	PEGMATITE		1961 PARSONS P. 50 1971 FERGUSON P. 52
47	-	GRANITE PEGMATITE		1952 LANG P. 146 1958 ROWE P. 93
48	URANINITE URANOTHORITE	SYENITE PEGMATITE GNEISS GRANITE PEGMATITE		1955 SATTERLY AND HEWITT PP. 33-34 1967 HEWITT P. 54 1956 SATTERLY P. 62 1961 HOGARTH P. 615 1962 LANG ET AL P. 263
49	URANINITE URANOTHORITE ALLANITE	GRANITE GRANITE PEGMATITE GNEISS AMPHIBOLITE	SYENITE GNEISS	1956 SATTERLY P. 30-36 1962 LANG P. 188,180 1967 HEWITT P. 54 1971 FERGUSON P. 46
50	ALLANITE URANOTHORITE ALLANITE	SYENITE PEGMATITE VEIN		1938 SPENCE AND CARNOCHAN PP. 74-73 1952 LANG PP. 142-45 1956 SATTERLY P. 56-57
51		CARBONATITE		1927 ELLSWORTH P. 48 1932 ELLSWORTH P. 227
52	URANINITE URANOTHORITE	GRANITE PEGMATITE METASEDIMENT AMPHIBOLITE		1952 LANG P. 138 1970 TRAILL P. 444 1956 SATTERLY PP. 41-42 1971 FERGUSON P. 46 1958 ROWE P. 92 1967 HEWITT P. 64
53	FELDSPAR SPHENE FLUORITE	GRANITE PEGMATITE PARAGNEISS MARBLE AMPHIBOLITE	PYROXENITE	1954 HEWITT P. 48 1967 HEWITT P. 64 1971 FERGUSON P. 47
54	ALLANITE URANOTHORITE	GRANITE PEGMATITE METASEDIMENT SYENITE GNEISS GRANITE GNEISS		1922 WALKER AND PARSONS P. 13 1956 SATTERLY PP. 138-140 1938 SPENCE P. 443 1958 ROWE P. 95 1932 ELLSWORTH PP. 208-209 1967 HEWITT P. 55 1955 SATTERLY AND HEWITT PP. 56-57 1971 FERGUSON P. 48
55	FELDSPAR URANOTHORITE	GRANITE PEGMATITE LEUCOGRANITE GRANITE GNEISS		1923 WALKER AND PARSONS P. 35 1970 TRAILL P. 161,446,478 1932 ELLSWORTH P. 208-213 1971 FERGUSON P. 48 1954 HEWITT P. 50-51 1958 ROWE P. 95
56	MONAZITE	GRANITE PEGMATITE		1944 SATTERLY P. 122 1971 FERGUSON P. 45 1952 LANG P. 142 1958 ROWE P. 93 1970 TRAILL P. 206,447
57		GRANITE PEGMATITE		1952 LANG P. 142 1958 ROWE P. 93
58	URANINITE URANOTHORITE	GRANITE PEGMATITE MARBLE PEGMATITIC GNEISS AMPHIBOLITE		1956 SATTERLY PP. 121-122 1960 ROSE P. 37
59		SYENITE PEGMATITE		
60	URANINITE URANOTHORITE ALLANITE	GRANITE METAGABBRO AMPHIBOLITE PEGMATITIC GNEISS	MARBLE	1956 SATTERLY P. 117-121 1971 FERGUSON P. 47 1962 LANG P. 262 1967 HEWITT P. 64 1970 TRAILL P. 209, 443
61	URANOTHORITE	SYENITE PEGMATITE MARBLE NEPHELINE SYENITE GNEISS		1955 SATTERLY AND HEWITT P. 49 1971 FERGUSON P. 47 1956 SATTERLY PP. 107-108 1967 HEWITT P. 54 1970 TRAILL P. 443
62		PEGMATITE HORNBLENDE GNEISS		1956 SATTERLY P. 170 1970 TRAILL P. 447 1971 FERGUSON P. 47
63		PEGMATITE GRANITE		1956 SATTERLY P. 20 1967 SATTERLY P. 64 1970 TRAILL P. 445 1971 FERGUSON P. 45
64		GRANITE PEGMATITE		1958 ROWE P. 92 1971 FERGUSON P. 50 1962 LANG ETAL P. 256 1967 HEWITT P. 68 1970 TRAILL P. 445
65	PYRRHOTITE	GRANITE PEGMATITE		1958 ROWE P. 91
66		GRANITE PEGMATITE		1967 HEWITT P. 65 1970 TRAILL P. 445 1971 FERGUSON P. 48

NUMBER	N.T.S. BLOCK	LATITUDE	LONGITUDE	PROVINCE	COUNTY OR DISTRICT	TOWNSHIP OR PARISH	TYPE OF DEPOSIT	NB-TA MINERALS
67	31E 1	45 03 20	78 04 00	ONT	HASTINGS COUNTY	HERSCHEL TP C8L39-40	PEGMATITE	BETAFITE PYROCHLORE MICROLITE EUXENITE
68	31E 1	45 06 00	78 01 00	ONT	HASTINGS COUNTY	HERSCHEL TP C1L30	PEGMATITE	PYROCHLORE MICROLITE
69	31D16	44 56 20	78 15 00	ONT	HALIBURTON COUNTY	MONMOUTH TP C8L19-20 C8L20	PEGMATITE	FERGUSONITE ALLANITE
70	31D16	44 57 00	78 19 00	ONT	HALIBURTON COUNTY	MONMOUTH TP C8L5-8 C9L5-9	PODS	PYROCHLORE MICROLITE BETAFITE
71	31C14	44 57 20	78 15 00	ONT	HALIBURTON COUNTY	MONMOUTH TP C8L20	PEGMATITE	FERGUSONITE
72	31D 9	44 44 15	78 21 15	ONT	PETERBOROUGH COUNTY	CAVENDISH TP C5L14 C6L13	PEGMATITE	BETAFITE
73	42N02	51 06	84 52 30	ONT	COCHRANE DISTRICT	ALBANY FORKS	STRATIFORM	PYROCHLORE
74	41I 7	46 23 45	80 51 00	ONT	SUDBURY DISTRICT	DILL TP C3L4	PEGMATITE	TOCOITE PYROCHLORE
75	41I 7	46 22 45	80 49 45	ONT	SUDBURY DISTRICT	DILL TP C2L2	PEGMATITE	PYROCHLORE BETAFITE EUXENITE ELLSWORTHITE
76	31L 7	46 14 00	78 53 30	ONT	NIPISSING DISTRICT	CALVIN TP C2L15-17	PEGMATITE	PYROCHLORE EUXENITE
77	31L 5	46 15	79 30	ONT	NIPISSING DISTRICT		IRREGULAR	PYROCHLORE
78	42O 9	49 08	85 48	ONT	THUNDER BAY DISTRICT	MANITOUWADGE AREA	IRREGULAR	
79	31E 4	45 24 30	79 51 30	ONT	PARRY SOUND DISTRICT	CONGER TP C10L7	PEGMATITE	EUXENITE COLUMBITE SAMARSKITE
80	31F 6	45 20 15	77 56 45	ONT	RENFREW COUNTY	LYNDOCH TP C15L23	PEGMATITE	EUXENITE COLUMBITE LINDOCITE SAMARSKITE
81	31F 6	45 19 45	77 55 45	ONT	RENFREW COUNTY	LYNDOCH TP C15L30	PEGMATITE	COLUMBITE FERGUSONITE EUXENITE
82	42G16	49 48 30	82 06	ONT	COCHRANE DISTRICT	CLAY TP NW4	IRREGULAR	
83	52F15	46 30	80 45	ONT	SUDBURY DISTRICT	DRYDEN TP	PEGMATITE	COLUMBITE
84							PEGMATITE	ESCHYNITE EUXENITE
85	31O 9	44 42 20	78 23 30	ONT	PETERBOROUGH COUNTY	CAVENDISH TP C3L3	PEGMATITE	FERGUSONITE
86	31L 7	46 13 45	78 51 45	ONT	NIPISSING DISTRICT	CALVIN TP C1L11-12	PEGMATITE	FERGUSONITE
87	31E 9	45 31 30	78 00 30	ONT	NIPISSING DISTRICT	MURCHISON TPC4L14-15	PEGMATITE	
88	31E 4	45 13 45	79 52 00	ONT	PARRY SOUND DISTRICT	CONGER TP C9 L9-10	PEGMATITE	SAMARSKITE

NUMBER	OTHER MINERALS	WALL-ROCKS	REFERENCES
67	URANOTHORITE ALLANITE	GRANITE PEGMATITE LEUCOGRANITE GRANITE GNEISS	1956 SATTERLY P. 135 1958 ROWE P. 93 1967 HEWITT P. 54 1970 TRAILL P. 47 1971 FERGUSON P. 47
68		PEGMATITE	1952 LANG P. 137 1958 ROWE P. 93 1970 TRAILL P. 445 1971 FERGUSON P. 47
69	URANOTHORITE URANINITE URANOPHANE	GRANITE PEGMATITE AMPHIBOLITE MARBLE METAGABBRO	1956 SATTERLY P. 96-99 1959 ROSE P. 39 1962 LANG P. 271 1967 HEWITT P. 54
70		MARBLE QUARTZITE PARAGNEISS	1956 SATTERLY P. 20 1962 LANG P. 270
71	URANOTHORITE URANINITE CRYTOLITE	GRANITE PEGMATITE MARBLE GRANITE AMPHIBOLITE QUARTZITE	1956 SATTERLY P. 92-96
72	URANOTHORITE URANOTHORITE ALLANITE	PEGMATITE MARBLE GABBRO	1956 SATTERLY P. 20 1962 LANG P. 255 1970 TRAILL P. 443 1971 FERGUSON P. 50
73	MAGNETITE	CARBONATITE	1971 FERGUSON P. 45
74	FELDSPAR GARNET	GRANITE PEGMATITE	1932 ELLSWORTH P. 171 1952 LANG P. 142 1958 ROWE P. 93 1970 TRAILL P. 161 1971 FERGUSON P. 52
75	FELDSPAR ALLANITE	GRANITE PEGMATITE	1958 ROWE P. 93 1962 LANG ET AL P. 258 1967 HEWITT P. 65 1971 FERGUSON P. 52
76		PEGMATITE	1962 HEINRICH P. 314 1970 TRAILL P. 447 1971 FERGUSON P. 49
77	URANINITE	SYENITE PYROXENITE FENITE CARBONATITE	1954 ROWE P. 5-7 1971 FERGUSON PP. 37-39 1971 LUMBERS PP.51-52,81-83
78			
79	MONAZITE	GRANITE PEGMATITE	1932 ELLSWORTH P. 187 1942 SATTERLY P. 57 1952 LANG P. 141 1958 ROWE P. 93 1960 ROSE P. 22 1967 HEWITT P. 54 1970 TRAILL P. 161 1971 FERGUSON P. 50
80	MONAZITE	GRANITE PEGMATITE GRANITE GNEISS	1915 JOHNSTON P. 196 1953 HEWITT P. 36-42 1958 ROWE P. 95 1959 ROSE P. 38 1967 HEWITT P. 65 1970 TRAILL P. 205 1971 FERGUSON P. 51
81	BERYL MICROCLINE ALBITITE	GRANITE PEGMATITE	1944 SATTERLY PP. 97-99 1953 HEWITT P. 42-46 1958 ROWE P. 94 1967 HEWITT P. 65 1970 TRAILL P. 161 1971 FERGUSON P. 51
82	MAGNETITE GARNET	CARBONATITE SYENITE GNEISS	1967 GITTINS P. 653 1971 FERGUSON PP. 32-33
83		PEGMATITE	
84		GRANITE PEGMATITE	1960 ROSE P. 18 1967 HEWITT P. 65 1970 TRAILL P. 203,207 1971 FERGUSON P. 51
85	MAGNETITE URANOTHORITE	GRANITE PEGMATITE GRANITE SYENITE	1956 SATTERLY P. 23 1962 LANG ET AL P. 255 1967 HEWITT P. 55 1970 TRAILL P. 209 1971 FERGUSON P. 51
86		GRANITE PEGMATITE	1952 LANG P. 138 1958 ROWE P. 91 1970 TRAILL P. 209 1971 FERGUSON P. 49
87		PEGMATITE	1944 SATTERLY P. 120 1952 LANG P. 147 1970 TRAILL P. 209 1971 FERGUSON P. 49
88	URANINITE THUCOLITE CRYTOLITE	PEGMATITE	1942 SATTERLY P. 57 1952 LANG P. 141 1958 ROWE P. 92 1960 ROSE P. 35 1962 LANG ET AL P. 256 1967 HEWITT P. 55 1970 TRAILL P. 478 1971 FERGUSON P. 50

NUMBER	N.T.S. BLOCK	LATITUDE	LONGITUDE	PROVINCE	COUNTY OR DISTRICT	TOWNSHIP OR PARISH	TYPE OF DEPOSIT	NB-TA MINERALS
89				ONT	NIPISSING DISTRICT	MATTAWAN TP C9 L19-20	PEGMATITE	EUXENITE PYROCHLORE
90	31C16	44 55	78 18 30	ONT	HALIBURTON COUNTY	MONMOUTH TP C9 L7N2	VEIN	PYROCHLORE
91	31L 7	46 17 30	78 57 00	ONT	NIPISSING DISTRICT	CALVIN TP C8L21-22	PEGMATITE	COLUMBITE EUXENITE SAMARSKITE
92	31D16	44 56 00	78 14 35	ONT	HALIBURTON COUNTY	MONMOUTH TP C5-6L18-20	PEGMATITE	FERGUSONITE
93	31E 1	45 20 20	78 10 12	ONT	HALIBURTON COUNTY	CARDIFF TP C21 L5	VEIN	BETAFITE EUXENITE
94	31D16	44 06 40	78 10 30	ONT	HALIBURTON COUNTY	CARDIFF TP C18L4-5	IRREGULAR	PYROCHLORE
95	31C15	44 47 40	76 31 20	ONT	LANARK COUNTY	S SHERBROOKE TPC5L13 C6	PEGMATITE	EUXENITE
96	41I 2	46 15 30	80 44 30	ONT	SUDBURY DISTRICT	SERVOS TP C6L6	PEGMATITE	EUXENITE ESCHYNITE
97	31E 1	45 02 50	78 31 20	ONT	HASTINGS COUNTY	FARADAY TP C15L30-31	PEGMATITE	BETAFITE PYROCHLORE EUXENITE ELLSWORTHITE
98	31E 8	44 59 00	78 03 00	ONT	NIPISSING DISTRICT	SABINE TP C1L28-29	PEGMATITE	ESCHYNITE EUXENITE
99	31E 8	44 49 20	78 10 40	ONT	NIPISSING DISTRICT	SABINE TP C1L2,8	PEGMATITE	ESCHYNITE
100	31F11	45 45 15	77 29 45	ONT	RENFREW COUNTY	RICHARDS TP C14L2	PEGMATITE	FERGUSONITE ESCHYNITE
101	31F 5	45 15	77 30	ONT	RENFREW COUNTY	RAGLAN TPC18L3-4	PEGMATITE	EUXENITE
102	31C15	44 42 20	76 43 20	ONT	FRONTENAC COUNTY	OLDEN TP C7L8	IRREGULAR	EUXENITE
103	31C15	44 45 30	76 20 00	ONT	LANARK COUNTY	NORTH BURGESS C6L23	PEGMATITE	PYROCHLORE EUXENITE
104	31E 9	45 31 30	78 00 30	ONT	NIPISSING DISTRICT	MURCHISON TP C4L15 C4L14	PEGMATITE	FERGUSONITE
105	31D16	44 50	78 07 30	ONT	HALIBURTON COUNTY	CARDIFF TP C12-13L10	VEIN	ELLSWORTHITE
106	31E 9	45 32 30	78 04 00	ONT	NIPISSING DISTRICT	MURCHISON TP C8L22	PEGMATITE	EUXENITE
107	31F 4	45 10 20	77 58 00	ONT	HASTINGS COUNTY	MONTEAGLE TP C7 L14	PEGMATITE	PYROCHLORE EUXENITE
108	31F09	45 09 00	77 46 30	ONT	HASTINGS COUNTY	MONTEAGLE TP C4L1112	PEGMATITE	ELLSWORTHITE
109	31D16	44 59 35	78 18 20	ONT	HALIBURTON COUNTY	MONMOUTH TP C3L3-5 C4L2-4,5	PEGMATITE	EUXENITE
110	31L 7	46 19 15	78 47 15	ONT	NIPISSING DISTRICT	MATTAWAN TP C3 L29	PEGMATITE	EUXENITE

NUMBER	OTHER MINERALS	WALL-ROCKS		REFERENCES
89	BERYL	GRANITE PEGMATITE		1899 BARLOW 1932 ELLSWORTH PP. 189-191 1968 MULLIGAN P. 86
90				1970 TRAILL P. 444 1971 FERGUSON P. 47
91	ALLANITE	GRANITE PEGMATITE		1932 SPENCE P. 51 1952 LANG P. 147 1960 ROSE P. 21 1967 HEWITT P. 68
92	URANINITE URANOPHANE URANOTHORITE	GRANITE PEGMATITE MARBLE		1970 TRAILL P. 209 1971 FERGUSON P. 46
93	URANINITE			1970 TRAILL P. 444 1971 FERGUSON P. 46
94				1970 TRAILL P. 444 1971 FERGUSON P. 46
95	FELDSPAR TOURMALINE	GRANITE PEGMATITE GABBRO GRANITE		1952 LANG P. 146 1958 ROWE P. 96 1960 ROSE P. 26 1967 HEWITT P. 65
96		GRANITE PEGMATITE		1952 LANG P. 149 1958 ROWE P. 96 1962 LANG ET AL P. 277 1967 HEWITT P. 65
97	APATITE PYRITE	MARBLE GNEISS GRANITE PEGMATITE		1943 THOMPSON P. 59 1956 SATTERLY PP. 123-132 1957 JONES P. 24 1958 ROWE P. 93 1961 HOGARTH P. 615 1962 LANG P. 260 1970 TRAILL P. 444 1971 FERGUSON P. 47
98	FELDSPAR	GRANITE PEGMATITE		1932 SATTERLY P. 53 1952 LANG P. 149 1958 ROWE P. 96 1962 LANG ET AL P. 277 1967 HEWITT P. 65 1970 TRAILL P. 205 1971 FERGUSON P. 50
99		GRANITE PEGMATITE		1958 ROWE P. 96 1971 FERGUSON P. 50
100	URANINITE			1958 ROWE P. 96 1959 ROSE P. 39 1971 FERGUSON P. 52
101	CORUNDUM ALLANITE URANINITE	SYENITE PEGMATITE MARBLE		1952 LANG P. 141 1953 HEWITT PP. 56-59 1958 ROWE P. 95 1959 ROSE P. 39 1962 LANG P. 277 1967 HEWITT P. 55 1971 FERGUSON P.51
102		BASALT MARBLE		1958 ROWE P. 95 1971 FERGUSON P. 45
103		GRANITE PEGMATITE MARBLE		1932 ELLSWORTH P. 262 1952 LANG P. 146 1958 ROWE P. 95 1970 TRAILL PP. 204-205 1971 FERGUSON P. 48
104	FELDSPAR ALLANITE	GRANITE PEGMATITE		1944 SATTERLY P. 120 1952 LANG P. 147 1958 ROWE P. 95 1962 LANG ET AL P. 274 1967 HEWITT P. 65
105	BIOTITE APATITE			1970 TRAILL P. 443 1971 FERGUSON P. 46
106	FELDSPAR ALLANITE	GRANITE PEGMATITE		1944 SATTERLY P. 121 1952 LANG P. 138 1958 ROWE P. 95 1962 LANG ET AL P. 275 1967 HEWITT P. 65 1971 FERGUSON P. 49
107	FELDSPAR	GRANITE PEGMATITE PARAGNEISS AMPHIBOLITE LIMESTONE	BRECCIA	1952 LANG P. 145 1954 HEWITT P. 48-49,69 1958 ROWE P. 95 1970 TRAILL P. 205,446 1971 FERGUSON P. 48
108	URANOTHORITE THORITE	GRANITE PEGMATITE PARAGNEISS AMPHIBOLITE PYROXENITE	GRANITE	1954 HEWITT P. 70 1956 SATTERLY P. 140-141 1962 LANG ET AL P. 272 1967 HEWITT P. 64 1971 FERGUSON P. 47
109	URANOTHORITE URANOPHANE ALLANITE	GRANITE PEGMATITE MARBLE		1956 SATTERLY PP. 88-89 1958 ROWE P. 95 1962 LANG P. 270 1971 FERGUSON P. 46
110		GRANITE PEGMATITE SYENITE GNEISS		1932 ELLSWORTH PP. 189-191 1952 LANG P. 148 1958 ROWE P. 94 1962 LANG ET AL P. 268 1967 HEWITT P. 65 1970 TRAILL P. 206 1971 FERGUSON P. 49

NUMBER	N.T.S. BLOCK	LATITUDE	LONGITUDE	PROVINCE	COUNTY OR DISTRICT	TOWNSHIP OR PARISH	TYPE OF DEPOSIT	NB-TA MINERALS
111	31L 7	46 18 52	78 47 15	ONT	NIPISSING DISTRICT	MATTAWAN TP C2 L29	PEGMATITE	EUXENITE
112	42A15	48 56	80 21	ONT	COCHRANE DISTRICT	MARATHON TP	IRREGULAR	PYROCHLORE
113	41N10	47 18	84 36	ONT	ALGOMA DISTRICT	TP 28 R12	PEGMATITE	PYROCHLORE ELLSWORTHITE
114	31F 6	45 20 00	77 24 00	ONT	RENFREW COUNTY	LYNDOCH TP C15L25	PEGMATITE	COLUMBITE EUXENITE LINDOCCITE
115	31C 7	44 26	76 32	ONT	FRONTENAC COUNTY	LOUGHBOROUGH TPC9L11	PEGMATITE	EUXENITE
116	31E 1	45 11 30	78 01 30	ONT	HASTINGS COUNTY	HERSCHEL TP C16L1718	PEGMATITE	ESCHYNITE EUXENITE
117	31E 1	45 09	77 59	ONT	HASTINGS COUNTY	HERSCHEL TP C1 L32-33		
118	31H05	45 48	80 35	ONT	PARRY SOUND DISTRICT	HENVEY TP CAL4	PEGMATITE	EUXENITE
119	41H15	45 48	80 35	ONT	PARRY SOUND DISTRICT	HENVEY TP C8L5	PEGMATITE	FERGUSONITE EUXENITE
120	31D10	44 40 20	78 26 30	ONT	PETERBOROUGH COUNTY	GALWAY TP C8 L26	IRREGULAR	PYROCHLORE
121	52C16	48 59	92 29	ONT	RAINY RIVER DISTRICT	ELI LAKE		BETAFITE
122	31F12	45 33 40	77 47 30	ONT	NIPISSING DISTRICT	DICKENS TP C2L2	PEGMATITE	EUXENITE
123	31F12	45 39 00	77 52 30	ONT	NIPISSING DISTRICT	DICKENS TP C13L9	PEGMATITE	PYROCHLORE EUXENITE SAMARSKITE
124	31D16	44 46 00	78 22 00	ONT	PETERBOROUGH COUNTY	CAVENDISH TP C8-9L15	IRREGULAR	FERGUSONITE
125	41P13	47 49	81 50	ONT	SUDBURY DISTRICT	CARTER TP MI98 CNR	PEGMATITE	EUXENITE
126	31E01	45 00 05	78 07 30	ONT	HALIBURTON COUNTY	CARDIFF TP C14L11S2	PEGMATITE	ELLSWORTHITE
127	31D16	44 59 15	78 03 00	ONT	HALIBURTON COUNTY	CARDIFF TP C9-13 L23-30	PEGMATITE	PYROCHLORE
128	31D16	44 59 02	78 06 03	ONT	HALIBURTON COUNTY	CARDIFF TP C8L12-14	PEGMATITE	HATCHETTOLITE PYROCHLORE
129	31L 7	46	78	ONT	NIPISSING DISTRICT	CALVIN TP C9L19-22	PEGMATITE	COLUMBITE EUXENITE
130	31L 7	46 14 45	78 56 30	ONT	NIPISSING DISTRICT	CALVIN TP C4 L22	PEGMATITE	EUXENITE SAMARSKITE
131	31E09	45 32 00	78 02 30	ONT	NIPISSING DISTRICT	MURCHISON TP C6L17	PEGMATITE	FERGUSONITE
132	31E11	45 43	79	ONT	NIPISSING DISTRICT	BUTT TP C9L5	PEGMATITE	PYROCHLORE FERGUSONITE ESCHYNITE

NUMBER	OTHER MINERALS	WALL-ROCKS	REFERENCES
111		GRANITE PEGMATITE	1952 LANG P. 147 1958 ROWE P. 94 1962 LANG ET AL P. 268 1967 HEWITT P. 65 1971 FERGUSON P. 45
112		SYENITE NEPHELINE SYENITE	1958 ROWE P. 96
113	ALLANITE	GRANITE PEGMATITE DIABASE	1952 LANG P. 130 1958 ROWE P. 96 1970 TRAILL P. 447 1971 FERGUSON P. 45
114	ALLANITE BERYL MONAZITE	GRANITE PEGMATITE MARBLE	1952 LANG P. 146 1953 HEWITT PP. 83-84 1958 ROWE P. 94 1971 FERGUSON P. 51
115	FELDSPAR GADOLINITE ALLANITE	GRANITE PEGMATITE MARBLE	1932 SPENCE P. 35 1952 LANG P. 146 1958 ROWE P. 94 1960 ROSE P. 4 1970 TRAILL P. 204 1971 FERGUSON P. 45
116		GRANITE PEGMATITE GRANITE GNEISS AMPHIBOLITE	1956 SATTERLY P. 134 1958 ROWE P. 93 1967 HEWITT P. 64 1970 TRAILL P. 205 1971 FERGUSON P. 47
117			1952 LANG P. 142 1958 ROWE P. 93
118	FELDSPAR THUCOLITE URANINITE	GRANITE PEGMATITE	1932 ELLSWORTH P. 173 1952 LANG P. 136 1958 ROWE P. 93
119	THUCOLITE URANINITE ALLANITE	GRANITE PEGMATITE	1932 ELLSWORTH P. 171-173 1952 LANG P. 137 1958 ROWE P. 93
120		MARBLE	1958 ROWE P. 93
121			1958 ROWE P. 96
122	FELDSPAR	GRANITE PEGMATITE	1952 LANG P. 142 1958 ROWE P. 93
123	FELDSPAR MONAZITE	GRANITE PEGMATITE	1932 ELLSWORTHITE PP. 192-194 1952 LANG P. 142 1958 ROWE P. 93 1971 FERGUSON P. 49
124		GRANITE	1956 SATTERLY P. 41 1958 ROWE P. 92
125		GRANITE PEGMATITE	1952 LANG P. 150 1968 MULLIGAN P. 79 1971 FERGUSON P. 52
126	URANINITE URANOTHORITE ALLANITE	GRANITE PEGMATITE GRANITE GNEISS SYENITE	1956 SATTERLY P. 67 1962 LANG P 253
127		PEGMATITE	1956 SATTERLY AND HEWITT P. 21
128	URANINITE URANOTHORITE ALLANITE	GRANITE PEGMATITE AMPHIBOLITE GRANULITE GNEISS	1956 SATTERLY PP. 43-45 1958 ROWE P. 92 1962 LANG P. 259 1967 HEWITT P. 54 1971 FERGUSON P. 45
129	ALLANITE FELDSPAR	GRANITE PEGMATITE	1932 ELLSWORTH P. 169 1952 LANG P. 147 1958 ROWE P. 91 1960 ROSE PP. 21-22 1970 TRAILL P. 206 1971 FERGUSON P. 49
130	ALLANITE	GRANITE PEGMATITE	1952 LANG P. 147 1958 ROWE P. 92 1962 LANG ET AL P. 251 1967 HEWITT P. 65 1971 FERGUSON P. 49
131	ALLANITE	GRANITE PEGMATITE GRANITE	1967 HEWITT P. 65
132		GRANITE PEGMATITE	1958 ROWE P. 91 1970 TRAILL P. 445 1971 FERGUSON P. 49

NUMBER	N.T.S. BLOCK	LATITUDE	LONGITUDE	PROVINCE	COUNTY OR DISTRICT	TOWNSHIP OR PARISH	TYPE OF DEPOSIT	NB-TA MINERALS
133	31C15	44 56 30	76 23 20	ONT	LANARK COUNTY	BATHURST TP C9L22	PEGMATITE	EUXENITE FERGUSONITE
134	41P09	41 33	80 04	ONT	TIMISKAMING DISTRICT	AULD TP C4 SE4 S2L5	PEGMATITE	FERGUSONITE
135	31F14	45 48 45	77 16 30	ONT	RENFREW COUNTY	ALICE TP C15L13	PEGMATITE	EUXENITE
136	42B03	48 03 00	83 06 00	ONT	SUDBURY DISTRICT	CHEWETT TP C6 L8 COLLINS TP C1 L9-10	IRREGULAR	PYROCHLORE
137	41O14	47 48	83 06	ONT	SUDBURY DISTRICT	MCNAUGHT TP C2-3L1 LACKNER TP C2-3L12	IRREGULAR	PYROCHLORE
138	41O14	47 48	83 03	ONT	SUDBURY DISTRICT	LACKNER TP	IRREGULAR	PYROCHLORE
139	41O14	47 48	83 03	ONT	SUDBURY DISTRICT	LACKNER TP	IRREGULAR	
140	41O14	47 48	83 03	ONT	SUDBURY DISTRICT	LACKNER TP	IRREGULAR	
141	41O14	47 48	83 03	ONT	SUDBURY DISTRICT	LACKNER TP	IRREGULAR	
142	41O14	47 58	83 11	ONT	SUDBURY DISTRICT	MCGEE TP C3L2	IRREGULAR	PYROCHLORE
143	41O 3	47 01 00	83 16 00	ONT	ALGOMA DISTRICT	TP 5E R12	IRREGULAR	PYROCHLORE
144	41O11	47 43	83 18	ONT	ALGOMA DISTRICT	TP 28-29 R 23	IRREGULAR	PYROCHLORE
145	42I15	50 52	80 37	ONT	COCHRANE DISTRICT	SOUTH BLUFF CR AREA	POOS	PYROCHLORE COLUMBITE
146	41O14	47 50 00	83 03 00	ONT	SUDBURY DISTRICT	LACKNER TP	IRREGULAR	
147	41O14	47 48	83 03	ONT	SUDBURY DISTRICT	MCNAUGHT TP C1-3L1-6	IRREGULAR	PYROCHLORE
148	41O14	47 48	83 03	ONT	SUDBURY DISTRICT	MCNAUGHT TP SE	IRREGULAR	
149	53A	52 30 40	89 30 40	ONT	KENORA DISTRICT	SCHRYBURT LAKE	IRREGULAR	PYROCHLORE
150	41G 3	47 01	83 17	ONT	ALGOMA DISTRICT	TP 5G R 12	IRREGULAR	PYROCHLORE
151	52M 2	51 03	94 32	ONT	KENORA DISTRICT	PRAIRIE LAKE	IRREGULAR	PYROCHLORE
152	41N15	47 55 00	84 42 00	ONT	ALGOMA DISTRICT	TP 29 R22	IRREGULAR	PYROCHLORE
153	31E01	45 10 06	78 05 30	ONT	HASTINGS COUNTY	HERSCHEL TP C16 L31	PEGMATITE	PYROCHLORE
154	42I 6	50 24	81 02	ONT	COCHRANE DISTRICT	JAMES BAY S	IRREGULAR	PYROCHLORE

NUMBER	OTHER MINERALS	WALL-ROCKS		REFERENCES
133	CRYTOLITE	GRANITE PEGMATITE GRANITE		1952 LANG P. 137 1958 ROWE P. 91 1960 ROSE P. 20-21 1962 LANG P. 248 1967 HEWITT P. 65 1970 TRAILL P. 205 1971 FERGUSON P. 48
134		APLITE		1958 ROWE P. 91 1971 FERGUSON P. 53
135		GRANITE PEGMATITE		1952 LANG P. 136 1958 ROWE P. 91 1962 LANG ET AL P. 130 1967 HEWITT P. 65 1970 TRAILL P. 206 1971 FERGUSON P. 51
136	AEGIRINE MAGNETITE APATITE	FENITE CARBONATITE		1961 PARSONS P. 46-50 1967 GITTINS ET AL P. 653 1971 FERGUSON PP. 41-42
137	APATITE MAGNETITE COLUMBITE	IJOLITE MALIGNITE CARBONATITE GRANITE GNEISS	NEPHELINE SYENITE	1958 ROWE PP. 35-45 1961 PARSONS P. 61-68 1961 HODDER P. 65-67 1971 FERGUSON PP. 39-41
138	APATITE MAGNETITE	SYENITE CARBONATITE		1961 PARSONS P. 61 1971 FERGUSON P. 52
139	APATITE MAGNETITE	NEPHELINE SYENITE CARBONATITE		1961 PARSONS P. 60
140		CARBONATITE		1961 PARSONS P. 60 1971 FERGUSON P. 52
141		CARBONATITE		1961 PARSONS P. 60 1971 FERGUSON P. 52
142		FENITE GRANITE PEGMATITE		1961 PARSONS P. 50
143	MAGNETITE	IJOLITE SYENITE CARBONATITE FENITE		1961 PARSONS P. 11-22 1971 FERGUSON PP. 31-32
144	HEMATITE MAGNETITE	CARBONATITE FENITE VOLCANICS GRANITE	SYENITE	1961 PARSONS P. 23-32 1971 FERGUSON PP. 30-31
145	APATITE	CARBONATITE PYROXENITE HORNBLENDITE		1967 GEORGE ET AL P. 135 1967 GITTINS ET AL PP. 651-655 1970 STOCKFORD PP. 1-34 1971 FERGUSON PP. 33-35
146		IJOLITE GRANITE PEGMATITE GNEISS		1961 PARSONS PP. 68-69 1971 FERGUSON P. 52
147	MAGNETITE	NEPHELINE SYENITE CARBONATITE		1961 PARSONS P. 68 1971 FERGUSON P. 52
148		GNEISS DIABASE CARBONATITE		1961 PARSONS P. 68
149	APATITE MAGNETITE	CARBONATITE NEPHELINE SYENITE BRECCIA		1963 JENESS PP. 43-44 1966 HEINRICH P. 398 1967 GITTINS ET AL PP. 651-655 1971 FERGUSON P. 48
150		SOVITE BRECCIA LAMPROPHYRE IJOLITE	PYROXENITE	1967 GITTINS ET AL PP. 651-655
151	MAGNETITE BIOTITE	IJOLITE FENITE GNEISS JUVITE	CARBONATITE	1967 GITTINS ET AL PP. 651-655
152	MAGNETITE PYRRHOTITE AEGIRINE	FENITE CARBONATITE SOVITE		1967 GITTINS ET AL PP. 651-655
153		GRANITE PEGMATITE		1971 FERGUSON P. 47
154		CARBONATITE		1967 GEORGE ETAL P. 135 1967 GITTINS ET AL PP. 651-655

NUMBER	N.T.S. BLOCK	LATITUDE	LONGITUDE	PROVINCE	COUNTY OR DISTRICT	TOWNSHIP OR PARISH	TYPE OF DEPOSIT	NB-TA MINERALS
155	41I12	46 35	81 44	ONT	SUDBURY DISTRICT	TP 107	IRREGULAR	PYROCHLORE
156	42G 2	49 18 00	82 50 00	ONT	COCHRANE DISTRICT	CARGILL TP	IRREGULAR	
157	42E16	49 54 30	86 12 00	ONT	THUNDER BAY DISTRICT	CHMEARA TP	IRREGULAR	PYROCHLORE
158	53A13	52 50 30	89 50 30	ONT	KENORA DISTRICT	BIG BEAVERHOUSE POST	IRREGULAR	PYROCHLORE
159	31E11	45 34	79 07	ONT	PARRY SOUND DISTRICT	BETHUNE TP	PEGMATITE	COLUMBITE
160	41I 9	46 03	80 18	ONT	SUDBURY DISTRICT	SCOLLARD TP		PYROCHLORE
161	31L 6	46 14	79 16	ONT	NIPISSING DISTRICT	E FERRIS N HIMSWORTH		COLUMBITE
162	41I 9	46 35	80 29	ONT	SUDBURY DISTRICT	LOUGHRIN TP	PEGMATITE	EUXENITE
163	42C02	48 00 00	84 36 42	ONT	ALGOMA DISTRICT			PYROCHLORE
164	42D05	49 24 00	87 50 30	ONT	THUNDER BAY DISTRICT	AULD TP	PEGMATITE	COLUMBITE
165	32D04	49 02 00	79 45 55	ONT	COCHRANE DIST	STEELE TP C5 L5	PEGMATITE	COLUMBITE
166	41P13	47 49	81 56	ONT	SUDBURY DISTRICT	WHALEN TP	PEGMATITE	COLUMBITE
167	42D 5	49 18 00	88 00 00	ONT	THUNDER BAY DISTRICT	BLAY LAKE	PEGMATITE	COLUMBITE
168	31F04	45 00	77 56	ONT	HASTINGS COUNTY	FARADAY TP CBL4N2	PEGMATITE	PYROCHLORE
169	31F04	45 02 40	78 32 10	ONT	HASTINGS COUNTY	FARADAY TP C16L31-32	PEGMATITE	PYROCHLORE
170	31F03	45 08 45	77 54 30	ONT	HASTINGS COUNTY	MONTEAGLE TR C6L24N2	PEGMATITE	ELLSWORTHITE
171	31F03	45 09 45	77 50 00	ONT	HASTINGS COUNTY	MONTEAGLE TP C7L21	PEGMATITE	ELLSWORTHITE
172	31E11	45 43	79 00	ONT	NIPISSING DISTRICT	BUTT TP C7L13 S2	PEGMATITE	EUXENITE COLUMBITE FERGUSONITE
173	31E11	45 28 15	78 45 00	ONT	NIPISSING DISTRICT	PECK TP C3-4L6	PEGMATITE	PYROCHLORE
174	31E08	44 58 30	78 05 30	ONT	NIPISSING DISTRICT	SAEINE TP C15L32S2	PEGMATITE	EUXENITE
175	31E04	45 12	79 52	ONT	PARRY SOUND DISTRICT	CONGER TP C9L10	PEGMATITE	CALCIOSAMARSKITE
176	31E13	45 16 00	79 53 45	ONT	PARRY SOUND DISTRICT	FOLEY TP C2L13	PEGMATITE	FERGUSONITE

NUMBE	OTHER MINERALS	WALL-ROCKS		REFERENCES
155		CARBONATITE		1967 GITTINS MACINTYRE AND YORK PP.6
156		CARBONATITE		1967 GITTINS ET AL PP. 651-655 1967 GEORGE ET AL P. 135
157	MAGNETITE APATITE CHALCOPYRITE	CARBONATITE ALKALINE SYENITE GNEISS BASALT		1967 GITTINS ET AL PP. 651-655 1971 FERGUSON PP. 42-43
158	APATITE PYRRHOTITE CHALCOPYRITE	CARBONATITE		1967 GITTINS ET AL PP. 651-655 1971 FERGUSON PP. 36-37
159		GRANITE PEGMATITE		
160				
161				
162		GRANITE PEGMATITE		1959 ROSE P. 39
163				
164	SPODUMENE	GRANITE PEGMATITE BICTITE SCHIST		1965 PYE P. 76-77 1965 MULLIGAN PP. 57-58 1971 FERGUSON P. 53
165	SPODUMENE POLLUCITE BERYL	GRANITE PEGMATITE METASEDIMENT		1962 LUMBERS P. 30 1967 HEWITT P. 68 1968 MULLIGAN P. 68 1971 FERGUSON P. 45
166		GRANITE PEGMATITE		1967 HEWITT P. 68. 1971 FERGUSON P. 53
167	SPODUMENE APATITE TOURMALINE	GRANITE PEGMATITE GRANITE BIOTITE SCHIST		1965 PYE P. 62-64 1965 MULLIGAN PP. 59-60 1971 FERGUSON P. 53
168		SYENITE PEGMATITE		1967 HEWITT P. 64 1971 FERGUSON P. 47
169	URANINITE URANOTHORITE	SYENITE PEGMATITE GRANITE AMPHIBOLITE MARBLE	SYENITE	1956 SATTERLY P. 122 1967 HEWITT P. 54
170	ALLANITE MAGNETITE FELDSPAR			1954 HEWITT P. 42 1967 HEWITT P. 64 1971 FERGUSON P. 47
171	FELDSPAR SPHENE MAGNETITE	GRANITE PEGMATITE AMPHIBOLITE		1954 HEWITT P. 47 1967 HEWITT P. 64 1971 FERGUSON P. 48
172	ALLANITE URANINITE MUSCOVITE	GRANITE PEGMATITE		1958 ROWE P. 91 1962 LANG P. 35 1971 FERGUSON P. 49
173		GRANITE PEGMATITE GRANITE		1958 ROWE P. 98 1971 FERGUSON P. 50
174		GRANITE PEGMATITE GRANITE		1967 HEWITT P. 65 1971 FERGUSON P. 50
175	ALLANITE URANINITE	GRANITE PEGMATITE		1962 LANG P. 256 1971 FERGUSON P. 50
176	ALLANITE	PEGMATITE		1959 ROSE P. 37

NUMBER	N.T.S. BLOCK	LATITUDE	LONGITUDE	PROVINCE	COUNTY OR DISTRICT	TOWNSHIP OR PARISH	TYPE OF DEPOSIT	NB-TA MINERALS
177	41H15	45 48	80 35	ONT	PARRY SOUND DISTRICT	HENVEY TP C1 L6	PEGMATITE	
178	41H15	45 48	80 35	ONT	PARRY SOUND DISTRICT	HENVEY TP	PEGMATITE	FERGUSONITE
179	31E 5	45 25	79 37	ONT	PARRY SOUND DISTRICT	MONTEITH TP	PEGMATITE	PYROCHLORE
180	31D16	44 51 15	78 34 30	ONT	PETERBOROUGH COUNTY	CHANDOS TPC16L9S2	PEGMATITE	
181	41I09	46 59 00	80 31 00	ONT	SUDBURY DISTRICT	HAGAR TP C3L10	PEGMATITE	
182	52H08	49 14 00	88 00 30	ONT	THUNDER BAY DISTRICT	COSGRAVE LAKE	PEGMATITE	COLUMBITE
183	52H08	49 23 00	87 16 30	ONT	THUNDER BAY DISTRICT	FORGAN LAKE	PEGMATITE	COLUMBITE
184	42I11	51 12 15	81 24 48	ONT	COCHRANE DISTRICT	VALENTINE TP	CARBONATITE	PYROCHLORE
185	31L07	46 15	78 45	ONT	NIPISSING DISTRICT	CALVIN TP	IRREGULAR	EUXENITE
186	31L 7	46 17 45	78 56 45	ONT	NIPISSING DISTRICT	CALVIN TP C10L19-21	PEGMATITE	EUXENITE COLUMBITE
187	21E09	45 33 20	78 03 30	ONT	NIPISSING DISTRICT	MURCHISON TP C11L17	PEGMATITE	FERGUSONITE
188	31L07	46 20 30	78 55 09	ONT	NIPISSING DISTRICT	OLRIG TP CCL1S2	PEGMATITE	EUXENITE
189	31L05	46 16	79 44	ONT	NIPISSING DISTRICT	BURRITT ISLAND	IRREGULAR	PYROCHLORE
190	31K05	46 16	79 53	ONT	NIPISSING DISTRICT	IRON ISLAND	IRREGULAR	PYROCHLORE
191	52F15	49 49	92 39	ONT	KENORA DISTRICT	BROWNRIDGE TP S M L	PEGMATITE	COLUMBITE
192	53J13	54 43 42	92 00 00	ONT	KENORA PATRICIA DIST	CARD LAKE	IRREGULAR	PYROCHLORE
193		45 57	80 13	ONT	PARRY SOUND DISTRICT	CARLING TP	PEGMATITE	PYROCHLORE
194	31L03	46 10	79 25	ONT	PARRY SOUND DISTRICT	NORTH HIMSWORTH TP	IRREGULAR	PYROCHLORE
195	41I06	46 22	81 14	ONT	SUDBURY DISTRICT	NEMAG L S-SIDE IR-6	PEGMATITE	NIOBIAN RUTILE
196	42D02	49 02	86 13	ONT	THUNDER BAY DISTRICT	PRAIRIE LAKE N-SIDE	PEGMATITE	PYROCHLORE
197	42J06	56 20.20	83 10 00	ONT	COCHRANE DISTRICT	PARTISON L	IRREGULAR	
198	32D 8	48 23	78 14	QUE	ABITIBI COUNTY	PREISSAC TP R7L55-60	PEGMATITE	COLUMBITE

NUMBER	OTHER MINERALS	WALL-ROCKS	REFERENCES
177		GRANITE PEGMATITE	1960 RCSE P. 38 1971 FERGUSON P. 50
178	ALLANITE	GRANITE PEGMATITE	1958 ROWE P. 94
179	URANOPHANE	GRANITE PEGMATITE	1967 HEWITT P. 65
180	ALLANITE URANOTHORITE BASTNAESITE	GRANITE PEGMATITE MARBLE	1956 SATTERLY P. 178
181	PYRRHOTITE	GRANITE PEGMATITE	1959 RCSE P. 37
182	SPODUMENE BERYL CASSITERITE	GRANITE PEGMATITE GRANITE	1965 PYE PP. 84-85 1971 FERGUSON P. 53.
183	SPODUMENE APATITE	GRANITE PEGMATITE BIOTITE SCHIST DIABASE	1965 PYE P. 80 1971 FERGUSON P. 53
184	APATITE	CARBONATITE PYROXENITE NEPHELINE SYENITE	1970 STOCKFORD PP. 33-34
185	ALLANITE	GRANITE PEGMATITE	1952 LANG P. 137 1971 FERGUSON P. 49
186	ALLANITE		
187	FELDSPAR ALLANITE	GRANITE PEGMATITE	1971 FERGUSON P. 49
188	MUSCOVITE TOURMALINE	GRANITE PEGMATITE	1944 SATTERLY PP. 32-33 1971 FERGUSON P. 49
189	AEGIRINE MAGNETITE APATITE	CARBONATITE FENITE GRANITE LAMPROPHYRE	1971 FERGUSON P. 50 1971 LUMBERS P. 51,81
190	MAGNETITE PYRITE APATITE	CARBONATITE NEPHELINE SYENITE IJOLITE LAMPROPHYRE	1971 LUMBERS PP. 50-51,79-81 1971 FERGUSON P. 50
191	SPODUMENE	GRANITE PEGMATITE	1970 TRAILL P. 161 1971 FERGUSON P. 48
192	APATITE SYNCHISITE		1971 FERGUSON PP. 35-36
193	URANOPHANE	GRANITE PEGMATITE	1971 FERGUSON P. 50
194	MAGNETITE PYRITE	CARBONATITE NEPHELINE SYENITE LAMPROPHYRE	1971 LUMBERS P. 52-53,83-85 1971 FERGUSON P. 51
195		GRANITE PEGMATITE	1971 FERGUSON P. 53
196	MAGNETITE WOLLASTONITE	CARBONATITE NEPHELINE SYENITE PYROXENITE	1971 FERGUSON P. 53
197	MAGNETITE	GOSSAN	1971 FERGUSON P. 45
198		GRANITE PEGMATITE	1945 NORMAN P. 8 1965 MULLIGAN P. 42

NUMBER	N.T.S. BLOCK	LATITUDE	LONGITUDE	PROVINCE	COUNTY OR DISTRICT	TOWNSHIP OR PARISH	TYPE OF DEPOSIT	NB-TA MINERALS
199	31G 8	45 31 06	74 03 12	QUE	TWO MOUNTAINS CTY	L"ANNONCIATION PAR	STRATIFORM	PYROCHLORE PEROVSKITE NIOCALITE
200	31G 8	45 33	74 01 54	QUE	TWO MOUNTAINS CTY	L"ANNONCIATION PAR	STRATIFORM	PYRCCHLORE PEROVSKITE BETAFITE
201	32C 5	48 24 45	77 52 30	QUE	ABITIBI COUNTY	LACORNE TP R8L16-17	PEGMATITE	COLUMBITE
202	31G 8	45 33	74 03	QUE	TWO MOUNTAINS COUNTY	OKA AREA	STRATIFORM	PYROCHLORE PEROVSKITE BETAFITE
203	32C 5	48 18 21	77 56 42	QUE	ABITIBI COUNTY	LACORNE TP R2L11	PEGMATITE	COLUMBITE
204	31G 8	45 31 54	74 03 54	QUE	TWO MOUNTAINS CTY	ST JOSEPH DU LAC PAR	STRATIFORM	PYRCCHLORE
205	31G 8	45 30 12	74 03 12	QUE	TWO MOUNTAINS CTY	L"ANNONCIATION PAR	STRATIFORM	PYROCHLORE BETAFITE NIOCALITE PEROVSKITE
206	31G	45 35	75 35	QUE	PAPINEAU COUNTY	PORTLAND TP R5L2	PEGMATITE	EUXENITE
207	31G 8	45 31 54	74 04 00	QUE	TWO MOUNTAINS CTY	ST BENOIT PAR	STRATIFORM	PYROCHLORE PEROVSKITE
208	31G 8	45 30 18	74 02 00	QUE	TWO MOUNTAINS CTY	L"ANNONCIATION PAR	STRATIFORM	PYROCHLORE PEROVSKITE
209	31G 8	45 34	74 03	QUE	TWO MOUNTAINS CTY	ST JOSEPH DU LAC PAR	STRATIFORM	PEROVSKITE
210	31L16	46 49	78 26	QUE	TIMISCAMINGUE COUNTY	VILLEDIEU TWP	PEGMATITE	PYROCHLORE BETAFITE MICROCLITE
211	31F1J	45 43 42	76 43 06	QUE	PONTIAC COUNTY	GRAND CALUMET TP R9 L11-12	VEIN	PYROCHLORE
212	31G12	45 36 34	75 52 04	QUE	GATINEAU COUNTY	HULL TP R9L22 N/2 R10L22	IRREGULAR	PYROCHLORE BETAFITE
213	31G12	45 31 18	75 54 38	QUE	GATINEAU COUNTY	HULL TP R10L27 N/2 R12L23-28	VEIN	BETAFITE
214	31G12	45 32 06	75 54 48	QUE	GATINEAU COUNTY	HULL TP R11L27 N/2	VEIN	PYROCHLORE
215	31J13	46 45	75 55	QUE	GATINEAU COUNTY	BASKATONG TP R2L2224 R2L2531	VEIN	PYROCHLORE ELLSWORTHITE
216	31J16	46 48	76 06 20	QUE	BERTHIER COUNTY	MAISONEUVE TP R2L1	PEGMATITE	SAMARSKITE EUXENITE FERGUSONITE
217	31J 9	46 42	73 58	QUE	BERTHIER COUNTY	BRASSARD TOWNSHIP	PEGMATITE	SAMARSKITE
218	32D 8	48 24 45	77 59 51	QUE	ABITIBI COUNTY	LAMOTTE TP R10L64	PEGMATITE	COLUMBITE
219	32D 8	48 26 57	78 10 54	QUE	ABITIBI COUNTY	FIGUERY TP R2L14 R2L36	PEGMATITE	COLUMBITE
220	32C 5	48 24 45	77 48 23	QUE	ABITIBI COUNTY	LOCORNE TP R9L52-53	PEGMATITE	COLUMBITE

NUMBER	OTHER MINERALS	WALL-ROCKS	REFERENCES
199		CARBONATITE IJOLITE OKAITE	1957 MAURICE P. 1-9 1958 ROWE P. 86-87 1960 NICKEL
200	APATITE CALCITE	MARBLE IJOLITE	1958 ROWE P. 88 1959 ROWE P. 46 1969 GOLD AND WALLEE PP. 1-37
201	BERYL MOLYBDENITE GARNET	GRANITE PEGMATITE ADAMELLITE	1950 TREMBLAY P. 89 1953 ROWE P. 16 1965 MULLIGAN P. 48-49
202		MARBLE IJOLITE LAMPROPHYRE BRECCIA	1958 ROWE P. 86 1959 FICKETT O.E. 1959 MTS MB IR59-20
203	SPODUMENE BERYL BISMUTHINITE	GRANITE PEGMATITE GRANODIORITE	1950 TREMBLAY P. 74 1957 MULLIGAN PP.12-13
204		DOLOMITE LAMPROPHYRE	1958 ROWE P. 84-85
205		MARBLE IJOLITE OKAITE	1954 ROWE P. 1-18 1958 ROWE P. 86-87
206	FELOSPAR MONAZITE	GRANITE PEGMATITE	1952 LANG P. 154
207			1958 ROWE P. 85-86
208		MARBLE BRECCIA PYROXENITE IJOLITE FENITE	1958 ROWE P. 86
209			1957 MAURICE P. 18 1958 ROWE P. 97
210		PEGMATITE	1958 ROWE P. 98
211	URANINITE URANOTHORITE	GRANITE PEGMATITE GNEISS MARBLE GABBRO	1956 GITTINS PP. 772-783
212		GRANITE SYENITE	1960 ROSE P. 40 1961 HOGARTH P. 615
213	URANINITE	GRANITE SYENITE	1961 HOGARTH P. 615
214		GRANITE SYENITE	1961 HOGARTH P. 615
215	URANOTHORITE THORITE	MARBLE	1958 ROWE P. 97 1962 LANG P. 284
216	URANINITE	PEGMATITE	1952 LANG P.153 1958 ROWE P. 98 1960 ROSE P. 59-10 1962 LANG P. 286
217			1880 HOFFMAN 1917 MILLER AND KNIGHT P. 316 1932 ELLSWORTH P. 248
218	SPODUMENE BERYL GARNET	GRANITE PEGMATITE GRANODIORITE DIORITE BIOTITE SCHIST	1950 TREMBLAY P. 76 1965 MULLIGAN P. 47
219	SPODUMENE GARNET TOURMALINE	GRANITE PEGMATITE BIOTITE SCHIST	1953 ROWE P. 1957 MULLIGAN P. 11 1965 MULLIGAN PP. 47-48
220	MOLYBDENITE BISMUTHINITE BERYL	GRANITE PEGMATITE GRANODIORITE AMPHIBOLITE	1950 TREMBLAY P. 76 1965 MULLIGAN P. 43-46

NUMBER	N.T.S. BLOCK	LATITUDE	LONGITUDE	PROVINCE	COUNTY OR DISTRICT	TOWNSHIP OR PARISH	TYPE OF DEPOSIT	RE-TA MINERALS
221	32D 8	48 23 06	78 14 51	QUE	ABITIBI COUNTY	PREISSAC TP R7L53-4	PEGMATITE	COLUMBITE
222	32D 8	48 3u	78 18 38	QUE	ABITIBI COUNTY	PREISSAC TOWNSHIP	PEGMATITE	COLUMBITE
223	21M16	47 24	70 51	QUE	CHARLEVOIX COUNTY	LAC PIED DES MONTS	PEGMATITE	SAMARSKITE FERGUSONITE EUXENITE
224	21N13	47 35	69 55	QUE	CHARLEVOIX EST COUNT	CALLIERES TWP R1 L11	PEGMATITE	FERGUSONITE
225	21N13	47 35	69 55	QUE	CHARLEVOIX EST COUNT	CALLIERES TP R2 3L 8	PEGMATITE	FERGUSONITE
226	31J 5	46 25	75 50	QUE	GATINEAU COUNTY	KENSINGTON TP	PEGMATITE	FERGUSONITE ESCHYNITE PYROCHLORE
227		48 24 45	77 47 15	QUE	ABITIBI COUNTY	LACORNE TP R9L57	PEGMATITE	COLUMBITE BETAFITE
228	32C12	48 25 54	77 54 30	QUE	ABITIBI COUNTY	LANDRIENNE TP R1L26 R1L25	PEGMATITE	COLUMBITE MICRCLITE
229	31H11	45 3u	73 20	QUE	ROUVILLE COUNTY	ST HILAIRE L381-330	IRREGULAR	PYROCHLORE
23J	31G 5	45 4J	75 40	QUE	GATINEAU COUNTY	TEMPLETON TP R12L20	PEGMATITE	EUXENITE
231	31G 5	45 4J	75 50	QUE	GATINEAU COUNTY	WAKEFIELD TP R3L25	PEGMATITE	EUXENITE
232	32C 5	48 25 06	77 51 54	QUE	ABITIBI COUNTY	LACORNE TP R10L38	PEGMATITE	COLUMBITE
233	32C 5	48 24 J6	72 59 15	QUE	ABITIBI COUNTY	LACORNE TP R9L1-2	PEGMATITE	COLUMBITE
234	32C 5	48 18 57	77 58 18	QUE	ABITIBI COUNTY	LACORNE TP R3L7-8	PEGMATITE	COLUMBITE
235	32C 5	48 25 J0	77 58 54	QUE	ABITIBI COUNTY	LACORNE TP R10L1-2 R9L1-5	PEGMATITE	COLUMBITE
236	21D11	48 33	71 12	QUE	DUBUC COUNTY	SIMARD TP R7	IRREGULAR	PYROCHLORE
237	31G 9	45 36 3U	74 06	QUE	TWO MOUNTAINS COUNTY	ST SCHOLASTIQUE	IRREGULAR	PYROCHLORE
238	31G 9	45 34	74 20	QUE	ARGENTEUIL COUNTY	ST ANDRE EST	IRREGULAR	PYROCHLORE
239	31H	45 3u	73 30	QUE	MONTREAL ISLAND	ST-MICHEL	IRREGULAR	PYROCHLORE
24J	31K09	46 4u	76 05	QUE	GATINEAU COUNTY	LYTTON TP R1L26	PEGMATITE	EUXENITE
241	31J15	46 23	75 58	QUE	MANIWAKI COUNTY	PINE CHUTES DESERT R	PEGMATITE	EUXENITE
242	31G11	45 40	75 40	QUE	GATINEAU COUNTY	TEPPLETON TP P13L5	PEGMATITE	EUXENITE

NUMBER	OTHER MINERALS	WALL-ROCKS	REFERENCES
221	BERYL	GRANITE PEGMATITE ADAMELLITE	1965 MULLIGAN P. 42
222		PEGMATITE	
223	URANINITE	GRANITE PEGMATITE	1906 OBALSKI P. 42 1959 ROSE P. 41
224	URANINITE MOLYBDENITE PYRITE	PEGMATITE	1952 LANG P. 152
225		PEGMATITE	1958 SHAW P. 21 1962 LANG P. 285
226	URANINITE	GRANITE PEGMATITE	1958 SHAW P. 42 1959 ROSE P. 40
227	SPODUMENE BERYL GARNET	GRANITE PEGMATITE GRANODIORITE MONZONITE	1950 TREMBLAY P. 76 1957 MULLIGAN PP. 10-11 1965 MULLIGAN PP. 43-46
228	SPODUMENE BERYL GARNET	GRANITE PEGMATITE BIOTITE SCHIST	1950 TREMBLAY P. 77 1957 MULLIGAN P. 12 1965 MULLIGAN PP. 46-47
229		GABBRO NEPHELINE SYENITE	1958 ROWE P. 97
230		PEGMATITE	1952 LANG P. 153 1959 ROSE P. 41
231	URANINITE	PEGMATITE	1958 ROWE P. 98 1962 LANG P. 293
232	SPODUMENE	GRANITE PEGMATITE GRANODIORITE	1950 TREMBLAY MAP 1957 MULLIGAN P. 12 1965 MULLIGAN P. 47
233	BERYL	GRANITE PEGMATITE GRANODIORITE	1950 TREMBLAY MAP 1957 MULLIGAN P. 46
234	SPODUMENE BERYL	GRANITE PEGMATITE GRANODIORITE BIOTITE SCHIST VOLCANICS	1957 MULLIGAN P. 12 1965 MULLIGAN P. 50
235		GRANITE PEGMATITE GRANODIORITE	1950 TREMBLAY MAP 1951 MULLIGAN P. 12 1965 MULLIGAN PP. 46-47
236	MOLYBDENITE MONAZITE	DOLOMITE CARBONATE NEPHELINE SYENITE DIORITE	1970 VALLEE AND DUBUC PP. 1-35
237			
238	FLUORITE BARITE	CARBONATITE	1969 P. 1-18
239	DAWSONITE MELOGANITE	LIMESTONE	1969 STEACY AND JAMBOR PP. 1971 FERGUSON P. 24
240		GRANITE PEGMATITE	1959 ROSE P. 40
241	ALLANITE URANINITE	GRANITE PEGMATITE	1959 ROSE P. 40
242	URANINITE MONAZITE	GRANITE PEGMATITE	1960 ROSE P. 41

NUMBER	N.T.S. BLOCK	LATITUDE	LONGITUDE	PROVINCE	COUNTY OR DISTRICT	TOWNSHIP OR PARISH	TYPE OF DEPOSIT	NB-TA MINERALS
243	31K16	46 58	76 11	QUE	GATINEAU COUNTY	TP P-68	PEGMATITE	EUXENITE
244	31J12	46 40	75 40	QUE	LABELLE COUNTY	POPE TP	PEGMATITE	ELLSWORTHITE
245	31J12	46 3u	75 40	QUE	LABELLE COUNTY	ROBERTSON TP	PEGMATITE	ELLSWORTHITE
246	31G13	45 43 33	75 28 41	QUE	PAPINEAU COUNTY	DERRY TP R2L14	PEGMATITE	EUXENITE
247	31G13	45 43 52	75 26 01	QUE	PAPINEAU COUNTY	DERRY TP P2L3-4	PEGMATITE	EUXENITE
248	31PJ4	47	73 30	QUE	ST MAURICE COUNTY	ST CATHERINE TP R1-2	PEGMATITE	FERGUSONITE
249	31J61	46 05	74 05	QUE	TERREBONNE COUNTY	WEXFORD TP	PEGMATITE	EUXENITE
25J	31G13	45 46 24	75 42 06	QUE	PAPINEAU COUNTY	W PORTLAND TP R6 L28	PEGMATITE	FERGUSONITE
251	31G 8	45 29 30	74 00 48	QUE	TWO MOUNTAINS COUNTY	L"ANNONCIATION PAR	IRREGULAR	PYROCHLORE
252	73H 3	55 06	105 17	SSK	LAC LA RONGE AREA	LARONGE VILLAGE	PEGMATITE	PYROCHLORE
253	74N13	59 48	109 55	SSK	CAMSELL PORTAGE AREA	HAZELTON LAKE	VEIN	EUXENITE PYROCHLORE
254	74N1J	59 35	108 15	SSK	GOLDFIELDS REGION	VIKING LAKE	GOSSAN	FERGUSONITE
255	74N10	59 35	108 15	SSK	GOLDFIELDS REGION	VIKING LAKE	PEGMATITE	FERGUSONITE
256	74N10	59 35	1J8 15	SSK	GOLDFIELDS REGION	VIKING LAKE	PEGMATITE	PYROCHLORE

NUMBER	OTHER MINERALS	WALL-ROCKS	REFERENCES
243	MONAZITE ALLANITE URANINITE	GRANITE PEGMATITE	1952 LANG P. 152 1962 LANG P. 293
244	ALLANITE	GRANITE PEGMATITE	1962 LANG P. 291
245	ALLANITE URANINITE URANOTHORITE	GRANITE PEGMATITE	1952 LANG P. 151 1962 LANG P. 290
246	ALLANITE URANINITE THUCOLITE	GRANITE PEGMATITE	1959 ROSE P. 40
247		GRANITE PEGMATITE	1959 ROSE P. 40
248	URANINITE THUCOLITE ALLANITE	GRANITE PEGMATITE	1960 ROSE P. 41
249		GRANITE PEGMATITE	1959 ROSE P. 41
250	ALLANITE WAKEFIELDITE	GRANITE PEGMATITE QUARTZITE MARBLE	1971 MILES ET AL PP. 385-410 1932 SPENCE P. 77
251		CARBONATITE SOVITE	1969 GOLD AND VALLEE P. 28
252	CRYTOLITE	GRANITE PEGMATITE	1958 ROWE P. 90
253		SERICITE SCHIST GRANITE	1958 ROWE P. 90
254		GOSSAN	1952 LANG P. 82 1955 ROBINSON P. 69
255		PEGMATITE GRANITE GNEISS	1958 ROWE P. 90
256	URANINITE MONAZITE PITCHBLENDE	GRANITE PEGMATITE AMPHIBOLITE GRANITE GNEISS	1955 ROBINSON PP. 35-36 1958 ROWE P. 90