



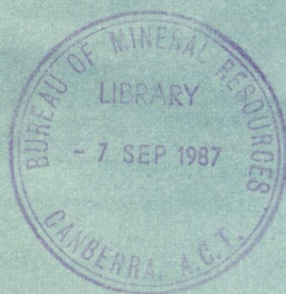
# Geology of Enderby Land and western Kemp Land, Antarctica

BMR Bulletin

# 223

J. W. Sheraton, R. J. Tingey, L. P. Black,  
L. A. Offe, & D. J. Ellis

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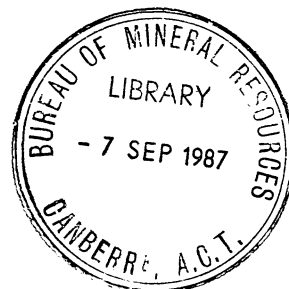
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DEPARTMENT OF RESOURCES AND ENERGY  
BUREAU OF MINERAL RESOURCES, GEOLOGY  
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BULLETIN 223



**Geology of an unusual Precambrian high-grade  
metamorphic terrane—Enderby Land and  
western Kemp Land, Antarctica**

J. W. SHERATON, R. J. TINGEY, L. P. BLACK,  
L. A. OFFE, & D. J. ELLIS



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Cover: Typical outcrop pattern of the southern Scott Mountains; Mount Gordon (left centre) and Francis Peaks (centre background) consist mainly of orthopyroxene-quartz-plagioclase gneiss (tonalitic orthogneiss). (M2175)



# CONTENTS

|                                                            | <i>Page</i> |
|------------------------------------------------------------|-------------|
| ABSTRACT . . . . .                                         | v           |
| INTRODUCTION . . . . .                                     | 1           |
| NAPIER COMPLEX . . . . .                                   | 3           |
| Pyroxene-quartz-feldspar gneiss . . . . .                  | 4           |
| Mafic granulite . . . . .                                  | 6           |
| Ultramafic rocks . . . . .                                 | 7           |
| Anorthosite . . . . .                                      | 7           |
| Garnet-quartz-feldspar gneiss . . . . .                    | 7           |
| Quartzite . . . . .                                        | 11          |
| Magnetite-rich rocks . . . . .                             | 11          |
| Aluminous metasediments . . . . .                          | 11          |
| Calc-silicate rocks . . . . .                              | 16          |
| Igneous rocks . . . . .                                    | 16          |
| Granitic intrusives . . . . .                              | 16          |
| Pegmatite . . . . .                                        | 17          |
| Mafic dykes . . . . .                                      | 17          |
| RAYNER COMPLEX . . . . .                                   | 22          |
| Pyroxene-biotite-quartz-feldspar gneiss . . . . .          | 22          |
| Garnet-biotite-quartz-feldspar gneiss . . . . .            | 22          |
| Mafic rocks . . . . .                                      | 23          |
| Ultramafic rocks . . . . .                                 | 23          |
| Aluminous metasediments . . . . .                          | 23          |
| Calc-silicate rocks and marble . . . . .                   | 23          |
| Granitic intrusives . . . . .                              | 23          |
| STRUCTURAL GEOLOGY . . . . .                               | 24          |
| Napier Complex . . . . .                                   | 24          |
| Rayner Complex . . . . .                                   | 28          |
| METAMORPHISM . . . . .                                     | 28          |
| Napier Complex . . . . .                                   | 28          |
| Peak metamorphism . . . . .                                | 28          |
| Retrograde metamorphism . . . . .                          | 31          |
| Rayner Complex . . . . .                                   | 35          |
| RELATIONSHIP OF RAYNER COMPLEX TO NAPIER COMPLEX . . . . . | 36          |
| SUMMARY AND DISCUSSION . . . . .                           | 39          |
| ACKNOWLEDGEMENTS . . . . .                                 | 46          |
| REFERENCES . . . . .                                       | 47          |
| APPENDICES 1. PETROGRAPHIC DATA . . . . .                  |             |
| 2. CHEMICAL ANALYSES . . . . .                             |             |

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## TABLES

|                                                                                                                                              | <i>Page</i> |
|----------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| 1. Comparison of Napier and Rayner Complexes, showing typical assemblages in the major rock types . . . . .                                  | 5           |
| 2. Area scan microprobe analyses of mesoperthites . . . . .                                                                                  | 5           |
| 3. Average compositions of felsic gneisses and granitic intrusives from Napier and Rayner Complexes . . . . .                                | 8           |
| 4. Average compositions of mafic granulites and dykes from Napier and Rayner Complexes . . . . .                                             | 10          |
| 5. Compositions of representative sapphirine and osumilite-bearing metapelites from the Napier Complex . . . . .                             | 13          |
| 6. Chemical analyses of minerals from spinel-phlogopite-sapphirine-enstatite pod in felsic orthogneiss, Gage Ridge . . . . .                 | 13          |
| 7. Representative chemical analyses of minerals from aluminous metasediments . . . . .                                                       | 14          |
| 8. Isotopic age determinations from Enderby Land and Western Kemp Land . . . . .                                                             | 37          |
| 9. Comparative geological histories of Napier and Rayner Complexes . . . . .                                                                 | 40          |
| 10. Provisional correlation of events in the Napier and Rayner Complexes with those in adjacent parts of the East Antarctic Shield . . . . . | 44          |

## FIGURES

|                                                                                                                                                                                                                        |    |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| 1. Map of part of East Antarctica showing metamorphic complexes and outcrops . . . . .                                                                                                                                 | 1  |
| 2. Tula Mountains, looking southeast . . . . .                                                                                                                                                                         | 1  |
| 3. Mount Codrington in the Napier Mountains . . . . .                                                                                                                                                                  | 2  |
| 4. Extent of metamorphic complexes in Enderby Land and western Kemp Land . . . . .                                                                                                                                     | 2  |
| 5. Proclamation Island . . . . .                                                                                                                                                                                       | 3  |
| 6. Generalised geological map of major areas of outcrop in Enderby Land . . . . .                                                                                                                                      | 4  |
| 7. Massive orthopyroxene-quartz-mesoperthite gneiss; Mount Selwood . . . . .                                                                                                                                           | 5  |
| 8. Mesoperthite in leucogneiss . . . . .                                                                                                                                                                               | 5  |
| 9. Normative Q-Ab-Or diagrams for felsic orthogneisses from the Napier Complex and part of the Rayner Complex . . . . .                                                                                                | 6  |
| 10. Normative Ab-Or-An diagrams showing plagioclase-alkali feldspar field boundary . . . . .                                                                                                                           | 6  |
| 11. Pyroxenite pod; Fyfe Hills . . . . .                                                                                                                                                                               | 7  |
| 12. Interlayered gneiss and metapelite; Mount Tomlinson . . . . .                                                                                                                                                      | 7  |
| 13. Layered garnet-quartz-feldspar gneiss; Mount McLennan . . . . .                                                                                                                                                    | 7  |
| 14. Garnet-orthopyroxene-magnetite-quartz rock; Mount Jewell . . . . .                                                                                                                                                 | 11 |
| 15. Distribution of sapphirine, osumilite, cordierite, spinel, and orthopyroxene + sillimanite in quartz-bearing metapelites, and garnet + clinopyroxene in mafic and ultramafic rocks of the Napier Complex . . . . . | 12 |
| 16. Folded (F <sub>1</sub> ) sapphirine-rich layers in bluish quartzite; spot height 945 . . . . .                                                                                                                     | 12 |

|                                                                                                                                                                                                                |    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| 17. Intergrowth of sapphirine + quartz in granulite.                                                                                                                                                           | 14 |
| 18. Cordierite reaction rims between sapphirine and quartz in granulite.                                                                                                                                       | 14 |
| 19. Rims of sillimanite + garnet between sapphirine and quartz in granulite.                                                                                                                                   | 15 |
| 20. Coexisting sapphirine + quartz in granulite.                                                                                                                                                               | 15 |
| 21. Osumilite in granulite.                                                                                                                                                                                    | 15 |
| 22. Typical symplectitic intergrowth after osumilite in granulite.                                                                                                                                             | 15 |
| 23. Detail of Fig. 22 showing symplectitic intergrowth.                                                                                                                                                        | 15 |
| 24. Modified AFM diagram for Napier Complex metapelites.                                                                                                                                                       | 16 |
| 25. Normative Q-Ab-Or and Ab-Or-An diagrams for granitic intrusives from Napier and Rayner Complexes.                                                                                                          | 17 |
| 26. Probable metapyroxenite (B <sub>1</sub> ) dyke cutting layered garnet-quartz-feldspar gneiss and metasediments; northwest Wyers Ice Shelf                                                                  | 17 |
| 27. Localities of analysed metatholeiite dykes.                                                                                                                                                                | 18 |
| 28. Typical granoblastic texture of metatholeiite (B <sub>2</sub> ) dyke.                                                                                                                                      | 18 |
| 29. Metatholeiite (B <sub>2</sub> ) dyke showing zoned plagioclase phenocrysts.                                                                                                                                | 19 |
| 30. High-Mg (B <sub>3</sub> ) dyke cutting layered gneisses; Mount Stadler.                                                                                                                                    | 19 |
| 31. High-Mg (B <sub>3</sub> ) dyke (norite).                                                                                                                                                                   | 19 |
| 32. Plot of atomic Mg-Al-(Fe+Ti) for high-Mg dykes.                                                                                                                                                            | 19 |
| 33. Amundsen dolerite (B <sub>4</sub> ) dyke cutting layered metasediments; Mount Trail.                                                                                                                       | 19 |
| 34. Group II Amundsen dolerite dyke.                                                                                                                                                                           | 20 |
| 35. Group I Amundsen dolerite dyke.                                                                                                                                                                            | 20 |
| 36. F (total FeO)—M(MgO)—A(Na <sub>2</sub> O + K <sub>2</sub> O) diagrams for A, mafic granulites and B, dykes from Napier Complex and metamorphosed mafic dykes from Edward VIII Gulf area of Rayner Complex. | 20 |
| 37. Alkalies—SiO <sub>2</sub> plot for mafic granulites and dykes.                                                                                                                                             | 21 |
| 38. Ti-Zr-Y diagram for mafic granulites and dykes.                                                                                                                                                            | 21 |
| 39. Alkali melasyenite (B <sub>3</sub> ) dykes, cutting Amundsen dolerites and layered gneiss; Priestley Peak.                                                                                                 | 21 |
| 40. Alkali melasyenite dyke.                                                                                                                                                                                   | 21 |
| 41. Contact of alkali melasyenite dyke with Amundsen dolerite.                                                                                                                                                 | 21 |
| 42. Migmatitic gneiss with boudinaged pegmatite layer; Molodezhnaya Station.                                                                                                                                   | 22 |
| 43. Metamorphosed Amundsen dolerite dykes, Georges Islands.                                                                                                                                                    | 22 |
| 44. F <sub>1</sub> intrafolial fold in massive orthopyroxene-quartz-feldspar gneiss; Rippon Depot.                                                                                                             | 24 |
| 45. F <sub>1</sub> isoclinal fold, defined by mafic granulite layer, refolded by F <sub>2</sub> folds; Rippon Depot.                                                                                           | 24 |
| 46. Fold styles in Napier (A-E) and Rayner (F) Complexes.                                                                                                                                                      | 25 |
| 47. Tight F <sub>2</sub> folds in layered gneisses and metasediments; Fyfe Hills.                                                                                                                              | 25 |
| 48. F <sub>1</sub> isoclinal fold refolded by major F <sub>2</sub> fold in layered gneiss and metasediments; Reference Peak.                                                                                   | 25 |
| 49. Major, asymmetric F <sub>3</sub> folds in layered gneisses; Mount McLennan.                                                                                                                                | 26 |
| 50. Mesoscopic, asymmetric F <sub>3</sub> folds in layered gneisses; Mount Denham.                                                                                                                             | 26 |
| 51. Metamorphosed pyroxenite dyke (B <sub>1</sub> ) folded by tight parasitic F <sub>3</sub> folds and cut by undeformed Amundsen dolerite dykes (B <sub>4</sub> ); Mount McGhee.                              | 26 |
| 52. Poles to foliations measured in 12 sub-areas (A to L) of Napier and Rayner Complexes.                                                                                                                      | 27 |
| 53. Stereographic plots of lineations.                                                                                                                                                                         | 27 |
| 54. F <sub>4</sub> shear zone in layered gneiss and metasediments; Mount Cronus.                                                                                                                               | 27 |
| 55. F <sub>4</sub> shear zone in layered mafic gneiss and metasediments; island west of McIntyre Island, Khmara Bay.                                                                                           | 28 |
| 56. F <sub>5</sub> mylonite zone in layered gneiss and mafic granulite; McIntyre Island, Khmara Bay.                                                                                                           | 28 |
| 57. Pegmatite intruded along steep limb of F <sub>c</sub> shear fold; Molodezhnaya Station.                                                                                                                    | 28 |
| 58. PT diagram showing estimated peak conditions of metamorphism (M <sub>1</sub> ) in Tula Mountains.                                                                                                          | 29 |
| 59. Estimated PT conditions and P-T-time paths for granulites from Napier and Rayner Complexes.                                                                                                                | 30 |
| 60. Ferroaugite exsolution lamellae in eulite.                                                                                                                                                                 | 30 |
| 61. Orthopyroxene exsolution lamellae in clinopyroxene, clinopyroxenite.                                                                                                                                       | 30 |
| 62. Aligned biotite grains in biotite-orthopyroxene-quartz-plagioclase gneiss.                                                                                                                                 | 32 |
| 63. Biotite (+ minor quartz) replacing orthopyroxene, orthopyroxene-biotite-quartz-plagioclase gneiss.                                                                                                         | 32 |
| 64. Garnet rimming pyroxene, garnet-orthopyroxene-clinopyroxene-plagioclase granulite.                                                                                                                         | 32 |
| 65. Garnet rimming hornblende in mafic granulite.                                                                                                                                                              | 33 |
| 66. Secondary garnet in felsic gneiss from shear zone.                                                                                                                                                         | 33 |
| 67. Garnet (+ minor clinopyroxene) replacing orthopyroxene in garnet-orthopyroxene-quartz-plagioclase gneiss.                                                                                                  | 33 |
| 68. Post-kinematic garnet in sheared gneiss.                                                                                                                                                                   | 34 |
| 69. Exsolved garnet in clinopyroxene, garnet clinopyroxenite.                                                                                                                                                  | 34 |
| 70. Cordierite formed by reaction between orthopyroxene, sillimanite and quartz in aluminous gneiss.                                                                                                           | 34 |
| 71. Cordierite, sapphirine, and spinel formed by reaction between orthopyroxene and sillimanite in aluminous gneiss.                                                                                           | 34 |
| 72. Partly recrystallised gneiss.                                                                                                                                                                              | 34 |
| 73. Secondary biotite aggregates replacing orthopyroxene and garnet in felsic gneiss.                                                                                                                          | 35 |
| 74. Symplectites of orthopyroxene + plagioclase + magnetite surrounding garnet, orthopyroxene-garnet-plagioclase-clinopyroxene granulite.                                                                      | 35 |
| 75. Symplectite of orthopyroxene + plagioclase + magnetite surrounding garnet, hornblende-garnet-orthopyroxene-plagioclase granulite.                                                                          | 35 |

## MAP

Geology of Enderby Land and Western Kemp Land, Australian Antarctic Territory (1:500 000 scale)





Frontispiece. Northern Scott Mountains, looking southeast from summit of Mount Pardoe (843 m). Amundsen Bay is on the left and Priestley Peak (showing Amundsen Dykes) at centre. (BMR Neg. No. M2042)

## ABSTRACT

The high-grade metamorphic rocks of Enderby Land and western Kemp Land, which form part of the East Antarctic Precambrian Shield, have been divided into two major metamorphic complexes: the Archaean *Napier Complex* and the Proterozoic *Rayner Complex*. The Napier Complex consists predominantly of pyroxene-quartz-feldspar gneiss and garnet-quartz-feldspar gneiss with subordinate mafic granulite, pyroxenite, and a variety of siliceous, aluminous, and ferruginous metasediments. Peak metamorphic conditions, accompanied by intense deformation ( $M_1$ - $D_1$ ), and granitoid emplacement, took place about 3070 Ma ago, although there is isotopic evidence for felsic crust as old as 3930 Ma. Very high temperatures of 900-1000°C at 7-11 kb (intermediate-pressure granulite facies) were reached in much of the Napier Complex and resulted in the formation of the rare associations of sapphirine + quartz, orthopyroxene + sillimanite, and osumilite within aluminous metasediments. The presence of these associations, as well as the common occurrence of calcic mesoperthite, is also consistent with very low  $P_{H_2O}$  (less than 500 bars) during metamorphism. Subsequent to this event, the Complex underwent near-isobaric cooling, suggesting that it was in approximate isostatic equilibrium with the underlying mantle. This implies that metamorphism either did not occur in association with extensive crustal thickening, or such thickening and consequent erosion and uplift preceded the thermal peak ( $M_1$ ). Further deformation took place about 2900 Ma ( $D_2$ ) and 2450 Ma ( $D_3$ ) ago, under slightly lower-grade (upper amphibolite to granulite facies) conditions, after which the Complex was essentially cratonised.

Several suites of mafic dykes are present in the Napier Complex. Metatholeiites and high-Mg tholeiites were emplaced at about 2350-2400 Ma during the waning stages of metamorphism at considerable depths in the crust. Additionally, an abundant suite of dolerites (the *Amundsen Dykes*) was emplaced about 1200 Ma ago. Rare alkali melasyenites (lamproites) constitute the youngest group (482 Ma).

The Rayner Complex was metamorphosed about 960 Ma ago at the same time as the Proterozoic rocks of the MacRobertson Land coast and northern Prince Charles Mountains. Limited reworking (and rehydration) of the margins of the Archaean craton is indicated in areas where mafic dykes occur as metamorphosed relics, but the relative abundance of metapelites and calc-silicate gneisses probably reflects Proterozoic sedimentation. The metamorphic grade of the Rayner Complex is somewhat lower (upper amphibolite to granulite facies) than that of the Napier Complex, although high-pressure (garnet + clinopyroxene) granulites are present locally near the contact with the Napier Complex. Water pressures were also higher, as evidenced by the relative abundance of migmatitic gneisses and hydrous minerals (biotite and hornblende) and the absence of mesoperthite. In contrast to the Napier Complex, metamorphism was followed by near-isothermal uplift consistent with major crustal thickening. The effects of the late Proterozoic metamorphism within the Napier Complex are generally confined to localised shear and mylonite zones ( $D_4$ ,  $D_5$ ) and areas of retrogression. Granitic and pegmatitic dykes were emplaced into both the Rayner Complex and adjacent parts of the Napier Complex about 770 and possibly 500-550 Ma ago.

# INTRODUCTION

Enderby Land, the first part of East Antarctica to be sighted by man, lies between longitudes 45° and 55°E, and forms the western part of Australian Antarctic Territory (Fig. 1). It is bounded to the east by Kemp Land. All known outcrops occur north of latitude 69°S and within 200 km of the coast, and most consist of jagged peaks and ridges (Figs. 2 & 3). The most extensive exposures are in the Tula, Scott, Raggatt, and Nye Mountains; most others are small and isolated (Fig. 4). These outcrops constitute one of the best-exposed parts of the East Antarctic Precambrian Shield, consisting almost entirely of granulite-facies metamorphic rocks, with subordinate dolerite dykes, granitic intrusives, and pegmatites.

Geological study of the area started only in 1930 when Mawson's British, Australian and New Zealand Antarctic Research Expedition (B.A.N.Z.A.R.E.) landed at Proclamation Island (Fig. 5) (Mawson, 1932). Rocks collected at that time were described by Tilley (1937), who defined the new rock type *enderbite* as 'an acid member of the charnockite series characterised by rhombic pyroxene and preponderating plagioclase among the feldspar constituents'. During the 1950s and 1960s, brief visits were made to scattered localities throughout Enderby Land by Bureau of Mineral Resources (BMR) geologists attached to the Australian National Antarctic Research Expeditions (ANARE) (Crohn, 1959; McLeod, 1959, 1964; Ruker, 1963; McLeod & others, 1966). These resulted in the discovery at 'Spot Height 945' (now formally named Dallwitz Nunatak) of the first known occurrence of coexisting sapphirine and quartz, an association which indicates exceptionally high temperatures of metamorphism (Dallwitz, 1968).

Geologists of the Soviet Antarctic Expedition (SAE) undertook more extensive 1:1 000 000-scale mapping of Enderby Land in the 1960s (Kamenev, 1972, 1975; Grikurov & others, 1976). They distinguished two metamorphic complexes, largely on the basis of differences in metamorphic grade, and postulated that the slightly higher-grade Napier

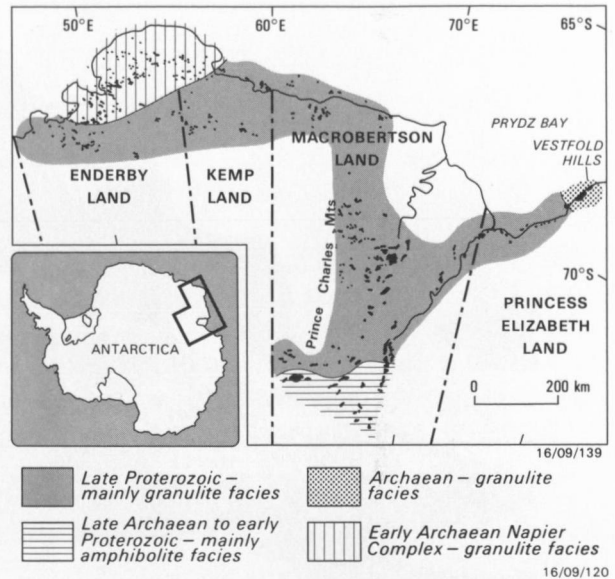


Fig. 1. Map of part of East Antarctica showing metamorphic complexes and outcrops (black). Late Proterozoic metamorphics in the northern part of the southern Prince Charles Mountains are greenschist to amphibolite facies; metamorphic rocks of similar age in Enderby Land and western Kemp Land are termed Rayner Complex (see Figs. 4, 6). All complexes except the late Proterozoic are intruded by abundant essentially undeformed dolerite dykes.

Complex was older than the Rayner Complex; however, both were considered to be of Archaean age (Grikurov & others, 1976). The Napier Complex, extending from the Raggatt to the eastern Napier Mountains (Fig. 4), consists of high-temperature granulite-facies rocks. It is bounded to the south and east by the Rayner Complex composed of upper



Fig. 2. Tula Mountains, looking southeast. Pythagoras Peak is at left centre and Mount Dungey at right. (M2174)





Fig. 3. Mount Codrington in the Napier Mountains, showing steeply dipping, retrogressed felsic gneisses. Note felsenmeer of rock debris on saddle. (M2041)

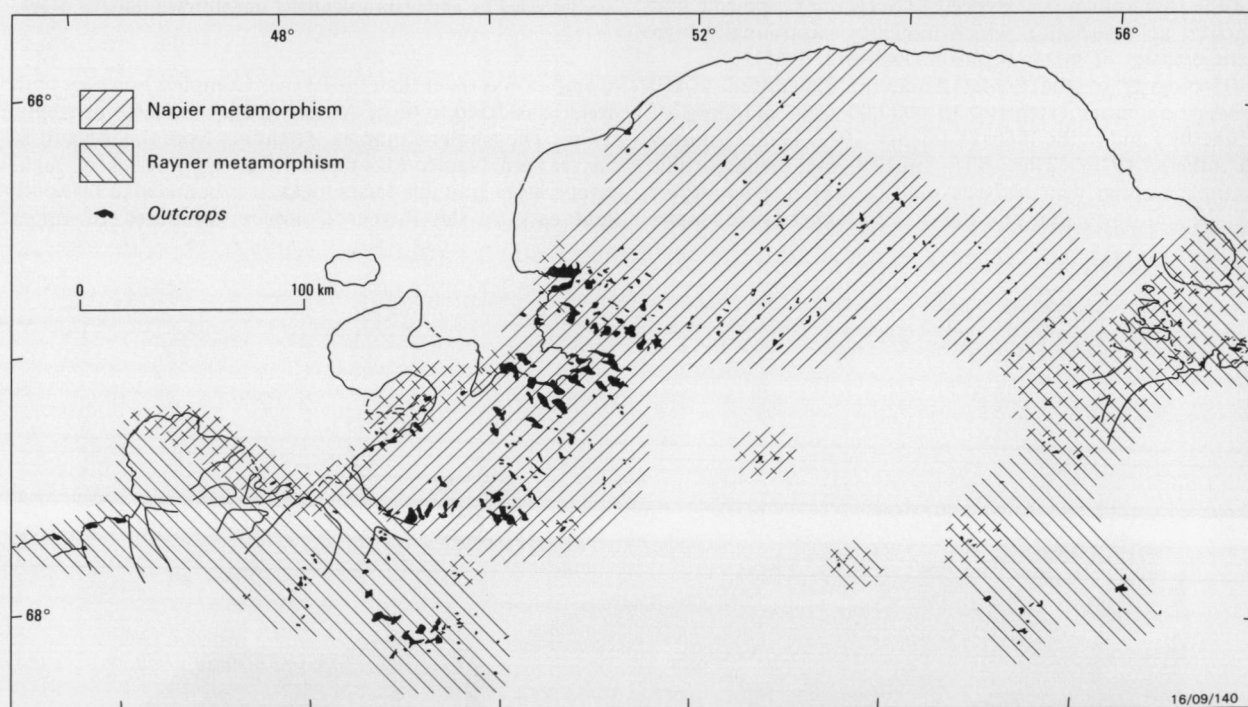


Fig. 4. Extent of metamorphic complexes in Enderby Land and western Kemp Land. Dashed lines indicate partial overprinting by Rayner metamorphism in Napier Complex and areas of Rayner Complex in which evidence of Napier metamorphism survives.

amphibolite to granulite-facies metamorphics, which, in part, represent remetamorphosed Napier Complex rocks. Extremely old U-Th-Pb ages of about 4000 Ma were reported for enderbite gneiss from Fyfe Hills in the Napier Complex (Sobotovich & others, 1976; Kamenev, 1982).

BMR geologists began systematic regional studies of Enderby Land in the 1974-75 summer, but bad weather and logistic problems confined activities to only a few localities

in eastern Enderby Land and adjacent western Kemp Land (Pieters & Wyborn, 1977). However, all major outcrops in Enderby Land were examined during the following two summer seasons as part of intensive helicopter-supported operations based on a field camp near Mount King (Fig. 6).

In subsequent seasons (1977-78 and 1979-80), geological fieldwork, in many cases by university geologists, was largely confined to more specialised investigations, including





Fig. 5. Proclamation Island where the British, Australian and New Zealand Antarctic Research Expedition (B.A.N.Z.A.R.E.) under Douglas Mawson landed on 13th January, 1930, and annexed the territory of Enderby Land, Kemp Land, and MacRobertson Land for Great Britain. The glaciated rock surfaces consist of granitic orthogneiss (charnockite). (M2041)

sampling for geochronology and metamorphic petrology, and detailed structural studies of localities of particular interest.

The present report gives a general account of the geology of Enderby Land and western Kemp Land resulting from these field investigations, and expands upon an earlier preliminary account (Sheraton & others, 1980). Some reference is made to the results of laboratory studies, but more specialised publications should be consulted for further details of, for example, metamorphic petrology (Ellis, 1980, 1983; Ellis & others, 1980; Grew, 1980, 1981a; 1982a; Harley, 1983, 1985b; Sandiford, 1985b), structural geology (Griffin, 1979; James & Black, 1981; Black & others, 1983a, b; Sandiford & Wilson, 1983, 1984; Sandiford, 1985a), geochemistry (Sheraton, 1980, 1984; Sheraton & Black, 1981, 1983; Sheraton & England, 1980; Sheraton & others, 1982, 1985), and geophysics (Wellman, 1983; Wellman & Tingey, 1982).

The Soviet geologists' subdivision into the Napier and Rayner Complexes is retained, with some modifications, although, apart from the difference in metamorphic grade,

they are distinguished by the unmetamorphosed dolerite dykes' restriction to the Napier Complex. Results of Rb-Sr whole-rock and U-Pb zircon dating of Napier Complex gneisses have confirmed the Archaean age (~3100 Ma) of the peak of the granulite-facies metamorphism, although there is evidence for continental crust as old as 3930 Ma (Black & James, 1983; Black & others, 1983a, 1986a; Compston & Williams, 1982; James & Black, 1981; McCulloch & Black, 1984; Sheraton & Black, 1983; Williams & others, 1984). Metamorphic rocks from the Rayner Complex have given monazite and zircon U-Pb and whole rock Rb-Sr isochron ages in the range 890–1020 Ma; granite and pegmatite dykes in the Rayner and adjacent parts of the Napier Complex were emplaced about 770 and possibly 500–550 Ma ago (Grew, 1978; Black & others, 1983b, 1987).

Although use of the term 'Rayner Complex' in this Bulletin is restricted to late Proterozoic metamorphic rocks of Kemp and western Enderby Lands, rocks of similar age crop out as far east as Princess Elizabeth Land (Fig. 1). Outcrops of the Napier Complex are entirely within the study area.

## NAPIER COMPLEX

Metamorphic rocks of the Napier Complex crop out over an area of at least 50 000 km<sup>2</sup> in Enderby Land and the western part of Kemp Land (Fig. 4). In contrast to Kamenev (1975), we have included the northeastern Tange Promontory, Khmara Bay, McLeod Nunataks, and the northern part of the Enderby Land Peninsula in the Napier Complex, rather than in the Rayner Complex, because of the presence of essentially unmetamorphosed dolerite dykes. However, there is evidence for considerable post-dyke deformation and retrograde metamorphism in these areas. The isolated Sheelagh Island, consisting mainly of ortho-

pyroxene-quartz-plagioclase-K-feldspar gneiss, cannot be confidently assigned to either the Napier or Rayner Complex, but has been tentatively included in the former.

We have generally followed the Soviet geologists' subdivision of the Napier Complex into two major gneiss groups: massive pyroxene-quartz-feldspar gneiss with minor mafic granulite (Ap, roughly corresponding to the Raggatt Series of Kamenev, 1975; and Grikurov & others, 1976), and layered garnet-quartz-feldspar gneiss with subordinate pelitic, psammitic, and ferruginous metasediments (As, the Tula Series of Kamenev, 1975). The pyroxene-quartz-feldspar

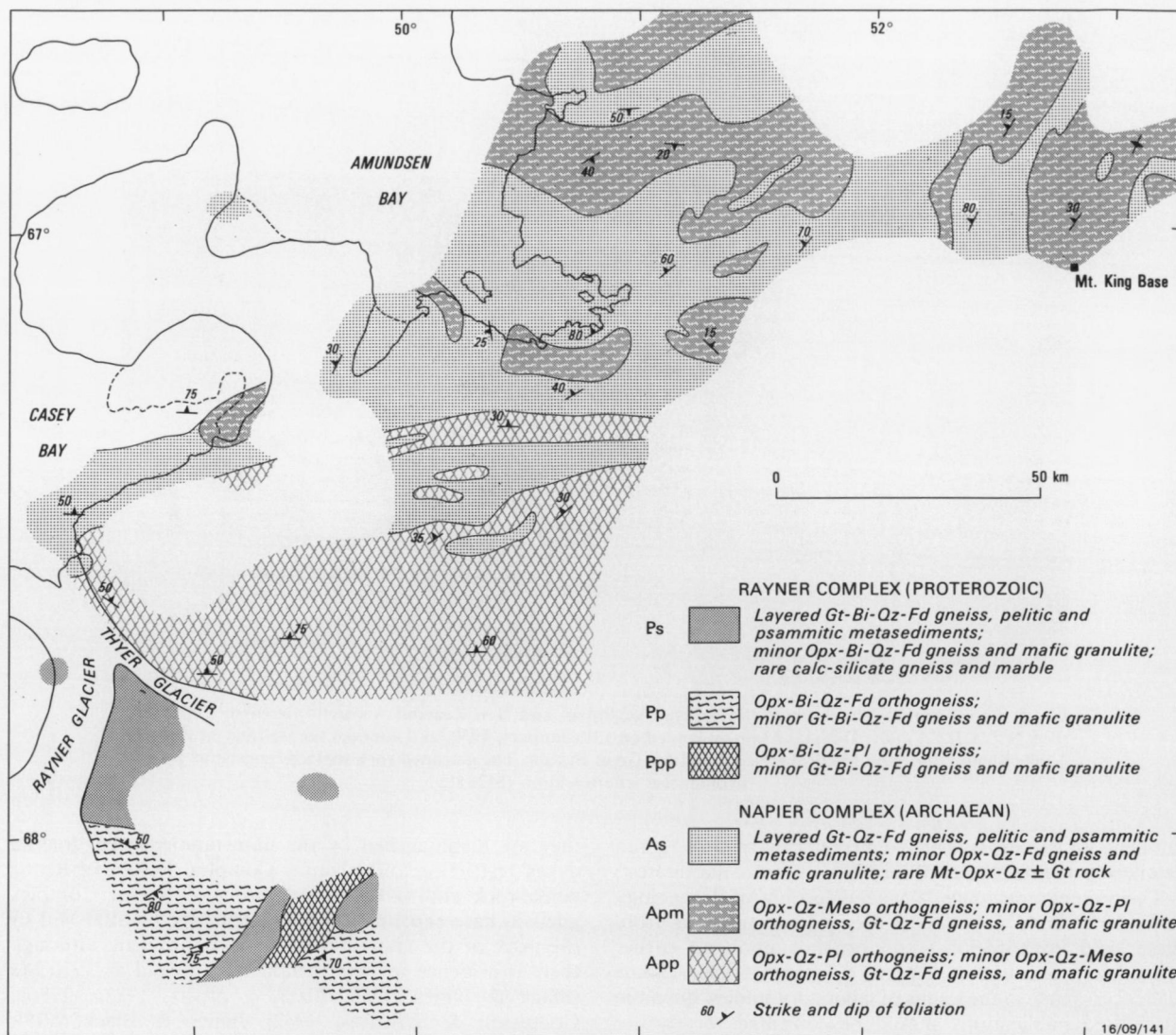


Fig. 6. Generalised geological map of major areas of outcrop in Enderby Land. Mineral abbreviations as in Table 1. Dashed sections of coastline indicate ice shelf edges.

gneiss can be further divided into potassic ('charnockitic') varieties (Apm), which typically contain mesoperthite, and more calcic ('enderbitic') gneiss (App) in which plagioclase is the predominant feldspar. The two major groups are not mutually exclusive because gradational varieties occur, and in many places the two types are intimately interlayered, so that it is only possible to indicate the predominant rock type on the geological map.

The Napier Complex gneisses are intruded by abundant tholeiitic dolerite dykes, which we have provisionally named Amundsen Dykes, as well as by several earlier generations of mafic and ultramafic dykes. Granitic intrusives occur in the Napier Mountains and Casey Bay area; cross-cutting quartz-feldspar pegmatite is locally abundant. The distribution of the main rock types is shown in Fig. 6 and the main petrographic features of the Napier Complex, as compared with the Rayner Complex, are summarised in Table 1. The relationship of the two complexes is discussed in detail in a later section.

#### Pyroxene-quartz-feldspar gneiss

Reddish brown-weathering orthopyroxene-quartz-feldspar gneiss is the predominant rock type over much of the Napier Complex. It is commonly massive, with a poorly developed

layering (Fig. 7), but also occurs interlayered with garnet-quartz-feldspar gneiss and various metasediments. The gneiss is generally fine to medium-grained and granoblastic, but locally it is well foliated and contains the lenticular or ribbon-like quartz aggregates typical of high-grade leucocratic gneisses (flaser structure). The main constituents are feldspar (55–70%), quartz (20–35%), and pleochroic hypersthene (1–10% in most samples). The latter tends to be concentrated in more-or-less distinct layers. Mesoperthite is the characteristic feldspar in gneiss of appropriate (i.e., relatively potassic) composition (Fig. 8), although rocks with both plagioclase (mostly oligoclase) and orthoclase occur in some areas, particularly in the eastern Napier Mountains, southern Scott Mountains (e.g., Mount Douglas), and at Proclamation Island. Mesoperthite commonly has an unusually high anorthite content (up to about 20%; Table 2). Potassic (granitic \* or 'charnockitic') mesoperthite gneiss predominates in the northern Scott and Tula Mountains and the Mount King area, whereas more sodic gneiss ('enderbite') of granodioritic, trondhjemitic, or tonalitic composition is particularly abundant in the Raggatt

\* The classification of Streckeisen (1976) is used in this Bulletin for igneous rocks and those metamorphic rocks derived from igneous precursors (e.g., orthogneisses).

TABLE 1. COMPARISON OF NAPIER AND RAYNER COMPLEXES, SHOWING TYPICAL ASSEMBLAGES IN THE MAJOR ROCK TYPES

|                           | <i>Napier Complex</i>                                                                                                                                             | <i>Rayner Complex</i>                                                                                                                      |
|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| Felsic gneiss             | Opx + Qz + Meso<br>Opx + Qz + Pl<br>Gt + Qz + Ksp/Meso                                                                                                            | Opx + Bi + Qz + Ksp + Pl<br>Opx + Bi + Qz + Pl<br>Gt + Bi + Qz + Ksp + Pl                                                                  |
| Mafic rocks               | Opx + Cpx + Pl                                                                                                                                                    | Opx + Cpx + Hb + Pl                                                                                                                        |
| Metapelites               | Gt + Si + Qz + Ksp/Meso<br>Gt + Cd + Opx + Qz + Ksp ± Pl<br>Gt + Si + Opx + Qz + Ksp ± Pl<br>Sa + Qz, and Os in a wide range of assemblages<br>Ru stable Ti oxide | Gt + Si + Bi + Qz + Ksp ± Pl<br>Gt + Cd + Opx + Bi + Qz + Ksp ± Pl<br>Gt + Cd + Si + Bi + Qz + Ksp ± Pl<br><br>Il stable Ti oxide; Ru rare |
| Meta-ironstones           | Mt + Opx + Qz ± Gt                                                                                                                                                | Rare                                                                                                                                       |
| Calc-silicate rocks, etc. | Rare                                                                                                                                                              | Di + Hb + Pl ± Gt<br>Impure marble                                                                                                         |
| Intrusives                | Bi granite; Opx granite, granodiorite, and tonalite; minor pegmatite. Tholeiite dykes abundant.                                                                   | Bi granite; Opx-Hb granite; abundant pegmatite.<br>No unmetamorphosed tholeiite dykes.                                                     |

Mineral abbreviations: Bi, biotite; Cd, cordierite; Cpx, clinopyroxene; Di, diopside; En, enstatite; Fd, feldspar; Gt, garnet; Hb, hornblende; Hy, hypersthene; Il, ilmenite; Ksp, K-feldspar; Ky, kyanite; Meso, mesoperthite; Mt, magnetite; Opx, orthopyroxene; Os, osumilite; Pl, plagioclase; Px, pyroxene; Qz, quartz; Ru, rutile; Sa, sapphirine; Si, sillimanite; Sp, spinel.

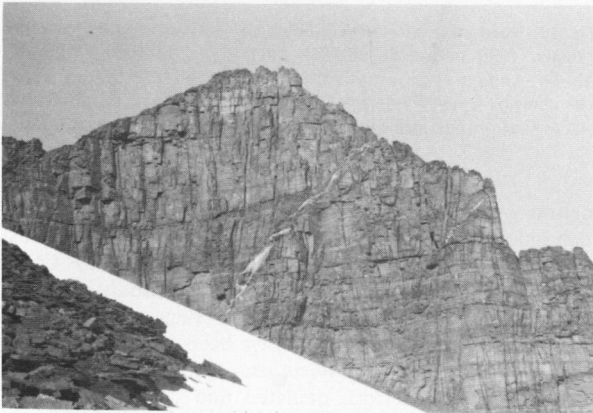


Fig. 7. Massive orthopyroxene-quartz-mesoperthite gneiss (granitic orthogneiss) with cross-cutting pegmatites; Mount Selwood, Tula Mountains. Height of cliff: about 150 m. (M2041)

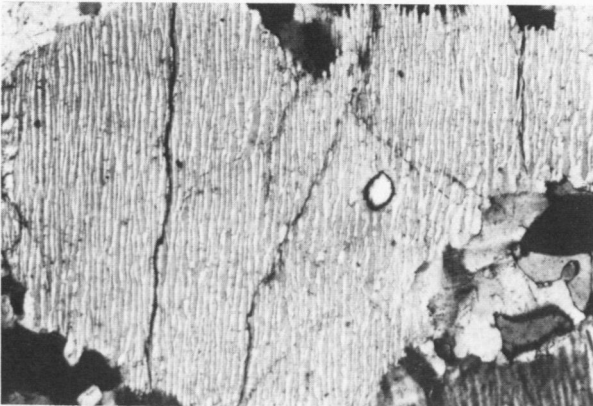


Fig. 8. Mesoperthite in leucogneiss; Mount Marsland, northern Scott Mountains (BMR registered sample number 77283414). Cross-polarised light; width of field: 1.5 mm. (M2643)

and southern Scott Mountains (Fig. 6). The latter contains calcic oligoclase or andesine antiperthite, but little or no orthoclase perthite. In other areas, sodic and potassic gneisses are both common. Relatively mafic layers contain more

TABLE 2. AREA SCAN MICROPROBE ANALYSES OF MESOPERTHITES

|                                | <i>A</i> | <i>B</i> | <i>C</i> | <i>D</i> | <i>E</i> |
|--------------------------------|----------|----------|----------|----------|----------|
| SiO <sub>2</sub>               | 62.55    | 62.48    | 62.86    | 63.52    | 64.36    |
| Al <sub>2</sub> O <sub>3</sub> | 22.94    | 22.50    | 22.25    | 21.20    | 20.01    |
| CaO                            | 4.74     | 3.86     | 3.22     | 2.12     | 1.27     |
| Na <sub>2</sub> O              | 6.26     | 5.67     | 5.79     | 4.67     | 3.80     |
| K <sub>2</sub> O               | 3.51     | 5.50     | 5.88     | 8.49     | 10.56    |
| <i>Cations per 8 oxygens</i>   |          |          |          |          |          |
| Si                             | 2.795    | 2.810    | 2.827    | 2.875    | 2.927    |
| Al                             | 1.208    | 1.193    | 1.179    | 1.131    | 1.073    |
| Ca                             | 0.227    | 0.186    | 0.155    | 0.103    | 0.062    |
| Na                             | 0.543    | 0.494    | 0.505    | 0.410    | 0.335    |
| K                              | 0.200    | 0.315    | 0.338    | 0.490    | 0.613    |
| Sum                            | 4.973    | 4.998    | 5.004    | 5.009    | 5.010    |

- A. Sillimanite-garnet-quartz-mesoperthite gneiss, Mount Torckler (76283235).
- B. Orthopyroxene-quartz-mesoperthite gneiss, Mount Smethurst (76283222).
- C. Orthopyroxene-quartz-mesoperthite gneiss, Mount Pardoe (76283057).
- D. Garnet-quartz-mesoperthite gneiss, Mount Ryder (76283202).
- E. Garnet-quartz-mesoperthite gneiss, Mount Jewell (76283282).

pyroxene (up to 25%), including clinopyroxene in some rocks, and andesine is the usual feldspar, K-feldspar generally being absent. Some layers contain up to 10% garnet. Primary reddish brown biotite is more common in the Napier Mountains and in some relatively strongly foliated gneiss elsewhere; dark brownish green hornblende is a rare primary phase. Zircon, apatite, ilmenite, magnetite, and rare rutile, sphene, and allanite occur as accessory minerals.

The effects of retrograde metamorphism are widespread in the Napier Mountains and in localised shear zones in the Amundsen Bay-Casey Bay area. They include recrystallisation of quartz and feldspar, and alteration of mafic minerals. Mesoperthite has recrystallised to plagioclase and K-feldspar (orthoclase or microcline), and pyroxene is wholly or partly replaced by fine-grained aggregates of biotite or actinolitic amphibole, quartz, and, in some places, minor carbonate and opaque minerals. Orthopyroxene is commonly altered to biotite, although thin rims of cummingtonite may be present, and some grains have been altered to a yellowish



brown iddingsite-like material. Clinopyroxene, where present, tends to be replaced by amphibole (hornblende or actinolite). Feldspar generally shows sericitic or saussuritic alteration.

The relative homogeneity and lack of any marked compositional layering in much of the orthopyroxene-quartz-feldspar gneiss are consistent with derivation from igneous protoliths. The most massive varieties, such as those at Proclamation Island and Grimsley Peaks, commonly contain xenoliths of layered gneiss, mafic granulite, etc., and were clearly derived from granitic (s.l.) intrusives; however, it is possible that others may be of volcanic or even arkose origin, particularly where interlayered with metasediments. Geochemical studies support an igneous origin for most of the gneiss, which is dominantly diopside-normative. It has a wide range of composition from tonalitic to granitic, but the former is particularly abundant (Figs. 9 & 10). Like Archaean orthogneisses from elsewhere, much of that in the Napier Complex (mainly of tonalitic to granodioritic composition) is depleted in Y and heavy rare-earth elements (HREE), which may be explained by partial

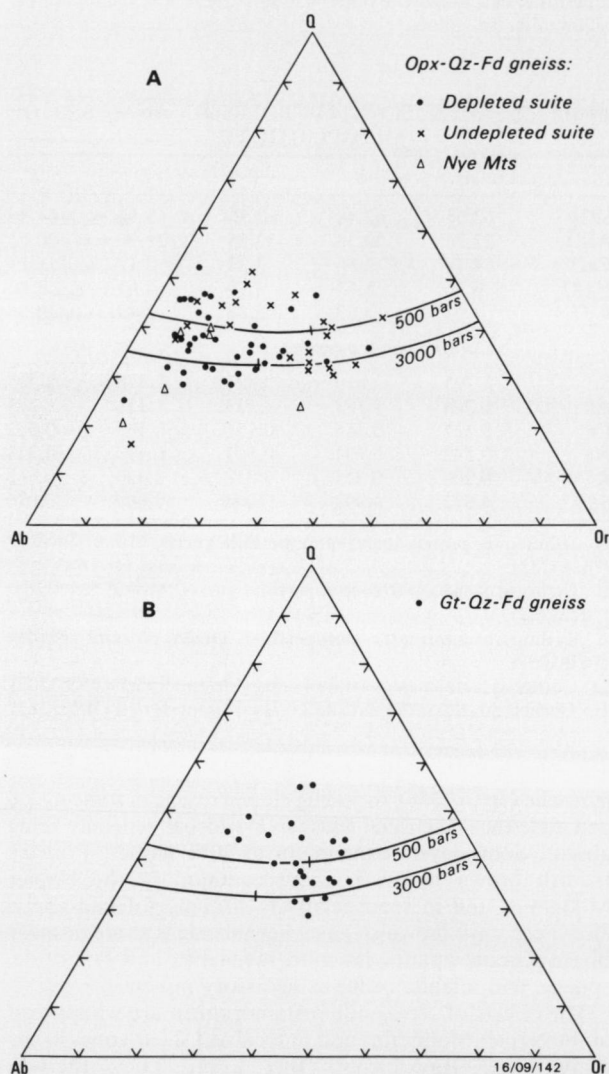


Fig. 9. Normative Q-Ab-Or diagrams for felsic gneisses from the Napier Complex and part of the Rayner Complex (Nye Mountains), showing quartz-feldspar field boundaries at 500 and 3000 bars  $P_{H_2O}$  and positions of quaternary isobaric minima (after Tuttle & Bowen, 1958). Depleted orthogneisses have relatively low Y and HREE contents and are predominantly of tonalitic and granodioritic composition, whereas undepleted orthogneisses are mostly of trondhjemitic and granitic composition.

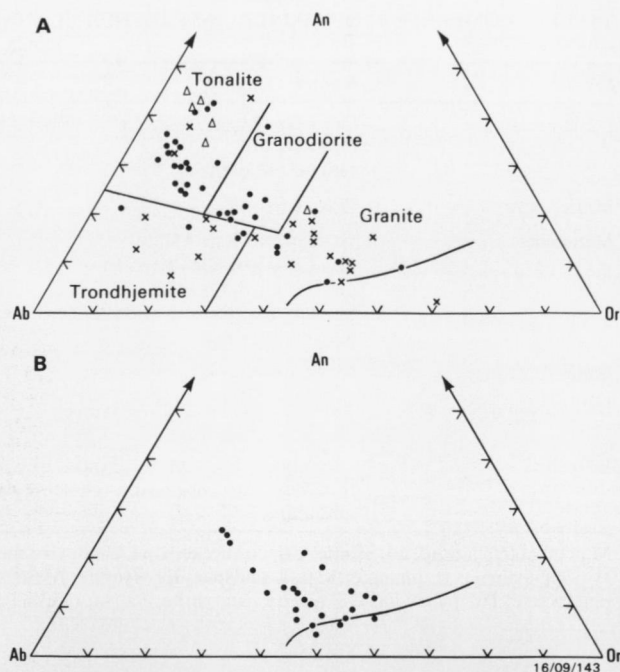


Fig. 10. Normative Ab-Or-An diagrams showing plagioclase-alkali feldspar field boundary at 1000 bars  $P_{H_2O}$ , projected onto the Ab-Or-An face of the tetrahedron (after James & Hamilton, 1969). The compositional fields are essentially those of O'Connor (1965), except that granite and quartz monzonite are combined as granite. Symbols as in Fig. 9A, B.

melting of a hornblende ( $\pm$  garnet)-bearing mafic source; such gneiss apparently represents new continental crust (Sheraton & Black, 1983; Sheraton & others, 1985). Other Napier Complex orthogneiss, mostly of trondhjemitic or granitic composition, does not show such Y and HREE depletion, and is considered to have been derived by partial melting of predominantly felsic crustal rocks leaving major residual plagioclase. Both 'depleted' and 'undepleted' suites show evidence for loss of Rb (relative to K), Th, and U during metamorphism, but Ba is generally high (Table 3).

### Mafic granulite

Mafic granulite and gneiss are commonly interlayered with felsic gneiss, individual layers rarely being more than a few metres thick. Most layers are massive, medium-grained, and granoblastic-polygonal, with compositions indicative of an igneous origin; many probably represent minor intrusions (dykes or sills). They include both olivine and quartz tholeiites of generally similar composition to the Amundsen Dykes (Table 4, Figs. 36 to 38), although mostly somewhat more depleted in large-ion lithophile elements (especially Rb; Sheraton, 1984). Andesine-labradorite (40–65%), orthopyroxene (15–30%), and clinopyroxene (10–25%) are major constituents; olive-green hornblende rarely exceeds 5%, and reddish brown biotite, ilmenite, magnetite, and apatite are minor phases. Up to 5% quartz is present in some rocks, but very rarely in association with primary hornblende. Actinolite and hornblende are the main alteration products of pyroxene in retrogressed granulites, but biotite envelops opaque grains. Secondary garnet occurs locally rimming pyroxene in or near shear zones, mainly in the Amundsen Bay-Khmara Bay area and at Gromov Nunataks. However, garnet-orthopyroxene-clinopyroxene-plagioclase granulite, with apparently primary garnet, crops out at Fyfe Hills.

A large body of massive mafic granulite, presumably a metagabbro, makes up much of Mount Biscoe, but has not been studied in detail. It contains sodic labradorite (60%),

orthopyroxene (10–15%), clinopyroxene (10–15%), hornblende (about 15%), and minor quartz, apatite, and opaque minerals (Table 4).

### Ultramafic rocks

Pods, lenses, and layers of coarse-grained (up to 10 cm) pyroxenite are widely distributed throughout the Napier Complex (Fig. 11). They are rarely more than a few metres across and probably represent boudinaged intrusive bodies. Most contain abundant orthopyroxene and clinopyroxene (websterite), but clinopyroxenite and orthopyroxenite are quite common. Pale brownish green hornblende, rarely exceeding 10%, is widespread, and olivine (mostly less than 30%) is present in some ultramafics (olivine websterite and lherzolite). Minor components are biotite or phlogopite, pale green spinel (generally in olivine-bearing rocks), plagioclase, and opaque minerals. Cumingtonite replaces orthopyroxene at the margins of some pyroxenite bodies in felsic gneiss.

Garnet pyroxenite crops out at northwest Wyers Ice Shelf, Gromov Nunataks, and several localities around Khmara Bay (Fig. 15). The garnet (up to 45%) is well crystallised and appears to be primary, i.e., distinct from the secondary garnet rims around pyroxene, which occur in many other rocks from the same area. Clinopyroxene is the other major mineral, with lesser amounts of orthopyroxene, biotite, hornblende, plagioclase and, in a few cases, quartz. Those from Gromov Nunataks contain up to 25% hornblende and 10% plagioclase. Chemical analyses (Table 4) indicate that these garnet-bearing assemblages may be confined to olivine-normative compositions (see below).

### Anorthosite

Anorthosite layers, commonly associated with leuconorite and leucogabbro, have been found at four localities in the Napier Complex (Bunt Island, Fyfe Hills, Mount Hardy, and northwest Wyers Ice Shelf). These layers are presumed to be of igneous origin, although intrusive contacts are not generally apparent, and may be genetically related to metamorphosed mafic intrusives such as that at Mount Biscoe (Table 4). At Fyfe Hills, partly boudinaged layers of metaleuconorite and metagabbro contain segregations of anorthosite (Black & others, 1983a). Most anorthosite bodies consist of labradorite and minor orthopyroxene, clinopyroxene, and opaque minerals; more mafic layers contain up to 25% pyroxene. Similar rocks have been reported from Queen (Dronning) Maud Land (Craddock, 1972a; Ravich & Kamenev, 1975).



Fig. 11. Pyroxenite pod in layered garnet–quartz–feldspar gneiss and orthopyroxene–quartz–feldspar gneiss; Fyfe Hills. Scale in cms. (M2036)

### Garnet–quartz–feldspar gneiss

White to grey, well-layered, fine to medium-grained garnet–quartz–feldspar gneiss (Figs. 12 & 13) is particularly abundant in the northern Scott, Tula, and western Napier Mountains, and the Mount King area (Fig. 6). It is commonly interlayered with pelitic and psammopelitic metasediments, as well as with the pyroxene–quartz–feldspar gneiss and pyroxene–plagioclase granulite described above.

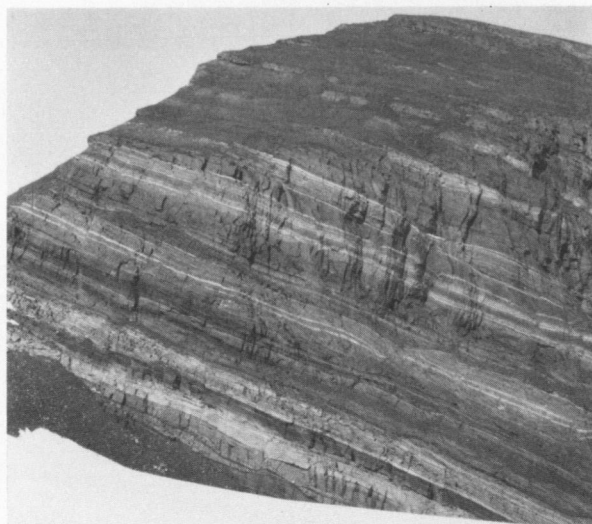


Fig. 12. Interlayered garnet–orthopyroxene–quartz–feldspar gneiss, orthopyroxene–quartz–feldspar gneiss, and metapelite; Mount Tomlinson, northern Scott Mountains. Height of cliff: about 250 m. (M2170)

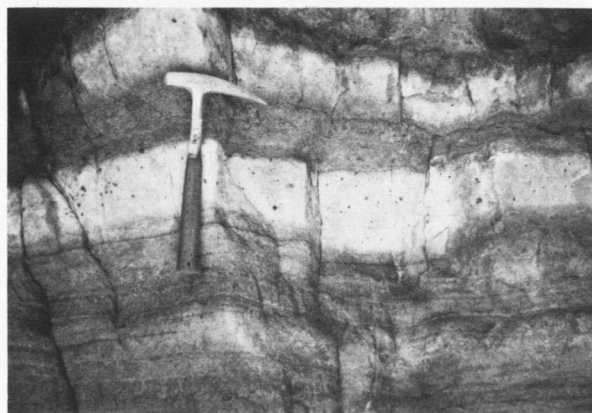


Fig. 13. Layered garnet–quartz–feldspar gneiss; Mount McLennan, northern Scott Mountains. (M2170)

Mesoperthite (60–70%), generally with  $\text{KAlSi}_3\text{O}_8$  as the predominant component (Table 2) and grading into orthoclase perthite, is the sole feldspar in most rocks; oligoclase (or rarely andesine) is confined to some less-potassic gneiss. Two-feldspar gneiss is rare, except locally in areas of recrystallisation associated with retrogression and Proterozoic shearing, but crops out, for example, at Mount Douglas, Proclamation Island, and in the eastern Napier Mountains. Other constituents are commonly rutiled quartz (25–40%), pyrope–almandine garnet (less than 8% in the majority of samples), minor zircon, ilmenite, and magnetite, and, in some rocks, apatite and rutile. Small amounts of primary, reddish brown biotite may be present (e.g., at Mount Douglas), and in retrogressed rocks garnet is partly replaced by fine-grained biotite. Some layers, particularly more mafic

TABLE 3. AVERAGE COMPOSITIONS OF FELSIC GNEISSES AND GRANITIC INTRUSIVES FROM NAPIER (A-G, I-K) AND RAYNER (H, L-N) COMPLEXES. A-H ARE ORTHOPYROXENE-QUARTZ-FELDSPAR GNEISSES

|                                | A.    | B.    | C.     | D.    | E.     | F.    | G.     | H.    | I.    | J.    | K.    | L.    | M.    | N.    |
|--------------------------------|-------|-------|--------|-------|--------|-------|--------|-------|-------|-------|-------|-------|-------|-------|
| SiO <sub>2</sub>               | 68.52 | 69.83 | 74.69  | 62.95 | 73.95  | 70.00 | 70.53  | 62.50 | 73.62 | 69.60 | 57.28 | 54.0  | 59.3  | 64.5  |
| TiO <sub>2</sub>               | 0.47  | 0.32  | 0.19   | 0.98  | 0.59   | 0.85  | 0.75   | 0.59  | 0.23  | 0.66  | 1.93  | 2.19  | 1.36  | 1.39  |
| Al <sub>2</sub> O <sub>3</sub> | 14.90 | 14.87 | 13.20  | 13.90 | 11.27  | 12.35 | 12.42  | 16.73 | 13.20 | 14.04 | 14.17 | 15.60 | 16.17 | 13.61 |
| Fe <sub>2</sub> O <sub>3</sub> | 1.63  | 1.01  | 0.77   | 2.56  | 1.57   | 1.79  | 1.86   | 2.22  | 1.21  | 1.03  | 3.26  | 4.54  | 3.44  | 2.78  |
| FeO                            | 2.57  | 2.08  | 0.89   | 6.48  | 3.04   | 3.42  | 3.31   | 3.47  | 1.59  | 2.69  | 7.32  | 5.31  | 4.24  | 4.23  |
| MnO                            | 0.05  | 0.05  | 0.03   | 0.12  | 0.05   | 0.08  | 0.06   | 0.12  | 0.05  | 0.03  | 0.13  | 0.13  | 0.13  | 0.12  |
| MgO                            | 1.87  | 1.39  | 0.52   | 2.44  | 1.32   | 1.01  | 0.85   | 2.78  | 0.75  | 0.76  | 1.79  | 3.95  | 2.12  | 1.33  |
| CaO                            | 4.11  | 2.98  | 1.71   | 4.94  | 2.10   | 2.13  | 2.31   | 5.91  | 1.59  | 1.71  | 5.93  | 6.55  | 4.74  | 3.73  |
| Na <sub>2</sub> O              | 4.22  | 4.09  | 3.23   | 3.69  | 4.00   | 2.70  | 2.93   | 3.76  | 3.14  | 2.66  | 2.75  | 2.63  | 3.11  | 2.02  |
| K <sub>2</sub> O               | 1.10  | 2.78  | 4.59   | 0.97  | 1.89   | 4.82  | 4.54   | 0.96  | 4.21  | 5.81  | 2.84  | 2.55  | 4.12  | 4.68  |
| P <sub>2</sub> O <sub>5</sub>  | 0.12  | 0.07  | 0.02   | 0.22  | 0.08   | 0.22  | 0.15   | 0.15  | 0.05  | 0.26  | 1.12  | 1.24  | 0.43  | 0.37  |
| H <sub>2</sub> O <sup>+</sup>  | 0.26  | 0.28  | 0.29   | 0.27  | 0.24   | 0.33  | 0.32   | 0.33  | 0.25  | 0.62  | 0.52  | 0.74  | 0.58  | 0.47  |
| Total                          | 99.82 | 99.75 | 100.13 | 99.52 | 100.10 | 99.70 | 100.03 | 99.52 | 99.89 | 99.87 | 99.34 | 99.43 | 99.74 | 99.23 |
| <i>C.I.P.W. Norms</i>          |       |       |        |       |        |       |        |       |       |       |       |       |       |       |
| q                              | 27.5  | 26.1  | 33.7   | 21.3  | 36.2   | 29.2  | 29.4   | 19.4  | 34.1  | 26.4  | 15.5  | 11.6  | 12.6  | 24.8  |
| c                              | —     | —     | —      | —     | —      | —     | —      | —     | 0.7   | 0.9   | —     | —     | —     | —     |
| or                             | 6.5   | 16.4  | 27.1   | 5.7   | 11.2   | 28.5  | 26.8   | 5.7   | 24.9  | 34.3  | 16.8  | 15.1  | 24.4  | 27.7  |
| ab                             | 35.7  | 34.6  | 27.3   | 31.2  | 33.9   | 22.9  | 24.8   | 31.8  | 26.6  | 22.5  | 23.3  | 22.3  | 26.3  | 17.1  |
| an                             | 18.5  | 14.0  | 8.0    | 18.5  | 7.2    | 7.3   | 7.3    | 25.9  | 7.6   | 6.8   | 17.9  | 23.2  | 18.0  | 14.3  |
| di                             | 0.9   | 0.3   | 0.3    | 3.8   | 2.2    | 1.5   | 2.7    | 2.0   | —     | —     | 3.5   | 0.9   | 2.2   | 1.5   |
| hy                             | 6.9   | 5.9   | 1.9    | 12.6  | 5.6    | 5.3   | 4.2    | 9.8   | 3.5   | 5.0   | 10.5  | 12.0  | 7.2   | 6.0   |
| mt                             | 2.4   | 1.5   | 1.1    | 3.7   | 2.3    | 2.6   | 2.7    | 3.2   | 1.8   | 1.5   | 4.7   | 6.6   | 5.0   | 4.0   |
| il                             | 0.9   | 0.6   | 0.4    | 1.9   | 1.1    | 1.6   | 1.4    | 1.1   | 0.4   | 1.3   | 3.7   | 4.2   | 2.6   | 2.6   |
| ap                             | 0.3   | 0.2   | 0.05   | 0.5   | 0.2    | 0.5   | 0.4    | 0.4   | 0.1   | 0.6   | 2.7   | 2.9   | 1.0   | 0.9   |



## Trace elements in parts per million

|                |                 |                 |                   |       |                 |      |      |       |      |      |      |      |      |      |
|----------------|-----------------|-----------------|-------------------|-------|-----------------|------|------|-------|------|------|------|------|------|------|
| V              | 45              | 37              | 13                | 121   | 17              | 27   | 32   | 103   | 17   | 23   | 73   | 173  | 83   | 80   |
| Cr             | 40 <sup>1</sup> | 41 <sup>1</sup> | 16 <sup>1</sup>   | 25    | 8               | 13   | 35   | 51    | 33   | 10   | 14   | 83   | 32   | 11   |
| Ni             | 22 <sup>1</sup> | 21 <sup>1</sup> | 10 <sup>1</sup>   | 16    | 15 <sup>1</sup> | 6    | 15   | 21    | 11   | 5    | 9    | 36   | 12   | 7    |
| Cu             | 11              | 10              | 8                 | 15    | 7               | 12   | 17   | 18    | 8    | 9    | 22   | 57   | 15   | 17   |
| Zn             | 50              | 40              | 22                | 96    | 42              | 62   | 49   | 64    | 22   | 48   | 132  | 118  | 92   | 92   |
| Ga             | 16              | 16              | 12                | 19    | 17              | 16   | 18   | 18    | 14   | 20   | 21   | 21   | 23   | 19   |
| Rb             | 14              | 50              | 117               | 13    | 22              | 102  | 117  | 7     | 123  | 203  | 65   | 84   | 126  | 213  |
| Sr             | 360             | 330             | 166               | 166   | 132             | 130  | 76   | 674   | 140  | 126  | 379  | 1060 | 406  | 239  |
| Y              | 10              | 7               | 4                 | 43    | 41              | 26   | 61   | 13    | 35   | 33   | 72   | 24   | 39   | 54   |
| Zr             | 152             | 126             | 106               | 269   | 379             | 586  | 358  | 124   | 150  | 483  | 776  | 207  | 434  | 340  |
| Nb             | 4               | 4               | 3                 | 14    | 14              | 19   | 22   | 3     | 5    | 28   | 51   | 27   | 16   | 22   |
| Ba             | 692             | 1163            | 1373              | 704   | 792             | 2310 | 1130 | 544   | 911  | 987  | 1675 | 1500 | 1485 | 1250 |
| La             | 29              | 30              | 68                | 57    | 60              | 108  | 48   | 16    | 47   | 186  | 161  | 125  | 59   | 100  |
| Ce             | 44              | 44              | 84                | 96    | 97              | 166  | 90   | 27    | 74   | 329  | 297  | 230  | 129  | 195  |
| Pb             | 10              | 20              | 29                | 11    | 10              | 23   | 10   | 5     | 38   | 51   | 19   | 19   | 26   | 23   |
| Th             | 4               | 7               | 18                | 18    | 14              | 24   | 2.2  | ~1    | 16   | 130  | 5    | 8    | 3    | 23   |
| U              | ~0.4            | ~0.7            | ~0.8 <sup>1</sup> | 1.4   | 1.4             | 1.0  | ~0.5 | ~0.3  | 1.5  | 3.8  | 0.9  | 1.0  | ~0.5 | <0.5 |
| F <sup>2</sup> | 143             | 73              | 195               | 110   | 105             | 123  | 150  | —     | 130  | 550  | 545  | —    | 780  | 1500 |
| mg             | 0.45            | 0.45            | 0.36              | 0.33  | 0.34            | 0.26 | 0.23 | 0.47  | 0.33 | 0.27 | 0.24 | 0.43 | 0.34 | 0.26 |
| K/Rb           | 650             | 461             | 326               | 619   | 713             | 392  | 322  | 1140  | 284  | 238  | 363  | 252  | 271  | 182  |
| Rb/Sr          | 0.039           | 0.15            | 0.70              | 0.078 | 0.17            | 0.78 | 1.54 | 0.010 | 0.88 | 1.61 | 0.17 | 0.08 | 0.31 | 0.89 |
| Ba/Sr          | 1.92            | 3.52            | 8.27              | 4.24  | 6.00            | 17.8 | 14.9 | 0.81  | 6.51 | 7.83 | 4.42 | 1.42 | 3.66 | 5.23 |
| Al/Ga          | 4900            | 4900            | 5800              | 3900  | 3500            | 4100 | 3650 | 4900  | 5000 | 3700 | 3600 | 3900 | 3700 | 3800 |
| Ce/Y           | 4.4             | 6.3             | 21.0              | 2.2   | 2.4             | 6.4  | 1.48 | 2.1   | 2.1  | 10.0 | 4.1  | 9.6  | 3.3  | 3.6  |
| Th/U           | ~10             | ~10             | ~11               | 13    | 10              | 24   | ~4   | ~3    | 11   | 34   | 6    | 6    | ~6   | >46  |

1. Single high values omitted when calculating means. 2. Fluorine averages based on fewer analyses. mg = atomic Mg/(Mg + total Fe). H<sub>2</sub>O<sup>+</sup>, FeO, and F determined by the Australian Mineral Development Laboratories, Adelaide; remaining elements by XRF and AAS in BMR Laboratory (see Sheraton & Labonne, 1978, for details of methods).

A. 21 depleted tonalitic gneisses

B. 12 depleted granodioritic gneisses

C. 7 depleted granitic gneisses

D. 4 undepleted tonalitic gneisses

E. 6 undepleted trondhjemitic gneisses

F. 6 undepleted granitic gneisses

G. 6 undepleted granitic gneisses from Proclamation Island.

H. 5 tonalitic gneisses from Nye Mountains

I. 24 garnet-quartz-feldspar gneisses from Napier Complex

J. 6 biotite granites from Napier Mountains

K. 4 orthopyroxene granodiorites from Tange Promontory

L. Hornblende-biotite granodiorite from Mount Sibiriyakov (77284603)

M. 2 hornblende-orthopyroxene granites from Sandercock Nunataks (77284366,8)

N. 2 foliated biotite-hornblende granites from Vechernyy Hill (77284678,9)

TABLE 4. AVERAGE COMPOSITIONS OF MAFIC GRANULITES AND DYKES FROM NAPIER (A-J, L, N) AND RAYNER (K, M) COMPLEXES

|                                            | A.    | B.    | C.     | D.    | E.     | F.    | G.    | H.    | I.    | J.    | K.    | L.    | M.    | N.    |
|--------------------------------------------|-------|-------|--------|-------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| SiO <sub>2</sub>                           | 50.34 | 52.2  | 50.8   | 49.98 | 51.29  | 51.4  | 55.4  | 49.55 | 49.89 | 46.3  | 48.7  | 43.1  | 49.8  | 51.15 |
| TiO <sub>2</sub>                           | 0.91  | 0.80  | 0.43   | 0.80  | 1.30   | 0.52  | 0.69  | 1.46  | 2.49  | 3.02  | 1.35  | 0.90  | 1.00  | 3.26  |
| Al <sub>2</sub> O <sub>3</sub>             | 14.61 | 17.10 | 25.1   | 4.52  | 13.49  | 8.86  | 13.59 | 13.46 | 13.86 | 14.25 | 13.45 | 13.60 | 13.33 | 8.87  |
| Fe <sub>2</sub> O <sub>3</sub>             | 2.48  | 1.53  | 2.62   | 3.74  | 4.29   | 2.15  | 1.47  | 3.70  | 4.37  | 4.88  | 3.41  | 3.29  | 2.46  | 2.41  |
| FeO                                        | 9.49  | 7.32  | 2.68   | 12.20 | 9.44   | 8.27  | 8.61  | 9.98  | 9.33  | 12.32 | 10.30 | 14.33 | 9.77  | 4.05  |
| MnO                                        | 0.21  | 0.14  | 0.06   | 0.28  | 0.22   | 0.18  | 0.17  | 0.22  | 0.19  | 0.27  | 0.23  | 0.36  | 0.23  | 0.10  |
| MgO                                        | 8.14  | 6.30  | 2.54   | 17.24 | 6.06   | 17.93 | 7.48  | 6.55  | 5.64  | 5.08  | 7.10  | 9.62  | 8.19  | 8.01  |
| CaO                                        | 10.30 | 9.94  | 11.81  | 8.39  | 10.23  | 7.25  | 8.37  | 10.98 | 9.79  | 8.32  | 11.77 | 12.85 | 11.58 | 5.08  |
| Na <sub>2</sub> O                          | 2.49  | 3.13  | 3.15   | 0.64  | 2.57   | 1.34  | 1.82  | 2.43  | 2.37  | 2.61  | 2.02  | 0.85  | 2.41  | 1.09  |
| K <sub>2</sub> O                           | 0.29  | 0.38  | 0.58   | 0.66  | 0.64   | 0.54  | 1.27  | 0.38  | 0.82  | 1.51  | 0.24  | 0.14  | 0.25  | 8.75  |
| P <sub>2</sub> O <sub>5</sub>              | 0.10  | 0.21  | 0.02   | 0.05  | 0.17   | 0.07  | 0.10  | 0.14  | 0.31  | 0.36  | 0.10  | 0.19  | 0.10  | 3.10  |
| H <sub>2</sub> O <sup>+</sup>              | 0.22  | 0.32  | 0.26   | —     | 0.34   | 0.37  | 0.46  | 0.54  | 0.71  | 0.63  | 1.31  | 0.30  | 0.35  | 0.84  |
| Total                                      | 99.58 | 99.37 | 100.05 | 98.50 | 100.04 | 98.88 | 99.43 | 99.39 | 99.77 | 99.55 | 99.98 | 99.53 | 99.47 | 98.55 |
| <i>C.I.P.W. Norms</i>                      |       |       |        |       |        |       |       |       |       |       |       |       |       |       |
| q                                          | —     | 0.9   | 1.5    | —     | 3.6    | —     | 8.3   | 1.3   | 4.7   | —     | 0.7   | —     | —     | 2.7   |
| or                                         | 1.7   | 2.3   | 3.4    | 3.9   | 3.8    | 3.2   | 7.5   | 2.3   | 4.9   | 8.9   | 1.4   | 0.8   | 1.5   | 48.4  |
| ab                                         | 21.1  | 26.5  | 26.7   | 5.4   | 21.8   | 11.3  | 15.4  | 20.6  | 20.1  | 22.1  | 17.1  | 7.2   | 20.4  | —     |
| an                                         | 27.8  | 31.5  | 52.6   | 7.5   | 23.4   | 16.6  | 25.2  | 24.7  | 24.8  | 22.7  | 26.9  | 32.9  | 24.8  | —     |
| di                                         | 18.5  | 13.5  | 4.7    | 27.3  | 21.6   | 15.1  | 12.9  | 23.7  | 17.8  | 13.5  | 25.3  | 24.5  | 26.2  | —     |
| hy                                         | 22.6  | 20.2  | 6.3    | 44.9  | 16.6   | 42.2  | 26.1  | 17.9  | 15.1  | 12.5  | 19.5  | 5.5   | 16.0  | 22.2  |
| ol                                         | 2.1   | —     | —      | 2.5   | —      | 5.8   | —     | —     | —     | 5.6   | —     | 21.4  | 4.6   | —     |
| mt                                         | 3.6   | 2.2   | 3.8    | 5.4   | 6.2    | 3.1   | 2.1   | 5.4   | 6.3   | 7.1   | 5.0   | 4.8   | 3.6   | —     |
| il                                         | 1.7   | 1.5   | 0.8    | 1.5   | 2.5    | 1.0   | 1.3   | 2.8   | 4.7   | 5.7   | 2.6   | 1.7   | 1.9   | 6.2   |
| ap                                         | 0.2   | 0.5   | 0.05   | 0.1   | 0.4    | 0.2   | 0.2   | 0.3   | 0.7   | 0.9   | 0.2   | 0.5   | 0.2   | 7.3   |
| <i>Trace elements in parts per million</i> |       |       |        |       |        |       |       |       |       |       |       |       |       |       |
| V                                          | 229   | 158   | 166    | 114   | 286    | 181   | 193   | 326   | 343   | 282   | 414   | 261   | 260   | 158   |
| Cr                                         | 303   | 131   | 969    | 1695  | 59     | 2220  | 454   | 123   | 71    | 36    | 85    | 98    | 260   | 308   |
| Ni                                         | 125   | 104   | 63     | 893   | 45     | 628   | 141   | 70    | 65    | 41    | 71    | 55    | 105   | 265   |
| Cu                                         | 30    | 112   | 16     | 49    | 90     | 42    | 25    | 139   | 96    | 50    | 224   | 16    | 54    | 52    |
| Zn                                         | 123   | 80    | 36     | 107   | 98     | 60    | 73    | 99    | 109   | 130   | 93    | 106   | 105   | 83    |
| Ga                                         | 18    | 20    | 22     | 8     | 18     | 10    | 17    | 17    | 19    | 21    | 17    | 17    | 16    | 14    |
| Rb                                         | 4     | 5     | 8      | 20    | 16     | 20    | 62    | 12    | 23    | 46    | 8     | ~1    | 2     | 156   |
| Sr                                         | 139   | 266   | 215    | 273   | 204    | 162   | 113   | 149   | 398   | 241   | 119   | 29    | 150   | 2700  |
| Y                                          | 23    | 38    | 14     | 29    | 28     | 11    | 19    | 30    | 28    | 48    | 29    | 74    | 23    | 34    |
| Zr                                         | 62    | 52    | 26     | 72    | 95     | 55    | 104   | 92    | 168   | 207   | 67    | 120   | 59    | 1665  |
| Nb                                         | 4     | 11    | 1      | 7     | 4      | 2     | 6     | 4     | 15    | 26    | 2     | 5     | 4     | 54    |
| Ba                                         | 92*   | 107   | 186    | 312   | 238    | 234   | 274   | 124   | 321   | 753   | 48    | 43    | 85    | 12130 |
| La                                         | 10    | 13    | 7      | 20    | 15     | 9     | 16    | 9     | 24    | 42    | 3     | 21    | 8     | 159   |
| Ce                                         | 18    | 22    | 10     | 48    | 27     | 15    | 34    | 17    | 49    | 73    | 6     | 45    | 13    | 293   |
| Pb                                         | 5     | 4     | 11     | 3     | 3      | 2     | 13    | 3     | 3     | 7     | 1     | ~1    | 2     | 48    |
| Th                                         | 1     | 1     | <1     | ~1    | 2      | 2     | 9     | 2     | 3     | 8     | 1     | ~2    | ~1    | 22    |
| U                                          | 0.5   | <0.5  | 0.5    | ~0.5  | 0.5    | 0.5   | 2.0   | 0.5   | 0.6   | 1.0   | <0.5  | ~1    | <0.5  | 8     |
| As                                         | ~0.7  | —     | —      | —     | 0.6    | 1.5   | 5.5   | 0.5   | 0.8   | —     | —     | —     | —     | 2.0   |
| mg                                         | 0.55  | 0.56  | 0.47   | 0.66  | 0.44   | 0.75  | 0.57  | 0.46  | 0.43  | 0.35  | 0.48  | 0.49  | 0.54  | 0.69  |

A. Average of 10 mafic granulites from Napier Complex

(\* high value of 374 ppm Ba excluded from average).

B. Average of 2 metagabbros from Mount Bischoe (77284308,9).

C. Anorthosite from Mount Hardy (77284628).

D. Average of 4 metapyroxenite dykes (B<sub>1</sub>: 76283244, 3250, 3259, 3276).E. Average of 7 metatholeiite dykes (B<sub>2</sub>).F. Norite dyke (B<sub>3</sub>) from Mount Henry (77284699).G. Average of 2 high-Mg quartz tholeiites (B<sub>3</sub>: 76283258, 77284758).H. Average of 12 group II Amundsen tholeiites (B<sub>4</sub>).I. Average of 12 group I Amundsen tholeiites (B<sub>4</sub>).J. Average of 2 olivine tholeiites (B<sub>4</sub>: 76283012, 78285051).

K. Metamorphosed tholeiite dyke from Rayner Complex, Georges Islands (77284813).

L. Average of 4 garnet + clinopyroxene ± orthopyroxene ± plagioclase granulites from Napier Complex.

M. Average of 5 garnet + clinopyroxene + plagioclase ± orthopyroxene granulites from Rayner Complex.

N. Average of 4 alkali melasyenite dykes (B<sub>5</sub>: 77283949C, 49D, 50, 51A).(Total includes 0.08% CO<sub>2</sub>, 0.60% SO<sub>3</sub>, 1.12% F, 0.04% Cl; norm includes 7.0% ac, 0.3% ns, 0.9% ks, 1.7% fr, 1.8% ba).

ones, contain orthopyroxene in addition to garnet; others are comparatively rich in quartz.

Much garnetiferous gneiss may be of sedimentary (possibly arkose or greywacke) origin, as it grades into more melanocratic garnet-rich gneiss, garnet quartzite, and sillimanite-bearing metapelite. Some is considerably more K-rich than typical felsic igneous rocks, and it generally has high normative corundum. However, widespread leucocratic gneiss with only minor (less than about 4%) garnet has a composition close to the granite minimum (Table 3; Figs. 9 & 10), and probably represents metamorphosed felsic intrusive or extrusive igneous rocks (Sheraton & Black, 1983).

### Quartzite

Impure quartzite is interlayered with garnet-rich gneisses and pelitic metasediments at a number of localities in the northern Scott, Tula, and Napier Mountains. Garnet and, less commonly, orthopyroxene are prominent but minor constituents, and feldspar and biotite have also been recorded. A quartzite layer at Mount Sones contains several percent of orange monazite. Many quartzites are pale to dark blue, possibly reflecting the presence of Ti in the quartz (Jayaraman, 1939). Much of the quartz in these rocks has a brownish appearance in thin section and contains abundant rutile needles. Blue quartz from a 2 cm-wide vein cutting felsic orthogneiss in the Vestfold Hills (Princess Elizabeth Land) contains about 160 ppm Ti (0.027% TiO<sub>2</sub>; Sheraton, unpublished data). More melanocratic garnet-orthopyroxene-quartz layers are generally associated with the quartzite, and rusty weathering garnet-perthite-quartz gneiss, transitional to the garnet-quartz-feldspar gneiss described above, crops out in the northern Scott Mountains (e.g., Debenham and Priestley Peaks).

### Magnetite-rich rocks

Layers and lenses of massive, medium-grained magnetite-rich quartzite are widespread, but are rarely more than a few metres thick. They contain quartz, magnetite (mostly 10–30%), orthopyroxene (10–40%), less commonly garnet (up to 40%), and minor clinopyroxene and amphibole (Fig. 14). The occurrence of clinopyroxene exsolution lamellae in orthopyroxene indicates inversion of primary metamorphic pigeonite with compositions at least as calcic as Ca<sub>10</sub>Mg<sub>22</sub>Fe<sub>68</sub> and Ca<sub>7</sub>Mg<sub>22</sub>Fe<sub>71</sub> (Sheraton, unpublished data; Harley, 1983). Coarser intergrowths of orthopyroxene and clinopyroxene may also represent inverted pigeonite or subcalcic ferroaugite. A similar, but more extensive ironstone body, which extends for at least 800 m, crops out at Newman Nunataks. It contains up to 40% by volume of magnetite

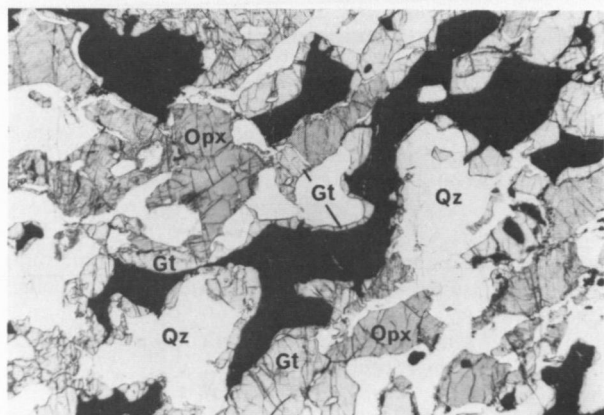


Fig. 14. Garnet-orthopyroxene-magnetite-quartz rock (mineral abbreviations as in Table 1); Mount Jewell. Sample 76283286; width of field: 7 mm. (M2643)

and has a total Fe content of 30–40 wt.% (Pieters & Wyborn, 1977). Mn- and Ba-rich ironstone (magnetite + spessartine + Mn-hedenbergite + hyalophane + quartz) crops out at Fyfe Hills (Sandiford & Wilson, 1986; Sandiford, in preparation).

### Aluminous metasediments

Pelitic and psammopelitic metasediments are interlayered with garnet-quartz-feldspar gneiss and quartzite at many localities in the Amundsen Bay area and Napier Mountains. They include rocks containing a number of rare high-temperature mineral associations, i.e., sapphirine + quartz, spinel + quartz, orthopyroxene + sillimanite + quartz, and osumilite, in a wide variety of assemblages, many of which have been recorded in granulites for the first time (Ellis, 1979; Ellis & others, 1980).

The most widespread assemblage, occurring throughout the Napier Complex, but particularly in the northern Scott and Tula Mountains, is garnet + sillimanite + K-feldspar + quartz. The feldspar is typically orthoclase perthite or mesoperthite, but antiperthite is present in a few places. Greenish brown spinel, reddish brown biotite, ilmenite, magnetite, and rutile are widespread minor phases, although spinel is locally quite abundant (up to 10%). Rutile is the predominant titanium mineral in most pelitic rocks; corundum, zircon, and monazite are rare. Kyanite is rare, and occurs only in aluminous rocks in younger shear zones, mainly in the Amundsen Bay-Khmara Bay area (see below).

Primary cordierite is largely confined to the Napier Mountains (Fig. 15), where the typical assemblage is cordierite + orthopyroxene + quartz + (K-feldspar ± plagioclase)/mesoperthite ± garnet. The more aluminous assemblage cordierite + garnet + sillimanite + quartz ± K-feldspar ± plagioclase was found only at Mount Sones and Newman and Wallis Nunataks, and cordierite + sillimanite + biotite + corundum at Mount Mueller. Possible primary cordierite occurs in association with sapphirine, orthopyroxene, and quartz at Mount Hardy, and with osumilite, sillimanite and quartz at Brusilov Nunataks. Elsewhere in the Napier Complex, cordierite is generally only present in reaction rims around aluminous phases, such as sapphirine and spinel. Rutile is a prominent accessory mineral, and in a few cases has pleochroic haloes in adjacent cordierite.

The association sillimanite + orthopyroxene + quartz, which defines the high-pressure stability limit of cordierite (Chatterjee & Schreyer, 1972; Newton, 1972; Annersten & Seifert, 1981), occurs mainly in the northern Scott Mountains and Casey Bay area (near Hydrographer and McIntyre Islands and Forefinger Point) (Fig. 15), although it has also been reported from Mount Riiser-Larsen and Mount Torckler (Grew, 1980, and personal communication; Motoyoshi & Matsueda, 1984) and 'Spot Height 945'. The most common assemblage is orthopyroxene + sillimanite + quartz + (K-feldspar ± plagioclase)/mesoperthite ± garnet ± biotite, and some rocks contain sapphirine as an additional phase (see below).

Sapphirine occurs over a wide area of the Napier Complex in silica-deficient aluminous rocks, which mostly form lenses and pods in layered gneiss. The most common assemblage is sapphirine + orthopyroxene ± spinel ± phlogopite ± cordierite, present at Mounts Elkins and Kjerringa, Young Nunataks, Latham Peak, and Gage Ridge; it is similar to that in a xenolith in orthopyroxene granite (charnockite) at Mawson Station (Segnit, 1957; Sheraton & others, 1982). Granulites comprising sapphirine + orthopyroxene + sillimanite + spinel, sapphirine + garnet + plagioclase + corundum, and sapphirine + orthopyroxene + garnet crop out in the Khmara Bay area (Sandiford & Wilson, 1986). Many of these granulites have exceptionally magnesian



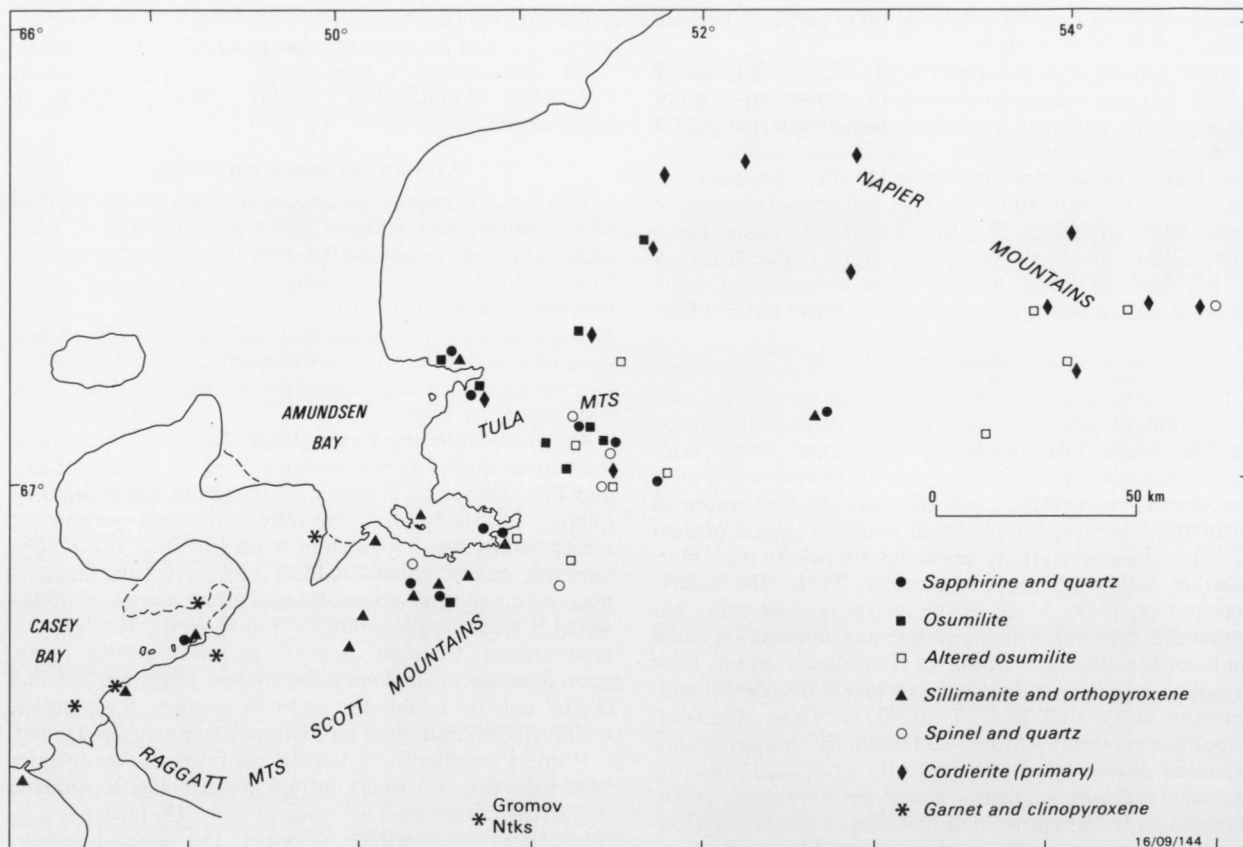


Fig. 15. Distribution of sapphirine, osumilite, cordierite, spinel, and orthopyroxene + sillimanite in quartz-bearing metapelites, and garnet + clinopyroxene in mafic and ultramafic rocks of the Napier Complex.

compositions (Table 5) and contain very pale blue to colourless sapphirine [up to  $\text{mg} = \text{atomic Mg}/(\text{Mg} + \text{total Fe})$ , 0.99], pale green to colourless spinel, and colourless enstatite and phlogopite (Table 6). The granulites may have been formed by metamorphism of hydrothermally altered mafic or ultramafic igneous rocks, or possibly from evaporite-rich sediments (Sheraton, 1980; Sheraton & others, 1982).

The rare high-temperature association of sapphirine + quartz (Chatterjee & Schreyer, 1972; Newton, 1972; Henson & Green, 1973) is of somewhat more restricted occurrence, but appears instead of cordierite in a variety of assemblages over much of the Napier Complex. It has been found at nine localities (Mounts Hardy, Hollingsworth, and Reed; Beaver, Bunt, and McIntyre Islands; Gage Ridge; Reference Peak; and Spot Height 945), mainly in the northern Scott and Tula Mountains (Fig. 15), and has also been reported from Mounts Riiser-Larsen and Torckler by Grew (1980, and personal communication) and Motoyoshi & Matsueda (1984). Mg-rich sapphirine (Table 7) occurs as pale to dark blue pleochroic grains up to 1 cm across in aluminous layers, commonly interlayered with massive cream or bluish impure quartzite (Fig. 16), or in association with garnet-quartz-feldspar gneiss and sillimanite-garnet-quartz-feldspar gneiss. Small amounts of sapphirine are also present in some of the quartzites. The aluminous layers are generally folded and discontinuous, ranging up to a metre or so in thickness, but are typically only a few centimetres thick. Thinner layers contain up to 50% sapphirine and in some cases have garnet or orthopyroxene-rich selvages, whereas most thicker layers have less sapphirine which occurs as scattered, irregularly distributed grains. In some rocks, sapphirine forms vermicular intergrowths with quartz in proportions suggesting a prograde reaction involving replacement of cordierite

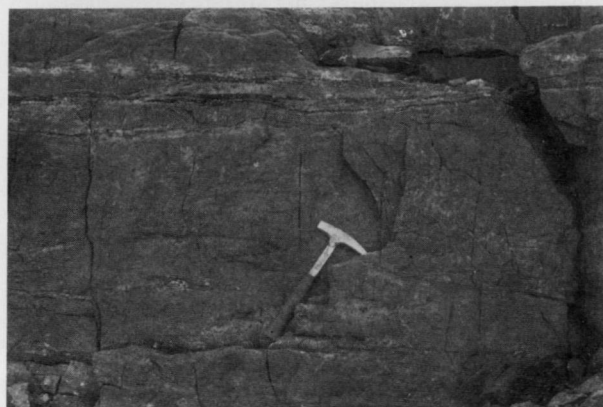


Fig. 16. Folded ( $F_1$ ) sapphirine-rich layers (dark) in bluish quartzite; spot height 945, Tula Mountains. (M2039)

(Fig. 17). Sapphirine is commonly separated from quartz by reaction rims composed of one or more of sillimanite, garnet, cordierite, and orthopyroxene (Figs. 18 & 19). Nevertheless, it is in contact with quartz in many places (Figs. 17 & 20), and in others the reaction rims are very thin ( $<0.05$  mm) and clearly resulted from retrograde reactions during cooling (see below).

Commonly associated with sapphirine and quartz is osumilite of composition near  $\text{K}_{0.93}\text{Na}_{0.13}\text{Mg}_{2.04}\text{Fe}_{0.21}\text{Al}_{4.60}\text{Si}_{10.16}\text{O}_{30}$  (Table 7). Osumilite was first described from metamorphic rocks in the Nain Complex of Labrador by Berg & Wheeler (1976), but in Enderby Land it is regionally widespread (Fig. 15). It has been reported from nine localities, mainly in the Tula Mountains (Mounts Bartlett, Dungey,

TABLE 5. COMPOSITIONS OF REPRESENTATIVE SAPPHIRINE AND OSUMILITE-BEARING METAPELITES FROM THE NAPIER COMPLEX

|                                            | A.    | B.    | C.     | D.    | E.     | F.    | G.    | H.    |
|--------------------------------------------|-------|-------|--------|-------|--------|-------|-------|-------|
| SiO <sub>2</sub>                           | 37.0  | 47.5  | 58.4   | 67.1  | 68.2   | 71.4  | 73.4  | 77.0  |
| TiO <sub>2</sub>                           | 0.73  | 1.26  | 0.65   | 0.74  | 0.94   | 0.35  | 0.72  | 0.05  |
| Al <sub>2</sub> O <sub>3</sub>             | 32.2  | 31.7  | 20.50  | 20.8  | 13.09  | 15.10 | 11.42 | 13.38 |
| Fe <sub>2</sub> O <sub>3</sub>             | 0.34  | 2.21  | 1.22   | 1.06  | 1.08   | 0.46  | 0.12  | 0.39  |
| FeO                                        | 0.24  | 5.95  | 3.35   | 2.26  | 5.55   | 5.45  | 1.75  | 1.24  |
| MnO                                        | 0.01  | 0.06  | 0.08   | 0.04  | 0.03   | 0.08  | 0.01  | 0.01  |
| MgO                                        | 27.9  | 9.21  | 11.09  | 5.84  | 10.57  | 3.86  | 4.55  | 3.53  |
| CaO                                        | 0.13  | 0.02  | 0.22   | <0.01 | 0.06   | 0.11  | 0.70  | 0.24  |
| Na <sub>2</sub> O                          | 0.09  | 0.12  | 1.79   | 0.12  | 0.07   | 0.22  | 2.34  | 0.91  |
| K <sub>2</sub> O                           | 0.68  | 1.10  | 3.01   | 1.02  | 0.01   | 1.68  | 2.20  | 2.61  |
| P <sub>2</sub> O <sub>5</sub>              | 0.04  | 0.01  | 0.05   | <0.01 | 0.02   | 0.04  | 0.02  | 0.03  |
| H <sub>2</sub> O <sup>+</sup>              | 0.60  | 0.65  | 0.23   | 0.54  | 0.63   | 0.26  | 0.62  | 0.40  |
| Total                                      | 99.96 | 99.79 | 100.59 | 99.52 | 100.25 | 99.01 | 97.85 | 99.79 |
| <i>Trace elements in parts per million</i> |       |       |        |       |        |       |       |       |
| V                                          | 50    | 243   | 22     | 98    | —      | —     | —     | 2     |
| Cr                                         | 7     | 1020  | 12     | 495   | 4      | 171   | 10    | 5     |
| Ni                                         | 22    | 183   | 8      | 151   | 3      | 81    | 36    | <2    |
| Cu                                         | 7     | 6     | 5      | 8     | 3      | 27    | 2     | 3     |
| Zn                                         | 3     | 25    | 108    | 18    | 14     | 24    | 22    | 23    |
| Ga                                         | 9     | 47    | 23     | 26    | —      | —     | —     | 18    |
| Rb                                         | 35    | 52    | 89     | 42    | <1     | 43    | 51    | 88    |
| Sr                                         | 5     | 10    | 60     | 11    | 1      | 19    | 37    | 21    |
| Y                                          | 10    | 52    | 5      | 18    | 21     | 35    | 1     | 6     |
| Zr                                         | 732   | 435   | 563    | 340   | 171    | 299   | 355   | 82    |
| Nb                                         | 44    | 85    | 15     | 17    | 19     | 6     | 7     | 1     |
| Ba                                         | 27    | 84    | 1160   | 76    | 8      | 291   | 1880  | 434   |
| La                                         | 38    | 4     | 134    | 10    | 23     | 6     | 4     | 15    |
| Ce                                         | 73    | 7     | 208    | 18    | 38     | 7     | 4     | 23    |
| Pb                                         | 26    | <1    | 9      | 2     | <1     | 3     | 1     | 10    |
| Th                                         | 240   | 2     | 20     | 4     | 13     | <1    | <1    | 7     |
| U                                          | 7.5   | 0.5   | 0.5    | 1.0   | 1.0    | 1.0   | 0.5   | 0.5   |
| mg                                         | 0.99  | 0.67  | 0.81   | 0.76  | 0.74   | 0.54  | 0.81  | 0.80  |

- A. Sapphirine-enstatite granulite, Gage Ridge (77284338).  
B. Sapphirine-osumilite-garnet-quartz (-sillimanite) granulite, Spot Height 945 (76283350A).  
C. Sapphirine-orthopyroxene-quartz-perthite-osumilite gneiss, Mount Bartlett (79285058).  
D. Sillimanite-sapphirine-osumilite-garnet-quartz granulite, Spot Height 945 (76283362).  
E. Cordierite-sapphirine-orthopyroxene quartzite, Mount Hardy (77284633).  
F. Sillimanite-garnet-osumilite (-spinel) quartzite, Gage Ridge (77284348).  
G. Phlogopite-orthopyroxene-osumilite-quartz-plagioclase (-sapphirine) gneiss, Mount Dungey (77284249).  
H. Mesoperthite-osumilite-quartz (-sillimanite) gneiss, Brusilov Nunataks (77284125).

TABLE 6. CHEMICAL ANALYSES OF MINERALS FROM SPINEL-PHLOGOPITE-SAPPHIRINE-ENSTATITE POD IN FELSIC ORTHOGNEISS, GAGE RIDGE (77284342) (FROM SHERATON & OTHERS, 1982)

|                                | Sa    | Sp    | Opx   | Phl    |
|--------------------------------|-------|-------|-------|--------|
| SiO <sub>2</sub>               | 14.40 |       | 55.91 | 41.13  |
| TiO <sub>2</sub>               |       |       |       | 0.78   |
| Al <sub>2</sub> O <sub>3</sub> | 62.88 | 70.17 | 5.75  | 17.78  |
| FeO                            | 1.23  | 4.37  | 1.74  | 0.17   |
| MgO                            | 21.46 | 25.46 | 37.23 | 25.58  |
| Na <sub>2</sub> O              |       |       |       | 0.19   |
| K <sub>2</sub> O               |       |       |       | 9.01   |
| O                              | 10    | 4     | 6     | 22     |
| Si                             | 0.833 |       | 1.875 | 5.689  |
| Ti                             |       |       |       | 0.081  |
| Al                             | 4.283 | 1.995 | 0.227 | 2.898  |
| Fe                             | 0.060 | 0.088 | 0.048 | 0.020  |
| Mg                             | 1.850 | 0.916 | 1.860 | 5.272  |
| Na                             |       |       |       | 0.050  |
| K                              |       |       |       | 1.590  |
| Sum                            | 7.026 | 2.999 | 4.010 | 15.600 |
| mg                             | 0.969 | 0.912 | 0.975 | 0.996  |

Hardy, and Riiser-Larsen; Brusilov Nunataks; Reference Peak; Gage Ridge; Spot Height 945; and the nunataks 15 km south-southwest of Latham Peak) (Sheraton & others, 1980;

Grew, 1982a). Enderby Land osumilite forms colourless to bright blue grains up to 1 cm across which generally have a slightly opalescent (moonstone) appearance. In thin section, it is colourless or has a faint brownish pleochroism, has a marked basal cleavage, and is length-fast with first-order grey to yellow interference colours (Fig. 21). Locally it mantles sapphirine or other minerals. In all specimens examined, the osumilite has been partly altered to a fine-grained intergrowth (symplectite) of cordierite, K-feldspar, quartz, and minor orthopyroxene (Table 7), which ranges in grain size from almost submicroscopic to about 0.05 mm (Figs. 22 & 23). More extensive alteration and recrystallisation results in a coarser-grained symplectite, and ultimately discrete crystals of cordierite, etc., are formed. The occurrence of the characteristic symplectite at many other places from the northern Scott to the Napier Mountains indicates a much wider original distribution of osumilite (Fig. 15).  
Other primary minerals in association with sapphirine and/or osumilite include garnet (pyrope-almandine), sillimanite, orthopyroxene, cordierite, spinel, phlogopite, orthoclase perthite, mesoperthite, plagioclase, rutile, and rare zircon, magnetite, monazite, and corundum; several of these also appear as breakdown products of sapphirine and other minerals. Typical assemblages are:  
sapphirine + osumilite + quartz  
sapphirine + orthopyroxene + quartz ± osumilite

TABLE 7. REPRESENTATIVE CHEMICAL ANALYSES OF MINERALS FROM ALUMINOUS METASEDIMENTS, MOSTLY FROM ELLIS & OTHERS (1980). MINERAL ABBREVIATIONS AS IN TABLE 1.

|                                | A.     | B.     | C.     | D.    | E.    | F.    | G.    | H.    | I.     | J.    | K.     |
|--------------------------------|--------|--------|--------|-------|-------|-------|-------|-------|--------|-------|--------|
|                                | Os     | Os     | Int    | Sa    | Sa    | Sp    | Opx   | Opx   | Cd     | Gt    | Phl    |
| SiO <sub>2</sub>               | 61.82  | 61.14  | 61.79  | 13.64 | 13.53 |       | 53.75 | 48.40 | 50.24  | 39.24 | 39.07  |
| TiO <sub>2</sub>               |        |        |        |       |       |       |       | 0.30  |        |       | 4.26   |
| Al <sub>2</sub> O <sub>3</sub> | 23.64  | 23.99  | 23.72  | 65.19 | 61.25 | 61.14 | 8.02  | 11.36 | 34.89  | 22.91 | 13.54  |
| Cr <sub>2</sub> O <sub>3</sub> |        |        |        |       | 0.36  | 5.40  |       | 0.40  |        | 0.26  | 0.36   |
| FeO                            | 1.42   | 2.28   | 2.01   | 1.22  | 8.35  | 17.83 | 4.00  | 14.81 | 2.07   | 21.21 | 4.29   |
| MnO                            |        |        |        |       |       |       |       |       |        | 0.70  |        |
| MgO                            | 8.40   | 7.78   | 7.95   | 19.95 | 16.51 | 15.63 | 34.24 | 24.73 | 12.80  | 14.51 | 21.21  |
| CaO                            |        |        |        |       |       |       |       |       |        | 1.17  |        |
| Na <sub>2</sub> O              | 0.24   | 0.20   | 0.59   |       |       |       |       |       |        |       |        |
| K <sub>2</sub> O               | 4.48   | 4.62   | 3.94   |       |       |       |       |       |        |       | 9.79   |
| O                              | 30     | 30     | 30     | 10    | 10    | 4     | 6     | 6     | 18     | 12    | 22     |
| Si                             | 10.177 | 10.116 | 10.178 | 0.787 | 0.808 |       | 1.832 | 1.738 | 4.943  | 2.934 | 5.716  |
| Ti                             |        |        |        |       |       |       |       | 0.008 |        |       | 0.469  |
| Al                             | 4.588  | 4.677  | 4.605  | 4.434 | 4.314 | 1.888 | 0.322 | 0.481 | 4.045  | 2.019 | 2.335  |
| Cr                             |        |        |        |       | 0.016 | 0.115 |       | 0.011 |        | 0.016 | 0.042  |
| Fe                             | 0.195  | 0.315  | 0.276  | 0.059 | 0.417 | 0.394 | 0.114 | 0.445 | 0.170  | 1.326 | 0.525  |
| Mn                             |        |        |        |       |       |       |       |       |        | 0.044 |        |
| Mg                             | 2.061  | 1.920  | 1.952  | 1.716 | 1.470 | 0.604 | 1.739 | 1.324 | 1.877  | 1.617 | 4.625  |
| Ca                             |        |        |        |       |       |       |       |       |        | 0.094 |        |
| Na                             | 0.077  | 0.063  | 0.187  |       |       |       |       |       |        |       |        |
| K                              | 0.941  | 0.975  | 0.829  |       |       |       |       |       |        |       | 1.828  |
| Sum                            | 18.038 | 18.066 | 18.027 | 6.996 | 7.025 | 3.001 | 4.007 | 4.007 | 11.035 | 8.049 | 15.540 |
| mg                             | 0.913  | 0.859  | 0.876  | 0.967 | 0.811 | 0.610 | 0.938 | 0.748 | 0.917  | 0.541 | 0.898  |

- A. Osumilite from sapphirine-sillimanite-garnet-osumilite-quartz granulite, Spot Height 945 (76283358).  
B. Osumilite from garnet-osumilite-plagioclase-quartz granulite, Gage Ridge (78285052).  
C. Intergrowth of Cd-Ksp-Opx-Qz after osumilite, sillimanite-quartz-garnet-sapphirine-osumilite granulite, Spot Height 945 (76283351).  
D. Sapphirine from sapphirine-osumilite-cordierite-phlogopite-quartz-sillimanite-orthopyroxene-plagioclase granulite, Reference Peak (77284773).  
E. Sapphirine from sillimanite-quartz-garnet-sapphirine-osumilite granulite, Spot Height 945 (76283350).  
F. Spinel inclusion in garnet (76283358).  
G. Orthopyroxene (77284773).  
H. Orthopyroxene from orthopyroxene-osumilite-phlogopite-quartz-garnet granulite, Spot Height 945 (76283355).  
I. Cordierite from Cd-Gt-Si reaction rim between sapphirine and quartz (76283350).  
J. Garnet (76283358).  
K. Phlogopite from osumilite-phlogopite-quartz-garnet-orthopyroxene granulite, Spot Height 945 (76283354).



Fig. 17. Intergrowth of sapphirine and quartz in sapphirine-garnet-osumilite(altered)-quartz granulite (impure quartzite); Gage Ridge, Tula Mountains. Sample 77284347; width of field: 3 mm. (M2250)

sapphirine + orthopyroxene + cordierite + quartz  
sapphirine + garnet + quartz ± osumilite  
sapphirine + osumilite + sillimanite + quartz  
sapphirine + garnet + spinel + quartz ±  
    osumilite ± sillimanite  
sapphirine + orthopyroxene + sillimanite + quartz  
    ± garnet  
sapphirine + garnet + sillimanite + quartz ± osumilite

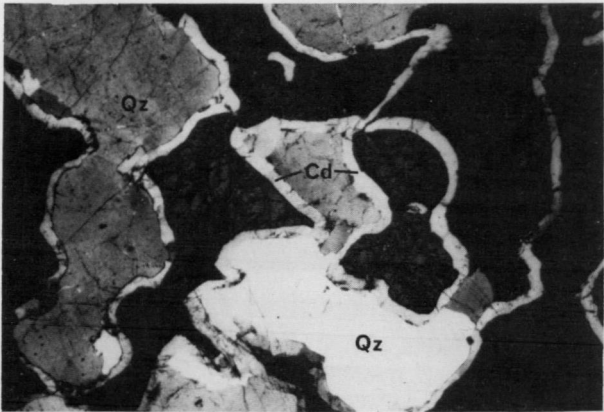


Fig. 18. Cordierite reaction rims between sapphirine and quartz, orthopyroxene-plagioclase-sapphirine-quartz granulite; Mount Hardy, Tula Mountains. Sample 77284632; cross-polarised light; width of field: 3 mm. (M2250)

sapphirine + osumilite + orthopyroxene + sillimanite  
    + quartz  
sapphirine + osumilite + orthopyroxene ± cordierite  
osumilite + quartz  
osumilite + orthopyroxene + quartz  
osumilite + sillimanite + quartz ± cordierite  
osumilite + garnet + sillimanite + quartz ± spinel



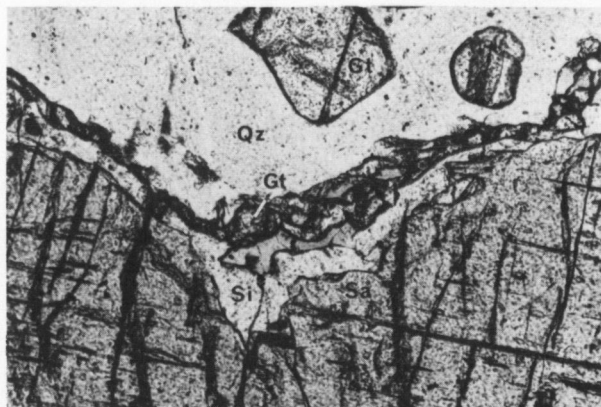


Fig. 19. Rim of sillimanite + garnet between sapphirine and quartz, sapphirine-orthopyroxene-biotite-K-feldspar-sillimanite-garnet-quartz granulite; McIntyre Island, Khmara Bay. Sample 77284271; width of field: 0.8 mm. (M2250)

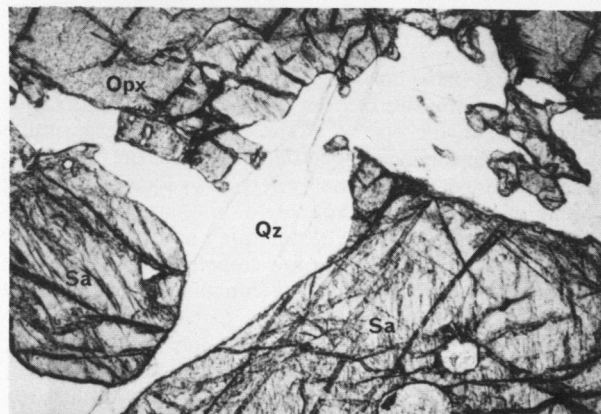


Fig. 20. Coexisting sapphirine + quartz in garnet-orthopyroxene-osumilite (altered)-sapphirine-quartz granulite; spot height 945, Tula Mountains. Sample 77283449; width of field: 3 mm (M2250)

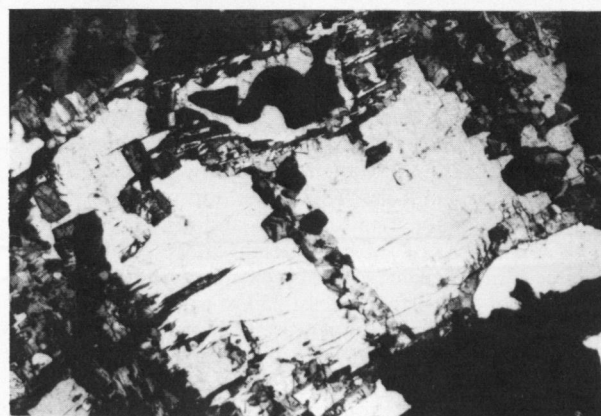


Fig. 21. Osumilite in sillimanite-osumilite-garnet-quartz granulite; Gage Ridge, Tula Mountains. Note alteration of osumilite along fractures and cleavages to a fine-grained intergrowth of cordierite + quartz + K-feldspar + orthopyroxene. Sample 77284348; cross-polarised light; width of field: 3 mm. (M2250)

osumilite + orthopyroxene + garnet + quartz ± sillimanite

osumilite + orthopyroxene + cordierite + quartz.

K-feldspar, mesoperthite, or plagioclase may be additional phases, although many samples contain little or no feldspar.

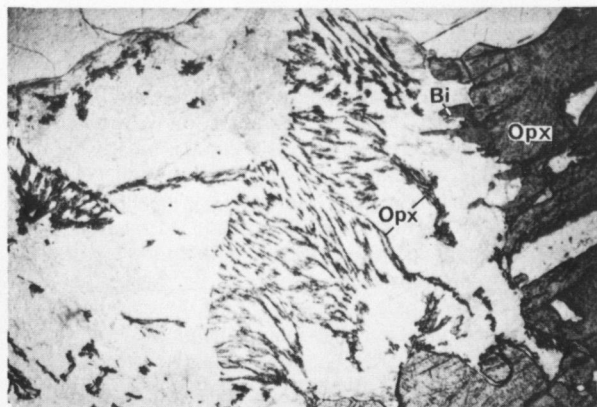


Fig. 22. Typical symplectitic intergrowth of cordierite + quartz + K-feldspar + orthopyroxene after osumilite, garnet-orthopyroxene-osumilite (altered)-sapphirine-quartz granulite; spot height 945, Tula Mountains. Sample 77283449; cross-polarised light in lower photo; width of field: 3 mm. (M2250)

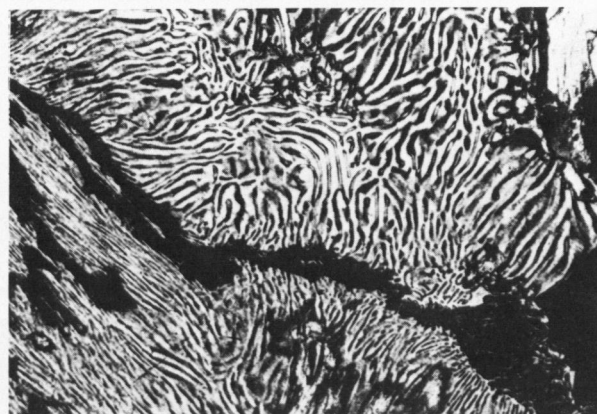


Fig. 23. Detail of Fig. 22, showing symplectitic intergrowth of cordierite + quartz + K-feldspar and dark trails of orthopyroxene. Width of field: 0.8 mm. (M2250)

Osumilite commonly occurs in association with plagioclase or mesoperthite, but rarely with K-feldspar. However, the following assemblages have been recorded:

osumilite + orthopyroxene + K-feldspar + quartz

osumilite + sapphirine + orthopyroxene + K-feldspar.

Small amounts of orange-brown phlogopite or biotite may be present, and cordierite occurs in many rocks, but these are commonly of retrograde origin. Much of the sillimanite may also be secondary, although primary subhedral

sillimanite is abundant in many of the more aluminous layers. Up to 1% of greenish brown or brown spinel (Cr-rich spinel-hercynite solid solutions; Table 7) is present in most of the sapphirine-bearing granulites, and a few layers are comparatively rich in spinel, in association with garnet and sillimanite. Adjacent to quartz, the spinel is mostly mantled by sapphirine, sillimanite, or garnet, although coexisting spinel and quartz have been found at a few localities (Mounts Riiser-Larsen, Sones, and Tomlinson; Priestley Peak; Newman Nunataks; Gage Ridge; and Spot Height 945). Orthopyroxene (enstatite, bronzite, or hypersthene) is pleochroic from pale orange or buff to colourless and commonly contains acicular inclusions of rutile; it may be extremely high in  $\text{Al}_2\text{O}_3$  (Table 7). Quartz is almost invariably rutiled. Golden yellow rutile is a ubiquitous accessory, whereas opaque minerals are rare. Kyanite, orthoamphibole (anthophyllite-gedrite), staurolite, garnet, biotite, and muscovite are characteristic phases in late-retrograde shear zones in assemblages such as kyanite + gedrite + biotite + plagioclase + quartz + rutile + ilmenite, and hornblende + plagioclase + ilmenite + quartz + garnet + gedrite; cordierite and staurolite occur in reaction coronas. The lower-pressure assemblage sillimanite + garnet + staurolite + cordierite + plagioclase + biotite is present in late-stage pegmatites (Sandiford, 1985a; Harley, 1985a).

More detailed descriptions of the petrology of the sapphirine and osumilite-bearing granulites, and of the various mineral equilibria and breakdown reactions are given by Ellis & others (1980), Grew (1980, 1982a), and Motoyoshi & Matsueda (1984). Sheraton (1980) and Ellis & others (1980) have shown that sapphirine is confined to metapelites with mg values greater than about 0.65; osumilite also occurs only in comparatively magnesian compositions (generally with  $\text{mg} > 0.55$ ) (Table 5; Fig. 24), although Grew (1982a) has reported osumilite in a garnet-bearing metapelite with mg as low as 0.43. The original nature of these magnesian metasediments is not clear, and Sheraton (1980) suggested derivation from either evaporitic mudstones, hydrothermally altered mafic or ultramafic igneous rocks, or weathering products of the latter. In spite of the apparent absence from the Napier Complex of metasediments of clearly evaporitic origin, some support for this possibility comes from the

presence of probable halite crystals in fluid inclusions in sapphirine-bearing rocks from Spot Height 945 (H. Etminan, BMR, personal communication, 1985).

### Calc-silicate rocks

Calcium-rich metasediments are very rare in the Napier Complex, in contrast to their rather more widespread distribution in the Rayner Complex (Grikurov & others, 1976, Sheraton & others, 1980). Nevertheless, calc-silicate gneiss crops out at Mounts Gleadell (diopside-plagioclase-quartz), in the Khmara Bay area (diopside-plagioclase-scapolite  $\pm$  grossular), and at the nunatak west of Mount Bergin (diopside-plagioclase-grossular-scapolite-quartz). Wollastonite occurs in association with scapolite, plagioclase, calcite, and diopside in veins cutting diopside-plagioclase gneiss at McLeod Nunataks (Warren & Hensen, 1983), and has been reported from south and west of McIntyre Island in Khmara Bay (Sandiford & Wilson, 1986).

### Igneous rocks

#### Granitic intrusives

Small, subconcordant felsic veins and more irregular bodies ranging in composition from tonalite to granite (s.s.) are widespread in the Napier Complex. They have a similar mineralogy (including mesoperthite) to that of the host gneiss from which they were probably derived by localised melting during metamorphism. Probably of similar age are stocks of orthopyroxene tonalite ('enderbite') and orthopyroxene granite ('charnockite'), respectively cropping out at Wilkinson Peaks and on the eastern side of Khmara Bay (Spot Height 128).

Several large intrusions of grey, commonly porphyroblastic, biotite granite are exposed at Mount Bride, Simmers Peaks, Fitzgerald Nunataks, and the nunataks west of Armstrong Peak, in the Napier Mountains, although their extent is difficult to estimate because of the poor outcrops. They are cut by Amundsen Dykes at Fitzgerald Nunataks and Mount Bride. The granite contains orthoclase or microcline micropertite (generally rather altered), sericitised oligoclase, quartz, dark brown biotite, and minor orthopyroxene, apatite, zircon, opaque minerals, garnet, epidote, monazite, and allanite. Much of the biotite is secondary and may have replaced orthopyroxene or garnet, or both. Biotite-garnet granite at Mount Bride has given a Rb-Sr isochron age of  $2840 \pm 220$  Ma, whereas biotite granite at Simmers Peaks is younger at  $2481 \pm 3$  Ma (zircon and monazite U-Pb age: Black & others, 1986b). These ages approximate those of major deformational episodes ( $D_2$  and  $D_3$ ).

A batholith of rather melanocratic biotite-hornblende-clinopyroxene-orthopyroxene granodiorite and granite that extends for at least 25 km from Felton Head to Waratah Island on the northeastern Tange Promontory is similarly intersected by Amundsen Dykes. It is also somewhat altered, and in places is quite strongly deformed, probably as a result of the late Proterozoic tectonothermal event. The main constituents are perthite, andesine antiperthite, quartz, and orthopyroxene (up to 10%); small amounts of clinopyroxene, dark brownish green hornblende, dark reddish brown biotite, opaque minerals (up to 2%), apatite, and zircon are also present. Secondary garnet (up to 3%) locally rims pyroxene and opaque minerals, and pyroxene is commonly partly altered to green amphibole and brown biotite. Late veins of grey biotite granite, exposed at both Wartah Island and Felton Head, are highly potassic and contain only minor plagioclase. The age of this intrusion is not known, but it clearly pre-dates the Amundsen Dykes. It has a relict igneous allotriomorphic granular texture, but

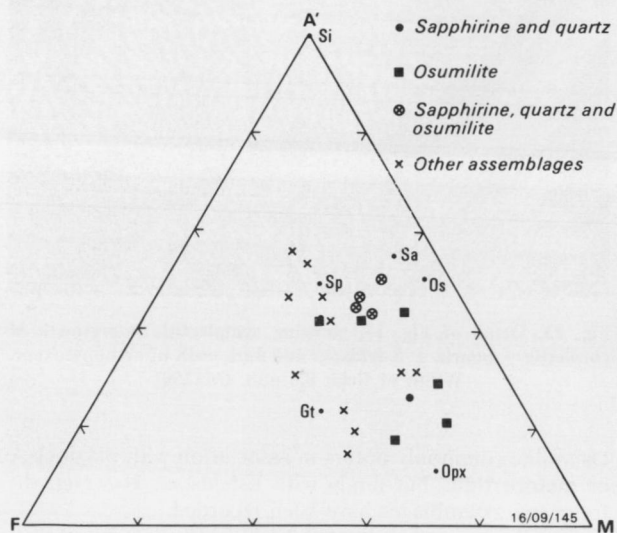


Fig. 24. Modified AFM diagram for Napier Complex metapelites (after Sheraton, 1980).  $A' = \text{Al}_2\text{O}_3 - (\text{K}_2\text{O} + \text{Na}_2\text{O} + \text{CaO})$ ; F = total Fe as FeO; M = MgO (all as molecular proportions). Approximate mineral compositions (from Ellis & others, 1980) are indicated (abbreviations as in Table 1).



contains high-grade assemblages, and is therefore possibly of either D<sub>2</sub> or D<sub>3</sub> age like the granites in the Napier Mountains.

Most of these late to post-orogenic granitic intrusives are relatively enriched in highly charged cations, notably Y, Zr, Nb, La, and Ce; Th is particularly variable, ranging from very high in the Napier Mountains granites to depleted in the Tange Promontory intrusive (Table 3). SiO<sub>2</sub> tends to be low, but K<sub>2</sub>O/Na<sub>2</sub>O is commonly high (Fig. 25). Such features are characteristic of anorogenic granitic rocks, termed A-type by Loiselle & Wones (1979) and Collins & others (1982), who postulated that they are derived by partial melting of relatively anhydrous (possibly residual) lower crustal rocks. Zircon and REE-rich phases apparently have considerably enhanced

solubilities in high-temperature melts of felsic granulites (Sheraton & Black, in press).

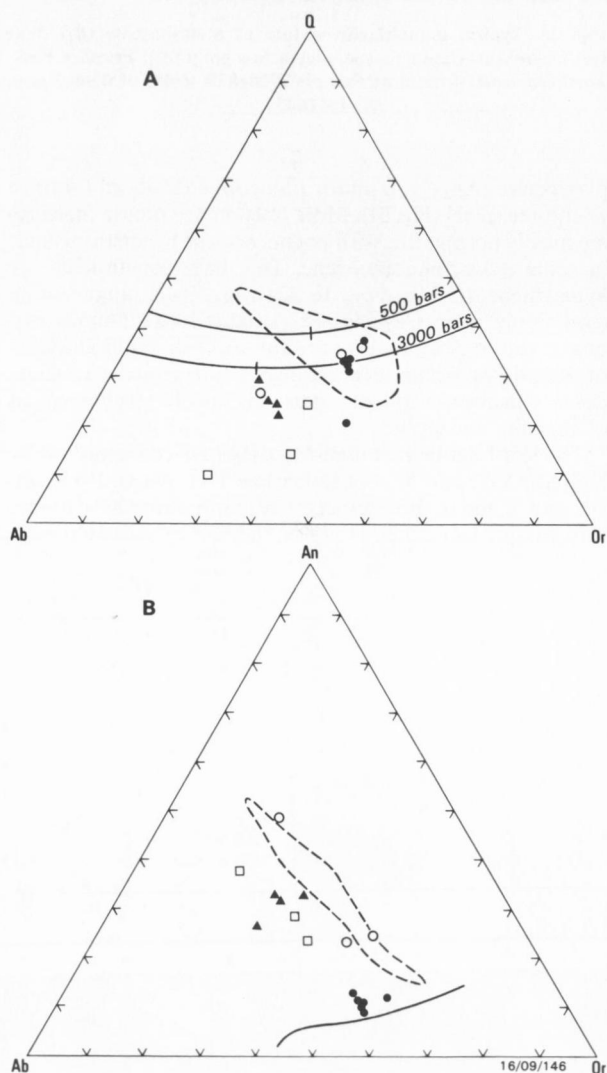
## Pegmatite

Pegmatite is not abundant in most of the Napier Complex. Where it is present, it generally forms irregular, partly discordant, synmetamorphic veins of similar mineralogy to that of the host gneiss. In addition to quartz and feldspar (perthite, mesoperthite, or plagioclase), most contain orthopyroxene or, less commonly, garnet or biotite. Grew (1981a) has reported several rare minerals (wagnerite, niobian rutile, surinamite, taaffeite and beryllian sapphirine) in beryllian pegmatites from near McIntyre Island, and Grew & Manton (1979) have noted perrierite and chevkinite in others.

Younger, cross-cutting pegmatite dykes, up to several metres thick, are locally abundant (e.g., at Mount Pardoe, Gromov Nunataks, and in the Khmara Bay area). They are similar to those found in the Rayner Complex, commonly containing biotite, garnet, or muscovite; accessory minerals include sphene, magnetite, allanite, beryl, kyanite, sillimanite, staurolite, tourmaline, dumortierite, and locally chrysoberyl, sodian cordierite and columbite-tantalite (Grew, 1981a; Sandiford, 1985a). At Gromov Nunataks, they intersect Amundsen Dykes. Biotite from a pegmatite at Mount Mueller has given a K-Ar age of  $580 \pm 12$  Ma (Pieters & Wyborn, 1977), and a pegmatite from Khmara Bay has given a Rb-Sr isochron age of  $522 \pm 10$  Ma (Black & others, 1983b). However, zircon and monazite U-Pb ages of similar pegmatites and granites in the Rayner Complex are considerably older, at about 770 Ma, than their Rb-Sr ages (480–570 Ma), suggesting that the latter were reset by a subsequent tectonothermal event (Black & others, 1987). It is not clear whether this also applies to some of the Napier Complex pegmatites, although the T<sub>UR</sub> model age (McCulloch & Wasserburg, 1978) of 555 Ma for that from Khmara Bay would, if taken at face value, indicate an early Palaeozoic emplacement age.

## Mafic dykes

Five petrographically and chemically distinct types of mafic and ultramafic dykes intrude Napier Complex rocks (Sheraton & others, 1980; Sheraton & Black, 1981). The oldest are rare *metapyroxenites* (B<sub>1</sub> of Sheraton & others, 1980) which post-date F<sub>1</sub> folds and pre-date F<sub>3</sub>, although their relationship to F<sub>2</sub> folds is not known (Fig. 26). Only a few such dykes have been found, mainly in the Mount King area.



### NAPIER COMPLEX

- Bi granite from Napier Mountains
- ▲ Opx granodiorite from Tange Promontory

### RAYNER COMPLEX

- Hb–Opx granite and granodiorite from Sandercock Nunataks
- Bi–Hb granite and granodiorite from Vechernyy Hill

--- Field of Mawson Charnockite

Fig. 25. Normative Q–Ab–Or and Ab–Or–An diagrams for granitic intrusives from Napier and Rayner Complexes. Field of late Proterozoic Mawson Charnockite (from Sheraton, 1982) is shown for comparison. Mineral abbreviations as in Table 1.



Fig. 26. Slightly discordant, strongly folded, probable metapyroxenite (B<sub>1</sub>) dyke cutting layered garnet–quartz–feldspar gneiss and metasediments; outcrop at northwest corner of Wyers Ice Shelf. Height of cliff: about 100 m. (M2314)



They consist of about equal proportions of clinopyroxene and orthopyroxene, and minor feldspar, biotite, and opaque minerals (Table 4). *Metatholeiite* dykes ( $B_2$ ) apparently post-date  $F_3$  folds, but may have been emplaced late in  $D_3$  (Sandiford & Wilson, 1983). They crop out chiefly in the northern Scott Mountains (Fig. 27) and are considered to have been intruded during the waning stages of the granulite-facies metamorphism. Pressure estimates of 7–10 kb, using the method of Ellis (1980), indicate equilibration at considerable depths, during emplacement  $2400 \pm 250$  Ma ago (Sheraton & Black, 1981). These dykes consist of plagioclase ( $An_{45-60}$ ), hypersthene, augite/salite, and smaller amounts of brownish green hornblende (up to 10%), Fe-Ti oxides, biotite, apatite, and, in some cases, quartz. Textures are essentially granoblastic-polygonal (Fig. 28), but some dykes contain plagioclase phenocrysts (Fig. 29). Garnet, where present, developed during the formation of later shear zones. These metatholeiites have been termed 'Khmara Dykes' by Sandiford & Wilson (1983).

*High-Mg dykes* ( $B_3$ ; Fig. 30) have given a statistically indistinguishable Rb-Sr whole-rock age to that of the metatholeiites ( $2350 \pm 48$  Ma; Sheraton & Black, 1981). Like the latter, they appear to have been emplaced at considerable crustal depths: textures are essentially magmatic, but the groundmasses are commonly granoblastic (Fig. 31). Estimated equilibration pressures for such dykes from the Tula and southern Napier Mountains (3–6 kb) are lower than those of the metatholeiites (Fig. 27). However, high-Mg dykes with granoblastic textures from Mount Charles and Rippon Depot give higher pressures (7 and 9 kb, respectively).

The high-Mg dykes range in composition from norite to hypersthene-bearing quartz tholeiite (mela-andesite). The single specimen of norite (77284699 from Mount Henry) contains abundant (50%) bronzite ( $Ca_2Mg_{73}Fe_{25}$ ) crystals up to 3 mm in length, augite ( $Ca_{38}Mg_{49}Fe_{13}$ ), which forms overgrowths on bronzite, as well as small interstitial grains,

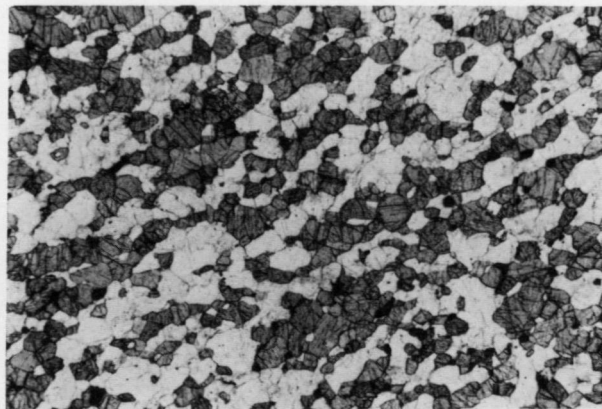


Fig. 28. Typical granoblastic texture of metatholeiite ( $B_2$ ) dyke (orthopyroxene-clinopyroxene-plagioclase granulite); Priestley Peak, northern Scott Mountains. Sample 77284828; width of field: 5 mm. (M2643)

plagioclase ( $An_{47-54}$ ), minor phlogopite (2%), and a trace of chrome spinel (Fig. 31). More fractionated quartz tholeiites are mostly porphyritic, with phenocrysts of hypersthene and, in some dykes, clinopyroxene. The main constituents are hypersthene ( $CaMg_{68}Fe_{28}$  to  $Ca_1Mg_{49}Fe_{50}$ ), augite/salite (commonly near  $Ca_{45}Mg_{40}Fe_{15}$ ), labradorite ( $An_{52-64}$ ), quartz (up to 5%), and biotite (up to 4%); small amounts of K-feldspar occur in granophyric intergrowths in some dykes. Opaque minerals are unusually rare, but include traces of ilmenite and pyrite.

The less-fractionated high-Mg dykes are characterised by high MgO, Cr and Ni, but rather low  $TiO_2$ ,  $Na_2O$ ,  $P_2O_5$ , Zr, Nb, and Y, and in these respects have some chemical affinities with basaltic komatiites. However, they are considerably more

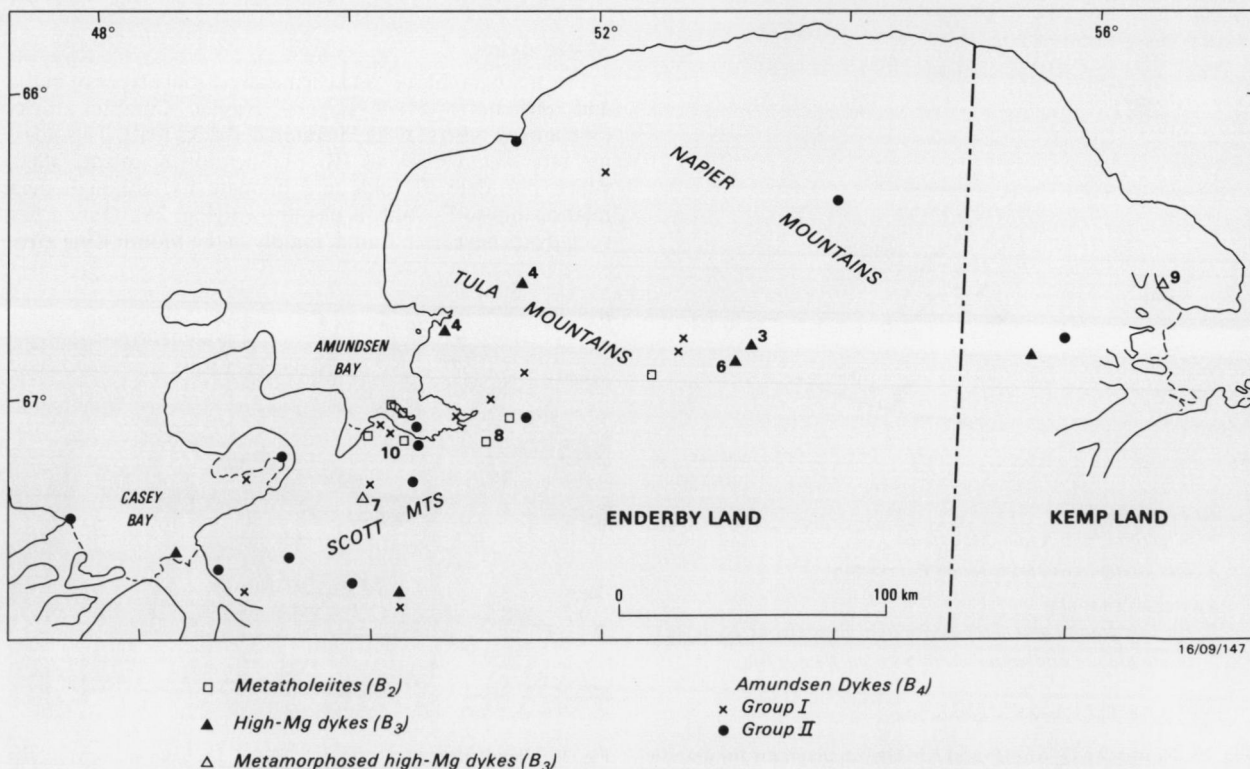


Fig. 27. Localities of analysed tholeiite dykes, showing estimated equilibration pressures (in kilobars) for  $B_2$  and  $B_3$  dykes. See text for discussion.

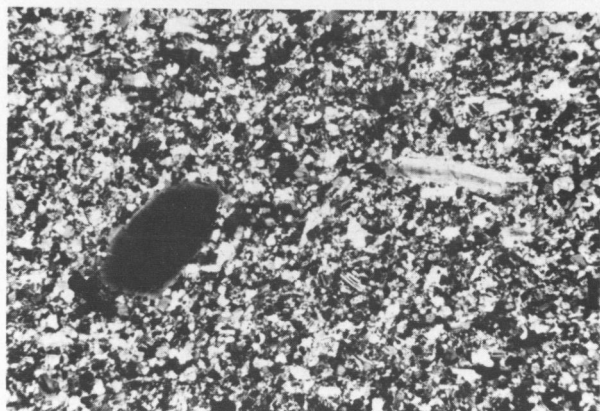
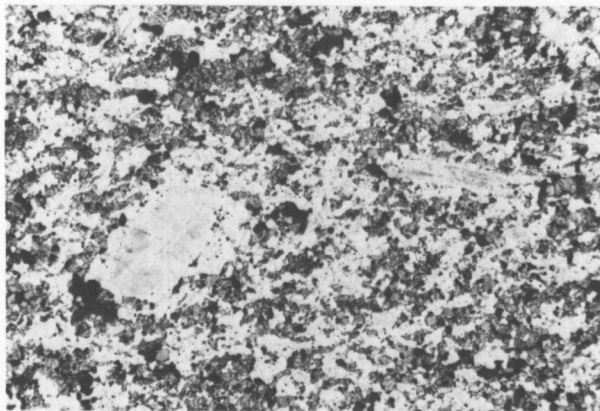


Fig. 29. Metatholeiite ( $B_2$ ) dyke (garnet-orthopyroxene-clinopyroxene-plagioclase granulite) showing zoned plagioclase phenocrysts; island 1 km west of Mount Pardoe, northern Scott Mountains. Sample 77284827, cross polarised light in lower photo; width of field: 5 mm. (M2643)



Fig. 30. High-Mg ( $B_3$ ) dyke (A-A) cutting layered garnet-quartz-feldspar gneiss (light layers), orthopyroxene-quartz-feldspar gneiss (grey layers), and magnetite-orthopyroxene-quartz rock (dark layers); Mount Stadler. Height of cliff: about 20 m. (M2039)

enriched in incompatible elements (particularly K, Rb, Pb, Th, U, and As), and show a well-defined fractionation trend to quartz-rich tholeiite (Sheraton & Black, 1981) (Table 4; Fig. 32).

By far the most abundant dykes in Enderby Land are dolerites which we have termed *Amundsen Dykes* ( $B_4$ ). They crop out throughout the Napier Complex (Fig. 33), and at least three distinct groups, distinguished mainly on chemical grounds, have been recognised (Table 4) (Sheraton & Black,



Fig. 31. High-Mg ( $B_3$ ) dyke (norite) showing bronzite phenocrysts with augite forming overgrowths and interstitial grains; light mineral is plagioclase; Mount Henry, southern Scott Mountains. Sample 77284699; width of field: 5 mm. (M2643)

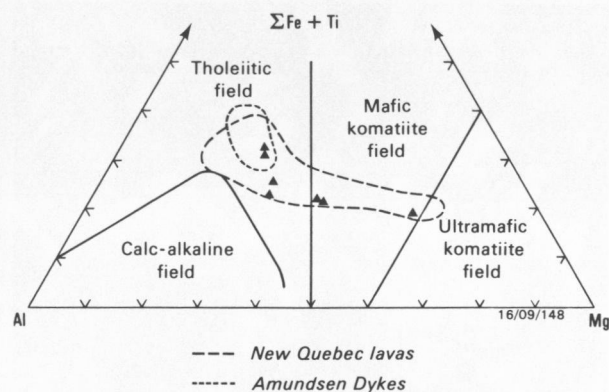


Fig. 32. Plot of atomic Mg-Al-(Fe+Ti) for high-Mg dykes, showing calc-alkaline, tholeiitic, and komatiitic fields of Jensen (1976). Field of Proterozoic lavas of New Quebec (Francis & Hynes, 1979) and Amundsen Dykes are also indicated.



Fig. 33. Amundsen dolerite ( $B_4$ ) dyke cutting layered metasediments; Mount Trail, northern Scott Mountains. Width of dyke: about 3 m. (M2040)

1981). Textures are subophitic to gabbroic or intergranular (Fig. 34), and many dykes are porphyritic (Fig. 35). Most dykes are fairly fresh, but some show extensive uraltisation of pyroxene, possibly as a result of the late Proterozoic metamorphism.

Group 1 quartz tholeiites of Sheraton & Black (1981) contain up to 30% of pale green augite (near  $\text{Ca}_{33}\text{Mg}_{45}\text{Fe}_{22}$ ), which commonly forms overgrowths on orthopyroxene (bronzite or hypersthene,  $\text{Ca}_4\text{Mg}_{71}\text{Fe}_{25}$  to  $\text{Ca}_4\text{Mg}_{48}\text{Fe}_{48}$ ) as



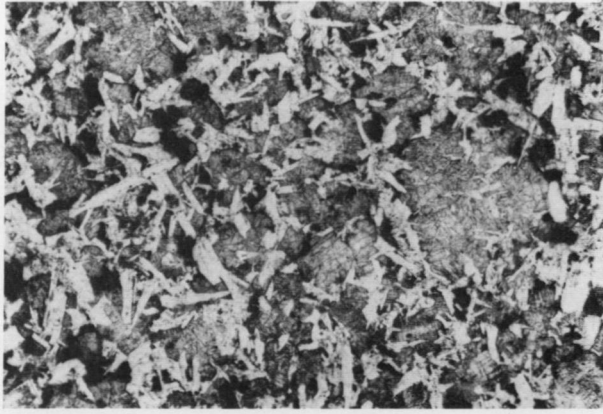


Fig. 34. Group II Amundsen dolerite dyke (clinopyroxene-plagioclase), showing typical sub-ophitic texture; Mount Biscoe. Sample 77284310; width of field: 6 mm. (M2641)

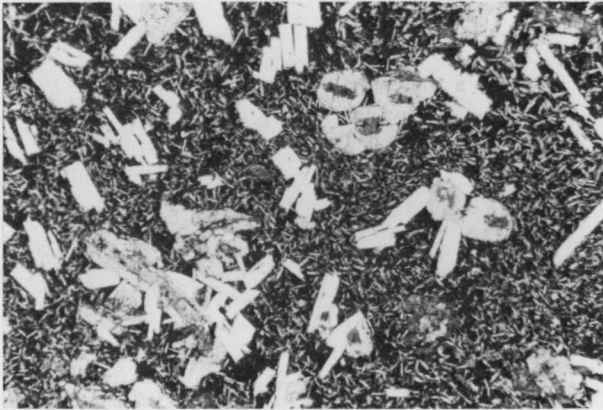


Fig. 35. Group I Amundsen dolerite dyke (orthopyroxene-clinopyroxene-plagioclase), showing phenocrysts of plagioclase (white) and pyroxene (clinopyroxene with darker cores of orthopyroxene); near Johnston Peak. Sample 77284065; width of field: 6 mm. (M2643)

well as discrete subhedral grains (Fig. 35). Modal orthopyroxene rarely exceeds 5%. Other constituents are zoned plagioclase (mostly  $An_{55-79}$ , with rims to  $An_{50}$ ), magnetite + ilmenite (3–7%), quartz (up to 3%), dark green hornblende (up to 4%), dark brown biotite (up to 2%), and rare apatite and pyrite. Phenocrysts comprise plagioclase (generally with a reddish brown clouding) and augite. Group II tholeiites are petrographically similar to those of group I, although augite is slightly more magnesian (averaging about  $Ca_{35}Mg_{49}Fe_{16}$ ), orthopyroxene is rare, plagioclase is mostly  $An_{56-66}$  (with some phenocrysts up to  $An_{87}$ ), and quartz and biotite are less abundant (generally less than 1%). Small amounts of primary dark green edenitic hornblende are present, and opaque minerals (2–5%) include ilmenite and magnetite. Phenocrysts comprise plagioclase and, less commonly, augite. A third rather heterogeneous group of rare olivine tholeiites contains augite ( $Ca_{29}Mg_{40}Fe_{31}$  to  $Ca_{41}Mg_{41}Fe_{18}$ ), clouded plagioclase ( $An_{46-63}$ ), biotite (up to 4%), ilmenite, magnetite, titanomagnetite, apatite, and rare pyrite. Three to 5% of olivine ( $Fo_{30-31}$  and  $Fo_{43-50}$ ) is present in several of the fresher dykes and a few contain small amounts of primary hornblende. Fe-Ti oxides are particularly abundant (up to 10%), but quartz is absent. Some dykes contain plagioclase phenocrysts.

Chemically, both groups I and II Amundsen Dykes are typical continental tholeiites (Table 4; Fig. 36), but differ in that the former group has considerably higher contents of

incompatible elements (K, P, Rb, Sr, Zr, Nb, La, and Ce). Olivine tholeiites are still more enriched in incompatible elements, as well as being relatively fractionated (lower  $Mg/(Mg + \text{total Fe})$ ). They plot in the alkaline field of Irvine & Baragar (1971) on an alkalis versus silica plot (Fig. 37), but are hypersthene-normative. Diagrams used to discriminate between basaltic rocks from different tectonic settings have proved of only limited use. Thus, on the Ti-Zr-Y diagram of Pearce & Cann (1973), the various dyke groups plot in several different fields, although all were clearly intruded in a continental environment (Fig. 38); nevertheless, such diagrams illustrate significant differences in minor element contents and ratios between groups. Variations in certain incompatible element ratios imply differences in mantle source compositions, many of which were interpreted by Sheraton & Black (1981) as being due to mantle metasomatism. Group I dykes have given a Rb-Sr whole rock age of  $1190 \pm 200$  Ma (Sheraton & Black, 1981); group II dykes are isotopically heterogeneous and do not plot on an isochron, but chemically virtually identical dolerites in the Vestfold Block have given a Rb-Sr age of  $1374 \pm 125$  Ma (Collerson & Sheraton, 1986b).

An *alkali-melasyenite* (lamproite) dyke ( $B_5$ ), cutting a fresh Amundsen Dyke at Priestley Peak (Fig. 39), consists of pale bluish green to buff potassium magnesio-arfvedsonite

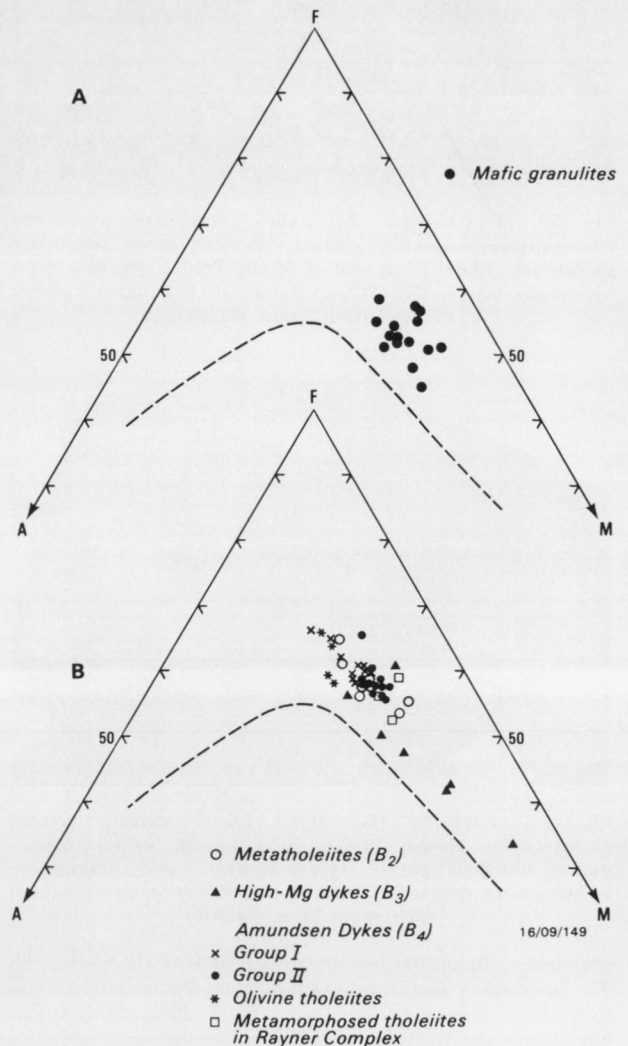


Fig. 36. F (total FeO) - M(MgO) - A( $Na_2O + K_2O$ ) diagrams for A, mafic granulites and B, dykes from Napier Complex and metamorphosed mafic dykes from Edward VIII Gulf area of Rayner Complex. Dashed line divides the tholeiitic (upper) and calc-alkaline fields of Irvine & Baragar (1971).



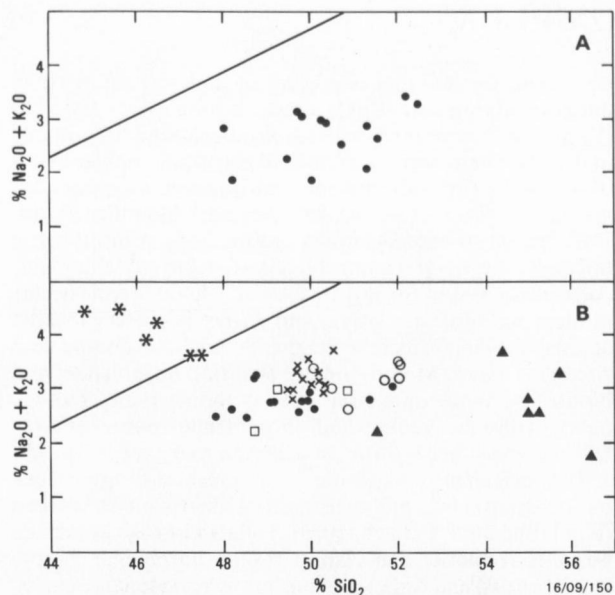


Fig. 37. Alkalies –  $\text{SiO}_2$  plot for mafic granulites and dykes. Line divides the alkaline (upper) and subalkaline fields of Irvine & Baragar (1971). Symbols as in Fig. 36A, B.

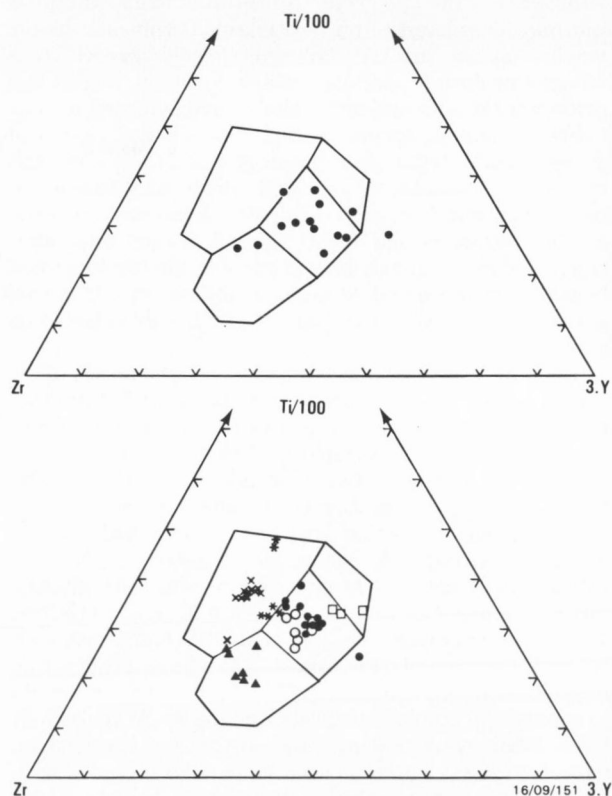


Fig. 38. Ti–Zr–Y diagram for mafic granulites and dykes. Fields are those suggested by Pearce & Cann (1973) for discrimination of basaltic rocks from different tectonic settings. Symbols as in Fig. 36A, B.

(10–30%), orange-brown phlogopite (10–40%), microcline (25–40%), apatite (10–15%), quartz (up to 3%), and minor rutile, sphene, and barite (Figs. 40 & 41). The distribution of these minerals is irregular, some parts being rich in phlogopite, others in amphibole. The Priestley Peak dyke is very strongly enriched in  $\text{K}_2\text{O}$  and other incompatible elements (Table 4), and has given a Rb–Sr isochron age of  $482 \pm 3$  Ma (Black & James, 1983). Chemically similar, but more fractionated dykes crop out at Hydrographer Island

(Sandiford & Wilson, 1983) and Mount Bayliss in the southern Prince Charles Mountains, the latter being of Silurian age (Sheraton & England, 1980). They belong to the K-rich mafic rock suite, which also includes the leucite lamproites of the West Kimberley area of Western Australia (Prider, 1960) and the volcanics of the Leucite Hills, Wyoming (Carmichael, 1967).



Fig. 39. Alkali melasyenite ( $B_5$ ) dykes (A–A), cutting Amundsen dolerites (B), which intrude layered garnet–quartz–feldspar gneiss; Priestley Peak, northern Scott Mountains. (M2175)

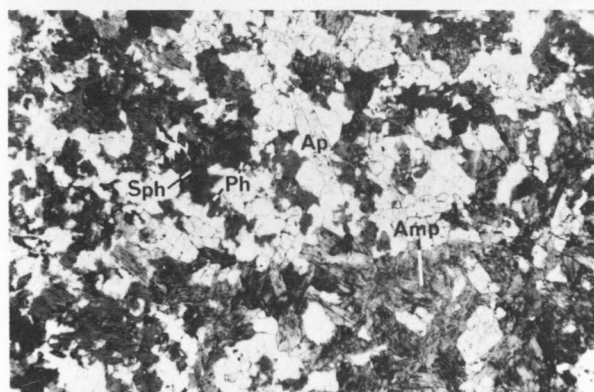


Fig. 40. Alkali melasyenite dyke containing pale bluish green K-arfvedsonite (Amp), orange-brown phlogopite (Ph), apatite (Ap), sphene (Sph), and microcline; Priestley Peak, northern Scott Mountains. Sample 77283949D; width of field: 4 mm. (M2643)

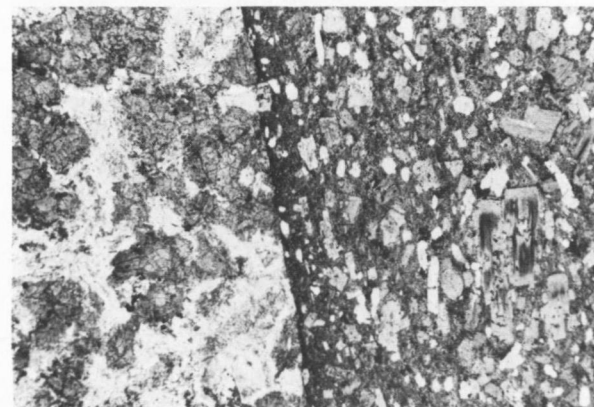


Fig. 41. Contact of alkali melasyenite dyke with Amundsen dolerite; Priestley Peak. The melasyenite contains flow-aligned phenocrysts of phlogopite (grey) and apatite (white), and in the dolerite, plagioclase is extensively altered and clinopyroxene largely replaced by amphibole and biotite. Sample 77283953; width of field: 6 mm. (M2643)

## RAYNER COMPLEX

The Rayner Complex covers most of the area west of the Rayner Glacier, the Nye Mountains (including Mount Sibiriyakov), most of Kemp Land and the isolated Doggers, Sandercock, and Kiri Nunataks and Knuckey Peaks (Fig. 4). Hydrous minerals (biotite and amphibole) are much more abundant than in rocks of the Napier Complex, and the gneisses of the Rayner Complex are considerably more migmatitic, particularly west of the Rayner Glacier where late granite and pegmatite veins are common (Fig. 42). No unaltered Amundsen Dykes have been found in the Rayner Complex, but metamorphosed relics occur in a few places, particularly in the Robert Glacier-Edward VIII Gulf area (Fig. 43). In a similar manner to the Napier Complex, Kamenev (1975) and Grikurov & others (1976) divided the Rayner Complex into the Condon Series (Ps, mostly garnet-bearing gneiss and pelitic metasediments) and the Nye Series (Ep, mostly pyroxene-bearing gneiss).



Fig. 42. Migmatitic hornblende-biotite-quartz-feldspar gneiss with boudinaged pegmatite layer; Molodezhnaya Station. (M2042)

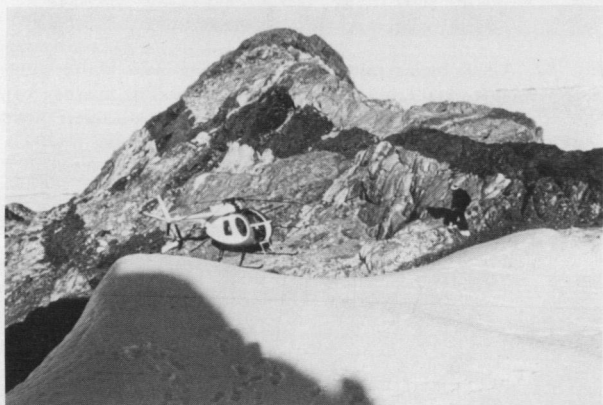


Fig. 43. Metamorphosed Amundsen dolerite dykes, intruded by pegmatites, cutting layered biotite-garnet-quartz-feldspar gneiss and biotite-orthopyroxene-quartz-feldspar gneiss; Georges Islands, Edward VIII Gulf. (M2040)

### Pyroxene-biotite-quartz-feldspar gneiss

Layered to massive orthopyroxene-biotite-quartz-feldspar gneiss is widespread in most parts of the Rayner Complex, including the Edward VIII Gulf-Rayner Peak area (Trail & others, 1967), Dismal Mountains, Leckie Range, Doggers Nunataks, Knuckey Peaks, and Nye Mountains. Both

orthoclase perthite and oligoclase or andesine antiperthite are generally present (Epk), although tonalitic orthogneiss (Epp) with little or no K-feldspar is quite abundant, notably in the Nye Mountains. In contrast to chemically similar gneiss of the Napier Complex, mesoperthite is absent, except as relict grains in a few rocks from Knuckey and Alderdice Peaks. Dark brown or reddish brown biotite, and, in more mafic layers, dark olive-green hornblende are relatively abundant, particularly west of the Rayner Glacier. Clinopyroxene occurs in more melanocratic layers, and garnet is present locally; accessory minerals include magnetite, ilmenite, apatite, and zircon. Around Molodezhnaya Station, hornblende and biotite are more abundant than orthopyroxene, biotite-quartz-feldspar gneiss and hornblende-biotite-quartz-feldspar gneiss being the most common rock types (Fig. 42).

The chemical composition of most orthopyroxene-biotite-quartz-feldspar gneiss is consistent with an igneous origin (Sheraton & Black, 1983). Foliated intrusives include hornblende-biotite and orthopyroxene-hornblende-biotite granite gneiss, and orthopyroxene-hornblende tonalite gneiss, all of which make up most of the outcrops immediately west of the Rayner Glacier (Mounts Christensen and Nils, and around Kitchenside Glacier). Similar orthogneiss is widespread in the Nye Mountains and includes subconcordant layers of porphyroblastic hornblende-biotite granite (augen gneiss). Foliated, locally garnetiferous biotite-hornblende granite, which contains orthoclase perthite, sodic andesine, and minor altered pyroxene, opaque minerals, apatite, zircon, sphene, and allanite, occurs at Vechernyy Hill. Biotite-hornblende granodiorite gneiss crops out near Molodezhnaya, and orthopyroxene-hornblende-biotite tonalite gneiss (enderbitic gneiss of Grew, 1978) at Point Widdows and Vechernyy Hill. Mount Sibiriyakov consists of more strongly layered gneisses, but includes small bodies and subconcordant layers of foliated biotite-garnet granite, muscovite-biotite granite, and hornblende-biotite granodiorite.

Some of these orthogneiss bodies are chemically quite similar to that on the northeast side of Tange Promontory (Fig. 25); for example, they tend to have high  $\text{TiO}_2$ ,  $\text{P}_2\text{O}_5$ , Nb, La, and Ce contents (Table 3). However, unlike the Tange Promontory intrusive, there is no evidence of their having been intruded by Amundsen Dykes, and it is very common for late-orogenic granitic rocks to be enriched in such elements (Sheraton & Black, in preparation). Granitic orthogneiss from the Molodezhnaya area has given a relatively young Rb-Sr isochron age of  $1022 \pm 62$  Ma (Grew, 1978), but similar rocks from the Thala Hills and Mount Flett have yielded zircon U-Pb ages of  $1425^{+29}_{-27}$  and  $1465^{+25}_{-20}$  Ma, respectively (Black & others, 1987). The last two are thought to approximate emplacement ages, and the Rb-Sr system may have been reset during high-grade metamorphism. Orthopyroxene + quartz + plagioclase  $\pm$  hornblende gneiss, which crops out at Ward and Papanin Nunataks and elsewhere in the Nye Mountains, is comparable in composition with layered tonalitic gneiss in nearby parts of the Napier Complex (Figs. 9 & 10) (Sheraton & Black, 1983), and may, in part, be considerably older (i.e., Archaean). However, one such gneiss from Ward Nunataks has Proterozoic Sm-Nd model ages ( $T_{\text{CHUR}}^{\text{Nd}} = 1500$  Ma,  $T_{\text{DM}}^{\text{Nd}} = 1940$  Ma; see Black & others, 1987).

### Garnet-biotite-quartz-feldspar gneiss

Garnet-biotite-quartz-feldspar gneiss is widespread in the Edward VIII Gulf-Rayner Peak area (Trail & others, 1967), Dismal Mountains, Leckie Range, Sandercock Nunataks, and parts of the Nye Mountains, but is less common west of the



Rayner Glacier. It contains orthoclase (rarely microcline) perthite, lesser amounts of oligoclase, garnet (mostly less than 10%), and reddish brown biotite (up to 10%). Orthopyroxene occurs locally, but hornblende is rare; zircon, apatite, and opaque minerals are the most abundant accessory minerals. Rather massive, porphyroblastic garnet-biotite-quartz-oligoclase-perthite gneiss, locally containing orthopyroxene, is common at Sandercock Nunataks, and may be of intrusive origin. The high-pressure assemblage garnet + clinopyroxene + orthopyroxene + quartz + antiperthite is present in felsic gneiss at Abrupt Point on the western side of Edward VIII Gulf.

### Mafic rocks

Orthopyroxene-clinopyroxene-plagioclase (andesine-labradorite) granulite is widespread, but, in contrast to that of the Napier Complex, greenish brown hornblende is almost invariably an important constituent (up to 40%), particularly in the area west of the Rayner Glacier. Biotite rarely exceeds about 10%, and minor quartz, opaque minerals, apatite, and rare spinel may also be present. Amphibolite (hornblende, andesine, and minor quartz, epidote, clinopyroxene, and biotite) crops out in the Molodezhnaya area and at Mount Sibiryakov. Anorthosite, with minor hornblende, clinopyroxene, orthopyroxene, and biotite, at Amphitheatre Peaks has given a zircon U-Pb age of  $1488 \pm 12$  Ma, probably that of emplacement (Black & others, 1987). Discordant bodies of mafic granulite at several localities in western Kemp Land (notably around Edward VIII Gulf) are considered to be the metamorphosed remnants of the Amundsen Dykes (B<sub>4</sub>) or earlier mafic dykes (B<sub>2</sub>, B<sub>3</sub>) of the Napier Complex. They are chemically very similar to dykes which cut the Napier Complex (Figs. 36 to 38); in particular, a metamorphosed dyke from Georges Island (Fig. 43) is virtually identical in composition to some of the Group II Amundsen Dykes (Table 4) (Sheraton, 1984).

The high-pressure assemblage garnet + clinopyroxene + orthopyroxene + hornblende + plagioclase  $\pm$  quartz is present in mafic rocks (including some metamorphosed Amundsen Dykes) of both quartz and olivine-normative compositions (Table 4) at a number of places in the Robert Glacier area (e.g., Mount Kernot, Rayner Peak, Turbulence Bluffs, Else Nunataks, Kvars Promontory) (Trail & others, 1967; Pieters & Wyborn, 1977), in the western Hansen Mountains (Trail & others, 1967), and at Mounts Robinson and Underwood in the Nye Mountains. In some rocks, the garnet is rimmed by intergrowths of plagioclase + orthopyroxene ( $\pm$  magnetite).

### Ultramafic rocks

Pyroxenite pods and discontinuous layers are widespread, but volumetrically minor, in the Rayner Complex. Most contain up to 30% of brownish hornblende and up to 10% of biotite or phlogopite, but olivine is rare. Olivine-pyroxene hornblende and pyroxene hornblende crop out at a few places.

### Aluminous metasediments

The assemblage garnet + sillimanite + biotite + K-feldspar + quartz  $\pm$  plagioclase occurs at several localities in the Nye Mountains and Rayner Glacier area, notably the Condon Hills, Mount Sibiryakov, and the nunataks adjacent to Mount Yuzhnaya. It has also been reported from the eastern part of the Rayner Complex, along the Kemp and MacRobertson Land coasts (Trail & others, 1967; Trail, 1970). Cordierite-bearing metapelites at Mounts Lira and Sibiryakov, and the Condon Hills, contain assemblages such as cordierite + garnet + biotite + K-feldspar + quartz  $\pm$  sillimanite  $\pm$  plagioclase, and

cordierite + garnet + orthopyroxene + biotite + K-feldspar + quartz  $\pm$  plagioclase.

At Mount Lira, quartz-feldspar pegmatites contain bluish purple cordierite crystals up to 15 cm long. Minor constituents include spinel, zircon, opaque minerals, and monazite; rutile is rare, but occurs in metapelites at Forefinger Point (possibly relict Napier Complex assemblages), Mount Lira, and near Fold Island, Kemp Land.

Grew (1978, 1981b) has reported from the Molodezhnaya area the presence of the three assemblages (all with quartz, K-feldspar, and plagioclase) garnet + biotite + cordierite, garnet + biotite + sillimanite, and garnet + biotite + orthopyroxene. In the Mawson area, garnet + cordierite + sillimanite + K-feldspar + quartz  $\pm$  biotite  $\pm$  plagioclase is widespread (Trail, 1970).

### Calc-silicate rocks and marble

Calcium-rich metasediments crop out at a number of localities in the Nye Mountains, Condon Hills, and Molodezhnaya area, and also occur in the western Hansen Mountains of Kemp Land as well as in exposures along the coasts of Kemp and MacRobertson Lands (Trail & others, 1967; Trail, 1970). Although not abundant, they are significantly more so than in the Napier Complex.

Diopside + plagioclase  $\pm$  quartz  $\pm$  hornblende gneiss, with subordinate scapolite or biotite, is the most common type. Minor phases include carbonate, K-feldspar, sphene, epidote, opaque minerals, and rare orthopyroxene. Calc-silicate gneiss containing dark green diopside, plagioclase, orange grossular-rich garnet, and smaller amounts of quartz, scapolite, allanite, and opaque minerals is exposed on the south side of the Assender Glacier, and quartz-garnet-clinopyroxene-scapolite gneiss at Dwyer Nunataks and Secluded Rocks in Kemp Land; epidote-hornblende-quartz-plagioclase gneiss is present near Molodezhnaya. Marble and diopside marble occur at several localities in the eastern Nye Mountains and scapolite-diopside marble in the Molodezhnaya area. Forsterite marble has been reported from Fram Peak in the Hansen Mountains (Trail & others, 1967).

### Granitic intrusives

Apart from the more-or-less strongly deformed intrusives described above, red to white porphyroblastic biotite-clinopyroxene-hornblende-orthopyroxene granite (grading into granodiorite: Fig. 25) makes up much of Sandercock Nunataks, and foliated biotite granite crops out at Condon Hills. Granite at Sandercock Nunataks contains orthoclase perthite, oligoclase-andesine, quartz, greenish brown hornblende, orthopyroxene, and minor clinopyroxene, biotite, opaque minerals, apatite, and zircon. Locally, it has a well-developed foliation (augen gneiss); such deformed rocks contain biotite and hornblende, but little or no pyroxene. Cross-cutting aplite veins consist of orthoclase perthite, oligoclase, quartz, brown biotite, and minor hornblende. The granite at Sandercock Nunataks has a relatively high mafic mineral content (6–12%), in common with many other 'charnockitic' intrusives in high-grade terranes, as for example the Mawson Charnockite (Sheraton, 1982) and the intrusive at Tange Promontory. The granite has fairly high Sr, Ba, and Zr contents, but is strongly depleted in Th and U (Table 3).

Younger biotite leucogranite veins are particularly abundant in the Rayner Glacier and Molodezhnaya areas, where they post-date the high-grade metamorphism. They are generally associated with granitic pegmatites, and form composite dykes of granite and pegmatite at Molodezhnaya, where subordinate clinopyroxene-hornblende-biotite diorite bodies also crop out (Grew, 1978). The granite consists of microcline, sodic plagioclase, quartz, and small amounts of



dark brown biotite, muscovite, hornblende, opaque minerals, zircon, and rare allanite. Pegmatites (Fig. 57), of at least two generations, have a similar mineralogy, and contain minor biotite, magnetite, and, less commonly, garnet, muscovite, or hornblende. Grew (1978) has reported other accessory minerals, including pyrite, monazite, polycrase, beryl, scapolite, sphene, and allanite. Granite dykes at Molodezhnaya have been dated at  $530 \pm 160$  Ma (corrected Rb-Sr isochron age) and associated pegmatites have given U-Th-Pb ages mostly between 450 and 550 Ma (Grew, 1978). Sphene and allanite from pegmatites at Forefinger Point have given U-Pb ages of 520 Ma (Grew & Manton, 1979), and Pieters & Wyborn (1977) reported a K-Ar age of  $511 \pm 10$  Ma on biotite from a pegmatite at Doggers Nunataks. In spite of these results, Black & others (1987) have shown that U-Pb

data for zircon from a pegmatite at Mount Underwood, and for minerals from the pegmatites studied by Grew (1978), define concordia with upper intercepts of about 760–770 Ma, considered to represent crystallisation ages. Similarly, biotite granite at Condon Hills has given zircon and monazite U-Pb ages of  $766^{+15}_{-11}$  and  $769^{+28}_{-19}$ , respectively. The granite at Sandercock Nunataks may be of similar age, but has not been dated. Hence, at least some of the post-tectonic felsic magmatism in this area is considerably older than previously thought. It is still unclear whether the c. 500–550 Ma Rb-Sr and K-Ar ages are all reset or partly define a second post-tectonic phase of granite emplacement; several generations of granite and pegmatite dyke occur at Molodezhnaya, but their age differences are not known.

## STRUCTURAL GEOLOGY

### Napier Complex

The earliest recognisable deformation ( $D_1$ ) in the Napier Complex, synchronous with the peak of the granulite-facies metamorphism, was responsible for the main foliation and associated structures ( $F_1$ ,  $L_1$ ). The foliation is generally parallel to the compositional layering, except at  $F_1$  fold hinges, and is defined by discontinuous layers and lenses of mafic minerals, and lenticular aggregates of quartz and feldspar; most rocks have granoblastic textures, but minerals in felsic gneisses are commonly interlobate, whereas those in mafic and ultramafic rocks are typically polygonal. There is generally no strongly preferred orientation of minerals such as biotite (which, in any case, is rare), although elongated quartz aggregates and, where present, sillimanite commonly define a lineation ( $L_1$ ). Zoned, poikiloblastic garnets probably grew throughout  $D_1$ , and aligned inclusions in some may reflect an older (pre- $D_1$ ) fabric (James & Black, 1981; Harley, 1985b). Clinopyroxene aggregates in gabbro-anorthosite bodies at Fyfe Hills may have originated as pre- $D_1$  igneous phenocrysts (Black & others, 1983a).

Whereas much of the gross compositional variation in metasedimentary rocks may represent sedimentary bedding, it is clear from the presence of intrafolial folds that transposition of this early bedding has occurred. Moreover, the abundance of boudinaged mafic and ultramafic layers indicates that there has been considerable elongation in all directions in the plane of the fold limbs. Where not significantly affected by later folding, the layering and foliation are sub-horizontal, and the enveloping surfaces of the later fold generations are also sub-horizontal (Sandiford & Wilson, 1984). Hence, the Napier Complex may be termed a recumbent gneiss terrane (James & Black, 1981).  $F_1$  folds are generally isoclinal and range up to tens of metres or more in amplitude, although irregular mesoscopic folds produced by ductile flow occur in some massive felsic layers (Figs. 16, 44, 45 & 46A,B). There is commonly a well-defined axial-plane foliation and an associated mineral-elongation lineation parallel to the plunge of these folds.

Folds ( $F_2$ ) produced during  $D_2$  are mostly tight to isoclinal, asymmetric, generally recumbent, and have amplitudes up to several hundred metres (Fig. 47). They clearly re-fold  $F_1$  structures in the Beaver Glacier area (Griffin, 1979) and at Reference Peak (Figs. 46 & 48), although both  $F_1$  and  $F_2$  folds may have formed in response to a single prolonged period of deformation. The metamorphic grade during  $D_2$  was still granulite facies, but in much of the Napier Complex there was apparently only limited recrystallization and formation of new microstructures during this event (James & Black, 1981). Nevertheless, in the



Fig. 44.  $F_1$  intrafolial fold in massive orthopyroxene-quartz-feldspar gneiss; Rippon Depot. Scale in cms (GB1023).



Fig. 45.  $F_1$  isoclinal fold, defined by mafic granulite layer, refolded by  $F_2$  folds; Rippon Depot (see Fig. 46B). Scale is 15 cm long. (GB1162)

Khmara Bay area,  $D_1$  fabrics were modified by static recrystallization during  $D_2$ , and a weak axial planar fabric in fold hinge zones and quartz ribbon and sillimanite lineations ( $L_2$ ) were developed locally (Black & others, 1983a; Sandiford & Wilson, 1984; Harley, 1985b).

The regional strike in most of the Napier Complex is largely the result of a third deformation episode ( $D_3$ ) which occurred during the waning stages of the high-grade metamorphism.  $F_3$  folds mostly have axial planes inclined

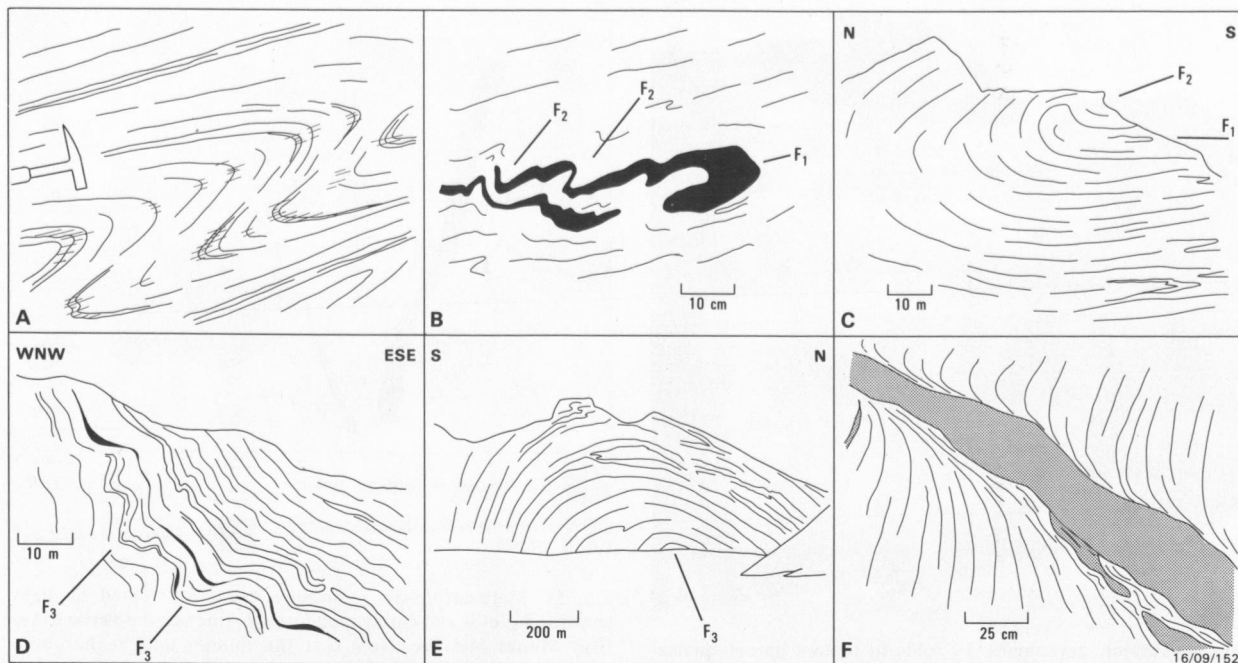


Fig. 46. Fold styles in Napier (A-E) and Rayner (F) Complexes. (A)  $F_1$  intrafolial fold; Mount Weller, northern Scott Mountains; (B)  $F_1$  isoclinal fold, refolded by  $F_2$  folds; Rippon Depot; (C)  $F_1$  isoclinal fold, refolded by major recumbent  $F_2$  fold; Reference Peak, northern Scott Mountains; (D) Parasitic  $F_3$  folds; Mount Denham; (E) Major asymmetric  $F_3$  fold; Mount McLennan, northern Scott Mountains; (F) Pegmatite intruding north-trending steep limb of  $F_c$  shear fold; Molodezhnaya Station. Note boudinaged pegmatite layer, which suggests that deformation continued during pegmatite emplacement.



Fig. 47. Tight  $F_2$  folds in layered orthopyroxene-quartz-feldspar gneiss, garnet-quartz-feldspar gneiss, and metasediments; Fyfe Hills. The upright nature of these folds is largely due to reorientation during  $F_3$  folding. Height of cliff, about 200 m. (M. Sandiford, University of Melbourne)

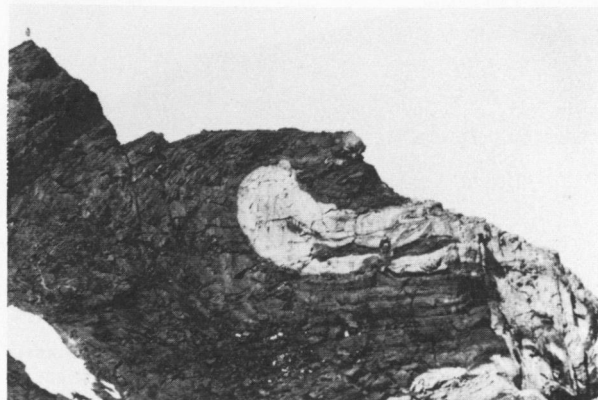


Fig. 48.  $F_1$  isoclinal fold refolded by major  $F_2$  fold in layered orthopyroxene-quartz-feldspar gneiss and aluminous metasediments; Reference Peak, northern Scott Mountains (see Fig. 46C). Note figure for scale. (M2314)

at large angles to the pre-existing foliation, dipping at moderate to steep angles ( $45-80^\circ$ ): to the northwest or west-northwest in the Mount King area, and to the north or northwest in the Scott Mountains.  $F_3$  minor fold axes and  $L_3$  lineations plunge at low angles to the east-northeast or west-southwest in the northern Scott Mountains-Khmara Bay area (James & Black, 1981; Sandiford & Wilson, 1984). The more open folds are generally asymmetrical (approaching monoclinal), with one steeply dipping limb and one gently or moderately dipping limb, and most have gently plunging axes (Figs. 46E & 49). Parasitic similar folds range from relatively open to tight, with axial planes roughly parallel to those of the major structures (Figs. 46D, 50 & 51). In some areas, e.g., the southern Scott Mountains, a penetrative foliation, defined by aligned biotite grains, was developed (Figs. 62 & 63), and locally shear zones and mylonites were

apparently formed (James & Black, 1981). Elsewhere,  $D_3$  resulted only in localized recrystallization to fine-grained polygonal aggregates (Harley, 1985b), although the metamorphic grade was still high (amphibolite to granulite facies). Detailed mapping has demonstrated the presence of complex interference patterns produced by refolding of  $F_2$  structures by  $F_3$  folds in the Amundsen Bay (Griffin, 1979) and Khmara Bay (Sandiford & Wilson, 1983, 1984) areas. On a regional scale,  $D_3$  resulted in the production of a dome and basin fold pattern which characterises the Napier Complex (James & Black, 1981).

Because of the tight to isoclinal nature of the earlier  $F_1$  and  $F_2$  folds, plots of poles to foliations can be used to delineate subareas having similar structural orientations with respect to the  $F_3$  folds (Fig. 52). Much of the scatter across the girdle for each subarea probably results from the presence



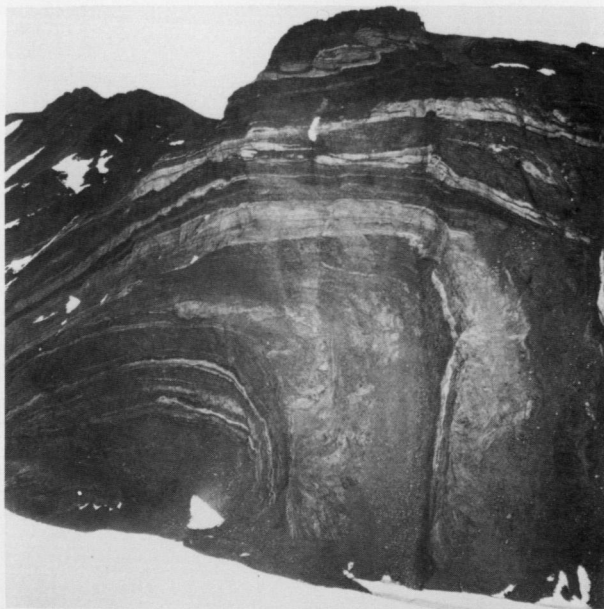


Fig. 49. Major, asymmetric  $F_3$  folds in layered garnet-quartz-feldspar gneiss and orthopyroxene-quartz-feldspar gneiss; northeast face of Mount McLennan, northern Scott Mountains (see Fig. 46E). Height of cliff: about 400 m. (M2170)



Fig. 50. Mesoscopic, asymmetric  $F_3$  folds in layered garnet-quartz-feldspar gneiss and orthopyroxene-quartz-feldspar gneiss; Mount Denham (see Fig. 46D). Height of cliff: about 50 m. (M2039)

of these  $F_1$  and, more particularly,  $F_2$  folds. The regional strike ranges from north to northeast in most of the northern part of the Napier Complex (subareas A to E of Fig. 52), and  $\pi$  axes are near-horizontal or plunge at low angles to the northeast or southwest. In the Rippon subarea (F), folding appears to have been predominantly about west-northwest-plunging axes, i.e., transverse to the trend in the Napier Mountains. The dominant trend in the Raggatt and Scott Mountains (subareas G, H, K & L) is east-west, and poles to foliations in subareas K and L define great circles with  $\pi$  axes plunging to the west (Fig. 52).  $L_1$  lineations are folded by  $F_2$  and  $F_3$  structures and, hence, show considerable scatter on stereographic plots (Fig. 53). Nevertheless, the data suggest that the early lineation (and  $F_1$  fold axes) originally plunged at low angles to the northeast or southwest over most of Napier Complex. In the Khmara Bay area and northern Scott Mountains (subareas K & L), however,  $L_1$  lineations mostly plunge west to west-southwest (Fig. 23, and Sandiford & Wilson, 1984), possibly due to re-orientation by relatively intense later folding episodes ( $D_2$  and  $D_3$ ).

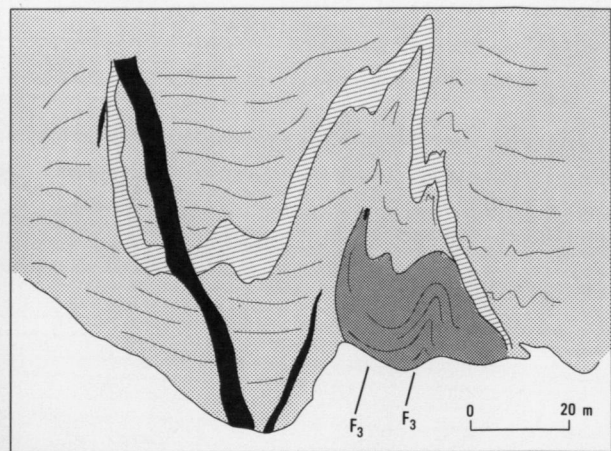


Fig. 51. Metamorphosed pyroxenite dyke ( $B_1$ ) folded by tight parasitic  $F_3$  folds and cut by undeformed Amundsen dolerite dykes ( $B_4$ ); Mount McGhee. Note that the thinner dolerite has been intruded parallel to the  $F_3$  axial planes.

The oldest suite of mafic or ultramafic dykes recognised in the Napier Complex ( $B_1$  pyroxenites) is clearly post- $F_1$ , but folded by  $F_3$  structures (Fig. 51). Only five such dykes have been found, however, and their relationship to the  $F_2$  folds in the country rocks is not known.  $B_2$  metatholeiites are generally undeformed, but have granoblastic-polygonal textures and, like the high-Mg dykes ( $B_3$ ) were apparently intruded under high-grade metamorphic conditions. They commonly appear to cross-cut  $F_3$  folds, although detailed studies in the Khmara Bay area (Sandiford & Wilson, 1983, 1984) suggest that at least some  $B_2$  dykes were intruded parallel to the axial surfaces of developing  $F_3$  folds. Geochronological data are consistent with emplacement of  $B_2$  dykes either during or soon after  $D_3$  (Sheraton & Black, 1981; Black & others, 1983a). Amundsen Dykes ( $B_4$ ) are undeformed and unmetamorphosed, except where affected by the structures described in the next paragraph.

All the deformations so far described are older than the Amundsen Dykes. The most prominent post-dyke structures, formed during  $D_4$ , are relatively narrow shear zones (Figs. 54 & 55) which are especially abundant in the western Tula Mountains and Amundsen Bay-Khmara Bay area, and appear to be related to the high-grade metamorphism and tectonism of the Rayner Complex to the southwest. These shear zones are mostly, but not invariably, near-vertical and in many places tend to follow pre-existing vertical structures such as major fold limbs or dolerite dyke margins. Extensive recrystallisation of minerals to fine-grained polygonal aggregates and production of mortar structures are common (Fig. 66), although deformation was largely ductile; a strongly penetrative foliation was developed (Fig. 68). A fine-grained mineral lineation ( $L_4$ ) locally parallels the axes of minor tight to isoclinal folds ( $F_4$ ) of variable, but generally steep, plunge. Late-stage deformation ( $D_5$ ) includes sub-vertical mylonite zones (Fig. 56), in places tens of metres across and locally with pseudotachylite veins, chlorite, prehnite-muscovite, and calcite-quartz veins, and faults. The mylonites occur in both discontinuous and continuous zones (Sandiford & Wilson, 1984; Sandiford, 1985a), and show some evidence of post-strain recrystallization, e.g., fine-grained polygonal aggregates of strain-free quartz. Many mylonites are younger than the shear zones, but they commonly tend to follow pre-existing shears and both may have formed in



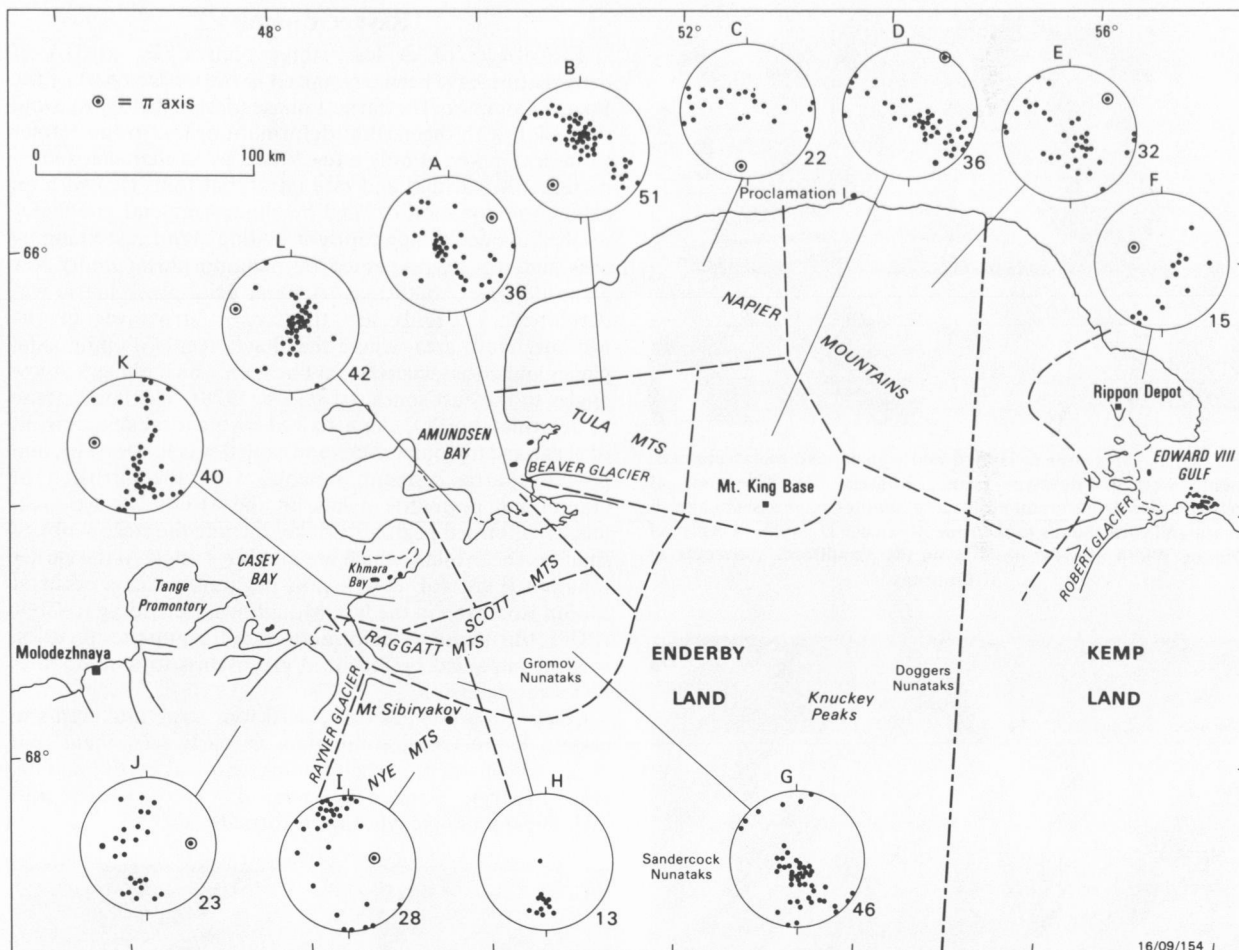


Fig. 52. Poles to foliations measured in 12 sub-areas (A to L) of Napier and Rayner Complexes. The number of measurements for each sub-area is indicated.

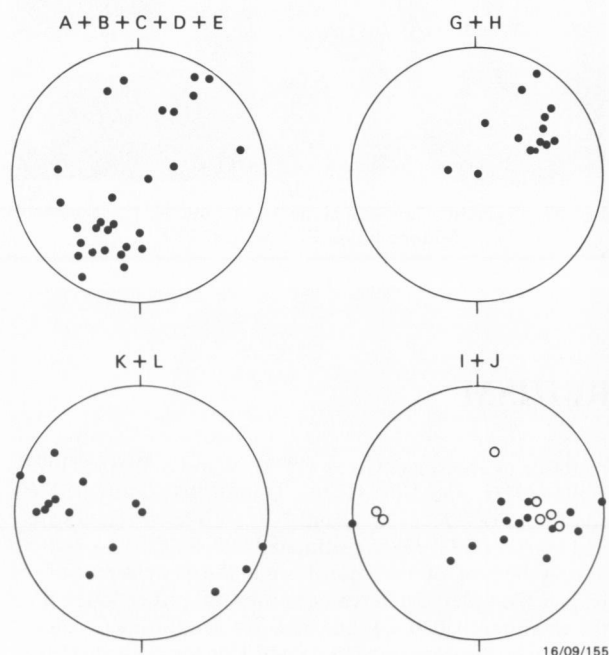


Fig. 53. Stereographic plots of lineations for subareas A to E, G + H, and K + L (Napier Complex), and I + J (western part of Rayner Complex) of Fig. 52. Open circles denote  $F_b$  fold axes.



Fig. 54.  $F_4$  shear zone in layered garnet-quartz-feldspar gneiss and metasediments; Mount Cronus, northern Scott Mountains. Note figure (arrowed) for scale. (M2314)

response to a single prolonged deformational episode during uplift (Sandiford & Wilson, 1984). However, other mylonites are clearly older (for example, dolerite dykes intrude faults in the Beaver Glacier area; A. C. Griffin, personal communication, 1978) and some mylonites may have been formed during  $D_3$  (Black & James, 1983). Evidence for re-activation of a mylonite zone was noted at Mount Maslen where a pegmatite intrudes a marginally mylonitized dolerite dyke but

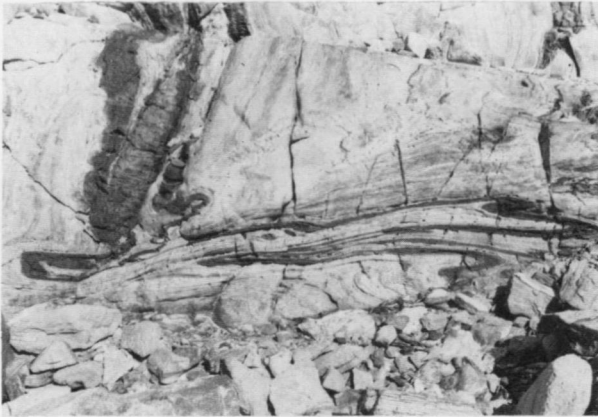


Fig. 55.  $F_4$  shear zone in layered mafic gneiss and metasediments; island west of McIntyre Island, Khmara Bay. The zone of retrogression from granulite to amphibolite-facies assemblages is sharp and corresponds to the zone of intense  $D_4$  strain in centre of Figure. Width of view: about 6 m. (M. Sandiford, University of Melbourne).



Fig. 56.  $F_5$  mylonite zone in layered pyroxene-quartz-feldspar gneiss and mafic granulite; McIntyre Island, Khmara Bay. Mylonite contains pegmatitic feldspar porphyroclasts. Note brittle rupture of mafic gneiss outside zone of ductile deformation. Width of view: about 4 m. (M. Sandiford, University of Melbourne).

is itself cut by a younger mylonite zone. Pegmatite emplacement appears to have been associated with both  $D_4$  and  $D_5$  structural events in the Khmara Bay area (Sandiford & Wilson, 1984).

## Rayner Complex

The effects of at least three phases ( $D_a$  to  $D_c$ ) of deformation have been recognized in the western part of the Rayner Complex. The earliest phase (designated  $D_a$  to avoid confusion with the earliest deformation,  $D_1$ , in the Napier Complex), noted at only a few localities, is characterised by mesoscopic isoclinal and rare intrafolial folds ( $F_a$ ) with an axial-plane foliation defined by aligned mineral grains.  $D_b$  resulted in open to tight upright folding about east-plunging axes and was accompanied by metamorphism under low granulite-facies conditions. A weak axial-plane fabric was developed.  $F_b$  folds are the major structures in the Molodezhnaya area, where they have steeply dipping axial planes and an associated axial lineation which plunges at low angles to the east-southeast (Grew, 1978). The latest phase of deformation ( $D_c$ ), characterized by the local development of shear and mylonite zones and faults, was followed by, and possibly partly contemporaneous with, the intrusion of granite and pegmatite dykes. In the Molodezhnaya area, locally deformed pegmatite dykes intrude the steep limbs of small  $F_c$  shear folds, which are at a large angle to the earlier foliation (Figs. 46F & 57); post-pegmatite shears occur at Mount Robinson in the Nye Mountains. According to Grew (1978), this phase of deformation and pegmatite intrusion was accompanied by localized greenschist to amphibolite-facies retrogression.

Clarke (in press) has recognised four structural events in eastern Kemp Land, comprising an early recumbent fold phase, two phases of upright folding (east and north-trending, respectively), and a period of shear and mylonite-pseudotachylite zone formation.

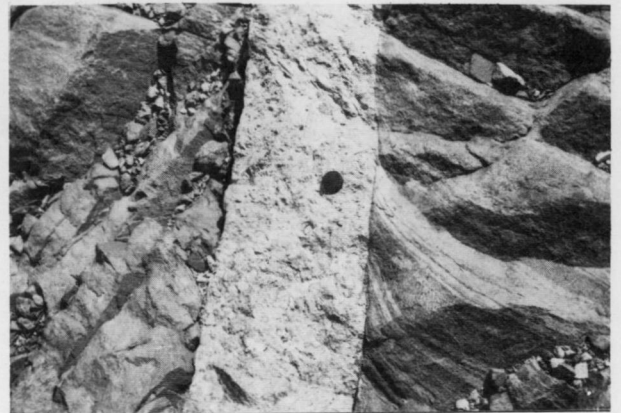


Fig. 57. Pegmatite intruded along steep limb of  $F_c$  shear fold; Molodezhnaya Station. (M2175)

## METAMORPHISM

### Napier Complex

#### Peak metamorphism

The metamorphic grade in most of the Napier Complex is intermediate-pressure granulite facies (Green & Ringwood, 1967). The presence of coexisting sapphirine and quartz in metapelites from an area of about 4000 km<sup>2</sup> in the northern Scott and Tula Mountains (Fig. 15) places these rocks amongst the highest-temperature metamorphics known on a regional scale. Detailed studies of granulites from 'Spot Height 945' in the Tula Mountains (Ellis, 1980) indicate peak metamorphism ( $M_1$ ) at 8–10 kb and 900–980°C, using the

methods of Hensen & Green (1973), Wood & Banno (1973), Wells (1977), and Ellis (1980). Grew (1980) estimated PT conditions of  $900 \pm 30^\circ\text{C}$  and  $7 \pm 1$  kb for the same area, and Harley (1983, 1985b) estimated 900–950°C and 7–10 kb during the peak of metamorphism in the western part of the Napier Complex. Such temperatures are rather lower than the minimum (1030°C) indicated for sapphirine + quartz stability by the experimental data of Hensen & Green (1973), although Newton (1972) and Newton & others (1974) have suggested that sapphirine + quartz may replace magnesian cordierite at temperatures as low as 800°C (at about 7–8 kb) under anhydrous conditions (Fig. 58). Additionally, the

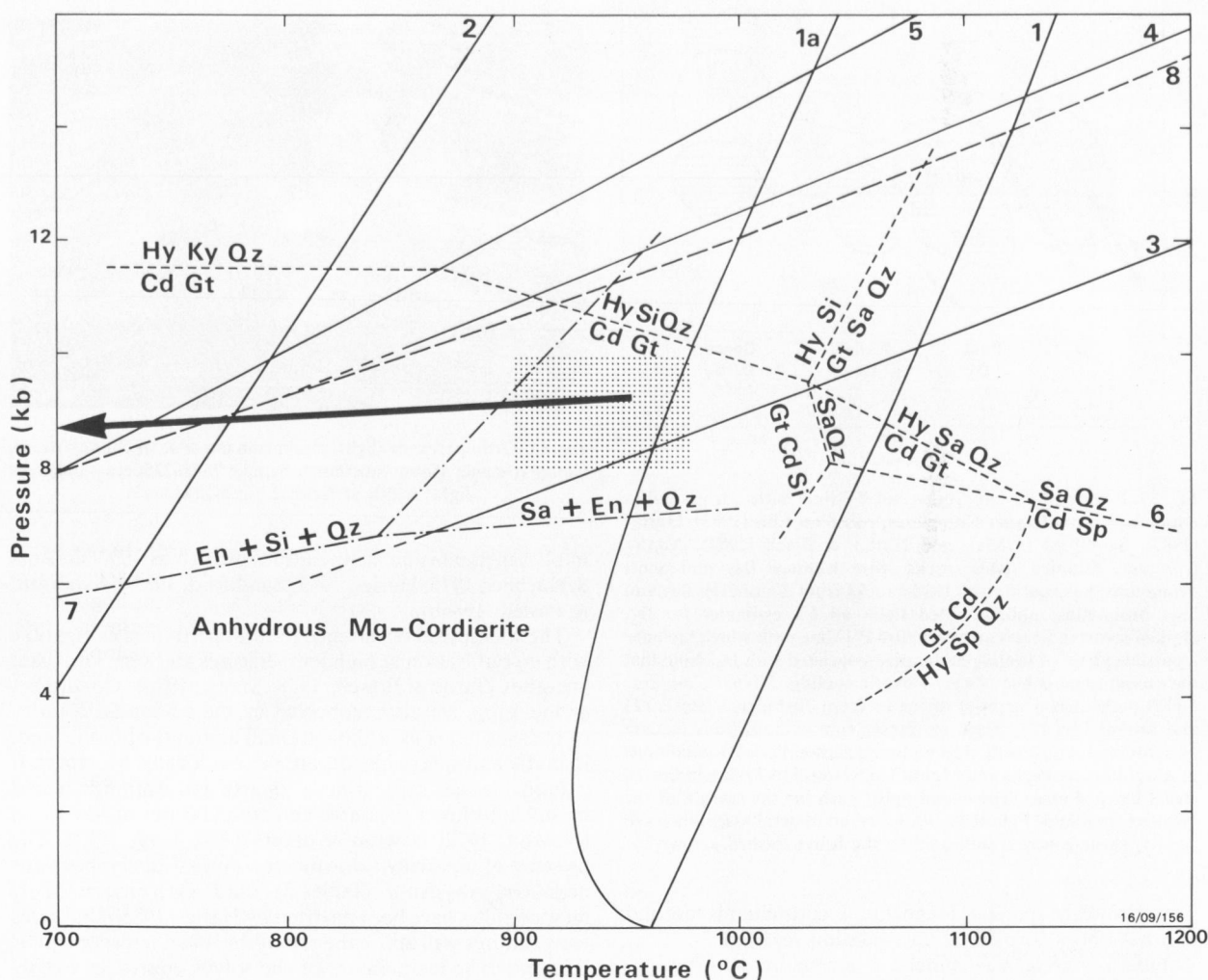


Fig. 58. PT diagram showing estimated peak conditions of metamorphism ( $M_1$ ) in Tula Mountains (stippled area) (after Ellis, 1980, using methods of Wood & Banno, 1973, and Wood, 1976). (1) Dry granite solidus (Huang & Wyllie, 1975). (1a) Estimated granite solidus for  $P_{H_2O} = 0.25P_{Total}$  (based on Cann, 1970; Huang & Wyllie, 1975); (2) Top of alkali feldspar solvus (Morse, 1970); (3) Appearance of garnet in mafic rocks of olivine tholeiite composition (Green & Ringwood, 1967, 1972); (4) Appearance of garnet in rocks of quartz tholeiite composition (Green & Ringwood, 1967, 1972); (5) Kyanite-sillimanite boundary (Holdaway, 1971); (6) Univariant phase boundaries for reactions in pelitic rocks (Hensen & Green, 1973). (7) Stability limits of enstatite + sillimanite + quartz, sapphirine + enstatite + quartz, and anhydrous magnesian cordierite (Newton & others, 1974). (8) Estimated late Archaean geotherm (O'Hara, 1977). Arrow indicates estimated metamorphic cooling path (Ellis & Green, 1985). Mineral abbreviations as in Table 1.

presence of minor components, such as Cr, in the sapphirine would extend the stability field of sapphirine + quartz to lower temperatures (Ellis, 1980).

Primary coexisting orthopyroxene and sillimanite is common only in the northern Scott Mountains and Casey Bay area (Fig. 15), suggesting higher pressures, lower temperatures, or both, during metamorphism, compared with those in the Tula Mountains. In the Napier Mountains, the presence of cordierite, rather than sapphirine + quartz, in metapelites indicates somewhat lower PT conditions and possibly higher  $P_{H_2O}$ . PT estimates based on coexisting garnet and orthopyroxene by Harley (1983, 1985b) indicate peak metamorphic pressures of 9–11 kb in the Scott Mountains and Khmara Bay area, 6–8 kb in the Tula Mountains, and about 5 kb in the Napier Mountains; corresponding temperatures are mostly in the range 900–950°C (Fig. 59).

The occurrence of osumilite indicates metamorphic conditions beyond the stability of the chemically equivalent assemblage cordierite + orthopyroxene + K-feldspar + quartz (Ellis & others, 1980). Its distribution, and that of its pseudomorphs (Fig. 15), shows that it was formed under

generally similar PT conditions to those of sapphirine + quartz, and that it is stable at significantly higher pressures than the 5 kb (at 700–900°C) at which osumilite crystallised in the contact aureole of the anorthositic Nain Complex, Labrador (Berg & Wheeler, 1976). Grew (1982a) has proposed that osumilite should be stable in rocks of appropriate bulk composition at temperatures above 750°C and pressures below 8–9 kb (with  $P_{H_2O} < P_{Total}$ ), that is, under PT conditions estimated for many other granulite terranes. However, osumilite appears to be particularly susceptible to alteration during cooling; even in Napier Complex metapelites with unusually high-temperature mineral assemblages, it is invariably partly replaced by a symplectite of cordierite + K-feldspar + orthopyroxene + quartz, and hence may only survive cooling under exceptional circumstances. Osumilite stability and breakdown reactions are discussed in more detail by Ellis & others (1980).

Coexisting spinel and quartz have been found in metasediments at a few localities (Fig. 15), but spinel is abundant only in rare relatively iron-rich rocks. In most cases there is evidence of the reaction

spinel + quartz → garnet + sapphirine + sillimanite.



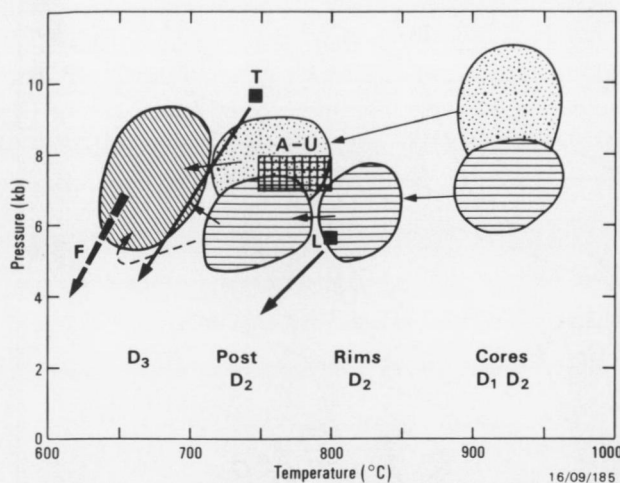
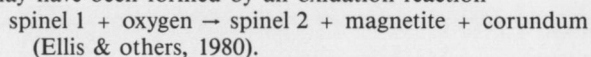
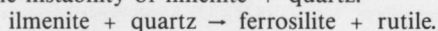


Fig. 59. Estimated PT conditions and P-T-time paths for granulites from Napier and Rayner Complexes, based on Ellis (1983), Harley (1983), Sandiford (1985a), and Harley & Black (1987). *Napier Complex*. Stippled fields: rocks from Khmara Bay and Scott Tula Mountains; horizontal ruled fields: rocks from Amundsen Bay and Tula Mountains; oblique ruled field: all PT estimates for D<sub>3</sub>. Dashed arrow indicates an alternative P-T-time path which includes a possible phase of heating and burial associated with D<sub>3</sub>. Note that the overall trend is one of near-isobaric cooling. *Rayner Complex*. Uplift paths (heavy arrows) for rocks from Turbulence Bluffs (T) and Mount Lira (L), based on garnet core compositions (square symbols) and symplectitic rims replacing garnet. Peak PT conditions at Amphi theatre Peaks and Mount Underwood (A-U) are indicated (cross hatched area). The coeval uplift path for the margin of the Napier Complex at Fyfe Hills (F), based on mineral assemblages in D<sub>4</sub> shear zones, is indicated by the heavy dashed arrow.

The assemblage spinel + magnetite + corundum is rare and may have been formed by an oxidation reaction



Rutile is the usual Ti oxide phase in metapelites, suggesting the instability of ilmenite + quartz:



Intergrowths of orthopyroxene and clinopyroxene in iron-rich metasediments (commonly with abundant magnetite) (Fig. 60) and pyroxenite bodies (Fig. 61) at a number of localities have apparently formed by inversion of pigeonite or subcalcic clinopyroxene. Stability data for Fe-rich pigeonite



Fig. 60. Ferroaugite exsolution lamellae (dark) in eulite (light) formed by inversion of pigeonite (about  $\text{Ca}_7\text{Mg}_{22}\text{Fe}_{71}$ ), quartz-garnet-pyroxene rock (probably Fe-rich metasediment); spot height 213, Khmara Bay. Sample 77284359; cross polarised light; width of field: 3 mm. (M2643)

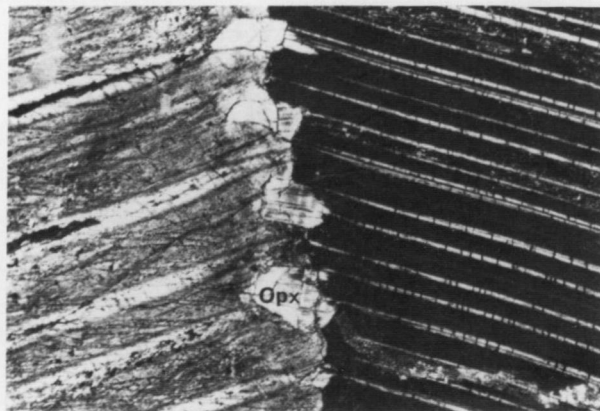


Fig. 61. Orthopyroxene (light) exsolution lamellae in clinopyroxene, clinopyroxenite; Mount Smethurst. Sample 76283225; cross polarised light; width of field: 2.5 mm. (M2643)

implies metamorphic temperatures as high as 1000°C (Ross & Huebner, 1975; Harley, 1983; Sandiford, 1985b; Sandiford & Powell, 1986b).

The widespread occurrence of mesoperthite is compatible with crystallisation at high temperatures and very low water pressures (Tuttle & Bowen, 1958; Smith, 1974). Conditions of low  $\text{P}_{\text{H}_2\text{O}}$  are also supported by the comparative rarity of hydrous minerals, although small amounts of biotite and, in mafic rocks, hornblende, are present locally. Moreover, it is probable that sapphirine + quartz and osumilite would be stable to lower pressures and temperatures at low  $\text{P}_{\text{H}_2\text{O}}$  (Newton, 1972; Newton & others 1974; Berg, 1977). The presence of unusually calcic mesoperthites with compositions near  $\text{Or}_{32}\text{Ab}_{49}\text{An}_{19}$  (Table 2) (and even more calcic mesoperthites have been reported by Harley, 1985b) indicates temperatures well above the top of the alkali feldspar solvus (Fig. 58). The temperature of the solvus crest rises steeply with increasing anorthite content, being 920°C for a composition  $\text{Or}_{29.6}\text{Ab}_{62.2}\text{An}_{8.2}$  (Morse, 1968). Morse's experimental data were obtained at 500 bars  $\text{P}_{\text{H}_2\text{O}}$  ( $=\text{P}_{\text{total}}$ ) at which pressure the feldspar solidus ( $925^\circ\text{C} \pm 5^\circ\text{C}$ ) lies only just above the solvus crest. At higher total pressures, the temperature of the solvus crest would be further raised, whereas the solidus is lowered with increasing  $\text{P}_{\text{H}_2\text{O}}$  (Morse, 1968, 1970). Hence, the original homogeneous Napier Complex feldspars must have formed at temperatures considerably higher than 920°C implying water pressures much less than 500 bars. Melting of granitic gneiss was apparently not very extensive, presumably being limited by the availability of water; indeed, the charnockitic assemblage K-feldspar + orthopyroxene transforms to biotite + quartz or begins to melt at water pressures above 0.7 kb (Luth, 1967). Nevertheless, very high temperatures of metamorphism are possible because, under dry conditions, a rock of granitic composition does not begin to melt until about 1050°C at 8 kb (Huang & Wyllie, 1975), with the solidus temperature being reduced by about 100°C if  $\text{P}_{\text{H}_2\text{O}} = 0.25\text{P}_{\text{total}}$  (Cann, 1970) (Fig. 58). Such very low water pressure may well be a result of a high proportion of  $\text{CO}_2$  in the fluid phase (Newton & others, 1980), and  $\text{CO}_2$  has been identified in fluid inclusions in sapphirine-bearing metapelites from Spot Height 945 (H. Etminan, BMR, personal communication, 1985). Indeed, dehydration and loss of K, Rb, Th, and U during granulite-facies metamorphism may have resulted from introduction of a  $\text{CO}_2$ -rich fluid, possibly derived from the mantle (Tarney & Windley, 1977; Newton & others, 1980).

Orthopyroxene + clinopyroxene + plagioclase  $\pm$  quartz is the usual assemblage in mafic rocks, but the equivalent higher-pressure assemblage garnet + clinopyroxene  $\pm$

orthopyroxene  $\pm$  plagioclase  $\pm$  quartz has been found in a few mafic and ultramafic rocks at Gromov Nunataks and several localities in the Amundsen Bay–Khmara Bay area (Fig. 15). Most such rocks are probably of igneous origin (Table 4), but the more iron-rich are most likely to be metasediments. The appearance of garnet seems to be partly controlled by chemical composition: all analysed samples are olivine-normative and have low to moderate mg (atomic Mg/(Mg + total Fe)) values (mostly 0.38–0.50) (Table 4). This is compatible with the observation of Green & Ringwood (1967, 1972) that garnet forms at lower pressures in undersaturated (olivine-normative) compositions and in rocks with relatively low mg values. At 1100°C, garnet appears in rocks of olivine tholeiite composition above about 10 kb, and in quartz tholeiites above 14 kb, although corresponding pressures are lower at lower temperatures (Fig. 58). Detailed studies of garnet clinopyroxenite at northwest Wyers Ice Shelf, south of Amundsen Bay, indicate PT conditions of about 9–11 kb and 900°C during the peak of the high-grade metamorphism (Ellis & Green, 1985); Black & others (1983a) give similar estimates of 9–11 kb and 900°C at Fyfe Hills. The absence of garnet, even from silica-undersaturated mafic rocks in other parts of the Napier Complex, implies pressures significantly less than 10 kb. This is consistent with the assemblages in aluminous metasediments and with the PT estimates of Harley (1983, 1985b), which, as outlined above, also indicate that maximum pressures were higher to the south and west. Wood (1975) estimated temperatures of 800–860°C at 10–13 kb during metamorphism of Lewisian rocks of South Harris, Scotland, where garnet is present in olivine-normative, but not in quartz-normative, mafic rocks. Under the higher temperature conditions in the Napier Complex, however, sillimanite, rather than kyanite, was the stable Al-silicate polymorph (Fig. 58).

## Retrograde metamorphism

During cooling, after the peak of metamorphism in the Napier Complex, a wide variety of mineral-reaction coronas was formed, particularly in aluminous metasediments. For example, sapphirine commonly shows evidence of breakdown according to the reaction

sapphirine + quartz  $\rightarrow$  sillimanite + garnet + cordierite.  
Rims of sillimanite + orthopyroxene separate sapphirine from quartz in specimens from the northern Scott Mountains, and indicate the retrograde reaction

sapphirine + garnet + quartz  $\rightarrow$  sillimanite + orthopyroxene,

or the continuous (divariant) reaction

sapphirine + quartz  $\rightarrow$  sillimanite + orthopyroxene, whereas in the Tula Mountains the divariant reaction

sapphirine + quartz  $\rightarrow$  cordierite

is more typical. This is interpreted as evidence that cooling took place under slightly higher pressure conditions in the former area, in agreement with PT estimates for the peak of metamorphism outlined above. Sapphirine breakdown reactions are described in more detail by Ellis & others (1980). Garnet coronas, generally around pyroxene, were widely developed in both felsic and mafic gneisses (see below).

Harley (1983, 1985b) estimated  $M_2$  metamorphic conditions of about 750–850°C and 5–7 kb over the western part of the Napier Complex during, or immediately after  $D_2$ , based on rim compositions of co-existing garnet and orthopyroxene considered to have equilibrated at that time (Fig. 59). Compositions of garnet-orthopyroxene assemblages, including garnet coronas, which apparently crystallised during  $D_3$ , give 600–750°C and 4–8 kb. Estimates for  $M_3$ – $D_3$  of 650°C and 7 kb at Fyfe Hills by Black & others (1983a) and Sandiford (1985b), and

650–700°C and 6–9 kb in the Field Islands, Khmara Bay, by Black & others (1983b) are in the same range. Estimated equilibration temperatures for metatholeiites and high-Mg dykes ( $B_2$  and  $B_3$ ), intruded during or shortly after  $D_3$ , are mostly in the range 810–890°C (using the method of Wood & Banno, 1973) and 845–960°C (Wells, 1977), although these methods tend to give high results (see Ellis, 1979). Estimates of 650–750°C and 7–10 kb for  $B_2$  dykes in the Khmara Bay area (Sandiford & Wilson, 1983) are probably more realistic and compare well with estimates for  $M_3$  quoted above. Two high-Mg dykes give much higher temperatures ( $\sim$ 1100°C), probably owing to incomplete equilibration during more rapid cooling at higher crustal levels. Pressure estimates, using the method of Ellis (1980), are 3.1–6.3 kb for high-Mg dykes in the Tula Mountains and 7.3–9.6 kb for metatholeiites (including one which, on chemical composition, belongs to the high-Mg suite) in the Scott Mountains. These pressures (Fig. 27) are thus consistent with those obtained on the country rocks and suggest that the Tula and southern Napier Mountains represent a somewhat higher crustal level than the Scott Mountains.

P-T-time paths compiled by Harley (1983, 1985b) show that the Napier Complex has undergone a prolonged period of near-isobaric cooling prior to uplift (Fig. 59), as first proposed by Ellis (1980, 1983). Assemblages in calc-silicate rocks at McLeod Nunataks also indicate near-isobaric cooling at constant high  $P_{CO_2}$  (Warren & Hensen, 1983), and PT estimates on garnet-clinopyroxenite at northwest Wyers Ice Shelf imply cooling from about 900 to 640°C with only slightly decreasing pressure (Ellis & Green, 1985). The unusual cooling history is reflected in the occurrence of lower-temperature reaction coronas around high-temperature phases (e.g., orthopyroxene + sillimanite + quartz  $\rightarrow$  garnet + cordierite), which contrasts with the more common low-pressure reaction coronas in other granulite terranes, including the Rayner Complex (e.g., garnet + quartz  $\rightarrow$  orthopyroxene + cordierite). Ellis (1980, 1983) has postulated that near-isobaric cooling, as well as exceptional conditions of metamorphism, was an important factor in the preservation of the unique high-temperature assemblages of the Napier Complex. Moreover, the observed P-T-time path for a rock will depend on the degree of penetrative deformation it has undergone. The presence of secondary reaction coronas and compositional zoning in primary minerals in many Napier Complex rocks can be attributed to the general lack of a thorough penetrative deformation following the peak of metamorphism, and enable the estimation of both peak metamorphic conditions and subsequent cooling to  $\sim$ 600°C (Ellis & Green, 1985). If deformation had resulted in complete recrystallisation at  $\sim$ 600°C, there would be no evidence for the higher temperature segment of the isobaric P-T-time path.

Apart from recrystallisation which accompanied the earlier deformations (mainly  $D_3$ ), and locally resulted in a new foliation defined by oriented biotite grains (Figs. 62 & 63), much of the retrograde metamorphism ( $M_4$ ) in the Napier Complex was associated with post-Amundsen Dyke shearing ( $D_4$ ), probably coeval with formation of the Rayner Complex. Thus, shear zones are most extensively developed in the Napier Complex near its boundary with the Rayner Complex, as in the Khmara Bay and Amundsen Bay areas. Estimated conditions of metamorphism in the Field Islands, Khmara Bay, during the Rayner event are  $600 \pm 50^\circ\text{C}$  and about 7 kb, followed by near-isothermal uplift to 3–4 kb (Black & others, 1983b). Mineral assemblages and reaction coronas in shear zones at Fyfe Hills also indicate near-isothermal uplift from 600–700°C/6–8 kb to 570–670°C/3–5 kb (Sandiford & Wilson, 1983; Sandiford, 1985a; Harley, 1985a), which is comparable with that of the Rayner Complex (see below), but contrasts with the near-isobaric cooling



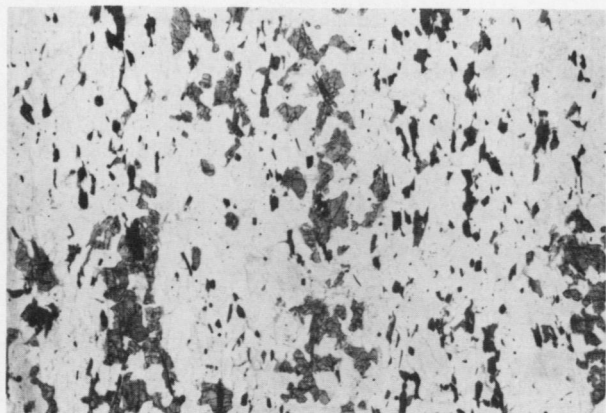


Fig. 62. Aligned biotite grains (dark grey) which post-date orthopyroxene (light grey) and define a D<sub>3</sub> foliation, biotite-orthopyroxene-quartz-plagioclase gneiss; Perov Nunataks. Sample 77284767; width of field: 10 mm. (M2641)

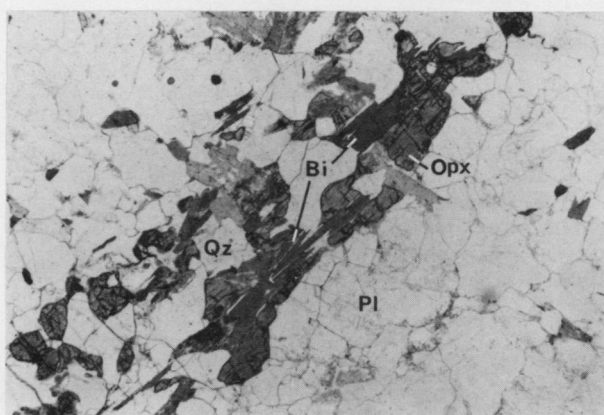
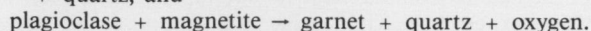
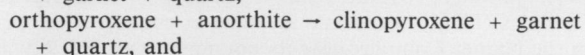
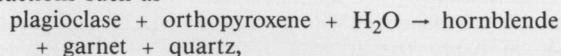


Fig. 63. Biotite (+ minor quartz) replacing orthopyroxene, orthopyroxene-biotite-quartz-plagioclase gneiss; nunatak 6 km west of Young Nunataks, Napier Mountains. Sample 77284210; width of field: 3.5 mm. (M2643)

previously undergone by the Napier Complex. It is only in these localised shear zones that mineral assemblages record the uplift which was synchronous with their formation.

Secondary garnet is sporadically developed in mafic granulites and Amundsen Dykes in the northern Scott Mountains-Casey Bay area, Mount Riiser-Larsen, Gromov Nunataks, and Cape Batterbee. It commonly forms poikiloblastic aggregates in extensively recrystallised rocks, but in less-deformed rocks occurs as coronas around pyroxene, magnetite, or hornblende (Figs. 64 & 65), suggesting reactions such as



The second reaction, which was used by de Waard (1967) to divide low-pressure from high-pressure granulites, is an oversimplification in that iron oxides (ilmenite or magnetite) probably also take part in the reaction, and quartz can be either a reactant or a product (McLelland & Whitney, 1977). Similar reactions have occurred in some felsic gneisses (Figs. 66 & 67), in many of which orthopyroxene is surrounded by reaction rims of garnet and quartz, with little or no clinopyroxene:

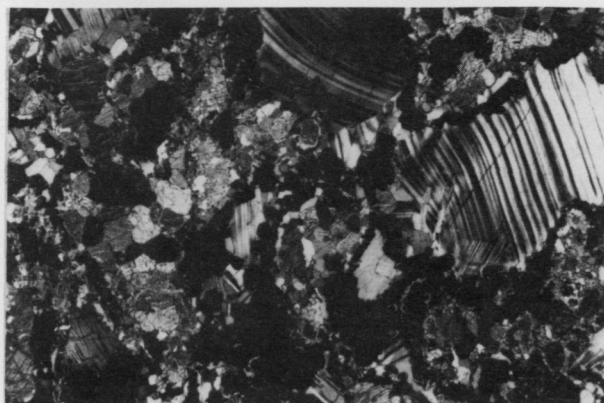
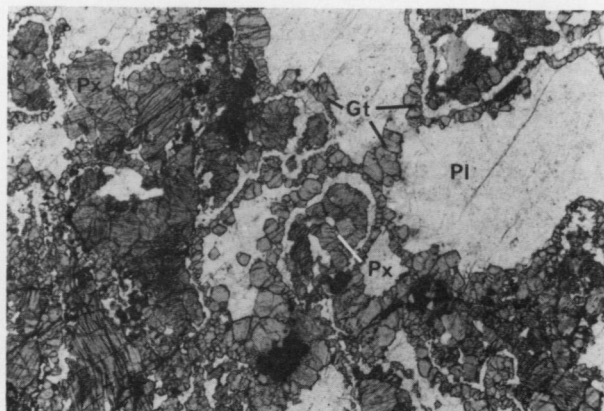
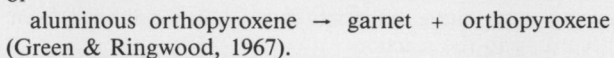
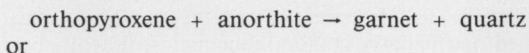


Fig. 64. Garnet rimming pyroxene, garnet-orthopyroxene-clinopyroxene-plagioclase granulite; outcrop 1 km southwest of McIntyre Island, Khmara Bay. Note deformed twin lamellae in plagioclase. Sample 77284846; cross-polarised light in lower photo; width of field: 6 mm. (M2642)



It is clear that garnet formation commonly accompanied post-Amundsen Dyke shearing (Figs. 65 & 68, and Sandiford & Wilson, 1984), and the distribution of secondary garnet in both Amundsen Dykes and country rocks is similar to that of abundant D<sub>4</sub> shear zones. However, as noted above, garnet coronas were also formed by similar reactions during near-isobaric cooling after the peak of the granulite-facies metamorphism (Ellis, 1980), i.e., during D<sub>2</sub> or D<sub>3</sub> (Black & others, 1983a; Sandiford & Wilson, 1984; Sandiford, 1985b; Harley, 1985b); garnet exsolved from clinopyroxene in garnet-clinopyroxenite at northwest Wyers Ice Shelf (Fig. 69) is thought to have a similar origin (Ellis & Green, 1985). In some cases, the age of garnet development is difficult to determine. For example, garnet coronas in orthopyroxene granodiorite at Tange Promontory predate amphibolite-facies retrogression, and may be of D<sub>2</sub>-D<sub>3</sub> age, or, alternatively, may be co-eval with garnet in shear zones which cut Amundsen Dykes in the same area. Estimated PT conditions during both the M<sub>3</sub>-D<sub>3</sub> and M<sub>4</sub>-D<sub>4</sub> events are consistent with garnet stability in mafic rocks (cf. Green & Ringwood, 1967, 1972).

At Fyfe Hills, sheared pelitic metasediments contain a variety of kyanite + gedrite/anthophyllite-bearing assemblages, which have partly reacted to give assemblages with cordierite and staurolite. For example, the assemblage orthoamphibole + kyanite + garnet + cordierite + biotite + quartz is consistent with the reaction



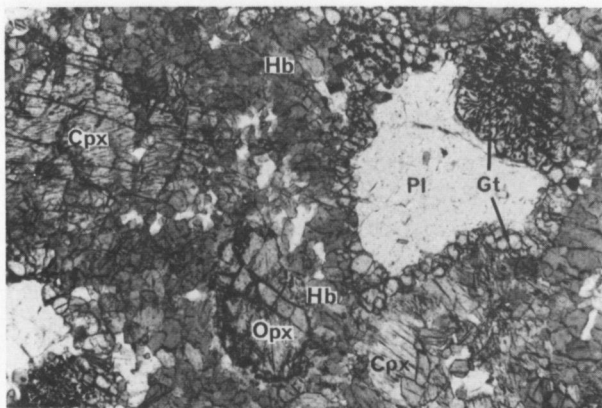


Fig. 65. Garnet rimming hornblende, which largely replaces clinopyroxene and orthopyroxene, garnet–orthopyroxene–clinopyroxene–plagioclase–hornblende granulite; Fyfe Hills. Sample 76283126; cross-polarised light in lower photo; width of field: 2.5 mm. (M2642)

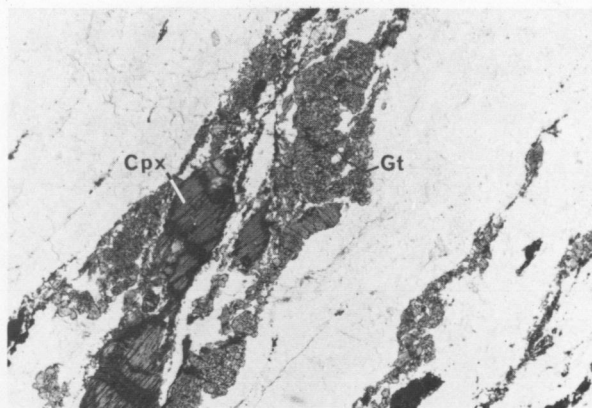
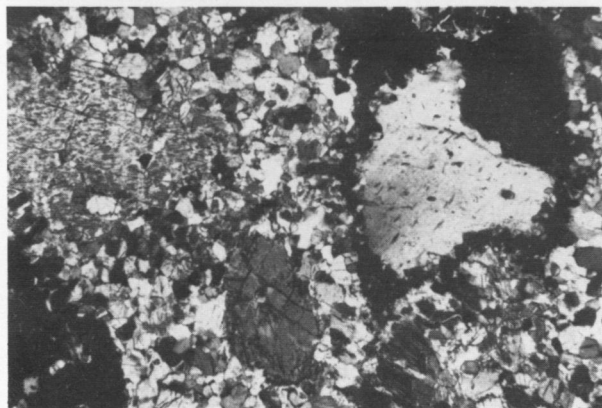
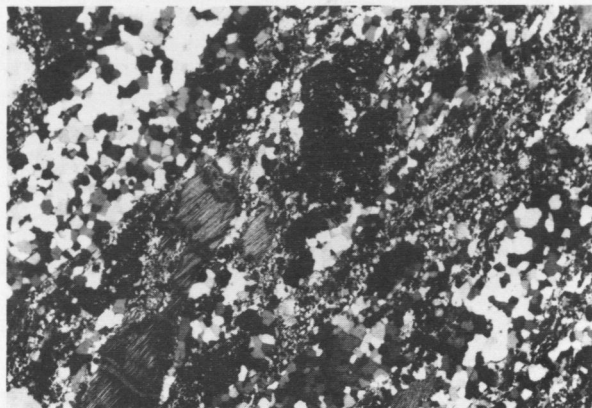


Fig. 66. Secondary garnet in garnet–clinopyroxene–quartz–mesoperthite gneiss from shear zone; island 3 km west of Hydrographer Island, Khmara Bay. Note relict clinopyroxene and finely recrystallised quartz and feldspar. Sample 77284488; cross-polarised light in lower photo; width of field: 7 mm. (M2641)



kyanite + gedrite + quartz  $\rightarrow$  cordierite + H<sub>2</sub>O described by Green & Vernon (1974). Other retrograde reactions in shear zones, which are described in more detail by Sandiford (1985a) and Harley (1985a), include orthoamphibole + kyanite  $\rightarrow$  cordierite + staurolite, and garnet + kyanite + quartz  $\rightarrow$  plagioclase + cordierite + staurolite.

As pointed out above, such reactions indicate near-isothermal uplift. Kyanite also occurs in strongly deformed metapelites at Mounts Gleadell and Cronus (with garnet, biotite, feldspar, and quartz) and near Hydrographer Island (with garnet, cordierite, biotite, and quartz), as well as in a deformed pegmatite at Fyfe Hills (with plagioclase and quartz). Grew (1981a) has reported the presence of secondary kyanite in a pegmatite near McIntyre Island. Sandiford & Wilson (1984) pointed out that kyanite is a diagnostic mineral of the D<sub>4</sub> structural episode.

All these assemblages in shear zones imply relatively high pressures, and temperatures corresponding to at least upper amphibolite-facies conditions; several of the reactions involve addition of water. The formation of near-vertical shear zones may have permitted the access of water into previously almost anhydrous rocks, and the strongly penetrative deformation was clearly an important factor in the development of the garnet-bearing and other assemblages which record the associated uplift (Ellis, 1983). Pressures were locally high enough to stabilise the assemblage garnet + clinopyroxene + plagioclase + orthopyroxene  $\pm$  hornblende in quartz-normative compositions, i.e., above about 8 kb at 700°C (Green & Ringwood, 1967, 1972).

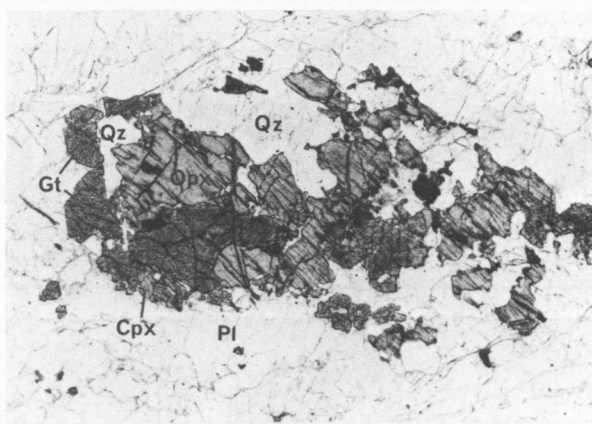


Fig. 67. Garnet (+ minor clinopyroxene) replacing orthopyroxene in garnet–orthopyroxene–quartz–plagioclase gneiss; outcrop 1 km southwest of McIntyre Island, Khmara Bay. Sample 77284844; width of field: 4.5 mm. (M2641)

At Forefinger Point, on the western side of the mouth of the Rayner Glacier, the assemblage orthopyroxene + sillimanite has been replaced by cordierite, probably during the high-grade metamorphism during which the Rayner Complex was formed. In quartz-bearing layers, there is evidence for the reaction (Fig. 70)



Fig. 68. Post-kinematic garnet (small equidimensional grains) in sheared garnet-biotite-quartz-feldspar gneiss; Proclamation Island. Biotite grains define a foliation parallel to the axial plane of an  $F_4$  isoclinal fold. Sample 76283089; width of field: 7 mm. (M2641)

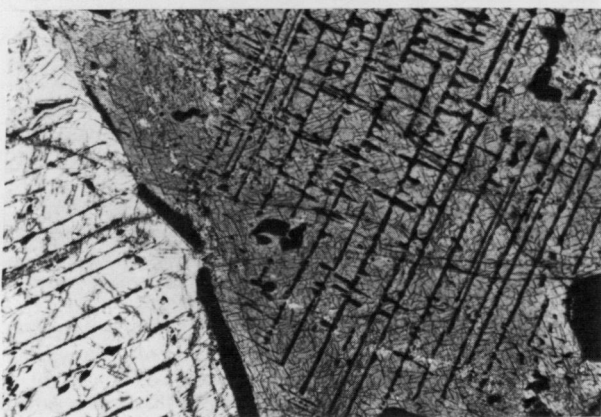


Fig. 69. Exsolved garnet (black) in clinopyroxene, garnet clinopyroxenite; nunatak at northwest corner of Wyers Ice Shelf. Sample 77284353; cross-polarised light; width of field: 5 mm. (M2643)

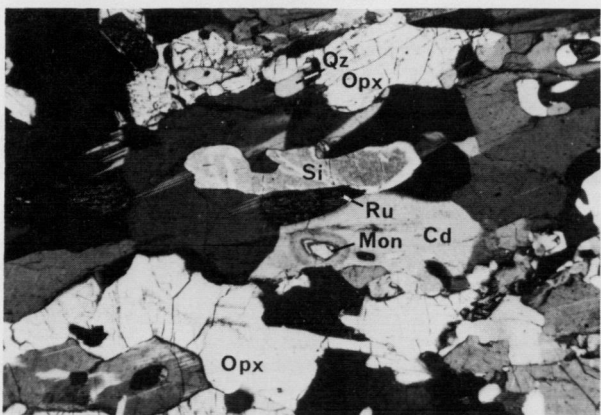


Fig. 70. Cordierite formed by reaction between orthopyroxene, sillimanite, and quartz, sillimanite-biotite-orthopyroxene-perthite-cordierite-quartz gneiss; Forefinger Point, near Rayner Glacier. Note twinning in cordierite and pleochroic haloes around rutile and monazite (Mon). Sample 77284651; cross-polarised light; width of field: 2.5 mm. (M2643)

orthopyroxene + sillimanite + quartz  $\rightarrow$  cordierite, whereas in silica-poor rocks sapphirine and spinel are additional products (Fig. 71);

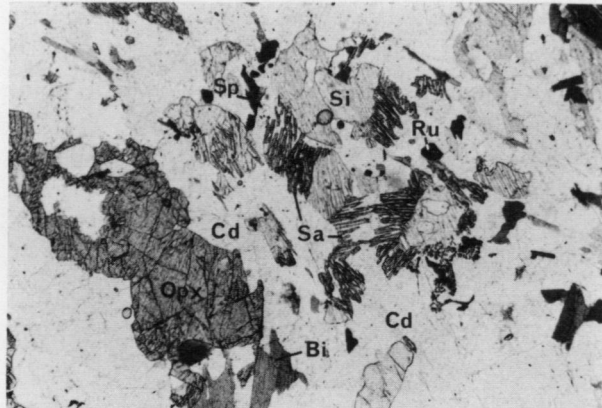


Fig. 71. Cordierite, sapphirine, and spinel formed by reaction between orthopyroxene and sillimanite, sillimanite-orthopyroxene-biotite-quartz-cordierite gneiss; Forefinger Point. Note that sapphirine and spinel form vermicular overgrowths on sillimanite grains. Sample 77284649; width of field: 4 mm. (M2643)

orthopyroxene + sillimanite  $\rightarrow$  cordierite + sapphirine, and

orthopyroxene + sillimanite  $\rightarrow$  cordierite + spinel.

Lower-grade (greenschist to amphibolite-facies) retrogression is widespread in both Amundsen Dykes and country rocks, and is particularly evident near shear zones and mylonites. Retrogression under amphibolite-facies conditions accompanied the intrusion of pegmatite dykes which post-date Amundsen Dykes at Gromov Nunataks. Although generally not particularly deformed, many of the rocks in the Napier Mountains (e.g., at Mount Codrington and Newman Nunataks) and elsewhere show extensive alteration. Mesoperthite has more-or-less recrystallised to plagioclase and K-feldspar (orthoclase or microcline) (Fig. 72) and pyroxene has been wholly or partly replaced by fine-grained aggregates of biotite or actinolitic amphibole, quartz, and, in some places, minor carbonate and opaque minerals. In felsic gneiss, orthopyroxene is commonly altered to biotite (Fig. 73), but thin rims of cummingtonite are present in a few samples. Actinolite and hornblende are the main alteration products of pyroxene in mafic rocks (Fig. 65), although biotite occurs around opaque oxide grains, possibly because the Mg/Fe ratio of the biotite is lower than that of the original pyroxene, and excess Fe was provided by the opaque minerals. Other retrograde effects include alteration

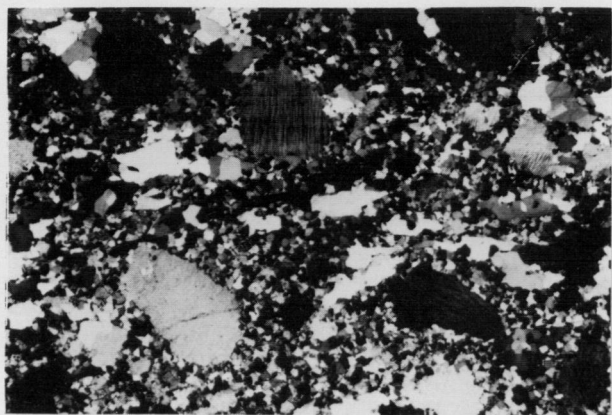


Fig. 72. Partly recrystallised hornblende-biotite-quartz-mesoperthite gneiss; Mount Pardoe, northern Scott Mountains. Note mesoperthite porphyroclasts, and development of microcline in recrystallised areas (e.g., near centre). Sample 76283058; cross-polarised light; width of field: 7 mm. (M2641)



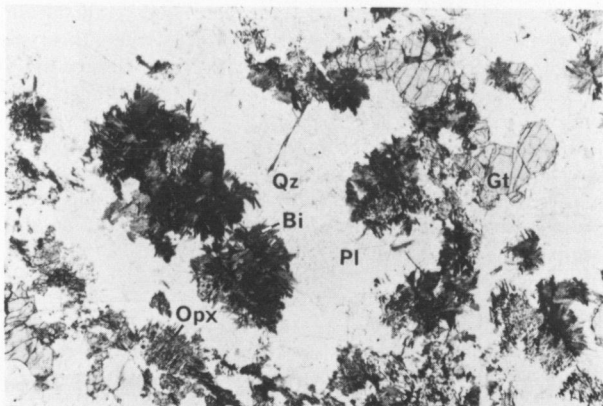


Fig. 73. Secondary biotite aggregates replacing orthopyroxene and, to a lesser extent, garnet in garnet-orthopyroxene-biotite-quartz-plagioclase gneiss; Mount Pardoe, northern Scott Mountains. Sample 77283936; width of field: 7 mm. (M2641)

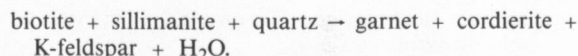
of orthopyroxene to a yellowish brown iddingsite-like material, chloritisation of biotite, and sericitisation and saussuritisation of feldspar. Late prehnite veins occur in shear zones at Fyfe Hills (Sandiford, 1985a).

### Rayner Complex

The metamorphic grade of the Rayner Complex is generally somewhat lower than that of the Napier Complex. The absence of mesoperthite, relative abundance of hornblende and biotite, and the strongly migmatitic appearance of much of the gneiss all indicate higher  $P_{H_2O}$ . Granite and pegmatite dykes are more abundant, particularly in the western part of the Rayner Complex.

Pyroxene is relatively uncommon in the Molodezhnaya area, although the local presence of orthopyroxene  $\pm$  clinopyroxene in both felsic and mafic gneisses indicates that granulite facies conditions had just been reached. Some amphibolites contain no pyroxene. The abundance in moraines in the same area of calc-silicate gneiss, rich in epidote, hornblende, and garnet, suggests that amphibolite-facies rocks may be more widespread under the ice-sheet than in outcrop. Grew (1981b) estimated PT conditions of metamorphism of  $700 \pm 30^\circ\text{C}$  and  $5.5 \pm 1$  kb for the Molodezhnaya area, based on compositions of coexisting garnet + biotite, garnet + cordierite, garnet + plagioclase (with sillimanite), and garnet + plagioclase + orthopyroxene.

In the Nye Mountains, the metamorphic grade is somewhat higher, although hornblende and biotite are also relatively abundant. The high-pressure assemblage garnet + clinopyroxene + orthopyroxene + hornblende + plagioclase is present in an olivine-normative mafic granulite ( $mg = 0.44$ ) from Mount Robinson, indicating a pressure of at least 6 kb, if a temperature of about  $800^\circ\text{C}$  is assumed (Green & Ringwood, 1972; O'Hara, 1977). An upper limit of about 10 kb at this temperature is set by the occurrence of sillimanite in metapelites (Holdaway, 1971). Elsewhere in the Rayner Glacier area, cordierite coexists with sillimanite and garnet, which is consistent with pressures of less than 10–11 kb (Newton, 1972; Hensen & Green, 1973). PT estimates for a variety of assemblages from the Nye Mountains-Rayner Glacier area are in the range  $550\text{--}800^\circ\text{C}$  and 4.5–7.5 kb (Ellis, 1983). The data of Black & others (1987) indicate peak metamorphic conditions, based on core compositions, of about  $750\text{--}800^\circ\text{C}$  and 7–8 kb, followed by re-equilibration of grain rims at about  $600 \pm 50^\circ\text{C}$  and pressures down to 3 kb (Fig. 59). At Mount Sibiryakov, garnet porphyroblasts have inclusions of biotite and sillimanite, whereas the groundmass contains biotite + cordierite. This suggests that during garnet growth the following reaction occurred:



Garnets in metapelites at Mount Lira are rimmed by a symplectite of cordierite + orthopyroxene, formed by the reaction



Both these reactions proceed from left to right with increasing temperature or decreasing pressure (Ellis, 1983).

In the eastern Rayner Complex, in western Kemp Land, medium-pressure (clinopyroxene + orthopyroxene + plagioclase + hornblende + quartz) granulites predominate. PT estimates for paragneiss from Mount Channon in the Dismal Mountains are  $800\text{--}850^\circ\text{C}$  and 5–7 kb (Black & others, 1987). However, in the Edward VIII Gulf-Robert Glacier area (i.e., close to the boundary with the Napier Complex), as well as in the Hansen Mountains (Trail & others, 1967; Pieters & Wyborn, 1977), the high-pressure assemblage garnet + clinopyroxene + orthopyroxene + plagioclase  $\pm$  hornblende  $\pm$  quartz occurs in both olivine and quartz-normative mafic rocks, including metamorphosed Amundsen Dykes, with  $mg$  values ranging from 0.36 to 0.60 (Table 4). Ellis (1983) obtained PT estimates of  $700\text{--}800^\circ\text{C}$  and 8.4–11 kb on such high-pressure granulites from Turbulence Bluffs. A felsic gneiss from Abrupt Point also contains coexisting garnet + clinopyroxene. In some rocks, symplectitic coronas of orthopyroxene and plagioclase surround garnet (Figs. 74 & 75); the reaction

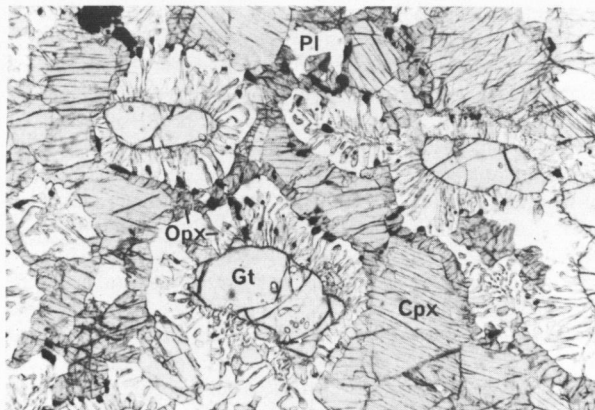


Fig. 74. Symplectites of orthopyroxene + plagioclase + magnetite surrounding garnet, orthopyroxene-garnet-plagioclase-clinopyroxene granulite; Else Nunataks. Orthopyroxene also rims clinopyroxene. Sample 65280221; width of field: 2.5 mm. (M2643)

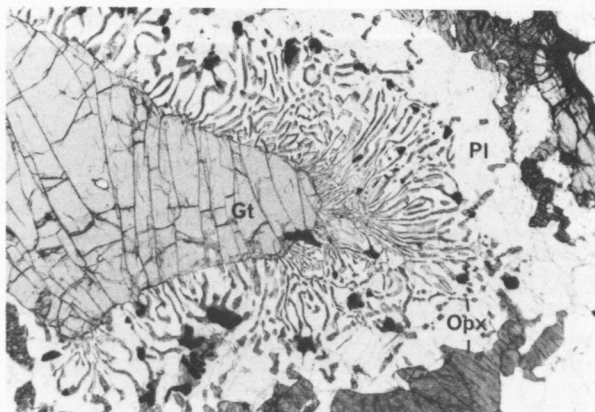


Fig. 75. Symplectite of orthopyroxene + plagioclase + magnetite surrounding garnet, hornblende-garnet-orthopyroxene-plagioclase granulite, Doggers Nunataks. Sample 77284853; width of field: 7 mm. (M2643)



garnet + clinopyroxene + quartz → anorthite + orthopyroxene

suggests partial equilibration at lower pressures during the waning stages of the high-grade metamorphism. Thus, in contrast to the near-isobaric cooling path of Napier Complex metamorphism, estimated P-T-time paths imply near-isothermal uplift for both eastern and western parts of the Rayner Complex (Fig. 59, and Ellis, 1983). Most rocks in the Rayner Complex contain mineral assemblages that indicate significantly lower pressures (and temperatures) than those of the Napier Complex, particularly in places where penetrative deformation subsequent to the peak of

metamorphism has caused complete recrystallisation. However, in areas such as Turbulence Bluffs, where this type of deformation was much less intense, both primary high-pressure and secondary low-pressure assemblages are preserved.

Retrograde effects are generally much less marked than in the Napier Complex, although localised amphibolite-facies retrogression was contemporaneous with the emplacement of late Proterozoic (and early Palaeozoic?) granite and pegmatite dykes at Molodezhnaya (Grew, 1978; Black & others, 1987).

## RELATIONSHIP OF RAYNER COMPLEX TO NAPIER COMPLEX

Sheraton & others (1980) discussed the distinctions between the Rayner and Napier Complexes in some detail. The subdivision was based on three main lines of evidence: differences in metamorphic grade; the presence of dolerite dykes (mostly Amundsen Dykes) in the Napier Complex and their absence, except as metamorphosed relics, from the Rayner Complex; and isotopic ages.

Differences in metamorphic grade have already been described and summarised in Table 1. The most obvious is the characteristic presence of mesoperthite in felsic gneiss of appropriate composition throughout the Napier Complex. Most gneisses containing separate grains of alkali feldspar and plagioclase have been recrystallised, and relict mesoperthite porphyroclasts are commonly present. However, some two-feldspar gneisses, such as the granite gneiss at Proclamation Island, may have been metamorphosed under relatively high  $P_{H_2O}$  conditions. Mesoperthite has not been found in the Rayner Complex, except in a few rocks at two localities (Knuckey and Alderdice Peaks), which are interpreted as relics of Napier Complex assemblages; all other Rayner Complex gneisses of granitic composition contains two discrete feldspars. The high-temperature associations sapphirine + quartz, orthopyroxene + sillimanite, and osumilite are confined to the Napier Complex. Overprinting and retrograde metamorphism are common in the Napier Complex, but rare in the Rayner, except adjacent to late pegmatite and granite veins, and in high-pressure mafic granulites in the Robert Glacier area which show evidence of low-pressure re-equilibration. Low-temperature, rather than low-pressure, reaction coronas are characteristic of the Napier Complex.

Dolerite dykes are common throughout the Napier Complex, but no unmetamorphosed mafic dykes have been found in Rayner Complex rocks. The orthopyroxene granodiorite on the northeast side of Tange Promontory is cut by several, only partly altered, dolerites which retain igneous textures; together with evidence of superposed metamorphism, such as garnet reaction coronas around pyroxene grains, in nearby parts of this intrusion, this is taken to indicate that it is an area of relict Napier Complex rocks. Similarly, a  $B_2$  metatholeiite dyke crops out at Kirkby Head, and both the dyke and country rocks contain secondary garnet. Chemical data are consistent with metadolerites in the Robert Glacier-Edward VIII Gulf area of the Rayner Complex being metamorphosed Amundsen Dykes (Figs. 36 to 38) (Sheraton, 1984). For example, a metamorphosed tholeiite (77284813) from Georges Islands is chemically virtually identical (including trace element contents) to the least incompatible element-enriched Group II Amundsen Dykes (Table 3), but is chemically distinct from the metamorphosed dykes ( $B_1$  and  $B_2$ ) of the Napier Complex. Garnet + clinopyroxene-bearing metadolerites from Turbulence Bluffs and Rayner Peak have very similar compositions. This supports the conclusion that there was a granulite-facies metamorphism after the intrusion of

Amundsen Dykes in this part of Kemp Land. An undeformed metamorphosed dyke from Rippon Depot belongs to the high-Mg suite ( $B_3$ ), and like the essentially contemporaneous metatholeiites ( $B_2$ ) may have crystallised at depth directly to a granulite-facies assemblage. A biotite-rich, deformed, but still slightly discordant, mafic dyke was found at Mount Sibiryakov; however, clear evidence of such metamorphosed dykes is rare in the western part of the Rayner Complex.

Isotopic dating (summarised in Table 8) has confirmed the earlier-postulated sequence of events in Enderby Land. Rb-Sr and Sm-Nd data indicate that the peak of the major high-grade gneiss-forming event ( $M_1$ - $D_1$ ) occurred about 3100 Ma ago, although there was significant resetting up to about 2450 Ma (Black & James, 1979, 1983; James & Black, 1981; McCulloch & Black, 1984; Sheraton & Black, 1983; Black & others, 1983a, b, 1984, 1986a).  $B_2$  and  $B_3$  dykes have given Rb-Sr isochron ages of  $2400 \pm 250$  Ma and  $2350 \pm 48$  Ma, respectively, whereas group I Amundsen Dykes ( $B_4$ ) are considerably younger at  $1190 \pm 200$  Ma (group II Amundsen Dykes do not lie on an isochron: Sheraton & Black, 1981). Zircon and monazite U-Pb and whole-rock Rb-Sr dating of gneisses from the western part of the Rayner Complex indicate high-grade metamorphism at about 960 Ma (Black & others, 1987). Most Napier Complex zircons lost some radiogenic lead at about this time (Grew & others, 1982; Black & James, 1983), although the apparent Pb loss at  $1087 \pm 29$  Ma of monazites from the Khmara Bay area (Black & others, 1984) may reflect more than one event, rather than being a precise estimate of the age of Rayner metamorphism.

Detailed investigation of the boundary between the two complexes is made difficult by the paucity of outcrop. The boundary is apparently fairly sharp (possibly faulted) in western Enderby Land, but is obscured by the Thyer Glacier. Thus, gneiss and dolerite dykes in the western Raggatt Mountains show some degree of retrogression and recrystallisation, but clearly belong to the Napier Complex. In contrast, gneiss in outcrops between the Rayner and Thyer Glaciers is much more migmatitic and is not cut by mafic dykes; it also includes a much higher proportion of aluminous metasediments, suggesting Proterozoic sedimentation, which is also supported by isotopic data (Black & others, 1987). Napier Complex rocks at Demidov Island contain secondary garnet, but a high-Mg dolerite dyke ( $B_3$ ) on the island immediately north of the Rayner Glacier retains a primary igneous texture. However, gneiss at nearby Forefinger Point has been extensively deformed and migmatized during the Rayner metamorphism, although traces of an original Napier orthopyroxene + sillimanite assemblage have survived locally in aluminous layers.

In western Kemp Land, the transition between the two complexes appears to be more gradual (over tens of km), with the thermal effects of the Rayner metamorphism extending farther west than the deformational effects. Dolerite dykes are metamorphosed, but show little or no deformation in the

TABLE 8. ISOTOPIC AGE DETERMINATIONS FROM ENDERBY LAND AND WESTERN KEMP LAND

| Locality               | Rock type                                        | Method           | Age (Ma)                               | Remarks                                         | Reference                  |
|------------------------|--------------------------------------------------|------------------|----------------------------------------|-------------------------------------------------|----------------------------|
| <b>NAPIER COMPLEX</b>  |                                                  |                  |                                        |                                                 |                            |
| Mount Sones            | Tonalitic orthogneiss                            | U-Th-Pb (Z-IM)   | 3955 ± 10                              | Brown zircon grain (core)                       | Williams & others (1984)   |
| Mount Sones            | Tonalitic orthogneiss                            | U-Th-Pb (Z-IM)   | 3927 ± 10                              | Brown zircon cores (better estimate than above) | Black & others (1986a)     |
| Fyfe Hills             | Granitic orthogneiss                             | U-Th-Pb (Z-IM)   | 3800                                   | Zircon grain (core)                             | Compston & Williams (1982) |
| Mount Sones            | Tonalitic orthogneiss                            | U-Pb (Z)         | ~ 3700                                 | Brown zircon fraction                           | Black & James (1983)       |
| Proclamation Island    | Granitic orthogneiss                             | U-Pb (Z)         | 3155 <sup>+240</sup> / <sub>-170</sub> |                                                 | Black & others (1986b)     |
| Fyfe Hills             | Granitic orthogneiss                             | Rb-Sr (WR)       | 3120 <sup>+230</sup> / <sub>-180</sub> | I.R. 0.724 ± 0.007                              | Black & others (1983a)     |
| Mount Sones            | Paragneiss                                       | Rb-Sr (WR)       | 3100 ± 500                             | I.R. 0.717 ± 0.021                              | Black & James (1979)       |
| Proclamation Island    | Granitic orthogneiss                             | Rb-Sr (WR)       | 3072 <sup>+35</sup> / <sub>-33</sub>   | I.R. 0.70091 ± 0.00004                          | Sheraton & Black (1983)    |
| Fyfe Hills             | Granitic orthogneiss<br>+ metagabbro-anorthosite | Sm-Nd (WR)       | 3060 ± 160                             | I.R. 0.50776 ± 0.00010                          | McCulloch & Black (1984)   |
| Mount Sones            | Paragneiss                                       | U-Pb (Z)         | 3000–3050                              | Brown zircon fraction                           | James & Black (1981)       |
| Fyfe Hills             | Granitic orthogneiss                             | U-Pb (Z)         | ~ 3000                                 | Brown zircon fraction                           | Black & others (1983a)     |
| Various Napier Complex | Garnet-quartz-feldspar gneiss                    | Rb-Sr (WR)       | 2980 <sup>+205</sup> / <sub>-167</sub> | I.R. 0.7019 ± 0.0017                            | Sheraton & Black (1983)    |
| Mount Sones            | Tonalitic orthogneiss                            | U-Th-Pb (Z-IM)   | 2948 <sup>+31</sup> / <sub>-17</sub>   | Brown zircon rims                               | Black & others (1986a)     |
| Mount Tod              | Tonalitic orthogneiss                            | Rb-Sr (WR)       | 2934 <sup>+146</sup> / <sub>-127</sub> | I.R. 0.7081 ± 0.0006                            | Black & James (1983)       |
| Mount Riiser-Larsen    | Paragneiss                                       | U-Th-Pb (Z-IM)   | ~ 2900                                 |                                                 | Black & James (1983)       |
| Mount Bride            | Biotite-garnet granite                           | Rb-Sr (WR)       | 2840 <sup>+220</sup> / <sub>-280</sub> | I.R. 0.703 ± 0.008                              | Black & others (1986b)     |
| Fyfe Hills             | Metagabbro-anorthosite                           | Rb-Sr (WR)       | 2790 ± 270                             | I.R. 0.706 ± 0.001                              | Black & others (1983a)     |
| Proclamation Island    | Granitic orthogneiss                             | U-Pb (Z)         | 2530 <sup>+60</sup> / <sub>-110</sub>  | Pb loss                                         | Black & others (1986b)     |
| Various Napier Complex | Granitic orthogneiss                             | Rb-Sr (WR)       | 2500 ± 200                             | I.R. 0.718 ± 0.013                              | Sheraton & Black (1983)    |
| Mount Sones            | Tonalitic orthogneiss                            | U-Pb (Z)         | ~ 2500                                 | Brown zircon fraction:<br>Pb loss               | Black & James (1983)       |
| Fyfe Hills             | Granitic orthogneiss                             | U-Pb (Z)         | ~ 2500                                 | Brown zircon fraction:<br>Pb loss               | Black & others (1983a)     |
| McIntyre Island        | Pegmatite                                        | U-Pb (Z)         | ~ 2500                                 |                                                 | Grew & others (1982)       |
| Field Islands          | Paragneiss                                       | U-Pb (Z)         | 2490 <sup>+72</sup> / <sub>-34</sub>   |                                                 | Black & others (1983b)     |
| Simmers Peaks          | Biotite granite                                  | U-Pb (Mon + Z)   | 2481 ± 3                               |                                                 | Black & others (1986b)     |
| Mount Sones            | Tonalitic orthogneiss                            | U-Th-Pb (Z-IM)   | 2479 ± 23                              | Pink zircon fraction                            | Black & others (1986a)     |
| Mount Hardy            | Metaleuconorite                                  | U-Pb (Z)         | 2474 <sup>+6</sup> / <sub>-3</sub>     |                                                 | James & Black (1981)       |
| Fyfe Hills             | Granitic orthogneiss<br>(1-cm slabs)             | Rb-Sr (WR)       | 2463 ± 35                              | I.R. 0.734 ± 0.001                              | Black & others (1983a)     |
| Field Islands          | Pegmatite                                        | U-Pb (Z)         | 2456 <sup>+8</sup> / <sub>-5</sub>     |                                                 | Black & others (1983b)     |
| Mount Bride            | Biotite-garnet granite                           | U-Pb (Z)         | 2447 <sup>+13</sup> / <sub>-14</sub>   | Pb loss                                         | Black & others (1986b)     |
| Field Islands          | Paragneiss                                       | Rb-Sr (WR)       | 2440 ± 115                             | I.R. 0.733 ± 0.007                              | Black & others (1983b)     |
| Field Islands          | Paragneiss                                       | U-Pb (Mon)       | 2429 <sup>+17</sup> / <sub>-16</sub>   | Probable Pb loss                                | Black & others (1984)      |
| Simmers Peaks          | Biotite granite                                  | Rb-Sr (WR)       | 2410 ± 130                             | I.R. 0.720 ± 0.012                              | Black & others (1986b)     |
| Field Islands          | Paragneiss                                       | Rb-Sr (WR)       | 2405 ± 140                             | I.R. 0.767 ± 0.027                              | Black & others (1983b)     |
| Various Napier Complex | Metatholeiite dykes<br>(B <sub>2</sub> )         | Rb-Sr (WR)       | 2400 ± 250                             | I.R. 0.702 ± 0.001                              | Sheraton & Black (1981)    |
| Various Napier Complex | High-Mg dykes (B <sub>3</sub> )                  | Rb-Sr (WR)       | 2350 ± 48                              | I.R. 0.7020 ± 0.0008                            | Sheraton & Black (1981)    |
| Fyfe Hills             | Metagabbro-anorthosite                           | Sm-Nd (WR + Min) | 2300 ± 300                             |                                                 | McCulloch & Black (1984)   |
| Mount Tod              | Tonalitic orthogneiss<br>(1-cm slabs)            | Rb-Sr (WR)       | 2255 ± 360                             | I.R. 0.7105 ± 0.0016                            | Black & James (1983)       |
| Various Napier Complex | Group I Amundsen<br>Dykes (B <sub>4</sub> )      | Rb-Sr (WR)       | 1190 ± 200                             | I.R. 0.7041 ± 0.0005                            | Sheraton & Black (1981)    |
| Field Islands          | Paragneiss                                       | U-Pb (Mon)       | 1087 ± 29                              | Pb loss                                         | Black & others (1984)      |
| McIntyre Island        | Pegmatite                                        | U-Pb (WR)        | ~ 1000                                 | Pb loss                                         | Grew & others (1982)       |
| Mount Mueller          | Pegmatite                                        | K-Ar (Bi)        | 580 ± 12                               |                                                 | Pieters & Wyborn (1977)    |
| Field Islands          | Pegmatite                                        | Rb-Sr (WR)       | 522 ± 10                               | I.R. 0.745 ± 0.005                              | Black & others (1983b)     |
| Priestley Peak         | Alkali melasyenite<br>dyke (B <sub>5</sub> )     | Rb-Sr (WR + Min) | 482 ± 3                                | I.R. 0.70852 ± 0.00007                          | Black & James (1983)       |

| Locality               | Rock type                         | Method                   | Age (Ma)                           | Remarks                                                | Reference               |
|------------------------|-----------------------------------|--------------------------|------------------------------------|--------------------------------------------------------|-------------------------|
| <b>RAYNER COMPLEX</b>  |                                   |                          |                                    |                                                        |                         |
| Mount Underwood        | Paragneiss                        | U-Pb (Z)                 | >2000                              | Inherited zircon (low U fraction)                      | Black & others (1987)   |
| Amphitheatre Lake      | Anorthosite                       | U-Pb (Z)                 | 1488 <sup>+19</sup> <sub>-16</sub> | Min. emplacement age                                   | Black & others (1987)   |
| Mount Flett            | Granitic orthogneiss              | U-Pb (Z)                 | 1465 <sup>+25</sup> <sub>-20</sub> | Igneous zircon (min. age)                              | Black & others (1987)   |
| Thala Hills            | Granitic orthogneiss              | U-Pb (Z)                 | 1425 <sup>+29</sup> <sub>-27</sub> | Min. emplacement age                                   | Black & others (1987)   |
| Molodezhnaya area      | Granitic orthogneiss              | Rb-Sr (WR)               | 1022 ± 62*                         | I.R. 0.7109 ± 0.0015                                   | Grew (1978)             |
| Mount Flett            | Granitic orthogneiss              | U-Pb (Z)                 | 923 <sup>+6</sup> <sub>-7</sub>    | Min. for metamorphism (Pb loss); prob. age 962–984 Ma. | Black & others (1987)   |
| Mount Underwood        | Paragneiss                        | U-Pb (Mon)               | 892 <sup>+90</sup> <sub>-14</sub>  | Min. for metamorphism                                  | Black & others (1987)   |
| Condon Hills           | Biotite granite                   | U-Pb (Mon)               | 769 <sup>+28</sup> <sub>-119</sub> |                                                        | Black & others (1987)   |
| Condon Hills           | Biotite granite                   | U-Pb (Z)                 | 766 <sup>+15</sup> <sub>-11</sub>  |                                                        | Black & others (1987)   |
| Mount Underwood        | Pegmatite                         | U-Pb (Z)                 | 761 <sup>+8</sup> <sub>-4</sub>    |                                                        | Black & others (1987)   |
| Mount Underwood        | Paragneiss                        | Rb-Sr (WR)               | 760 ± 100                          | I.R. 0.713 ± 0.002 (reset or partly reset age)         | Black & others (1987)   |
| Mount Underwood        | Paragneiss                        | U-Pb (Mon)               | 580 <sup>+210</sup> <sub>-14</sub> | Pb loss                                                | Black & others (1987)   |
| Condon Hills           | Biotite granite                   | Rb-Sr (WR)               | 574 ± 30                           | I.R. 0.776 ± 0.003 (reset age)                         | Black & others (1987)   |
| Thala Hills            | Granitic orthogneiss              | U-Pb (Z)                 | 538 ± 6                            | Pb loss                                                | Black & others (1987)   |
| Condon Hills           | Biotite granite                   | U-Pb (Mon)               | 528 <sup>+43</sup> <sub>-51</sub>  | Pb loss                                                | Black & others (1987)   |
| Molodezhnaya           | Granite                           | Rb-Sr (WR)               | 530 ± 160*                         | I.R. 0.7134 ± 0.0161                                   | Grew (1978)             |
| Molodezhnaya           | Pegmatite                         | U-Pb, Pb-Pb, Th-Pb (Min) | 423–703                            | Prob. reset ages                                       | Grew (1978)             |
| Forefinger Point       | Pegmatite                         | U-Pb (All, Sph)          | ~520                               |                                                        | Grew (1979)             |
| Doggers Nunataks       | Pegmatite                         | K-Ar (Bi)                | 511 ± 10                           |                                                        | Pieters & Wyborn (1977) |
| Various Rayner Complex | Gneiss and pegmatite              | Rb-Sr (Bi)               | 482–497                            |                                                        | Black & others (1987)   |
| Molodezhnaya           | Hornblende-quartz-feldspar gneiss | Rb-Sr (Bi)               | 483 ± 20*;<br>476 ± 20*            |                                                        | Grew (1978)             |

\* Recalculated using  $Rb = 1.42 \times 10^{-11} \text{ yr}^{-1}$ . IM, ion microprobe; IR., initial  $^{87}\text{Sr}/^{86}\text{Sr}$  or  $^{143}\text{Nd}/^{144}\text{Nd}$  ratio; WR, whole rock; All, allanite; Bi, biotite; Mon, monazite; Min, mineral; Sph, zircon.

Edward VIII Gulf–Robert Glacier area. Several contain the high-pressure assemblage garnet ± clinopyroxene (e.g., Turbulence Bluffs, Rayner Peak), whereas others contain lower-pressure granulite-facies assemblages (Georges Islands, Kloa Point, Jagar Islands, Jensen Island) (Trail & others, 1967; Trail, 1970; Pieters & Wyborn, 1977). Farther east (e.g., the eastern Oygarden Group, Broka Island, Svart Mountain, Secluded Rocks, Stillwell Hills), however, the dykes are more intensely deformed (Trail, 1970; Clarke, in press), ultimately being recognisable only by the local discordance of otherwise concordant and boundinaged mafic layers. Gneiss at Wheeler Rocks contains secondary garnet rims on pyroxene grains, suggesting only minor Rayner overprinting effects on Napier Complex rocks.

The presence of metamorphosed relics of Amundsen Dykes in Kemp Land is consistent with at least part of the Rayner Complex being derived by direct remetamorphism of Napier Complex rocks. Moreover, tonalitic orthogneiss at Martin and Jensen Islands closely resembles in composition that in parts of the Napier Mountains. Rb–Sr data for gneisses from the same area indicate that they represent reworked Archaean rocks which underwent little re-equilibration during the Rayner event (Sheraton & Black, 1983). Similarly, Rb–Sr isotopic evidence shows that most Rayner Complex gneisses in eastern Kemp Land were derived from Archaean precursors (Clarke, in press). Nevertheless, it is worth pointing out that the presence of metamorphosed mafic dykes does not necessarily imply an Archaean origin for the country rocks. In the Prydz Bay area, late Proterozoic metamorphics adjacent to the Archaean Vestfold Block contain deformed relics of such dykes, but include only a minor component of Archaean origin (Sheraton & others, 1984).

Isotopic data for rocks from the western part of the Rayner Complex indicate a markedly different history. Orthopyroxene-quartz-plagioclase gneiss in the eastern Nye Mountains is chemically very similar to tonalitic orthogneiss in the nearby Raggatt and southern Scott Mountains, showing the same marked depletion in Rb and Y (Table 3; Figs. 9 & 10), which might suggest an Archaean origin. However, one such gneiss from Ward Nunataks has given middle Proterozoic Sm–Nd model ages (Black & others, 1987). Foliated granitic intrusives are widespread in the western part of the Rayner Complex, and examples from the Thala Hills and Mount Flett have been dated by the U–Pb method on zircon at 1425<sup>+29</sup><sub>-27</sub> and 1465<sup>+25</sup><sub>-20</sub> Ma, respectively (Black & others, 1987). These ages are thought to represent minima for crystallisation of igneous zircons (i.e., emplacement ages). It is not clear whether the isochron age of 1022 ± 62 Ma (initial  $^{87}\text{Sr}/^{86}\text{Sr} = 0.7109 \pm 0.0015$ , reported by Grew (1978) for granitic orthogneiss from the Molodezhnaya area, is that of emplacement or granulite-facies metamorphism, but the average  $T_{\text{UR}}^{\text{Sr}}$  model age of 1300 Ma is clearly inconsistent with an Archaean origin. Similarly, orthogneiss at Mount Underwood has a  $T_{\text{DM}}^{\text{Nd}}$  model age of 1290 Ma, significantly younger than those (2170–80 Ma) of the Thala Hills and Mount Flett orthogneisses (Black & others, 1987). The previously noted more widespread occurrence of calc-silicate gneiss, marble, and other metasediments in the Rayner Complex, compared with the Napier Complex, suggests the presence of post-Napier supracrustal rocks. Paragneiss from Mount Underwood contains zircons apparently derived by palaeoweathering of late Archaean–early Proterozoic rocks, but Sm–Nd data indicate that it was formed in substantial part from younger (i.e., middle Proterozoic) material (Black



& others, 1987). The absence of evidence for metamorphosed mafic dykes in these metasediments suggests that they may have been deposited after dyke emplacement in the nearby Napier Complex (~1200 Ma) and not very long before high-

grade metamorphism. Clearly, most of the gneisses in the western part of the Rayner Complex cannot be remetamorphosed Archaean rocks.

## SUMMARY AND DISCUSSION

A summary of the geological history of Enderby Land and the adjacent part of Kemp Land is given in Table 9, although in a number of respects this sequence of events is by no means conclusively established. In particular, the chronological relationships of the major units which make up the Napier Complex are uncertain. There is evidence from the Fyfe Hills for continental crust (of felsic igneous origin) at least as old as 3800 Ma (Compston & Williams, 1982; Black & others, 1983a) and Rb-Sr data suggest that much of the tonalitic and granodioritic orthogneiss may have been originally emplaced at about that time (Sheraton & Black, 1983). Ion microprobe studies of zircon in tonalitic orthogneiss at Mount Sones have identified both 3930 (magmatic) and 2950 Ma (metamorphic) components (Williams & others, 1984; Black & others, 1986a), so that felsic crust must have existed as long ago as 3930 Ma. In contrast, some granitic orthogneiss, such as that at Proclamation Island and much of the garnet-bearing granitic gneiss, was apparently emplaced near the peak of the high-grade metamorphism ( $M_1$ , event 5 in Table 9) 3070 Ma ago (Sheraton & Black, 1983). Field studies have not established any consistent age relationships between the orthogneiss and paragneiss (i.e., layered garnet-quartz-feldspar gneiss and associated metasediments), partly because such relationships are generally obscured by tectonic processes and localised melting during metamorphism. Detailed structural mapping at Mount McLennan by James & Black (1981) suggested that, on a large scale, the two groups are separated by a tectonic discontinuity. However, some orthogneiss layers are slightly discordant and locally contain inclusions of paragneiss, indicating an intrusive relationship, whereas others are intimately interlayered with paragneiss. Sandiford & Wilson (1986) noted the preservation of intrusive contacts between massive orthogneiss and layered gneiss in the Fyfe Hills region, and showed that the former unit is predominantly of 'undepleted' (in Y and HREE) granitic composition, whereas orthogneiss associated with the latter is mainly of depleted type. On a regional scale, the predominantly 'depleted' tonalitic to granodioritic orthogneiss of the Raggatt and southern Scott Mountains underlies layered garnet-quartz-feldspar gneiss and associated metasediments to the north (Fig. 6); massive orthogneiss (generally of more potassic composition) and layered paragneiss are more complexly interlayered in the northern part of the area.

Isotopic data are not conclusive regarding the ages of formation of the various Napier Complex lithologies, as both the Rb-Sr and Sm-Nd systems were partly reset during  $M_1$ , metamorphism at 3070 Ma (Black & McCulloch, 1987; McCulloch & Black, 1984). However, they are consistent with granitic orthogneiss, both orthopyroxene and garnet-bearing, being generally younger than tonalitic and granodioritic orthogneiss (Sheraton & Black, 1983). If these garnet-bearing granitic gneisses are mostly of extrusive origin, they must be of similar age to associated metasediments, which, in turn, could not be very much older than the high-grade metamorphism. Alternatively, they may be of intrusive origin, and hence younger than the metasediments. The question of whether the precursors of the oldest orthogneisses (mainly tonalites and granodiorites) were intruded into (or probably, at least in some cases, extruded over) a still older sedimentary

sequence, or represent part of the earliest felsic crust, cannot be answered with certainty. Their depletion in Y and HREE implies that they represent new continental crust derived by hydrous partial melting of a hornblende  $\pm$  garnet-bearing mafic source (Sheraton & Black, 1983; Sheraton & others, 1985). Moreover, these orthogneisses make up most of the southwestern part of the Napier Complex, which was at a deeper crustal level during  $M_1$  metamorphism (as indicated by higher-pressure mineral assemblages in mafic rocks and metapelites, as well as PT estimates; Harley, 1983, 1985b) than the northeastern part. The latter area includes a much higher proportion of 'undepleted' orthogneisses, mainly derived by reworking of pre-existing continental crust, and metasediments. However, it is apparent from both field and isotopic data that emplacement of granitic magma took place over a considerable period prior to and during the high-grade metamorphism ( $M_1$ ) of the Napier Complex, and that there was probably a major period of felsic crust formation at about 3100 Ma (Black & others, 1986b; Harley & Black, 1987). It is probable that sedimentary rocks were also deposited over a considerable time. Similarly, it is possible that some mafic to ultramafic layers and pods are relics of an early mafic crust, although others almost certainly represent disrupted intrusive bodies. Hence, the sequence of events 2 to 4 in Table 9 must be regarded as tentative and is undoubtedly over-simplified. A long (at least 1200 Ma) Archaean history involving several episodes of deposition of sediments and volcanic rocks, and emplacement of felsic and mafic intrusions has been demonstrated for the North Atlantic craton (Bridgwater & others, 1978).

Generation of the magmas that formed the depleted tonalitic and granodioritic orthogneisses by partial melting of amphibolite or garnet amphibolite at high  $P_{H_2O}$  might suggest derivation from subducted hydrated oceanic crust (Sheraton & Black, 1983; Sheraton & others, 1985; Sheraton & Collerson, 1984). Dehydration of subducted oceanic crust would also provide a possible means of generating a fluid phase rich in large-ion lithophile elements (K, Rb, Ba, Th, and U); the compositional differences between the depleted tonalites and granodiorites can be almost entirely explained by interaction of either the source material or the magma with such a fluid (Sheraton & Black, 1983; Sheraton & others, 1985). Palaeomagnetic, geodynamic, and geochemical data indicate that subduction processes may well have operated in the Archaean (McElhinny & Senanayake, 1980; Ringwood, 1982; Arndt, 1983; Nisbett & Fowler, 1983).

The association sapphirine + quartz has been described from several other high-temperature granulite terranes throughout the world (e.g., Wilson, in Hensen & Green, 1970; Morse & Talley, 1971; Nixon & others, 1973), and osumilite is known in high-grade metamorphic rocks from at least two localities (Berg & Wheeler, 1976; Berg, 1977; Maijer & others, 1977). The granulites of the Napier Complex are the first in which these very high-temperature associations have been shown to occur on a regional scale (at least 4000 km<sup>2</sup> of central Enderby Land), although coexisting sapphirine + quartz has recently been reported from a wide area of the Proterozoic Grenville province in Labrador (Arima & others, 1986). The widespread occurrence of osumilite and garnet + osumilite, rather than cordierite + orthopyroxene + K-

TABLE 9. COMPARATIVE GEOLOGICAL HISTORIES OF NAPIER AND RAYNER COMPLEXES. (APPROXIMATE PT CONDITIONS OF METAMORPHISM ARE INDICATED (BASED ON REFERENCES GIVEN IN FIG. 59))

| <i>Napier Complex</i>                                                                                                                                                                                                                                                                     | <i>Metamorphism</i>                                       | <i>Rayner Complex</i>                                                                                                                                                                                                                     | <i>Metamorphism</i>                  | <i>Probable age (Ma)</i> |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|--------------------------|
| 1. Oldest continental crust                                                                                                                                                                                                                                                               |                                                           |                                                                                                                                                                                                                                           |                                      | ≥ 3950?                  |
| 2. Emplacement of oldest granitic bodies, predominantly tonalite and granodiorite (e.g., Fyfe Hills, Mount Sones)                                                                                                                                                                         |                                                           |                                                                                                                                                                                                                                           |                                      | ~ 3800–3950              |
| 3. Deposition of sediments, including pelitic, siliceous, and ferruginous types; ?extrusion of mainly felsic volcanics                                                                                                                                                                    |                                                           |                                                                                                                                                                                                                                           |                                      | > 3100                   |
| 4. Emplacement of mafic and ultra-mafic bodies                                                                                                                                                                                                                                            |                                                           |                                                                                                                                                                                                                                           |                                      |                          |
| 5. Medium-pressure, high-temperature granulite-facies metamorphism ( $M_1$ ); emplacement of orthopyroxene-bearing granitic rocks (e.g., Proclamation Island); formation of present foliation, intrafolial folds ( $F_1$ ), and lineation ( $L_1$ )                                       | Granulite facies (900–950°C/ 6–10 kb)                     | Metamorphism of oldest precursors of Rayner Complex (including sediments and granitic intrusives)                                                                                                                                         | ?Granulite facies                    | 3100                     |
| 6. Formation of tight to isoclinal, commonly asymmetric folds ( $F_2$ ), under granulite-facies conditions ( $M_2$ ); emplacement of granitic rocks (Mount Bride)                                                                                                                         | (750–850°C/ 5–8 kb)                                       |                                                                                                                                                                                                                                           |                                      | ~ 2900                   |
| 7. ?Emplacement of rare mafic to ultra-mafic (pyroxenite) dykes ( $B_1$ )                                                                                                                                                                                                                 |                                                           |                                                                                                                                                                                                                                           |                                      |                          |
| 8. Major asymmetric folding ( $F_3$ ), locally with retrograde (amphibolite to low granulite-facies) metamorphism ( $M_3$ ) associated with strong fabric development; emplacement of granitic rocks (e.g., Napier Mountains), and pegmatites; intrusion of metatholeiite dykes ( $B_2$ ) | (650–700°C/ 5–8 kb)                                       | ?Folding                                                                                                                                                                                                                                  |                                      | 2450                     |
| 9. Intrusion of high-Mg tholeiite dykes ( $B_3$ )                                                                                                                                                                                                                                         |                                                           |                                                                                                                                                                                                                                           |                                      | 2350                     |
| 10.                                                                                                                                                                                                                                                                                       |                                                           | Formation of continental crust (emplacement of granitic rocks and/or deposition of sediments)                                                                                                                                             |                                      | ~ 1800–2000              |
| 11.                                                                                                                                                                                                                                                                                       |                                                           | Emplacement of granitic and anorthositic rocks                                                                                                                                                                                            |                                      | 1500                     |
| 12. Intrusion of dolerite dykes (Amundsen Dykes, $B_4$ )                                                                                                                                                                                                                                  |                                                           | Intrusion of dolerite dykes; emplacement of granitic rocks                                                                                                                                                                                |                                      | ~ 1200                   |
| 13.                                                                                                                                                                                                                                                                                       |                                                           | Deposition of sediments                                                                                                                                                                                                                   |                                      |                          |
| 14. Localised high-pressure metamorphism ( $M_4$ ) associated with shearing and formation of isoclinal folds ( $F_4$ ) and lineation ( $L_4$ ); retrograde metamorphism elsewhere                                                                                                         | Amphibolite to lower granulite facies (600–700°C/ 4–7 kb) | Upper amphibolite to lower granulite-facies metamorphism in western Enderby Land; granulite-facies metamorphism (locally high pressure) in Kemp Land; emplacement of granitic rocks; formation of foliation and isoclinal folds ( $F_5$ ) | Granulite facies (700–800°C/ 4–9 kb) | 950–1000                 |
| 15.                                                                                                                                                                                                                                                                                       |                                                           | Open to tight folding ( $F_6$ )                                                                                                                                                                                                           |                                      |                          |
| 16. Low-grade retrogression ( $M_5$ ); ?formation of mylonite zones, epidote veins and pseudotachylite ( $D_3$ )                                                                                                                                                                          |                                                           | Formation of shear folds ( $F_6$ ) and mylonite zones                                                                                                                                                                                     |                                      |                          |
| 17. Pegmatite intrusion and associated retrogression; formation of mylonite zones ( $D_5$ )                                                                                                                                                                                               | Amphibolite facies                                        | Intrusion of granite and pegmatite; formation of shear and mylonite zones with localised retrogression                                                                                                                                    | Amphibolite facies                   | 500–550, 770             |
| 18. Intrusion of rare alkali melasyenite dykes ( $B_5$ )                                                                                                                                                                                                                                  |                                                           |                                                                                                                                                                                                                                           |                                      | 480                      |

feldspar + quartz, was considered by Ellis (1983) to define a new subfacies of the granulite facies for pelitic rocks. However, the PT estimate of 8–10 kb and 900–980°C of Ellis (1980) implies an averaged geothermal gradient of about 30°C/km over 30 km, which is only slightly greater than that proposed by O'Hara (1977) for the Archaean Lewisian gneisses of northwest Scotland and Green's (1975) proposed Archaean geotherm. Mesoperthite compositions indicate that  $P_{H_2O}$  was very low (<0.5 kb), so that this, together with high  $P_{CO_2}$ , may have been just as important as exceptional

PT (very high T, moderate P) conditions in stabilising sapphirine + quartz, and osumilite. Nevertheless, metamorphic temperatures were apparently significantly higher than most other granulite terranes (Newton & Perkins, 1982), and approached the maximum possible for a crustal metamorphic terrane.

As already pointed out, pressures were relatively high (up to about 11 kb) in the southwestern part of the Napier Complex, as evidenced by mineral assemblages in metapelites and the presence of garnet + clinopyroxene in a few mafic

and ultramafic rocks, whereas the metamorphic grade is slightly lower in the Napier Mountains (Harley, 1983, 1985b). Such variations in grade presumably reflect, at least in part, differences in the presently exposed structural level of the complex. However, the area in which metapelites containing coexisting sapphirine and quartz crop out corresponds roughly with a negative gravity anomaly (Wellman, 1983). Similar negative anomalies elsewhere in Enderby Land appear to be associated with granitic intrusives, but the possibility that anorthositic intrusions are present at depth cannot be discounted because thin anorthosite layers have been found at two localities in the Tula Mountains. Anorthosite massifs typically occur in high-grade metamorphic terranes (Emslie, 1978) and may be characteristic of continental areas with abnormally steep geothermal gradients (Bridgwater & Windley, 1973). Nevertheless, as Ellis (1980) has pointed out, high geothermal gradients may actually be a consequence of mantle-derived liquids accreting at the base of the crust. Indeed, it is possible that the high-grade metamorphism itself was a consequence of emplacement of such magma. Thus, there may be similarities with the situations in Labrador and Norway (Berg & Wheeler, 1976; Berg, 1977; Maijer & others, 1977), except that at these localities osumilite is confined to contact aureoles in the immediate vicinity of anorthositic intrusions, rather than occurring on a regional scale as in the Napier Complex.

Events 5 to 8 represent a possible prolonged period of metamorphism and deformation lasting about 600 Ma, after which the Napier Complex was essentially cratonised (Black & James, 1979, 1983; James & Black, 1981; McCulloch & Black, 1984; Sheraton & Black, 1983).  $M_2$ - $D_2$  probably occurred under similar metamorphic conditions to, and not very long after,  $M_1$ - $D_1$  (Black & others, 1983a) and should perhaps be regarded as being part of the same tectonothermal event. Limited U-Pb zircon data suggest an age for  $D_2$  of about 2900 Ma (Black & James, 1983; Black & others, 1986a). Significant resetting of U-Pb, Sm-Nd, and Rb-Sr systems took place during  $D_3$  at about 2450–2500 Ma (Black & James, 1983; Black & McCulloch, 1987; Black & others, 1983a, 1984, 1986a; McCulloch & Black, 1984) and a pegmatite from the Khmara Bay area, interpreted to have been emplaced during  $D_3$ , has given a U-Pb zircon age of  $2456 \pm 8$  Ma (Black & others, 1983b). Granite was emplaced in the Napier Mountains (and possibly in the Tange Promontory) during, or shortly before, both  $D_2$  and  $D_3$  (Black & others, 1986b). The relatively high Y, Zr, Nb, La, and Ce contents of these late-orogenic intrusives are consistent with a trend towards A-type (anorogenic) granitoid compositions, which are characteristic of stabilised, thick continental crust. Early Palaeozoic post-orogenic granites with more pronounced A-type characteristics intrude late Proterozoic metamorphics in the Prydz Bay area (Sheraton & others, 1984; Sheraton & Black, in preparation).

It is not clear whether temperatures dropped continuously between  $M_1$ - $M_2$  and  $M_3$ , or decreased to some extent before increasing again, so that  $M_3$ - $D_3$  represents a distinct tectonothermal event (see Fig. 59, and Black & James, 1983; Sandiford, 1985b; Harley, 1985b). Rare low-pressure plagioclase + orthopyroxene reaction coronas around garnet, in which the orthopyroxene is rimmed by a second generation of garnet, have been recorded in the Khmara Bay area (Sandiford, 1985b); although their exact significance is unclear, they suggest a complex cooling history. Periods of increased temperature may have been associated with emplacement of granitic magma, but deformation-associated recrystallisation was probably the most important factor causing mineral re-equilibration, at least during  $D_3$ , as is indicated by isotopic studies (Black & others, 1983a, b). Nevertheless, it is apparent that the Napier Complex underwent a prolonged period of overall near-isobaric cooling

at that time, which suggests that it was in approximate isostatic equilibrium with the underlying mantle, and may account for the preservation of rare high-temperature mineral associations (Ellis, 1980, 1983; Ellis & Green, 1985). It is significant that the sapphirine + quartz-bearing granulites of Labrador also underwent near-isobaric cooling (Arima & others, 1986). The thermal peak may have been a consequence of emplacement of voluminous mantle-derived magmas at the base of the crust (Ellis, 1980). Isotopic data indicate emplacement of granitic magma over a long period up to and including  $M_1$ - $D_1$  (Sheraton & Black, 1983), with a major phase of continental crust formation at about  $M_1$ - $D_1$  (Black & others, 1986b). Such a magma-accretion model with only limited crustal thickening, as opposed to one of major thickening in a convergent tectonic regime involving overthrusting, would be consistent with subsequent near-isobaric cooling (Sandiford, 1985b; Harley, 1985b; Harley & Black, 1987). Granulite-facies metamorphism resulting from the enhanced heat flow in an extensional environment would also be followed by near-isobaric cooling and could explain the essentially recumbent nature of the Napier Complex (Sandiford & Powell, 1986). Nevertheless, it must be emphasised that the near-isobaric cooling history of the Napier Complex does not preclude significant crustal thickening and consequent erosion and uplift prior to the peak of metamorphism ( $M_1$ ) (Harley, 1983, 1985b). Indeed, Ellis (1987) has proposed an alternative model involving burial of the Napier Complex protoliths in the lower part of a doubly thickened crust, followed by uplift and subsequent prolonged near-isobaric cooling near the base of a crust of normal thickness. Both models require a second orogenic cycle (the Rayner event) to uplift the lower crustal segment to the surface.

Our chronology differs significantly from that of DePaolo & others (1982) and Sandiford & Wilson (1983) who considered that the peak of metamorphism (their  $M_1$  and  $D_2$ ) occurred about 2500 Ma ago. Moreover, our data do not indicate a 1000 Ma interval between crust formation and granulite-facies metamorphism, as proposed by DePaolo & others (1982), although the oldest continental crust in the Napier Complex appears to have been formed at least 700 Ma before the peak of metamorphism. The different interpretations are largely the result of the assignment of 2500 Ma (U-Pb zircon age) pegmatites in the Khmara Bay area to  $D_2$ , and their correlation with other, sapphirine + quartz-bearing, pegmatites in the same area by Grew & others (1982). In contrast, Black & others (1983b) considered a nearby pegmatite, dated at  $2456 \pm 8$  Ma, to be of  $D_3$  age. In view of the isotopic evidence for initial granulite-facies metamorphism ( $M_1$ - $D_1$ ) at about 3100 Ma and for widespread resetting during  $M_3$ - $D_3$  at about 2500 Ma elsewhere in the Napier Complex (Table 8), we consider the most probable explanation to be that the dated pegmatites were either emplaced during  $D_3$ , or were isotopically reset at that time (see Black & others, 1983a, 1987).

It is not known whether the pyroxenite dykes ( $B_1$ ) are older or younger than  $F_2$  folds, but they are clearly folded by  $F_3$ . Both the metatholeiites ( $B_2$ ) and high-Mg dykes ( $B_3$ ) were emplaced about 2300–2400 Ma ago during the waning stages of the metamorphism, after deformation had largely ceased (Griffin, 1979; Sheraton & Black, 1981); emplacement of  $B_2$  dykes during the later stages of  $D_3$  (Sandiford & Wilson, 1983) would not be inconsistent with available geochronological data. Subsequent tectonic activity in the Napier Complex was confined to further emplacement of mafic dykes and localised ductile to brittle deformation (formation of shear zones and mylonites). Much of the localised post-Amundsen Dyke shearing and associated metamorphism ( $M_4$ - $D_4$ ) in the Napier Complex (14) is thought to be essentially contemporaneous with the late



Proterozoic metamorphism and deformation, which formed the Rayner Complex at about 960 Ma. Monazite and zircon in rocks of the Casey Bay area, where the effects of this shearing are relatively intense, lost Pb at about 1100 Ma (Grew & others, 1982; Black & others, 1983b, 1984). Some of the low-grade retrogression and brittle deformation (16) in central Enderby Land may be of similar age, although many mylonite zones were formed at about the same time as the emplacement of younger (500–770 Ma) pegmatites and granites (17) (Sandiford & Wilson, 1984). The ages of these shear and mylonite zones (D<sub>4</sub> and D<sub>5</sub>) are by no means well established, and deformation may have occurred in two (or more) discrete events, or more-or-less continually from about 1000 to 500 Ma (Sandiford, 1985a). Emplacement of granite and pegmatite occurred at about 770 Ma, but it is not clear whether widespread c. 500–550 Ma isotopic ages for similar rocks were all reset, or partly represent primary igneous crystallisation ages. Hence, post-tectonic felsic magmatism is put under a single heading (event 17) in Table 9. The best estimate for early Palaeozoic retrogression is a zircon U–Pb age of  $538 \pm 6$  Ma for orthogneiss from Thala Hills (Black & others, 1987).

The occurrence in western Kemp Land of a zone of high-pressure metamorphism in the Rayner Complex near its contact with Napier Complex invites comparison with the probably coeval development of high-pressure assemblages associated with shear-zone formation in the western part of the Napier Complex. However, there is little evidence for major vertical movements or shearing in the former area, and it is not clear whether the Rayner Complex was in fact at a significantly deeper structural level than the adjacent part of the Napier Complex at that time. Structural studies have suggested that in Kemp Land the Rayner event was a consequence of ductile thrusting of Archaean gneisses westwards over the stable craton of the Napier Complex (Clarke, *in press*). PT estimates (Grew, 1981b; Ellis, 1983; Sandiford & Wilson, 1983; Black & others, 1983b; Sandiford, 1985a) indicate that the crustal level of the western Rayner Complex was not very different to that of the adjacent Napier Complex, and that the development of garnet- (and rare kyanite-) bearing assemblages in Napier shear zones resulted from metamorphism at similar pressures but relatively low temperatures. It is of interest that the high-pressure association garnet + clinopyroxene is also developed in metamorphosed, but little-deformed, middle Proterozoic dolerite dykes which cut Archaean metamorphics of the Vestfold Hills, Princess Elizabeth Land, near their contact with late Proterozoic (~1000 Ma) granulite-facies metamorphics to the southwest (Sheraton & Collerson, 1983).

As Ellis (1983) has pointed out, the fundamental reasons for the development of a Proterozoic mobile belt are unclear. Isotopic data have shown that a major part of the Rayner Complex adjacent to the Napier Complex in Kemp Land represents remetamorphosed Archaean rocks (Sheraton & Black, 1983; Clarke, *in press*), whereas that in western Enderby Land probably includes only a minor Archaean component, the majority of analysed samples having middle Proterozoic (1700–2000 Ma) crustal-formation ( $T_{\text{CHUR}}^{\text{Nd}}$ ) ages (Black & others, 1987). The relative abundance of metapelites and calc-silicate gneisses in parts of the Rayner Complex is consistent with derivation from younger (Proterozoic) sedimentary rocks. Inclusions of muscovite in garnet at Mount Yuzhnaya provide evidence for an earlier lower-grade history (Ellis, 1983). Extensive granite emplacement occurred in the Molodezhnaya area and elsewhere (Grew, 1978; Black & others, 1987) during, and up to 500 Ma before, the Rayner metamorphism. High-grade metamorphics of late Proterozoic age in wide areas of MacRobertson Land also include a major proportion with only a relatively short previous crustal history (Tingey, 1982; P. A. Arriens, unpublished data—copy housed

at BMR); chemical data are consistent with many being derived, either directly or by partial melting, from sedimentary protoliths, unlike most of those in the Napier Complex (Sheraton & Black, 1983). Proterozoic low to medium-grade pelitic and calcareous metasediments are widespread in the southern Prince Charles Mountains (Tingey, 1982). Similar relationships have also been observed in the Prydz Bay area of Princess Elizabeth Land where Archaean gneisses of the Vestfold Block are largely of igneous derivation (orthogneisses), in contrast to nearby late Proterozoic (~1000 Ma) metamorphics which mostly have middle Proterozoic crustal formation ages (~1600–1800 Ma) and include a much higher proportion of aluminous paragneisses (Sheraton & others, 1984).

It would thus appear that, except in eastern Kemp Land, the late Proterozoic metamorphism involved only very limited reworking of the margins of Archaean cratons. Sediment loading in marginal basins adjacent to the Archaean cratons is probable (Othman & others, 1984), since there is little isotopic evidence for the late Proterozoic terrane being underlain by Archaean crystalline basement (*cf.* Windley, 1973; Lowman, 1984). In contrast to some other Proterozoic mobile belts (Taylor & others, 1984), that in this part of East Antarctica may have been derived, in the main, from protoliths formed by lateral accretion at continental margins, rather than in intra-cratonic basins. Similar relationships have been reported for the Ketilidian mobile belt of South Greenland, where Pb–Pb and Rb–Sr isotopic data for granitic rocks indicate only limited marginal involvement of Archaean crust (Kalsbeek & Taylor, 1985). Metamorphism under granulite-facies conditions followed by near-isothermal decompression would be consistent with crustal thickening by overthrusting and subsequent erosion and uplift (Newton & Perkins, 1982; Jahn & Zhang, 1984; Sandiford, 1985a; Ellis, 1987). Calculations based on estimates of present crustal thickness and levels of exposure in Enderby Land are also consistent with extensive post-Archaean crustal thickening (Sandiford, 1985b). The predominance of I-type (*i.e.*, derived by melting of igneous rocks) granitic intrusives in the Rayner Complex (although sediment-derived S-types are also present) might suggest a Cordilleran-type (Andean) continental margin, but extensive crustal thickening would be more consistent with a continental collision (Hercyno-type) environment (Pitcher, 1983). Underplating of Proterozoic sediments beneath the margin of the Napier Complex would provide a source of water for hydration of the Archaean granulites during limited 'reworking' (Ellis, 1983); a low-grade crustal source beneath the Fyfe Hills area is also indicated by enrichment of Proterozoic retrograde shear zones in K, Rb, Ba, Be, and B (Sandiford, 1985a).

Although most of the Rayner Complex and adjacent parts of the late Proterozoic terrane represent relatively new continental crust, Y-depleted orthogneisses like those of the Napier Complex are not abundant; most of the larger intrusive bodies are of undepleted I-type (Sheraton & Black, 1983). There are several possible, but not mutually exclusive, explanations for this: (1) High Archaean geothermal gradients may have resulted in more extensive melting of garnet-bearing subducted oceanic crust, with an enhanced production of depleted magma at that time (Tarney & Saunders, 1979; Martin, 1986). Post-Archaean subduction-related (calc-alkaline) granitic magmatism is apparently more typically of undepleted I-type, although also of predominantly tonalitic composition (Pitcher, 1983). (2) Isotopic data indicate a more rapid rate of production of new felsic crust during the Archaean (Moorbath, 1977; Windley, 1984). (3) Differences in the present erosion levels may be important. The Napier Complex represents a very deep crustal level, consistent with emplacement of primary hydrous tonalitic magmas by an underplating mechanism at or near the base of the crust

(Holland & Lambert, 1975; Tarney & Windley, 1977). It is noteworthy that depleted orthogneisses are more abundant in the southwestern part of the Napier Complex which was at a deeper level during the high-grade metamorphism ( $M_1$ ). Relatively dry partial melts of felsic crust would tend to rise much higher in the crust before crystallising (Cann, 1970).

The fundamental change in tectonic style from an essentially stabilised craton in isostatic equilibrium with the underlying mantle during the Archaean to one of vertical tectonics (uplift) in the late Proterozoic was emphasised by Ellis (1983). The occurrence of 1200 Ma dolerite dykes with chilled margins and commonly porphyritic subophitic to gabbroic textures, quite different to those of the  $B_2$  and  $B_3$  dykes, may suggest some uplift of the Napier Complex in early to middle Proterozoic times. Moreover, the presence in adjacent parts of the East Antarctic Shield (such as the southern Prince Charles Mountains) of extensive metasediments deposited during late Archaean to middle Proterozoic times (see below) presumably implies uplift and erosion of older Archaean terranes like the Napier Complex. On the other hand, pressure estimates (Kuehner & Green, 1986; M. Sandiford, personal communication, 1985) suggest that Amundsen Dykes in the Khmara Bay area may have been emplaced at depths of up to about 25 km. Their igneous textures may be the result of more rapid quenching on emplacement into somewhat lower-temperature country rocks compared to the  $B_2$  and  $B_3$  dykes. The granuloblastic textures of the latter could be explained by intrusion late during the  $M_3$ – $D_3$  event. However, it is possible that the marginal Khmara Bay area may not be typical, in terms of uplift history, of the Napier Complex as a whole. If significant uplift did take place during the early to middle Proterozoic, then at least the southwestern part of the Napier Complex was buried to depths of about 20–25 km by the time of the Rayner event at about 1000 Ma (Sandiford, 1985a).

The suggested geological history differs in several significant respects from that proposed by Kamenev (1972, 1975). In particular, we have good structural, geochemical, and geochronological evidence that the Amundsen Dykes ( $B_4$ ) were intruded before the metamorphism of the Rayner Complex. An identical situation is apparent farther east in MacRobertson Land where a suite of dolerite dykes intrudes Archaean to early Proterozoic metamorphics in the southern Prince Charles Mountains, but is not present in the late Proterozoic metamorphics of the northern Prince Charles Mountains–Mawson coast area. The only unmetamorphosed mafic dykes reported from the latter area have alkaline affinities, and those dated are of Phanerozoic age (Tingey, 1982; Sheraton, 1983). However, a few synorogenic metatholeiites intrude the late Proterozoic Mawson Charnockite (S. M. Kuehner, personal communication, 1986). Dolerite dykes of similar age and composition to those in Enderby Land also intrude Archaean metamorphics of the Vestfold Block (Collerson & Sheraton, 1986b), but occur only as metamorphosed relics in adjacent late Proterozoic (~1000 Ma) metamorphics (Sheraton & Collerson, 1983). These Proterozoic dolerites have thus proved useful as stratigraphic markers over much of the East Antarctic Shield. Indeed, they have been used in many other high-grade metamorphic terranes and the correlations have subsequently been confirmed by geochronological data, e.g., Greenland (Escher & others, 1975; Bridgwater & Collerson, 1977) and northwest Scotland (Park, 1970).

The Napier Complex is the largest relatively unmodified Archaean cratonic block known in Antarctica. Only in the southern Prince Charles Mountains, where Rb–Sr isochron ages up to 2900 Ma have been obtained (Tingey, 1982), do Archaean metamorphics crop out over a similarly large area, but these have been affected to a much greater extent by late Proterozoic metamorphism. Granulite-facies gneisses of the

Vestfold Block, which have given Rb–Sr isochron ages between 2400 and 3060 Ma (Collerson & Arriens, 1979; Collerson & others, 1983), are exposed over only a relatively small area (about 500 km<sup>2</sup>). In addition, a Pb–Pb isochron age of about 3100 Ma and Rb–Sr isochron age of  $2768 \pm 88$  Ma have been obtained on granite from the Ahlmannryggen in western Dronning (Queen) Maud Land (Wolmarans & Kent, 1982; Barton & others, in preparation) and generally similar U–Pb zircon ages (2400–3000 Ma) have been reported from the Windmill Islands in Wilkes Land and Commonwealth Bay in George V Land (Oliver & others, 1983; Williams & others, 1983). The presence of Proterozoic dolerite dykes (or sills) in all three areas, as well as in the Bunge Hills, and possibly Heimfrontfjella (Juckes, 1972; James & Tingey, 1983), is consistent with an Archaean or early to middle Proterozoic age for the metamorphic country rocks.

Table 10 is an attempted correlation of events in the Napier Complex with those of the two other well-documented Archaean cratons (the Vestfold Block and the southern Prince Charles Mountains), as well as with the Rayner Complex and its eastward extension through MacRobertson Land (the northern Prince Charles Mountains and MacRobertson Land coast) to the Prydz Bay coast of Princess Elizabeth Land, adjacent to the Vestfold Block. There are marked similarities in the geological histories, lithologies, and metamorphic grade of the Napier Complex and Vestfold Block, except that in the latter area much more extensive granulite emplacement occurred at about 2400–2500 Ma (Crooked Lake gneiss: Collerson & others, 1983) and intrusion of dolerite dykes took place about 1800 Ma ago (Collerson & Sheraton, 1986b). The most abundant (group II) dolerites, chemically equivalent to the group II Amundsen Dykes, were emplaced  $1374 \pm 125$  Ma ago. There are apparently few late Archaean to early Proterozoic granitic intrusives in the Napier Complex (although biotite granites of this age crop out in the Napier Mountains), and no 1800 Ma old dolerites have yet been recognised.

In contrast, in the southern Prince Charles Mountains, an Archaean granitic basement is apparently unconformably overlain by an extensive series of late Archaean to early Proterozoic metasediments (Tingey, 1982). This terrane clearly represents a much shallower crustal level: the metamorphic grade is generally no higher than amphibolite facies, and the basement orthogneisses were mostly derived by partial melting of felsic crustal rocks, unlike those of the Napier Complex and Vestfold Block which include major proportions of new continental crust (Sheraton & Black, 1983; Sheraton & others, 1985; Sheraton & Collerson, 1984). The age of the metamorphism in the southern Prince Charles Mountains' granitic basement is by no means well established, but Rb–Sr isochron ages, as well as  $T_{D_R}$  model ages, cluster between 2700 and 3000 Ma (Tingey, 1982; P. A. Arriens, unpublished data), suggesting approximate contemporaneity with the granulite-facies event in the Napier Complex and Vestfold Block. No reliable geochronological data are available for the overlying metasediments. They are intersected by a pegmatite dated at 2525 Ma (Rb–Sr muscovite age: Tingey, 1982) at one locality, but deposition may have continued well into the Proterozoic. Hence, the correlation of their earliest recognisable metamorphism with the 2400–2500 Ma event in the other Archaean cratons is only tentative; their kyanite-grade metamorphism is thought to be of late Proterozoic age.

As discussed above, isotopic evidence indicates only relatively limited reworking of Archaean rocks near the margins of the late Proterozoic terrane. There is only a very minor component of Archaean origin in late Proterozoic metamorphics of the Prydz Bay coast within 20–25 km of the Vestfold Block. On the basis of both Rb–Sr and Sm–Nd data, this may be as old as 3800 Ma (Sheraton & others, 1984).

TABLE 10. PROVISIONAL CORRELATION OF EVENTS IN THE NAPIER AND RAYNER COMPLEXES WITH THOSE IN ADJACENT PARTS OF THE EAST ANTARCTIC SHIELD

| <i>Napier Complex</i>                                                                                                                                                                         | <i>Vestfold Block</i>                                                                                                                                                                 | <i>Southern Prince Charles Mountains</i>                                                                                              | <i>Rayner Complex</i>                                                    | <i>Northern Prince Charles Mts, MacRobertson Land coast</i>  | <i>Prydz Bay coast</i>                                                   | <i>Approximate age (Ma)</i> |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|--------------------------------------------------------------|--------------------------------------------------------------------------|-----------------------------|
| 1. Emplacement of mainly tonalitic and granodioritic intrusives; deposition of sediments and volcanics; emplacement of mafic and ultramafic bodies                                            | Extrusion of mafic volcanics (Tryne metavolcanics); emplacement of tonalitic intrusives (Mossel gneiss); deposition of sediments (Chelnok supracrustals); emplacement of mafic bodies | ?Deposition of sediments; ?emplacement of granitic rocks and mafic bodies                                                             | Emplacement of tonalitic to granitic intrusives; deposition of sediments |                                                              | Emplacement of granitic intrusives                                       | > 3100 (up to ~3950)        |
| 2. Granulite-facies metamorphism (M <sub>1</sub> ) and deformation (D <sub>1</sub> ); emplacement of granitic intrusives                                                                      | Granulite-facies metamorphism and deformation (D <sub>1</sub> ); emplacement of tonalitic intrusives (part of Mossel gneiss)                                                          |                                                                                                                                       | Granulite-facies metamorphism                                            | ?Granulite-facies metamorphism                               | Granulite-facies metamorphism                                            | 3000–3100                   |
| 3. Tight to isoclinal folding (D <sub>2</sub> ) under granulite-facies conditions (M <sub>2</sub> ); emplacement of granitic intrusives                                                       |                                                                                                                                                                                       | Emplacement of granitic intrusives; ?high-grade metamorphism and deformation                                                          |                                                                          |                                                              |                                                                          | ~ 2900                      |
| 4.                                                                                                                                                                                            |                                                                                                                                                                                       | Deposition of mainly pelitic and psammitic sediments, including banded ironstones (exact age uncertain —probably Proterozoic in part) |                                                                          |                                                              |                                                                          |                             |
| 5. Intrusion of mafic to ultramafic dykes                                                                                                                                                     | Intrusion of mafic dykes                                                                                                                                                              |                                                                                                                                       |                                                                          |                                                              |                                                                          |                             |
| 6. Amphibolite to granulite-facies metamorphism (M <sub>3</sub> ); major asymmetric folding (D <sub>3</sub> ); emplacement of granitic rocks and pegmatites; intrusion of metatholeiite dykes | Granulite-facies metamorphism and deformation (D <sub>2</sub> ); emplacement of dioritic to granitic intrusives (Crooked Lake gneiss)                                                 | Possible amphibolite-facies metamorphism and deformation (age correlations uncertain)                                                 | ?Metamorphism                                                            | ?Metamorphism                                                | ?Metamorphism                                                            | 2400–2500                   |
| 7.                                                                                                                                                                                            | Amphibolite-facies metamorphism and formation of shear zones (D <sub>3</sub> ); pegmatite intrusion                                                                                   |                                                                                                                                       |                                                                          |                                                              |                                                                          |                             |
| 8. Intrusion of high-Mg tholeiite dykes                                                                                                                                                       | Intrusion of high-Mg tholeiite dykes                                                                                                                                                  |                                                                                                                                       |                                                                          |                                                              |                                                                          | 2350                        |
| 9.                                                                                                                                                                                            |                                                                                                                                                                                       | ?Pegmatite intrusion                                                                                                                  |                                                                          |                                                              |                                                                          | ~ 1900                      |
| 10.                                                                                                                                                                                           | Intrusion of dolerite dykes                                                                                                                                                           |                                                                                                                                       |                                                                          |                                                              |                                                                          | 1800                        |
| 11.                                                                                                                                                                                           | ?Formation of mylonite zones                                                                                                                                                          |                                                                                                                                       | Emplacement of granitic intrusives; ?deposition of sediments             | Emplacement of granitic intrusives; ?deposition of sediments | Emplacement of tonalitic to granitic intrusives; deposition of sediments |                             |
| 12. Intrusion of dolerite dykes (Amundsen Dykes)                                                                                                                                              | Intrusion of abundant dolerite dykes                                                                                                                                                  | Intrusion of dolerite dykes                                                                                                           | Intrusion of dolerite dykes; emplacement of granitic rocks               | Intrusion of dolerite dykes                                  | Intrusion of dolerite dykes                                              | 1200–1300                   |
| 13.                                                                                                                                                                                           |                                                                                                                                                                                       | ?Deposition of calcareous and pelitic sediments                                                                                       | Deposition of sediments                                                  | Deposition of sediments                                      | Deposition of mainly pelitic sediments                                   |                             |



| <i>Napier Complex</i>                                                                                                    | <i>Vestfold Block</i>                                | <i>Southern Prince Charles Mountains</i>                                                         | <i>Rayner Complex</i>                                                                                                            | <i>Northern Prince Charles Mts, MacRobertson Land coast</i>                                                  | <i>Prydz Bay coast</i>                                                                           | <i>Approximate age (Ma)</i> |
|--------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|--------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|-----------------------------|
| 14. Localised high-pressure metamorphism ( $M_4$ ) associated with shearing ( $D_4$ ); retrograde metamorphism elsewhere | Localised high-pressure metamorphism and shearing    | Amphibolite to granulite-facies metamorphism and deformation; emplacement of granitic intrusives | Amphibolite to granulite-facies metamorphism and deformation; emplacement of granitic intrusives                                 | Granulite-facies metamorphism and deformation; emplacement of granitic intrusives (e.g., Mawson Charnockite) | Granulite-facies metamorphism and deformation; emplacement of granitic intrusives and pegmatites | 900–1100                    |
| 15. Low-grade retrogression ( $M_5$ ); ?formation of mylonite zones ( $D_5$ )                                            |                                                      | ?Deposition of calcareous and pelitic sediments                                                  | Folding; formation of shear-zones and mylonites                                                                                  | Folding                                                                                                      |                                                                                                  |                             |
| 16. Pegmatite intrusion and associated retrogression; formation of mylonite zones ( $D_5$ )                              | Intrusion of pegmatites                              | Emplacement of granitic intrusives and pegmatites; greenschist-facies metamorphism               | Intrusion to granite and pegmatite dykes; formation of shear-zones and mylonites with localised amphibolite-facies retrogression | Intrusion of pegmatites; formation of shear-zones and mylonites                                              | Emplacement of (A-type) granitic intrusives, (e.g., Landing Bluff)                               | 500–550; 770                |
| 17. Intrusion of alkali melasyenite dykes                                                                                | ?Intrusion of alkaline dykes, including lamprophyres | Intrusion of alkali melasyenite dykes                                                            |                                                                                                                                  | Intrusion of alkali basalt dykes                                                                             |                                                                                                  | 420–500                     |
| 18.                                                                                                                      |                                                      | Deposition of sediments                                                                          |                                                                                                                                  | Deposition of sediments, including coal measures; intrusion of basalt dykes                                  |                                                                                                  | ~ 240                       |
| 19.                                                                                                                      |                                                      |                                                                                                  |                                                                                                                                  | Intrusion of alnöite sills                                                                                   |                                                                                                  | 110                         |
| 20.                                                                                                                      |                                                      |                                                                                                  |                                                                                                                                  | Extrusion of tristanite lavas                                                                                |                                                                                                  | 50                          |

Data sources: Black & James (1983), Black & others (1986a, b, 1987), Clarke (in press), Collerson & others (1983), Collerson & Sheraton (1986b), Grew (1978), Oliver & others (1982), Parker & others (1983), Sandiford & Wilson (1984), Sheraton (1983), Sheraton & Black (1981, 1983), Sheraton & Collerson (1983), Sheraton & others (1980), Tingey (1972, 1981, 1982), Tingey & others (1981), Trail (1970).

The importance of the 1200–1400 Ma dolerite dykes as stratigraphic markers over the whole area is clear from Table 10. There is some isotopic evidence (from rocks cut by deformed and metamorphosed dolerite dykes) for granitoid emplacement and deposition of sediments during the early or middle Proterozoic in MacRobertson Land and the Prydz Bay coast, although it is not possible with the available data to estimate their extent. Herz (1969) has pointed out that a major period of anorthosite emplacement occurred over a wide area of Gondwanaland 1300  $\pm$  200 Ma ago, which is similar to the age of the anorthosite body at Amphitheatre Peaks (1488  $\pm$  19 Ma). The presence of metasediments without even the metamorphosed relics of mafic dykes suggests deposition of sediments over wide areas of the late Proterozoic terrane shortly before high-grade (amphibolite to granulite-facies) metamorphism (Tingey, 1982; Sheraton & others, 1984).

Rb–Sr ages of 800 to 1100 Ma, similar to those obtained in the Rayner Complex (Grew, 1978; Black & others, 1987) and adjacent parts of the Napier Complex (Black & others, 1984), have been obtained from high-grade metamorphics of the northern Prince Charles Mountains and MacRobertson Land coast (Tingey, 1982; P. A. Arriens, unpublished data; G. Clarke, personal communication, 1986). Similar ages have also been reported from elsewhere in East Antarctica, e.g., Rb–Sr isochron ages of 1000 to 1200 Ma from Lutzow–Holm Bay (Maegoya & others, 1968; Yoshida, 1979; Yoshida & others, 1983) and western Dronning Maud Land (Wolmarans

& Kent, 1982), and 950 Ma for detrital zircon from the Sør-Rondane Mountains in eastern Dronning Maud Land (Van Autenboer & Loy, 1972). Slightly older Rb–Sr and U–Pb ages (mostly 1300–1500 Ma) have been obtained on amphibolite to granulite-facies metamorphics of the Windmill Islands (Oliver & others, 1983; Williams & others, 1983). A late Proterozoic metamorphism thus affected rocks over much of East Antarctica, and can probably be correlated with the Kibaran orogeny in southern Africa (Clifford, 1974) and the formation of the Vijayan gneisses of Sri Lanka (Crawford & Oliver, 1969).

Calcareous and pelitic metasediments of greenschist facies in parts of the southern Prince Charles Mountains appear to have been deposited after this late Proterozoic event (Halpern & Grikurov, 1975). Their metamorphism may correlate with the widespread retrograde metamorphism in this area (Tingey, 1982), at least some of which appears to be associated with early Palaeozoic magmatism (mainly granite and pegmatite emplacement). Such magmatism is most evident in the late Proterozoic terrane, but also occurred in the Archaean cratons. U–Th–Pb mineral and Rb–Sr whole-rock and mineral ages of 450–550 Ma obtained from granites and pegmatites in the Molodezhnaya–Nye Mountains (Grew, 1978; Black & others, 1987) and Casey Bay (Black & others, 1983b) areas are similar to those of pegmatites and granitic rocks, as well as minerals, from a wide area of MacRobertson Land (Tingey, 1982) and elsewhere in the East Antarctic Shield (James & Tingey, 1983; Yoshida & others, 1983).

However, at least some of those from the Rayner Complex are reset, rather than emplacement ages, although granite emplacement occurred in the Prydz Bay area at about 500 Ma based on both U-Pb zircon and Rb-Sr whole-rock dating (Sheraton & Black, in press). In eastern Kemp Land, pegmatite emplacement occurred before a period of shear and mylonite zone formation (Clarke, in press); the latter structures were correlated by Clarke with the younger (D<sub>5</sub>) mylonites of the Napier Complex and were considered to have resulted from the north-directed thrusting of the Rayner Complex over the Napier Complex during the early Palaeozoic. The early Palaeozoic thermal activity was apparently coeval with the Ross orogeny in the Transantarctic Mountains (Elliot, 1975; Laird & Bradshaw, 1982), as well as the Pan-African orogeny that has been widely identified in basement rocks from Africa (Clifford, 1974) and other parts of Gondwanaland (Craddock, 1972b). However, the late Proterozoic (~ 770 Ma) felsic magmatism identified by Black & others (1987) was previously unrecognised.

The emplacement of A-type granitic rocks in the Prydz Bay area and alkali melasyenite dykes in the Napier Complex and southern Prince Charles Mountains at about this time may have been associated with internal fracturing of Gondwanaland before eventual break-up, possibly an early stage of formation of the major Amery Ice Shelf-Lambert Glacier rift structure (Wellman & Tingey, 1976). The geological evolution of the East Antarctic Shield as a whole is described in more detail by Tingey (1978) and James & Tingey (1983). Geological correlations with peninsular India, the east coast of which is placed adjacent to Enderby Land in most Gondwanaland reconstructions (e.g., Smith & Hallam, 1970), have been discussed by a number of authors (Katz, 1972, 1974; Crawford, 1974; Grew & Manton, 1979; Federov & others, 1982; Grew, 1982b; Collerson & Sheraton, 1986a,b).

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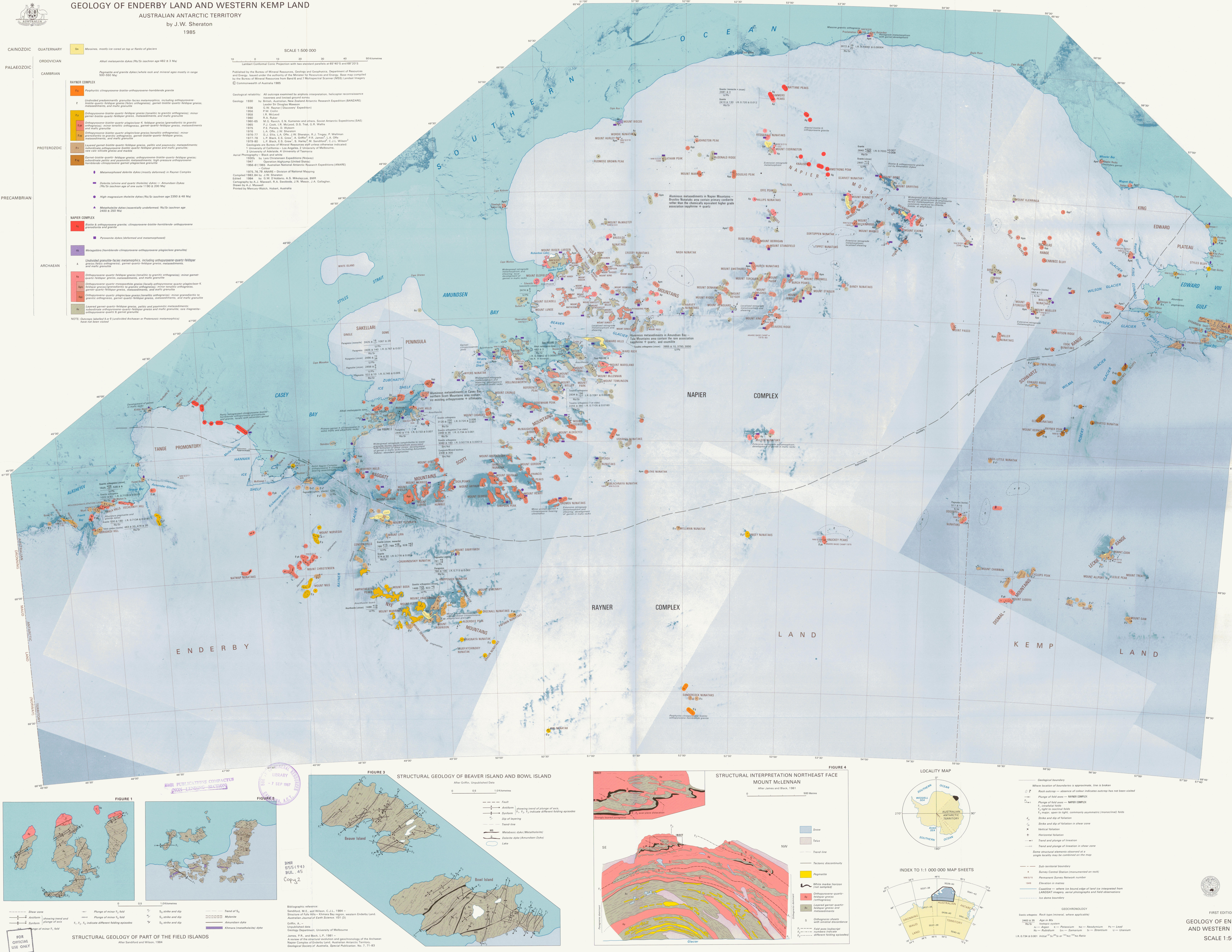
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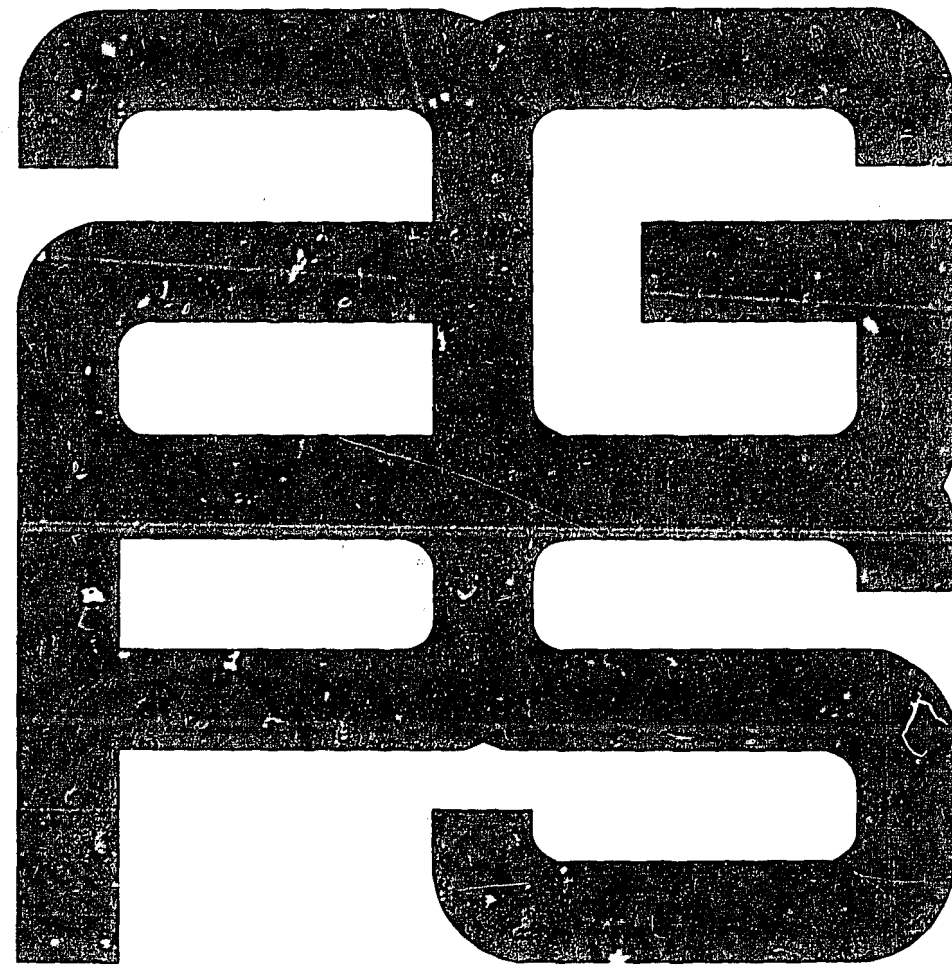
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# APPENDIX 1: PETROGRAPHIC DATA

In the following tables, samples from the Napier Complex are listed before those from the Rayner Complex, and each group is subdivided according to rock type. Visual estimates of mineral percentages are given in most cases (X = trace amount, <1%). Where no estimates are given, XX indicates a major constituent (>5%), and X a minor constituent (<5%).

Mineral abbreviations are as follows:

|                                          |                                          |
|------------------------------------------|------------------------------------------|
| All - Allanite                           | Mon - Monazite                           |
| Amp - Amphibole                          | Mt - Magnetite                           |
| An - Anorthite                           | Mus - Muscovite                          |
| Ap - Apatite                             | Ol - Olivine                             |
| Ba - Barite                              | Op - Opaque minerals                     |
| Bi - Biotite (or phlogopite)             | Cpx - Orthopyroxene                      |
| Carb - Carbonate                         | Os - Osumilite                           |
| Cd - Cordierite                          | Phl - Phlogopite                         |
| Chev - Chevkinite or Perrierite          | Pl - Plagioclase(including antiperthite) |
| Cor - Corundum                           | Py - Pyrite                              |
| Cpx - Clinopyroxene                      | Pyx - Pyroxene                           |
| Ep - Epidote                             | Qz - Quartz                              |
| Feld - Feldspar                          | Ru - Rutile                              |
| Gt - Garnet                              | Sa - Sapphirine                          |
| Hb - Hornblende                          | Scap - Scapolite                         |
| Hm - Hematite                            | Si - Sillimanite                         |
| Il - Ilmenite                            | Sp - Spinel                              |
| Ksp - Alkali felspar(including perthite) | Sph - Sphene                             |
| Ky - Kyanite                             | Tour - Tourmaline                        |
| Meso - Mesoperthite                      | Z - Zircon                               |

Note that (except for the mafic dykes) "Hb" includes both primary hornblend and secondary amphibole, although the presence of the latter, and of other secondary phases, is normally pointed out under "remarks".



NAPIER COMPLEX PYROXENE-QUARTZ-FELDSPAR GNEISSES

| Sample No. | Locality                | Qz | Ksp | Meso | Pl | Opx | Cpx | Bi | Hb | Op | Accessories | Remarks                                                      |
|------------|-------------------------|----|-----|------|----|-----|-----|----|----|----|-------------|--------------------------------------------------------------|
| 4576       | Perov Ntks              | 12 | 18  |      | 40 | 28  | 2   |    |    | X  | Ru          | Layered                                                      |
| 4576       | Adams Fjord             | 35 |     | 65   |    |     |     |    |    |    |             | Leucogneiss                                                  |
| 4586       | McLeod Ntks             | 30 | 40  |      | 23 |     |     | 6  | 1  | X  | Ap,Z,Carb   | Altered: Bi + Hb replace ?Pyx; P and microcline part altered |
| 7265       | Mt. Bennett             | 30 | 64  |      | 5  |     |     | X  | X  | 1  | Ap          | Secondary Bi <sup>f</sup> + Hb                               |
| 7266       | Armstrong Peak          | 20 | 50  |      | 22 |     |     | 3  | 5  | X  | Ap          | ?Intrusive                                                   |
| 7281       | Mt. Riiser-Larsen       | 30 |     | 64   |    | 6   |     |    |    | X  |             |                                                              |
| 65280087   | Mt. Pasco               | 30 | 33  |      | 33 | 4   |     | X  |    | X  | Ap,Z        | An40                                                         |
| 127        | S. Seaton Gl.           | 27 | 70  |      | X  | 3   |     | X  |    | X  | Ap,Z        | Opx part altered; much Pl in perthite; minor An 26           |
| 128        | Wilson Gl.              | 30 | X   |      | 66 | 4   |     | X  |    | X  | Ap,Z        | An 32                                                        |
| 132        | 20 km NE of Mt. Mueller | 20 |     |      | 76 |     |     | 4  | X  | X  | Ap,Z        | ?Intrusive                                                   |
| 134        | Downer Gl.              | 28 | 70  |      |    | 2   |     | X  |    | X  | Z           | Much Pl in perthite; Opx part altered                        |
| 188        | W. Rippon Gl.           | 26 | 68  |      | 3  | 1.5 | X   |    | X  | 1  | Ap, Z       | Opx part altered; An 26                                      |
| 192        | Mt. Storegutt           | 34 | 50  |      | 15 | 1   |     | X  |    | X  | Ap, Z       | Opx part altered                                             |
| 197        | 10 km SE of Mt. Pasco   | 15 |     |      | 50 | 10  | 25  |    |    | X  | Carb, Sph   | Part sheared; ?calc-silicate                                 |
| 198        | Mt. Pasco               | 30 | 49  |      | 20 | X   |     | 1  |    | X  | Ap          | Opx altered                                                  |
| 217        | Downer Gl.              | 28 | 45  |      | 25 | 2   |     | X  |    | X  | Ap,Z        | Opx part altered                                             |
| 218        | Watson Ridge            | 30 | 38  |      | 30 | 1   |     | X  |    | 1  | Ap,Z        | ?Intrusive; porphyroblastic                                  |
| 228        | Wheeler Rocks           | 27 | 38  |      | 27 | 5   | X   |    | 3  | X  | Ap,Z        | Minor Gt rims Opx + Op;<br>?Intrusive                        |

NAPIER COMPLEX PYROXENE-QUARTZ-FELDSPAR GNEISSES

| Sample No. | Locality         | Qz | Ksp | Meso | Pl | Opx | Cpx | Bi | Hb | Op | Accessories | Remarks                                                              |
|------------|------------------|----|-----|------|----|-----|-----|----|----|----|-------------|----------------------------------------------------------------------|
| 75830021   | Rippon Depot     | 25 |     | 72   |    | 3   |     |    |    | X  | Ap          | Opx altered                                                          |
| 27         | Newman Ntks      | 30 | 67  |      |    |     |     | 3  |    | X  | Z           | Altered: Bi replaces ?Opx                                            |
| 37         | Newman Ntks      | 40 | XX  |      | XX |     |     | X  |    |    |             | Altered: Ksp + Pl (60)<br>sericitized                                |
| 201        | Mt. Mueller      | 27 |     |      | 66 | 7   |     | X  |    | X  | Ap,Z        | An 30                                                                |
| 221        | Mt. Mueller      | 27 |     |      | 62 | 10  |     |    |    | 1  | Ap,Z        | An 30                                                                |
| 225        | Mt. Breckinridge | 25 |     | 70   |    |     | 2   | X  | X  | 3  | Z           | Secondary Hb + Bi                                                    |
| 227        | Mt. Breckinridge | 30 | XX  |      | XX |     |     | 9  | 6  |    | Ap          | Sheared; altered; Ksp = Pl (55)                                      |
| 229        | Mt. Breckinridge | 5  |     | 71   |    | 20  |     | 4  |    | X  | Ap,Z        |                                                                      |
| 230        | Mt. Breckinridge | 24 | 48  |      | 8  |     |     | 10 | 8  | 2  | Ap,Z        | Retrograde gneiss; sievey Hb + Q<br>aggregates; An 25                |
| 231        | Mt. Breckinridge | 30 | XX  |      | XX |     |     | 11 | 6  | 1  | Ap,Z        | Retrograde gneiss; part<br>recrystallised; An 30; Ksp +<br>Pl (52)   |
| 76283001   | Mt. King         | 30 |     | 66   |    | 4   |     | X  |    | X  |             | Secondary Bi                                                         |
| 3002       | Mt. King         | 30 |     |      | 62 |     |     | 8  |    | X  | Ap,Z        | Altered: Bi (+Carb + Ep)<br>replaces ?Pyx; some<br>recrystallisation |
|            | Mt. King         | XX | XX  | XX   | XX |     |     | X  |    | X  | Ap,Z        | Sheared and recrystallised;<br>secondary Bi                          |
| 3006       | Seavers Ridge    | 29 |     | 60   |    | 10  | X   |    |    | 1  | Ap,Z        |                                                                      |
| 3007       | Seavers Ridge    | 27 |     | 65   |    | 7   | X   |    |    | 1  | Ap,Z        |                                                                      |
| 3009       | Seavers Ridge    | 8  | 10  |      | 47 | 25  | 10  |    |    | X  | Z           | Layered                                                              |



NAPIER COMPLEX PYROXENE-QUARTZ-FELDSPAR GNEISSES

| Sample No. | Locality       | Qz | Ksp | Meso | Pl | Opx | Cpx | Bi | Hb | Op | Accessories | Remarks                                                                     |
|------------|----------------|----|-----|------|----|-----|-----|----|----|----|-------------|-----------------------------------------------------------------------------|
| 76283017   | Seavers Ridge  | 25 |     | 60   |    |     |     | 5  | 10 | X  | Ap,Z        | Altered Hb + Bi replace Pyx                                                 |
| 3018       | Seavers Ridge  | 26 |     | 65   |    | 4   | 3   |    |    | 2  | Ap          |                                                                             |
| 3020       | Mt. Douglas    | 16 |     |      | 61 | 18  | 4   | 1  |    | X  | Ap          |                                                                             |
| 3022       | Mt. Douglas    | 27 |     |      | 45 | 20  |     | 8  |    | X  | Ap          | Aligned Bi                                                                  |
| 3023       | Mt. Douglas    | 30 | 25  |      | 40 | 4   |     | 1  |    | X  |             | Gt in hand specimen; part<br>recrystallised                                 |
| 3025       | Mt. Douglas    | XX | ?   |      | XX | XX  |     |    |    | X  |             | Strongly sheared gneiss                                                     |
| 3033       | Mt. Douglas    | 25 |     |      | 60 | 12  |     | 3  |    | X  |             |                                                                             |
| 3056       | Mt. Pardoe     | 30 |     | 68   |    | 2   |     | X  |    | X  |             | Opx part altered;<br>recrystallised                                         |
| 3057       | Mt. Pardoe     | 30 |     | 67   |    | 3   |     |    |    | X  |             | Recrystallised                                                              |
| 3058       | Mt. Pardoe     | 33 |     | 62   |    |     |     | 3  | 2  | X  |             | Bi replaces ?Opx; recrystallised                                            |
| 3066       | Mt. Pardoe     | 32 | 45  |      | 20 |     |     | 2  |    | 1  | Ap,Z        | Altered; Bi replaces ?Opx;<br>minor secondary Gt; some<br>recrystallisation |
| 3067       | Mt. Hurley     | 35 |     | 65   |    | X   |     |    |    |    |             | Some recrystallisation                                                      |
| 3068       | Mt. Hurley     | 32 |     | 66   | X  | 2   |     |    |    |    |             |                                                                             |
| 3069       | Mt. Hurley     | 20 |     | 65   | X  | 15  |     |    |    | X  |             |                                                                             |
| 3073       | Mt. Hurley     | 30 | 66  |      |    |     |     |    | 2  | 1  | Ap(1)       | Secondary Amp + Chl + Sph + Ep;<br>recrystallised; some Meso                |
| 3074       | Mt. Codrington | 25 |     |      | 60 | 12  |     | X  |    | 2  |             |                                                                             |
| 3075       | Mt. Codrington | 37 | 55  |      |    | 6   |     | 2  |    | X  | Z           | Some Meso                                                                   |

NAPIER COMPLEX PYROXENE-QUARTZ-FELDSPAR GNEISSES

| Sample No. | Locality         | Qz | Ksp | Meso | Pl | Opx | Cpx | Bi | Hb  | Op | Accessories | Remarks                              |
|------------|------------------|----|-----|------|----|-----|-----|----|-----|----|-------------|--------------------------------------|
| 76283077   | Mt. Codrington   | 30 |     |      | 60 | 7   |     | X  |     | 3  |             | Opx part altered to Bi + Chl + Carb. |
| 3078       | Mt. Codrington   | 30 | 62  |      |    |     |     | 8  |     | X  | Z           | Bi replaces Pyx                      |
| 3079       | Mt. Codrington   | 30 | 40  |      | 25 |     |     | 5  |     | X  | Z           | Bi replaces ?Pyx                     |
| 3083       | Proclamation Is. | 30 | 32  |      | 32 | 5   | X   |    | 0.5 | 1  | Ap          | An 32; 3083-5 prob. intrusive        |
| 3084       | Proclamation Is. | 25 | 40  |      | 17 | 5   | 1   |    | 0.5 | 1  | Ap,Z        | An 30                                |
| 3085       | Proclamation Is. | 30 | 34  |      | 30 | 5   | X   |    | X   | 1  | Ap          | An 32                                |
| 3092       | Proclamation Is. | 36 | 29  |      | 29 | 3   |     | 3  |     | X  |             | Bi replaces Opx                      |
| 3093       | Mt. King         | 34 |     | 64   |    |     |     | 2  |     | X  | Z           | Altered: Bi replaces ?Opx            |
| 3094       | Mt. King         | 30 |     | 65   |    | 3   | 1   |    |     | 1  | Ap,Z        | Some recrystallisation               |
| 3098       | Mt. Selwood      | 15 |     |      | 64 | 20  |     | 1  |     | X  | Ap          |                                      |
| 3107       | Rippon Depot     | 30 |     | 68   |    | 2   |     |    |     |    | Ap,Z        | Opx part altered                     |
| 3109       | Rippon Depot     | 20 | 57  |      | 20 | 2   |     | 1  |     | X  |             |                                      |
| 3112       | Rippon Depot     | 36 |     | 28   | 25 | 8   |     | 3  |     | X  | Ap,Z        | Layered; minor ?Mon                  |
| 3114       | Mt. Breckinridge | 25 |     | 69   |    |     | 3   |    |     | 3  | Ap          |                                      |
| 3115A      | Mt. Breckinridge | 30 |     | 68   |    | 2   |     | X  |     | X  | Ap          | Opx part altered                     |
| 3132       | Fyfe Hills       | 30 |     |      | 64 | 5   |     |    | X   | 1  | Z           | Recrystallised                       |
| 3136       | Fyfe Hills       | 25 |     |      | 65 | 8   |     | X  | X   | 2  | Ap          | Hb + Bi replace Opx                  |
| 3138       | Fyfe Hills       | XX |     |      | XX | XX  | XX  | X  | X   | X  | Sph         | Layered; Hb + Bi replace Pyx         |
| 3149       | Sheelagh Is.     | 15 | 60  |      | 20 | 5   |     |    |     | X  | Ap,Z        | ?Napier Complex                      |
| 3150       | Sheelagh Is.     | 20 | 60  |      | 17 | 3   |     |    |     | X  | Ap          | ?Napier Complex                      |
| 3158       | Latham Peak      | 20 | 38  |      | 30 | 5   |     | 5  |     | 2  | Z           | Ksp near Meso; some Bi replaces Opx  |



NAPIER COMPLEX PYROXENE-QUARTZ-FELDSPAR GNEISSES

| Sample No. | Locality      | Qz | Ksp | Meso | Pl | Opx | Cpx | Bi | Hb | Op  | Accessories | Remarks                          |
|------------|---------------|----|-----|------|----|-----|-----|----|----|-----|-------------|----------------------------------|
| 76283161A  | Latham Peak   | 35 |     |      | 64 | X   |     | X  |    | X   |             | Layered; Carb                    |
| 3170       | Latham Peak   | XX |     |      | XX |     |     | XX | XX | X   | Ap,Z        | Sheared, altered gneiss          |
| 3203       | Mt. Ryder     | 35 |     |      | 63 | 2   |     |    |    | X   | Z           | Opx part altered                 |
| 3204       | Mt. Ryder     | 35 |     | 64   |    | 1   |     |    |    | X   | Ap          | Opx altered; part recrystallised |
| 3212       | Mt. Denham    | 33 |     | 64   |    |     |     | 3  |    | X   | Ap,Z        | Altered: Bi replaces ?Opx        |
| 3213       | Mt. Denham    | 34 |     | 65   |    | X   |     | 1  |    | X   | Z           | Opx altered                      |
| 3215       | Mt. Denham    | 34 |     | 64   |    |     |     | 2  | X  |     |             | Bi replaces ?Opx                 |
| 3217       | Mt. Renouard  | 35 |     | 65   |    | X   |     |    |    | X   |             | Opx altered                      |
| 3222       | Mt. Smethurst | 30 |     | 61   |    | 4   |     |    |    | X   | Ap          |                                  |
| 3223       | Mt. Smethurst | 34 |     | 65   |    | 1   |     |    |    | X   |             | Opx altered                      |
| 3226       | Mt. Paish     | 15 |     |      | 53 | 24  | 8   | X  |    | X   |             |                                  |
| 3227       | Mt. Paish     | 40 |     | 55   |    | 5   |     |    |    | X   | Z           |                                  |
| 3228       | Mt. Paish     | 35 |     | 61   |    | 3   |     |    |    | 1   | Z           |                                  |
| 3231       | Mt. Paish     | 20 |     | 57   |    |     |     | 23 |    | X   | Z           | Altered: Bi replaces ?Pyx        |
| 3232       | Mt. Paish     | 35 |     | 63   |    |     |     | 3  |    | X   | Z           | Altered: Bi replaces ?Opx        |
| 3245       | Mt. McGhee    | 35 |     | 63   |    | 2   |     | X  | X  | X   | Z           | Opx part altered                 |
| 3246       | Mt. McGhee    | 35 |     | 60   |    |     |     | 5  | X  | X   | Ap,Z        | Altered: Bi + Hb replace Pyx     |
| 3248       | Burch Peaks   | 30 |     | 67   |    | 3   | X   |    |    | X   | Ap,Z,?Chev  |                                  |
| 3249       | Burch Peaks   | 40 |     | 59   |    | 1   |     |    |    | X   |             | Opx altered                      |
| 3253       | Mt. Cordwell  | 35 |     | 58   |    | 6   |     |    |    | 1   | Ap,Z        |                                  |
| 3273       | Mt. Jewell    | 15 |     |      | 59 | 15  | 10  |    |    | 1   | Ap          |                                  |
| 3274       | Mt. Jewell    | 30 |     | 63   |    | 6   | X   |    |    | 0.5 | Ap,Z        |                                  |
| 3280       | Mt. Jewell    | 30 | 69  |      |    | 1   |     | X  |    | X   | Z           | Opx altered                      |

NAPIER COMPLEX PYROXENE-QUARTZ-FELDSPAR GNEISSES

| Sample No. | Locality               | Qz | Ksp | Meso | Pl | Opx | Cpx | Bi | Ht | Op | Accessories | Remarks                                   |
|------------|------------------------|----|-----|------|----|-----|-----|----|----|----|-------------|-------------------------------------------|
| 77283401   | Mt. Marsland           | 25 |     |      | 47 | 28  |     |    |    | X  | Ap,Z        |                                           |
| 3406       | Mt. Marsland           | 28 |     | 67   |    | 3   |     |    |    |    | Z,Ru        |                                           |
| 3407       | Mt. Marsland           | 32 |     | 60   |    | 8   |     |    |    |    | Z,Ru        |                                           |
| 3408       | Mt. Marsland           | 31 |     | 65   |    | 3   |     |    |    | 1  | Ap          |                                           |
| 3409       | Mt. Marsland           | 17 |     |      | 80 | X   | X   | 2  |    | X  | Ap,Z        | Bi replaces Opx                           |
| 3412       | Mt. Marsland           | 38 |     |      | 52 |     |     | 6  | 4  | X  | Ap          | Altered: Bi + Hb replace ?Pyx             |
| 3414       | Mt. Marsland           | 33 |     | 67   |    |     |     |    |    | X  |             | Leucogneiss                               |
| 3418       | Mt. Riiser-Larsen      | 30 |     | 65   |    | 5   |     |    |    | X  | Z           |                                           |
| 3424       | Mt. Riiser-Larsen      | 30 |     | 65   |    | 4   |     |    |    | 1  | Ap          |                                           |
| 3426       | Mt. Riiser-Larsen      | 30 |     | 60   |    |     |     | 5  | 5  | X  | Ap,Z        | Altered: Bi + Hb replace ?Pyx             |
| 3428       | Mt. Riiser-Larsen      | 24 |     |      | 70 | 6   |     |    |    | X  | Ap          |                                           |
| 3437       | Peacock Ridge          | 30 |     | 63   |    | 5   |     |    |    | 1  | Ap(1)       | Opx part altered; recrystallised          |
| 3439       | Graham Peak            | 30 |     | 68   |    | 2   |     |    |    | X  |             |                                           |
| 3457       | 4 km SE of Mt. Selwood | 40 |     |      | 50 |     |     | 10 |    | X  | Z,Ru        | Bi replaces ?Pyx; most of Feldspar is ?Pl |
| 3463       | 6 km E of Mt. Selwood  | 35 |     | 63   |    | 2   |     |    |    | X  | Z           | Opx altered                               |
| 3502       | Mt. Tomlinson          | 10 |     |      | 65 | 25  | X   |    |    | X  |             | Recrystallised                            |
| 3508       | Mt. McLennan           | 10 |     |      | 60 | 14  | 14  | X  |    | 1  |             | Part recrystallized                       |
| 3510       | Mt. Degerfeldt         | 30 |     | 67   |    |     |     | 3  |    |    |             | Secondary Bi; scree                       |
| 3516       | Mt. Bartlett           | 27 |     | 70   |    | 3   |     |    |    | X  |             |                                           |
| 3523       | Mt. Bartlett           | XX | XX  |      | XX |     |     | XX |    |    |             | Altered, sheared gneiss; scree            |
| 3524       | Mt. Bartlett           | 20 |     | 70   |    | 7   |     |    |    | 3  |             | ?Intrusive                                |
| 3531       | 4 km SE of Mt. Selwood | 35 |     | 52   |    | 13  |     |    |    |    |             |                                           |



## NAPIER COMPLEX PYROXENE-QUARTZ-FELDSPAR GNEISSES

| Sample No. | Locality               | Qz | Ksp | Meso | Pl | Opx | Cpx | Bi | Hb | Op | Accessories | Remarks                                   |
|------------|------------------------|----|-----|------|----|-----|-----|----|----|----|-------------|-------------------------------------------|
| 77283538   | 4 km SE of Mt. Selwood | 37 |     |      | 50 | 12  |     |    |    | 1  |             | Layered                                   |
| 3548       | Mt. Sones              | 15 |     |      | 65 | 20  |     |    |    | X  | Ap          |                                           |
| 3580A      | 22 km NE of Perov Ntks | 8  |     |      | 66 | 16  | 6   |    |    | 4  |             | Part recrystallised                       |
| 3589       | Rippon Depot           | 10 |     |      | 50 | 32  |     | 8  |    |    |             | Layered                                   |
| 3594       | Mt. Tod                | 27 |     | 60   |    | 12  |     |    |    | 1  |             | Part recrystallised                       |
| 3595       | Crohn Is.              | 17 | 55  |      |    | 24  |     | 4  |    | X  | Ap          | Secondary Bi                              |
| 3601       | Mt. Tomlinson          | 25 |     |      | 56 | 18  |     |    |    | 1  | Ap,Z        |                                           |
| 3602       | Mt. Tomlinson          | 30 |     | 69   |    | 1   |     |    |    |    |             | Opx part altered                          |
| 3607       | Mt. McLennan           | 25 |     | 74   |    | 1   |     | X  |    | X  |             | Opx altered                               |
| 3610       | Mt. Degerfeld          | 12 |     |      | 60 | 28  |     |    |    | X  | Ap          |                                           |
| 3611       | Mt. Mateer             | 30 |     | 68   |    | 2   |     | X  |    | X  | Ap,Z        | Opx part altered                          |
| 3619       | Harvey Ntks            | 40 | 60  |      |    |     |     |    |    |    |             | Leucogneiss; secondary Mus;<br>microcline |
| 3632       | 6 km NE of Mt. Reed    | 35 |     |      | 62 | 2   | 0.5 |    |    | X  | Ru          | Opx slightly altered                      |
| 3634       | 6 km NE of Mt. Reed    | 22 |     |      | 65 | 12  | 1   | X  |    | X  | Ap          | Layered; Opx slightly altered to<br>Bi    |
| 3636       | 1 km E of Mt. Reed     | 35 | 65  |      | X  |     |     | X  |    |    |             | Leucogneiss; secondary Bi                 |
| 3647       | Mt Reed                | 40 |     |      | 52 | 3   | 5   | X  |    |    |             | Layered; secondary Amp and Ep             |
| 3675       | Litke Ntk.             | 34 |     | 64   |    | 2   |     |    |    | X  |             | Opx altered; part recrystallised          |
| 3676       | Mt. Pasco              | 35 | 50  |      | 14 | 1   |     | X  |    | X  |             | Opx altered                               |
| 3677       | Watson Ridge           | 33 | 42  |      | 20 | 4   |     | X  |    | 1  | Ap,Z        | Opx part altered                          |
| 3678       | Mt. Tod                | 33 |     | 64   |    | 3   |     |    |    | X  | Ap          | Recrystallised                            |
| 3682       | Crohn Is.              | 34 |     |      | 62 | 4   |     | X  |    | X  | Z           | Opx part altered to Bi                    |

NAPIER COMPLEX PYROXENE-QUARTZ-FELDSPAR GNEISSES

| Sample No. | Locality           | Qz | Ksp | Meso | Pl | Opx | Cpx | Bi | Hb | Op | Accessories | Remarks                                       |
|------------|--------------------|----|-----|------|----|-----|-----|----|----|----|-------------|-----------------------------------------------|
| 77283688   | Crohn Is.          | 12 | 33  |      | 33 | 15  | 7   |    |    | X  |             | Layered                                       |
| 3694       | Bunt Is.           | 35 | 40  |      | 23 | 2   |     | X  |    | X  | Ap,Z,Mon    | Opx altered to Bi, etc.                       |
| 3710       | Howard Hills       | 28 |     | 70   |    | 2   |     |    |    | X  | Z           | ?Opx altered                                  |
| 3712       | Howard Hills       | 33 |     | 60   |    | 7   |     |    |    | X  | Ap,Z        | Part recrystallised                           |
| 3721       | Mt. Harvey         | 30 | XX  | XX   |    |     |     | 4  |    | X  | Z           | Altered; secondary Bi; Meso/Ksp (66)          |
| 3723       | Mt. Harvey         | 10 |     | 65   |    | 25  |     |    |    | X  | Ap          |                                               |
| 3727       | Crosby Ntks        | XX |     | XX   |    | XX  |     |    |    |    |             |                                               |
| 3728       | Crosby Ntks        | 30 |     | 47   |    | 15  |     | 8  |    |    | Ru          | ?Metasediment; secondary Bi                   |
| 3734       | Mt. Hampson        | 16 |     | 64   |    | 20  |     |    |    | X  |             |                                               |
| 3736       | Mt. Hampson        | 30 | 5   |      | 60 | 5   |     |    |    | X  | Ap          | Foliated aplite                               |
| 3738       | Mt. Hampson        | 28 |     | 68   |    | 4   |     |    |    | X  | Ap,Z        |                                               |
| 3740       | Mt. Hollingsworth  | 30 | 65  |      |    |     |     | 5  |    | X  | Z,?Mon, Mus | Microcline perthite (near Meso)               |
| 3741       | Mt. Hollingsworth  | 40 | 42  |      |    |     |     | 18 |    | X  | Z           | Much secondary Bi after ?Opx; also aligned Bi |
| 3764       | Debenham Peak      | 25 |     |      | 68 | 7   |     |    |    | X  | Ap,Z        |                                               |
| 3768       | NW Wyers Ice Shelf | 30 |     | 68   |    |     |     | 1  | 1  | X  |             | ?Intrusive; secondary Bi + Hb                 |
| 3769       | NW Wyers Ice Shelf | 24 |     | XX   | XX |     |     | 8  | 10 | 1  | Ap          | ?Intrusive; Meso + Pl (57); secondary Bi + Hb |
| 3912       | Watson Ridge       | 30 | 32  |      | 32 | 4   |     |    |    | 2  | Ap,Z        | Opx part altered                              |
| 3914       | Tonagh Is.         | 25 |     |      | 75 | 10  | X   |    |    | X  | Ap          |                                               |
| 3923       | Tonagh Is.         | 15 |     |      | 70 | 11  | 3   | X  | X  | 1  |             | Some alteration of Pyx                        |
| 3959       | Debenham Peak      | 30 |     |      | 65 | 3   |     |    |    | 1  | Ap,Z        |                                               |



NAPIER COMPLEX PYROXENE-QUARTZ-FELDSPAR GNEISSES

| Sample No. | Locality               | Qz | Ksp | Meso | Pl | Opx | Cpx | Bi | Hb | Op  | Accessories   | Remarks                                             |
|------------|------------------------|----|-----|------|----|-----|-----|----|----|-----|---------------|-----------------------------------------------------|
| 77283960   | Debenham Peak          | 18 |     |      | 50 | 15  | 15  |    |    | 2   | Ap            | Some recrystallisation                              |
| 3969       | 6 km SE of Mt. Charles | 30 |     | 68   |    | 2   |     |    |    | X   | Z             | Gt in hand specimen                                 |
| 3972       | Mt. Charles            | 22 |     |      | 60 | 18  |     |    |    | X   | Z, Ru, Sph    |                                                     |
| 3974       | Mt. Bennett            | 30 |     |      | 65 | 4   |     | X  |    | X   | Z             |                                                     |
| 3980       | Mt. Bennett            | 30 |     | 65   |    | 4   |     |    |    | 1   | Ap            |                                                     |
| 3981       | Mt. Bennett            | 30 |     | 65   |    | 5   |     | X  |    | X   |               | Bi replaces Opx                                     |
| 3983       | Mt. Bennett            | 35 |     | 55   |    |     |     | 10 |    | X   | Z             | Bi replaces ?Opx                                    |
| 3984       | Grimsley Peaks         | 30 |     | 66   |    | 4   |     |    |    | 0.5 | Sp            | Opx part altered; ?intrusive                        |
| 3985       | Grimsley Peaks         | 20 |     |      | 70 | 9   |     |    |    | 1   | Ap, Z         |                                                     |
| 3988       | Grimsley Peaks         | 30 |     |      | 65 | 4   | X   | X  |    | X   | Ap, Hm        | Pl part altered (Mus, Ep)                           |
| 3989       | Grimsley Peaks         | 30 |     |      | 64 | 6   |     | X  |    | X   | Ap, Z         |                                                     |
| 3991       | Mt. Maines             | 30 | 60  |      |    |     |     | 10 |    | X   | Z             | Bi replaces ?Opx                                    |
| 3992       | Mt. Maines             | 30 | 50  |      | 10 |     |     | 3  | 2  | 4   | Ap, Z, Ep     | Altered: Bi + Hb replace ?Pyx                       |
| 3993       | Mt. Maines             | 35 | 58  |      |    | 7   |     | X  |    | X   | Z, Ep         | Opx part altered                                    |
| 3994       | Mt. Maines             | 35 |     | 68   |    |     |     | 1  | 3  | 3   | Z, Ep, ?Al    | Altered: Hb + Bi may replace<br>Pyx; recrystallised |
| 3998       | Mt. Codrington         | 17 |     |      | 60 |     |     | 14 | 7  | X   | Ap, Z, Sph(2) | Altered: Hb + Bi may replace<br>Pyx; recrystallised |
| 3999       | Mt. Codrington         | 30 | 25  |      | 35 |     |     | 7  | 2  | 0.5 | Ap, Z         | Altered: Hb + Bi may replace<br>Pyx; recrystallised |
| 4000       | Mt. Codrington         | 25 |     |      | 65 | X   |     | 2  | 8  | X   | Ap, Z         | Altered: Hb + Bi + cummingtonite<br>replace ?Opx    |
| 4017       | Mt. Giddings           | 20 |     |      | 60 | 18  |     |    |    | 2   |               |                                                     |

NAPIER COMPLEX PYROXENE-QUARTZ-FELDSPAR GNEISSES

| Sample No. | Locality               | Qz | Ksp | Meso | Pl | Opx | Cpx | Bi | Hb | Op | Accessories | Remarks                                                                             |
|------------|------------------------|----|-----|------|----|-----|-----|----|----|----|-------------|-------------------------------------------------------------------------------------|
| 77284064   | Johnston Peak          | 13 | 5   |      | 65 | 10  |     | 7  |    | X  | Ap          |                                                                                     |
| 4068       | Mt. Marr               | 20 |     |      | 53 | 25  |     | 1  |    | 1  |             |                                                                                     |
| 4074       | 8 km E of Mt. Giddings | 35 |     | 60   |    |     |     | 5  |    | X  |             | Altered: Bi replaces ?Opx                                                           |
| 4078       | Pythagoras Peak        | 30 |     | 60   |    |     |     | 10 |    |    |             | Altered: Bi replaces ?Pyx                                                           |
| 4081       | Pythagoras Peak        | 15 |     |      | 55 | 30  | X   |    |    | X  |             | Some recrystallisation                                                              |
| 4082       | Mt. Dungey             | 45 | 53  |      |    | 1.5 |     |    |    | X  |             | Opx altered                                                                         |
| 4094A      | Ward Rocks             | 25 | 20  |      | 37 | 12  |     | 6  |    | X  |             | Secondary Bi                                                                        |
| 4100       | Mt. Stansfield         | 26 |     | 70   |    | 4   |     |    |    | X  |             |                                                                                     |
| 4112       | Fitzgerald Ntks        | 37 | XX  | XX   | X  |     |     | 7  |    | X  | Z           | Ksp + Meso + Pl(56); microcline; secondary Bi                                       |
| 4114       | Mt. Arthur             | 30 |     |      | 62 | 6   | 2   |    |    | X  | Ap,Z        |                                                                                     |
| 4118       | Mt. George             | 18 |     |      | 52 | 6   | 22  |    |    | 2  | Ap          |                                                                                     |
| 4127       | Brusilov Ntks          | 30 |     |      | 65 | 4   |     |    |    | 1  | Z           | Pl near Meso; ?Intrusive                                                            |
| 4128       | Brusilov Ntks          | 40 |     |      |    |     |     |    |    |    |             | Altered: Feld (60) strongly sericitized                                             |
| 4130       | Brusilov Ntks          | 34 |     |      | XX |     |     |    |    | X  |             | Altered; sericitized Feld (inc. Pl) (65); altered ?Pyx(1)                           |
| 4132       | Brusilov Ntks          | 22 |     |      | 57 | 12  | 8   |    |    | 1  | Ap          |                                                                                     |
| 4136       | Brusilov Ntks          | 30 |     |      | 62 |     |     |    |    | X  | Z           | Altered; Bi + Amp + Mus (8) replace ?Pyx; Pl sericitized                            |
| 4142       | Demidov Is.            | 28 | 30  |      | 35 | 2   | 2   | X  | 2  | 1  | Ap,Z,Carb   | Myrmekite; Opx part altered; ?intrusive; like 77284192 from Kitchenside GL (Rayner) |



NAPIER COMPLEX PYROXENE-QUARTZ-FELDSPAR GNEISSES

| Sample No. | Locality                    | Qz | Ksp | Meso | Pl | Opx | Cpx | Bi | Hb | Op | Accessories | Remarks                                                |
|------------|-----------------------------|----|-----|------|----|-----|-----|----|----|----|-------------|--------------------------------------------------------|
| 77284149   | Simpson Peak                | 10 |     | 60   |    | 10  | 10  | 9  |    | 1  | Ap,Z        | Aligned Bi after Opx                                   |
| 4198       | Wheeler Rocks               | 20 | 45  |      | 25 | 6   | 1   |    | 2  | 1  | Ap,Gt,Z     | Opx part altered; secondary Gt rims Pyx + Op           |
| 4207       | Young Ntks                  | 33 |     |      | 57 | 5   |     |    |    | 4  | Ap,Z        |                                                        |
| 4209       | 6 km of W of Young Ntks     |    | 34  | 40   |    | 24  | 2   | X  |    | X  |             | Microcline; Opx part altered                           |
| 4210       | 6 km W of Young Ntks        | 30 |     |      | 60 | 3   |     | 7  |    | X  | Ap,Z        | Bi post-dates Opx                                      |
| 4211       | 6 km W of Young Ntks        | 33 |     | 55   |    |     |     | 1  |    | X  | Z           | Bi, Meso altered; secondary Che (10), Ep, Mus          |
| 4212       | Mt. Elkins                  | 30 | 50  |      | 16 | 2   |     |    |    | 2  | Ap,Z        | Opx part altered; microcline                           |
| 4216       | Mt. Codrington              | 40 |     |      | 60 |     |     |    |    |    |             | Altered leucogneiss; minor secondary Chl + Ep + Mus    |
| 4222       | Johnston Peak               | 33 |     | 63   |    | 3   |     | 1  |    | X  | Mus         | Opx part altered                                       |
| 4224       | Johnston Peak               | 30 |     | 68   |    | 2   |     | X  | X  |    |             | Recrystallised; Meso + Pl + Ksp (68); Opx part altered |
| 4225       | 5.5 km SW of Johnstone Peak | 20 |     |      | 65 | 15  |     | X  | X  |    |             |                                                        |
| 4229       | Douglas Peak                | 40 |     |      | 52 | 8   | X   | X  |    | X  | Ap,Z,       | Intrusive; Pl rather altered secondary Mus, Chl, Ep    |
| 4232       | Mt. Oldfield                | 25 |     | 69   |    | 6   | X   |    |    | X  | Ap          | Pl dominant in Meso                                    |
| 4233       | Mt. Oldfield                | 30 |     |      | 63 | 7   |     | X  |    | X  | Ap          | Layered; secondary Bi                                  |
| 4235       | Mt. Oldfield                | XX |     |      |    | X   |     |    |    | XX |             | Mylonized gneiss                                       |

NAPIER COMPLEX PYROXENE-QUARTZ-FELDSPAR GNEISSES

| Sample No. | Locality                 | Qz | Ksp | Meso | Pl | Opx | Cpx | Bi  | Hb | Op | Accessories | Remarks                                           |
|------------|--------------------------|----|-----|------|----|-----|-----|-----|----|----|-------------|---------------------------------------------------|
| 77284237   | Mt. Oldfield             | 20 |     |      | 69 | 8   | 3   |     |    | X  |             | Some recrystallisation                            |
| 4244       | Pythagoras Peak          | 35 | 65  |      | X  | X   |     |     |    | X  | Z           | ?Intrusive                                        |
| 4245       | Pythagoras Peak          | 35 |     | 63   |    |     |     | X   |    | X  |             | Mylonized gneiss; Meso part recrystallised        |
| 4246A      | Pythagoras Peak          | 30 |     | 70   |    |     |     | X   |    | X  | Z           | Altered: secondary Chl + Bi                       |
| 4254       | Fyfe Hills               | 30 | 14  |      | 40 | 7   | 7   |     |    | X  | Gt(2),Ap    | Layered; Gt rims Pyx; some recrystallisation      |
| 4255       | Fyfe Hills               | 18 |     |      | 51 | 18  | 6   | 4   | 3  |    | Ap          | Amp + Bi partly replace Pyx; minor secondary Carb |
| 4257       | Fyfe Hills               | 30 |     | 68   |    | 2   |     | X   |    | X  |             | Opx part altered; Meso much recrystallised        |
| 4259       | 7 km SSW of Mt. Renouard | 28 |     | 68   |    | 4   |     |     |    | X  | Z           | Opx slightly altered                              |
| 4282       | Mt. Elkins               | 35 |     | 64   |    | X   |     | 1   |    | X  |             | Bi replaces Opx; microcline                       |
| 4291       | Newman Ntks              | 30 |     | 68   |    | 2   |     | X   |    | X  | Z,Gt        | Myrmekite; Opx part altered to Bi + Chl           |
| 4297       | Newman Ntks              | 32 |     | 65   |    | 2   |     | 1   |    | X  | Z           | Opx part altered; some recrystallisation          |
| 4301       | Mt. Codrington           | 35 | 55  |      | 5  |     |     | 3   | 2  | X  | Z           | Altered: Hb + Bi replace Pyx; ?Intrusive          |
| 4304       | Wordie Ntk.              | 28 | 40  |      | 25 | 5   |     | 0.5 |    | 1  | Z,Ap        | ?Intrusive                                        |
| 4305       | Mt. Biscoe               | 30 |     | 65   |    | 3   |     |     |    | 2  | Ap,Ep       | Opx part altered                                  |



NAPIER COMPLEX PYROXENE-QUARTZ-FELDSPAR GNEISSES

| Sample No. | Locality               | Qz | Ksp | Meso | Pl | Opx | Cpx | Bi  | Hb | Op  | Accessories | Remarks                                          |
|------------|------------------------|----|-----|------|----|-----|-----|-----|----|-----|-------------|--------------------------------------------------|
| 77284313   | Mt. Oldfield           | 32 |     | 65   |    | 3   |     |     |    | X   | Ap,Z        |                                                  |
| 4314       | Mt. Oldfield           | 30 |     | 68   |    | 2   |     |     |    | X   |             | Opx altered                                      |
| 4323       | Mt. Brockelsby         | 30 |     |      | 65 | 3   |     |     |    | 2   | Ap,Z        |                                                  |
| 4324       | Mt. Brockelsby         | 28 | 70  |      |    | 2   |     |     |    | X   | Ap,Z        |                                                  |
| 4325       | Mt. Gordon             | 31 |     |      | 62 | 2   | 3   | 0.5 |    | 1   | Ap,Z        |                                                  |
| 4327       | Francis Peaks          | 30 |     |      | 66 | 3   |     |     |    | 1   | Ap,Z        |                                                  |
| 4328       | Francis Peaks          | 30 |     |      | 65 | 5   |     | X   |    | X   | Ap,Z        |                                                  |
| 4329       | Francis Peaks          | 32 |     |      | 60 | 3   |     |     |    | X   | Ap,Z        | Opx part altered                                 |
| 4331       | Mt. Storer             | 30 | 67  |      |    | 2   |     | X   |    |     | Z           | Opx altered; minor Chl                           |
| 4332       | Mt. Storer             | 27 |     |      | 65 | 8   |     |     |    | X   | Ap,Z        |                                                  |
| 4333       | Mt. Storer             | 17 |     |      | 63 | 15  | 4   | 0.5 |    | X   | Ap          |                                                  |
| 4335       | Mt. Letten             | 30 | 65  |      | 5  |     |     |     |    | X   | Z           |                                                  |
| 4336       | Mt. Letten             | 30 |     |      | 46 |     |     | 6   | 18 | X   | Ap,Z        | Altered: Hb + Bi replace ?Pyx;<br>recrystallised |
| 4351       | Gage Ridge             | 45 |     | 40   | 15 |     |     | X   |    | X   | Ru          | ?Metasediment                                    |
| 4352       | Gage Ridge             | 30 |     | 65   |    | 5   |     |     |    | X   | Z           |                                                  |
| 4360       | Ward Rock              | 30 |     | 65   |    | 5   |     |     |    | 0.5 | Ap,Z        |                                                  |
| 4364       | Mt. Renouard           | 25 |     | 70   |    | 5   |     |     |    | X   | Ap,Z        |                                                  |
| 4374       | Khmara Bay (SH 213)    | 29 |     |      | 65 | 6   |     |     |    | X   | Ap,Z        |                                                  |
| 4378       | Khmara Bay (SH 128)    | 33 |     | 60   |    | 7   |     |     |    | X   | Z           | ?Intrusive; part recrystallised                  |
| 4383       | 7 km N of McIntyre Is. | 27 |     |      | 58 | 12  |     | 3   |    |     | Z,Ru        | Secondary Bi                                     |
| 4384       | 7 km N of McIntyre Is. | 30 |     |      | 62 | 6   |     | 2   |    | X   | Ap,Z,Hm     | Secondary Bi                                     |

NAPIER COMPLEX PYROXENE-QUARTZ-FELDSPAR GNEISSES

| Sample No. | Locality                | Qz | Ksp | Meso | Pl | Opx | Cpx | Bi  | Hb | Op | Accessories | Remarks                                          |
|------------|-------------------------|----|-----|------|----|-----|-----|-----|----|----|-------------|--------------------------------------------------|
| 77284388   | 8 km NW of McIntyre Is. | 32 |     | 63   |    | 3   |     | 2   |    | X  | Ap,Z        | Part sheared and altered                         |
| 4390       | Newman Ntks             | 27 | 38  |      | 30 | 3   |     | 1   |    | 1  | Ap,Z        |                                                  |
| 4396       | Aker Peaks              | 32 | 40  |      | 27 | 1   |     | X   |    | X  | Z           | Opx part altered                                 |
| 4397       | Aker Peaks              | 33 |     |      | 63 | 3   |     | 0.5 |    | X  | Z           | Secondary Bi                                     |
| 4398       | Aker Peaks              | 35 |     | 57   |    | 8   |     |     |    | X  | Z           | Gt in hand specimen                              |
| 4399       | Aker Peaks              | 25 |     |      | 63 |     |     | 5   | 7  |    | Ap,Z        | Hb + Bi prob. replace Pyx, but well-crystallised |
| 4400       | Jennings Bluff          | 27 | 25  |      | 40 | 6   | 1   |     | X  | 1  | Ap,Z        |                                                  |
| 4401       | 3 km NW of Mt. Bergin   | 25 |     |      | 69 |     | 2   | 2   | 2  | X  | Ap,Z        | Bi + Chl + Amp replace Pyx                       |
| 4404       | Mt. Bergin              | 28 |     | 66   |    | 5   | 1   | X   |    | X  | Ap          | Fd includes perthite and antiperthite            |
| 4407       | Mt. Bergin              | 25 |     |      | 62 | 13  |     | X   |    |    |             |                                                  |
| 4412       | Mt. Maslen              | 10 |     |      | 76 | 6   | 4   | 1   | X  | 3  | Ap          | Secondary Bi                                     |
| 4414       | Mt. Currie              | 20 |     |      | 52 | 24  | 1   | 3   |    | X  | Ap          | Bi after Opx                                     |
| 4416       | Mt. Currie              | 20 |     |      | 56 | 24  | X   | X   |    | X  | Ap          | Secondary Bi                                     |
| 4417       | Mt. Currie              | 33 |     | 67   |    | X   |     |     |    | X  | Z, Gt       | Altered ?Opx                                     |
| 4453       | Offe Peak               | 26 |     |      | 70 | 4   |     | X   |    | X  | Ap          | Secondary Bi                                     |
| 4454       | Offe Peak               | 37 | 50  |      | 5  | 7   |     | X   |    | X  | Cd(1)       | Cd part altered                                  |
| 4455       | Offe Peak               | 30 | 37  | 30   |    |     |     | X   |    | X  | Z           | Secondary Bi + Mus + Chl + Ep(3) after ?Opx      |
| 4457       | Thorp Ridges            | 23 | 39  |      | 20 | 3   |     | 3   |    | X  | Z           | Opx part altered to Bi; myrmekite                |
| 4458       | Thorp Ridges            | 30 | 7   |      | 55 | 3   |     | 5   |    | X  | Ap,Z        | Opx part altered; secondary Bi                   |



NAPIER COMPLEX PYROXENE-QUARTZ-FELDSPAR GNEISSES

| Sample No. | Locality             | Qz | Ksp | Meso | Pl | Opx | Cpx | Bi | Hb | Op | Accessories | Remarks                                                                     |
|------------|----------------------|----|-----|------|----|-----|-----|----|----|----|-------------|-----------------------------------------------------------------------------|
| 77284466   | Mt. Alekseyev        | 27 |     |      | 68 | 5   | X   | X  |    | X  | Ap          | Opx slightly altered                                                        |
| 4467       | Mt. Alekseyev        | 35 |     |      | 53 |     |     | 5  | 7  | X  | Ap,Z        | Aligned Bi oblique to<br>compositional layering                             |
| 4468       | McNaughton Ridges    | 30 |     | 68   |    | 2   |     |    |    | X  | Sp,Z        | Opx part altered                                                            |
| 4471       | E Wyers Ice Shelf    | 30 | 69  |      |    | X   |     |    |    | 1  | Z           | Opx mostly altered; part<br>recrystallised                                  |
| 4474       | Reference Peak       | 35 |     | 53   |    | 7   |     | 5  |    | X  | Ru          | Phlogopite                                                                  |
| 4476       | Reference Peak       | 33 |     | 50   | 9  | 8   |     |    |    | X  | Ap,Z        |                                                                             |
| 4491       | Thorp Ridges         | 30 | 40  |      | 20 |     |     | 10 |    | X  | Z           | Altered; secondary Bi + Mus +<br>Ep; microcline                             |
| 4498       | McLeod Ntks          | 23 |     |      | 68 | 8   | X   |    |    | 1  | Ap,Z        |                                                                             |
| 4503       | 3 km N of Mt Denham  | 30 | 40  |      | 25 | 2   |     |    |    | 3  | Z           |                                                                             |
| 4526       | Mt. Elkins           | 18 |     |      | 62 | 19  |     | X  |    | 1  | Ap,Z        |                                                                             |
| 4527       | Wilkinson Peaks      | 35 |     |      | 50 | 15  |     | X  |    | X  | Ap          | Foliated, conformable intrusive;<br>Opx part altered                        |
| 4536       | Newman Ntks          | 31 | 65  |      |    |     |     | 4  |    | X  |             | Altered: Bi replaces ?Pyx                                                   |
| 4538       | 3 km W of Mt. Bergin | 30 |     |      | 61 |     |     | 8  | 1  | X  | Ap,Z        | Altered: Bi + Hb replace ?Pyx                                               |
| 4545       | Mt. Merrick          | 8  |     | 62   |    | 20  | 7   | 2  |    | 1  |             |                                                                             |
| 4577       | Wattle Is.           | 30 | 67  |      |    | 2   |     |    |    | 1  | Z           | Opx altered; some recrystal-<br>lization; Ksp near Meso;<br>?Napier complex |

NAPIER COMPLEX PYROXENE-QUARTZ-FELDSPAR GNEISSES

| Sample No. | Locality           | Qz | Ksp | Meso | Pl | Opx | Cpx | Bi  | Hb | Op  | Accessories | Remarks                                     |
|------------|--------------------|----|-----|------|----|-----|-----|-----|----|-----|-------------|---------------------------------------------|
| 77284580   | 10 km E of Francis |    |     |      |    |     |     |     |    |     |             |                                             |
|            | Peaks              | 30 |     |      | 66 | 4   |     |     |    | X   |             |                                             |
| 4583       | 6 km NE of Francis |    |     |      |    |     |     |     |    |     |             |                                             |
|            | Peaks              | 27 |     |      | 67 | 6   |     |     |    | X   | Ap          | Part recrystallised                         |
| 4597       | Edwards Is.        | 30 |     |      | 57 | 9   | 3   |     |    | 1   |             |                                             |
| 4610       | Mt. Humble         | 18 |     |      | 75 | 5   | 2   | X   |    | X   | Ap,Z        | Secondary Bi                                |
| 4611       | Mt. Humble         | 7  |     |      | 75 | 6   | 11  | X   |    | 1   | Ap          | Secondary Bi                                |
| 4612       | Mt. Humble         | 6  |     |      | 75 | 6   | 6   | 5   | X  | 1   | Z           | Opx altered                                 |
| 4614       | Mt. Humble         | 9  |     | 75   |    | 6   | 6   | 3   |    | 1   | Ap          |                                             |
| 4615       | Mt. Humble         | 7  |     | 78   |    | 8   | 6   | X   |    | 1   | Ap          |                                             |
| 4617       | Dick Peaks         | 31 | 12  |      | 50 | 3   | 2   | 0.5 |    | 1   | Ap,Z        |                                             |
| 4618       | Dick Peaks         | 29 |     | 70   |    | 0.5 |     | 0.5 |    | X   | Ap,Z        | Opx altered; part<br>recrystallised         |
| 4620       | Mt. Dyke           | 30 |     |      | 68 | 2   |     | X   |    | X   | Ap,Z        |                                             |
| 4622       | 3 km W of Mt. Dyke | 27 |     |      | 70 | 2   |     |     |    | 0.5 | Ap,Z        |                                             |
| 4623       | 3 km W of Mt. Dyke | 29 |     |      | 65 |     |     | 4   | 2  | X   | Ap,Z        | Hb + Bi replace Pyx; much<br>recrystallised |
| 4657       | Geoffrey Hills     | 33 |     |      | 65 | 2   |     | X   |    | X   | Z           | Opx altered                                 |
| 4658       | Geoffrey Hills     | 30 |     |      | 63 | 4   | 2   | 0.5 |    | X   | Ap,Z        |                                             |
| 4666       | Proclamation Is.   | 35 | 65  |      |    |     |     | X   |    | X   |             | Secondary Bi; 4666-76 prob.<br>intrusive    |



NAPIER COMPLEX PYROXENE-QUARTZ-FELDSPAR GNEISSES

| Sample No. | Locality                 | Qz | Ksp | Meso | Pl | Opx | Cpx | Bi  | Hb  | Op  | Accessories | Remarks                                        |
|------------|--------------------------|----|-----|------|----|-----|-----|-----|-----|-----|-------------|------------------------------------------------|
| 77284667   | Proclamation Is.         | 34 | 60  |      | 2  | 1   |     |     | 2   | 1   | Ap,Z        |                                                |
| 4668       | Proclamation Is.         | 34 | 60  |      | 3  |     |     | 3   |     | X   | Ap,Z        | Bi replaces ?Opx                               |
| 4669       | Proclamation Is.         | 35 | 60  |      | 3  | 2   | X   |     | X   | X   | Ap,Z        | Opx part altered                               |
| 4670       | Proclamation Is.         | 30 | 44  |      | 20 | 4   | X   |     | 0.5 | 1.5 | Ap,Z        |                                                |
| 4671       | Proclamation Is.         | 30 | 50  |      | 18 | 1   |     | 0.5 | 0.5 | X   | Ap,Z, ?Chev |                                                |
| 4672       | Proclamation Is.         | 30 | 46  |      | 20 | 2   | X   | X   | 1   | 1   | Ap,Z        |                                                |
| 4673       | Proclamation Is.         | 10 |     | 80   |    |     | 8   | X   | X   | 2   | Ap,Z        | Meso much recrystallised                       |
| 4674       | Proclamation Is.         | 29 | 45  |      | 20 | 2   | 2   |     |     | 2   |             |                                                |
| 4675       | Proclamation Is.         | 26 | 45  |      | 25 | 3   | X   |     | 0.5 | X   | Ap,Z        |                                                |
| 4676       | Proclamation Is.         | 35 | 55  |      | 10 |     |     |     |     | X   | Ap,Z        | Leucogneiss                                    |
| 4693       | Mt. Henry                | 25 | 10  |      | 50 | 10  | 5   | X   |     | X   | Ap,Z        |                                                |
| 4694       | Mt. Henry                | 32 |     |      | 63 | 3   | 2   |     |     | X   | Ap,Z        | Antiperthite near Meso                         |
| 4696       | Mt. Henry                | 27 |     |      | 70 | 3   |     | X   |     | X   | Ap,Z        | Antiperthite near Meso                         |
| 4700       | Gromov Ntks              | 23 |     |      | 70 | 7   |     |     |     | X   | Ap,Z        |                                                |
| 4708       | Budd Peak                | 30 |     | 67   |    | 3   |     |     |     | X   | Ap,Z        |                                                |
| 4709       | McLeod Ntks              | 10 |     |      | 60 |     |     | 6   | 24  | X   | Ap          | Hb + Bi may replace Pyx, but well crystallised |
| 4710       | McLeod Ntks              | 30 | 68  |      |    |     |     | 2   |     |     |             | Altered: Bi replaces ?Opx                      |
| 4761       | 10 km NE of Ushakov Ntks | 30 |     |      | 58 |     |     | 6   | 6   | X   | Ap,Z        | Secondary Hb + Bi                              |
| 4763       | Ushakov Ntks             | 34 |     |      | 45 | 15  | 5   |     |     | 1   | Ap,Z        | Qz-rich ?metasediment; some exsolved Cpx       |

NAPIER COMPLEX PYROXENE-QUARTZ-FELDSPAR GNEISSES

| Sample No. | Locality               | Qz | Ksp | Meso | Pl | Opx | Cpx | Bi | Hb | Op | Accessories      | Remarks                                                       |
|------------|------------------------|----|-----|------|----|-----|-----|----|----|----|------------------|---------------------------------------------------------------|
| 77284767   | Perov Ntks             | 30 |     |      | 58 | 9   |     | 3  |    | X  | Gt,Ru,Sph,?Mon,Z | Aligned Bi; Opx part altered                                  |
| 4768       | Perov Ntks             | 40 |     |      | 40 |     |     | 20 |    | X  | Z,?Mon           | Some secondary Bi                                             |
| 4776       | ?Reference Peak        | 30 | XX  | XX   | XX | 3   |     |    |    |    | Z                | Ksp + Meso + Pl(67); part<br>recrystallised; Opx part altered |
| 4787       | Geoffrey Hills         | 28 |     |      | 60 |     |     | 5  | 5  | 2  | Ap,Z             | Secondary Bi + Amp (Inc.<br>cummingtonite)                    |
| 4788       | Geoffrey Hills         | 30 |     |      | 67 | 3   |     |    |    | X  | Ap,Z             | Opx much altered; sheared and<br>recrystallised               |
| 4797       | 10 km W of Cape Dalton | 30 |     |      | 65 | 5   |     | X  |    | X  | Ap,Z             | Opx part altered                                              |
| 4798       | Cook Ntks              | 23 |     |      | 70 | 7   |     |    |    | X  | Ap,Z             | ?Napier Complex                                               |
| 4799       | Cook Ntks              | 24 |     |      | 60 | 8   |     | 4  |    | X  | Ap,Z,Hm          | Aligned Bi after Opx; ?Napier<br>Complex                      |
| 4801       | Nicholas Range         | 32 |     |      | 67 | 1   |     | X  | X  | X  | Z                | Opx part altered                                              |
| 4802       | Nicholas Range         | 30 |     |      | 68 | 2   |     | X  | X  | X  | Ap,Z             | Opx part altered                                              |
| 4803       | Head of Seaton Gl.     | 32 |     |      | 65 | 3   |     |    |    | X  | Ap,Z             |                                                               |
| 4819       | Gromov Ntks            | 30 |     |      | 63 | 6   | X   | X  | X  | 1  | Ap,Z             | Secondary Hb + Bi                                             |
| 4820       | Gromov Ntks            | 35 |     |      | 57 | 2   |     | 2  | 1  | 2  | Ap,Z             | Opx much altered; secondary Gt(1)                             |
| 4821       | Gromov Ntks            | 28 |     |      | 65 |     |     | 4  | 2  | 1  | Ap,Z             | Altered: Hb + Bi replace Opx ;<br>secondary Gt(0.5)           |
| 4823       | Gromov Ntks            | 25 |     |      | 68 | 4   | 2   | X  | X  | 1  | Ap,Z             | Secondary Hb + Bi                                             |
| 4826       | 1 km W of Mt. Pardoe   | 10 |     |      | 75 | 10  | 4   |    |    | 1  | Ap,Z             | Part recrystallised                                           |



NAPIER COMPLEX PYROXENE-QUARTZ-FELDSPAR GNEISSES

| Sample No. | Locality                      | Qz | Ksp | Meso | Pl | Opx | Cpx | Bl | Hb  | Op | Accessories | Remarks                                                                      |
|------------|-------------------------------|----|-----|------|----|-----|-----|----|-----|----|-------------|------------------------------------------------------------------------------|
| 77284830   | Priestley Peak                | 7  |     |      | 68 | 13  | 13  | X  | 0.5 | X  | Ap          | Layered                                                                      |
| 4838       | 3 km N of<br>Hydrographer Is. | 25 |     |      | 68 | 6   |     | 1  |     | X  | Ap,Z        | Part recrystallised                                                          |
| 4839       | 3 km N of<br>Hydrographer Is. | 35 |     | 65   |    |     |     |    |     |    | Z           | Leucogneiss; ?Intrusive;<br>recrystallised                                   |
| 4843       | 1 km SW of McIntyre Is.       | 25 |     | 64   |    | 8   | 0.5 | 2  |     | X  | Ap,Z        |                                                                              |
| 4848       | Fyfe Hills                    | 30 |     | 61   |    | 6   |     |    |     | X  | Ap,Z        | Strongly recrystallised                                                      |
| 4857       | Miller Ntks                   | 33 | 43  |      | 22 | 2   |     | X  |     | X  | Ap,Z        | Opx part altered                                                             |
| 4858       | 13 km ENE of Wallis Ntks      | 37 |     |      | 61 | 1   |     | X  |     | X  | Ap,Z        | Secondary Bl;                                                                |
| 78285001   | Wheeler Rocks                 | 16 | 30  |      | 36 | 8   | 3   |    | 5   | 2  | Ap,Z        | Minor secondary Gt; ?intrusive                                               |
| 5003B      | Mt. Tod                       | 33 | XX  | XX   | XX | 2   |     |    |     | X  | Ap          | Recrystallised; Meso porphyro-<br>clasts + Ksp + Pl(65);<br>Opx part altered |
| 5004       | Grimsley Peaks                | 35 | 40  |      | 22 | 3   |     |    |     | X  | Z           | Opx part altered; Feld part<br>recrystallised                                |
| 5005       | SH 945                        | 27 |     | 70   |    | 3   |     |    |     | X  | Z           | Opx part altered                                                             |
| 5007       | Mt. Sones                     | 30 |     |      | 63 | 7   |     |    |     | X  | Ap,Z        |                                                                              |
| 5013       | Gage Ridge                    | 35 |     | 64   |    | 0.5 |     |    |     |    | Z           | Opx part altered                                                             |
| 5015       | Ward Rock                     | 21 |     |      | 60 | 12  | 4   |    |     | 3  | Ap,Z        |                                                                              |
| 5025       | Mt. Maslen                    | 28 |     |      | 67 | 4   |     |    |     | 1  | Ap,Z        |                                                                              |
| 5031       | McNaughton Ridges             | 25 |     |      | 70 | 5   |     |    |     | X  | Ap,Z        |                                                                              |

NAPIER COMPLEX PYROXENE-QUARTZ-FELDSPAR GNEISSES

| Sample no. | Locality       | Qz | Ksp | Meso | Pl | Opx | Cpx | Bi | Hb | Op | Accessories | Remarks                                        |
|------------|----------------|----|-----|------|----|-----|-----|----|----|----|-------------|------------------------------------------------|
| 80285040E  | Fyfe Hills     | 35 | 60  |      | 5  | X   |     |    |    |    | Z           | Leucogneiss                                    |
| 5040K      | Fyfe Hills     | 28 | 53  |      | 13 | 6   |     | X  |    | X  | Ap,Z        | Layered; Opx part altered                      |
| 5046B      | Cape Batterbee | 33 |     | 63   |    | 1   |     | 2  |    | 1  | Ap,Z        | Opx altered; secondary Bi; part recrystallised |



## NAPIER COMPLEX MAFIC ROCKS

| Sample No. | Locality                | Qz | Pl | Cpx | Opx | Hb | Bi | Op | Accessories    | Remarks                                          |
|------------|-------------------------|----|----|-----|-----|----|----|----|----------------|--------------------------------------------------|
| 4579       | Adams Fjord             |    | 70 | X   | 28  |    |    | 2  | Ap, Ksp        |                                                  |
| 4584       | McLeod Ntks             |    | 64 | 18  | 15  | X  | 3  | X  | Ap             |                                                  |
| 65280189   | W. Rippon Gl            |    | 20 |     | 7   | 68 | 5  |    |                | An 38                                            |
| 191        | 1 km E of Mt. Storegutt | 5  | 60 |     | 20  |    | 15 | X  | Ap             | An 65-70                                         |
| 75830022   | Aker Peaks              |    | 56 | 20  | 23  | X  | X  | 1  | Ap             | An 54                                            |
| 23         | Aker Peaks              |    | 50 | 17  | 32  |    |    | 1  | Ap             | Layered                                          |
| 24         | Aker Peaks              |    | 60 | 15  | 15  | 6  | 3  | 1  | Ap             | Some secondary Hb                                |
| 33         | Newman Ntks             |    | 15 | X   | 30  |    | 50 |    | Ksp            | An 52                                            |
| 34         | Newman Ntks             | 9  | 58 | 15  | 15  |    | X  | 3  | Ap,Z           | Secondary Amp; An 44; layered                    |
| 41         | Newman Ntks             | 5  | 60 | 13  | 20  |    |    | 2  | Ap,Z           | Layered; Pyx part altered to Amp;<br>Qz-Pl layer |
| 43         | Newman Ntks             |    | 60 | 24  | 15  | X  | X  | 1  | Ap             | Slight alteration of Pyx; An 64                  |
| 44         | Newman Ntks             |    | 57 | 18  | 18  | 4  |    | 3  | Ap             | Primary and secondary Hb; An 58                  |
| 45         | Newman Ntks             |    | 75 |     | 10  |    | 15 |    | ?Ru            | Enstatite + phlogopite; An 58                    |
| 209        | Mt. Mueller             |    | 51 | 20  | 25  | 1  | 3  | X  | Ap             | An 60-70                                         |
| 214        | Mt. Mueller             | 4  | 56 | 20  | 20  |    |    | X  | Ap             | An 50                                            |
| 215        | Mt. Mueller             |    | 52 |     | 30  |    | 15 | X  | Ksp(3), Ap, ?Z | An 60                                            |
| 217        | Mt. Mueller             |    | 15 | 20  | 40  | 20 | 5  | X  |                | An 70-90                                         |
| 223        | Mt. Mueller             |    | 40 |     | 50  |    | 10 | X  |                | An 45                                            |
| 233        | Mt. Breckinridge        |    | 63 | 20  | 5   | 10 | X  | 2  | Ap             |                                                  |
| 76283003   | Mt. King                |    | 40 | X   |     | 59 | X  | 1  |                | Altered: Amp + Bi replace Pyx                    |

NAPIER COMPLEX MAFIC ROCKS

| Sample No. | Locality                 | Qz | Pl | Cpx | Opx | Hb | Bi | Op | Accessories | Remarks                                                                           |
|------------|--------------------------|----|----|-----|-----|----|----|----|-------------|-----------------------------------------------------------------------------------|
| 76283008   | Seavers Ridge            |    | 50 | 13  | 36  |    | X  | X  | Ksp(1)      | An 50                                                                             |
| 3019       | 1 km NE of Seavers Ridge |    | 60 | 18  | 18  | 1  | 1  | 2  | Ap          | Secondary Amp + Bi; Ksp(10) in antiperthite                                       |
| 3024       | Mt. Douglas              |    | 50 | 15  | 20  |    | 14 | 1  | Ap, Ksp     |                                                                                   |
| 3028       | Mt. Douglas              | 10 | 53 |     | 35  |    | 2  | X  | Ap          |                                                                                   |
| 3060       | Mt. Pardoe               |    | 60 | 15  | 20  | 4  |    | 1  | Ap          | Minor secondary Gt                                                                |
| 3061       | Mt. Pardoe               |    | 50 | 19  |     | 6  | X  | 1  | Ap          | Gt(4) rims Op, Pyx, Hb                                                            |
| 3062       | Mt. Pardoe               |    | 41 | 2   | 25  | 14 | 5  | 1  | Ap          | Altered: Amp + Bi replace Pyx; Gt(12) rims Op, Hb, Pyx; recrystallised            |
| 3076       | Mt. Codrington           |    | 60 | 13  | 16  | 6  | 4  | 1  | Ap, Ksp     | Pyx part altered; Hb + Bi mostly primary                                          |
| 3106       | Rippon Depot             |    | 20 |     | 60  | 20 | X  | X  |             | Xenolith                                                                          |
| 3108       | Rippon Depot             |    | 17 |     | 40  | 40 | 3  | X  |             |                                                                                   |
| 3110       | Rippon Depot             | 10 | 30 | 10  | 30  | 10 | 10 | X  | Z           | Layered                                                                           |
| 3111       | Rippon Depot             |    | 50 | 22  | 26  | X  | 1  | 1  |             |                                                                                   |
| 3126       | Fyfe Hills               | X  | 20 | 10  | 6   | 56 | X  | 1  |             | Altered: green to colourless Amp replaces Pyx; Gt(7) rims Hb, Pyx; recrystallised |
| 3147       | Fyfe Hills               |    | 55 | 19  | 25  |    | 1  | X  | Gt          |                                                                                   |
| 3151       | Sheelagh Is              |    | 56 | 20  | 20  | 2  | X  | 2  |             | ?Napier Complex; ?metamorphosed dyke                                              |



NAPIER COMPLEX MAFIC ROCKS

| Sample No. | Locality                 | Qz | Pl | Cpx | Opx | Hb | Bl | Op | Accessories  | Remarks                                                                      |
|------------|--------------------------|----|----|-----|-----|----|----|----|--------------|------------------------------------------------------------------------------|
| 76283157   | Latham Peak              |    | 35 |     |     | 53 |    | 2  | Z            | Altered: pale Amp + Chl(10) replace<br>Pyx; Pl sericitized and saussuritized |
| 3159       | Latham Peak              |    | 16 | 20  | 56  | 8  | X  |    |              | Poikiloblastic Opx                                                           |
| 3160       | Latham Peak              |    | 40 |     | 35  |    | 24 |    | Ap, Z, Sp(1) | Slight recrystallisation; foliated                                           |
| 3173       | Latham Peak              | X  | 55 | 20  | 23  |    |    | 2  | Ap           |                                                                              |
| 3196A      | McLeod Ntks              |    | 50 | 25  | 25  |    | X  | X  |              |                                                                              |
| 3205       | Mt. Ryder                | 3  | 48 | 7   | 28  |    |    | 1  |              | Ksp(13) in antiperthite                                                      |
| 3206       | Mt. Ryder                | 1  | 54 | 13  | 30  |    |    | 1  | Ksp(1)       |                                                                              |
| 3214       | Mt. Denham               | 5  | 54 | 15  | 25  |    |    | 1  |              | Layered                                                                      |
| 3224       | Mt. Smethurst            |    | 60 | 10  | 29  |    | X  | 1  | Ap, Ksp      |                                                                              |
| 3239       | 3 km SSW of Mt. Torckler |    | 60 | 22  | 18  |    | X  |    |              |                                                                              |
| 3252       | Mt. Cordwell             | X  | 40 | 8   | 50  |    | 1  | 1  | Ap, Z        | Mafic part of layered gneiss; part<br>recrystallised                         |
| 3260       | SH 945                   |    | 35 | 25  | 40  |    |    |    | Ru           |                                                                              |
| 3261       | SH 945                   |    | 35 | 38  | 23  | 2  | 1  | 1  |              |                                                                              |
| 3275       | Mt. Jewell               |    | 58 | 20  | 21  |    |    | 1  |              |                                                                              |
| 3279       | Mt. Jewell               | 3  | 48 |     | 48  |    |    | 1  | Ap, ?Ru      |                                                                              |
| 3281       | Mt. Jewell               |    | 8  | 60  | 30  |    | 1  | 1  |              | ?Metamorphosed dyke                                                          |
| 77283422   | Mt. Riiser-Larsen        |    | 50 | 4   |     | 43 | 1  | 2  |              | Altered: Amp replaces Pyx; some<br>primary Hb                                |

NAPIER COMPLEX MAFIC ROCKS

| Sample No. | Locality               | Qz | Pl | Cpx | Opx | Hb | Bi | Op | Accessories | Remarks                                                   |
|------------|------------------------|----|----|-----|-----|----|----|----|-------------|-----------------------------------------------------------|
| 77283425   | Mt. Riiser-Larsen      |    | 51 | 12  | 33  |    | 2  |    |             |                                                           |
| 3427       | Mt. Riiser-Larsen      | 8  | 33 |     |     | 56 | 3  | X  | Ap          | Altered: Amp + Bi replace Pyx;<br>layered; recrystallised |
| 3436       | Peacock Ridge          |    | 48 | 22  | 30  |    |    | X  | Ap          | Two parts of layered gneiss                               |
| 3436       | Peacock Ridge          |    | 80 | 10  | 10  |    |    | X  | Ap          |                                                           |
| 3438       | Peacock Ridge          |    | 55 | 22  | 22  |    | X  | 1  | Ap          |                                                           |
| 3454       | 4 km SE of Mt. Selwood | 9  | 50 | 25  | 15  |    |    | 1  | Ap          | Layered                                                   |
| 3455       | 4 km SE of Mt. Selwood |    | 60 | 7   |     | 43 |    | X  |             | Altered: Amp + Ep replace Pyx;<br>primary Hb(10)          |
| 3456       | 4 km SE of Mt. Selwood | 5  | 50 |     | 45  |    | X  |    |             |                                                           |
| 3458       | 4 km SE of Mt. Selwood |    | 50 | 10  | 40  |    | X  |    |             |                                                           |
| 3462       | 6 km E of Mt. Selwood  |    | 50 | 25  | 25  |    |    | X  | Ap          |                                                           |
| 3467       | Mt. Sones              |    | 40 | 27  | 32  |    |    | 1  |             |                                                           |
| 3501       | Mt. Tomlinson          |    | 15 | 25  | 35  | 25 | X  |    |             |                                                           |
| 3515       | Mt. Mateer             |    | 70 | 18  | 12  |    |    |    |             | Scree                                                     |
| 3517       | Mt. Bartlett           |    | 68 | 15  | 15  |    |    | 2  |             |                                                           |
| 3522       | Mt. Bartlett           | 5  | 25 |     | 65  |    | 5  |    | Ksp         | Layered                                                   |
| 3529       | SH 945                 | 3  | 60 | 4   | 33  |    |    |    |             |                                                           |
| 3534       | 4 km SE of Mt. Selwood |    | 45 | 5   | 43  |    | 7  |    |             |                                                           |
| 3535       | 4 km SE of Mt. Selwood |    | 20 | 5   | 65  |    | 10 |    |             |                                                           |
| 3541       | 6 km E of Mt. Selwood  | 2  | 55 | 20  | 23  |    |    | X  | Ap          |                                                           |
| 3592       | Mt. Tod                |    | 60 | 20  | 15  | 2  | X  | 3  |             | Scree; recrystallised                                     |



NAPIER COMPLEX MAFIC ROCKS

| Sample No. | Locality           | Qz | Pl | Cpx | Opx | Hb | Bi | Op | Accessories | Remarks                                                        |
|------------|--------------------|----|----|-----|-----|----|----|----|-------------|----------------------------------------------------------------|
| 77283593   | Mt. Tod            |    | 60 | 20  | 20  |    |    | X  |             | Part recrystallised                                            |
| 3596       | Crohn Is.          |    | 56 | 17  | 22  | 3  |    | X  | Z           |                                                                |
| 3599       | Crohn Is.          |    | 60 | 20  | 17  | 3  |    |    |             |                                                                |
| 3616       | Harvey Ntks        | X  | 60 | 14  | 25  |    |    | 1  |             | Some Cpx exsolution lamellae                                   |
| 3625       | Harvey Ntks        |    | 60 | 15  | 25  |    |    | X  |             |                                                                |
| 3645       | Mt. Reed           |    | 80 | 8   | 12  | X  |    |    |             | Leucogabbro                                                    |
| 3636       | Mt. Reed           | 10 | 60 | 20  | 10  |    |    |    |             | Qz in felsic layer                                             |
| 3680       | Mt. Tod            |    | 55 | 20  | 25  |    | X  | X  |             | Part recrystallised                                            |
| 3691       | Beaver Is          | 5  | 50 | X   | 45  |    | X  | X  | Ru          | ?Metasediment                                                  |
| 3692       | Bunt Is.           |    | 88 |     | 12  |    | X  |    |             | Leuconorite; locally discordant                                |
| 3693       | Bunt Is.           |    | 65 |     | 30  |    | 5  | X  | ?All,Z      | Metasediment; All partly metamict (pos. Ru also); Bi secondary |
| 3700       | NW Wyers Ice Shelf | X  | 55 | 17  | 25  | X  | X  | 3  | Ap,Z        | Secondary Amp + Bi                                             |
| 3709       | Howard Hills       | X  | 55 | X   | 43  | 2  | X  | X  |             | Slight recrystallisation; secondary Amp                        |
| 3711       | Howard Hills       |    | 50 |     | 50  |    | X  | X  | Ap          | ?Metamorphosed dyke; Opx + Qz + Pl layer adjacent              |
| 3715       | Observation Is.    | 8  | 40 |     |     | 22 | 30 |    | Ap,Z        | Altered: Amp + Bi replace Pyx; abundant Ap                     |
| 3717       | Mt. Gleadell       | 3  | 60 | 18  | 18  |    |    | 1  | Ap          |                                                                |
| 3742       | Mt. Hollingsworth  |    | 40 | 13  | 30  | 16 |    | 1  | Ap          | Minor secondary Gt; ?dyke; layered                             |

NAPIER COMPLEX MAFIC ROCKS

| Sample No. | Locality                 | Qz | Pl | Cpx | Opx | Hb | Bi | Op  | Accessories | Remarks                       |
|------------|--------------------------|----|----|-----|-----|----|----|-----|-------------|-------------------------------|
| 77283744   | Mt. Hollingsworth        |    | 60 | 18  | 20  |    |    | 2   | Ap          | Some recrystallisation        |
| 3765       | Debenham Peak            |    | 57 | 15  | 3   | 22 | X  | 3   | Ap          | Part recrystallised           |
| 3773       | NW Wyers Ice Shelf       |    | 99 |     |     |    | 1  | X   |             | Anorthosite                   |
| 3774       | NW Wyers Ice Shelf       |    | 48 | 1   | 40  |    | 2  | 2   |             | Gt(7); Bi + some Gt secondary |
| 3861       | Dingle Dome              |    | 12 | 53  | 25  |    | X  | X   | Ksp         | Ksp in antiperthite           |
| 3908       | Gromov Ntks              |    | 13 | 33  | 50  | 2  | 2  | X   | Ru          | Secondary Hb + Bi             |
| 3909       | Gromov Ntks              |    | 30 | 7   | 7   | 54 | X  | 2   | Ap          | Altered: Amp replaces Pyx     |
| 3915       | Tonagh Is.               |    | 5  | 30  | 19  |    | 1  | X   | Ap          | Secondary Bi                  |
| 3921       | Tonagh Is.               |    | 53 | 10  | 35  |    | X  | 1   | Ap          |                               |
| 3922       | Tonagh Is.               | 2  | 50 |     | 30  |    |    | 2   |             | Gt(16) rims Opx               |
| 3925       | Tonagh Is.               |    | 15 | 25  | 40  | 15 | 3  | 1   |             | Part recrystallised           |
| 3938       | Mt. Pardoe               | 4  | 40 | 13  |     | 40 |    |     | Ep(2), Sph  | Adjacent to pegmatite         |
| 3945       | Mt. Pardoe               | 3  | 13 | 40  | 43  |    |    | X   | Sph(1)      |                               |
| 3957A      | 1 km E of Priestley Peak |    | 50 | 15  | 23  |    |    | 2   | Ap          |                               |
| 3958       | Priestley Peak           |    | 40 | 33  | 25  |    |    | 2   | Ap          |                               |
| 3966       | 5 km E of Mt. Charles    |    | 55 | 20  | 20  |    | 4  | 1   | Ap          | ?Secondary Bi                 |
| 3975       | Mt. Bennett              |    | 60 | 13  | 25  |    |    | 2   |             |                               |
| 3976       | Mt. Bennett              |    | 55 | 21  | 21  | 2  |    | 1   |             |                               |
| 3982       | Mt. Bennett              |    | 55 | 22  | 22  |    | X  | 0.5 | Ap          |                               |
| 3987       | Grimsley Peaks           |    | 59 | 20  | 20  | X  | X  | 1   |             | Pyx slightly altered          |



NAPIER COMPLEX MAFIC ROCKS

| Sample No. | Locality                 | Qz | Pl | Cpx | Opx | Hb | Bl | Op | Accessories | Remarks                                            |
|------------|--------------------------|----|----|-----|-----|----|----|----|-------------|----------------------------------------------------|
| 77283990   | Grimsley Peaks           | X  | 50 | X   |     | 49 | X  | 1  | Ap          | Prob. altered, recrystallised mafic granulite      |
| 4008       | Beaver Is.               | 3  | 52 | 10  | 35  |    |    | X  |             |                                                    |
| 4012       | Bowl Is.                 |    | 40 | 30  | 30  |    |    | X  |             |                                                    |
| 4050       | 10 km SW of Mt. Elkins   | X  | 67 | 5   | 20  |    | 8  | X  |             |                                                    |
| 4051       | 10 km SW of Mt. Elkins   |    | 50 | 24  | 24  |    |    | 2  |             | Pyx slightly altered                               |
| 4053B      | Young Ntks               |    | 64 | 15  | 20  |    |    | 1  |             |                                                    |
| 4058       | 10 km W of Young Ntks    |    | 70 |     | 20  |    | 6  | 1  | Ksp(3)      |                                                    |
| 4066       | 3 km W of McDonald Ridge |    | 45 | 20  | 35  |    |    | X  |             |                                                    |
| 4067       | Mt. Marr                 | 1  | 60 | 10  | 27  | X  |    | 2  |             | Slightly altered                                   |
| 4072       | 5 km NE of Mt. Giddings  | 6  | 56 | 15  | 15  |    |    | 3  |             | Gt(5) rims Pyx; part recrystallised                |
| 4073       | 8 km E of Mt. Giddings   | X  | 55 | 20  | 20  | X  |    | 2  |             | Gt(3) rims Pyx; recrystallised                     |
| 4084       | Mt. Miller               |    | 58 |     | 40  |    | 2  | X  |             |                                                    |
| 4091A      | NW Wyers Ice Shelf       | 2  | 58 | 19  | 19  |    | X  | 2  | Ap          |                                                    |
| 4091B      | NW Wyers Ice Shelf       |    | 15 | 25  | 60  |    |    |    |             |                                                    |
| 4097       | E of Mt. Stadler         | 12 | 40 | 15  | 30  |    |    | 3  |             |                                                    |
| 4115       | Mt. Arthur               |    | 15 | 25  | 55  | 1  | 4  | X  |             |                                                    |
| 4116       | Mt. Arthur               | 4  | 50 | 10  | 29  | X  | 6  | 1  | Ap          | Cpx + Opx + Qz + Pl gneiss layer; slightly sheared |
| 4117       | Mt. George               | X  | 80 | X   | 19  |    |    | 1  | Ap,Z        | Leuconorite                                        |
| 4119       | Simpson Peak             | 5  | 60 | 17  | 17  |    |    | 1  | Ap          |                                                    |

NAPIER COMPLEX MAFIC ROCKS

| Sample No. | Locality                | Qz | Pl | Cpx | Opx | Hb | Bi | Op | Accessories | Remarks                                 |
|------------|-------------------------|----|----|-----|-----|----|----|----|-------------|-----------------------------------------|
| 77284121   | Simpson Peak            | 60 |    | 20  | 16  | 4  | X  | X  | Ap          |                                         |
| 4122       | Simpson Peak            | 3  | 13 | 13  | 10  | 1  | 10 | X  | Ap          | Aligned Bi; Ksp(50); ?metasediment      |
| 4135       | Brusilov Ntks           |    | 16 | 30  | 50  |    | 2  | 2  |             |                                         |
| 4140       | Demidov Is.             | 3  | 35 | 43  | 12  |    |    | 2  | Ap          | Secondary Gt(15)                        |
| 4141       | Demidov Is.             |    | 56 | 30  | 4   | 3  | X  | 1  | Ap          | Secondary Gt(5); primary + secondary Hb |
| 4143       | Demidov Is.             |    | 53 | 20  | 20  | 7  |    | X  | Ap          | Mostly secondary Hb                     |
| 4144       | Demidov Is.             | 5  | 40 |     |     | 53 | X  | X  | Sph(2), Ap  | Amphibolite; adjacent to pegmatite dyke |
| 4154       | Bird Ridge              |    | XX | XX  | XX  | XX |    |    |             |                                         |
| 4182       | Fyfe Hills              |    | XX | XX  |     | XX | X  |    | Carb        | Sheared ?dyke                           |
| 4208       | Young Ntks              |    | 30 | 5   | 45  |    | 15 | X  | Ap          |                                         |
| 4217       | Mt. Codrington          |    | 55 | 17  | 16  | 10 |    | 2  |             |                                         |
| 4218       | McDonald Ridge          |    | 50 | 8   | 32  | 10 |    | X  |             |                                         |
| 4223       | Johnston Peak           |    | 60 | 17  | 17  | 3  |    | 3  |             | Andesine; Cpx exsolution lamellae       |
| 4228       | Mt. Marr                | 7  | 53 | 5   | 34  | X  | X  | 1  |             |                                         |
| 4238       | Mt. Giddings            | X  | XX | XX  | XX  |    | X  | X  |             | Strongly deformed                       |
| 4240       | 6 km NE of Mt. Giddings |    | 53 | 20  | 8   |    |    | 2  |             | Well crystallised Gt(17)                |
| 4241       | 6 km NE of Mt. Giddings |    | 52 | 25  | 15  |    |    | 2  |             | Gt(6) rims Pyx                          |
| 4243       | Pythagoras Peak         | 5  | 55 | 20  | 19  |    |    | 1  | Ap          |                                         |
| 4248       | Mt. Dungey              | X  |    | 35  | 35  |    |    | X  |             | Meso (30); K-rich                       |
| 4256       | Fyfe Hills              |    | 60 | 20  | 15  | 5  |    | X  |             | Hb partly rims Pyx                      |
| 4272       | McIntyre Is.            |    | XX | XX  | XX  |    | X  | X  |             | Mylonised granulite; secondary Gt       |



NAPIER COMPLEX MAFIC ROCKS

| Sample No. | Locality                    | Qz | Pl | Cpx | Opx | Hb | Bi  | Op  | Accessories | Remarks                                                       |
|------------|-----------------------------|----|----|-----|-----|----|-----|-----|-------------|---------------------------------------------------------------|
| 77284276   | Hydrographer Is.            | 4  | 56 | 6   | 8   | 17 | 5   | 1   | Ap          | Altered; secondary Hb + Bi; Gt(3) rims Pyx                    |
| 4277       | Hydrographer Is.            |    | 65 | X   | 34  | 1  | X   | X   | Ap          | Hb + Bi secondary; some recrystallisation                     |
| 4278       | Hydrographer Is.            | 2  | 55 | 15  | 5   | 4  | 3   | 2   |             | Gt(14), Bi, and some Hb secondary; sheared and recrystallised |
| 4279       | 8 km SW of Hydrographer Is. | 8  | 52 | 15  | 4   | X  | 2   | 3   |             | Secondary Gt (14), Hb, Bi                                     |
| 4285       | Wilkinson Peaks             | 4  | 68 |     | 25  |    | 3   | X   | Ap          | Xenolith; Opx part altered to Bi; some primary Bi; andesine   |
| 4288       | Newman Ntks                 | 8  | 55 | 17  | 20  |    |     | X   | Ap          | Andesine                                                      |
| 4299       | 3 km NW of Mt. Bergin       | 1  | 55 | 1   | 10  | 30 | 2   | 1   | Ap          | Altered; Hb largely replaces Pyx; some primary Hb             |
| 4308       | Mt. Biscoe                  | 2  | 60 | 15  | 15  | 8  | X   | X   | Ap          | Metagabbro                                                    |
| 4309       | Mt. Biscoe                  |    | 62 | 12  | 12  | 12 |     | 2   | Ap          | Metagabbro                                                    |
| 4316       | Mt. Oldfield                |    | 64 | 18  | 18  |    | X   |     |             |                                                               |
| 4326       | Mt. Gordon                  | 3  | 35 | 15  | 15  | 30 | X   | 2   | Ap          | Layered                                                       |
| 4330       | 8 km W of Mt. Brockelsby    |    | 58 | 15  | 25  |    |     | 1.5 | Ap(0.5)     |                                                               |
| 4334       | Mt. Storer                  |    | 60 | 18  | 20  |    |     | 2   | Ap          |                                                               |
| 4345       | Gage Ridge                  | 4  | 45 | 20  | 30  |    | 0.5 | X   | Ap, Ru      | Layered                                                       |
| 4365       | 7 km SSW of Mt. Renouard    | 2  | 67 | 15  | 15  |    |     | 1   | Ap, ?Z, Ksp |                                                               |
| 4375       | Khmara Bay (SH 213)         |    | 57 | 20  | 20  | 3  |     | X   | Ap          | Hb rims Pyx; part recrystallised                              |
| 4381       | 4 km N of Fyfe Hills        |    | 59 | 20  | 20  | 1  |     | X   | Ap          | Hb rims Pyx; part recrystallised                              |

NAPIER COMPLEX MAFIC ROCKS

| Sample No. | Locality                    | Qz | Pl | Cpx | Opx | Hb | Bi | Op | Accessories | Remarks                                                                 |
|------------|-----------------------------|----|----|-----|-----|----|----|----|-------------|-------------------------------------------------------------------------|
| 77284382   | 4 km N of Fyfe Hills        |    | 30 | 7   | 2   | 9  |    | 2  | Ap          | Gt(50) ls primary; part recrystallised                                  |
| 4385       | 6 km N of McIntyre Is.      | 5  | 63 | 10  | 20  | X  | X  | 2  | Ap          | Layered; secondary Bi + Amp; slightly recrystallised                    |
| 4405       | Mt. Bergin                  |    | 55 | 4   | 17  | 20 | X  | 4  |             |                                                                         |
| 4406       | Mt. Bergin                  |    | 66 | 13  |     | 20 | X  | 1  |             | Brown and green primary Hb                                              |
| 4408       | Mt. Maslen                  | X  | XX |     |     | XX | X  | X  | Carb        | Sheared and recrystallised                                              |
| 4410       | Mt. Maslen                  | 5  | 10 | X   |     | 28 | 12 | X  | Ap          | Ksp(45); retrograde; K-rich; Hb + Bi replace Pyx                        |
| 4411       | Mt. Maslen                  |    | 40 | 4   | 24  | 30 | X  | 2  |             | Minor secondary Hb                                                      |
| 4413       | Mt. Maslen                  | 4  | 56 | 22  | 17  | X  | 1  | X  | Ap          | Layered; secondary Bi + Hb                                              |
| 4420       | Mt. Merrick                 | 5  | 15 | 10  | 35  | 35 | X  | X  | Carb        | Carb + Bi secondary                                                     |
| 4421       | Mt. Merrick                 | 3  | 55 | 20  | 21  | 1  | X  | X  |             | Secondary Amp in alteration zone                                        |
| 4449       | 13 km SW of Armstrong Peak  |    | 58 | 34  |     | X  |    | 8  | Ap          | Hb secondary; minor ?scapolite; probably calc-silicate gneiss           |
| 4450       | 13 km SW of Armstrong Peak  |    | 64 | 26  |     |    | 10 | X  |             | Aligned Bi after Cpx; ?calc-silicate                                    |
| 4452       | Offe Peak                   |    | 60 | 18  | 17  | X  | X  | 5  | Ap          |                                                                         |
| 4470       | E Wyers Ice Shelf           |    | 70 | 4   | 20  |    | 6  |    |             |                                                                         |
| 4475       | Reference Peak              |    | 40 | 30  | 25  |    | 2  | 3  | Ap          | Secondary Gt(1) rims Pyx + Bi                                           |
| 4481       | 10 km E of Demidov Is       | 5  | 60 | 6   | X   | 25 | 1  | X  | Gt(3), Ap   | Altered; Amp + Bi replace Pyx; some primary Hb; relict Gt porphyroblast |
| 4485       | 4 km SW of Hydrographer Is. |    | 12 | 31  | 28  | 18 |    | 3  | Ap          | Secondary Gt(8) rims Pyx, Gt, Op; zoned Pl                              |



NAPIER COMPLEX MAFIC ROCKS

| Sample No. | Locality                    | Qz | Pl | Cpx | Opx | Hb | Bi | Op | Accessories | Remarks                                            |
|------------|-----------------------------|----|----|-----|-----|----|----|----|-------------|----------------------------------------------------|
| 77284510A  | Fyfe Hills                  | 4  | 70 | 4   | 8   |    |    | 4  | Ap          | Gt(10) rims Pyx                                    |
| 4510B      | Fyfe Hills                  |    | 50 | 20  | 14  |    |    | 3  |             | Gt(13) forms rims and large grains                 |
| 4519       | McIntyre Is.                | 2  | 35 |     | 40  |    | 23 |    | Ru          | Layered                                            |
| 4521       | Hydrographer Is.            |    | 25 | 40  | 34  | X  | X  | 1  |             | Secondary Amp + Bi                                 |
| 4523       | Hydrographer Is.            | 1  | 60 | 10  | 20  | X  | X  | 3  |             | Secondary Amp + Bi, and Gt(6); part recrystallised |
| 4525       | 5 km SW of Hydrographer Is. |    | 59 | 20  | 18  |    | 2  | 1  |             | Secondary Bi                                       |
| 4530       | Newman Ntks                 |    | 50 | 10  | 30  | 10 |    | X  |             |                                                    |
| 4537       | 3 km W of Mt. Bergin        |    | 60 | 15  | X   | 24 | X  | 1  | Ap          | Altered: Amp replace Pyx                           |
| 4539       | 3 km W of Mt. Bergin        |    | 60 | 15  | 15  | 8  | 2  | X  |             |                                                    |
| 4540       | 3 km W of Mt. Bergin        | 3  | 56 |     |     | 20 | 20 | X  | Sph(1)      | Altered, recrystallised                            |
| 4544       | Mt. Currie                  | X  | XX | XX  | X   | XX |    | X  |             | Secondary Gt(XX)                                   |
| 4571       | Geoffrey Hills              | 4  | 60 | 17  | 17  |    |    | 2  |             |                                                    |
| 4581       | 10 km E of Francis Peaks    |    | 60 | 17  | 17  | 1  |    | 5  |             |                                                    |
| 4582       | 6 km NE of Francis Peaks    | 2  | 63 | 20  | 14  |    |    | 1  |             |                                                    |
| 4586       | McNaughton Ridges           | 4  | 66 |     | 30  |    | X  |    |             |                                                    |
| 4595       | Burkett Is.                 |    | 6  | 18  | 18  |    | 2  | 2  | Ap          | Perthite (54); secondary Bi                        |
| 4600       | 10 km E of Demidov Is.      | 10 | 50 | 16  | 5   | 5  | X  | 2  |             | Secondary Gt (12)                                  |
| 4621       | Mt. Dyke                    |    | 60 | 13  | 13  | 12 |    | 2  |             |                                                    |
| 4628       | Mt. Hardy                   |    | 94 | 2   | 2   |    |    | 2  |             | Anorthosite                                        |
| 4629       | Mt. Hardy                   |    | 75 | 12  | 12  |    |    | 1  | Ap          | Leucogabbro                                        |
| 4697       | Mt. Henry                   |    | 60 | 20  | 20  |    | X  | X  |             |                                                    |

NAPIER COMPLEX MAFIC ROCKS

| Sample No. | Locality                   | Qz | Pl | Cpx | Opx | Hb | Bi | Op | Accessories | Remarks                                             |
|------------|----------------------------|----|----|-----|-----|----|----|----|-------------|-----------------------------------------------------|
| 77284704   | W of Hydrographer Is.      |    | 56 | 20  | 17  | X  | X  | X  |             | Secondary Gt(7)                                     |
| 4705       | SW of McIntyre Is.         | X  | XX |     |     | XX | XX |    |             | Gt (XX); recrystallised                             |
| 4753       | Kirkby Head                |    | 50 | 20  | 16  | 7  |    | 1  |             | Sheared ?dyke; secondary Gt(6)                      |
| 4759       | N end of Rayner Gl.        |    | 53 | 20  | 20  | 7  |    | X  |             | Primary + secondary Hb                              |
| 4762       | 10 km NE of Ushakov Ntks   |    | 60 | 20  | 17  |    |    | 3  | Ap          |                                                     |
| 4770       | NE Wyers Ice Shelf         |    | 45 | 34  | 20  |    | 1  | X  | Ap          | Part recrystallised; Ksp in antiperthite            |
| 4771       | NE Wyers Ice Shelf         |    | 65 | 8   | 24  |    | 3  |    | Ap          | Part recrystallised; secondary Bi                   |
| 4772       | NE Wyers Ice Shelf         |    | 64 | 8   | 23  |    | 5  |    |             | Secondary aligned Bi; some recrystallisation        |
| 4775       | Reference Peak             |    | 60 | 18  | 20  |    |    | 2  | Ap          |                                                     |
| 4786       | Geoffrey Hills             |    | 50 | 10  | 16  | 24 | X  | X  | Ap          | Part recrystallised; some secondary Amp             |
| 4794       | 15 km SSW of Latham Peak   |    | 55 | 10  | 25  |    | 9  | 1  |             | Aligned Bi                                          |
| 4800       | ?15 km SSW of Latham Peak  | X  | 84 |     | 10  |    | 2  | X  | Z,Ksp(4)    | Leuconorite; Bi after Opx; most Ksp in antiperthite |
| 4804       | 7 km NW of Rippon Depot    |    | 50 | 22  | 28  |    | X  | X  | Ap          | Ksp(6) in antiperthite                              |
| 4815       | Gromov Ntks                |    | 65 | 20  | 14  |    |    | 1  | Ap          |                                                     |
| 4824       | Gromov Ntks                | X  | 50 |     |     | 50 |    | X  | Sph         | Adjacent to large pegmatite                         |
| 4836       | Mt. Trail                  | 2  | 53 | 15  | 30  |    | X  | X  | Ru          | Some recrystallisation                              |
| 4840       | 4 km N of Hydrographer Is. | 8  | 51 | 18  | 18  |    | X  | 2  | Ap          | Secondary Gt(3)                                     |
| 4845       | 1 km SW of McIntyre Is.    | 2  | 55 | 13  | 13  | 2  | X  | 2  | Ap          | Gt(12) rims Pyx                                     |



NAPIER COMPLEX MAFIC ROCKS

| Sample No. | Locality                | Qz | Pl | Cpx | Opx | Hb | Bl | Op | Accessories | Remarks               |
|------------|-------------------------|----|----|-----|-----|----|----|----|-------------|-----------------------|
| 77284846   | 1 km SW of McIntyre Is. | 2  | 46 | 17  | 17  | 1  |    | 2  |             | Gt(15) rims Pyx       |
| 78285017   | Mt. Hardy               |    | 88 | 2   | 10  |    |    | X  |             | Leuconorite; zoned Pl |
| 5018       | Mt. Hardy               |    | 58 | 20  | 20  |    | 2  | X  |             |                       |

## NAPIER COMPLEX ULTRAMAFIC ROCKS

| Sample No. | Locality         | Opx | Cpx | Ol | Hb | Bi | Gt | Pl | Op | Sp | Accessories | Remarks                                            |
|------------|------------------|-----|-----|----|----|----|----|----|----|----|-------------|----------------------------------------------------|
| 4575       | Perov Ntks       | 70  | 8   |    | 2  | 17 |    | X  | 2  |    |             |                                                    |
| 4577       | Perov Ntks       | 100 |     |    |    | X  |    | X  |    |    |             |                                                    |
| 4582       | Adams Fjord      | 92  |     |    |    | 7  |    | 1  |    |    |             |                                                    |
| 4585       | McLeod Ntks      | 98  |     |    |    |    |    |    |    |    | Qz(2)       |                                                    |
| 75830029   | Newman Ntks      | 84  |     |    |    | 13 |    |    |    |    | Qz(3),Z     | Enstatite + phlogopite (??sapphirine)              |
| 76283004   | Mt. King         |     | 100 |    |    |    |    |    |    |    |             | Clinopyroxenite pod                                |
| 3015       | Seavers Ridge    | 20  | 80  |    |    |    |    |    |    |    |             | Pyroxenite pod                                     |
| 3063       | Mt. Pardoe       | XX  | XX  | XX | XX | 6  |    |    | 3  |    |             |                                                    |
| 3090       | Proclamation Is. | 33  | 33  |    |    | 33 |    |    | 1  |    |             | Bi pyroxenite layer                                |
| 3095       | Mt. King         | 60  |     | 12 |    | 12 | 15 |    | X  |    |             | Moraine                                            |
| 3113       | Rippon Depot     | X   | 95  |    |    |    |    | 5  | X  |    |             | Clinopyroxenite                                    |
| 3131       | Fyfe Hills       | 49  | 49  |    | 1  | X  |    |    | X  |    |             | Pyroxenite; Hb rims Pyx                            |
| 3137       | Fyfe Hills       | 40  | 59  |    | X  | X  |    |    | 1  |    |             | Pyroxenite                                         |
| 3141       | Fyfe Hills       | XX  | ?   | XX |    | XX |    |    | XX |    |             | Sheared, altered; much serpentine + opaque         |
| 3144       | Fyfe Hills       |     | 96  |    |    | 4  |    | X  |    |    |             | Clinopyroxenite                                    |
| 3146A      | Fyfe Hills       | 60  | 34  |    | 4  | X  |    |    | 2  | X  |             | Layered pyroxenite                                 |
| 3146B      | Fyfe Hills       | 35  | 15  | 45 |    | 5  |    |    | X  |    |             | Lherzolite layer                                   |
| 3148       | Fyfe Hills       | 90  | 8   |    |    | 2  |    | X  | X  |    | Ksp         |                                                    |
| 3155       | Latham Peak      | 35  | 25  | 5  | 5  |    |    |    | 3  | 1  |             | Altered: Serp + Op + Talc + Chl replace<br>Ol, etc |
| 3162       | Latham Peak      | 60  |     | 35 |    | 3  |    |    | X  | X  |             | Minor humite; Ol orthopyroxenite layer             |

NAPIER COMPLEX ULTRAMAFIC ROCKS

| Sample No. | Locality                   | Opx | Cpx | Ol | Hb | Bi | Gt | Pl | Op | Sp | Accessories   | Remarks                                                  |
|------------|----------------------------|-----|-----|----|----|----|----|----|----|----|---------------|----------------------------------------------------------|
| 76283166   | Latham Peak                |     | 98  |    |    |    |    |    |    |    | Qz(2)         | Clinopyroxenite pod in felsic gneiss                     |
| 3192       | McLeod Ntks                | 85  |     |    | 11 | X  |    | 2  | X  | 2  |               |                                                          |
| 3207       | Mt. Ryder                  | 88  | 5   |    |    | 5  |    | 2  |    |    |               | Moraine                                                  |
| 3208       | Mt. Ryder                  |     | 86  |    |    |    |    | 10 |    |    | Qz(2), Ksp(2) | Clinopyroxenite layer                                    |
| 3209       | Mt. Ryder                  | 65  | 27  |    |    | 4  |    | 2  | 2  | X  |               | Pyroxenite layer                                         |
| 3225       | Mt. Smethurst              | X   | ~90 |    |    |    |    | X  | X  |    | Q, Ksp        | Clinopyroxene segregation                                |
| 3240       | 3 km SSW of<br>Mt Torckler | 65  | 32  |    | 1  |    |    | 1  | 1  |    |               | Pyroxenite layer                                         |
| 3251       | Burch Peaks                |     | 100 |    |    |    |    |    |    |    |               | Clinopyroxenite layer                                    |
| 77283413   | Mt. Marsland               | 50  | 15  | 25 | 10 |    |    |    | X  | X  |               | Ol part serpentinised; ?slightly discordant              |
| 3512       | Mt. Mateer                 | XX  | XX  | XX |    | XX |    |    |    |    |               | Ol part serpentinised; layer                             |
| 3518       | Mt. Bartlett               | 70  | 10  |    | 20 |    |    |    |    |    |               | Hb pyroxenite layer                                      |
| 3520       | Mt. Bartlett               | 55  | 20  |    |    | 25 |    |    |    |    |               | Phlogopite pyroxenite layer                              |
| 3537       | 4 km SE of<br>Mt. Selwood  |     |     |    |    |    |    |    | X  |    |               | Orthopyroxenite pod                                      |
| 3580B      | 22 km NE of Perov<br>Ntks  | 65  | 15  |    | 20 |    |    |    |    |    |               | Hb pyroxenite layer                                      |
| 3600A      | Crohn Is.                  | 30  | 70  |    |    |    |    |    | X  |    |               | Pyroxenite layer                                         |
| 3605       | Mt. McLennan               | 24  | 24  | 50 |    |    |    |    | 2  | X  |               | Lherzolite lens; Ol much altered to serpentine; foliated |



NAPIER COMPLEX ULTRAMAFIC ROCKS

| Sample No. | Locality            | Opx | Cpx | Ol | Hb | Bi | Gt | Pl | Op | Sp | Accessories | Remarks                                                                              |
|------------|---------------------|-----|-----|----|----|----|----|----|----|----|-------------|--------------------------------------------------------------------------------------|
| 77283617   | Harvey Ntks         | 40  | 60  |    | X  | X  |    |    | X  |    |             | Websterite                                                                           |
| 3620       | Harvey Ntks         | XX  | XX  |    | XX | 7  |    | 8  | 5  |    |             | Strongly sheared, altered                                                            |
| 3623       | Harvey Ntks         | 70  | 10  |    |    | 20 |    | X  |    |    | Ksp         | Phlogopite pyroxenite pod; foliated                                                  |
| 3633       | 6 km NE of Mt. Reed | 88  | 8   |    |    |    |    | 2  |    | 2  |             | Orthopyroxenite pod                                                                  |
| 3643       | Mt. Reed            | 68  | 30  |    |    | X  |    | 2  | X  |    | ?Ru         | Websterite layer; secondary Amp<br>(tremolite) and Carb                              |
| 3681       | Mt. Tod             | X   | 98  |    |    |    |    |    | 2  |    | Ap, Qz      | Clinopyroxenite layer; deformed Opx ex-<br>solution lamellae; some recrystallisation |
| 3683       | Crohn Is.           | 45  | 40  |    | 4  | 3  |    | 8  |    |    |             | Bi-Hb pyroxenite pod                                                                 |
| 3684       | Crohn Is.           | X   | X   |    | 88 |    | 2  |    |    | X  |             | Sheared lherzolite layer; Pyx(10);<br>Ol partly serpentinised                        |
| 3685       | Crohn Is.           | 85  | 14  |    |    | 1  |    | X  |    |    |             | Websterite                                                                           |
| 3687       | Crohn Is.           | 65  | 30  | 2  |    | 2  |    | X  | X  | X  |             | Websterite layer                                                                     |
| 3699       | NW Wyers Ice Shelf  |     | 81  |    | 4  | 3  | 8  | 2  | X  |    | Ksp(2)      | Gt clinopyroxenite pod                                                               |
| 3701       | Howard Hills        | 100 | X   |    |    |    |    |    |    |    |             | Orthopyroxenite ?dyke                                                                |
| 3704       | Howard Hills        | 46  | 2   | 50 |    |    |    |    | 2  |    |             | Harzburgite; Ol part serpentinised                                                   |
| 3724       | Mt. Harvey          | 86  | 5   |    | 3  | 6  |    |    |    |    |             | Hb-Bi pyroxenite                                                                     |
| 3767       | Reference Peak      | 84  | 8   |    |    | 3  |    | 5  |    |    |             | Bi pyroxenite pod                                                                    |
| 3770       | NW Wyers Ice Shelf  | 60  | 13  | 7  | 20 |    |    |    | X  | X  |             | Ol-Hb pyroxenite                                                                     |
| 3771       | NW Wyers Ice Shelf  | XX  |     |    |    |    |    |    | X  |    | Qz, Ap      | Orthopyroxenite, part altered to<br>?cummingtonite; contact with felsic gneiss       |

NAPIER COMPLEX ULTRAMAFIC ROCKS

| Sample No. | Locality           | Opx | Cpx | Ol | Hb | Bi | Gt | Pl | Op | Sp | Accessories | Remarks                                               |
|------------|--------------------|-----|-----|----|----|----|----|----|----|----|-------------|-------------------------------------------------------|
| 77283772   | NW Wyers Ice Shelf | XX  |     |    |    |    |    |    | X  |    | Qz          | Orthopyroxenite much altered to<br>?cummingtonite     |
| 3777A      | NW Wyers Ice Shelf |     | 33  |    | 50 | 17 | 8  |    | 1  | 1  |             | Secondary Gt; little or no Opx?                       |
| 3777B      | NW Wyers Ice Shelf |     | 42  |    | 46 | 4  | 8  |    | X  | X  |             | Secondary (inc. exsolved) Gt                          |
| 3778A      | NW Wyers Ice Shelf |     | 63  |    | 7  | 2  | 18 | 8  | X  | X  | Scap(2)     | Pl sericitised; exsolved Gt                           |
| 3778B      | NW Wyers Ice Shelf |     | 10  |    | 38 | 15 | 30 | 7  | X  | X  |             | Gt part altered; Pl sericitised; secondary<br>Bi + Ep |
| 3780       | NW Wyers Ice Shelf | 30  | 70  |    |    |    |    |    |    |    |             | Websterite                                            |
| 3784       | NW Wyers Ice Shelf | 92  | 3   |    | 5  |    |    |    |    |    |             | Orthopyroxenite; secondary Hb +<br>?cummingtonite     |
| 3916       | Tonagh Is.         | 42  | 20  | 30 | 3  | 2  |    |    | 2  | 1  |             | Ol pyroxenite layer                                   |
| 3920       | Tonagh Is.         | 50  | 23  | 25 |    | 1  |    |    |    | 1  |             | Ol websterite layer                                   |
| 3929       | Tonagh Is.         | 50  | X   |    |    |    | 43 | 1  |    |    |             | Qz(6); fine-grained Opx with exsolved Cpx             |
| 3931       | Tonagh Is.         | 63  | 30  |    | 5  |    |    |    | X  | 2  |             | Pyroxenite layer                                      |
| 4004       | Beaver Is.         | 80  | 10  |    | X  | 2  |    | 8  | X  |    |             | Pyroxenite layer                                      |
| 4011       | Bunt Is.           | 70  |     | 30 |    | X  |    |    |    | X  |             | Ol orthopyroxenite layer                              |
| 4018       | Mt. Giddings       | XX  | XX  | XX |    | X  |    |    |    | X  |             | Sheared layer                                         |
| 4069       | Douglas Peak       | 60  | 22  |    |    | 18 |    |    | X  |    |             | Bi pyroxenite                                         |
| 4071       | 5 km NE of Mt.     |     |     |    |    |    |    |    |    |    |             |                                                       |
|            | Giddings           | 50  | 10  |    | 40 |    |    |    | X  |    |             | Hb pyroxenite layer; recrystallised                   |

NAPIER COMPLEX ULTRAMAFIC ROCKS

| Sample No. | Locality           | Opx | Cpx | Ol | Hb | Bi | Gt | Pl | Op | Sp | Accessories | Remarks                                        |
|------------|--------------------|-----|-----|----|----|----|----|----|----|----|-------------|------------------------------------------------|
| 77284092   | Khmara Bay (SH213) | XX  | XX  |    |    |    | 8  |    |    |    |             | Qz(10); ?Opx has exsolved Cpx;<br>see 77284359 |
| 4093       | Ward Rock          | 10  | 76  |    |    |    | 4  |    | 10 |    |             | Gt pyroxenite layer; Gt exsolved from Cpx      |
| 4094B      | Ward Rock          | 30  | 53  |    |    | 4  | 5  | 4  | 4  |    |             | Gt rims Pyx in part                            |
| 4095       | E of Mt. Stadler   | 78  | 8   | 7  | 7  |    |    |    |    |    |             | Ol-Hb pyroxenite layer                         |
| 4131       | Brusilov Ntks      | 45  | 45  |    |    | 3  |    | 7  | X  |    |             | Bi pyroxenite pod                              |
| 4137       | Mt. Parviainen     | 44  | 44  | 5  |    | 7  |    |    | X  |    |             | Ol-Bi pyroxenite                               |
| 4138       | Mt. Parviainen     | 50  | 40  |    | 4  | 4  |    |    | 2  | X  |             | Hb-Bi pyroxenite pod                           |
| 4145       | Demidov Is         | 48  | 40  |    | 4  |    |    | 8  | X  |    |             | Layered pyroxenite; some secondary Hb          |
| 4146       | Demidov Is         | 50  | 48  |    | 2  |    |    |    | X  |    |             | Websterite; mostly secondary Hb                |
| 4147       | Demidov Is         | XX  | XX  |    | XX |    | XX |    | X  |    | Ap          | Much secondary Amp                             |
| 4151       | Simpson Peak       | 82  | 2   |    |    | 10 |    | 6  |    |    |             | Bi orthopyroxenite                             |
| 4156       | Wallis Ntks        | 99  |     |    | X  |    | X  | X  |    |    |             | Orthopyroxenite pod                            |
| 4227       | Mt. Marr           | 80  |     |    |    |    | 7  |    | 10 |    | Qz(3)       | Gt rims Op; ?metasedimentary layer             |
| 4230       | Douglas Peak       | 37  | 40  | ?  | X  | 15 |    | 8  |    |    |             | Websterite; Pl zoned                           |
| 4231       | Douglas Peak       | XX  | XX  | XX |    | XX |    | X  |    |    |             | Phlogopite websterite layer                    |
| 4234       | Mt. Oldfield       | 15  |     | 85 |    | X  |    |    | X  |    |             | Harzburgite pod; Ol part serpentinitised       |
| 4252       | Mt. Miller         | 45  | 48  |    |    | 1  |    | 6  | X  |    |             | Websterite                                     |
| 4253       | Pythagoras Peak    | 36  | 50  |    |    | 8  |    | 5  |    | 1  |             | Pl-rich segregation                            |
| 4267       | Fyfe Hills         | 35  |     | 30 | 28 | 5  |    |    | 2  |    |             | Ol-Hb pyroxenite pod; Hb has exsolved ore      |
| 4275       | Hydrographer Is.   | 40  | 15  | 16 | 25 |    |    |    | X  | 4  |             | Ol-Hb pyroxenite pod                           |



## NAPIER COMPLEX ULTRAMAFIC ROCKS

| Sample No. | Locality                     | Opx | Cpx | Ol | Hb | Bl  | Gt | Pl | Op | Sp | Accessories | Remarks                                                           |
|------------|------------------------------|-----|-----|----|----|-----|----|----|----|----|-------------|-------------------------------------------------------------------|
| 77284293   | Newman Ntk                   | 98  |     |    |    | 1   |    | X  |    |    | Qz,Z        | Orthopyroxenite; some secondary Bi<br>round felsic (Pl + Qz) area |
| 4322       | 7 km NW of Mt.<br>Brockelsby | 50  | 10  | 20 | 5  |     |    |    |    | 5  |             | Ol pyroxenite layer                                               |
| 4346       | Gage Ridge                   | 38  | 27  | 30 | 5  | 5   |    |    | X  |    |             | Ol pyroxenite pod                                                 |
| 4353       | NW Wyers Ice Shelf           |     | 70  |    | 3  |     | 27 |    |    |    |             | Pod; some exsolved Gt                                             |
| 4356       | NW Wyers Ice Shelf           | 87  | 7   |    | 4  |     |    | 2  |    |    |             | Pyroxenite pod; recrystallised                                    |
| 4359       | Khmara Bay (SH213)           | XX  | XX  |    |    |     | 6  |    | X  |    | Ap          | Qz(6); Pyx(88) is ferroaugite + eulite;<br>possible metasediment  |
| 4361       | Ward Rock                    | 45  | 40  | 5  | 6  | 0.5 |    |    | 3  | X  |             | Ol-Hb pyroxenite lens                                             |
| 4386       | 6 km N of McIntyre Is.       | 46  | 38  | 10 |    | 3   |    |    |    | 3  |             | Ol websterite lens; recrystallised                                |
| 4402       | 3 km NW of Mt. Bergin        | 25  | 75  |    | X  |     |    |    | X  |    |             | Websterite layer; cut by shear zone with<br>abundant Hb           |
| 4415       | Mt. Currie                   | 30  | 40  |    | X  | 25  |    | 5  | X  |    | Ap          | Bi pyroxenite layer                                               |
| 4451       | Offe Peak                    | 35  | 40  |    | X  | 20  |    | 5  | X  |    |             | Bi pyroxenite layer; zoned Pl                                     |
| 4469       | McNaughton Ridges            | 82  |     |    |    | 14  |    | 4  |    |    | Hm          | Phlogopite orthopyroxenite layer                                  |
| 4472       | E Wyers Ice Shelf            | 70  | 20  |    | X  | 10  |    | X  | X  |    | Ap          | Bi pyroxenite layer; part recrystallised                          |
| 4484       | 10 km E of<br>Demidov Is.    | X   | X   |    | 98 |     |    |    | X  |    |             | Altered: largely secondary tremolite                              |
| 4494       | Mt. Berrigan                 | 58  | 30  |    |    | 8   |    | 1  | X  |    | Ksp(3)      | Bi pyroxenite layer; aligned Bi                                   |
| 4497       | McLeod Ntk                   | 50  | 15  | 9  | 18 | 5   |    |    | X  | 3  |             | Ol-Hb pyroxenite layer                                            |

NAPIER COMPLEX ULTRAMAFIC ROCKS

| Sample No. | Locality                  | Opx | Cpx | Ol | Hb | Bi | Gt | Pl | Op | Sp | Accessories | Remarks                |
|------------|---------------------------|-----|-----|----|----|----|----|----|----|----|-------------|------------------------|
| 77284596   | Edwards Is.               | 56  | 20  |    | 20 | 1  |    |    | 2  | 1  |             | Hb pyroxenite layer    |
| 4598       | 10 km E of<br>Damidov Is. | X   | 45  |    | 8  | 7  | 36 | 3  | 1  |    |             | Gt clinopyroxenite     |
| 4698       | Mt. Henry                 | 30  | 60  |    | 10 |    |    |    |    |    |             | Hb pyroxenite layer    |
| 4766       | Ushakov Ntks              | 30  | 30  |    | 40 |    |    |    |    |    | Ap          | Hb pyroxenite          |
| 4816       | Gromov Ntks               | 10  | 45  |    | 2  |    | 37 | 5  | 1  |    | Ap          | Gt pyroxenite          |
| 4817       | Gromov Ntks               | 10  | 32  |    | 20 |    | 25 | 10 | 3  | X  | Ap          | Gt-Hb pyroxenite layer |
| 4818       | Gromov Ntks               | 4   | 43  |    | 25 |    | 25 |    | 3  |    |             | Gt-Hb pyroxenite layer |

## NAPIER COMPLEX GARNET-QUARTZ-FELDSPAR GNEISSES

| Sample No. | Locality      | Qz | Ksp | Meso | Pl | Gt  | Bi  | Opx | Op | Accessories | Remarks                                                      |
|------------|---------------|----|-----|------|----|-----|-----|-----|----|-------------|--------------------------------------------------------------|
| 4581       | Adams Fjord   | 40 |     | 51   |    | 9   | X   |     | X  | Ru          |                                                              |
| 7282       | Adams Fjord   | 35 |     | 64   |    | 1   |     |     | X  | Z           |                                                              |
| 65280088   | Wilson Gl     | 30 |     |      | 60 | 10  |     |     |    |             |                                                              |
| 151        | Mt. Mueller   | XX | XX  |      |    | X   | X   |     |    | Z           |                                                              |
| 190        | 1 km E of Mt. |    |     |      |    |     |     |     |    |             |                                                              |
|            | Storegutt     | 40 | 25  |      | 25 | 10  | X   |     | X  | Z           |                                                              |
| 75830030   | Newman Ntks   | 35 | 46  |      | 16 | 0.5 | 2.5 |     | X  | Z           | Altered: Bi replaces Gt; secondary Carb, Mus                 |
| 39H        | Newman Ntks   | 54 |     |      | 40 | 2   | 4   |     | X  |             | Layered; altered Bi replaces Gt; secondary Ep, Chl, sericite |
| 39I        | Newman Ntks   | 30 | 20  |      | 50 | X   | X   |     | X  | Hm          | Minor altered ?Opx; Feld part sericitised; secondary Mus, Ep |
| 42         | Newman Ntks   | 30 | 65  |      |    | 2   | 3   | X   | X  | Z           | Altered: Bi + Mus replace Gt and ?Opx; Ksp near Meso         |
| 46         | Newman Ntks   | 40 | 30  |      | 15 | 15  | X   |     | X  |             | Feld part sericitised; An 26-28                              |
| 203        | Mt. Mueller   | 20 |     |      | 58 | 8   | 2   | 12  | X  | Ap,Z        | An 30; some secondary Gt + Qz and Bi+Qz                      |
| 204        | Mt. Mueller   | 33 | 40  |      | 24 | 3   |     |     |    |             | An 35                                                        |
| 76283021   | Mt. Douglas   | 30 | 13  |      | 45 | 7   | X   | 5   | X  | Ap          | Gt aggregates                                                |
| 3026       | Mt. Douglas   |    | 20  |      | 45 | 24  | 11  |     | X  | Z           |                                                              |
| 3027       | Mt. Douglas   | 28 | 20  |      | 46 | 5   | 1   |     | X  |             | Secondary Bi                                                 |
| 3029       | Mt. Douglas   | 25 | 30  |      | 30 | 12  | 1   | 2   | X  |             |                                                              |
| 3034       | Mt. Douglas   | 25 | 30  |      | 30 | 5   | 2   | 7   | X  |             |                                                              |



## NAPIER COMPLEX GARNET-QUARTZ-FELDSPAR GNEISSES

| Sample No. | Locality         | Qz | Ksp | Meso | Pl | Gt  | Bl  | Opx | Op | Accessories | Remarks                                        |
|------------|------------------|----|-----|------|----|-----|-----|-----|----|-------------|------------------------------------------------|
| 76283036   | Mt. Douglas      | 45 | 15  |      | 22 | 15  | 2   | 1   | X  |             | Opx altered                                    |
| 3055       | Mt. Pardoe       | 33 |     | 65   |    | 1   | X   | 1   | X  |             | Opx part altered; recrystallised               |
| 3059A      | Mt. Pardoe       | 35 |     | 65   |    | X   |     |     |    |             | Leucogneiss; recrystallised                    |
| 3059B      | Mt. Pardoe       | 25 |     | 70   |    | 3   | 1   | 1   | X  | Z           | Gt rims Opx; recrystallised                    |
| 3064       | Mt. Pardoe       | 34 |     | 65   |    | 0.5 |     |     | X  |             | Some recrystallisation                         |
| 3070       | Mt. Hurley       | 35 |     | 62   |    | 3   | X   |     |    |             |                                                |
| 3071       | Mt. Hurley       | 37 | 60  |      |    | 3   |     |     |    |             | Some Meso; part recrystallised                 |
| 3072       | Mt. Hurley       | 32 |     | 64   |    | 2   | 2   |     | X  |             | Gt part altered; part recrystallised; some Ksp |
| 3082       | Proclamation Is. | 35 | 27  |      | 27 | 5   | 3   | 3   | X  |             |                                                |
| 3087       | Proclamation Is. | 25 | 35  |      | 35 | 2   | 0.5 | 2   | X  | Z           |                                                |
| 3088       | Proclamation Is. | 35 | 45  |      | 17 | 1   | 1   |     | X  | Z           | Cd(1)                                          |
| 3089       | Proclamation Is. | XX | XX  |      | XX | X   | X   |     |    |             | Sheared; post-kinematic Gt                     |
| 3096       | Mt. Selwood      | 35 |     | 57   |    | 4   |     | 4   | X  | Z           | Some recrystallisation                         |
| 3097       | Mt. Selwood      | 25 |     | 62   |    | 5   | X   | 8   | X  |             |                                                |
| 3099       | Mt. Selwood      | 35 |     | 62   |    | 0.5 |     | 2   | X  |             | Some recrystallisation                         |
| 3100       | Mt. Selwood      | 35 |     | 30   |    | 35  | X   | X   | X  |             | ?Metasediment                                  |
| 3134       | Fyfe Hills       | 35 |     | 63   |    | 2   | X   |     | X  | Z           |                                                |
| 3143       | Fyfe Hills       | 32 |     | 65   |    | X   |     | X   | 1  | Ap,Z        | Hb(2)                                          |
| 3145       | Fyfe Hills       | 28 |     | 70   |    | 2   |     |     | X  |             |                                                |
| 3163       | Latham Peak      | 20 | 20  |      | 50 | 5   | X   | 5   | X  |             | Opx part altered                               |
| 3167       | Latham Peak      | 30 | 20  |      | 43 | 1   | X   | 5   | 1  |             | Gt rims Opx                                    |

NAPIER COMPLEX GARNET-QUARTZ-FELDSPAR GNEISSES

| Sample No. | Locality        | Qz | Ksp | Meso | Pl | Gt | Bi  | Opx | Op | Accessories | Remarks                                          |
|------------|-----------------|----|-----|------|----|----|-----|-----|----|-------------|--------------------------------------------------|
| 76283169   | Latham Peak     | 25 | 65  |      | 5  | 5  |     |     |    | Z           |                                                  |
| 3171       | Latham Peak     | 25 |     | 67   |    | 2  |     | 5   | 1  | Z           |                                                  |
| 3172       | Latham Peak     | 30 |     | 68   |    | 2  | X   |     | X  |             | Gt part altered                                  |
| 3193       | McLeod Ntks     | 15 |     |      | 45 | 40 | X   |     | X  | Z           | Minor Sl, Sp; ?metasediment                      |
| 3201       | Mt. Ryder       | 35 |     | 63   |    | 2  |     |     | X  |             |                                                  |
| 3202       | Mt. Ryder       | 32 |     | 65   |    | 3  |     |     |    |             |                                                  |
| 3210       | Mt. Denham      | 35 |     | 65   |    | X  |     |     |    |             |                                                  |
| 3211       | Mt. Denham      | 35 |     | 63   |    | 2  | X   |     | X  |             | Secondary Bi                                     |
| 3218       | Mt. Renouard    | 35 |     | 60   |    | 5  |     |     | X  |             |                                                  |
| 3221       | Mt. Renouard    | 28 |     | 70   |    | 2  |     |     |    |             | Some recrystallisation                           |
| 3229       | Mt. Paish       | 30 |     | 68   |    | 2  |     |     |    |             |                                                  |
| 3230       | Mt. Paish       | 33 |     | 64   |    | 2  | 0.5 |     | X  | Z           | Gt part altered                                  |
| 3233       | Mt. Paish       | 33 |     | 62   |    | 4  | 1   |     | X  | Z           | Bi replaces Gt and ?Pyx                          |
| 3234       | 3 km SSW of Mt. |    |     |      |    |    |     |     |    |             |                                                  |
|            | Torckler        | 34 |     | 63   |    | 3  |     |     | X  |             | Part recrystallised                              |
| 3241       | 3 km SSW of Mt. |    |     |      |    |    |     |     |    |             |                                                  |
|            | Torckler        | 30 |     | 67   |    | 2  | X   | 1   | X  | Z           | Opx altered; some Ksp                            |
| 3247       | Mt. McGhee      | 35 |     | 61   |    | 3  | 1   |     |    |             | Gt part altered                                  |
| 3256       | Mt. Stadler     | 40 |     | 745  |    | 15 | X   |     |    | Ru          | Gt part altered; Feld sericitised; ?metasediment |
| 3257       | Mt. Stadler     | 40 |     |      | 40 | 8  | X   | 11  | 1  |             | Layered; Opx part altered                        |
| 3264       | SH 945          | 35 | 62  |      |    | 2  |     | 1   | X  |             | Opx altered                                      |

## NAPIER COMPLEX GARNET-QUARTZ-FELDSPAR GNEISSES

| Sample No. | Locality          | Qz | Ksp | Meso | Pl | Gt | Bi | Opx | Op | Accessories | Remarks                                                 |
|------------|-------------------|----|-----|------|----|----|----|-----|----|-------------|---------------------------------------------------------|
| 76283267   | Mt. Sones         | 50 | X   |      | 30 | 18 |    |     | 1  | Z           | Metasediment                                            |
| 3272       | Mt. Stadler       | 45 | 44  |      | 3  | 7  |    |     | 1  | Ap,Z        |                                                         |
| 3282       | Mt. Jewell        | 29 |     | 70   |    | 1  |    |     | X  |             |                                                         |
| 3283       | Mt. Jewell        | 30 |     | 68   |    | 2  |    |     |    |             |                                                         |
| 3284A      | Mt. Jewell        | 30 |     | 67   |    | 3  |    |     |    |             | Layered                                                 |
| 3306       | Oblachnaya Ntk.   | 30 |     | 65   |    | 5  | X  |     |    |             | Mylonised                                               |
| 3309       | Oblachnaya Ntk.   | 35 |     | 63   |    | 2  | X  |     | X  |             |                                                         |
| 3310       | Oblachnaya Ntk.   | 30 |     | 20   | 35 | 11 | 2  | 2   | X  | Ap          | Opx part altered                                        |
| 3311       | Oblachnaya Ntk.   | 35 |     |      | 44 | 10 | 10 |     | 1  |             | Some recrystallisation; Gt part altered                 |
| 3313       | Oblachnaya Ntk.   | 25 |     | 42   | 10 | 15 | 3  | 5   | X  |             | Opx part altered                                        |
| 3316       | Oblachnaya Ntk.   | 10 |     |      | 55 | 15 | 20 |     | X  | Z           | Part recrystallised; relict Gt; Feld altered-mostly Pl? |
| 3317       | Oblachnaya Ntk.   | 30 | 14  |      | 50 | 5  | X  | X   | 1  | Ap,Z,Sph    | Opx part altered; some antiperthite near Meso           |
| 77283411   | Mt. Marsland      | 42 | 40  |      | 5  | 5  | X  | 8   | X  | Z           |                                                         |
| 3416       | Mt. Marsland      | 30 |     | 60   |    | 2  | 8  |     | X  | Z           | Bi replaces ?Opx and Gt                                 |
| 3417       | Mt. Marsland      | 35 |     | 63   |    | 2  | X  |     |    |             |                                                         |
| 3419       | Mt. Riiser-Larsen | 20 |     |      | 50 | 5  |    | 23  | 2  | Z           |                                                         |
| 3423       | Mt. Riiser-Larsen | 39 |     | 50   |    | 7  |    | 4   | X  | Z           |                                                         |
| 3435       | Mt. Soucek        | 33 |     | 63   |    | 4  |    |     | X  |             |                                                         |
| 3464       | Mt. Sones         | 32 | 68  |      |    | X  |    |     |    | Z           | Leucogneiss                                             |
| 3465       | Mt. Sones         | 27 |     |      | 63 | 6  |    | 4   | X  |             |                                                         |



## NAPIER COMPLEX GARNET-QUARTZ-FELDSPAR GNEISSES

| Sample No. | Locality              | Qz | Ksp | Meso | Pl | Gt | Bi | Opx | Op | Accessories  | Remarks                                                  |
|------------|-----------------------|----|-----|------|----|----|----|-----|----|--------------|----------------------------------------------------------|
| 77283468   | Mt. Sones             | 10 |     |      | 45 | 17 |    | 28  | X  |              |                                                          |
| 3514       | Mt. Mateer            | 29 |     | 70   |    | 1  |    |     |    |              | Scree                                                    |
| 3521       | Mt. Bartlett          | 30 | 68  |      |    | 2  |    |     |    |              | Scree                                                    |
| 3525       | SH 945                | 33 | 65  |      |    | 1  |    |     |    | Si (1)       |                                                          |
| 3540       | 6 km E of Mt. Selwood | 30 |     | 67   |    | 3  |    |     | X  | Ru           |                                                          |
| 3543       | 6 km E of Mt. Selwood | 40 |     |      | 47 | 8  |    | 3   | X  |              |                                                          |
| 3547       | 6 km E of Mt. Selwood | 35 |     | 60   |    | X  | 5  |     |    |              | Altered; Bi + Ep replace Gt                              |
| 3590       | Rippon Depot          | 35 |     |      | 65 | X  |    |     |    |              | Conformable granitic vein                                |
| 3598       | Crohn Is              | 30 |     | 67   |    | 3  |    |     |    |              | Slight recrystallisation                                 |
| 3609       | Mt. Degerfeld         | 50 | 20  |      |    | 30 |    |     | X  |              | Layered metasediment                                     |
| 3618       | Harvey Ntks           | 50 | 45  |      |    | 1  |    |     |    | Ru, ?Si      | Gt much altered; secondary Bi + Mus; layered; microcline |
| 3621       | Harvey Ntks           | 35 |     | 63   |    | 2  | X  |     |    | Z            | Gt slightly altered; secondary Bi, Mus, Chl              |
| 3622       | Harvey Ntks           | 35 |     | 60   |    | 2  | X  | 3   | X  | Z            | Opx part altered                                         |
| 3644       | Mt. Reed              | 35 | 35  |      | 5  | 20 |    | 5   |    | Ru           | Metasediment                                             |
| 3689       | Beaver Is.            | 30 |     | 40   |    | 25 | X  | 5   | X  | Sp, ?Amp, Ap | Opx part altered; part recrystallised (inc. Gt)          |
| 3698       | Mt. Giddings          | 40 | 52  |      | 5  | 3  | X  |     | X  | Ru           |                                                          |
| 3714       | Observation Is.       | 35 |     | 50   |    | 8  | 6  | 1   | X  | Z            | Opx mostly altered to Bi                                 |
| 3716       | Observation Is.       | 40 |     | 45   |    | 8  | X  | 7   | X  | Ap           | Secondary Bi                                             |
| 3722       | Mt. Harvey            | 35 |     | 64   |    | 1  | X  |     | X  | Z            | Intrusive; minor secondary Bi + Mus                      |
| 3726       | Crosby Ntks           | 40 | 56  |      |    | 4  |    |     |    | Z            | Ksp near Meso                                            |

NAPIER COMPLEX GARNET-QUARTZ-FELDSPAR GNEISSES

| Sample No. | Locality              | Qz | Ksp | Meso | Pl | Gt  | Bi | Opx | Op | Accessories | Remarks                                            |
|------------|-----------------------|----|-----|------|----|-----|----|-----|----|-------------|----------------------------------------------------|
| 77283733   | Mt. Hampson           | 32 |     | 55   |    | 8   | 1  | 4   | X  | Z           | Secondary Bi                                       |
| 3735       | Mt. Hampson           | 28 |     | 52   |    | 10  |    | 10  | X  | Z           |                                                    |
| 3737       | Mt. Hampson           | 35 |     | 61   |    | 4   |    |     |    | Z           |                                                    |
| 3747       | Mt. Weller            | 28 | XX  |      | XX | 2   |    |     |    |             | Sheared; perthite + recrystallised Ksp and Pl (70) |
| 3785       | Wyers Ntk.            | 28 |     |      | 60 | 12  |    |     | X  | Ru          | Part recrystallised                                |
| 3791       | Mt. Griffiths         | 28 | XX  |      | XX | 6   | 6  |     | X  | Hm          | Secondary Bi; part recrystallised; Pl + Ksp (60)   |
| 3860       | Dingle Dome           | 30 |     | 70   |    | X   |    |     |    |             | Trace of altered ?Opx                              |
| 3910       | Litke Ntk.            | 35 | 40  |      | 22 | 0.5 |    | 2   | X  | Z           | Gt rims Opx                                        |
| 3911       | Mt. Pascoe            | 36 |     | 60   |    | 2   | X  | 2   | X  | Ap,Z        | Opx part altered                                   |
| 3913       | Tonagh Is.            | 33 |     | 65   |    | 2   |    |     | X  | Z           | Some recrystallisation                             |
| 3932       | Tonagh Is.            | 25 |     | 50   |    | 25  |    |     | X  | Z           | Layered                                            |
| 3933       | Mt. Pardoe            | 29 |     | 70   |    | 1   | X  |     |    | Ap,Z        |                                                    |
| 3934       | Mt. Pardoe            | 30 | 65  |      |    | 2   | 3  |     |    | Z           | Altered: Bi replaces Gt; recrystallised            |
| 3935       | Mt. Pardoe            | 30 | 57  |      |    | 7   | 2  | 4   | X  | Z           | Secondary Bi                                       |
| 3936       | Mt. Pardoe            | 28 |     |      | 55 | 5   | 7  | 5   | X  | Z           | Recrystallised; new Gt                             |
| 3939       | Mt. Pardoe            | 28 |     | 58   |    | 8   | X  | 6   | X  | Ap, Z       | Part recrystallised                                |
| 3944       | Mt. Pardoe            | 33 |     | 63   |    | 4   |    |     | X  | Z           | Part recrystallised                                |
| 3962       | Debenham Peak         | 25 | 56  |      | 12 | 6   |    | 21  | X  | Ap,Z        | Altered ?Opx                                       |
| 3963       | Debenham Peak         | 30 |     | 60   |    | 5   |    | 4   | 1  | Ap,Z        |                                                    |
| 3965       | 5 km E of Mt. Charles | 30 |     | 60   |    | 8   | 2  |     | X  | Z,Ru        | Some secondary Bi                                  |

NAPIER COMPLEX GARNET-QUARTZ-FELDSPAR GNEISSES

| Sample No. | Locality               | Qz | Ksp | Meso | Pl | Gt | Bi | Opx | Op | Accessories | Remarks                                                                |
|------------|------------------------|----|-----|------|----|----|----|-----|----|-------------|------------------------------------------------------------------------|
| 77283970   | Mt. Charles            | 30 | 15  |      | 40 | 9  |    | 6   | X  | Ap, Ru      |                                                                        |
| 3978       | Mt. Bennett            | 32 |     | 67   |    | 1  |    |     |    |             | ?Granite; moraine                                                      |
| 3979       | Mt. Bennett            | 37 |     | 62   |    | 1  | X  |     |    | Z           |                                                                        |
| 4003       | Beaver Is.             | 25 |     |      | 50 | 10 | X  | 14  | 1  |             |                                                                        |
| 4047       | Wilkinson Peaks        | 27 |     | 70   |    | 1  |    | 3   | X  |             | Opx part altered                                                       |
| 4049       | Wilkinson Peaks        | 33 |     | 67   |    | X  |    |     |    |             | Leucogneiss; ?intrusive                                                |
| 4052       | 10 km SW of Mt. Elkins | 25 |     |      | 40 | 20 | 15 |     | X  |             |                                                                        |
| 4059       | 10 km W of Young Ntks  | X  |     | 58   | 3  | 10 | 7  | 5   | 2  | Sp          |                                                                        |
| 4075       | Mt. Alekseyev          | 30 | 67  |      |    | 3  |    |     | X  |             |                                                                        |
| 4080       | Pythagoras Peak        | 30 | 67  |      |    | X  | 3  |     |    |             | Gt altered                                                             |
| 4101       | Mt. Bride              | 30 | 35  |      | 15 | 8  | 8  | 4   | X  | Z, Hm       | Opx part altered; secondary Bi + Gt; microcline; myrmekite             |
| 4123       | Brusilov Ntks          | 35 |     | 65   |    |    |    |     |    |             | Gt in hand specimen; leucogneiss                                       |
| 4126       | Brusilov Ntks          | 45 |     |      | 50 | 2  | 3  |     | X  | Z           | Qz-rich                                                                |
| 4133       | Brusilov Ntks          | 33 |     | XX   | XX | 5  |    | 7   | X  |             | Pl + Meso (55); some secondary Gt                                      |
| 4139       | Mt. Parvainen          |    |     | 45   |    | 1  | X  | 8   | X  | Z           | Bi + some Gt secondary                                                 |
| 4142       | Demidov Is.            |    |     |      | 40 | 6  | X  |     | X  | Z, Hb       | Altered ?Pyx (7); secondary Carb(2);<br>Pl sericitised; recrystallised |
| 4152       | Bird Ridge             | 35 | 10  |      | 48 | X  | X  | 7   | X  | Ap, Z       | Bi + some Gt secondary; Opx part altered                               |
| 4153       | Bird Ridge             | 40 | 33  |      | 20 | 2  | 5  |     | X  | Ap, Z, ?Mon | Gt part altered; secondary Bi; myrmekite                               |
| 4157       | Wallis Ntks            | 30 | 54  |      | 8  | 6  | 2  |     | X  | Z           | Myrmekite                                                              |



## NAPIER COMPLEX GARNET-QUARTZ-FELDSPAR GNEISSES

| Sample No. | Locality                    | Qz | Ksp | Meso | Pl | Gt | Bi  | Opx | Op | Accessories | Remarks                                                     |
|------------|-----------------------------|----|-----|------|----|----|-----|-----|----|-------------|-------------------------------------------------------------|
| 77284203   | Wilkinson Peaks             | 30 |     | 68   |    | X  | X   | 2   | X  | Sp          | Opx part altered to Bi                                      |
| 4214       | Mt. Codrington              | 30 |     | 65   |    | 5  |     |     |    |             | Gt mostly altered to Chl; minor secondary Mus               |
| 4219       | McDonald Ridge              | 30 | 59  |      | 10 | 1  |     |     | X  |             | Feld altered; secondary Ep, Chl, sericite;<br>microcline    |
| 4236       | Mt Oldfield                 | 32 |     | 56   |    | 7  |     | 5   | X  |             | Opx slightly altered                                        |
| 4239       | 6 km NE of Mt.<br>Giddings  | XX | XX  |      | XX | XX |     | XX  | X  | Cpx, Ap, Z  | Strongly deformed: secondary Gt; Cpx exsolution<br>lamellae |
| 4242       | 8 km E of Mt.<br>Giddings   | 35 | 65  |      |    | X  | X   |     | X  | Z           | Gt part altered to Bi                                       |
| 4246B      | Pythagoras Peak             | 40 |     |      | 51 | 9  | X   |     | X  | Ru          | Secondary Bi                                                |
| 4260       | 7 km SSW of Mt.<br>Renouard | 50 | 25  |      |    | 18 | X   | 6   | 1  |             | Opx slightly altered; metasediment                          |
| 4266       | Fyfe Hills                  | 20 |     |      | 55 | 12 |     | 8   | 3  | Ap, Cpx(2)  | Secondary Gt; part sheared                                  |
| 4270       | McIntyre Is.                | 16 |     |      | 60 | 10 |     |     | 4  | Ap          | Cpx(10); secondary Gt rims Op, Cpx; little or<br>no Opx     |
| 4292A      | Newman Ntks                 | 40 |     | 59   |    | X  | 1   |     |    |             | Most Bi may replace Opx; Gt slightly altered                |
| 4302       | Mt. Codrington              | 35 | 40  |      | 20 | 3  | 0.5 | 1.5 | X  | Z           | Gt rims Opx; Opx part altered                               |
| 4303       | Wordie Ntk.                 | 31 |     | 65   |    | 3  | 1   |     | X  | Z           | Secondary Bi                                                |
| 4306       | Mt. Bliscoe                 | 38 |     | 60   |    | 2  |     |     |    | Z           |                                                             |

NAPIER COMPLEX GARNET-QUARTZ-FELDSPAR GNEISSES

| Sample No. | Locality                      | Qz | Ksp | Meso | Pl | Gt  | Bi | Opx | Op | Accessories          | Remarks                                                                                     |
|------------|-------------------------------|----|-----|------|----|-----|----|-----|----|----------------------|---------------------------------------------------------------------------------------------|
| 77284311   | Rudmose-Brown Peak            | 35 | 57  |      | 5  | 2   |    | 1   | X  | Z                    | Opx altered; moraine                                                                        |
| 4312       | Rudmose-Brown Peak            | 27 |     |      | 43 | 10  | 10 |     | X  |                      | Altered Gt and Feld (mostly Pl?); sericite (10)                                             |
| 4315       | Mt. Oldfield                  | 40 |     | 45   |    | 15  | X  |     | X  | Z, Ru                |                                                                                             |
| 4320       | 7 km NW of Mt.<br>Brockelsby  | 27 | 53  |      | 8  | 6   |    | 6   | X  | Ap, Z                | New Gt                                                                                      |
| 4321       | 7 km NW of Mt.<br>Brockelsby  | 30 | 54  |      | 5  | 9   | 2  |     | X  | Ap, Z                | Secondary Bi; part recrystallised                                                           |
| 4337       | Gage Ridge                    | 40 |     | 48   |    | 7   | X  | 5   | X  | Z                    | Secondary Bi                                                                                |
| 4358       | Khmara Bay (SH213)            | 5  | 73  |      | 5  | 7   |    | 7   | 3  | Ap                   |                                                                                             |
| 4391       | Mt. Kjerringa                 | 36 |     | 60   |    | 2   | 1  |     | 1  | Z                    | Secondary Bi                                                                                |
| 4418       | Mt. Currie                    | 23 | 20  |      | 37 | 10  | 2  | 8   | X  | Ap                   | Some secondary Bi and Gt                                                                    |
| 4419       | Mt. Merrick                   | 33 |     |      | 64 |     | X  | 3   | X  | Ap, Z                |                                                                                             |
| 4424       | Mt. Hardy                     | 40 |     |      | 50 | 5   |    | 5   | X  | Z                    |                                                                                             |
| 4477       | Reference Peak                | 32 |     |      | 52 | 7   |    | 9   | X  |                      |                                                                                             |
| 4478       | Beaver Is.                    | 30 |     | 69   |    | 1   |    |     |    |                      | Grain boundaries sutured                                                                    |
| 4488       | 3 km W of<br>Hydrographer Is. | 35 |     | 58   |    | 3   | X  |     | X  | Cpx(3), Hb(1), Ap, Z | Sheared and recrystallised; secondary Gt                                                    |
| 4489       | 6 km SW of<br>McIntyre Is.    | 33 | XX  | X    | XX | 0.5 | 3  |     | X  | Hb, Z                | Sheared and recrystallised; green and brown<br>Bi replaces Gt and ?Pyx; Meso + Ksp + Pl(63) |

## NAPIER COMPLEX GARNET-QUARTZ-FELDSPAR GNEISSES

| Sample No. | Locality                 | Qz | Ksp | Meso | Pl | Gt | Bl | Opx | Op | Accessories   | Remarks                                                 |
|------------|--------------------------|----|-----|------|----|----|----|-----|----|---------------|---------------------------------------------------------|
| 77284490   | Thorp Ridges             | 40 | 15  |      | 5  | 27 | 2  | 5   | X  | Z             | Secondary Bl + Mus + Chl; microcline; Feld part altered |
| 4492       | Thorp Ridges             | 30 | 56  |      | 12 | 2  |    |     |    |               | Secondary Mus + Chl; microcline                         |
| 4502       | 3 km of Mt. Denham       | 30 | 67  |      | 3  |    |    |     |    |               |                                                         |
| 4509       | Fyfe Hills               | 28 | 55  |      |    | 7  | 1  | X   | 4  | Hb(1), Cpx(4) | Secondary Gt                                            |
| 4522       | Hydrographer Is.         | 35 | 55  |      |    | 7  | 3  |     |    | Ru            |                                                         |
| 4524       | Hydrographer Is.         | 3  | 45  |      | 19 | 25 | 1  | 6   | 1  | Z             | Secondary Gt and Bl; recrystallised                     |
| 4532       | Newman Ntks              | 30 | 50  |      | 14 | 2  | X  | 4   | X  |               | Opx + Gt part altered                                   |
| 4533       | Newman Ntks              | 30 | 36  |      | 20 | 14 |    |     |    | Z             |                                                         |
| 4549       | Mt. Hardy                | 18 |     |      | 42 | 20 |    | 17  |    | Ru(2)         | Metasediment                                            |
| 4585       | McNaughton Ridges        | 30 |     | 69   |    | 1  |    |     |    |               |                                                         |
| 4627       | Mt. Hardy                | 32 |     |      | 58 | 6  | 1  | 3   | X  | Z             | Antiperthite near Meso; secondary Bl                    |
| 4656       | 4 km N of Geoffrey Hills | 34 |     |      | 60 | 1  | 2  | 1   | X  | Hb(2), Ap, Z  | New Gt                                                  |
| 4752       | Kirkby Head              | 30 |     |      | 55 | 7  | 1  | 5   | X  | Hb(2), Ap, Z  | Secondary Gt; Opx part altered                          |
| 4764       | Ushakov Ntks             | 33 | XX  | XX   |    | 4  |    |     | X  | Z             | Ksp + Meso(63); some recrystallisation                  |
| 4765       | Ushakov Ntks             | 35 |     | 63   |    | 1  |    | 1   | X  | Z             | Opx part altered; some secondary Gt                     |
| 4769       | Perov Ntks               | 30 | 65  |      |    | 3  | X  | 2   | X  | Z             | Some secondary Gt                                       |
| 4795       | 15 km SSW of Latham Peak | 35 | XX  | XX   |    | 5  |    |     | X  | Z             | Ksp + Meso (60)                                         |



NAPIER COMPLEX GARNET-QUARTZ-FELDSPAR GNEISSES

| Sample No. | Locality                    | Qz | Ksp | Meso | Pl | Gt | Bi | Opx | Op | Accessories                 | Remarks                            |
|------------|-----------------------------|----|-----|------|----|----|----|-----|----|-----------------------------|------------------------------------|
| 77284825   | Mt. Pardoe                  | 10 |     |      | 50 | 25 | X  | 15  | X  |                             | Gt rims Opx                        |
| 4832       | Mt. Trail                   | 30 | 69  |      |    | 1  |    |     | X  | Z                           | Part recrystallised                |
| 4834       | Mt. Trail                   | 8  |     |      | 62 | 15 | X  | 10  | 1  | Ap(3)                       |                                    |
| 4842       | 1 km SW of McIntyre Is.     | 33 |     | 65   |    | 2  |    |     |    | Z                           |                                    |
| 4844       | 1 km SW of McIntyre Is.     | 11 |     |      | 60 | 14 | X  | 10  | 1  | Hb(1.5), Ap(1),<br>Cpx(0.5) | Secondary Gt                       |
| 4850       | 16 km SSW of Latham<br>Peak | 35 | 62  |      |    | 3  |    | 1   | X  | Z                           | New Gt                             |
| 78285030   | Mt. George                  | 30 |     | 67   |    | 3  |    |     | X  | ?Mon                        |                                    |
| 80285034   | Mt. Hardy                   | 33 |     | 53   |    | 7  | X  | 7   | X  |                             |                                    |
| 5040E2     | Fyfe Hills                  | 26 | 28  |      | 30 | 5  | 1  | 9   | 1  | Ap, Cpx                     | Secondary Bi; layered; Gt rims Opx |

NAPIER COMPLEX METASEDIMENTS

| Sample No. | Locality          | Qz | Ksp | Meso | Pl | Gt | Opx | Sl | Sa | Os | Cd | Bi | Sp | Op | Accessories | Remarks                                                      |
|------------|-------------------|----|-----|------|----|----|-----|----|----|----|----|----|----|----|-------------|--------------------------------------------------------------|
| 7283       | Mt. Riiser-Larsen | 60 |     |      |    |    | 10  |    |    |    |    |    |    | 30 |             | Mt-rich ironstone                                            |
| 65280151   | Mt Mueller        | 40 | 34  |      |    | 24 |     | X  |    |    |    |    | 1  | 1  |             | Sp + Qz; Sl rims Sp                                          |
| 187        | Cook Ntks         | 50 |     |      |    |    | 10  |    |    |    |    |    |    | 30 | Ap          | Cpx(10); Mt-rich ironstone;<br>?Napier Complex.              |
| 195        | 10 km N of Mt.    |    |     |      |    |    |     |    |    |    |    |    |    |    |             |                                                              |
|            | Storegutt         | 45 | 28  |      | 12 | 3  |     |    |    |    | 11 | 1  |    | X  | Z           | Cd part altered                                              |
| 75830025   | Newman Ntks       | 10 |     |      |    |    | 65  |    |    |    |    |    |    | 25 |             | Mt-rich ironstone                                            |
| 26         | Newman Ntks       | 50 |     |      |    |    | 35  |    |    |    |    |    |    | 15 |             | Mt-rich ironstone                                            |
| 28         | Newman Ntks       | 30 |     |      |    |    |     |    |    |    | 70 | X  |    | X  | Z           | Cd part altered                                              |
| 31         | Newman Ntks       | 73 |     |      |    |    | 12  |    |    |    |    |    |    | 15 |             | Mt-rich ironstone; minor<br>secondary Amp                    |
| 32         | Newman Ntks       | 65 |     |      |    |    | X   |    |    |    |    |    |    | 30 |             | Mt-rich ironstone; ?Opx +<br>secondary Amp (5)               |
| 35         | Newman Ntks       | 60 |     |      |    |    | 8   |    |    |    |    |    |    | 30 |             | Mt-rich ironstone; secondary<br>Amp (2)                      |
| 36         | Newman Ntks       | 50 |     |      | 14 |    | 25  |    |    |    | 8  | 3  |    | X  | Z           | Cd-rich symplectite may<br>replace Os                        |
| 47         | Newman Ntks       | 45 |     |      |    |    | 25  |    |    |    | 30 | X  |    | X  |             | Layered; coarse Cd rimmed by<br>symplectite and part altered |
| 48         | Newman Ntks       |    |     |      | X  | XX | XX  |    |    |    | X  | XX | X  | X  |             | An 40                                                        |

NAPIER COMPLEX METASEDIMENTS

| Sample No. | Locality         | Qz | Ksp | Meso | Pl | Gt | Opx | Sl | Sa | Os | Cd | Bl | Sp | Op | Accessories | Remarks                                      |
|------------|------------------|----|-----|------|----|----|-----|----|----|----|----|----|----|----|-------------|----------------------------------------------|
| 205        | Mt. Mueller      | 24 |     | 60   |    |    | 1   |    |    |    | 1  | 14 |    | X  |             | Meso + recrystallised Feld (60); Opx altered |
| 206        | Mt. Mueller      |    |     |      |    |    |     | 10 |    |    | 40 | 45 |    |    | Z           | Cor (5)                                      |
| 207        | Mt. Mueller      |    |     |      | 50 |    | 5   |    |    |    |    | 43 |    | 2  | Z           | Opx rimmed by Bl; An35                       |
| 208        | Mt. Mueller      | 50 |     |      |    |    | 5   |    |    |    |    |    |    | 15 | Ap(2)       | Cpx(28); Mt-rich ironstone                   |
| 210        | Mt. Mueller      | 2  | 2   |      |    | 95 |     |    |    |    |    | X  |    | 1  |             |                                              |
| 212        | Mt. Mueller      | 44 |     |      |    | 50 | 6   |    |    |    |    |    |    | X  |             |                                              |
| 213        | Mt. Mueller      | 42 | 2   |      | 8  | 40 | 8   |    |    |    |    |    |    | X  | Ap,Z        |                                              |
| 220        | Mt. Mueller      | 60 | 6   |      | 10 | 2  | 1   |    |    |    | 20 | 1  |    | X  | Ru,Z        |                                              |
| 224        | Mt. Mueller      |    | X   |      | X  | XX | XX  |    |    |    | X  |    |    |    |             | Pl + Opx + Ksp symplectite; pegmatite        |
| 226        | Mt. Breckinridge |    |     |      | 7  |    |     |    |    |    |    |    |    | 18 | Ap,Z,Hb     | Cpx(75); Mt-rich ironstone                   |
| 232        | Mt. Breckinridge |    |     |      | X  |    |     | XX |    |    |    | XX |    |    |             | Altered: secondary Bl + sericite; Cor(xx)    |
| 76283035   | Mt. Douglas      | 50 |     |      |    | 25 | 25  |    |    |    |    |    |    | X  |             |                                              |
| 3080       | Mt. Coddington   | 60 | 5   |      |    | 30 | 5   |    |    |    |    | X  |    | X  |             |                                              |
| 3081       | Mt. Coddington   | 80 |     |      |    | 18 |     |    |    |    |    |    |    | 2  |             |                                              |
| 3086       | Proclamation Is. | 40 | 42  |      |    | 10 | 2   | X  |    |    | 2  | 4  | X  | X  |             |                                              |
| 3123       | Fyfe Hills       | 64 |     |      |    | 18 |     | 15 |    |    |    |    |    | X  | Ru          | Minor altered ?Cd; Gt part altered           |
| 3124       | Fyfe Hills       | XX | XX  |      | XX | XX |     | X  |    |    |    | XX |    | X  | Z           | Sheared, altered                             |
| 3125       | Fyfe Hills       | 45 | ?   |      | 35 | 10 |     | 2  |    |    |    | 8  |    | X  | Z           | Recrystallised                               |



## NAPIER COMPLEX METASEDIMENTS

| Sample No. | Locality                    | Qz | Ksp | Meso | Pl | Gt | Opx | Sl | Sa | Os | Cd | Bl | Sp | Op | Accessories | Remarks                                                            |
|------------|-----------------------------|----|-----|------|----|----|-----|----|----|----|----|----|----|----|-------------|--------------------------------------------------------------------|
| 76283127   | Fyfe Hills                  | 55 |     |      | X  | 3  |     |    |    |    | 10 | 3  |    | 1  | Z           | Sheared; Ky(XX), Gedrite(10)                                       |
| 3128       | Fyfe Hills                  | XX |     |      |    | XX |     |    |    |    | XX | X  |    | X  | Z, Ru       | Sheared; Ky(XX), Gedrite<br>(XX); Interlayered with<br>amphibolite |
| 3133       | Fyfe Hills                  | 35 |     | 52   |    | 7  |     | 6  |    |    |    | X  |    | X  | Z, Ru       |                                                                    |
| 3135       | Fyfe Hills                  | 30 |     |      |    | 30 | 30  |    |    |    |    |    |    | 10 |             | Mt-rich                                                            |
| 3139       | Fyfe Hills                  | 42 |     |      | X  | 35 | 20  |    |    |    |    |    |    | 3  |             | Layered                                                            |
| 3140       | Fyfe Hills                  | 35 |     |      |    | 40 | 20  |    |    |    |    |    |    | 5  |             | Mt-rich                                                            |
| 3156       | Latham Peak                 | 35 |     |      |    |    |     |    |    |    |    |    |    | 30 | Ap          | Altered Ironstone: Amp(35)<br>replaces ?Opx                        |
| 3165       | Latham Peak                 | 20 |     |      |    |    | 80  |    |    |    |    |    |    | X  |             |                                                                    |
| 3174       | Latham Peak                 |    | 30  |      | 10 |    | 7   |    | 15 |    | 15 | 20 | 3  |    | Z           | Pleochroic Cd                                                      |
| 3175       | Latham Peak                 |    | 30  |      |    |    | 20  |    | 5  |    | 5  | 20 | 20 |    |             | Sa rims Sp                                                         |
| 3176       | Latham Peak                 |    | 22  |      | 22 |    | 22  |    | 5  |    | 3  | 14 | 12 |    |             | Layered                                                            |
| 3194       | McLeod Ntks                 | 50 |     |      |    | X  | 30  |    |    |    |    |    | 20 |    |             | Mt-rich Ironstone                                                  |
| 3195       | McLeod Ntks                 |    |     |      | 2  | 36 | 60  |    |    |    |    | 2  | X  | X  |             |                                                                    |
| 3216       | Mt. Denham                  | 25 |     |      |    | 48 | 25  |    |    |    |    |    |    | 2  |             |                                                                    |
| 3219       | Mt. Renouard                | 72 |     |      |    | 28 |     |    |    |    |    |    |    | X  | Z, Ru       |                                                                    |
| 3220       | Mt. Renouard                | 65 | 10  |      |    | 25 | X   |    |    |    |    |    |    | X  | Z           |                                                                    |
| 3235       | 3 km SSW of Mt.<br>Torckler | 8  | 40  |      |    | 30 |     | 10 | 1  |    | 6  | 3  | X  | X  | Z, Ru       | Sp in Gt, Sl; Sa in Gt, Sl,<br>Ksp; no Sa + Qz                     |

NAPIER COMPLEX METASEDIMENTS

| Sample No. | Locality                 | Qz | Ksp | Meso | Pl | Gt | Opx | Sl | Sa | Os | Cd | Bl | Sp  | Op | Accessories | Remarks                                       |
|------------|--------------------------|----|-----|------|----|----|-----|----|----|----|----|----|-----|----|-------------|-----------------------------------------------|
| 76283236   | 3 km SSW of Mt. Torckler | 35 |     |      | 25 | 25 |     | 14 |    |    |    |    | 0.5 | 1  |             | Sl + Gt rims Sp; Ksp(8)<br>In antiperthite    |
| 3237       | 3 km SSW of Mt. Torckler | 26 | 22  |      |    | 25 |     | 25 |    |    |    |    | X   | 1  |             | Sp in Gt, Sl                                  |
| 3238       | 3 km SSW of Mt. Torckler | 48 |     | 2    |    | 22 |     | 26 |    |    |    |    | 1   | 1  | Ru          | Sp in Gt, Sl                                  |
| 3254       | Mt. Stadler              | 40 |     |      |    |    | 35  |    |    |    |    |    |     | 25 |             | Mt-rich ironstone; Cpx<br>exsolved from Opx   |
| 3255       | Mt. Stadler              | 60 |     |      |    |    | 20  |    |    |    |    |    |     | 20 |             | Mt-rich ironstone; Cpx<br>exsolution lamellae |
| 3262       | SH 945                   | 72 |     |      |    | 8  |     | 5  |    | 14 |    | X  | 1   |    | Ru          | Sp + Qz; Os altered                           |
| 3263       | SH 945                   | 50 |     |      | 5  | 44 |     |    |    |    |    |    |     | 1  |             |                                               |
| 3265       | SH 945                   | X  |     | 22   | 2  | 60 |     | 5  |    |    |    |    | 10  | 1  | Ru          | Layered                                       |
| 3266       | SH 945                   | 65 |     |      |    | 14 |     | 13 |    | 8  |    |    | X   |    | Ru          | Os altered                                    |
| 3268       | SH 945                   | 42 |     | 55   |    | 1  |     | 2  |    |    |    |    |     |    |             |                                               |
| 3270       | SH 945                   | 58 |     |      |    | 40 |     |    |    |    |    |    |     | 2  | Ru          |                                               |
| 3278       | Mt. Jewell               | 25 |     |      |    | 15 | 55  |    |    |    | 5  |    |     | X  | Z, Ru       |                                               |
| 3285       | Mt. Jewell               | 50 |     |      | X  | 15 | 20  |    |    |    |    |    |     | 15 |             | Mt-rich ironstone                             |
| 3286       | Mt. Jewell               | 50 |     |      |    | 15 | 20  |    |    |    |    |    |     | 15 |             | Mt-rich ironstone                             |
| 3308       | Oblachnaya Ntk.          |    | 5   |      |    | 75 |     |    |    |    |    | 20 |     | X  |             |                                               |

## NAPIER COMPLEX METASEDIMENTS

| Sample No. | Locality | Qz | Ksp | Meso | Pl | Gt | Opx | Sl  | Sa | Os | Cd | Bl | Sp | Op | Accessories | Remarks                                                                  |
|------------|----------|----|-----|------|----|----|-----|-----|----|----|----|----|----|----|-------------|--------------------------------------------------------------------------|
| 76283350   | SH 945   | 16 |     |      |    | 20 |     | 4   | 25 | 33 |    |    | 1  |    | Ru(1)       | Os altered; Cd + Sl + Gt rim Sa; Sa + Qz                                 |
| 3351       | SH 945   | 13 |     |      |    | 20 |     | 5   | 25 | 36 |    |    | 1  | X  | Ru          | Os altered; Cd + Sl + Gt rim Sa; Sa + Qz                                 |
| 3352       | SH 945   | 78 |     |      |    |    | 3   | 3   | 6  | 10 |    |    |    |    | Ru          | Aluminous layers in quartzite; Os altered; Cd + Sl + Opx rim Sa; Sa + Qz |
| 3353       | SH 945   | 81 |     |      |    |    | 4   | 1   | 8  | 6  |    |    |    |    | Ru          | Aluminous layers in quartzite; Os altered; Sa + Qz                       |
| 3354       | SH 945   | 4  |     |      |    | 45 | 45  |     |    | 2  |    | 4  |    |    | Ru          | Os altered; Bl part secondary                                            |
| 3355       | SH 945   | 15 |     |      |    | 40 | 13  | X   |    | 15 |    | 15 |    |    | Ru(2)       | Os altered; Bl part secondary                                            |
| 3356       | SH 945   | 70 |     |      |    | 1  | 13  | X   | X  | 10 | 5  | X  |    | X  | Ru, Mon     | Os altered; coarse Cd pos. secondary                                     |
| 3357       | SH 945   | 66 |     |      |    | 2  | 1   | 0.5 | 10 | 14 | 6  |    |    |    | Ru, Z       | Os altered, Sl rims Sa; coarse Cd                                        |
| 3358       | SH 945   | 45 |     |      |    | 10 |     | 6   | 3  | 35 |    |    | 1  |    | Ru, Z       | Os part altered (some fresh); Sp + Qz                                    |
| 3358       | SH 945   | 68 |     |      |    | 11 |     |     |    | 20 |    |    | 1  |    | Ru, Z       | Os part altered; Sp + Q                                                  |
| 3359       | SH 945   | 54 |     |      |    | 8  | 2   | 4   | 12 | 20 |    |    |    |    | Ru, Z       | Layered; Cd + Sl + Cd rim Sa + Qz; Os altered                            |
| 3360       | SH 945   | 70 |     |      |    | 6  |     | 2   | 3  | 19 |    |    |    |    | Ru          | Os altered; Sa + Qz                                                      |



NAPIER COMPLEX METASEDIMENTS

| Sample No. | Locality | Qz | Ksp | Meso | Pl | Gt | Opx | Sl | Sa  | Os | Cd | Bl | Sp | Op | Accessories | Remarks                                                          |
|------------|----------|----|-----|------|----|----|-----|----|-----|----|----|----|----|----|-------------|------------------------------------------------------------------|
| 76283361   | SH 945   | 67 |     |      |    | 12 | 2   | 6  |     | 5  | X  | 8  | X  |    | Ru, Hm      | Layered; Bl + Sl part secondary; Os + secondary Cd + Opx altered |
| 3362       | SH 945   | 40 |     |      |    | 4  | 4   | 4  | 8   | 40 |    |    | X  |    | Ru          | Sl + Opx; Sa + Q; Os altered; Sl + Opx + Gt + Cd rim Sa          |
| 3363       | SH 945   | 25 |     |      |    | 4  | 3   | 16 | 17  | 35 |    |    | X  |    | Ru          | Sl + Opx; Sa + Q; Os altered                                     |
| 3364       | SH 945   | 60 |     |      | 6  | 14 | 20  |    |     |    |    |    |    | X  | Ru          | Opx selvage to Gt-rich layer                                     |
| 3365       | SH 945   | 25 | X   |      |    | 40 | 12  | 3  | 8   | 12 |    |    |    |    | Ru, Z       | Layered; Os altered; no Sa + Qz                                  |
| 3366       | SH 945   | 35 |     |      |    | 18 | 10  | 5  | 12  | 20 |    |    |    |    | Ru          | Layered; Os altered                                              |
| 3367       | SH 945   | 64 |     |      |    | 1  | 2   | 5  | 8   | 20 |    |    |    |    | Ru          | Layered; Os altered; Sa + Qz; Gt + Sl rim Sa                     |
| 3368       | SH 945   | 50 |     |      |    | 2  |     | 4  | 44  |    |    |    |    | X  | Ru(1)       | Gt + Sl rim Sa; Sa + Qz                                          |
| 3368A      | SH 945   | 70 |     |      |    | 13 | 1.5 | 2  | 3.5 | 10 |    | X  | X  |    | Ru, Z       | Os altered; Sa + Qz; some coarse Cd.                             |
| 3369       | SH 945   | 76 |     |      |    |    | 9   | 3  |     | 12 |    |    |    |    | Ru, Z       | Os altered; Opx + Sl                                             |
| 3370       | SH 945   | 70 |     |      |    |    | 7   |    |     | 16 | 7  | X  |    |    | Ru          | Os altered; coarse Cd pcs. secondary                             |
| 3371       | SH 945   | 13 |     |      |    | 4  |     | 11 | 35  | 37 |    |    |    |    | Ru(1), Mon  | Os altered; Sa + Qz; Gt + Sl rim Sa                              |
| 3372       | SH 945   | 52 |     |      |    | 3  |     | 7  | 28  | 17 |    |    |    |    | Ru(1), Z    | Os altered; Sa + Qz rim Sa                                       |

## NAPIER COMPLEX METASEDIMENTS

| Sample No. | Locality                  | Qz | Ksp | Meso | Pl | Gt | Opx | Sl | Sa | Os | Cd | Bl | Sp | Op | Accessories         | Remarks                                         |
|------------|---------------------------|----|-----|------|----|----|-----|----|----|----|----|----|----|----|---------------------|-------------------------------------------------|
| 77283448   | SH 945                    | 5  |     |      |    | 52 |     | 12 | 17 | 12 | X  | X  | 1  |    | Ru(1), Z            | Os altered; some coarse Cd                      |
| 3449       | SH 945                    | 31 |     |      |    | 5  | 12  | 2  | 25 | 23 | X  | 1  | X  |    | Ru(1)               | Layered; Os altered; Sa +<br>Qz; secondary Bl   |
| 3450       | 4 km SE of<br>Mt. Selwood | 25 |     | 50   | 5  | 9  |     |    |    |    | 3  | X  | 5  | 1  | Ru(1), Cor(1),<br>Z | Layered                                         |
| 3451       | 4 km SE of<br>Mt. Selwood | 5  |     | 70   | 10 | 9  |     |    |    |    |    |    | 5  | 1  | Cor                 | Layered                                         |
| 3452       | 4 km SE of<br>Mt. Selwood | 20 |     | 56   | 7  | 8  | 2   | X  |    |    | 2  |    | 4  | 1  | Ru, Cor             | Layered; Il; ?Opx altered                       |
| 3453       | 4 km SE of<br>Mt. Selwood | 60 |     |      | 24 | 8  |     |    |    |    |    |    |    | X  | Ru, Z               | Layered; Hm +Il + Mt;<br>altered ?Opx or ?Cd(8) |
| 3459       | 6 km E of<br>Mt. Selwood  | 32 |     | 60   |    | 5  |     | 2  |    |    |    |    | 1  |    | Ru                  |                                                 |
| 3460       | 6 km E of<br>Mt. Selwood  | 42 | 48  |      |    | 5  |     | 5  |    |    |    |    | X  |    | Ru, Z               |                                                 |
| 3461       | 6 km E of<br>Mt. Selwood  | 42 | 45  |      |    | 8  |     | 3  |    |    | X  |    | 1  | X  | Ru(1), Z, ?Cor      | Altered ?Cd                                     |
| 3466       | Mt. Sones                 | 12 | 20  |      |    | 30 |     | 7  |    | 30 |    | X  | 1  | X  | Ru                  | Part sheared; secondary Bl;<br>Os altered       |
| 3469       | Mt. Sones                 | 40 | 30  |      |    | 20 |     | 10 |    |    |    |    | X  |    | Ru                  | Slightly sheared                                |

NAPIER COMPLEX METASEDIMENTS

| Sample No. | Locality                  | Qz | Ksp | Meso | Pl | Gt | Opx | Sl | Sa | Os | Cd | Bl | Sp | Op | Accessories | Remarks                                              |
|------------|---------------------------|----|-----|------|----|----|-----|----|----|----|----|----|----|----|-------------|------------------------------------------------------|
| 77283506   | Mt. McLennan              |    |     |      | 75 |    | 23  |    | X  |    |    | 2  |    |    |             | Sa in Opx and as rims                                |
| 3513       | Mt. Mateer                | 40 |     |      |    |    | 47  |    |    |    |    |    |    | 10 |             | Mt-rich; Cpx(3); moraine                             |
| 3519B      | Mt. Bartlett              |    | XX  |      |    |    | XX  |    | XX | XX | XX |    |    |    | Ru          | Os altered; ?secondary Cd;<br>Sa + Opx intergrowths  |
| 3519C      | Mt. Bartlett              |    | ?   |      |    |    | XX  |    | XX | XX | XX | X  |    |    | Ru          | Os altered; some coarse Cd;<br>Sa + Opx intergrowths |
| 3519D      | Mt. Bartlett              | XX |     |      |    |    | XX  |    | XX | XX | XX | X  |    |    | Ru, Z       | Os part altered; Qz in<br>separate layer             |
| 3519F      | Mt. Bartlett              | XX |     |      |    |    | XX  |    | XX | XX | X  | X  |    |    | Ru          | Os part altered; no Sa + Qz                          |
| 3519H      | Mt. Bartlett              | XX | ?   |      |    |    | XX  |    | XX | XX | XX |    |    | X  | Ru, Z       | Qz in separate layer;<br>Os altered                  |
| 3519I      | Mt. Bartlett              |    | XX  |      |    |    | XX  |    | XX | XX | XX |    | X  |    | Ru, Z       | Os part altered                                      |
| 3519J      | Mt. Bartlett              |    | XX  |      |    |    | XX  |    | XX | X  | X  | XX |    |    | Ru          | Os altered                                           |
| 3526       | SH 945                    | 58 |     |      |    |    | 12  | X  | 14 | 12 | 4  |    |    |    | Ru, Z       | Os altered; some coarse Cd;<br>Sa + Qz               |
| 3528       | SH 945                    | 24 |     |      | 40 | 24 |     | 12 |    |    |    | X  | X  | X  | Ru          |                                                      |
| 3530       | SH 945                    | 20 | X   |      | 30 | 20 |     | 15 |    | 15 |    |    | X  |    | Ru          |                                                      |
| 3532       | 4 km SE of<br>Mt. Selwood | XX |     |      | XX | XX | XX  |    |    |    |    |    | X  | X  |             |                                                      |
| 3533       | 4 km SE of<br>Mt. Selwood | X  | 78  |      | 5  | 12 |     |    |    |    |    |    | 4  | X  | Z, Cor      | Layered                                              |



NAPIER COMPLEX METASEDIMENTS

| Sample No. | Locality                  | Qz | Ksp | Meso | Pl | Gt | Opx | Sl | Sa | Os | Cd | Bl | Sp | Op | Accessories | Remarks                                 |
|------------|---------------------------|----|-----|------|----|----|-----|----|----|----|----|----|----|----|-------------|-----------------------------------------|
| 77283536   | 4 km SE of<br>Mt. Selwood | 4  |     | 66   |    | 14 |     | 10 |    |    |    |    | 6  | X  | Ru          | Layered; Pl + Ksp + Meso                |
| 3539       | 4 km SE of<br>Mt. Selwood | 60 |     |      | 30 | 10 |     |    |    |    |    |    |    | X  |             | Layered; Gt part altered                |
| 3542       | 6 km E of<br>Mt. Selwood  | 25 | 35  |      |    | 24 |     | 12 | X  |    | 3  |    | X  | X  | Ru          | Cd altered                              |
| 3544       | 6 km E of<br>Mt. Selwood  | X  | 88  |      |    | 10 |     | X  |    |    |    |    | 2  |    |             |                                         |
| 3545       | 6 km E of<br>Mt. Selwood  | 28 |     | 60   |    | 9  |     | X  | X  |    | X  |    | 3  |    | Ru          | Layered; Sa in Feld; Pl +<br>Ksp + Meso |
| 3549       | Mt. Sones                 | 30 | 58  |      |    | 6  |     | 6  |    |    | X  |    |    | X  | Ru          | Layered                                 |
| 3550       | Mt. Sones                 | 25 | 35  |      |    | 25 |     | 15 |    |    | X  |    | X  |    | Ru          | Layered                                 |
| 3552       | Mt. Sones                 |    |     |      | 50 | 20 | 30  |    |    |    |    |    |    | X  |             | Layered                                 |
| 3553       | Mt. Sones                 |    |     | 16   |    | 25 | 3   |    | 25 | 22 | 8  | X  |    | X  | Ru(1)       | Moraine; Os altered;<br>coarse Cd       |
| 3587       | Rippon Depot              |    |     | 9    |    | 45 |     |    |    |    |    | 45 | 1  |    |             |                                         |
| 3588       | Rippon Depot              |    | 76  |      |    | 33 |     |    |    |    |    | 54 | 7  |    |             | Late Gt                                 |
| 3597       | Crohn Is.                 | 7  |     | 10   | X  | 50 | 30  |    |    |    |    |    |    | 3  |             | Part recrystallised; Pl +<br>Meso       |

NAPIER COMPLEX METASEDIMENTS

| Sample No. | Locality           | Qz | Ksp | Meso | Pl | Gt | Opx | Sl | Sa | Os | Cd | Bl | Sp | Op | Accessories | Remarks                                                    |
|------------|--------------------|----|-----|------|----|----|-----|----|----|----|----|----|----|----|-------------|------------------------------------------------------------|
| 77283603   | Mt. Tomlinson      | 30 | 65  |      |    | 2  |     | 1  |    |    | 1  |    | 1  |    |             | Cd rims Sl and Sp; Gt rims Sp                              |
| 3604       | Mt. Tomlinson      | 15 |     |      |    | 45 | 40  |    |    |    | X  | X  |    |    | Ru          | Opx + Cd rim Gt                                            |
| 3606       | Mt. McLennan       | 50 |     |      |    |    | 30  |    |    |    |    |    |    | 20 | Ap          | Mt-rich ironstone; Cpx<br>exsolution lamellae in Opx       |
| 3612       | Mt. Bartlett       |    | X   |      |    |    | 30  |    | 10 | XX | XX |    |    |    | Ru, Z       | Altered Os + ?secondary Cd<br>(60); Sa + Opx intergrowths  |
| 3624       | Harvey Ntks        | 45 |     |      | 15 | 15 |     | 20 |    |    |    | 5  |    | X  | Ru, Z       | Gt part altered; secondary<br>Bl, Mus                      |
| 3627       | Harvey Ntks        | 60 |     |      |    |    | 20  |    |    |    |    |    |    | 15 | Ap          | Mt-rich ironstone; Cpx(5)<br>partly as exsolution lamellae |
| 3635       | 1 km E of Mt. Reed | 35 |     | 35   |    | 15 |     | 15 |    |    |    |    | X  | X  | Ru          |                                                            |
| 3638       | 1 km E of Mt. Reed | XX |     |      | X  |    | XX  | X  | XX | XX | X  | X  |    |    | Ru          | Sa + Qz; Os altered;<br>secondary Cd and Bl                |
| 3679       | Mt. Tod            | XX | XX  |      | XX |    | ?   | XX |    |    | ?  |    |    |    | Ru          | ?Opx + Sl; part<br>recrystallised                          |
| 3686       | Crohn Is.          | 40 |     |      | 20 | 20 | 20  |    |    |    | X  |    |    |    | Ru          | Sheared and recrystallised                                 |
| 3690       | Beaver Is.         | 10 |     |      | 56 | 25 | 1   | 5  | 3  |    | X  | X  | X  |    | Ru          | Sa + Qz; secondary Bl, Opx +<br>Sl, and ?Cd; Pl near Meso  |

NAPIER COMPLEX METASEDIMENTS

| Sample No. | Locality     | Qz | Ksp | Meso | Pl | Gt | Opx | Sl | Sa | Os | Cd | Bl | Sp | Op | Accessories | Remarks                                                        |
|------------|--------------|----|-----|------|----|----|-----|----|----|----|----|----|----|----|-------------|----------------------------------------------------------------|
| 77283695   | Bowl Is.     | 45 | ?15 |      |    | 20 | 15  |    |    |    | X  |    |    |    | Ru          | Alt ?Ksp(15); Gt partly replaced by Bl + Mus + Chl             |
| 3696       | Bowl Is.     | 30 | 30  |      |    | 20 |     | 20 |    |    |    | X  | X  |    | Ru          | ?Secondary Bl                                                  |
| 3697       | Mt. Giddings | XX | X   |      | XX | XX | X   | XX |    |    | X  |    |    | X  | Ru          | Secondary Opx, Cd in intergrowths                              |
| 3703       | Howard Hills | XX |     |      |    |    | ?   |    |    |    |    |    |    | XX |             | Mylonized ironstone                                            |
| 3705       | Howard Hills | 30 | 58  |      | 6  | 1  |     | X  |    |    |    |    |    |    |             | Secondary Bl + Mus + Sl replace ?Os or Cd; Gt part altered     |
| 3706       | Howard Hills | 73 |     |      |    | 10 | 7   |    |    |    |    |    |    | 10 |             | Mt-rich ironstone; part recrystallised                         |
| 3707       | Howard Hills | 52 |     |      |    | 20 | 10  |    |    |    |    |    |    | 18 |             | Mt-rich ironstone; recrystallised                              |
| 3708       | Howard Hills | 15 |     | 30   | 30 | 25 |     | X  |    |    |    |    | X  | X  | Ru, Z       | Layered; Sl inclusions in Gt                                   |
| 3719       | Mt. Gleadell | 38 |     |      |    | 15 |     | 8  |    |    |    | 9  |    | X  | Z, Ru, Hm   | Altered; minor Ky; secondary Bl; altered ?Feld (30)            |
| 3720       | Mt. Gleadell | 45 | 5   |      | 15 | 25 | 3   |    | 2  | ?X | 5  | X  |    |    | Z, Hm       | No Sa + Qz; coarse Meso; Cd may be secondary; some altered ?Os |
| 3729       | Crosby Ntks  | 50 |     |      |    |    | 12  |    |    | 38 |    | X  |    | X  | Ru, Z       | Os altered; secondary Bl                                       |



NAPIER COMPLEX METASEDIMENTS

| Sample No. | Locality           | Qz | Ksp | Meso | Pl | Gt | Opx | Sl | Sa | Os | Cd | Bi | Sp | Op | Accessories | Remarks                                          |
|------------|--------------------|----|-----|------|----|----|-----|----|----|----|----|----|----|----|-------------|--------------------------------------------------|
| 77283743   | Mt. Hollingsworth  | 40 |     |      | 37 |    | 15  | 5  | 2  |    |    | 1  |    |    | Ru,Z        | Sa + Qz; Opx + Sl; Opx + Sl rim Sa; secondary Bi |
| 3766       | Reference Peak     | XX | X   |      | XX | XX | XX  | X  | X  |    |    | XX |    |    | Ru          | No Sa + Qz; layered; Bi may be secondary         |
| 3773       | NW Wyers Ice Shelf |    |     |      | XX | XX |     |    |    |    |    | XX | X  | X  | ?Cor        | Xenolith in anorthosite; secondary Bi            |
| 3775       | NW Wyers Ice Shelf | 27 |     |      |    |    | 30  | 30 |    |    |    |    |    | 8  |             | Cpx(5); some exsolved Cpx; part recrystallised   |
| 3786       | Wyers Ntks         | 70 |     |      |    |    | 30  |    |    |    |    |    |    |    | Z           |                                                  |
| 3790       | Mt. Cronus         | 53 |     |      | 25 | 10 |     |    |    |    |    | 8  |    |    | ?Mon        | ?Ky(4); sheared; secondary Bi                    |
| 3792       | Mt. Griffiths      | 30 | 30  | X    | 20 |    | 14  |    |    |    | 6  | X  |    | X  | Z           | Some Meso                                        |
| 3795       | Mt. Griffiths      |    |     | XX   | XX | 3  | 20  |    |    |    | 56 | X  | X  | 1  | Z           | Pl + Meso(20); secondary Gt                      |
| 3918       | Tonagh Is.         | 77 |     |      |    |    | 10  | 10 |    |    |    |    |    | 3  |             |                                                  |
| 3919       | Tonagh Is.         | 80 |     |      |    |    |     | 8  |    |    |    |    |    | 12 | Ap          | Mt-rich                                          |
| 3930       | Tonagh Is.         | 18 |     | 10   |    | 70 |     | 2  |    |    |    |    |    | X  | Ru          |                                                  |
| 3937       | Mt. Pardoe         | 60 |     |      |    |    | 20  |    |    |    |    |    |    | 20 | Ap,Cpx      | Mt-rich ironstone; part recrystallised           |
| 3943       | Mt. Pardoe         | 37 |     | 47   |    |    | 6   | 6  |    |    | ?  | 3  |    |    | Ru(1),Z     | Part recrystallised; secondary Bi                |
| 3946       | Priestley Peak     | 31 | 40  |      |    | 10 |     | 18 |    |    |    |    |    | X  | Ru(1)       |                                                  |
| 3964       | Dobenham Peak      | 27 | 19  |      | 19 | 20 | 10  | 4  |    |    |    | 1  | X  | X  | Ru          | Layered                                          |

[illegible]

|          |                        |    |    |     |     |    |    |   |    |     |   |    |            |  |  |  |  |                                                 |
|----------|------------------------|----|----|-----|-----|----|----|---|----|-----|---|----|------------|--|--|--|--|-------------------------------------------------|
| 77283967 | 6 km SE of Mt. Charles | 29 | 70 | 0.5 | 0.5 |    |    |   |    |     |   |    |            |  |  |  |  | Part recrystallised                             |
| 3968     | 6 km SE of Mt. Charles | 27 | 33 |     | 20  | 20 |    |   | X  |     | X |    | Ru(1),Z    |  |  |  |  |                                                 |
| 3971     | Mt. Charles            | 40 | 12 |     | 10  | 10 | 13 |   | 5  |     | X |    | Ru,Z       |  |  |  |  | Recrystallised; Opx + Sl; new Gt; secondary Bl  |
| 3973     | Mt. Charles            | 30 | 52 |     | 6   | 3  | 2  |   | 3  | 4   |   |    | Ru         |  |  |  |  | Altered Cd round Gt                             |
| 3986     | Grimsley Peaks         |    |    | 75  |     | X  |    |   |    | 23  |   |    |            |  |  |  |  | Moraine; Pl + Meso; phlogopite; altered ?Opx(2) |
| 3995     | 3 km NE of Mt. Maines  |    |    |     |     | 50 |    |   | 30 | 20  | X | X  | Z          |  |  |  |  |                                                 |
| 3997     | 3 km NE of Mt. Maines  | 50 |    | 5   |     | 12 |    |   | 31 | 0.5 |   |    | Ru(1),Z,Ap |  |  |  |  | Cd + symplectite after ?Os                      |
| 4001     | Beaver Is.             | 35 | 30 |     | 15  | 5  | 15 |   | X  |     |   |    | Ru         |  |  |  |  | Sa + Oz; Gt + Sl + Cd rim Sa                    |
| 4002     | Beaver Is.             | 20 |    | 30  | 32  |    | 15 | 3 | X  |     |   |    | Ru         |  |  |  |  | Sa + Oz; Gt + Sl + Cd rim Sa                    |
| 4005     | Beaver Is.             | 28 |    |     | 30  | 30 |    |   |    |     |   | 12 |            |  |  |  |  | Mt-rich; sheared                                |
| 4006     | Beaver Is.             | 37 | 10 | 14  | 28  | 12 |    |   |    | 1   |   | X  |            |  |  |  |  |                                                 |
| 4007     | Beaver Is.             | 20 |    |     | 25  | 40 |    |   |    |     |   | 15 |            |  |  |  |  | Mt-rich ironstone; sheared                      |
| 4010     | Bunt Is.               | 30 | 44 |     | 20  | 6  |    |   |    |     | X |    | Ru         |  |  |  |  |                                                 |
| 4013     | Bowl Is.               | XX | XX | XX  | XX  | XX |    |   |    | XX  |   |    | Ru         |  |  |  |  |                                                 |
| 4015     | Mt. Giddings           | 56 | 4  |     | 25  | 15 |    |   |    | X   |   | X  | Ru         |  |  |  |  |                                                 |
| 4016     | Mt. Giddings           | 52 |    | 40  | 8   |    |    |   |    |     |   | X  | Ru,Z       |  |  |  |  |                                                 |

## NAPIER COMPLEX METASEDIMENTS

| Sample No. | Locality                 | Qz | Ksp | Meso | Pl | Gt | Opx | Sl | Sa | Os | Cd  | Bl | Sp | Op | Accessories | Remarks                                                     |
|------------|--------------------------|----|-----|------|----|----|-----|----|----|----|-----|----|----|----|-------------|-------------------------------------------------------------|
| 77284035   | NW Wvers Ice Shelf       | 73 |     | 20   |    |    | 6   |    |    |    |     |    |    | 1  |             |                                                             |
| 4048       | Wikinson Peaks           |    | XX  |      |    |    | XX  |    | XX |    | XX  | XX |    |    |             | Cd rims Sa; Sa + Opx<br>Intergrowths                        |
| 4053A      | Young Ntks               | XX | XX  |      |    | XX |     | XX |    |    | XX  | XX | X  |    |             | Sheared                                                     |
| 4054       | 10 km W of Young<br>Ntks |    |     |      |    |    | XX  |    | XX |    |     | XX | XX | X  | ?Ru         | Mg-rich layer (enstatite,<br>phlogopite)                    |
| 4055       | 10 km W of Young<br>Ntks |    |     |      |    |    | XX  |    | XX |    |     | XX | X  |    |             |                                                             |
| 4056A      | 10 km W of Young<br>Ntks |    |     |      |    |    | XX  |    | XX |    |     | XX | XX |    | ?Ru         |                                                             |
| 4056B      | 10 km W of Young<br>Ntks |    |     |      |    |    | XX  |    | XX |    | XX  | XX | XX |    |             | Cd rims Sa rims Sp                                          |
| 4057       | 10 km W of Young<br>Ntks | 40 |     |      |    |    | 25  |    |    |    | 35  |    |    |    | Ru,Z        | Cd + symplectite after Os?                                  |
| 4060       | 10 km W of Young<br>Ntks |    |     |      |    |    | 15  |    | 25 |    | 10  | 50 | X  |    |             | Relict Sp; Sa + Opx<br>Intergrowths                         |
| 4061       | Mt. Elkins               |    | X   |      |    |    | XX  |    | ?  |    |     | X  |    |    |             | Pos. Sa                                                     |
| 4062       | Mt. Elkins               |    |     |      |    |    | XX  |    | XX |    |     | XX | XX |    |             | Sa + Opx Intergrowths                                       |
| 4070       | Mt. Oldfield             |    |     |      | 42 |    | 7   |    | 46 |    |     |    | 5  | X  |             | Moraine                                                     |
| 4083       | Mt. Miller               | 27 | 44  |      |    | 18 |     | 7  |    |    |     |    | 4  | X  | Z           | Gt + Sl rim Sp                                              |
| 4085       | Mt. Miller               | 10 |     |      |    | 20 | 70  |    |    |    |     |    |    | X  |             |                                                             |
| 4096       | E of Mt. Stadler         | 30 | XX  |      | XX | 15 |     | 8  |    |    | X   |    | 1  | X  | Ru          | Pl + Ksp(46); secondary Cd                                  |
| 4098       | E of Mt. Stadler         | 75 |     |      | 8  | 7  |     |    |    | 5  |     | 5  |    |    |             | Os altered                                                  |
| 4102       | Mt. Bride                | 32 |     |      | 22 |    |     |    |    |    | ?12 | 20 |    |    | Ap,Z        | From near granite contact;<br>cumingtonite(14); altered ?Cd |



## NAPIER COMPLEX METASEDIMENTS

| Sample No. | Locality             | Qz | Ksp | Meso | Pl | Gt | Opx | Si | Sa | Os | Cd | Bl | Sp | Op | Accessories | Remarks                                                            |
|------------|----------------------|----|-----|------|----|----|-----|----|----|----|----|----|----|----|-------------|--------------------------------------------------------------------|
| 77284120   | Simpson Peak         | 48 |     |      | 3  |    |     |    |    |    |    | 1  |    | 2  |             | Altered; cummingtonite + Bl<br>+ green Amp(46) replace Pyx         |
| 4124       | Brusilov Ntks        | 50 |     | 5    |    |    | X   | X  |    | 45 |    |    |    |    | Z           | Os part altered                                                    |
| 4125       | Brusilov Ntks        | 50 |     | 5    |    |    |     | X  |    | 45 |    |    |    |    | Z           | Os part altered, but much<br>fresh                                 |
| 4148       | Simpson Peak         | 64 |     |      |    |    | 18  |    |    |    |    |    |    | 18 | Cpx, Ap     | Mt-rich ironstone                                                  |
| 4158A      | Wallis Ntks          | 27 | 10  |      | 8  | 4  |     | 2  |    |    | 46 | X  | 2  | 1  | Z           | Gt + Si rim Sp                                                     |
| 4158B      | Wallis Ntks          | 45 | 7   |      | 12 | 5  |     | 10 |    |    | 20 |    | X  | 1  | Z           | Si rims Sp; Si inclusions in<br>Gt                                 |
| 4159       | Wallis Ntks          | 30 | 27  |      |    | 15 |     | 12 |    |    | 15 | X  | X  | 1  | Z, Ru       | Si rims Sp; Si inclusions<br>in Gt                                 |
| 4201       | NW Wyers Ice Shelf   |    |     |      |    | 20 | 50  |    | 15 |    |    | 14 |    |    | Ru(1)       | Pod                                                                |
| 4202       | NW Wyers Ice Shelf   |    |     |      |    | 35 | 15  |    |    |    |    | 50 |    |    | Ru          | Pod                                                                |
| 4204       | Wilkinson Peaks      |    | XX  |      |    |    | XX  |    | XX |    | X  | XX | X  | X  |             | Sa + Opx intergrowths;<br>?secondary Cd                            |
| 4205       | Wilkinson Peaks      | X  |     |      |    |    | X   |    | X  |    |    | XX | X  | X  |             | Sheared and altered; relict<br>Sa + Sp + Opx; secondary<br>Chl(XX) |
| 4211B      | 6 km W of Young Ntks |    |     |      |    |    | XX  |    | XX |    | X  | XX | ?X |    | Ru, Z       | Probable Sp; phlogopite                                            |
| 4215       | Mt. Codrington       | 30 |     | 24   |    |    | 15  |    |    |    | 30 | X  |    | 1  |             |                                                                    |
| 4220       | McDonald Ridge       | 89 |     |      | 7  | 4  |     |    |    |    |    |    |    |    | Z           | Minor secondary Ep, Mus                                            |

## NAPIER COMPLEX METASEDIMENTS

| Sample No. | Locality                      | Qz | Ksp | Meso | Pl | Gt | Opx | Sl | Sa | Os | Cd | Bl | Sp | Op | Accessories | Remarks                                                               |
|------------|-------------------------------|----|-----|------|----|----|-----|----|----|----|----|----|----|----|-------------|-----------------------------------------------------------------------|
| 77284221   | McDonald Ridge                | 35 | 50  |      | 3  | 2  |     |    |    |    | 10 |    |    |    | Ru,Z        | Cd much altered; microcline;<br>secondary Mus                         |
| 4226       | 5.5 km W of<br>McDonald Ridge | 40 | 50  |      | 5  | 3  |     | X  |    |    | X  |    | 2  |    |             | Sp + Qz; Sl and Cd rim Sp                                             |
| 4247       | Pythagoras Peak               | 50 |     | 29   |    | 10 |     | 8  |    |    |    | 3  | X  | X  | Ru          | Gt part altered to Bl                                                 |
| 4249       | Mt. Dungey                    | 42 |     |      | 8  |    | 3   |    | X  | 40 |    | 7  |    |    | Ru, Z       | Os part altered; no Sa + Qz;<br>?primary Bl                           |
| 4250       | Mt. Dungey                    | XX |     |      | XX |    | XX  |    | XX | XX |    | X  |    |    |             | Os part altered; no Sa + Qz                                           |
| 4251       | Mt. Miller                    | 4  | 15  |      | 11 |    | 50  |    | X  | 20 |    | 1  |    | X  | Ru,Z        | Os altered; no Sa + Qz                                                |
| 4258       | Mt. McGhee                    | 90 |     | 9    |    | 1  |     |    |    |    |    |    |    | X  | Z           | Part recrystallised quartzite                                         |
| 4271       | McIntyre Is.                  | 60 | 7   |      |    | 15 | 5   | 9  | 2  |    | X  | 7  |    | X  | Ru,Z        | Sa + Qz; Opx + Sl; Gt rims<br>Sa, Sl, Opx; ?secondary Bl              |
| 4281       | Mt. Elkins                    |    |     |      | X  |    | 60  |    |    |    |    | 35 |    |    | Cpx(5)      | Aligned phlogopite                                                    |
| 4283       | Wilkinson Peaks               | 65 |     |      | 14 |    | 17  |    |    |    |    | 4  |    |    |             |                                                                       |
| 4290       | Newman Ntks                   |    |     |      |    |    |     | X  |    |    | 75 | 7  | X  | 15 |             | ?Opx or Sl inclusions in<br>Op; Op includes Py, Il, and<br>pyrrhotite |
| 4294       | Newman Ntks                   | 37 |     |      |    |    |     | 7  |    |    |    |    |    | 1  |             | Altered; Chl + Mus(55)<br>replace ?Cd; altered mafic                  |
| 4338       | Gage Ridge                    |    |     |      |    |    | 40  |    | 60 |    | X  | X  |    |    | Ru          | Mg-rich pod; enstatite,<br>phlogopite                                 |

## NAPIER COMPLEX METASEDIMENTS

| Sample No. | Locality                  | Qz | Ksp | Meso | Pl | Gt | Opx | Sl | Sa | Os | Cd | Bl | Sp  | Op | Accessories | Remarks                                     |
|------------|---------------------------|----|-----|------|----|----|-----|----|----|----|----|----|-----|----|-------------|---------------------------------------------|
| 77284339   | Gage Ridge                |    |     |      |    |    | 60  |    |    |    |    | 12 | 28  |    | Ru          | Estimates very approx;<br>minor Ol          |
| 4340       | Gage Ridge                |    |     |      |    |    |     |    | 25 |    | 5  | 70 |     |    |             | Phlogopite                                  |
| 4341       | Gage Ridge                |    | X   |      | X  |    | 70  |    | 22 |    | 3  | X  |     |    |             | Ksp + Pl(5); Fe-rich margin<br>of pod       |
| 4342       | Gage Ridge                |    |     |      | 3  |    | 60  |    | 25 |    | X  | 6  | 6   |    |             |                                             |
| 4343       | Gage Ridge                |    |     | X    | X  |    | 60  |    | 20 |    | 10 | 5  |     |    | Ru,Z        | Pl + Meso(5)                                |
| 4347       | Gage Ridge                | 82 |     |      |    | 4  |     | X  | 4  | 10 |    |    | X   |    | Ru,Z        | Sp + Qz; Sa + Qz; Os altered                |
| 4348       | Gage Ridge                | 65 |     |      |    | 15 |     | 5  |    | 14 |    |    | 1   | X  | Ru          | Os part altered; Sp + Qz;<br>Gt + Sl rim Sp |
| 4349       | Gage Ridge                | 51 | X   |      |    | 15 |     | 3  |    | 31 |    |    | 1   | X  | Ru,Z        | Os part altered; Gt + Sl<br>rim Sp          |
| 4350       | Gage Ridge                | 45 |     |      |    | 20 |     | 10 |    | 25 |    |    | X   | X  | Ru,Z        | Os part altered; Sp + Qz                    |
| 4354       | NW Wyers Ice Shelf        | 37 |     |      |    | 15 | 42  |    |    |    |    |    |     | 6  |             | Mt-rich                                     |
| 4355       | NW Wyers Ice Shelf        |    |     |      |    | 7  | 50  |    | 15 |    |    | 25 | 3   |    | Ru          | Sa rims Sp                                  |
| 4389       | 7 km NW of<br>McIntyre Is | 50 | 18  |      |    | 20 |     | 10 |    |    |    | 2  |     | X  | Ru          | Secondary Bl                                |
| 4393       | Mt. Kjerringa             |    |     |      |    |    |     |    | 25 |    |    | 50 | 125 |    |             | Mg-rich pod; phlogopite                     |
| 4394       | Mt. Kjerringa             |    |     |      |    |    |     | XX | XX |    | XX |    |     |    | Ru          | Zoned; Inclusion of Bl + Qz +<br>Ksp + Pl   |
| 4395       | Mt. Kjerringa             |    | X   |      |    |    | XX  | XX | XX |    | XX | XX |     |    | ?Mon        | Zoned; Sl + Opx $\rightarrow$ Cd + Sa       |



NAPIER COMPLEX METASEDIMENTS

| Sample No. | Locality                       | Qz | Ksp | Meso | Pl | Gt | Opx | Sl | Sa | Os | Cd | Bl | Sp | Op | Accessories | Remarks                                                |
|------------|--------------------------------|----|-----|------|----|----|-----|----|----|----|----|----|----|----|-------------|--------------------------------------------------------|
| 77284473   | E Wyers Ice Shelf              |    | 46  |      | 20 | 26 | 3   | X  | 1  |    | X  | 4  | X  |    | Ru          | Cd (alt) rims Sa rims Sp;<br>secondary Bl; minor ?Qz   |
| 4479       | Beaver Is.                     | 25 |     |      |    | 48 | 15  |    |    |    |    |    |    | 12 |             | Mt-rich ironstone                                      |
| 4480       | Beaver Is.                     | XX |     | XX   |    | XX | X   | XX | XX |    |    | X  | X  |    | Ru          | Sa + Qz; Sl + Gt rim Sa and<br>Sp; ?secondary Opx + Sl |
| 4483       | 10 km E of Demidov Is.         | 40 |     |      | 27 | 16 |     | 5  |    |    | X  | 12 |    | X  | Ru          | Gt part altered to Bl                                  |
| 4486       | 4 km SW of<br>Hydrographer Is. | 30 |     | 29   |    | 13 | 15  | 1  |    |    | X  | 12 |    |    | Ru,Z        | Opx + Sl; secondary Bl and<br>Cd (rims Gt)             |
| 4487       | 3 km W of<br>Hydrographer Is.  | XX |     | XX   |    | XX |     | X  |    |    | X  | XX |    |    | Ru,Z        | Cd altered; secondary Bl +<br>Mus + Carb               |
| 4493       | Thorp Ridges                   | 34 | 50  |      |    | 2  | 2   |    |    |    | 8  | 4  |    |    | Z           | Secondary, aligned Bl                                  |
| 4504       | 3 km N of Mt. Denham           | X  | 20  |      | 52 | 18 |     | X  |    |    |    |    | X  | X  |             | Sp + Op(10)                                            |
| 4505       | 3 km N of Mt. Denham           | 45 |     |      | 8  |    | 20  |    |    |    |    |    |    | 20 |             | Mt-rich ironstone; Cpx(7)                              |
| 4508       | Fyfe Hills                     | XX | XX  |      | XX | XX |     |    |    |    |    | X  |    | X  | Z, Cor      | Layered, sheared; secondary<br>Gt, Bl                  |
| 4511       | McIntyre Is.                   | X  |     |      | X  | 65 |     | 10 |    |    |    | 20 |    |    |             | Layered; Qz + Pl(5)                                    |
| 4512       | McIntyre Is.                   | 25 | 37  |      |    | 12 | 8   | 10 | 5  |    |    | 3  |    | X  | Ru, Mon     | Sa + Qz; Sl + Qpx + Gt rim<br>Sa; ?secondary Bl        |
| 4513       | McIntyre Is.                   | 27 | 40  |      |    | 15 | 5   | 9  | 1  |    |    | 3  |    |    | Ru, Mon     | Sa + Qz                                                |
| 4514       | McIntyre Is.                   | 25 | 45  |      |    | 25 |     | 5  | X  |    |    | X  |    |    | Ru          |                                                        |

NAPIER COMPLEX METASEDIMENTS

| Sample No. | Locality                  | Qz | Ksp | Meso | Pl | Gt | Opx | Sl | Sa | Os | Cd | Bl | Sp | Op | Accessories | Remarks                         |
|------------|---------------------------|----|-----|------|----|----|-----|----|----|----|----|----|----|----|-------------|---------------------------------|
| 77284515   | McIntyre Is.              | 25 | 40  |      |    | 20 |     | 8  | X  |    |    | 7  |    |    | Ru, Mon     | Sa + Qz                         |
| 4516       | McIntyre Is.              | 40 | 26  |      |    | 17 | X   | 13 | 4  |    |    | X  |    |    | Ru          | Sa + Qz; Sl + Opx + Gt rim Sa   |
| 4517       | McIntyre Is.              | 24 | 40  |      |    | 10 | 6   | 8  |    |    |    | 2  |    |    | Ru          | Sl + Opx                        |
| 4518       | McIntyre Is.              | 30 | 44  |      |    | 6  | 10  | 10 | X  |    |    | X  |    |    | Ru          | Sl + Opx                        |
| 4528       | Wilkinson Peaks           | 10 |     |      | 45 | 20 | 15  |    |    | 10 |    |    |    |    | Mon, Z      | ?Os altered; some coarse Cd     |
| 4534       | Newman Ntks               | XX |     |      | XX | XX |     | XX |    |    | XX |    | XX | X  |             | Sp + Q; altered ?Os             |
| 4547       | Mt. Hardy                 | 74 |     |      | 10 | 8  | 8   |    |    |    |    |    | X  | X  | Z           |                                 |
| 4548       | Mt. Hardy                 | 68 |     |      |    |    | 20  | X  | 10 |    | 2  |    |    |    | Ru, Z       | Sa + Qz; Cd rims Sa             |
| 4550       | Mt. Hardy                 | 50 |     |      | 33 |    | 10  |    | 3  |    | 4  |    |    |    | Ru, Z       | Layered; secondary Cd           |
| 4551       | Mt. Hardy                 | 47 |     |      |    |    | 25  |    | 20 |    | 8  |    |    |    | Z           | Secondary Cd                    |
| 4576       | Wattle Is.                | 60 | 22  |      |    | 18 |     |    |    |    |    | X  |    | X  |             | Ksp near Meso; ?Napier Complex  |
| 4587       | McNaughton Ridges         | 20 |     |      | 23 | 45 | 5   |    |    |    |    | 7  |    |    |             |                                 |
| 4588       | McNaughton Ridges         | 30 |     |      |    | 58 | 10  |    |    |    |    |    |    | 2  |             |                                 |
| 4592       | Howard Hills              | 3  | X   |      | 62 | 28 |     | 5  |    |    |    |    | 2  |    |             |                                 |
| 4593       | Howard Hills              |    |     |      | 10 | 45 | 42  |    |    |    |    |    |    |    | ?Ru(3)      |                                 |
| 4594       | Burkett Is.               | XX |     |      | XX | XX |     | XX |    |    |    | XX | X  |    | Ru          | Altered; secondary Bl           |
| 4599       | 10 km E of<br>Demidov Is. | 60 |     |      |    |    | 20  |    |    |    |    |    |    | 20 |             | Mt-rich ironstone; exsolved Cpx |
| 4630       | Mt. Hardy                 | 38 |     |      |    |    | 20  |    | 12 |    | 30 |    |    |    | Ru, Z       | Sa + Qz; Cd rims Sa; coarse Cd  |
| 4631       | Mt. Hardy                 | 90 |     |      |    |    | 4   |    | 2  |    | 4  | X  |    |    | Ru, Z       | Sa + Qz; Cd rims Sa             |

## NAPIER COMPLEX METASEDIMENTS

| Sample No. | Locality                    | Qz | Ksp | Meso | Pl | Gt | Opx | Sl | Sa | Os | Cd | Bi | Sp | Op | Accessories | Remarks                                                                  |
|------------|-----------------------------|----|-----|------|----|----|-----|----|----|----|----|----|----|----|-------------|--------------------------------------------------------------------------|
| 77284632   | Mt. Hardy                   | 50 |     |      | 10 |    | 5   |    | 32 |    | 3  | X  |    |    | Ru,Z        | Sa + Qz; Cd rims Sa                                                      |
| 4633       | Mt. Hardy                   | 70 |     |      |    |    | 23  | X  | 10 |    | 7  |    |    | X  | Ru,Z        | Sa + Qz; Cd rims Sa                                                      |
| 4701       | 10 km E of<br>Demidov Is.   | XX |     |      | XX | XX |     | XX |    |    |    | XX |    |    |             | Altered Gt; secondary Cd, Bi                                             |
| 4702       | SW of Hydrographer Is.      | XX |     |      |    | XX |     |    |    |    | XX | XX |    | X  | Ru          | Ky (XX); scree                                                           |
| 4743       | Mt. Oldfield                |    |     |      | 42 |    | 2   |    | 50 |    | 4  | 2  |    |    | Ru, Cor     | Moraine; secondary<br>phlogopite; Sa + Opx inter-<br>growth; ?norbergite |
| 4760       | N. end of Rayner Gl.        | 40 |     |      |    |    | 56  |    |    |    |    |    |    | 4  | Cpx         | Layered                                                                  |
| 4773       | Reference Peak              | XX |     |      | XX |    | XX  | XX | XX | X  |    | XX |    | X  | Ru, ?Mon    | ?Os altered; Opx + Sl; Sa +<br>Qz intergrowths; some<br>secondary Sl     |
| 4774       | Reference Peak              | X  |     |      | XX |    | XX  | XX | X  | X  | X  | X  |    |    | Ru          | ?Os altered; Opx + Sl, Sa +<br>Qz intergrowths; ?secondary<br>Bi and Cd  |
| 4789       | Geoffrey Hills              | 76 |     |      |    | X  | 9   |    |    |    |    |    |    | 9  | Ap, Hb      | Mt-rich ironstone; Cpx(6)                                                |
| 4790       | Newman Ntk                  | 80 |     |      |    |    | 2   |    |    |    |    |    |    | 18 | Hm          | Mt-rich ironstone; altered<br>?Opx                                       |
| 4791       | 15 km SSW of<br>Latham Peak | 44 |     |      |    | 8  |     |    |    | 44 |    | 4  |    | X  | Z,Ru        | Os slightly altered                                                      |
| 4792       | 15 km SSW of<br>Latham Peak | 50 |     |      |    |    | 3   |    |    | XX | XX | X  |    | X  | Z,Ru        | Os(mostly altered) + coarse<br>Cd(47)                                    |

## NAPIER COMPLEX METASEDIMENTS

| Sample No. | Locality                 | Qz | Ksp | Meso | Pl | Gt | Opx | Sl | Sa | Os | Cd | Bl | Sp | Op | Accessories | Remarks                                |
|------------|--------------------------|----|-----|------|----|----|-----|----|----|----|----|----|----|----|-------------|----------------------------------------|
| 77284793   | 15 km SSW of Latham Peak | 42 |     |      |    |    | 8   |    |    | 50 |    | X  |    | X  | Z,Ru        | Os mostly fresh                        |
| 4793A      | 15 km SSW of Latham Peak |    |     |      |    |    | 20  |    | 3  |    | 75 | 2  |    |    | Ru(1),Z     | Sa looks relict                        |
| 4831       | Priestley Peak           | 55 | 35  |      |    | 10 |     | X  |    |    | X  | X  | X  |    | Ru          | Cd altered                             |
| 4833       | Mt. Trail                |    |     |      |    | 45 | 45  | X  | 9  |    | X  | 1  |    | X  | Ru          |                                        |
| 78285006   | SH 945                   | 42 | 50  |      |    | 4  |     | 4  |    |    |    |    |    |    |             | Ksp near Meso                          |
| 5008       | Mt. Sones                | 36 | 35  |      |    | 16 |     | 9  |    | 2  | 2  | X  | X  | X  | Ru          | Os altered; coarse Cd may be secondary |
| 5011       | Mt. Sones                |    |     |      | 7  | 13 | 80  |    |    |    |    | X  |    |    |             |                                        |
| 5011       | Mt. Sones                |    |     |      |    |    | 12  |    | 78 |    | 10 | X  | X  | X  | Ru          | Part of above lens; Cd may replace ?Os |
| 5019       | Fyfe Hills               | 37 |     |      | 50 |    |     |    |    |    |    |    |    |    | Amp         | Deformed pegmatite; Ky(10); Mus(3)     |
| 5020       | Fyfe Hills               | XX | X   |      | X  |    |     | XX |    |    |    | XX |    | X  | Ap,Z        | Sheared; fibrolite                     |
| 5022       | Field Is.                | 70 |     |      |    | 5  |     | 7  |    |    |    | 18 |    |    | Z           |                                        |
| 5029       | Bunt Is.                 | 35 |     |      | 35 |    | 25  | 1  | X  | 3  |    |    |    |    | Ru(1),Z     | Os altered; Opx + Si                   |
| 5052       | Gage Ridge               | 40 |     |      | 42 | 2  |     | 1  |    | 15 |    |    |    |    |             | Os part altered (up to 1 cm)           |
| 5053       | Gage Ridge               | 6  |     |      | 14 | 18 |     | 8  |    | 50 |    |    | 3  | X  | Ru(1)       | Layered; Os part altered; Si rims Sp   |



## NAPIER COMPLEX METASEDIMENTS

| Sample No. | Locality          | Qz | Ksp | Meso | Pl | Gt | Opx | Sl | Sa | Os | Cd | Bl | Sp | Op | Accessories | Remarks                                        |
|------------|-------------------|----|-----|------|----|----|-----|----|----|----|----|----|----|----|-------------|------------------------------------------------|
| 78285054   | Mt. Hardy         | 40 |     |      | 25 | 12 |     | 3  |    | 20 |    |    |    | X  | Ru          | Os mostly altered                              |
| 5055       | Mt. Torckler      |    |     |      | 5  | 66 | 20  |    | 8  | ?  |    |    |    |    | Ru          | Minor altered ?Os                              |
| 5056       | Mt. Torckler      | 20 |     |      |    | 10 | 45  | 25 |    |    |    |    |    |    | Ru          | Opx + Sl                                       |
| 5057       | Mt. Torckler      |    | 5   |      | 30 | 32 | 32  |    |    |    |    | X  |    | 1  |             |                                                |
| 79285058   | Mt. Bartlett      | 16 | 32  |      | 5  |    | 12  |    | 2  | 33 |    | X  |    |    | Ru,Z,?Mon   | Os mostly altered                              |
| 80285070   | Mt. Riiser-Larsen | 50 |     |      | 10 |    | 15  |    | 10 | 15 |    | X  |    |    | Ru,Z        | Sa + Qz; Os mostly altered                     |
| 5071       | Mt. Riiser-Larsen | 48 |     |      |    | 5  | 15  | 7  | 10 | 15 |    |    |    |    | Z           | Sa + Qz; Sl + Opx; Os part altered             |
| 5072       | Mt. Riiser-Larsen |    | 750 |      |    | 10 | 20  |    | 15 | X  |    | X  |    |    | Z           | Feld prob. Ksp; Os altered                     |
| 5073       | Mt. Riiser-Larsen | 60 |     |      |    |    |     | 5  |    | 35 |    |    |    |    |             | Os part altered                                |
| 5074       | Brusilov Ntks     | 42 |     |      |    |    | 5   |    | 2  | 50 |    | X  |    |    | Z           | Os part altered; no Sa + Qz                    |
| 5075       | Brusilov Ntks     | 46 |     |      |    |    | X   | 3  |    | 50 | 1  |    |    |    | Z           | Os part altered; some coarse Cd                |
| 5076       | Brusilov Ntks     | 45 |     |      |    |    |     | X  |    | 50 | 5  |    |    |    | Z           | Os part altered; some coarse Cd                |
| 5077       | Brusilov Ntks     | 40 |     |      | 4  |    | X   | X  |    | 56 | X  |    |    |    | Z           | Os fairly fresh                                |
| 5078       | Reference Peak    | XX |     |      | XX |    | XX  | X  | X  | XX | X  | X  |    | X  | Ru          | Os altered; some coarse Cd                     |
| 5079       | Reference Peak    | XX |     |      | XX |    | X   | X  |    | XX |    |    |    | X  | Ru, ?Mon    | Os part altered; Sl after Os                   |
| 5080       | Reference Peak    | XX |     |      | X  |    | XX  | X  | X  | XX | XX | X  |    | X  | Ru,Z        | Os mostly altered; Sl after Os; some coarse Cd |
| 82285081   | Gage Ridge        | 50 |     | 49   |    | 1  |     | X  |    |    |    |    | X  |    |             | Sp + Qz                                        |

NAPIER COMPLEX CALC-SILICATE ROCKS

| Sample No. | Locality              | Qz | Pl | Cpx | Hb | Gt | Scap | Op | Accessories | Remarks                                                                   |
|------------|-----------------------|----|----|-----|----|----|------|----|-------------|---------------------------------------------------------------------------|
| 76283065   | Mt. Pardoe            | 35 | 39 |     | 25 |    |      | 1  |             | ?Calc-silicate                                                            |
| 3154       | Latham Peak           |    |    |     |    |    |      |    |             | Ep + Chl vein cutting Qz-Meso gneiss                                      |
| 3198       | McLeod Ntks           |    | 65 | 35  |    |    | X    |    | Sph, Carb   | Cut by Wollastonite + Cpx + Carb vein; Scap + Sph concentrated at contact |
| 3199       | McLeod Ntks           |    | 70 | 30  |    |    |      |    | Ap          | Cut by Wollastonite + Carb + Cpx vein; Scap + Sph concentrated at contact |
| 3302       | McLeod Ntks           |    | 20 | 80  |    |    |      |    |             | Cut by wollastonite + Cpx + Scap vein + minor Carb, Sph, Qz               |
| 77283718   | Mt. Gleadell          | 40 | 10 | 50  |    |    |      |    | Bi, Ksp, Ap | Ksp in antiperthite                                                       |
| 4103       | Mt. Bride             |    |    |     |    |    |      |    |             | Ep + Pl rock from granite contact                                         |
| 4403       | 3 km NW of Mt. Bergin |    | 72 | 6   |    | 9  | 5    | 1  | Sph(2), Ap  | Very similar to 4683 from Rayner Complex                                  |

NAPIER COMPLEX GRANITIC INTRUSIVES

| Sample No. | Locality        | Qz | Ksp | Meso | Pl | Opx | Cpx | Hb | Bi | Gt | Op | Accessories     | Remarks                                                  |
|------------|-----------------|----|-----|------|----|-----|-----|----|----|----|----|-----------------|----------------------------------------------------------|
| 75830216   | Mt. Mueller     | 7  | 44  |      | 44 | 3   |     |    |    |    | 2  |                 | Pegmatite; An 25                                         |
| 218        | Mt. Mueller     | XX | XX  |      | X  |     |     |    |    |    |    | Mus,Z,?Mon      | Pegmatite                                                |
| 76283122   | Fyfe Hills      | 40 | 14  |      | 40 |     |     |    | 5  |    | X  | Ap,Z,AlI,Mus(1) | Pegmatite; part sheared                                  |
| 77283702   | Howard Hills    | XX | XX  |      | XX |     |     |    |    |    |    | Z               | Aplite vein; recrystallised; Ksp, Pl                     |
| 3796       | Mt. Bride       | 30 | 60  |      | 5  | 4   |     |    | X  |    | X  | Ap,Z            | Granite; ?Opx altered; Bi secondary; Feld part altered   |
| 3797       | Mt. Bride       | 40 | 35  |      | 25 |     |     |    |    |    | X  | Z               | Altered granite; sericitised Feld                        |
| 3798       | Mt. Bride       | 35 | 40  |      | 10 |     |     |    | 15 |    | X  | Z,Ep,Gt         | Altered granite; secondary Bi + Mus; relict Gt           |
| 3799       | Mt. Bride       | 25 | 60  |      | 13 |     |     |    | 2  |    | X  | Z               | Leucogranite; Feld part sericitised                      |
| 3800       | Mt. Bride       | XX | XX  |      | XX |     |     |    | XX |    |    | Z,Ep            | Recrystallised aplite; Mus(XX)                           |
| 4106       | Simmers Peaks   | 20 | 43  |      | 30 |     |     |    | 7  |    | X  | Ap,Z            | Granite; secondary Carb + Mus                            |
| 4107       | Simmers Peaks   | XX | XX  |      |    |     |     |    | X  |    | X  | Ap,Z,Ep         | Deformed pegmatite                                       |
| 4108       | Simmers Peaks   | 30 | 50  |      | 13 |     |     |    | 7  |    | X  | Ap,Z,Ep,?AlI    | Granite; slightly recrystallised; secondary Mus + Carb   |
| 4109       | Fitzgerald Ntks |    |     |      |    |     |     |    | 50 |    | X  | Ap(5),Mus(3)    | ?Xenolith from granite; sericitised Feld(42)             |
| 4110       | Fitzgerald Ntks | 25 | XX  |      | XX |     |     |    | 20 |    | X  | Ap(1),Z,Ep      | Altered granite; Feld sericitised; aggregates of Bi + Ep |
| 4213       | Mt. Elkins      | 8  | 85  |      |    | 7   |     |    | X  |    | X  |                 | Pegmatite; Opx slightly altered to Bi; microcline        |

## NAPIER COMPLEX GRANITIC INTRUSIVES

| Sample No. | Locality                    | Qz | Ksp | Meso | Pl | Opx | Cpx | Hb  | Bl | Gt  | Op  | Accessories  | Remarks                                                              |
|------------|-----------------------------|----|-----|------|----|-----|-----|-----|----|-----|-----|--------------|----------------------------------------------------------------------|
| 77284269   | Fyfe Hills                  | XX | XX  |      |    |     |     |     | X  | X   | X   |              | Pegmatite vein; sheared; Chl replaces Bl                             |
| 4273       | Hydrographer Is.            | 30 | 48  |      | 20 |     |     |     | 2  |     | X   | Z            | Aplite dyke                                                          |
| 4274       | Hydrographer Is.            | 35 | 15  |      | 45 |     |     |     |    | X   | X   | Mus(5)       | Pegmatite dyke                                                       |
| 4284       | Wilkinson Peaks             | 4  |     |      | 70 | 25  |     |     | 1  |     |     | Ap           | Tonalite; contains Pl + Opx xenolith                                 |
| 4286       | Wilkinson Peaks             | 40 |     |      | 40 | 10  |     |     | 2  | 6   | X   | Z            | Tonalite; secondary Bl                                               |
| 4289       | Newman Ntks                 | 5  |     |      | 83 | 7   |     |     | 3  |     | 2   |              | Tonalite vein                                                        |
| 4296       | Newman Ntks                 | 15 | 20  |      | 35 |     |     | 18  | 10 |     | 2   | Ap           | Granodiorite: igneous texture; Hb + Bl may replace Pyx               |
| 4376       | Khmara Bay (SH 128)         | 33 |     | 65   |    | 2   |     |     | X  |     | X   | Z            | Granite                                                              |
| 4377       | Khmara Bay (SH 128)         | 30 |     | 66   |    |     |     |     | 4  |     | X   | All          | Altered granite; secondary Bl                                        |
| 4409       | Mt. Maslen                  | 30 | 30  |      | 38 |     |     |     | 2  |     | X   |              | Aplite                                                               |
| 4456       | 10 km SE of Douglas Peak    | 30 | 36  |      | 30 | 3   |     |     | X  | 1   | X   | Z            | Granite; secondary Bl                                                |
| 4495       | Mt. Berrigan                |    |     |      | XX | XX  |     |     |    |     | X   | Ap,Z         | Pegmatite; much Ksp in antiperthite                                  |
| 4574       | W of Armstrong Peak         | 20 | 65  |      | 10 | 4   |     |     | 1  |     | X   | Z            | Granite; Opx part altered                                            |
| 4575       | 13 km WNW of Armstrong Peak | 28 | 60  |      | 5  |     |     |     | 6  |     | 1   | Z            | Altered granite; secondary Bl, foliated                              |
| 4684       | Felton Head                 | 15 | 15  |      | 53 | 10  | 1   | 0.5 | X  | 2.5 | 2   | Ap(1),Z      | Granodiorite; secondary Gt                                           |
| 4685       | Felton Head                 | 15 | 25  |      | 46 | 8   | 1   | 1.5 | X  | 1.5 | 1.5 | Ap,Z         | Granodiorite; secondary Gt                                           |
| 4686       | Felton Head                 | 15 | 30  |      | 35 | X   |     | 8   | 9  | 1   | 1   | Ap(1),Z(0.5) | Altered granodiorite: Hb + Bl replace Pyx; foliated; secondary Gt    |
| 4687       | Felton Head                 | 33 | 60  |      | 5  |     |     | X   | 1  |     | X   | Ap,Z         | Granite; slightly recrystallised                                     |
| 4754       | Waratah Is.                 | 34 | 55  |      | 5  |     |     |     | 6  |     |     | Ap,Z         | Granite                                                              |
| 4756       | Waratah Is.                 | 12 | 45  |      | 33 | 9   | 3   | 1   |    | X   | 2   | Ap(1)        | Granodiorite; identical to Felton Head intrusive; minor secondary Gt |



NAPIER COMPLEX GRANITIC INTRUSIVES

| Sample No. | Locality                     | Qz | Ksp | Meso | Pl | Opx | Cpx | Hb | Bi | Gt | Op | Accessories | Remarks                                                  |
|------------|------------------------------|----|-----|------|----|-----|-----|----|----|----|----|-------------|----------------------------------------------------------|
| 77284837   | 10 km WNW of Hydrographer Is | 35 | 20  |      | 42 |     |     |    | 2  |    | X  | Z, Mus(1)   | Granite vein                                             |
| 78285021   | Field Is.                    | XX | XX  |      | XX |     |     |    |    |    |    | Mus         | Pegmatite                                                |
| 80285032   | Simms Peaks                  | 30 | 45  |      | 15 |     |     |    | 7  |    | 3  | Ap, Z, ?Mon | Granite; secondary Bi + minor Carb;<br>some altered ?Pyx |
| 5033       | Mt. Bride                    | 27 | 60  |      | 10 |     |     |    | X  | 3  |    |             | Granite; secondary Bi + Chl                              |

NAPIER COMPLEX MAFIC DYKES

| Sample No. | Locality         | Pl | Cpx | Opx | Hb | Bt | Sec. |     | Op | Accessories | Remarks                                                        |
|------------|------------------|----|-----|-----|----|----|------|-----|----|-------------|----------------------------------------------------------------|
|            |                  |    |     |     |    |    | Amp  | Qz  |    |             |                                                                |
| 4578       | Perov Ntks       | 55 | 35  | ?   |    | 2  | 6    |     | 2  |             | B4; Pyx part recrystallised; pos. some Opx                     |
| 4587       | McLeod Ntks      | 50 | 30  |     | 2  |    | 10   | 2   | 5  | Ap          | B4; secondary Gt(1)                                            |
| 7264       | Cape Batterbee   | 50 | 30  |     | 17 | X  |      | 1.5 | X  |             | B4; Pyx + Hb part recrystallised; Scap(1)                      |
| 65280193   | Mt. Storegutt    | 54 | 20  |     | 2  |    | 20   | 2   | 2  | Ap          | B4; rather patchy alteration; An30-50                          |
| 194        | Mt. Mueller      | 60 | 25  |     | 1  |    | 10   | 1   | 3  | Ap          | B4                                                             |
| 75830202   | Mt. Mueller      | 57 | 30  |     | X  | X  | 10   | 1   | 2  |             | B4; An25-50                                                    |
| 222        | Mt. Mueller      | 55 | 20  |     |    |    | 22   | X   | 3  | Ap          | B4                                                             |
| 228        | Mt. Breckinridge | 50 | 14  |     | 30 |    |      |     | 6  |             | B4; Cpx(10) + Pl(15) phenocrysts; much Hb in groundmass        |
| 76283010   | Seavers Ridge    | 55 | 13  | X   | 25 |    |      | 3   | 4  |             | B4; Cpx + Pl phenocrysts; groundmass Hb may be secondary       |
| 3011       | Seavers Ridge    | 60 | 22  |     | 2  | 2  | 6    | 3   | 5  | Ap          | B4                                                             |
| 3012       | Seavers Ridge    | 60 | 21  |     | 2  | 5  | 2    | X   | 10 | Ap          | B4; olivine tholeiite                                          |
| 3013       | Seavers Ridge    | XX | XX  |     | XX | XX |      |     | X  |             | Mylonised dyke margin                                          |
| 3014       | Seavers Ridge    | 25 | X   |     |    | X  |      |     | 5  |             | B4 dyke chilled margin; Pl phenocrysts                         |
| 3016       | Seavers Ridge    |    |     |     |    |    |      |     |    |             | Pseudotachylite vein                                           |
| 3030       | Mt. Douglas      | 60 | 33  | X   | 1  |    | 4    | 1   | 1  | Ap          | B4                                                             |
| 3031       | Mt. Douglas      | 60 | 30  | X   | 1  |    | 5    | 2   | 1  |             | B4                                                             |
| 3032       | Mt. Douglas      |    |     |     |    |    |      |     |    |             | Pseudotachylite veins cutting mylonised dyke margin            |
| 3091       | Proclamation Is. | 12 | 15  |     | X  |    |      |     | 3  |             | B4; moraine; Pl + Cpx phenocrysts                              |
| 3105       | Rippon Depot     | 45 | 27  | 25  |    |    |      | ?   | 3  |             | B3; granuloblastic                                             |
| 3115B      | Mt. Breckinridge | 15 | 10  |     |    |    |      |     | 4  |             | 1 cm vein; Pl + Cpx phenocrysts                                |
| 3153       | Latham Peak      | 40 | 41  |     | X  | 1  | 9    |     | 7  |             | B4                                                             |
| 3164       | Latham Peak      | XX | XX  |     |    |    |      |     | X  |             | B4; Cpx(10) + Pl(10) phenocrysts; very fine-grained groundmass |

## NAPIER COMPLEX MAFIC DYKES

| Sample No. | Locality          | Pl | Cpx | Opx | Hb | Bt  | Sec. |    | Op | Accessories | Remarks                                             |
|------------|-------------------|----|-----|-----|----|-----|------|----|----|-------------|-----------------------------------------------------|
|            |                   |    |     |     |    |     | Amp  | Qz |    |             |                                                     |
| 76283168   | Latham Peak       | 50 | 33  |     | 2  | 1   | 7    |    | 7  |             | B4; Pl phenocrysts; part altered                    |
| 3180       | Pinn Is.          | 44 | 47  |     |    |     | 4    |    | 5  |             | B4; moraine; Pl +Cpx phenocrysts                    |
| 3242       | Mt. McGhee        | 60 | 20  | X   | 3  | 4   | 4    | 2  | 7  |             | B4                                                  |
| 3243       | Mt. McGhee        | 55 | 27  |     |    | 4   | 6    |    | 8  |             | B4                                                  |
| 3244       | Mt. McGhee        | 1  | 43  | 50  |    | 5   | X    |    | 1  |             | B1 pyroxenite; granuloblastic                       |
| 3250       | Burch Peaks       |    | 40  | 54  |    | 0.5 | X    |    |    | Ksp(5)      | B1 pyroxenite ?dyke; perthite(5)                    |
| 3258       | Mt. Stadler       | 52 | 10  | 30  |    |     |      | 4  | 1  | Ksp         | B3; aligned Opx phenocrysts; Ksp ?(3)               |
| 3259       | SH 945            | 12 | 35  | 50  |    | X   |      |    | 2  |             | B1 ?dyke; granuloblastic                            |
| 3276       | Mt. Jewell        |    | 49  | 48  |    | 2   |      |    | 1  | Ksp         | B1 pyroxenite dyke; granuloblastic                  |
| 3277       | Mt. Jewell        | 56 | 18  | 20  |    |     |      | ?3 | 3  | ?Ksp        | B3; composite Opx + Cpx phenocrysts; exsolved ore   |
| 77283402   | Mt. Marsland      | 55 | 40  | X   |    | 2   |      |    | 3  | Sp,Ap       | B4; slightly recrystallised                         |
| 3415       | Mt. Marsland      | 53 | 40  |     |    | X   | X    |    | 3  | Ol(4),Sp,Ap | B4; olivine tholeiite; Il, Mt, Py                   |
| 3420       | Mt. Riiser-Larsen | 45 | 37  | X   | 8  | X   |      | 3  | 5  |             | B4; recrystallised; secondary Gt(2)                 |
| 3421       | Mt. Riiser-Larsen | XX | XX  | X   |    | XX  |      |    | X  |             | B4; sheared and recrystallised; Pl part altered; Gt |
| 3429       | Mt. Riiser-Larsen | XX | XX  |     |    | X   |      | X  |    |             | B4; much Gt; strongly sheared                       |
| 3430       | Mt. Riiser-Larsen | 50 | 44  | X   |    |     |      |    | 6  |             | B4; flow-banded; Pl phenocrysts                     |
| 3503       | Mt. McLennan      | 60 | 33  |     | X  | X   |      | X  | 4  |             | B4                                                  |
| 3504       | Mt. McLennan      | 60 | 20  | 17  |    |     |      | ?  | 3  |             | B2; granuloblastic                                  |
| 3509       | Mt. Degerfeldt    | 63 | 25  |     | 2  | 1   | 2    | 3  | 4  |             | B4                                                  |
| 3591       | Mt. Tod           | 60 | 34  |     |    | X   | 2    | X  | 4  | Ol, Ap      | B4; minor altered Ol                                |
| 3626       | Harvey Ntks       | 60 | 20  | X   | 3  |     | 11   | 2  | 4  | Ap          | B4                                                  |

## NAPIER COMPLEX MAFIC DYKES

| Sample No. | Locality           | Pl | Cpx | Opx | Hb | Bt | Sec. |    | Op | Accessories | Remarks                                              |
|------------|--------------------|----|-----|-----|----|----|------|----|----|-------------|------------------------------------------------------|
|            |                    |    |     |     |    |    | Amp  | Qz |    |             |                                                      |
| 77283637   | 1 km E of Mt. Reed | 50 | XX  | XX  | 14 |    |      |    | 3  | Ap          | Recrystallised B4?; Cpx + Opx(33)                    |
| 3673       | Gromov Ntks        | XX | XX  | XX  | X  | X  |      |    | X  |             | Sheared and mylonised; Gt(XX)                        |
| 3674       | Gromov Ntks        | XX | XX  | XX  | XX | X  |      |    | X  |             | Sheared, recrystallised; Gt(XX)                      |
| 3713       | Howard Hills       | 50 | 35  | 3   |    | 1  | 6    |    | 5  |             | B4; slightly porphyritic; Cpx + Pl; Opx cores in Cpx |
| 3730       | Crosby Ntks        | 60 | 15  |     | 18 |    |      | 3  | 4  |             | ?B4; granular Cpx + Hb; Pl phenocrysts               |
| 3731       | Mt. Hampson        | 55 | 20  |     |    | 1  | 20   | 1  | 3  |             | B4                                                   |
| 3732       | Mt. Hampson        | 51 | 15  |     |    | 3  | 30   | X  | 1  |             | B4; altered dyke margin; ?Scap(3)                    |
| 3739       | Mt. Hampson        | 56 | 33  |     |    | 1  | 7    |    | 3  |             | B4; locally sheared and altered                      |
| 3746       | Mt. Weller         | 55 | 23  | 20  |    | X  | X    |    | 2  |             | ?B2; sheared; granuloblastic                         |
| 3763       | Debenham Peak      | 50 | 44  |     |    |    |      |    | 6  | Ol          | B4; minor altered ol; Pl + Cpx phenocrysts           |
| 3787       | Wyers Ntks         | 55 | 12  | 12  | 14 |    |      |    | 3  |             | B2; granuloblastic; Gt(4)                            |
| 3788       | Wyers Ntks         | 60 | 27  |     | 2  | X  | 8    | 1  | 2  | Ap          | B4; minor secondary Gt                               |
| 3789       | Mt. Cronus         | 54 | 16  | 12  | 4  | 2  |      |    | 3  |             | ?B2; granuloblastic; sheared; Gt(9)                  |
| 3793       | Mt. Griffiths      | XX | XX  | XX  |    | X  |      |    | X  |             | ?B3; Cpx/Opx phenocrysts; granuloblastic groundmass  |
| 3794B      | Mt. Griffiths      | 30 |     | 5   |    | X  | 65   |    | X  |             | ?B3; altered; colourless Amp replaces Pyx            |
| 3845       | Mt. Charles        | 50 | 20  | 6   |    | 2  | 19   |    | 3  |             | B4; Pl + Cpx/Opx phenocrysts                         |
| 3917       | Tonagh Is.         | 60 | 31  | X   | 3  | 1  | 1    | 2  | 2  | Ap          | B4; Il                                               |
| 3924       | Tonagh Is.         | 55 | 15  | 15  | 10 | X  |      |    | 5  | Ap          | B2; granuloblastic                                   |
| 3926       | Tonagh Is.         | 55 | 22  | 20  | X  | X  |      |    | 3  |             | B2; granuloblastic                                   |
| 3927       | Tonagh Is.         | 50 | 18  | 16  | 10 | X  |      | ?  | 1  | Ap          | B2; sheared and recrystallised; Gt(5)                |
| 3928       | Tonagh Is.         | 57 | 20  | 15  | 5  |    |      |    | 3  | Ap          | B2; granuloblastic                                   |



NAPIER COMPLEX MAFIC DYKES

| Sample No. | Locality       | Pl | Cpx | Opx | Hb | Bt | Sec. |     | Op | Accessories                     | Remarks                                                     |
|------------|----------------|----|-----|-----|----|----|------|-----|----|---------------------------------|-------------------------------------------------------------|
|            |                |    |     |     |    |    | Amp  | Qz  |    |                                 |                                                             |
| 77283940   | Mt. Pardoe     | 55 | 20  | 3   |    | 2  | 15   | 2   | 3  | Ap                              | B4; Hb + Sec. Amp(15); minor secondary Gt                   |
| 3941       | Mt. Pardoe     | 52 | 6   | 8   | 30 | X  |      | X   | 4  |                                 | B4; groundmass Hb may be secondary; Pyx + Pl phenocrysts    |
| 3947       | Priestley Peak | 50 | 40  | X   | X  | 1  | 4    | 2   | 3  | ?Ol, Ap                         | B4; minor altered Ol                                        |
| 3948       | Priestley Peak | 50 | 16  | 8   | 4  | 1  | 16   | 2   | 3  | Ap                              | B4                                                          |
| 3949A      | Priestley Peak |    |     |     | 20 | 25 |      | 2   | X  | Sph(1), Ru +<br>Op(1)           | B5 alkali melasyenite; Ksp(34); Ap(15); Amp is arfvedsonite |
| 3949B      | Priestley Peak |    |     |     | 20 | 20 |      | 2   | X  | Sph(2), Ru +<br>Op (0.5)        | B5; Ksp(45); Ap(10)                                         |
| 3949C      | Priestley Peak |    |     |     | 12 | 27 |      | 3   | X  | Sph(1), Ru +<br>Op(2)           | B5; Ksp(38); Ap(17)                                         |
| 3949D      | Priestley Peak |    |     |     | 20 | 35 |      | 0.5 | X  | Sph(2), Ru +<br>Op(1)           | B5; Ksp(25); Ap(16)                                         |
| 3950       | Priestley Peak |    |     |     | 5  | 48 |      | 2   | X  | Sph(1), Ru + Op<br>(0.5), Ba(1) | B5; Ksp(27); Ap(15)                                         |
| 3951A      | Priestley Peak |    |     |     | 30 | 10 |      | 4   | X  | Sph(1), Ru + Op<br>(2); Ba(4)   | B5; Ksp(40); Ap(9)                                          |
| 3951B      | Priestley Peak |    |     |     | 20 | 25 |      | 1   | X  | Sph(3), Ru + Op<br>(0.5); Ba    | B5; Ksp(35); Ap(15)                                         |
| 3951C      | Priestley Peak |    |     |     | 25 | 20 |      |     | X  | Sph(2); Ru + Op<br>(1); Ba      | B5; Ksp(43); Ap(9)                                          |
| 3952       | Priestley Peak |    |     |     |    |    |      |     |    |                                 | Contact of B4 and B5 dykes                                  |

NAPIER COMPLEX MAFIC DYKES

| Sample No. | Locality            | Pl | Cpx | Opx | Hb | Bt  | Sec. |     | Op | Accessories | Remarks                                                             |
|------------|---------------------|----|-----|-----|----|-----|------|-----|----|-------------|---------------------------------------------------------------------|
|            |                     |    |     |     |    |     | Amp  | Qz  |    |             |                                                                     |
| 77283953   | Priestley Peak      |    |     |     |    |     |      |     |    |             | Contact of B4 and B5 dykes                                          |
| 3954       | Priestley Peak      |    |     |     |    |     |      |     |    |             | Contact of B4 and B5 dykes                                          |
| 3955       | Priestley Peak      |    |     |     | 5  | 27  |      | 3   | 2  | Sph(3)      | B5 dyke margin; Ksp(48); Ap(12)                                     |
| 3956       | Priestley Peak      | 56 | 30  |     | 1  | 0.5 | 9    | 1   | 2  | Ap          | B4; Il, Mt, Py                                                      |
| 3957B      | Priestley Peak      | 20 | 20  | X   | X  |     |      |     | 6  | ?Ol         | B4; Pl + Cpx phenocrysts; much Amp in groundmass; minor altered ?Ol |
| 3961       | Debenham Peak       | 50 | 28  | 5   | 3  | X   | 10   | X   | 4  | Ap          | B4                                                                  |
| 3977       | Mt. Bennett         | 55 | 35  | ?   |    | 5   |      | X   | 5  |             | B5; part recrystallised                                             |
| 4009       | Bunt Is.            | 55 | 25  | 3   | 1  | 1.5 | 7    | 1.5 | 6  | Ap          | B4                                                                  |
| 4014       | Mt. Giddings        | XX | XX  |     | X  | X   |      |     | X  |             | B4; Cpx + Pl phenocrysts                                            |
| 4063       | McDonald Ridge      | XX | XX  |     |    |     | XX   |     | X  |             | B4; Cpx + Pl phenocrysts                                            |
| 4065       | SW of Johnston Peak | 24 | 12  | 5   | X  |     |      |     | 6  |             | B4; Cpx/Opx + Pl phenocrysts; Opx altered                           |
| 4079       | Pythagoras Peak     | 64 | 20  |     | 2  | 1   | 8    | 1   | 4  |             | B4                                                                  |
| 4086       | Pythagoras Peak     | XX | XX  |     |    | 5   | XX   |     | 5  |             | B4                                                                  |
| 4099       | Mt. Stansfield      | 50 | 20  | 20  |    | 7   |      |     | 3  |             | ?B1; folded; granuloblastic                                         |
| 4104       | Mt. Bride           | 60 | 20  |     | ?  | X   | 15   | X   | 3  |             | B4; cuts granite                                                    |
| 4111       | Fitzgerald Ntks     | 55 | 5   | 3   |    | 30  | 2    | 5   |    |             | B4; cuts granite; altered; Amp replaces Pyx                         |
| 4113       | Mt. Arthur          | 60 | 35  |     | X  | X   |      | X   | 4  | ?Ol         | B4; minor altered ?Ol                                               |
| 4134       | Brusilov Ntks       | 61 | 10  | 18  |    | 3   | 2    | 3   | X  | Ksp(3)      | B3                                                                  |
| 4150       | Simpson Peak        | 58 | 23  | 10  | 2  | 2   |      | 3   | 2  |             | ?B3; granular Cpx + Opx; Cpx phenocrysts                            |

NAPIER COMPLEX MAFIC DYKES

| Sample No. | Locality                  | Pl | Cpx | Opx | Hb | Bi  | Sec. |    | Op | Accessories  | Remarks                                                              |
|------------|---------------------------|----|-----|-----|----|-----|------|----|----|--------------|----------------------------------------------------------------------|
|            |                           |    |     |     |    |     | Amp  | Qz |    |              |                                                                      |
| 77284155   | Bird Ridge                | 52 | 22  | 15  |    | 4   |      | 1  | 6  |              | ?B3; rather granular Pyx; exsolved ore                               |
| 4161       | Wallis Ntks               | 55 | 20  |     | 3  | 1   | 15   | 2  | 4  |              | B4; altered; Hb replaces Cpx; minor secondary Gt                     |
| 4162       | Wallis Ntks               | XX | XX  | XX  |    | X   |      |    | X  |              | B3; Cpx/Opx phenocrysts(12); fine-grained granuloblastic groundmass  |
| 4206       | 10 km SW of<br>Mt. Elkins | 55 | 30  |     |    |     | 10   |    | 5  |              | B4                                                                   |
| 4268       | Fyfe Hills                | 60 | 18  | 18  | 2  |     |      | X  | 2  |              | B4; recrystallised Pyx + Hb                                          |
| 4287       | Newman Ntks               | 60 | 24  | 1   | 2  | 1   | 5    | 2  | 5  | ?Ol          | B4; minor altered ?Ol                                                |
| 4295       | Newman Ntks               | 56 |     |     | 32 | 5   |      | 4  | 3  | Ap           | B4; altered: Hb + Bi replace Pyx                                     |
| 4298       | 3 km NW of<br>Mt. Bergin  | 43 | 15  |     | 35 |     |      | 5  | 2  |              | B4; flowbanded; Pl + Cpx phenocrysts; groundmass Hb may be secondary |
| 4300       | 3 km NW of<br>Mt. Bergin  | 56 | 8   |     | 32 | X   |      | 2  | 2  |              | B4; altered: Hb + Bi replace Pyx                                     |
| 4307       | Mt. Biscoe                | 50 | 24  |     | 2  |     | 21   |    | 3  |              | B4; Pl part altered                                                  |
| 4310       | Mt. Biscoe                | 53 | 35  |     | 1  | 0.5 | 5    |    | 3  |              | B4                                                                   |
| 4317       | Mt. Oldfield              | 50 | 27  |     |    | 5   | 2    |    | 12 | Ol(4), Ap(2) | B4; olivine basalt; Il, Mt, Ti-Mt.                                   |
| 4318       | Mt. Charles               | 45 | 20  | 25  | 1  |     |      | 7  | 2  |              | B3; granuloblastic                                                   |
| 4319       | Mt. Charles               | 47 | 18  | 23  |    |     |      | 10 | 2  |              | B3; granuloblastic                                                   |
| 4344       | Gage Ridge                | 50 |     |     | 36 | 12  |      |    | 2  | Ap           | ?B4; altered: Hb + Bi replace Pyx; relict subophitic texture         |
| 4357       | Khmara Bay (SH 213)       | 53 | 20  |     |    |     | 25   |    | 2  |              | B4; altered                                                          |

## NAPIER COMPLEX MAFIC DYKES

| Sample No. | Locality                  | Pl | Cpx | Opx | Hb | Bi  | Sec. |    | Op | Accessories | Remarks                                                             |
|------------|---------------------------|----|-----|-----|----|-----|------|----|----|-------------|---------------------------------------------------------------------|
|            |                           |    |     |     |    |     | Amp  | Qz |    |             |                                                                     |
| 77284362   | Mt. McGhee                | 60 | 25  | 3   | 2  | 1   | 3    | 3  | 3  | Ap          | B4; Il, Mt                                                          |
| 4363       | Mt. Renouard              | 60 | 15  | 15  | 5  |     |      | 2  | 3  |             | B2; granuloblastic                                                  |
| 4373       | Khmara Bay (SH 213)       | 55 | 40  |     | 1  |     |      | X  | 4  | Ap, ?Ol     | B4; Il, Mt                                                          |
| 4379       | Khmara Bay (SH 128)       | 55 | 17  | 23  | 4  |     |      |    | 1  | Ap          | B2; granuloblastic                                                  |
| 4387       | 7 km NW of<br>McIntyre Is | 60 | 14  | 6   | 12 | 3   |      | X  | 5  | Ap          | B4; Pl + Cpx/Opx phenocrysts; groundmass Hb may be secondary;<br>Il |
| 4392       | Mt. Kjerringa             | 53 | 40  | ?   |    | 0.5 | 2.5  |    | 3  | Ap          | ?B2; granuloblastic Pyx, but igneous Pl                             |
| 4422       | Mt. Hardy                 | 54 | 5   | 35  |    | 2   |      | 3  | 1  | ?Ksp        | B3; large Opx; Cpx in groundmass; dyke margin                       |
| 4423       | Mt. Hardy                 | 52 | 10  | 30  |    | 5   | X    | 3  | X  | ?Ksp        | B3; large Opx with exsolved ore                                     |
| 4425       | Mt. Hardy                 |    |     |     |    |     |      |    |    |             | Mylonised dolerite dyke                                             |
| 4482       | 10 km E of<br>Demidov Is  | 30 | 15  | 45  |    | 9   |      | ?  | 1  |             | ?B3; sheared; ?igneous texture                                      |
| 4501       | 3 km N of Mt. Denham      | 60 | 30  |     | 1  |     | 5    | 1  | 3  |             | B4                                                                  |
| 4520       | Hydrographer Is.          | 60 | 16  | 12  |    | X   | X    | X  | 4  |             | Secondary Gt(8); granuloblastic                                     |
| 4529       | Newman Ntks               | 58 | 25  |     | 2  | X   | 8    | 2  | 5  | Ap          | B4                                                                  |
| 4531       | Newman Ntks               | XX |     |     |    | X   | XX   |    | X  |             | ?B4; altered                                                        |
| 4535       | Newman Ntks               | 53 | X   |     | 4  | 8   | 30   | 2  | 3  | Ap          | B4; altered: Amp + Bi replace Pyx                                   |
| 4541       | Mt. Bergin                | 50 | 25  | 10  |    | 2   | 3    | X  | 10 |             | B4                                                                  |
| 4542       | Mt. Maslen                | XX | XX  | X   | X  |     |      |    | X  |             | B4; part recrystallised                                             |
| 4543       | Mt. Currie                | XX | X   |     | XX |     |      |    |    |             | Sheared; granuloblastic; minor Gt                                   |



## NAPIER COMPLEX MAFIC DYKES

| Sample No. | Locality              | Pl | Cpx | Opx | Hb  | Bt | Sec. |    | Op | Accessories | Remarks                                                      |
|------------|-----------------------|----|-----|-----|-----|----|------|----|----|-------------|--------------------------------------------------------------|
|            |                       |    |     |     |     |    | Amp  | Qz |    |             |                                                              |
| 77284546   | Mt. Merrick           | 60 | 27  |     | X   | X  | 8    | X  | 4  | ?Ol         | B4; minor altered ?Ol                                        |
| 4584       | Mt. Alekseyev         | 58 | 38  |     |     |    |      | X  | 4  |             | B4; slightly porphyritic: Cpx + Pl phenocrysts               |
| 4589       | Ward Rocks            | 60 | 14  | 14  | 9   |    |      |    | 3  |             | B2; granuloblastic, foliated                                 |
| 4590       | Ward rocks            | 60 | 35  |     | 1   |    |      | X  | 4  |             | B4                                                           |
| 4591       | Howard Hills          | XX | XX  |     |     | X  |      |    | 10 |             | B4; olivine basalt; Pl phenocrysts; Cpx has reddish clouding |
| 4613       | Mt. Humble            | 58 | 30  |     |     |    | 10   | 1  | 1  |             | B4                                                           |
| 4619       | Dick Peaks            | 60 | 20  | 11  | 1   | 2  |      | 5  | 1  |             | ?B3; granuloblastic but pos. igneous                         |
| 4624       | 3 km W of Mt. Dyke    | 60 | 36  |     |     | X  | X    | X  | 4  |             | B4; Pl phenocrysts                                           |
| 4625       | Mt. Hardy             | 55 | 12  | 25  | X   | 4  |      | 4  |    | ?Ksp        | B3; large Opx with Cpx rims                                  |
| 4626       | Mt. Hardy             | 53 | 10  | 30  |     | 3  |      | 4  |    | ?Ksp        | B3                                                           |
| 4659       | Geoffrey Hills        | 60 | 28  |     | 0.5 | X  | 8    | 1  | 2  | Ap          | B4                                                           |
| 4695       | Mt. Henry             | 55 | 30  | 6   | 1   | 1  | 2    | 2  | 3  | Ap          | B4; Il, Mt                                                   |
| 4699       | Mt. Henry             | 27 | 20  | 50  |     | 3  |      |    | X  |             | B3                                                           |
| 4703       | W of Hydrographer Is. | XX | XX  |     | X   | X  | XX   |    | X  |             | B4; secondary Gt; r recrystallised                           |
| 4706       | Thorp Ridges          | 55 |     |     |     | 5  | 34   | X  | 6  |             | B4; altered: Amp + Bt replace Pyx; Pl altered (Ep)           |
| 4707       | Mt. Berrigan          | 56 | 32  |     |     | X  | 8    | 1  | 3  |             | B4                                                           |
| 4751       | Kirkby Head           | 50 | 16  | 12  | 10  |    |      | 4  |    |             | ?B2; granuloblastic but a few Cpx and Pl phenocrysts; Gt(8)  |
| 4757       | Waratah Is.           | 57 | 8   |     | 2   |    | 32   | X  | 1  |             | B4; altered                                                  |
| 4758       | N end of Rayner Gl.   | 60 | 10  | 26  |     | 4  |      | X  | X  |             | B3; Opx phenocrysts(12); fine-grained groundmass             |
| 4822       | Gromov Ntks           | 58 | 14  |     | 4   | X  | 20   | 1  | 2  | Ap          | B4; secondary Gt(1); much well-crystallised Hb               |

NAPIER COMPLEX MAFIC DYKES

| Sample No. | Locality                  | Pl | Cpx | Opx | Hb | Bi  | Sec. |    | Accessories | Remarks                                                         |
|------------|---------------------------|----|-----|-----|----|-----|------|----|-------------|-----------------------------------------------------------------|
|            |                           |    |     |     |    |     | Amp  | Qz | Op          |                                                                 |
| 77284827   | 1 km W of Mt. Pardoe      | 60 | 14  | 10  | X  |     |      | X  | 6           | B2; Gt(10); some igneous Pl, but granuloblastic; cut by B4 dyke |
| 4828       | Priestley Peak            | 59 | 20  | 20  | X  | X   |      |    | 1           | B2; granuloblastic                                              |
| 4829       | Priestley Peak            | 55 | 23  | 20  |    |     |      | X  | 1           | B2; granuloblastic; Gt (1.5)                                    |
| 4835       | Mt. Trail                 | 56 | XX  | XX  |    | 2   |      |    | 3           | Ap<br>B4; olivine tholeiite; Gt(4); granular Pyx: Opx + Cpx(35) |
| 4841       | 3 km N of Hydrographer Is | 58 | 17  | 20  | 2  | X   |      | 2  | 1           | B2; granuloblastic                                              |
| 4847       | 1 km SW of McIntyre Is    | 55 | 17  | 23  |    | 3   |      | 2  |             | ?B3; granuloblastic                                             |
| 4849       | Fyfe Hills                | 50 | 22  | 20  | 2  | 0.5 |      |    | X           | ?B2; granuloblastic; Gt(5)                                      |
| 4859       | 13 km ENE of Wallis Ntks  | 55 | 40  | X   | X  | X   |      |    | 5           | B4; granular Pyx; Cpx + Pl phenocrysts; Opx in groundmass       |
| 78285016   | Mt. Hardy                 | 55 | 10  | 22  | X  | 8   |      | 5  | X           | ?Ksp<br>B3; as 4625/6; Opx phenocrysts have exsolved ore        |
| 5028       | Mt. Tod                   | 60 | 28  |     | 2  | 1   | 6    |    | 3           | B4                                                              |
| 5051       | Beaver Is.                | XX | XX  |     |    | XX  | XX   |    | 10          | B4; olivine tholeiite; Pl phenocryst; groundmass altered        |
| 80285046A  | Cape Batterbee            | 50 | 20  | 10  | 5  |     |      |    | 3           | B4; sheared, much recrystallised; Gt(12)                        |

## RAYNER COMPLEX PYROXENE-QUARTZ-FELDSPAR GNEISSES

| Sample No. | Locality            | Qz | Ksp | Pl | Opx | Cpx | Bi | Hb | Op | Accessories | Remarks                               |
|------------|---------------------|----|-----|----|-----|-----|----|----|----|-------------|---------------------------------------|
| 4588       | Knuckey Peaks       | 30 | 25  | 45 | X   |     | X  |    | X  |             | Part recrystallised; secondary Bi     |
| 4592       | Leckie Range        | 25 |     | 66 | 5   |     | 4  |    | X  | Ap,Z,Carb   | An 50                                 |
| 4595       | Fram Peak           | 33 | 50  | 17 |     |     | X  |    | X  | Ap          | ?Intrusive; minor altered Bi and ?Opx |
| 7267       | Martin Is.          | 30 |     | 68 | 2   |     |    |    | X  | Ap,Z        |                                       |
| 7269       | Cape Gotley         | 28 | 60  | 4  | 5   | X   |    |    | 3  | Ap,Z        | Minor ?secondary Gt; Opx part altered |
| 7271       | Cape Gotley         | 35 |     | 62 | 2   |     | 1  |    | X  | Ap          | An 25                                 |
| 7273       | Thala Hills         | 28 | 44  | 23 | X   | 1   |    | 4  | X  | Ap,Z,Carb   |                                       |
| 7274       | Thala Hills         | 9  |     | 78 | 6   | 4   |    |    | 3  | Ap,Z        | ?Intrusive                            |
| 7277       | Thala Hills         | 58 |     | 40 |     |     | 2  |    | X  | Ap,Z,Sph    | ?Intrusive; secondary Chl             |
| 7278       | Thala Hills         | 30 | 57  | 10 | 3   |     | X  |    | X  | Ap          |                                       |
| 7280       | Kitchenside Rookery | 15 | 37  | 37 |     |     | 6  | 4  | X  | Ap,Z        | ?Intrusive                            |
| 65280024   | Stillwell Hills     | 30 |     | 67 | 3   |     |    | X  | X  | Ap,Z        |                                       |
| 26         | Stillwell Hills     | XX |     | XX | 1   |     |    |    |    |             |                                       |
| 53         | Mt. Kernot          | 35 | 28  | 35 | 1.5 |     | X  |    | X  | Ap,Z        | Opx part altered; An 24-30            |
| 66         | Stillwell Hills     | 30 |     | 66 | 4   |     | X  |    | X  | Ap,Z        |                                       |
| 67         | Stillwell Hills     | 20 |     | 67 | 12  |     |    | 1  | X  | Ap,Z        |                                       |
| 74         | Fram Peak           | 27 | 48  | 24 | 1   |     |    |    | X  | Ap,Z        |                                       |
| 75         | Fram Peak           | 20 |     | 56 | 12  | 12  | X  |    | X  | Z           | Opx part altered                      |
| 130        | Abrupt Pt.          | 40 |     | 51 | 1   |     | 8  |    | X  | Ap,Z        | An35                                  |
| 131        | Abrupt Pt.          | 23 |     | 63 | 2   | 8   |    |    | 4  | Ap,Z,Gt     | Minor Gt(0.5)                         |
| 135        | Robert Gl.          | 30 |     | 61 | 8   |     |    | 1  | X  | Ap,Z        |                                       |

## RAYNER COMPLEX PYROXENE-QUARTZ-FELDSPAR GNEISSES

| Sample No. | Locality        | Qz | Ksp | Pl | Opx | Cpx | Bi  | Hb  | Op | Accessories | Remarks                                      |
|------------|-----------------|----|-----|----|-----|-----|-----|-----|----|-------------|----------------------------------------------|
| 65280145   | Stillwell Hills | 50 |     | 39 | 8   |     | X   |     | 3  | Z           | Qz-rich; ?metasediment                       |
| 147        | Fram Peak       | 30 | 30  | 39 |     |     |     |     | 1  | Z           | ?Intrusive; leucogenesis                     |
| 156        | W. Hansen Mts   | 18 |     | 51 | 3   | 22  |     |     | 1  | Sph         | Gt(5) may be secondary; pos. a calc-silicate |
| 161        | Wornock Is.     | 27 | 24  | 30 | 13  | X   |     | 2   | X  | Ap,Z        | Gt(4) rims Opx and Op                        |
| 172        | Bertha Is.      | 16 |     | 70 | 9   |     | 1.5 | 1.5 | 2  | Ap,Z        | Sheared                                      |
| 174        | Havestein Is.   | 33 | 60  | 6  |     |     | X   |     | X  | Z           | Minor altered ?Opx                           |
| 177        | Solitary Ntk.   | 33 |     | 57 | 9   |     |     | X   | 1  | Ap,Hm       |                                              |
| 179        | Svart Mt.       | 30 |     | 60 | 6   |     |     | X   | 4  | Ap          |                                              |
| 184        | Jagar Is.       | 23 |     | 63 | 13  | 1   |     |     | X  | Ap,Z        | An 35                                        |
| 199        | W side Bell Bay | 25 |     | 64 | 9   | 2   | X   | X   | X  | Ap,Z        | Layered                                      |
| 219        | Else Ntks       | 27 | X   | 57 | 8   | 1   | X   | 7   | X  | Ap,Z        | Layered                                      |
| 226        | Kvars Prom.     | 25 |     | 65 | 7   |     |     | 2   | X  | Ap,Z        |                                              |
| 75830005   | Knuckey Peaks   | 38 | 60  | 2  |     |     | X   |     |    |             | ?Intrusive; some Ksp near Meso               |
| 50         | Knuckey Peaks   | 25 | 70  | X  | 5   |     |     |     | X  | Ap,Z        | Ksp near Meso                                |
| 51         | Knuckey Peaks   | 30 | 40  | 20 |     |     | 10  |     | X  | Ap,Z        | An 20-28; aligned Bi                         |
| 53         | Knuckey Peaks   | 30 | 35  | 35 |     |     | 7   | 1   | 2  | Ap,Z        | An 20-26; Ksp near Meso; part recrystallised |
| 54         | Knuckey Peaks   | 30 | 50  | 17 |     |     | 3   |     | X  | Z           | An 20                                        |
| 55         | Knuckey Peaks   | 29 | 60  | 6  |     |     | 4   |     | 1  | Ap,Z        | Secondary Bi                                 |
| 57         | Knuckey Peaks   | 35 | 60  | 5  |     |     | X   |     | X  | Z,Tour      | ?Intrusive                                   |
| 58         | Knuckey Peaks   | 33 | XX  | XX | 8   | X   |     |     | 1  | Ap,Z        | Ksp + Pl + Meso(58); exsolved Cpx            |
| 67B        | Knuckey Peaks   | 27 | 35  | 35 | 3   |     |     |     | X  | Ap,Z        | Opx part altered                             |



## RAYNER COMPLEX PYROXENE-QUARTZ-FELDSPAR GNEISSES

| Sample No. | Locality      | Qz | Ksp | Pl | Opx | Cpx | Bi | Hb | Op | Accessories  | Remarks                                                |
|------------|---------------|----|-----|----|-----|-----|----|----|----|--------------|--------------------------------------------------------|
| 75830069   | Knuckey Peaks | 30 | 57  |    | 13  |     |    |    | X  | Ap,Z         | Ksp near Meso                                          |
| 70         | Knuckey Peaks | 25 | 68  |    | 7   |     |    |    | X  | Ap,Z         | Ksp near Meso; Opx part altered                        |
| 71         | Knuckey Peaks | 30 | 61  |    | 8   | 1   |    |    | X  | Ap,Z         | Much Pl in perthite; Opx slightly altered              |
| 72         | Knuckey Peaks | 40 | 59  |    | 1   | X   | X  |    | X  | Ru, Ap, Z    | Pyx part altered                                       |
| 246        | Doggers Ntks  | 30 | 55  | 15 | X   |     |    |    | X  | Ap,Z         | Opx altered                                            |
| 257        | Doggers Ntks  | 30 | 55  | 15 |     |     |    |    | X  | Z            | Leucogneiss                                            |
| 259        | Doggers Ntks  | 40 |     | 57 | 3   |     | X  | X  | X  | Ap,Z,Mus     | Opx altered; An 30                                     |
| 266        | Jensen Is.    | 20 | 48  | 24 | 7   | 1   |    |    | X  | Ap,Z, ?Sph   | Some large grains of ?Sph (or Mon?)                    |
| 267        | Jensen Is.    | 24 |     | 60 | 12  | 3   |    |    | 1  | Ap,Z         | Ksp(5) in antiperthite                                 |
| 268        | Jensen Is.    | 20 |     | 67 | 10  | 2   |    | X  | 1  | Ap,Z         | Ksp(5) in antiperthite; layered                        |
| 269        | Jensen Is.    | 20 |     | 64 | 10  | 5   |    | X  | 1  | Ap,Z         | Ksp(5) in antiperthite                                 |
| 270        | Jensen Is.    | 18 |     | 66 |     | 10  |    | 16 | X  | Ap,Z,Sph,Chl | Retrograde gneiss; secondary Hb and Bi; Pl sericitised |
| 285        | Martin Is.    | 30 |     | 70 |     |     |    |    | X  |              | Leucogneiss; An 30                                     |
| 287        | Martin Is.    | 25 |     | 65 | 10  |     |    |    | X  | Ap,Z         | An 25-30                                               |
| 290        | Martin Is.    | 30 |     | 56 | 14  |     |    |    | X  | Ap,Z         | An 30                                                  |
| 292        | Martin Is.    | 20 |     | 70 | 10  | X   |    |    | X  | Ap,Z         | An 40; layered                                         |
| 76283038   | Molodezhnaya  | 12 | X   | 74 | 4   | 4   | 4  | 2  | X  | Ap,Z         | Bi may be secondary; An 35                             |
| 3039       | Molodezhnaya  | 46 |     | 46 |     |     |    | 7  | X  | Ep(1), Ap    | Minor Chl                                              |
| 3042       | Molodezhnaya  | 35 | 30  | 34 |     |     | 1  |    | X  |              | An 35                                                  |
| 3043       | Molodezhnaya  | 9  |     | 60 |     |     | 8  | 22 | 1  | Ap           | An 36; Hb + Qz intergrowths after ?Pyx                 |
| 3044       | Molodezhnaya  | 30 | 40  | 26 |     |     | 2  |    | 1  | Z            | Zoned Pl; aligned Bi                                   |

## RAYNER COMPLEX PYROXENE-QUARTZ-FELDSPAR GNEISSES

| Sample No. | Locality        | Qz | Ksp | Pl | Opx | Cpx | Bi  | Hb | Op | Accessories   | Remarks                                                   |
|------------|-----------------|----|-----|----|-----|-----|-----|----|----|---------------|-----------------------------------------------------------|
| 76283045   | Molodezhnaya    | 35 | 40  | 20 |     |     | 5   |    | X  | Ap            |                                                           |
| 3046       | Molodezhnaya    | 35 | 20  | 35 |     |     | 6   | 2  | 1  | Ap(1),Z,Sph   | An 30                                                     |
| 3050       | Molodezhnaya    | 30 | 33  | 30 |     |     | 5   |    | 1  | Ap(1)         | An 26                                                     |
| 3053       | Molodezhnaya    | 2  | 6   | 87 |     |     | 4   |    | 1  | Ap            | Section prob. not representative; pos. deformed pegmatite |
| 3116       | Mt. Christensen | 25 | 35  | 27 |     |     | 4   | 8  | 1  | Ap,Z,Ep       | ?Intrusive                                                |
| 3120       | Point Widdows   | 18 |     | 70 | 3   |     | 3   | 5  | 1  | Ap,Z          | Opx slightly altered                                      |
| 3177       | Pinn Is.        | 30 | 60  | 5  |     |     | 5   |    | X  | Ap            | Moraine; altered: secondary Bi + Chl                      |
| 3183       | Krasin Ntk      | 35 |     | 65 |     |     |     |    |    |               | Leucogneiss                                               |
| 3184       | Krasin Ntk      | 30 | 35  | 35 |     |     | X   |    | X  | Z             | Leucogneiss                                               |
| 3185       | Krasin Ntk      | 23 |     | 57 | 5   | 2   | 5   | 8  | X  | Ap            | Layered                                                   |
| 3186       | Krasin Ntk      | 30 | 50  | 20 |     |     | X   |    | X  |               |                                                           |
| 77283476   | Mt. Robinson    | 29 |     | 65 | 5   |     | X   |    | 1  | Ap            |                                                           |
| 3481       | Mt. Robinson    | 32 |     | 48 | 6   | 12  | 1   |    | X  | Sph(0.5),Ap,Z | ?Calc-silicate                                            |
| 3486       | Alderice Peak   | 34 | XX  | XX |     |     | 1   |    | X  |               | Altered: Bi replaces ?Opx; Meso(65)                       |
| 3489       | Krasnaya Ntk.   | 44 |     | 53 | 3   |     |     |    | X  |               | Felsic layer                                              |
| 3493       | Papanin Ntk     | 30 |     | 65 | 3   |     | 0.5 |    | 1  | Z             | ?Intrusive                                                |
| 3498       | Ward Ntk        | 29 |     | 58 | 6   |     | 2   | 4  | 1  | Ap,Z          | ?Intrusive                                                |
| 3499       | Ward Ntk        | 25 |     | 63 | 5   | 2   |     | 4  | 1  | Ap            | ?Intrusive                                                |
| 3500       | Dismal Mts      | 30 | 35  | 30 | 2.5 | 1.5 |     | 1  | X  | Ap,Z          | ?Intrusive; Opx part altered                              |
| 3554       | Mt. Underwood   | 15 | 38  | 38 | 5   | 0.5 | 3   |    | X  |               | Deformed                                                  |
| 3558       | Mt. Flett       | 20 | 49  | 20 |     |     | 4   | 7  | X  | Ap,Z          | ?Intrusive; porphyroblastic Ksp                           |

## RAYNER COMPLEX PYROXENE-QUARTZ-FELDSPAR GNEISSES

| Sample No. | Locality           | Qz | Ksp | Pl | Opx | Cpx | Bi | Hb | Op | Accessories | Remarks                                                 |
|------------|--------------------|----|-----|----|-----|-----|----|----|----|-------------|---------------------------------------------------------|
| 77283564   | Mt. Denholm        | 30 |     | 54 | 12  | X   |    | 4  | X  | Ap          |                                                         |
| 3567       | Mt. Denholm        | 17 |     | 72 | 6   | 3   | 1  |    | 1  | Ap,Z        |                                                         |
| 3574       | Mt. Underwood      | 30 | 20  | 34 |     |     | 11 |    | 5  | Z           |                                                         |
| 3576       | Mt. Channon        | 34 |     | 50 | 13  |     | 3  |    | X  |             |                                                         |
| 3585       | Turbulence Bluffs  | 16 |     | 58 | 2   |     |    | 24 | X  | Ap          | Opx part altered; secondary Carb                        |
| 3586       | Turbulence Bluffs  | 26 |     | 65 | 5   |     |    | 3  | 1  | Ap,Z        |                                                         |
| 3648       | Mt. Underwood      | 23 | 2   | 65 | 7   |     | 3  |    | X  | Ap          |                                                         |
| 3654       | Mt. Flett          | 13 |     | 55 | 6   | X   |    | 15 | 2  | Ap          | Ksp(9)                                                  |
| 3655       | Mt. Flett          | 35 | 50  | 10 |     |     | 3  | 2  | X  | Ap,Z        | Part recrystallised                                     |
| 3656       | Mt. Flett          | 15 | 55  | 15 |     |     | 7  | 8  | X  | Ap,Z        | Augen gneiss; recrystallised                            |
| 3658       | Mt. Marriner       | 25 | 40  | 28 |     |     | 3  | 6  | X  | Ap, Z       | Augen gneiss; recrystallised                            |
| 3661       | Mt. Denholm        | 28 | 40  | 25 |     |     | 2  |    | X  | Ap,Z        | Secondary Carb, Mus and Chl; recrystallised; ?Intrusive |
| 3664       | Dismal Mts         | 15 | 45  | 35 | 4   |     |    |    | 1  | Ap,Z        | Augen gneiss; ?Intrusive                                |
| 3665       | Mt. Saw            | 18 |     | 67 | 10  |     | 5  |    | X  | Ap,Z        | Andesine                                                |
| 3666       | Mt. Saw            | 25 |     | 60 | 8   |     | 7  |    | X  | Ap          | Part recrystallised; strongly foliated                  |
| 3749       | SH 821             | 30 | 6   | 52 | 2   |     | 8  |    | 2  | Ap,Z, ?Mon  | Opx part altered                                        |
| 3756       | Amphitheatre Peaks | 20 |     | 57 | 7   | 5   |    | 8  | 3  | Ap          |                                                         |
| 3757       | Mt. Boda           | 32 | 66  |    |     |     | X  |    |    |             | Secondary Bi + Chl(2) after ?Opx; Ksp near Meso         |
| 3758       | Mt. Boda           | 18 |     | 60 | 12  |     | X  | 7  | 3  | Ap,Z        | Layered                                                 |
| 3759       | Mt. Boda           | 17 |     | 40 | 11  | 4   | 3  | 25 | X  | Ap,Z        | Layered; secondary Bi                                   |
| 3901       | Mt. Saw            | 22 |     | 54 | 8   | 8   | 8  |    | X  | Ap,Z        |                                                         |

RAYNER COMPLEX PYROXENE-QUARTZ-FELDSPAR GNEISSES

| Sample No. | Locality                 | Qz | Ksp | Pl | Opx | Cpx | Bi  | Hb | Op | Accessories | Remarks                                           |
|------------|--------------------------|----|-----|----|-----|-----|-----|----|----|-------------|---------------------------------------------------|
| 77283904   | Doggers Ntks             | 30 | 33  | 33 | 2.5 |     | 1.5 |    | X  | Ap,Z        | Opx altered; minor Carb                           |
| 3905       | 65 km W of Knuckey Peaks | 26 |     | 70 | 4   |     |     |    | X  | Ap,Z        | ?Rayner Complex                                   |
| 4176       | Mt. Lira                 | 30 |     | 48 | 20  |     | 1   |    | 1  | Ap          | Zoned Pl                                          |
| 4177       | Mt. Lira                 | XX |     | XX | XX  |     | XX  |    | X  | Ap          | Layer of Cpx + Hb                                 |
| 4183       | Pinn Is.                 | 10 |     | 53 | 16  | 12  | 9   |    | X  | Ap          | Bi after Opx                                      |
| 4187       | Galkin Is.               | 20 |     | 50 | 12  |     | 6   | 12 | X  | Z           | Layered                                           |
| 4190       | Galkin Is.               | 35 | 30  | 25 | 3   |     | 7   |    |    | Z           | Opx part altered; aligned Bi                      |
| 4191       | Galkin Is.               | 40 |     | 50 | 1   |     | 9   |    | X  | Ap,Z        | Opx part altered; aligned Bi                      |
| 4192       | Kitchenside Gl.          | 30 | 30  | 34 | 5   | X   | X   | X  | 1  | Ap,Z,?Mon   | ?Intrusive; Opx slightly altered; secondary Bi    |
| 4194       | Confluence Ntk.          | 28 | 66  | X  | 4   |     | 2   |    | X  | Ap,Z        | Opx part altered; aligned Bi; part recrystallised |
| 4199       | Fluted Rock              | 15 |     | 63 | 17  | 3   |     |    | 2  | Ap,Z        |                                                   |
| 4263       | Kiri Ntks                | 30 | 26  | 40 | 4   |     |     |    | X  |             | ?Intrusive                                        |
| 4431       | Fram Peak                | 13 |     | 68 | 18  | X   | X   |    | 1  |             | ?Intrusive; recrystallised                        |
| 4432       | Fram Peak                | 45 |     | 47 | 3   | 5   | X   |    | X  |             | Opx part altered                                  |
| 4435       | Solitary Ntk.            | 26 | 66  | 6  | 2   |     | X   |    | X  | Z           | Opx part altered; oligoclase                      |
| 4438       | Gwynn Bay                | 35 | 42  | 22 |     | X   | X   |    | 1  | Ap,Z,Sph    | Oligoclase                                        |
| 4443       | Natmap Ntk.              | 25 | 35  | 30 | 2   |     | X   | 7  | X  | Ap,Z        | Opx part altered; oligoclase; myrmekite           |
| 4445       | Mt. Nils                 | 15 |     | 70 | 12  |     |     | 2  | 1  | Ap          | Andesine                                          |
| 4448       | Mt. Christensen          | 28 | 25  | 35 |     |     |     | 10 | 2  | Ap,Z        | Myrmekite                                         |
| 4459       | Vechernyy Hill           | 30 | 30  | 30 |     |     | 2   | 7  | 1  | Ap,Z        | Myrmekite                                         |



RAYNER COMPLEX PYROXENE-QUARTZ-FELDSPAR GNEISSES

| Sample No. | Locality                      | Qz | Ksp | Pl | Opx | Cpx | Bl  | Hb  | Op  | Accessories           | Remarks                                                 |
|------------|-------------------------------|----|-----|----|-----|-----|-----|-----|-----|-----------------------|---------------------------------------------------------|
| 77284461   | Vechernyy Hill                | 20 | 27  | 30 |     |     | 5   | 15  | 3   | Ap,Z,Sph, Ep          | Secondary Hb + Qz aggregates after ?Pyx; microcline     |
| 4463       | McKinnon Is.                  | 30 | 65  | 5  |     |     |     |     | X   |                       | Locally intrusive; ?Opx altered; oligoclase; microcline |
| 4506       | Kiri Ntks                     | 32 | 40  | 25 |     |     | 3   |     |     | Ap                    |                                                         |
| 4601       | Mt. Sibiryakov                | 30 | 55  | 10 |     |     | 3   |     | X   | Z,Ep                  | Foliated granite; Chl(1), Mus(1); Feld rather altered   |
| 4603       | Mt. Sibiryakov                | 15 | 6   | 60 | x   | 1   | 9   | 6   | 2   | Ap(1)                 | Foliated granodiorite                                   |
| 4607       | Mt. Sibiryakov                | 37 | 55  | 6  |     |     | 1.5 |     | X   | Z                     |                                                         |
| 4641       | Svart Mt.                     | 30 |     | 64 | 4   |     | 2   | X   | X   | Ap,Z                  | Part recrystallised                                     |
| 4642       | Svart Mt.                     | 30 |     | 63 | 5   |     | 1   | 0.5 | X   | Ap,Z                  | ?Intrusive; part recrystallised                         |
| 4644       | Forefinger Pt.                | 30 | XX  | XX | X   |     | X   |     | X   | Z                     | Leucogneiss; minor altered ?Opx; Ksp + Meso(70)         |
| 4645       | Forefinger Pt.                | 35 | 45  | 14 | 2   |     | 3   |     | 1   | Ap,Z                  |                                                         |
| 4679       | Vechernyy Hill                | 25 | 40  | 25 |     |     | 5   | 3   | 1   | Sph(0.5),Ap,Z,<br>All | ?Intrusive                                              |
| 4680       | Vechernyy Hill                | 5  |     | 70 | 4   | 3   | 8   | 7   | 2   | Ap,Z                  | ?Intrusive; secondary Bl + Qz intergrowths              |
| 4681       | S of Assender Gl.             | 13 | 35  | 50 | 1.5 |     | X   |     | 0.5 | Ap,Z                  | Opx part altered                                        |
| 4682       | S of Assender Gl.             | 27 | 57  | 15 |     |     | X   |     | X   | Ap,Z,?All             | ?Intrusive; altered ?Opx(1)                             |
| 4689       | 2 km SW of<br>Forefinger Pt.  | 15 |     | 65 | 16  | 3   |     |     | 1   | Ap                    |                                                         |
| 4691       | 2 km SW of<br>Forefinger Pt.  | 25 | 30  | 40 | 2   |     | 3   |     | X   | Ap,Z                  | Inclusion in foliated leucogranite                      |
| 4784       | 15 km SE of<br>Forefinger Pt. | 38 | 25  | 30 | 6   |     | 1   |     | X   | Ap,Z                  |                                                         |

RAYNER COMPLEX PYROXENE-QUARTZ-FELDSPAR GNEISSES

| Sample No. | Locality        | Qz | Ksp | Pl | Opx | Cpx | Bl  | Hb  | Op | Accessories     | Remarks                 |
|------------|-----------------|----|-----|----|-----|-----|-----|-----|----|-----------------|-------------------------|
| 77284811   | Georges Is.     | 30 | 34  | 34 | 1.5 |     |     |     | X  | Ap              |                         |
| 4812       | Georges Is.     | 32 | 18  | 40 | 6   | X   | 4   | X   | X  | Ap              | Layered                 |
| 4851       | Doggers Ntks    | 36 | 60  | 3  | 1   |     | X   |     | X  | Ap,Z, All, Chev | ?Intrusive; Opx altered |
| 78285014   | Kitchenside Gl. | 20 | 34  | 34 | 3   | 3   |     | 4   | 2  | Ap,Z            | ?Intrusive              |
| 5023       | Mt. Flett       | 30 | 42  | 22 |     |     | 2.5 | 2.5 | 1  | Ap,Z            | ?Intrusive              |
| 5024       | Condon Hills    | 30 | 67  |    |     |     | 2   |     | 1  | Z,Mon           | ?Intrusive              |
| 5027       | Thala Hills     | 25 | 45  | 25 |     |     | 5   |     | X  | Ap,Z,?Mon       | Some secondary Bl       |

RAYNER COMPLEX MAFIC ROCKS

| Sample No. | Locality              | Qz | Pl | Cpx | Opx | Hb | Bi | Op | Accessories | Remarks                                                                 |
|------------|-----------------------|----|----|-----|-----|----|----|----|-------------|-------------------------------------------------------------------------|
| 4573       | Amphitheatre Peaks    | 2  | 94 |     |     | 4  | X  | X  |             | Anorthosite                                                             |
| 4591       | Mt. Channon           | 4  | 63 | 4   | 25  |    |    | 4  | Ap, Z       | Zoned Pl                                                                |
| 4594       | Leckie Range          |    | 65 | 9   | 10  | 6  | 9  | 1  | Ap          | Metamorphosed dyke                                                      |
| 7276       | Thala Hills           | 3  | 39 | 8   |     | 50 |    | X  |             | Amphibolite; Cpx part altered to Carb, Amp, etc; cut by Qz vein         |
| 65280025   | Stillwell Hills       |    | 60 | 15  | 25  |    |    | X  | Ap          |                                                                         |
| 52         | Mt. Kernot            | X  | 30 | 18  | 6   | 12 |    | 4  | Ap, ?Z, Ksp | Gt(30); Gt + Cpx; Qz inclusions in Gt                                   |
| 69         | Stillwell Hills       | 5  | 63 |     | 32  |    |    | X  |             |                                                                         |
| 70         | Stillwell Hills       | 4  | 60 | 18  | 18  |    | X  | X  |             |                                                                         |
| 78         | Its                   |    | 64 | 16  | 8   |    | 10 | 2  |             | Aligned Bi                                                              |
| 86         | Still Gulf            | 3  | 65 | 12  | 20  |    | X  | X  |             |                                                                         |
| 162        | Ives Tongue: Fold Is. |    | 60 | 12  | 28  | X  | X  | X  | Ap          |                                                                         |
| 168        | Farrington Is.        |    | 60 | 22  | 13  | 2  |    | 3  | Ap          |                                                                         |
| 169        | Farrington Is.        |    | 45 | 10  | 17  | 26 | X  | 2  | Ap          |                                                                         |
| 178        | Solitary Ntk          | X  | 60 | 20  | 20  |    |    | X  |             |                                                                         |
| 180        | Svart Mt.             |    | 55 | 22  | 22  | X  | 1  | X  | Ap          |                                                                         |
| 182        | W. side Gwynn Bay     | 2  | 63 | 15  | 15  | 2  |    | 3  | Ap          |                                                                         |
| 209        | W. Robert Gl.         |    | 42 | 15  | 4   | 15 | 7  | 2  | Ap          | Gt(15); Gt + Cpx; An 30-35                                              |
| 213        | Rayner Peak           | 1  | 50 | 22  | 8   | 1  | 1  | 1  | Ap          | Gt(16); Gt + Cpx; Opx + Pl locally rim Gt; An 26-28; metamorphosed dyke |
| 215        | Abrupt Pt.            | 2  | 60 | 8   | 12  | 15 |    | 3  | Ap          | Zoned Pl: An 50-60                                                      |

## RAYNER COMPLEX MAFIC ROCKS

| Sample No. | Locality                | Qz | Pl | Cpx | Opx | Hb | Bi | Up | Accessories | Remarks                                                                         |
|------------|-------------------------|----|----|-----|-----|----|----|----|-------------|---------------------------------------------------------------------------------|
| 65280216   | N King Edward Ice Shelf | 2  | 78 | 17  |     | 3  |    | X  | Ap          | An 50; ?calc-silicate                                                           |
| 220        | Else Ntks               | 4  | 64 | 18  | 10  | X  |    | 2  | Ap          | Gt(2); Gt + Cpx; Opx + Pl rim Gt; zoned Pl: An 40-55                            |
| 221        | Else Ntks               |    | 25 | 40  | 8   |    |    | 2  |             | Gt(25); Gt + Cpx; Opx + Pl symplectite rims Gt;<br>adjacent Opx - Qz - Pl layer |
| 223        | Edward Ridge            | 6  | 40 |     |     | 51 | 1  | X  | Ap          | Gt(2); Gt amphibolite                                                           |
| 224        | Turbulence Bluffs       | X  | 47 | 15  | 15  | 20 |    | X  | Ap          | Gt(3); Gt + Cpx                                                                 |
| 225        | Turbulence Bluffs       | 9  | 32 |     |     | 34 | 9  | 1  | Ap, Carb    | Gt(15); Gt amphibolite; adjacent Bi-Qz-Pl layer                                 |
| 227        | Kvars Prom.             |    | 55 | 20  | 14  | 10 | X  | 1  | Gt, Ap      |                                                                                 |
| 75830004   | Rayner Peak             |    | 50 | 20  | 10  | 8  | X  | X  | Ap          | Gt(12); Gt + Cpx; Opx + Pl + Hb rim Gt                                          |
| 12         | Rayner Peak             | 3  | 30 | 28  | 5   | 5  |    | X  |             | Gt(25); Gt + Cpx; Opx + Pl rim Gt; An 50                                        |
| 13         | Rayner Peak             | ?  | 50 | 24  | 14  | 3  | 5  | X  |             | Gt(4); Gt + Cpx; Opx + Pl rim Gt; zoned Pl                                      |
| 19         | Rayner Peak             | X  | 18 | 37  | 3   | 12 | X  | X  |             | Gt(30); Gt + Cpx; Opx + Pl rim Gt; An 35-40                                     |
| 49         | Knuckey Peaks           |    | 50 | 9   | 16  | 25 |    | 1  | Ap          | New Opx round Hb                                                                |
| 59         | Knuckey Peaks           |    | 20 | 35  | 33  |    | 12 | X  | Ru, Ap      |                                                                                 |
| 68         | Knuckey Peaks           |    | 20 | 5   | 65  |    | 10 | X  | Ap          | An 58                                                                           |
| 234        | Doggers Ntks            |    | 55 | 23  | 10  | 5  |    | 7  | Ap          | An 40                                                                           |
| 245        | Doggers Ntks            |    | 60 | 14  | 14  | 10 |    | 2  | Ap, Ksp     | Ksp(4) in antiperthite; layered                                                 |
| 251A       | Doggers Ntks            |    | XX |     | XX  |    | X  | XX | Sp(XX)      | Symplectite rimming Gt                                                          |
| 251B       | Doggers Ntks            |    | XX |     | XX  | X  | X  | XX | Sp(XX)      | Symplectite rimming Gt; some coarse Opx, Hb, Pl                                 |
| 256        | Doggers Ntks            |    | 60 | 10  | 15  | 15 |    | X  | Ap          | An 55                                                                           |



## RAYNER COMPLEX MAFIC ROCKS

| Sample No. | Locality       | Qz | Pl | Cpx | Opx | Hb | Bi | Op  | Accessories | Remarks                               |
|------------|----------------|----|----|-----|-----|----|----|-----|-------------|---------------------------------------|
| 75830271   | Jensen Is.     |    | 60 | 14  | 10  | 15 |    | 1   | Ap, Gt      | Metamorphosed dyke; granuloblastic    |
| 282        | Martin Is.     |    | 15 |     | 68  | X  | 17 | X   |             |                                       |
| 286        | Martin Is.     |    | 55 | 4   | 38  |    |    | 2   | Gt(1)       | An 40                                 |
| 289        | Martin Is.     |    | 55 |     | 20  | 20 | 5  | X   | Ap          | An 70; phlogopite + cummingtonite     |
| 76283037   | Molodezhnaya   | 15 | 50 |     |     | 35 |    |     |             | Amphibolite                           |
| 3054       | Molodezhnaya   | 6  | 52 |     |     | 37 | 5  | X   | Ap          | Amphibolite                           |
| 3178       | Pinn Is.       |    | 25 | 5   | 18  | 45 | 7  |     |             | Moraine                               |
| 3179       | Pinn Is.       |    | 25 | 20  | 35  |    | 18 | 2   | Z           | Moraine                               |
| 3181       | Krasin Ntk     | X  | 58 | 10  | 15  | 15 | 2  | X   | Ap          |                                       |
| 3182       | Krasin Ntk     |    | 70 | X   | 28  | X  |    | 2   | Ap, Ksp     |                                       |
| 3271       | Doggers Ntk    |    | XX |     | XX  | X  | XX | X   |             | Large Gt rimmed by Opx + Pl + Bi + Op |
| 77283470   | Mt. Robinson   |    | 45 | 15  | 7   | 20 |    | 1   |             | Gt(12) may be secondary               |
| 3471       | Mt. Robinson   |    | 50 | 17  | 10  | 6  |    | 1.5 |             | Gt(12); layered                       |
| 3472       | Mt. Robinson   |    | 40 | 18  | 5   | 37 |    | X   |             |                                       |
| 3477       | Mt. Robinson   |    | 63 | 20  | 10  |    | 5  | 1.5 | Ap          |                                       |
| 3483       | Mt. Robinson   |    | 60 | 10  | 3   | 20 | 7  | X   | Ap          |                                       |
| 3484       | Mt. Robinson   | ?  | 60 | 13  | 7   | 20 |    | X   |             |                                       |
| 3487       | Alderdice Peak |    | 53 | 20  | 15  | 10 | X  | 2   | Ap          | Layered                               |
| 3489       | Krasnaya Ntk.  |    | 55 | 12  | 22  | 10 |    | 1   |             | Mafic layer                           |
| 3490       | Krasnaya Ntk.  | 1  | 50 | 23  | 20  | 2  |    | 4   | Ap          |                                       |
| 3557       | Mt. Underwood  |    | 60 | 8   | 8   | 20 | 4  |     |             |                                       |

RAYNER COMPLEX MAFIC ROCKS

| Sample No. | Locality                 | Qz | Pl | Cpx | Opx | Hb | Bi | Op | Accessories | Remarks                                                |
|------------|--------------------------|----|----|-----|-----|----|----|----|-------------|--------------------------------------------------------|
| 77283559   | Mt. Flett                | 55 | 20 | 10  | 10  | 5  | X  | Sp |             |                                                        |
| 3563       | Mt. Narriner             | ?  | 60 | 6   |     |    | 34 |    | Ap          | Sheared                                                |
| 3565       | Mt. Denholm              | 5  | 60 | 20  | 10  |    | 1  | 4  |             |                                                        |
| 3566       | Mt. Denholm              |    | 24 | 37  | 30  |    | 8  | 1  |             |                                                        |
| 3573       | Mt. Underwood            |    | 24 | 6   |     | 40 |    | X  | Sp          | Gt(30)                                                 |
| 3577       | Mt. Cook                 |    | 60 | 10  | 10  | 20 |    | X  |             |                                                        |
| 3581       | Turbulence Bluffs        | ?  | 45 | 15  | 15  | 15 |    | X  |             | Dyke; Gt(10)                                           |
| 3583       | Turbulence Bluffs        |    | 55 | 14  | 8   | 5  | X  | 4  | Ap          | Gt(14)                                                 |
| 3584       | Turbulence Bluffs        | 12 | 33 | 5   | X   | 20 |    | 5  |             | Gt(20); Opx + Pl rim Gt                                |
| 3649       | Mt. Underwood            |    | 50 | 16  | 11  | 20 |    | 3  |             |                                                        |
| 3650       | Mt. Underwood            |    | 50 |     | 17  | 15 | 5  | 3  |             | Gt(10); ?metasediment                                  |
| 3662       | Mt. Denholm              |    | 12 | 35  | 45  |    | 8  | X  | Ap          | Pod                                                    |
| 3663       | Dismal Mts               |    | 65 | 17  | 17  |    | X  | 1  | Ap          |                                                        |
| 3668       | Doggers Ntks             |    | 35 | 18  | 34  | 3  | 10 |    |             |                                                        |
| 3669       | Doggers Ntks             |    | 60 | 20  | 15  | 1  | X  | 4  |             | Pl + Opx + Op intergrowths after Gt?; Pl reverse zoned |
| 3672       | 65 km W of Knuckey Peaks |    | 35 |     | 25  | 38 | 2  | X  | Ap          | Pl reverse zoned                                       |
| 3753       | Amphitheatre Peaks       | X  | 74 | 5   | 15  | 6  | X  |    | Z           |                                                        |
| 3755       | Amphitheatre Peaks       | X  | 97 | 1   |     | 2  |    |    | Z           | Anorthosite                                            |
| 3907       | 65 km W of Knuckey Peaks |    | 40 | 7   | 18  | 20 | 15 |    | Ap          | Zoned Pl                                               |
| 4184       | Pinn Is.                 |    | 50 | 10  | 10  | 22 | 8  | X  | Ap          | Aligned Bi                                             |
| 4185       | Pinn Is.                 |    | 36 |     | 16  | 40 | 8  | X  | Ap          | Zoned Pl; aligned Bi                                   |

RAYNER COMPLEX MAFIC ROCKS

| Sample No. | Locality        | Qz | Pl | Cpx | Opx | Hb | Bi | Op  | Accessories | Remarks                  |
|------------|-----------------|----|----|-----|-----|----|----|-----|-------------|--------------------------|
| 77284189   | Galkin Is.      |    | 55 | 24  | 12  | 8  | 1  | X   |             | ?Metamorphosed dyke      |
| 4193       | Kitchenside Gl. | 1  | 60 | 10  | 10  | 18 |    | 1   | Ap          | Layered                  |
| 4195       | Confluence Ntk. |    |    | 30  | 25  |    | 20 | X   | Ap          | Ksp(25); pod; aligned Bi |
| 4196       | Confluence Ntk. |    | 63 | 20  | 14  |    | X  | 3   | Ap          |                          |
| 4200       | Fluted Rock     |    | 32 | 24  | 16  | 28 |    |     |             | ?Metamorphosed dyke      |
| 4261       | Kiri Ntk        |    | 50 | 12  | 12  | 25 |    | 1   |             | Labradorite              |
| 4264       | Kiri Ntk        |    | 54 | 15  | 10  | 20 | X  | 1   |             |                          |
| 4428       | See Ntk.        | 3  | 58 | 5   | 25  |    | 8  | 1   |             | Aligned Bi               |
| 4433       | Fram Peak       | 2  | 55 | 5   | 30  |    |    | 8   | Ap          | Xenolith                 |
| 4436       | Solitary Ntk.   |    | 58 | 20  | 17  | 2  |    | 3   |             |                          |
| 4439       | Gwynn Bay       | 4  | 56 | 5   | 10  | 25 | X  | X   | Ap          | Minor secondary Hb       |
| 4440       | Gwynn Bay       | X  | 40 | 18  | 5   | 37 |    | X   | Ap          | Opx part altered         |
| 4465       | McKinnon Is.    | X  | 60 | 3   | 27  |    | 10 | X   |             | Aligned Bi; zoned Pl     |
| 4507       | Kiri Ntk        |    | 58 | 13  | 13  | 14 |    | 2   |             |                          |
| 4555       | Svart Mt.       |    | 55 | 17  | 18  | 4  | 2  | 2   |             | ?Secondary Gt(2)         |
| 4556       | Svart Mt.       |    | 53 | 23  | 18  | 5  | X  | 1   |             |                          |
| 4579       | McKinnon Is.    |    | 60 | 13  | 14  | 4  | 7  | 2   |             | Foliated                 |
| 4604       | Mt. Sibiryakov  |    | 51 | 17  | 10  |    | 22 | X   | Ap          | Deformed dyke            |
| 4605       | Mt. Sibiryakov  | 5  | 64 |     |     | 24 | 6  | 1   | Ap          |                          |
| 4639       | Secluded Rocks  | 5  | 55 | 10  |     | 27 |    | 2.5 | Sph(0.5)    | Deformed dyke            |
| 4640       | Secluded Rocks  | 4  | 50 | 18  | 12  | 5  |    | 5   | Ap          | Deformed dyke; Scap(7)   |

RAYNER COMPLEX MAFIC ROCKS

| Sample No. | Locality                  | Qz  | Pl | Cpx | Opx | Hb | Bl | Op  | Accessories | Remarks                                     |
|------------|---------------------------|-----|----|-----|-----|----|----|-----|-------------|---------------------------------------------|
| 77284643   | Svart Mt.                 |     | 60 | 16  | 16  | 5  |    | 2.5 | Ap          | Pos. a deformed dyke                        |
| 4646       | Forefinger Pt.            |     | 56 | 11  | 11  | 18 | 2  | 2   | Ap          |                                             |
| 4664       | 5 km WNW of Mt. Yuzhnaya  | 7   | 56 | 5   | 20  | 7  |    | 5   | Ap          |                                             |
| 4688       | 2 km SW of Forefinger Pt. | 6   | 54 | 15  | 17  | 5  | 1  | 1.5 |             | Layered                                     |
| 4780       | 3 km SE of Forefinger Pt. |     | 50 | 23  | 23  | 1  |    | 3   | Ap          |                                             |
| 4780A      | 3 km SE of Forefinger Pt. |     | 60 | 10  | 10  | 17 | X  | 3   | Ap          |                                             |
| 4781       | 3 km SE of Forefinger Pt. |     | 24 | 10  | 50  | 14 | 2  |     |             | Aligned Bl                                  |
| 4807       | Georges Is.               | 5   | 58 |     | 11  | 4  | 20 | 1   | Ap(1),Z,Gt  | Opx part altered to Amp + Qz + Bl + Op, etc |
| 4808       | Georges Is.               | 5   | 42 | 3   |     | 50 |    |     |             | Cpx part altered                            |
| 4809       | Georges Is.               | 1.5 | 60 | 10  | 15  | 13 |    | 0.5 |             | ?Dyke                                       |
| 4813       | Georges Is.               | 2   | 50 | 10  | 8   | 30 |    | X   |             | Dyke; some secondary Amp                    |
| 4814       | Georges Is.               |     | 50 | 15  | 10  | 24 |    | 1   |             | Dyke; relict Pl phenocrysts                 |
| 4852       | Doggers Ntks              | 1.5 | 55 | 9   | 4   | 30 | X  | X   |             | Prob. deformed dyke                         |
| 4853       | Doggers Ntks              | X   | XX | X   | XX  | XX | X  | X   |             | Gt(XX); Mt + Opx + Pl symplectite rims Gt   |
| 4856       | Edward Ridge              | 7   | 60 |     | 2   | 25 | 6  | X   | Ap, Hm, Gt  | Layered; large aggregate Pl                 |
| 78285026   | 6 km W of Pt. Widdows     | 3   | 57 |     |     | 32 | 8  |     | Ap          | Amphibolite                                 |



RAYNER COMPLEX ULTRAMAFIC ROCKS

| Sample No. | Locality                          | Opx | Cpx | Ol | Hb | Bl | Pl | Op | Sp | Accessories | Remarks                                                     |
|------------|-----------------------------------|-----|-----|----|----|----|----|----|----|-------------|-------------------------------------------------------------|
| 4589       | Knuckey Peaks                     | 60  | 26  |    | 10 | 1  |    |    | 3  |             |                                                             |
| 4590       | Knuckey Peaks                     |     |     |    | 40 | 50 |    |    |    | Qz(10)      |                                                             |
| 4593       | Leckie Range                      | 98  |     |    |    |    |    |    |    |             | Orthopyroxenite; minor cummingtonite                        |
| 7268       | Martin Is.                        | 82  |     |    | 4  | 4  | 10 | X  |    |             | Zoned Pl: An 30-50                                          |
| 65280085   | Hoseason Gl.                      | 12  | 80  |    | 8  |    |    | X  |    | Pl, ?Qz     | Hb pyroxenite                                               |
| 175        | Havstein Is.                      | 35  | 10  |    | 50 | 5  |    |    |    |             |                                                             |
| 185        | Jagar Is.                         | 19  |     |    | 50 | 19 | 12 |    |    |             | Bronzite                                                    |
| 186        | Jagar Is.                         | 60  | 6   |    | 34 |    | X  | X  |    | Hm          | Bronzite                                                    |
| 214        | Junc. of Seaton &<br>Wilson Gl.s. | 20  | 33  |    | 40 | 2  | 5  | X  |    |             | Hb pyroxenite                                               |
| 75830002   | Rayner Peak                       | 25  | 10  |    | 65 | X  | X  |    |    |             | Pyx hornblendite                                            |
| 8          | Rayner Peak                       | 2   | 30  |    | 2  | X  | 3  | 3  |    |             | Gt(60) has rims of Opx + Pl; Gt + Cpx; An 36                |
| 55A        | Knuckey Peaks                     | 45  | 10  |    | 45 |    |    | X  |    |             | Hb pyroxenite                                               |
| 60         | Knuckey Peaks                     | 70  |     |    | 20 | 5  |    |    |    |             | Hb orthopyroxenite                                          |
| 61         | Knuckey Peaks                     | 25  | 52  |    | 18 |    |    | X  |    |             | Hb pyroxenite                                               |
| 62         | Knuckey Peaks                     | 55  | 40  |    | 5  |    |    | X  |    | Gt          | Pyroxenite; Gt rims Pyx                                     |
| 235        | Doggers Ntks                      | 5   | 10  | 15 | 70 |    |    | X  |    | Carb        | Ol-Pyx hornblendite; Ol part altered                        |
| 236        | Doggers Ntks                      | 25  | 13  | 12 | 50 |    |    | X  |    | Carb        | Ol-Pyx hornblendite; layered; Ol part altered to iddingsite |
| 238        | Doggers Ntks                      | XX  | X   |    | X  | X  |    | X  |    |             | Pegmatoid                                                   |
| 239        | Doggers Ntks                      | XX  | XX  |    | X  | X  | X  |    |    | Qz          | Qz + Pl rich layer; secondary Hb                            |
| 240        | Doggers Ntks                      | 25  | 40  |    | 25 | 10 | X  |    |    |             | Hb-Bl pyroxenite                                            |

RAYNER COMPLEX ULTRAMAFIC ROCKS

| Sample No. | Locality                    | Opx | Cpx | Ol | Hb | Bl | Pl | Op | Sp | Accessories | Remarks                                           |
|------------|-----------------------------|-----|-----|----|----|----|----|----|----|-------------|---------------------------------------------------|
| 75830241   | Doggers Ntks                | 76  | 3   |    | 3  | 15 | 3  |    |    |             | Bl orthopyroxenite                                |
| 242        | Doggers Ntks                | 94  | X   |    |    | 6  | X  | X  |    |             | Bl orthopyroxenite                                |
| 247        | Doggers Ntks                | 40  | 40  |    | 20 |    | X  | X  |    | Carb        | Hb pyroxenite                                     |
| 248        | Doggers Ntks                | 48  | 48  |    |    |    | 4  |    |    | Ksp, Qz     | Pl + Ksp + Qz patch; pyroxenite                   |
| 249        | Doggers Ntks                | XX  | X   |    |    | X  | X  |    |    |             | Pegmatoid                                         |
| 254        | Doggers Ntks                | 22  | 22  |    |    | 45 | 10 |    |    |             | Zoned Pl                                          |
| 255        | Doggers Ntks                | 40  | 45  |    |    | 8  | 7  |    |    |             | Zoned Pl An 50; Bl pyroxenite                     |
| 258        | Doggers Ntks                | 85  | X   |    |    | 10 | 2  |    |    | Ksp(2)      | Bl orthopyroxenite                                |
| 281        | Martin Is.                  | 80  | 6   |    | 2  | 12 | X  |    |    |             | Bl orthopyroxenite                                |
| 283        | Martin Is.                  | XX  |     |    | X  | X  | X  | X  |    |             | Orthopyroxenite; very pale green ?Hb              |
| 284        | Martin Is.                  | XX  | X   |    | X  | X  | X  | X  |    |             | Orthopyroxenite                                   |
| 288        | Martin Is.                  | 50  |     |    | 45 |    | 5  | X  |    |             |                                                   |
| 76283188   | Krasin Ntks                 | 20  | 35  | 28 | 12 | 4  |    | 1  |    |             | Ol-Hb pyroxenite layer; Ol slightly serpentinised |
| 77283447   | 1 km W of Mt. Robinson      | 45  | 45  |    | 5  | 5  |    |    |    |             | Pyroxenite pod                                    |
| 3482       | Mt. Robinson                | 36  | 20  | 20 | 20 | 2  |    | X  | X  | Carb(2)     | Ol-Hb pyroxenite pod; Ol part altered             |
| 3485       | Mt. Robinson                | 90  | X   |    |    | 1  | 5  | X  |    |             | Orthopyroxenite pod                               |
| 3488       | Alderdice Peak              | 62  | 32  |    | 5  | 1  |    |    |    |             | Pyroxenite pod                                    |
| 3497       | 6 km ENE of Ward Ntks       | 40  | 30  |    | 30 |    |    |    |    |             | Hb pyroxenite pod                                 |
| 3578       | Mt. Cook                    | 65  | 35  |    |    |    |    |    |    |             | Pyroxenite                                        |
| 3579       | 32 km W of<br>Knuckey Peaks | 80  | 10  |    |    | 7  | 3  |    |    |             | Pyroxenite                                        |

RAYNER COMPLEX ULTRAMAFIC ROCKS

| Sample No. | Locality        | Opx | Cpx | Ol | Hb | Bi | Pl | Op | Sp | Accessories | Remarks                                                                 |
|------------|-----------------|-----|-----|----|----|----|----|----|----|-------------|-------------------------------------------------------------------------|
| 77283614   | Mt. Underwood   | 20  |     | 5  | 70 |    |    | 3  | 2  |             | Scree                                                                   |
| 3652       | Mt. Underwood   | 40  |     | 25 | 30 |    |    | X  | 5  |             | Ol-Hb pyroxenite layer                                                  |
| 3653       | Mt. Underwood   | 13  |     | 7  | 80 |    |    | X  | X  |             | Ol-Pyx hornblendite pod; Ol part altered                                |
| 3750       | SH 821          | 4   | 5   |    | 81 |    | 8  | 1  |    | Qz, Ap      | Pyx hornblendite layer                                                  |
| 3760       | Mt. Boda        | 8   | 86  |    | 4  |    | 2  |    |    |             | Hb pyroxenite                                                           |
| 3761       | Mt. Boda        | 4   | 2   |    | 85 | 5  | 4  | X  |    |             | Pyx hornblendite pod; Pyx rims Hb                                       |
| 3762       | Mt. Boda        | 40  | 43  |    | 5  | 9  | 3  |    |    |             | Hi-Bi pyroxenite pod                                                    |
| 4172       | Mt. Lira        | X   | 80  |    | 10 |    | 6  | X  |    | Sph         | Hb pyroxenite; Pl sericitised; most Hb secondary; some ?Opx             |
| 4197       | Kitchenside Gl. | X   | XX  |    | X  |    | X  | X  |    | Qz          | Erratic; clinopyroxenite; intergrowth of Hb + Opx + Ol may be secondary |
| 4446       | Mt. Nils        | 15  |     |    | 80 | X  | 5  | X  |    |             | Pyx hornblendite layer; red-brown Hb; zoned Pl                          |
| 4462       | McKinnon Is.    | 40  | 36  |    | 1  | 15 | 8  |    |    |             | Bi pyroxenite xenolith                                                  |
| 4647       | Forefinger Pt.  | 22  | 34  |    | 34 | 10 | X  | X  |    |             | Hb-Bi pyroxenite layer                                                  |
| 4810       | Georges Is.     | 96  | X   |    | 4  |    |    | X  |    |             | Orthopyroxenite                                                         |

RAYNER COMPLEX GARNET-QUARTZ-FELDSPAR GNEISSES

| Sample No. | Locality                 | Qz | Ksp | Pl | Gt | Bi  | Opx | Op | Accessories | Remarks                    |
|------------|--------------------------|----|-----|----|----|-----|-----|----|-------------|----------------------------|
| 4834       | Mt. Channon              | 33 | 31  | 25 | 9  | 2   |     | X  | Ap,Z        |                            |
| 7279       | Thala Hills              | 43 |     | 40 | 2  |     | 15  | X  | Ap          |                            |
| 65280050   | Mt. Kernot               | 35 | 38  | 25 | 2  | X   |     |    |             | An 24                      |
| 76         | E. Hansen Mts            | 30 | 40  | 20 | 9  | X   |     |    |             |                            |
| 77         | E. Hansen Mts            | 30 | 33  | 30 | 4  | 3   |     | X  | Z           |                            |
| 129        | Georges Is.              | 27 | 48  | 20 | 3  | 1.5 |     |    | Ap,Z        | An 26-28                   |
| 133        | C. King Edward Ice Shelf | 35 | 57  | 7  | 1  | X   |     | X  |             | An 26                      |
| 144        | Stillwell Hills          | 20 |     | 66 | 5  | 2   | 5   | 2  | Ap          |                            |
| 157        | W. Hansen Mts.           | 26 | 16  | 40 | 11 | 4   | 3   |    |             |                            |
| 160        | Ives Tongue: Fold Is.    | 20 | 5   | 50 | 20 | 5   |     | X  | Ru,Z        |                            |
| 173        | Bertha Is.               | 33 | 48  | 12 | 1  | 6   |     | X  | Ap,Z        |                            |
| 181        | W side Gwynn Bay         | 33 | 59  | 6  | 1  | X   |     | X  |             | Altered ?Opx(1)            |
| 208        | Mt. Kernot               | 30 | 12  | 50 | 3  | X   | 5   | X  | Ap,Z        | Minor secondary Carb.      |
| 210        | W Robert Gl.             | 33 | 53  | 10 | 4  |     |     | X  | Z           |                            |
| 212        | W Robert Gl.             | 30 | 30  | 31 | 1  | 5   | X   |    | Ap,Z        | Hb(3); An 30               |
| 222        | Edward Ridge             | 40 | 36  | 8  | 6  | 10  |     |    | Z           | Minor secondary Chl        |
| 226        | Kvars Prom.              | 25 |     | 65 | 1  |     | 7   | X  | Hb(2), Ap,Z |                            |
| 75830001   | Rayner Peak              | 30 | 36  | 30 | 4  | X   |     | X  | Ap,Z        | An 26                      |
| 7          | Rayner Peak              | 30 | 42  | 20 | 7  | 1   |     | X  | Z           | An 26                      |
| 10         | Rayner Peak              | 30 | 26  | 40 | 2  | X   | 2   | X  | Ap,Z        | An 10-30; Opx part altered |
| 11         | Rayner Peak              | 30 | 40  | 24 | 4  | 2   |     | X  |             | An 10-30; layered          |



RAYNER COMPLEX GARNET-QUARTZ-FELDSPAR GNEISSES

| Sample No. | Locality               | Qz | Ksp | Pl | Gt  | Bi  | Opx | Op | Accessories    | Remarks                          |
|------------|------------------------|----|-----|----|-----|-----|-----|----|----------------|----------------------------------|
| 75830014   | Rayner Peak            | 28 | 37  | 30 | 5   | X   |     | X  | Z              | An 32                            |
| 15         | Rayner Peak            | 25 | 30  | 38 | X   | 7   |     | X  | Ap,Z           |                                  |
| 16         | Rayner Peak            | 30 | 50  | 20 | 0.5 |     |     |    |                |                                  |
| 17         | Rayner Peak            | 33 | 40  | 24 | 3   | X   |     | X  | Z              | Layered; An 24-30                |
| 18         | Rayner Peak            | 30 | 60  | 5  | 5   |     |     | X  | Z              | An 24-30                         |
| 67A        | Knuckey Peaks          | 25 | 50  | 20 | 5   | X   | X   | X  | Ap,Z           | Opx altered                      |
| 250        | Doggers Ntks           | 8  | 25  | 28 | 20  | X   | 15  | 4  | Z,Sp           |                                  |
| 76283048   | Molodezhnaya           | 40 | 25  | 25 | 6   | 3   |     | X  | Z              | Moraine; Bi partly replaces Gt   |
| 3303       | Sandercock Ntks        | 35 | 22  | 25 | 1   | 4   | 2   | 1  | Ap,Z           |                                  |
| 77283446   | 1 km W of Mt. Robinson | 30 |     | 55 | 2   | 11  |     | 2  | Ap             |                                  |
| 3473       | Mt. Robinson           | 25 | 25  | 22 | 22  | 5   |     | X  | Ap(1),Z,Sph,Hm |                                  |
| 3475       | Mt. Robinson           | 30 | 37  | 22 | 2   | X   | 8   | 1  | Ap,Z           | Part recrystallised              |
| 3491       | Krasnaya Ntk.          | 25 | 60  | 8  | 5   | 2   | X   | X  |                | ?Opx altered                     |
| 3492       | Papanin Ntks           | 25 |     | 65 | 5   | 0.5 | 2.5 | 2  | Ap,Z           | ?Intrusive                       |
| 3494       | 6 km ENE of Ward Ntks  | 30 | 20  | 38 | 3   | 9   |     | X  | Z              |                                  |
| 3495       | 6 km ENE of Ward Ntks  | 32 |     | 57 | 2   | 7   | 2   | X  | Z              | Altered ?Opx                     |
| 3555       | Mt. Underwood          | 26 | 30  | 20 | 20  | 4   |     | X  | Ru,            | Minor altered ?Cd; ?metasediment |
| 3561       | Mt. Marriner           |    |     | 90 | X   | 10  |     | X  | Z              | Bi altered                       |
| 3562       | Mt. Marriner           | 5  |     | 70 | 10  | 15  |     |    | Ap,Z           |                                  |
| 3569       | Mt. Underwood          | 30 | X   | 48 | 14  | 8   |     | X  |                |                                  |
| 3570       | Mt. Underwood          | 45 | X   | 35 | 10  | 10  |     | X  | Z              |                                  |

RAYNER COMPLEX GARNET-QUARTZ-FELDSPAR GNEISSES

| Sample No. | Locality                 | Qz | Ksp | Pl | Gt  | Bi  | Opx | Op | Accessories | Remarks                                              |
|------------|--------------------------|----|-----|----|-----|-----|-----|----|-------------|------------------------------------------------------|
| 77283571   | Mt. Underwood            | 25 |     | 45 | 18  | 10  |     | 2  | Z           |                                                      |
| 3572       | Mt. Underwood            |    | 65  | 10 | 15  | 10  |     |    |             |                                                      |
| 3582       | Turbulence Bluffs        | 30 |     | 63 | 1   | 1   | 2   | X  | Hb(3), Ap,Z | Opx part altered                                     |
| 3651       | Mt. Underwood            | 35 |     | 56 | 9   | X   |     | X  | Z           |                                                      |
| 3660       | Mt. Denholm              | 20 | 30  | 18 | 28  | 4   |     | X  | Z           | Part recrystallised; Pl partly altered to Mus and Ep |
| 3667       | Doggers Ntks             | 40 | 33  | 25 | 2   | X   |     |    |             |                                                      |
| 3902       | Mt. Saw                  | 27 | 15  | 46 | 1.5 | 7   | 3   | X  | Ap,Z        |                                                      |
| 3903       | Mt. Saw                  | 30 | 36  | 20 | 10  | 4   |     | X  | Z           |                                                      |
| 3905       | 65 km W of Knuckey Peaks | 2  | 45  | 45 | 2   | 6   |     | X  |             | Minor Carb                                           |
| 4180       | Mt. Lira                 | 28 |     | 35 | 4   | 24  | 8   | 1  | Z           | Zoned Pl; much Bi + some Gt secondary                |
| 4265       | Kiri Ntks                | 35 | 40  | 20 | 2   | 3   |     | X  | Ap          | Aligned Bi; ?intrusive                               |
| 4371       | Sanddercock Ntks         | 25 | 39  | 30 | 1.5 | 2.5 | 2   | X  | Ap,Z        | ?Intrusive; porphyroblastic                          |
| 4372       | Sandercock Ntks          | 30 | 47  | 20 | 1   | 2   |     | X  | Ap,Z        | ?Intrusive; porphyroblastic                          |
| 4429       | See Ntk.                 | 40 | 27  | 16 | 10  | 7   |     |    | Z           | Bi after Gt                                          |
| 4437       | Gwynn Bay                | 40 | 38  | 20 | X   |     | X   | 2  | Z           | Opx part altered; slightly sheared; myrmekite        |
| 4444       | Mt Nils                  | 30 | 25  | 31 | 7   | 7   |     | X  | Z, Sp       | Feld partly altered; Sp inclusions in Gt             |
| 4460       | Vechernyy Hill           | 16 |     | 63 | 2   | X   | 4   | 2  | Ap,Z        | Hb(13); Opx part altered; much Ksp in antiperthite   |
| 4553       | Dwyer Ntks               | 32 | ?   | 55 | 1   | 3   | 9   | X  | Ap,Z        | Secondary Gt; part recrystallised                    |
| 4578       | Mckinnon Is.             | 30 | 10  | 40 | 10  | 10  |     |    |             |                                                      |
| 4602       | Mt. Sibiryakov           | 27 | 57  | 12 | 2.5 | 1   |     | X  | Z           | Slightly foliated granite                            |
| 4606       | Mt. Sibiryakov           | 30 | 22  | 45 | 0.5 | 0.5 | 2   | X  | Ap,Z        | ?Intrusive                                           |

RAYNER COMPLEX GARNET-QUARTZ-FELDSPAR GNEISSES

| Sample No. | Locality                   | Qz | Ksp | Pl | Gt  | Bi  | Opx | Op | Accessories | Remarks                          |
|------------|----------------------------|----|-----|----|-----|-----|-----|----|-------------|----------------------------------|
| 77284634   | Maruff Peaks               | 40 | 25  | 25 | 6   | 4   |     | X  | Ap,Z        |                                  |
| 4635       | Maruff Peaks               | 32 | X   | 35 | 30  | 1   |     | 2  | Z           |                                  |
| 4636       | Maruff Peaks               | 20 | 40  | 33 | 4   | 3   | X   | X  | Ap,Z,Hm     | Minor Carb                       |
| 4661       | 5 km WNW of Mt. Yuzhnaya   | 58 |     | 20 | 12  | 10  | X   | X  | Z,Mus       | Minor altered Opx; ?metasediment |
| 4677       | Vechernyy Hill             | 30 | 43  | 17 | 1   | 3   |     | 1  | Hb(5),Ap,Z  | ?Intrusive                       |
| 4678       | Vechernyy Hill             | 25 | 40  | 25 | 1   | 0.5 | 2   | 1  | Hb(5),Ap,Z  | Carb + Hb + ?Bi replace ?Opx     |
| 4690       | 2 km SW of Forefinger Pt.  |    | 11  | 50 | 16  | 20  |     | 3  | Z           |                                  |
| 4692       | 2 km SW of Forefinger Pt.  | 30 | XX  | XX | 2   |     |     |    |             | Meso(68); part recrystallised    |
| 4782       | 15 km SE of Forefinger Pt. | 40 | 32  | 18 | 7   | 3   |     | X  | Ap,Z,Hm     |                                  |
| 4805       | Georges Is.                | 30 | X   | 47 | 6   | 2   | X   | 1  | Ap          | Hb(14)                           |
| 4806       | Georges Is.                | 33 |     | 63 | 0.5 | 3.5 |     |    | Z           | Minor Ep + Chl                   |
| 4854       | Mt. Kernot                 | 34 | 38  | 25 | 1   |     | 1.5 | X  | Ap,Z,Hm     | Opx altered                      |
| 4855       | Edward Ridge               | 40 | 40  | 7  | 7   | 6   |     | X  | Z           |                                  |
| 78285009   | Mt. Underwood              | 43 |     | 35 | 10  | 12  |     | X  | Z, Mon      |                                  |

## RAYNER COMPLEX METASEDMENTS

| Sample No. | Locality              | Qz | Ksp | Pl | Gt | Opx | Sl | Cd | Bl | Op | Accessories | Remarks                                    |
|------------|-----------------------|----|-----|----|----|-----|----|----|----|----|-------------|--------------------------------------------|
| 7270       | Kloa Pt.              | 50 | 30  |    |    |     |    |    | 10 | X  | Z           | Altered Ksp; Mus(10); pos. some altered Cd |
| 65280051   | Mt. Kernot            | 74 |     |    |    | 10  |    |    |    | 12 | Ap          | Cpx(4); Mt-rich                            |
| 68         | Stillwell Hills       | 96 |     |    |    |     | 4  |    |    |    | ?Ru         | Quartzite                                  |
| 71         | Stillwell Hills       | 30 | 62  | 4  | 3  |     | 1  |    | X  | X  |             |                                            |
| 138        | Ives Tongue: Fold Is. | 80 | 20  | X  |    |     |    |    |    | X  |             | Gt + Sl in hand specimen                   |
| 159        | Ives Tongue: Fold Is. | 42 | 40  |    | 15 |     | 2  |    | 1  | X  | Ru,Z        |                                            |
| 170        | Bertha Is.            | 20 | 39  |    | 18 |     | 14 |    | 7  | 2  | ?Mon        |                                            |
| 229        | W Stefansson Bay      | 50 | 24  | 14 | 7  |     | 1  |    | 3  | 1  |             |                                            |
| 230        | W Stefansson Bay      | 35 | 40  | 10 | 7  |     | 5  |    | 3  | X  |             |                                            |
| 231        | Secluded Rocks        | 35 | 25  | 15 | 15 |     | 3  |    | 6  | 1  | Sp          |                                            |
| 75830003   | Rayner Peak           | 95 | X   |    |    |     |    |    | 5  | X  | Z           | Quartzite                                  |
| 6          | Rayner Peak           | 90 | 3   | 4  | 1  |     |    |    | 2  |    | Z           | Quartzite; An25                            |
| 9          | Rayner Peak           | 30 |     |    | 30 | X   |    |    |    | X  |             | Cpx(38); Hb(2); Opx + Pl rim Gt            |
| 56         | Knuckey Peaks         |    | X   | 20 | 50 |     |    |    | 30 | X  | Ap,Z        |                                            |
| 63         | Knuckey Peaks         | 10 |     |    |    | 87  |    |    |    | X  | Cpx(3),Ap   | Exsolved Cpx                               |
| 291        | Martin Is             | 75 |     | 24 |    | 1   |    |    |    | X  | Z           | An 30; Opx altered                         |
| 76283051   | Molodezhnaya          | 20 | 25  | 10 | 20 |     | X  | 10 | 15 | X  | Z           | Moraine; Cd part altered                   |
| 77283474   | Mt. Robinson          | 65 | 9   |    | 15 |     | 5  |    | 6  |    |             | Rotated Gt                                 |
| 3556       | Mt. Underwood         | 24 | 40  | 12 | 12 | X   | X  | X  | 12 |    |             |                                            |
| 3568       | Mt. Denholm           | 20 | 38  | 15 | 17 |     | 8  |    | 2  | X  | Sp,Ap       |                                            |
| 3575       | Mt. Channon           | 34 | 34  |    | 15 |     | 4  | 5  | 3  | X  | Sp,Z        | Op + Sp(5); Sp + Qz                        |



RAYNER COMPLEX METASEDMENTS

| Sample No. | Locality                 | Qz | Ksp | Pl | Gt | Opx | Sl | Cd | Bl | Op | Accessories  | Remarks                                                 |
|------------|--------------------------|----|-----|----|----|-----|----|----|----|----|--------------|---------------------------------------------------------|
| 77283670   | 65 km W of Knuckey Peaks |    |     | 70 | 7  |     | X  |    | 15 | X  | Sp,Z         | Op + Sp(8); Sl needles in Gt                            |
| 3671       | 65 km W of Knuckey Peaks |    |     | 20 | 15 | 30  |    |    | 35 |    |              | Gt relict?                                              |
| 3752       | Amphitheatre Peaks       | 40 | 25  | 15 | 1  |     | 18 |    | 1  | X  |              |                                                         |
| 4165       | Condon Hills             | 30 | 30  | 5  |    |     | 3  | 15 | 6  | 1  | Z            | Microcline                                              |
| 4166       | Condon Hills             | 35 | 20  | 29 | 3  |     | 6  |    | 7  |    | Z            |                                                         |
| 4167       | Condon Hills             | 65 | 15  | X  |    |     | 2  | 9  | 4  | X  | Z            | Microcline                                              |
| 4168       | Condon Hills             | 2  |     |    |    | 20  |    | 8  | 70 |    | Z            |                                                         |
| 4170       | Mt. Lira                 | 45 |     | 15 | 10 | 25  |    |    | X  | 5  | Ap,Hm        |                                                         |
| 4171       | Mt. Lira                 | 62 | ~10 |    |    |     | 11 | 10 | 7  | X  | Z,Ru,Hm      | Cd altered; secondary Mus                               |
| 4173       | Mt. Lira                 | 48 |     |    | 15 | 5   | X  | 20 | 12 | X  | Z            | Sl inclusions in Gt; Cd + Opx rim Gt; some secondary Bl |
| 4174       | Mt. Lira                 | 40 |     |    | 18 | 7   |    | 25 | 10 | X  | Ru,Z         | Opx + Cd rim Gt; some secondary Bl                      |
| 4179       | Mt. Lira                 |    |     |    | 20 | 47  |    | 18 | 15 | X  | Sp,Z         | Bl + Opx inclusions in Gt                               |
| 4188       | Galkin Is.               | 56 |     |    | X  | 35  |    |    |    | 3  | Hb(1),Cpx(5) | Layered                                                 |
| 4434       | Fram Peak                |    | X   | X  | XX | X   |    | X  | XX |    |              | Xenolith; Gt, Cd, and Opx part altered                  |
| 4464       | McKinnon Is.             | 45 |     | 10 | 25 |     |    |    | 20 |    | Hm           |                                                         |
| 4554       | Solitary Mtk.            | 28 | X   | 40 | 28 |     | 2  |    | 2  | X  | Z            |                                                         |
| 4573       | 5 km WNW of Mt. Yuzhnaya | 25 | 34  | X  | 20 |     | 1  |    | 20 |    |              | Sheared                                                 |
| 4608       | Mt. Sibiryakov           | 33 | 27  | 30 | 5  |     | 2  |    | 3  | X  | Z            | Layered                                                 |
| 4609       | Mt. Sibiryakov           | 10 | 42  |    | 11 |     | 2  | 30 | 5  | X  | Z            | Cd rims Gt                                              |
| 4648       | Forefinger Pt.           | 22 | 20  |    | 1  | 4   | 2  | 45 | 6  |    | Z            | Cd + Opx rim Gt                                         |

RAYNER COMPLEX METASEDMENTS

| Sample No. | Locality                   | Qz | Ksp | Pl | Gt  | Opx | Si  | Cd | Bi | Op | Accessories             | Remarks                                                                                          |
|------------|----------------------------|----|-----|----|-----|-----|-----|----|----|----|-------------------------|--------------------------------------------------------------------------------------------------|
| 77284649   | Forefinger Pt.             | 15 |     |    | 1.5 | 14  | 2   | 50 | 15 |    | Sa(2), Sp(0.5),<br>Z,Ru | Layered; Sa + Sp symplectite in Cd; Opx + Si $\rightarrow$ Sa + Cd;<br>Gt $\rightarrow$ Opx + Cd |
| 4650       | Forefinger Pt.             | 50 | 2   |    |     | 10  | 3   | 30 | 5  |    | Sa(0.5),Z,Ru            | Layered; original (?Napier) Si + Opx                                                             |
| 4651       | Forefinger Pt.             | 35 | 15  |    |     | 7   | 3   | 35 | 5  |    | Ru,Z                    | Original Opx + Si                                                                                |
| 4652       | Forefinger Pt.             |    |     |    | 7   | 25  |     | 18 | 35 |    | Sp,Z                    | Sa(15); layered                                                                                  |
| 4653       | Forefinger Pt.             |    |     |    |     | 20  | X   | 50 | 23 |    | Ap,Z                    | Sa(7) as symplectite in Cd (after Si)                                                            |
| 4654       | Forefinger Pt.             |    | 6   |    |     | 40  | 17  | 20 | 15 |    | Sa(1),Ru(1),Z           | Sa as symplectite; Opx + Si                                                                      |
| 4655       | Forefinger Pt.             |    |     |    | 6   | 6   |     | 45 | 40 |    | Sa(3),Sp,Ap,Z           | Sa + Sp as symplectite; Opx + Cd rim Gt                                                          |
| 4662       | 5 km WNW of Mt. Yuzhnaya   | 20 | 27  | 8  | 30  |     | 2   |    | 13 |    | Sp,Z,Hm,Mus             | Part recrystallised                                                                              |
| 4663       | 5 km WNW of Mt. Yuzhnaya   | 20 | 30  |    | 30  |     | 7   |    | 13 |    | Mon                     |                                                                                                  |
| 4665       | Mt. Lira                   | 20 | X   | 18 | 50  | 3   |     | 6  | 3  | X  | Z,Ru                    | Opx + Cd rim Gt                                                                                  |
| 4777       | 3 km SE of Forefinger Pt.  | 72 | 25  |    | X   |     |     |    | 3  | X  | Mus,Z                   | Strongly foliated; sericitised Feld; microcline                                                  |
| 4779       | 3 km SE of Forefinger Pt.  | 50 | 45  |    | 4   |     | 0.5 |    | X  | X  | Ru                      | Secondary Bi                                                                                     |
| 4783       | 15 km SE of Forefinger Pt. | 30 | 29  | 30 | 8   |     | 3   |    | X  | X  | Z                       | Si inclusions in Gt                                                                              |
| 4785       | 15 km SE of Forefinger Pt. | 30 | 22  | X  | 15  |     | 16  | 8  | 6  | 3  | Z                       | Cd altered; Si inclusions in Gt                                                                  |

RAYNER COMPLEX CALC-SILICATE ROCKS AND MARBLES

| Sample No. | Locality              | Qz | Pl | Cpx | Hb | Carb | Gt | Scap | Ksp | Op | Accessories     | Remarks                                          |
|------------|-----------------------|----|----|-----|----|------|----|------|-----|----|-----------------|--------------------------------------------------|
| 4596       | Fram Peak             |    |    |     |    | 70   |    |      |     | 5  | Sp(5)           | Marble; Ol(20); Ol mostly serpentised            |
| 4597       | Fram Peak             |    |    |     |    | X    |    |      |     | 8  | Bi              | Ol(84); Sp(8); segregation                       |
| 7284       | Thala Hills           | X  |    | 5   | X  | 90   |    | 5    |     |    | Ep              | Marble                                           |
| 65280072   | Stillwell Hills       | 38 | 40 | 18  |    |      |    | 1    |     |    | Sph(3)          |                                                  |
| 73         | Fram Peak             |    |    |     |    | 85   |    |      |     | 4  | Sp              | Marble; Ol(11)                                   |
| 79         | W. Hansen Mts         | 30 | 52 | 14  |    |      |    |      |     | X  | Opx(4), Ap      |                                                  |
| 80         | W. Hansen Mts         | 20 | 47 | 26  |    |      |    |      |     | X  | Sph(2), Hm      | Part recrystallised; Ksp(5)                      |
| 158        | Kemp Peak             | 13 | 20 | 65  |    | X    | X  |      |     |    | Sph(2)          | Minor altered phlogopite or Scap; Gt rims Cpx    |
| 171        | Bertha Is.            | X  | 52 |     | 18 |      |    | 10   |     | 6  |                 | Opx(10); Bi(4); part sheared; ?calc-silicate     |
| 176        | Secluded Rocks        | 5  |    | 50  |    |      |    |      |     |    | Sph(2)          | Ep(43)                                           |
| 207        | Mt. Kernot            |    | 28 | 70  |    |      | 2  |      |     | X  |                 | ?Secondary Gt; An 30                             |
| 211        | W. Robert Gl.         | 7  | 62 | 30  |    |      |    |      |     |    | Sph(1), Ap      | An 40                                            |
| 232        | Secluded Rocks        | X  | 62 | 25  |    |      |    |      | 10  | 2  | Sph(1), Ap      | Layered                                          |
| 76283047   | Molodezhnaya          | 16 | 30 |     | 46 |      |    |      |     | X  | Bi(5); Ep(3)    |                                                  |
| 77283478   | Mt. Robinson          |    | 3  | 32  |    | 62   |    |      |     |    | Phl(3)          | Inclusion of Qz + Bi with adjacent Cpx-rich zone |
| 3480       | Mt. Robinson          | 20 | 25 | 20  |    | 3    |    | 20   | 10  |    | Sph(2)          |                                                  |
| 3496       | 7 km ENE of Ward Ntks |    | 3  | 44  | 44 |      |    | 6    |     | X  | Bi(3)           | Layered                                          |
| 3560       | Mt. Marriner          |    | 36 | 34  | 30 |      |    |      |     | X  | Bi, Ap          | ?Calc-silicate                                   |
| 3657       | Mt. Marriner          | X  |    | 50  | 20 | 21   |    |      |     | 1  | Sph(1.5); Bi(6) |                                                  |
| 3751       | SH 821                | 27 | 35 | 27  | 5  |      |    |      |     |    | Bi(6), Ap, Z    | ?Calc-silicate; layered                          |
| 4164       | Condon Hills          |    | 54 | 10  | 30 |      |    | 1    |     |    | Opx(5)          |                                                  |

RAYNER COMPLEX CALC-SILICATE ROCKS AND MARBLES

| Sample No. | Locality                 | Qz | Pl | Cpx | Hb | Carb | Gt | Scap | Ksp | Op | Accessories        | Remarks                         |
|------------|--------------------------|----|----|-----|----|------|----|------|-----|----|--------------------|---------------------------------|
| 77284186   | Galkin Is.               | 72 | 5  | 20  |    |      |    |      |     |    | Bi(3), Sph, Ap, Hm |                                 |
| 4552       | Dwyer Ntks               | 20 |    | 30  |    | X    | 15 | 32   |     |    | Sph(3)             |                                 |
| 4572       | 5 km WNW of Mt. Yuzhnaya | 5  | 47 | 4   | 40 |      |    | X    |     | 3  |                    | ?Calc-silicate                  |
| 4637       | Secluded Rocks           | 3  |    | 35  |    | X    | 20 | 35   | 5   |    | Sph(0.5)           |                                 |
| 4638       | Secluded Rocks           | 4  |    | 40  |    | 3    | 40 | 8    | 4   | X  | Sph(1), Z          |                                 |
| 4683       | S of Assender Gl.        |    | 60 | 8   |    |      | 28 | 2    |     | X  | Sph(2), Ap, Z      | An 76; andradite + hedenbergite |
| 78285012   | Mt. Underwood            |    | 10 | 84  |    |      |    | 1    |     |    | Ol(5), Sph         | Rims lens of marble             |

## RAYNER COMPLEX GRANITIC INTRUSIVES

| Sample No. | Locality                  | Qz | Ksp | Pl | Opx | Cpx | Hb | Bi  | Gt | Op  | Accessories | Remarks                                                |
|------------|---------------------------|----|-----|----|-----|-----|----|-----|----|-----|-------------|--------------------------------------------------------|
| 7275       | Thala Hills               | 30 | 40  | 30 |     |     |    | 0.5 |    | X   | Mus, Hm     | Granite; Pl sericitised                                |
| 65280149   | Jagar Is.                 | XX |     | XX |     |     |    |     |    |     | Mus         | Pegmatite; ?spodumene; An 15                           |
| 183        | Cape Dalton               | XX | XX  | X  |     |     |    | X   |    |     | Z           | Pegmatite; An 24-26                                    |
| 76283040   | Molodezhnaya              | 30 | 45  | 23 |     |     |    | 2   |    | X   | Z           | Granite vein                                           |
| 3041       | Molodezhnaya              | 40 |     | 54 |     |     |    | 5   |    | 1   | Ap, Z       | Pegmatite vein                                         |
| 3052       | Molodezhnaya              | 30 | 38  | 30 |     |     |    | 2   |    | X   | Z           | Granite vein                                           |
| 77283613   | Mt. Underwood             | XX | XX  | XX |     |     |    | XX  | X  | X   | Z, Mon      | Pegmatite; Op may be graphite                          |
| 3659       | Mt. Denholm               | 33 | 46  | 20 |     |     |    | 1   |    | X   |             | Partly discordant granite                              |
| 4163       | Condon Hills              | 30 | 50  | 18 |     |     |    | 2   |    | X   | Z           | Granite                                                |
| 4178       | Mt. Lira                  | 20 | 80  |    |     |     |    | X   |    |     | Mus         | Pegmatite                                              |
| 4262       | Kiri Ntks                 | 35 | 52  | 10 |     |     |    | 3   |    | X   | Z           | Subconformable granite; secondary Bi + Hm + Carb clots |
| 4366       | Sandercock Ntks           | 20 | 40  | 33 | 2   | X   | 4  | X   |    | 0.5 | Ap, Z       | Porphyritic granite                                    |
| 4367       | Sandercock Ntks           | 14 | 45  | 35 | 5   | 0.5 | 1  |     |    | X   | Ap, Z       | Porphyritic granite; Opx part altered                  |
| 4368       | Sandercock Ntks           | 15 | 43  | 32 | 3   | 3   | 3  |     |    | 1   | Ap, ?All    | Foliated, porphyroblastic granite                      |
| 4369       | Sandercock Ntks           | 15 | 40  | 31 |     |     | 7  | 7   |    | X   | Ap, Z       | Foliated, porphyroblastic granite                      |
| 4370       | Sandercock Ntks           | 28 | 34  | 35 |     |     | 1  | 2   |    | X   |             | Granitic aplite vein                                   |
| 4430       | See Ntk.                  | 30 | 40  | 24 |     |     |    | 6   |    | X   | Z, Mon      | Subconformable granite vein                            |
| 4441       | Natmap Ntks               | 20 | 70  | 6  |     |     | 2  | 1   |    | 1   | Z, All      | Subconformable granite layer                           |
| 4442       | Natmap Ntks               | XX | XX  | XX |     |     | XX | X   |    | X   | Ap, All     | Pegmatite                                              |
| 4447       | Mt. Nils                  | 25 | 30  | 15 |     |     | 18 | 1   |    | 1   | Ap, Z       | Pegmatite                                              |
| 4660       | 5 km WNW of Mt. Yuzhnaya  | 35 | X   | 65 |     |     |    | X   |    | X   | Z, Mus      | Trondhjemite vein (locally derived)                    |
| 4778       | 3 km SE of Forefinger Pt. | 25 | 73  |    |     |     |    | X   | 2  | X   | Z           | Granite vein (locally derived)                         |
| 78285010   | Mt. Underwood             | XX |     | XX |     |     |    |     | X  |     | Z           | Pegmatite                                              |



APPENDIX 2 : CHEMICAL ANALYSES

INTRODUCTION

Chemical analyses of rock samples from Enderby and Kemp Lands are listed. The specimens comprise high-grade metamorphics and a variety of felsic and mafic igneous rocks, mostly of Precambrian age but including a few Phanerozoic intrusives. The vast majority were collected between 1975 and 1980 by BMR geologists, but 12 samples from the Khmara Bay area were analysed by M. Sandiford, University of Melbourne.

Analytical methods

SiO<sub>2</sub>, TiO<sub>2</sub>, Al<sub>2</sub>O<sub>3</sub>, Fe<sub>2</sub>O<sub>3</sub> (total), MnO, MgO, CaO, Na<sub>2</sub>O, K<sub>2</sub>O, P<sub>2</sub>O<sub>5</sub>, Ba, Rb, Sr, Pb, Th, U, Zr, Nb, Y, La, Ce, Sn, V and Ga were determined in the BMR laboratories, using Philips PW-1210 or PW-1450 automatic X-ray spectrometers. Major elements (excluding Na<sub>2</sub>O) were measured on fusion discs using the techniques of Norrish & Hutton (1969); Na<sub>2</sub>O analyses were carried out on pressed powder pellets. Analyses of trace elements were also made using powder pellets, either with direct measurement of the mass absorption coefficients of each sample or using Compton scattered tube lines to estimate the mass absorption coefficient (Norrish & Chappell, 1977). Interfering element corrections were made empirically where necessary. Detection limits (Table 2.1) were calculated at the 95% confidence level for detection of peak above background, using the relation given by Jenkins & de Vries (1967), although in practice detection limits will be slightly higher than this, particularly in cases where there are significant inter-element interferences.

TABLE 2.1 DETECTION LIMITS

|                                | (in %) |    | (in ppm) |
|--------------------------------|--------|----|----------|
| SiO <sub>2</sub>               | 0.02   | Ba | 3        |
| TiO <sub>2</sub>               | 0.004  | Rb | 1        |
| Al <sub>2</sub> O <sub>3</sub> | 0.03   | Sr | 1        |
| Fe <sub>2</sub> O <sub>3</sub> | 0.01   | Pb | 1        |
| MnO                            | 0.005  | Th | 1        |
| MgO                            | 0.11   | U  | 0.5      |
| CaO                            | 0.006  | Zr | 1        |
| Na <sub>2</sub> O              | 0.11   | Nb | 1        |
| K <sub>2</sub> O               | 0.002  | Y  | 1        |
| P <sub>2</sub> O <sub>5</sub>  | 0.006  | La | 2        |
|                                |        | Ce | 3        |
|                                |        | Sn | 1        |
|                                |        | V  | 1        |
|                                |        | Cr | 3        |
|                                |        | Ni | 2        |
|                                |        | Cu | 2        |
|                                |        | Zn | 2        |
|                                |        | Ga | 1        |

$$\text{Detection limit} = \frac{3c}{(R_p - R_b)} \sqrt{\frac{R_b}{t}}$$

Where,  $R_p$  = Peak count rate (counts/sec),

$R_b$  = Background count rate (counts/sec),

$t$  = Background counting time (secs),

$c$  = Concentration of element.

Cr, Ni, Cu, Zn, and some  $\text{Na}_2\text{O}$  determinations were made by atomic absorption spectrophotometry in the BMR laboratories.  $\text{H}_2\text{O}^+$ ,  $\text{H}_2\text{O}^-$ ,  $\text{CO}_2$  (gravimetric), and ferrous iron (volumetric) were determined either by the Australian Mineral Development Laboratories, Adelaide, or at the BMR.

#### Precision and accuracy

Precision of the X-ray fluorescence technique is generally good. The effects of all but very short-term drift in machine conditions were practically eliminated by rationing each measurement to a reference standard. Each determination was carried out in duplicate (using the same sample) and, in cases where significant differences occurred between duplicates, the determination was repeated. Replicate sample precision was checked by running duplicate samples, and was found to be within acceptable limits ( $\pm 1\%$  for fusion discs, and generally better for powder pellets).

Accuracy was assessed by analysing international rock standards. Comparisons of XRF and AA results with recommended values for two standard rocks (CRPG granite GH and USGS andesite AGV1) are given in Table 2.2. For most major elements, agreement between recommended and XRF results is good (i.e., within  $\pm 3\%$ ). For  $\text{Na}_2\text{O}$  and most trace elements (except near the detection limit), accuracy is of the order of  $\pm 5-10\%$ .

TABLE 2.2. COMPARISON OF STANDARD ROCK ANALYSES. RECOMMENDED VALUES FROM ABBEY (1983). VALUES IN BRACKETS ARE MAGNITUDES ONLY.

|                          | GH          |       | AGVI        |       |
|--------------------------|-------------|-------|-------------|-------|
|                          | Recommended | BMR   | Recommended | BMR   |
| $\text{SiO}_2$           | 75.85       | 75.93 | 59.61       | 59.27 |
| $\text{TiO}_2$           | 0.08        | 0.08  | 1.06        | 1.09  |
| $\text{Al}_2\text{O}_3$  | 12.51       | 12.59 | 17.19       | 17.15 |
| $+\text{Fe}_2\text{O}_3$ | 1.34        | 1.37  | 6.81        | 6.86  |
| MnO                      | 0.05        | 0.05  | 0.10        | 0.10  |
| MgO                      | 0.03        | 0.13  | 1.52        | 1.61  |
| CaO                      | 0.69        | 0.71  | 4.94        | 4.98  |
| $\text{Na}_2\text{O}$    | 3.85        | 3.59  | 4.32        | 4.10  |
| $\text{K}_2\text{O}$     | 4.76        | 4.75  | 2.92        | 2.91  |
| $\text{P}_2\text{O}_5$   | 0.01        | 0.01  | 0.51        | 0.50  |
| TOTAL                    | 99.17       | 99.21 | 98.98       | 98.57 |
| Ba                       | 22          | 19    | 1200        | 1210  |
| Rb                       | 390         | 386   | 67          | 67    |
| Sr                       | 10          | 10    | 660         | 653   |
| Pb                       | 45          | 40    | 33          | 35    |
| Th                       | (90)        | 76    | 6.4         | 7     |
| U                        | (18)        | 16    | 1.95        | 1.9   |
| Zr                       | 150         | 152   | 230         | 236   |
| Nb                       | (85)        | 90    | (16)        | 14    |
| Y                        | 70          | 80    | 19          | 19    |
| La                       | (25)        | 17    | 36          | 43    |
| Ce                       | (50)        | 47    | 71          | 71    |
| Sn                       | (10)        | 11    | 3.6         | 5     |
| V                        | (5)         | < 1   | 125         | 119   |
| Cr                       | 6           | < 4   | 10          | 13    |
| Ni                       | 3           | 2     | 15          | 13    |
| Cu                       | 14          | 15    | 59          | 56    |
| Zn                       | 85          | 88    | 86          | 31    |
| Ga                       | 23          | 23    | 21          | 19    |

+Total Fe as  $\text{Fe}_2\text{O}_3$

Notes on analytical data

Analyses are listed firstly on the basis of approximate age (Napier or Rayner Complex) and then by rock type. Each analysis has a number of headings, as follows:

1. BMR registered sample number.
2. Area: Enderby or Kemp Land.
3. Locality.
4. Rock type: For each complex, analyses are listed in the following order:

felsic gneiss  
mafic and ultramafic granulites  
metasediments  
granitic intrusives  
mafic intrusives

Owing to limitations of space, the following abbreviations are used:

|            |                 |         |               |
|------------|-----------------|---------|---------------|
| Alk.,      | Alkali          | granod, | granodiorite  |
| Calc-sil., | Calc-silicate   | tonal,  | tonalite      |
| gn,        | gneiss          | trond,  | trondhjemite  |
| bi,        | biotite         | ol,     | olivine       |
| cd,        | cordierite      | op,     | orthopyroxene |
| cp,        | clinopyroxene   | os,     | osumilite     |
| gt,        | garnet          | pl,     | plagioclase   |
| hb,        | hornblende      | px,     | pyroxene      |
| kf,        | alkali feldspar | qz,     | quartz        |
| mp,        | mesoperthite    | sa,     | sapphirine    |
| sp,        | spinel          | si,     | sillimanite   |

5. Additional data.

I and II refer to the two main groups of Proterozoic tholeiite dykes (Amundsen Dykes) as defined by Sheraton & Black (ref. 9). D and Un refer to the depleted and undepleted felsic orthogneiss suites, respectively, of Sheraton & Black (ref. 6); Op gneiss and Gt gneiss classifications are also those used by these authors.

6. Age: Only generalised ages are given, e.g. Archaean, Proterozoic, etc.
7. Bibliographic references are given below.
8. Analytical data for major oxides are given in weight percent; those for trace elements in ppm. Where no FeO figure is given, Fe<sub>2</sub>O<sub>3</sub> is total Fe as Fe<sub>2</sub>O<sub>3</sub>; where no H<sub>2</sub>O- figure is given, H<sub>2</sub>O+ is total water.

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## Napier Complex Pyroxene-Quartz-Feldspar Gneisses

| Sample Number                  | 76283022           | 76283033        | 76283203           | 77283428        | 77283914        | 77283959        | 77283974        | 77284114        | 77284323        | 77284327        |
|--------------------------------|--------------------|-----------------|--------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Area                           | Enderby            | Enderby         | Enderby            | Enderby         | Enderby         | Enderby         | Enderby         | Enderby         | Enderby         | Enderby         |
| Locality                       | Land               | Land            | Land               | Land            | Land            | Land            | Land            | Land            | Land            | Land            |
| Rock type                      | Mount              | Mount           | Mount              | Mt Riiser-      | Tonagh          | Debenham        | Mount           | Mount           | Mount           | Francis         |
| Additional Data                | Douglas            | Douglas         | Ryder              | Larsen          | Island          | Peak            | Bennett         | Arthur          | Brockelsby      | Peaks           |
| Age                            | Bi-op-qz-pl gneiss | Op-qz-pl gneiss | Op-kf-qz-pl gneiss | Op-qz-pl gneiss | Op-qz-pl gneiss | Op-qz-pl gneiss | Op-qz-pl gneiss | Op-qz-pl gneiss | Op-qz-pl gneiss | Op-qz-pl gneiss |
| Bibliog. ref.                  | D tonal            | D tonal         | D tonal            | D tonal         | D tonal         | D tonal         | D tonal         | D tonal         | D tonal         | D tonal         |
|                                | Archaean           | Archaean        | Archaean           | Archaean        | Archaean        | Archaean        | Archaean        | Archaean        | Archaean        | Archaean        |
|                                | 5,6                | 5,6             | 5,6,19             | 5,6,19          | 5,6             | 5,6             | 5,6             | 5,6,19          | 5,6             | 5,6             |
| SiO <sub>2</sub>               | 64.30              | 63.50           | 70.80              | 73.30           | 63.50           | 71.10           | 67.50           | 64.20           | 66.60           | 69.80           |
| TiO <sub>2</sub>               | 0.49               | 0.65            | 0.43               | 0.35            | 0.62            | 0.39            | 0.29            | 0.60            | 0.71            | 0.39            |
| Al <sub>2</sub> O <sub>3</sub> | 12.62              | 14.29           | 14.76              | 13.94           | 16.64           | 15.26           | 16.24           | 15.28           | 15.55           | 15.33           |
| Fe <sub>2</sub> O <sub>3</sub> | 1.18               | 2.19            | 1.18               | 0.90            | 0.99            | 0.71            | 1.44            | 1.94            | 3.10            | 2.18            |
| FeO                            | 6.30               | 5.84            | 1.67               | 1.88            | 4.67            | 1.73            | 2.17            | 3.37            | 2.24            | 0.95            |
| MnO                            | 0.12               | 0.10            | 0.03               | 0.04            | 0.07            | 0.04            | 0.05            | 0.07            | 0.08            | 0.03            |
| MgO                            | 6.66               | 4.11            | 0.84               | 1.04            | 2.63            | 1.11            | 2.13            | 2.63            | 1.01            | 1.14            |
| CaO                            | 4.18               | 2.97            | 3.72               | 3.82            | 5.67            | 4.32            | 3.08            | 5.05            | 4.06            | 3.52            |
| Na <sub>2</sub> O              | 2.60               | 4.26            | 4.53               | 4.08            | 3.61            | 4.08            | 6.16            | 4.30            | 4.31            | 4.35            |
| K <sub>2</sub> O               | 0.80               | 1.35            | 1.52               | 0.98            | 1.05            | 0.76            | 0.55            | 1.30            | 1.24            | 1.81            |
| P <sub>2</sub> O <sub>5</sub>  | 0.16               | 0.03            | 0.07               | 0.08            | 0.32            | 0.08            | 0.02            | 0.17            | 0.18            | 0.17            |
| H <sub>2</sub> O+              |                    |                 |                    | 0.25            | 0.17            | 0.16            | 0.38            | 0.26            | 0.16            | 0.30            |
| H <sub>2</sub> O-              |                    |                 |                    | 0.09            | 0.11            | 0.11            | 0.07            | 0.14            | 0.07            | 0.08            |
| CO <sub>2</sub>                |                    |                 |                    |                 |                 |                 |                 |                 |                 |                 |
| Rest                           | 0.30               | 0.23            | 0.17               | 0.16            | 0.23            | 0.16            | 0.32            | 0.21            | 0.10            | 0.17            |
| TOTAL                          | 99.71              | 99.52           | 99.72              | 100.91          | 100.28          | 100.01          | 100.40          | 99.52           | 99.41           | 100.22          |
| Ba                             | 836                | 494             | 713                | 674             | 864             | 641             | 1860            | 741             | 386             | 656             |
| Rb                             | 52                 | 38              | 15                 | 4               | 3               | 1               | 1               | 14              | 6               | 40              |
| Sr                             | 317                | 370             | 292                | 295             | 549             | 458             | 435             | 386             | 147             | 252             |
| Pb                             | 10                 | 17              | 9                  | 9               | 11              | 8               | 18              | 10              | 11              | 16              |
| Th                             | 12                 | 25              | 4                  | <1              | <1              | <1              | 1               | 1               | 11              | 13              |
| U                              | 2                  | 1               | <1                 | <1              | <1              | <1              | <1              | <1              | 1               | <1              |
| Zr                             | 122                | 187             | 196                | 144             | 95              | 105             | 217             | 153             | 88              | 182             |
| Nb                             | 6                  | 8               | 7                  | 2               | 3               | 2               | 1               | 4               | 5               | 5               |
| Y                              | 19                 | 14              | 2                  | 3               | 13              | 6               | 2               | 15              | 24              | 11              |
| La                             | 26                 | 45              | 59                 | 18              | 32              | 21              | 22              | 25              | 19              | 43              |
| Ce                             | 47                 | 75              | 80                 | 21              | 56              | 26              | 30              | 38              | 37              | 70              |
| Nd                             |                    |                 |                    |                 |                 |                 |                 |                 |                 |                 |
| Sn                             | <1                 | <1              | 1                  | <1              | 1               | 1               | <1              | 3               | <1              | <1              |
| V                              | 101                | 98              | 12                 | 46              | 86              | 34              | 41              | 72              | 20              | 29              |
| Cr                             | 604                | 231             | 13                 | 20              | 60              | 9               | 7               | 100             | 5               | 14              |
| Ni                             | 99                 | 93              | 5                  | 19              | 25              | 13              | 23              | 25              | 12              | 8               |
| Cu                             | 15                 | 27              | 6                  | 6               | 14              | 5               | 5               | 9               | 14              | 3               |
| Zn                             | 68                 | 82              | 33                 | 32              | 71              | 32              | 76              | 68              | 57              | 42              |
| Ga                             | 15                 | 18              | 15                 | 14              | 19              | 18              | 19              | 19              | 17              | 17              |



Napier Complex Pyroxene-Quartz-Feldspar Gneisses

| Sample Number                  | 77284374  | 77284617  | 77284620 | 77284658  | 77284696 | 77284700 | 77284803 | 77284826  | 77284858 | 77284580 |
|--------------------------------|-----------|-----------|----------|-----------|----------|----------|----------|-----------|----------|----------|
| Area                           | Enderby   | Enderby   | Enderby  | Enderby   | Enderby  | Enderby  | Kemp     | Enderby   | Kemp     | Enderby  |
| Locality                       | Land      | Land      | Land     | Land      | Land     | Land     | Land     | Land      | Land     | Land     |
|                                | Zubchatyy | Dick      | Mount    | Geoffrey  | Mount    | Gromov   | Seaton   | Mount     | Wallis   | Francis  |
|                                | Ice Shelf | Peaks     | Dyke     | Hills     | Henry    | Ntks     | Glacier  | Pardoe    | Ntks     | Peaks    |
| Rock type                      | Op-qz-pl  | Px-kf-qz- | Op-qz-pl | Cp-op-qz- | Op-qz-pl | Op-qz-pl | Op-qz-pl | Cp-op-qz- | Op-qz-pl | Op-qz-pl |
|                                | gneiss    | pl gneiss | gneiss   | pl gneiss | gneiss   | gneiss   | gneiss   | pl gneiss | gneiss   | gneiss   |
| Additional Data                | D tonal   | D tonal   | D tonal  | D tonal   | D tonal  | D tonal  | D tonal  | D tonal   | D tonal  | D tonal  |
| Age                            | Archaean  | Archaean  | Archaean | Archaean  | Archaean | Archaean | Archaean | Archaean  | Archaean | Archaean |
| Bibliog. ref.                  | 5,6,19    | 5,6       | 5,6      | 5,6,19    | 5,6      | 5,6      | 5,6      | 5,6       | 5,6      | 5,6      |
| SiO <sub>2</sub>               | 67.20     | 70.70     | 69.60    | 65.80     | 70.80    | 68.10    | 72.50    | 60.20     | 71.40    | 75.50    |
| TiO <sub>2</sub>               | 0.47      | 0.44      | 0.37     | 0.40      | 0.44     | 0.69     | 0.35     | 0.79      | 0.36     | 0.24     |
| Al <sub>2</sub> O <sub>3</sub> | 15.06     | 13.72     | 15.40    | 14.88     | 15.11    | 14.37    | 15.18    | 16.23     | 15.22    | 13.40    |
| Fe <sub>2</sub> O <sub>3</sub> | 1.88      | 2.49      | 0.96     | 1.45      | 1.79     | 1.78     | 0.86     | 3.68      | 0.89     | 1.18     |
| FeO                            | 3.35      | 1.76      | 1.74     | 2.68      | 1.03     | 3.64     | 1.10     | 3.67      | 1.17     | 1.24     |
| MnO                            | 0.08      | 0.04      | 0.04     | 0.06      | 0.03     | 0.07     | 0.02     | 0.09      | 0.02     | 0.03     |
| MgO                            | 1.99      | 1.10      | 1.02     | 2.89      | 0.86     | 1.88     | 0.51     | 3.45      | 1.01     | 0.47     |
| CaO                            | 4.14      | 3.63      | 3.59     | 5.48      | 2.70     | 4.32     | 3.82     | 6.71      | 4.47     | 3.61     |
| Na <sub>2</sub> O              | 4.31      | 3.47      | 4.75     | 4.02      | 5.12     | 3.87     | 4.42     | 3.75      | 4.25     | 4.04     |
| K <sub>2</sub> O               | 0.76      | 1.63      | 1.31     | 0.86      | 2.14     | 0.49     | 1.10     | 0.79      | 0.62     | 0.56     |
| P <sub>2</sub> O <sub>5</sub>  | 0.08      | 0.10      | 0.09     | 0.14      | 0.16     | 0.14     | 0.03     | 0.31      | 0.10     | 0.03     |
| H <sub>2</sub> O+              | 0.25      | 0.34      | 0.30     | 0.29      | 0.33     | 0.17     | 0.31     | 0.25      | 0.42     | 0.13     |
| H <sub>2</sub> O-              | 0.06      | 0.06      | 0.03     | 0.09      | 0.01     | 0.03     | 0.05     | 0.08      | 0.08     | 0.06     |
| CO <sub>2</sub>                |           |           |          |           |          |          |          |           |          |          |
| Rest                           | 0.14      | 0.21      | 0.17     | 0.20      | 0.20     | 0.15     | 0.15     | 0.20      | 0.15     | 0.09     |
| TOTAL                          | 99.77     | 99.69     | 99.37    | 99.24     | 100.72   | 99.70    | 100.40   | 100.20    | 100.16   | 100.68   |
| Ba                             | 456       | 1020      | 748      | 680       | 784      | 425      | 429      | 696       | 243      | 256      |
| Rb                             | 2         | 27        | 9        | 6         | 36       | <1       | 7        | 5         | 3        | 2        |
| Sr                             | 349       | 358       | 376      | 412       | 501      | 310      | 364      | 418       | 509      | 270      |
| Pb                             | 5         | 12        | 7        | 8         | 15       | 3        | 6        | 9         | 3        | 4        |
| Th                             | <1        | 3         | <1       | 12        | 1        | <1       | 1        | <1        | <1       | 1        |
| U                              | <1        | <1        | <1       | <1        | <1       | <1       | <1       | <1        | <1       | <1       |
| Zr                             | 64        | 147       | 100      | 97        | 137      | 171      | 257      | 153       | 328      | 89       |
| Nb                             | 3         | 2         | 2        | 3         | 3        | 5        | 4        | 5         | 3        | 4        |
| Y                              | 9         | 11        | 3        | 13        | 6        | 12       | 3        | 21        | 4        | 8        |
| La                             | 12        | 37        | 18       | 37        | 28       | 26       | 19       | 35        | 16       | 24       |
| Ce                             | 18        | 51        | 23       | 56        | 48       | 37       | 26       | 61        | 24       | 44       |
| Nd                             |           |           |          |           |          |          |          |           |          |          |
| Sn                             | <1        | <1        | <1       | <1        | <1       | <1       | 1        | 1         | <1       | <1       |
| V                              | 64        | 48        | 32       | 72        | 29       | 60       | 14       | 27        | 11       | 15       |
| Cr                             | 47        | 14        | 15       | 91        | 18       | 48       | 12       | 80        | 5        | 8        |
| Ni                             | 18        | 8         | 14       | 54        | 13       | 26       | 5        | 60        | 13       | 2        |
| Cu                             | 24        | 6         | 7        | 21        | 5        | 10       | 5        | 30        | 11       | 3        |
| Zn                             | 66        | 40        | 45       | 42        | 45       | 62       | 30       | 62        | 28       | 27       |
| Ga                             | 18        | 14        | 18       | 16        | 18       | 17       | 18       | 19        | 17       | 13       |

## Napier Complex Pyroxene-Quartz-Feldspar Gneisses

| Sample Number                  | 77284583           | 78285003B          | 78285007F          | 76283023               | 76283057           | 76283069           | 76283099           | 76283222           | 76283246           | 77283424             |
|--------------------------------|--------------------|--------------------|--------------------|------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|----------------------|
| Area                           | Enderby<br>Land    | Enderby<br>Land    | Enderby<br>Land    | Enderby<br>Land        | Enderby<br>Land    | Enderby<br>Land    | Enderby<br>Land    | Enderby<br>Land    | Enderby<br>Land    | Enderby<br>Land      |
| Locality                       | Francis<br>Peaks   | Mount<br>Tod       | Mount<br>Sones     | Mount<br>Douglas       | Mount<br>Pardoe    | Mount<br>Hurley    | Mount<br>Selwood   | Mount<br>Smethurst | Mount<br>McGhee    | Mt Riiser-<br>Larsen |
| Rock type                      | Op-qz-pl<br>gneiss | Op-qz-mp<br>gneiss | Op-qz-pl<br>gneiss | Op-qz-kf-<br>pl gneiss | Op-qz-mp<br>gneiss | Op-qz-mp<br>gneiss | Op-qz-mp<br>gneiss | Op-qz-mp<br>gneiss | Bi-qz-mp<br>gneiss | Op-qz-mp<br>gneiss   |
| Additional Data                | D tonal            | ?D tonal           | D tonal            | D granod               | D granod           | D granod           | D granod           | D granod           | D granod           | D granod             |
| Age                            | Archaean           | Archaean           | Archaean           | Archaean               | Archaean           | Archaean           | Archaean           | Archaean           | Archaean           | Archaean             |
| Bibliog. ref.                  | 5,6                | 5,6                | 5,6                | 5,6,19                 | 5,6,19             | 5,6                | 5,6                | 5,6                | 5,6,19             | 5,6                  |
| SiO <sub>2</sub>               | 72.40              | 60.80              | 66.90              | 68.40                  | 72.70              | 66.20              | 71.80              | 70.40              | 72.40              | 70.50                |
| TiO <sub>2</sub>               | 0.41               | 0.85               | 0.42               | 0.33                   | 0.27               | 0.51               | 0.32               | 0.35               | 0.10               | 0.27                 |
| Al <sub>2</sub> O <sub>3</sub> | 14.46              | 14.95              | 16.90              | 15.79                  | 14.19              | 15.02              | 14.13              | 14.70              | 14.31              | 15.17                |
| Fe <sub>2</sub> O <sub>3</sub> | 1.39               | 1.87               | 0.55               | 1.41                   | 1.05               | 0.66               | 0.91               | 0.96               | 0.39               | 0.85                 |
| FeO                            | 1.80               | 4.76               | 2.48               | 2.07                   | 1.21               | 4.65               | 2.23               | 2.10               | 1.12               | 1.56                 |
| MnO                            | 0.04               | 0.10               | 0.02               | 0.07                   | 0.03               | 0.06               | 0.05               | 0.06               | 0.03               | 0.04                 |
| MgO                            | 0.83               | 3.72               | 0.88               | 1.38                   | 0.42               | 2.39               | 1.36               | 0.92               | 0.38               | 1.01                 |
| CaO                            | 3.36               | 7.61               | 3.81               | 2.95                   | 2.30               | 2.58               | 2.68               | 3.02               | 2.27               | 3.28                 |
| Na <sub>2</sub> O              | 4.37               | 3.92               | 5.18               | 4.31                   | 4.34               | 4.22               | 3.67               | 4.28               | 5.23               | 3.85                 |
| K <sub>2</sub> O               | 1.40               | 1.11               | 1.95               | 2.84                   | 3.12               | 2.37               | 2.60               | 2.66               | 2.42               | 2.80                 |
| P <sub>2</sub> O <sub>5</sub>  | 0.10               | 0.15               | 0.13               | 0.13                   | 0.03               | 0.06               | 0.05               | 0.06               | 0.03               | 0.10                 |
| H <sub>2</sub> O+              | 0.19               |                    |                    |                        |                    |                    |                    |                    |                    | 0.36                 |
| H <sub>2</sub> O-              | 0.06               |                    |                    |                        |                    |                    |                    |                    |                    | 0.04                 |
| CO <sub>2</sub>                |                    |                    |                    |                        |                    |                    |                    |                    |                    |                      |
| Rest                           | 0.18               | 0.17               | 0.18               | 0.33                   | 0.19               | 0.23               | 0.26               | 0.14               | 0.15               | 0.20                 |
| TOTAL                          | 100.99             | 100.01             | 99.40              | 100.01                 | 99.85              | 98.95              | 100.06             | 99.65              | 98.83              | 100.03               |
| Ba                             | 937                | 565                | 659                | 1610                   | 1060               | 905                | 1250               | 557                | 898                | 1190                 |
| Rb                             | 11                 | 8                  | 31                 | 47                     | 60                 | 51                 | 54                 | 41                 | 43                 | 26                   |
| Sr                             | 199                | 154                | 323                | 727                    | 177                | 338                | 426                | 223                | 289                | 283                  |
| Pb                             | 10                 | 9                  | 11                 | 25                     | 23                 | 26                 | 22                 | 11                 | 10                 | 15                   |
| Th                             | 1                  | 7                  | 3                  | 9                      | 20                 | 10                 | 7                  | 6                  | <1                 | <1                   |
| U                              | <1                 | 1                  | 1                  | <1                     | 1                  | 1                  | <1                 | <1                 | <1                 | <1                   |
| Zr                             | 166                | 121                | 183                | 145                    | 122                | 139                | 134                | 105                | 21                 | 45                   |
| Nb                             | 3                  | 7                  | 8                  | 3                      | 8                  | 8                  | 3                  | 7                  | <1                 | <1                   |
| Y                              | 10                 | 29                 | 5                  | 9                      | 10                 | 11                 | 12                 | 8                  | 2                  | 3                    |
| La                             | 39                 | 35                 | 61                 | 33                     | 42                 | 45                 | 35                 | 26                 | 11                 | 27                   |
| Ce                             | 56                 | 55                 | 90                 | 52                     | 63                 | 74                 | 61                 | 40                 | 14                 | 31                   |
| Nd                             |                    | 26                 | 29                 |                        |                    |                    |                    |                    |                    |                      |
| Sn                             | <1                 |                    |                    | <1                     | <1                 | <1                 | <1                 | <1                 | <1                 | <1                   |
| V                              | 33                 | 155                | 20                 | 36                     | 11                 | 76                 | 42                 | 18                 | 6                  | 30                   |
| Cr                             | 9                  | 46                 | 7                  | 33                     | 5                  | 106                | 60                 | 32                 | 8                  | 24                   |
| Ni                             | 5                  | 38                 | 9                  | 15                     | 3                  | 38                 | 32                 | 9                  | 6                  | 14                   |
| Cu                             | 14                 | 46                 | 6                  | 5                      | 3                  | 26                 | 24                 | 6                  | 3                  | 6                    |
| Zn                             | 36                 | 59                 | 39                 | 47                     | 39                 | 59                 | 33                 | 39                 | 20                 | 30                   |
| Ga                             | 14                 | 16                 | 17                 | 18                     | 16                 | 18                 | 15                 | 17                 | 15                 | 15                   |

## Napier Complex Pyroxene-Quartz-Feldspar Gneisses

| Sample Number                  | 77283439 | 77284305 | 77284335 | 77284378  | 77284064  | 76283001  | 76283215  | 76283248  | 77283981  | 77284313  |
|--------------------------------|----------|----------|----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Area                           | Enderby  | Enderby  | Enderby  | Enderby   | Enderby   | Enderby   | Enderby   | Enderby   | Enderby   | Enderby   |
| Locality                       | Land     | Land     | Land     | Land      | Land      | Land      | Land      | Land      | Land      | Land      |
| Rock type                      | Graham   | Mount    | Mount    | Zubchatyy | Johnston  | Mount     | Mount     | Burch     | Mount     | Mount     |
| Additional Data                | Peak     | Biscoe   | Letten   | Ice Shelf | Peak      | King      | Denham    | Peaks     | Bennett   | Oldfield  |
| Age                            | Op-qz-mp | Op-qz-mp | Op-qz-mp | Op-qz-mp  | Bi-op-qz- | Op-qz-mp  | Bi-qz-kf  | Op-qz-mp  | Op-qz-kf  | Op-qz-mp  |
| Bibliog. ref.                  | gneiss   | gneiss   | gneiss   | gneiss    | pl gneiss | gneiss    | gneiss    | gneiss    | gneiss    | gneiss    |
|                                | D granod | D granod | D granod | D granod  | D granod  | D granite | D granite | D granite | D granite | D granite |
|                                | Archaean | Archaean | Archaean | Archaean  | Archaean  | Archaean  | Archaean  | Archaean  | Archaean  | Archaean  |
|                                | 5,6      | 5,6      | 5,6      | 5,6       | 5,6       | 1,5,19    | 5,6       | 5,6       | 5,6       | 5,6,19    |
| SiO <sub>2</sub>               | 74.80    | 69.10    | 69.90    | 67.40     | 64.40     | 71.70     | 75.40     | 73.00     | 78.50     | 76.20     |
| TiO <sub>2</sub>               | 0.11     | 0.35     | 0.31     | 0.44      | 0.53      | 0.26      | 0.06      | 0.33      | 0.20      | 0.15      |
| Al <sub>2</sub> O <sub>3</sub> | 13.72    | 15.85    | 13.50    | 15.29     | 16.77     | 14.48     | 13.28     | 13.72     | 10.37     | 12.40     |
| Fe <sub>2</sub> O <sub>3</sub> | 0.76     | 1.42     | 2.00     | 1.28      | 0.46      | 0.73      | 0.29      | 0.88      | 0.96      | 0.64      |
| FeO                            | 0.51     | 1.81     | 1.82     | 2.72      | 3.17      | 1.30      | 0.47      | 1.09      | 1.03      | 0.94      |
| MnO                            | 0.01     | 0.04     | 0.05     | 0.04      | 0.06      | 0.03      | 0.02      | 0.04      | 0.02      | 0.03      |
| MgO                            | 0.49     | 0.89     | 2.39     | 1.77      | 3.22      | 0.91      | 0.12      | 0.36      | 0.90      | 0.62      |
| CaO                            | 2.37     | 3.06     | 2.56     | 2.97      | 5.67      | 2.67      | 1.25      | 1.53      | 0.78      | 1.82      |
| Na <sub>2</sub> O              | 4.09     | 4.69     | 3.67     | 3.61      | 3.09      | 3.04      | 2.37      | 3.25      | 2.78      | 3.22      |
| K <sub>2</sub> O               | 3.02     | 2.95     | 3.00     | 3.17      | 2.44      | 4.24      | 6.55      | 5.42      | 4.27      | 3.57      |
| P <sub>2</sub> O <sub>5</sub>  | 0.02     | 0.16     | 0.03     | 0.02      | 0.13      | 0.02      | 0.01      | 0.02      | 0.01      | 0.03      |
| H <sub>2</sub> O+              | 0.21     | 0.23     | 0.17     | 0.45      | 0.25      |           |           |           | 0.48      | 0.29      |
| H <sub>2</sub> O-              | 0.08     | 0.13     | 0.03     | 0.08      | 0.04      |           |           |           | 0.09      | 0.07      |
| CO <sub>2</sub>                |          |          |          |           |           |           |           |           |           |           |
| Rest                           | 0.26     | 0.16     | 0.23     | 0.38      | 0.26      | 0.24      | 0.34      | 0.44      | 0.15      | 0.20      |
| TOTAL                          | 100.45   | 100.84   | 99.66    | 99.62     | 100.49    | 99.62     | 100.16    | 100.08    | 100.54    | 100.18    |
| Ba                             | 1840     | 639      | 1120     | 1900      | 991       | 1170      | 2470      | 2840      | 559       | 1150      |
| Rb                             | 25       | 49       | 67       | 55        | 76        | 67        | 273       | 109       | 110       | 59        |
| Sr                             | 264      | 171      | 258      | 474       | 333       | 274       | 130       | 204       | 73        | 181       |
| Pb                             | 13       | 27       | 26       | 34        | 7         | 24        | 33        | 38        | 41        | 19        |
| Th                             | 2        | 7        | 19       | 6         | 2         | 18        | 2         | 43        | 23        | <1        |
| U                              | <1       | <1       | 1        | 2         | 2         | <1        | <1        | 1         | 7         | <1        |
| Zr                             | 21       | 192      | 102      | 346       | 135       | 107       | 29        | 126       | 108       | 153       |
| Nb                             | <1       | 3        | 3        | 5         | 3         | 3         | 1         | 6         | 5         | 1         |
| Y                              | <1       | 9        | 2        | 7         | 6         | 4         | 5         | 7         | 8         | 1         |
| La                             | 19       | 28       | 39       | 47        | 13        | 138       | 36        | 167       | 23        | 34        |
| Ce                             | 16       | 38       | 49       | 65        | 22        | 165       | 36        | 210       | 28        | 41        |
| Nd                             |          |          |          |           |           |           |           |           |           |           |
| Sn                             | <1       | 1        | <1       | <1        | <1        | <1        | <1        | 1         | 1         | <1        |
| V                              | 15       | 31       | 34       | 73        | 77        | 9         | 4         | 12        | 28        | 19        |
| Cr                             | 9        | 11       | 87       | 83        | 240       | 42        | 13        | 7         | 156       | 7         |
| Ni                             | 13       | 14       | 26       | 64        | 102       | 28        | 5         | 3         | 47        | 9         |
| Cu                             | 4        | 7        | 14       | 15        | 3         | 8         | 4         | 7         | 2         | 28        |
| Zn                             | 15       | 45       | 47       | 41        | 65        | 25        | 7         | 22        | 34        | 21        |
| Ga                             | 12       | 19       | 17       | 16        | 17        | 15        | 12        | 17        | 12        | 12        |

Napier Complex Pyroxene-Quartz-Feldspar Gneisses

| Sample Number                  | 77284324   | 77284708  | 77284710  | 80285046B | 78285005D | 80285040I | 76283074   | 76283273  | 77283985 | 77284622 |
|--------------------------------|------------|-----------|-----------|-----------|-----------|-----------|------------|-----------|----------|----------|
| Area                           | Enderby    | Enderby   | Enderby   | Enderby   | Enderby   | Enderby   | Enderby    | Enderby   | Enderby  | Enderby  |
| Locality                       | Land       | Land      | Land      | Land      | Land      | Land      | Land       | Land      | Land     | Land     |
|                                | Mount      | Budd      | McLeod    | Cape      | Mtk 945   | Fyfe      | Mount      | Mount     | Grimsley | Mount    |
|                                | Brockelsby | Peak      | Ntk       | Batterbee |           | Hills     | Codrington | Jewell    | Peaks    | Dyke     |
| Rock type                      | Op-qz-kf   | Op-qz-mp  | Op-qz-kf  | Bi-qz-mp  | Op-qz-mp  | Op-pl-qz- | Op-qz-pl   | Cp-op-qz- | Op-qz-pl | Op-qz-pl |
|                                | gneiss     | gneiss    | gneiss    | gneiss    | gneiss    | kf gneiss | gneiss     | pl gneiss | gneiss   | gneiss   |
| Additional Data                | D granite  | D granite | D granite | D granite | D granite | D granite | Un tonal   | Un tonal  | Un tonal | Un tonal |
| Age                            | Archaean   | Archaean  | Archaean  | Archaean  | Archaean  | Archaean  | Archaean   | Archaean  | Archaean | Archaean |
| Bibliog. ref.                  | 5,6        | 5,6       | 5,6       | 5,6       | 5,6       | 5,6       | 5,6,19     | 5,6       | 5,6,19   | 5,6      |
| SiO <sub>2</sub>               | 74.00      | 74.00     | 75.50     | 73.36     | 73.70     | 74.90     | 63.70      | 59.20     | 64.70    | 64.20    |
| TiO <sub>2</sub>               | 0.17       | 0.18      | 0.20      | 0.29      | 0.18      | 0.16      | 1.05       | 1.22      | 0.74     | 0.91     |
| Al <sub>2</sub> O <sub>3</sub> | 14.07      | 14.06     | 13.09     | 13.74     | 13.81     | 13.57     | 12.78      | 12.39     | 15.14    | 15.30    |
| Fe <sub>2</sub> O <sub>3</sub> | 1.05       | 0.85      | 0.96      | 0.69      | 0.76      | 0.39      | 2.90       | 1.23      | 2.28     | 3.83     |
| FeO                            | 0.55       | 0.85      | 0.60      | 0.84      | 1.10      | 0.92      | 8.01       | 10.37     | 4.73     | 2.80     |
| MnO                            | 0.03       | 0.02      | 0.03      | 0.02      | 0.02      | 0.01      | 0.16       | 0.13      | 0.11     | 0.07     |
| MgO                            | 0.41       | 0.33      | 0.41      | 0.43      | 0.17      | 0.38      | 2.46       | 3.25      | 2.37     | 1.67     |
| CaO                            | 1.93       | 2.00      | 1.62      | 1.40      | 1.56      | 2.47      | 4.52       | 5.93      | 4.87     | 4.44     |
| Na <sub>2</sub> O              | 4.01       | 3.91      | 2.70      | 3.76      | 3.39      | 2.61      | 2.23       | 4.58      | 3.70     | 4.26     |
| K <sub>2</sub> O               | 4.07       | 4.03      | 5.55      | 4.78      | 5.17      | 4.63      | 1.32       | 0.87      | 0.81     | 0.88     |
| P <sub>2</sub> O <sub>5</sub>  | 0.04       | 0.03      | 0.04      | 0.05      | 0.04      | 0.03      | 0.14       | 0.20      | 0.28     | 0.27     |
| H <sub>2</sub> O+              | 0.21       | 0.17      | 0.18      |           |           |           |            |           | 0.22     | 0.31     |
| H <sub>2</sub> O-              | 0.10       | 0.09      | 0.07      |           |           |           |            |           | 0.07     | 0.08     |
| CO <sub>2</sub>                |            |           |           |           |           |           |            |           |          |          |
| Rest                           | 0.15       | 0.16      | 0.32      | 0.18      | 0.22      | 0.19      | 0.30       | 0.16      | 0.19     | 0.20     |
| TOTAL                          | 100.79     | 100.68    | 101.27    | 99.48     | 100.12    | 100.26    | 99.57      | 99.53     | 100.21   | 99.22    |
| Ba                             | 644        | 780       | 2190      | 736       | 1063      | 1063      | 1240       | 418       | 530      | 628      |
| Rb                             | 148        | 52        | 100       | 82        | 154       | 76        | 33         | 4         | 8        | 8        |
| Sr                             | 119        | 183       | 125       | 247       | 145       | 128       | 128        | 145       | 134      | 258      |
| Pb                             | 31         | 18        | 22        | 26        | 46        | 17        | 14         | 2         | 19       | 7        |
| Th                             | 29         | 8         | 20        | 22        | 43        | 5         | 21         | 2         | 39       | 11       |
| U                              | 4          | <1        | <1        | 1         | 2         | 1         | 1          | <1        | 4        | <1       |
| Zr                             | 100        | 120       | 126       | 174       | 132       | 87        | 337        | 215       | 253      | 270      |
| Nb                             | 4          | 4         | 1         | 12        | 3         | 2         | 17         | 11        | 18       | 10       |
| Y                              | 5          | <1        | 2         | 1         | 5         | 6         | 39         | 36        | 57       | 40       |
| La                             | 33         | 46        | 49        | 77        | 76        | 43        | 74         | 54        | 43       | 56       |
| Ce                             | 49         | 58        | 63        | 114       | 115       | 54        | 119        | 87        | 84       | 95       |
| Nd                             |            |           |           |           | 34        | 14        |            |           |          |          |
| Sn                             | <1         | <1        | <1        | <1        |           |           | 2          | 1         | 2        | <1       |
| V                              | 10         | 6         | 23        | 2         | 9         | 9         | 195        | 123       | 96       | 71       |
| Cr                             | 17         | 7         | 7         | <3        | 7         | 44        | 8          | 5         | 66       | 21       |
| Ni                             | 6          | 10        | 8         | 15        | 2         | 9         | 16         | 9         | 20       | 20       |
| Cu                             | 3          | 3         | 7         | 7         | 5         | 5         | 9          | 19        | 9        | 23       |
| Zn                             | 24         | 22        | 15        | 30        | 26        | 15        | 150        | 72        | 85       | 78       |
| Ga                             | 15         | 15        | 11        | 19        | 16        | 15        | 19         | 19        | 20       | 19       |

## Napier Complex Pyroxene-Quartz-Feldspar Gneisses

| Sample Number                  | 77284498           | 76283227           | 76283253           | 76283274           | 77283980           | 77284360           | 77284397           | 76283006           | 76283018               | 76283075            |
|--------------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|------------------------|---------------------|
| Area                           | Enderby<br>Land    | Enderby<br>Land    | Enderby<br>Land    | Enderby<br>Land    | Enderby<br>Land    | Enderby<br>Land    | Kemp<br>Land       | Enderby<br>Land    | Enderby<br>Land        | Enderby<br>Land     |
| Locality                       | McLeod<br>Ntks     | Mount<br>Paish     | Mount<br>Cordwell  | Mount<br>Jewell    | Mount<br>Bennett   | Ward<br>Rocks      | Aker<br>Peaks      | Seavers<br>Ridge   | Seavers<br>Ridge       | Mount<br>Codrington |
| Rock type                      | Op-qz-pl<br>gneiss | Op-qz-mp<br>gneiss | Op-qz-mp<br>gneiss | Op-qz-mp<br>gneiss | Op-qz-mp<br>gneiss | Op-qz-mp<br>gneiss | Op-qz-pl<br>gneiss | Op-qz-mp<br>gneiss | Cp-op-qz-<br>mp gneiss | Op-qz- kf<br>gneiss |
| Additional Data                | ?Un tonal          | Un trond           | Un trond           | Un trond           | Un trond           | Un trond           | Un trond           | Un granite         | Un granite             | Un granite          |
| Age                            | Archaean           | Archaean           | Archaean           | Archaean           | Archaean           | Archaean           | Archaean           | Archaean           | Archaean               | Archaean            |
| Bibliog. ref.                  | 5,6                | 5,6                | 5,6                | 5,6,19             | 5,6,19             | 5,6                | 5,6                | 5,6,19             | 5,6                    | 5,6                 |
| SiO <sub>2</sub>               | 65.30              | 76.60              | 71.40              | 71.90              | 75.10              | 70.90              | 77.80              | 66.40              | 65.70                  | 74.40               |
| TiO <sub>2</sub>               | 1.39               | 0.47               | 0.81               | 0.61               | 0.56               | 0.92               | 0.13               | 1.28               | 1.30                   | 0.32                |
| Al <sub>2</sub> O <sub>3</sub> | 14.45              | 10.63              | 11.02              | 11.14              | 11.35              | 11.51              | 11.96              | 12.02              | 12.88                  | 10.70               |
| Fe <sub>2</sub> O <sub>3</sub> | 2.02               | 1.15               | 2.20               | 1.10               | 2.44               | 1.95               | 0.58               | 2.70               | 2.63                   | 0.90                |
| FeO                            | 4.72               | 2.29               | 4.80               | 4.43               | 2.28               | 3.58               | 0.87               | 4.18               | 4.29                   | 3.20                |
| MnO                            | 0.04               | 0.04               | 0.10               | 0.04               | 0.06               | 0.06               | 0.01               | 0.13               | 0.15                   | 0.03                |
| MgO                            | 2.02               | 1.25               | 1.25               | 1.69               | 0.56               | 2.13               | 1.00               | 1.16               | 1.08                   | 1.45                |
| CaO                            | 4.07               | 1.29               | 2.37               | 2.37               | 2.27               | 2.54               | 1.76               | 3.35               | 3.39                   | 0.19                |
| Na <sub>2</sub> O              | 3.56               | 4.47               | 3.19               | 4.09               | 3.64               | 3.64               | 4.96               | 3.07               | 2.98                   | 1.71                |
| K <sub>2</sub> O               | 2.01               | 1.75               | 2.66               | 2.06               | 1.99               | 1.78               | 1.05               | 4.26               | 4.18                   | 6.10                |
| P <sub>2</sub> O <sub>5</sub>  | 0.23               | 0.02               | 0.08               | 0.08               | 0.15               | 0.16               | 0.01               | 0.39               | 0.42                   | 0.02                |
| H <sub>2</sub> O+              | 0.23               |                    |                    |                    | 0.23               | 0.24               | 0.24               |                    |                        |                     |
| H <sub>2</sub> O-              | 0.11               |                    |                    |                    | 0.01               | 0.06               | 0.12               |                    |                        |                     |
| CO <sub>2</sub>                |                    |                    |                    |                    |                    |                    |                    |                    |                        |                     |
| Rest                           | 0.65               | 0.25               | 0.23               | 0.23               | 0.18               | 0.19               | 0.13               | 0.44               | 0.47                   | 0.52                |
| TOTAL                          | 100.80             | 100.21             | 100.11             | 99.74              | 100.82             | 99.66              | 100.62             | 100.28             | 99.47                  | 99.54               |
| Ba                             | 4230               | 970                | 1060               | 1060               | 740                | 718                | 204                | 2480               | 2730                   | 2960                |
| Rb                             | 16                 | 15                 | 28                 | 9                  | 46                 | 31                 | 6                  | 74                 | 73                     | 175                 |
| Sr                             | 233                | 106                | 142                | 134                | 176                | 104                | 128                | 174                | 178                    | 68                  |
| Pb                             | 9                  | 7                  | 9                  | 9                  | 17                 | 11                 | 6                  | 19                 | 19                     | 42                  |
| Th                             | 10                 | 22                 | <1                 | 16                 | 18                 | 21                 | 9                  | <1                 | <1                     | 60                  |
| U                              | 1                  | 2                  | 1                  | <1                 | 2                  | 3                  | 1                  | <1                 | <1                     | 4                   |
| Zr                             | 533                | 560                | 371                | 386                | 234                | 304                | 419                | 529                | 507                    | 745                 |
| Nb                             | 21                 | 27                 | 13                 | 14                 | 9                  | 15                 | 4                  | 22                 | 22                     | 23                  |
| Y                              | 12                 | 54                 | 18                 | 25                 | 46                 | 62                 | 45                 | 41                 | 44                     | 20                  |
| La                             | 148                | 94                 | 41                 | 64                 | 44                 | 54                 | 65                 | 88                 | 102                    | 97                  |
| Ce                             | 179                | 151                | 56                 | 98                 | 72                 | 88                 | 115                | 144                | 161                    | 153                 |
| Nd                             |                    |                    |                    |                    |                    |                    |                    |                    |                        |                     |
| Sn                             | <1                 | 1                  | <1                 | <1                 | 1                  | 2                  | <1                 | <1                 | <1                     | 1                   |
| V                              | 59                 | <1                 | 29                 | 11                 | 4                  | 60                 | <1                 | 51                 | 52                     | 2                   |
| Cr                             | 10                 | 9                  | 7                  | 13                 | 4                  | 10                 | 4                  | 9                  | 10                     | 15                  |
| Ni                             | 42                 | 6                  | 64                 | 26                 | 10                 | 14                 | 20                 | 7                  | 9                      | <2                  |
| Cu                             | 10                 | 4                  | 14                 | 8                  | 7                  | 5                  | 2                  | 18                 | 20                     | 5                   |
| Zn                             | 60                 | 21                 | 88                 | 33                 | 58                 | 45                 | 8                  | 57                 | 71                     | 87                  |
| Ga                             | 15                 | 15                 | 15                 | 17                 | 17                 | 15                 | 22                 | 16                 | 17                     | 16                  |



## Napier Complex Pyroxene-Quartz-Feldspar Gneisses

| Sample Number                  | 76283084                                        | 76283085                                        | 76283094                            | 76283228                             | 77284304                                | 77284667                                        | 77284669                                    | 77284670                                        | 77284675                                        | 78285004                                    |
|--------------------------------|-------------------------------------------------|-------------------------------------------------|-------------------------------------|--------------------------------------|-----------------------------------------|-------------------------------------------------|---------------------------------------------|-------------------------------------------------|-------------------------------------------------|---------------------------------------------|
| Area                           | Enderby                                         | Enderby                                         | Enderby                             | Enderby                              | Enderby                                 | Enderby                                         | Enderby                                     | Enderby                                         | Enderby                                         | Endrby                                      |
| Locality                       | Land                                            | Land                                            | Land                                | Land                                 | Land                                    | Land                                            | Land                                        | Land                                            | Land                                            | Land                                        |
| Rock type                      | Proclam-<br>ation Is.<br>Op-qz-pl-<br>kf gneiss | Proclam-<br>ation Is.<br>Op-qz-pl-<br>kf gneiss | Mount<br>King<br>Op-qz-mp<br>gneiss | Mount<br>Paish<br>Op-qz-mp<br>gneiss | Wordie<br>Ntk<br>Op-qz-pl-<br>kf gneiss | Proclam-<br>ation Is.<br>Hb-op-qz-<br>kf gneiss | Proclam-<br>ation Is.<br>Op-qz-kf<br>gneiss | Proclam-<br>ation Is.<br>Op-qz-pl-<br>kf gneiss | Proclam-<br>ation Is.<br>Op-qz-pl-<br>kf gneiss | Grimsley<br>Peaks<br>Op-pl-qz-<br>kf gneiss |
| Additional Data                | Un granite                                      | Un granite                                      | Un granite                          | Un granite                           | Un granite                              | Un granite                                      | Un granite                                  | Un granite                                      | Un granite                                      | Un granite                                  |
| Age                            | Archaean                                        | Archaean                                        | Archaean                            | Archaean                             | Archaean                                | Archaean                                        | Archaean                                    | Archaean                                        | Archaean                                        | Archaean                                    |
| Bibliog. ref.                  | 5,6,22                                          | 5,6,22                                          | 5,6                                 | 5,6,19                               | 5,6                                     | 5,6,22                                          | 5,6,22                                      | 5,6,22                                          | 5,6,22                                          | 5,6                                         |
| SiO <sub>2</sub>               | 68.00                                           | 68.00                                           | 69.10                               | 75.30                                | 69.10                                   | 74.30                                           | 74.70                                       | 71.60                                           | 66.60                                           | 74.60                                       |
| TiO <sub>2</sub>               | 0.96                                            | 0.78                                            | 0.97                                | 0.44                                 | 0.74                                    | 0.35                                            | 0.37                                        | 0.90                                            | 1.11                                            | 0.20                                        |
| Al <sub>2</sub> O <sub>3</sub> | 12.46                                           | 13.59                                           | 12.93                               | 10.55                                | 14.09                                   | 12.06                                           | 11.89                                       | 11.46                                           | 13.08                                           | 13.56                                       |
| Fe <sub>2</sub> O <sub>3</sub> | 2.21                                            | 1.79                                            | 1.67                                | 1.61                                 | 1.26                                    | 1.24                                            | 1.38                                        | 2.49                                            | 2.03                                            | 0.92                                        |
| FeO                            | 4.32                                            | 4.19                                            | 3.26                                | 2.55                                 | 3.03                                    | 1.46                                            | 1.26                                        | 3.39                                            | 5.24                                            | 0.77                                        |
| MnO                            | 0.09                                            | 0.08                                            | 0.10                                | 0.04                                 | 0.04                                    | 0.02                                            | 0.02                                        | 0.07                                            | 0.09                                            | 0.01                                        |
| MgO                            | 1.00                                            | 1.17                                            | 0.64                                | 0.77                                 | 0.90                                    | 0.35                                            | 0.41                                        | 0.96                                            | 1.22                                            | 0.21                                        |
| CaO                            | 2.51                                            | 3.08                                            | 2.40                                | 1.19                                 | 2.24                                    | 1.42                                            | 1.44                                        | 2.14                                            | 3.28                                            | 1.64                                        |
| Na <sub>2</sub> O              | 2.91                                            | 3.29                                            | 2.95                                | 3.03                                 | 2.46                                    | 2.79                                            | 3.01                                        | 2.71                                            | 2.87                                            | 3.24                                        |
| K <sub>2</sub> O               | 5.25                                            | 3.74                                            | 5.25                                | 3.50                                 | 5.62                                    | 5.02                                            | 5.03                                        | 4.29                                            | 3.89                                            | 5.02                                        |
| P <sub>2</sub> O <sub>5</sub>  | 0.20                                            | 0.17                                            | 0.25                                | 0.02                                 | 0.22                                    | 0.06                                            | 0.06                                        | 0.17                                            | 0.26                                            | 0.04                                        |
| H <sub>2</sub> O <sup>+</sup>  |                                                 |                                                 |                                     |                                      | 0.33                                    | 0.38                                            | 0.26                                        | 0.26                                            | 0.39                                            |                                             |
| H <sub>2</sub> O <sup>-</sup>  |                                                 |                                                 |                                     |                                      | 0.07                                    | 0.10                                            | 0.12                                        | 0.13                                            | 0.11                                            |                                             |
| CO <sub>2</sub>                |                                                 |                                                 |                                     |                                      |                                         |                                                 |                                             |                                                 |                                                 |                                             |
| Rest                           | 0.35                                            | 0.32                                            | 0.41                                | 0.25                                 | 0.47                                    | 0.15                                            | 0.15                                        | 0.22                                            | 0.31                                            | 0.16                                        |
| TOTAL                          | 100.26                                          | 100.20                                          | 99.93                               | 99.25                                | 100.57                                  | 99.71                                           | 100.10                                      | 100.79                                          | 100.48                                          | 100.37                                      |
| Ba                             | 1810                                            | 1690                                            | 2410                                | 984                                  | 2290                                    | 511                                             | 525                                         | 782                                             | 1470                                            | 720                                         |
| Rb                             | 112                                             | 82                                              | 101                                 | 40                                   | 149                                     | 167                                             | 149                                         | 104                                             | 86                                              | 165                                         |
| Sr                             | 130                                             | 84                                              | 128                                 | 77                                   | 160                                     | 60                                              | 44                                          | 54                                              | 86                                              | 86                                          |
| Pb                             | 8                                               | 9                                               | 20                                  | 10                                   | 31                                      | 13                                              | 14                                          | 10                                              | 8                                               | 35                                          |
| Th                             | 1                                               | 1                                               | <1                                  | 17                                   | 67                                      | 5                                               | 5                                           | 1                                               | <1                                              | 21                                          |
| U                              | <1                                              | <1                                              | <1                                  | 2                                    | <1                                      | <1                                              | <1                                          | <1                                              | <1                                              | 2                                           |
| Zr                             | 420                                             | 403                                             | 537                                 | 619                                  | 575                                     | 191                                             | 257                                         | 439                                             | 439                                             | 93                                          |
| Nb                             | 30                                              | 23                                              | 16                                  | 16                                   | 11                                      | 10                                              | 11                                          | 28                                              | 29                                              | 3                                           |
| Y                              | 76                                              | 54                                              | 25                                  | 21                                   | 8                                       | 51                                              | 45                                          | 64                                              | 77                                              | 23                                          |
| La                             | 52                                              | 41                                              | 41                                  | 73                                   | 244                                     | 49                                              | 43                                          | 40                                              | 60                                              | 47                                          |
| Ce                             | 103                                             | 83                                              | 62                                  | 113                                  | 359                                     | 83                                              | 73                                          | 82                                              | 113                                             | 71                                          |
| Nd                             |                                                 |                                                 |                                     |                                      |                                         |                                                 |                                             |                                                 |                                                 | 21                                          |
| Sn                             | 1                                               | 1                                               | <1                                  | 1                                    | <1                                      | <1                                              | 1                                           | 1                                               | 1                                               |                                             |
| V                              | 35                                              | 38                                              | 24                                  | <1                                   | 28                                      | 16                                              | 16                                          | 38                                              | 50                                              | 11                                          |
| Cr                             | 44                                              | 56                                              | 19                                  | 6                                    | 17                                      | 16                                              | 14                                          | 32                                              | 47                                              | <3                                          |
| Ni                             | 18                                              | 24                                              | 6                                   | <2                                   | 9                                       | 8                                               | 8                                           | 13                                              | 21                                              | 3                                           |
| Cu                             | 12                                              | 19                                              | 10                                  | 6                                    | 10                                      | 24                                              | 14                                          | 15                                              | 17                                              | 4                                           |
| Zn                             | 44                                              | 62                                              | 47                                  | 73                                   | 38                                      | 28                                              | 21                                          | 58                                              | 78                                              | 23                                          |
| Ga                             | 17                                              | 21                                              | 15                                  | 16                                   | 18                                      | 17                                              | 16                                          | 16                                              | 19                                              | 14                                          |

## Napier Complex Biotite- and Pyroxene-Quartz-Feldspar Gneisses

| Sample Number                  | 77283406  | 77283407  | 77284117  | 77284610  | 77284615  | 77283999   | 77284301   | 77284074  | 77284538  |
|--------------------------------|-----------|-----------|-----------|-----------|-----------|------------|------------|-----------|-----------|
| Area                           | Enderby   | Enderby   | Enderby   | Enderby   | Enderby   | Enderby    | Enderby    | Enderby   | Enderby   |
|                                | Land      | Land      | Land      | Land      | Land      | Land       | Land       | Land      | Land      |
| Locality                       | Mount     | Mount     | Mount     | Mount     | Mount     | Mount      | Mount      | Mount     | Mount     |
|                                | Marsland  | Marsland  | George    | Humble    | Humble    | Codrington | Codrington | Giddings  | Bergin    |
| Rock type                      | Op-qz-mp  | Op-qz-pl  | Op-qz-pl  | Cp-op-qz- | Cp-op-qz- | Bi-qz-kf-  | Bi-qz-mp-  | Bi-qz-mp- | Bi-qz-pl  |
|                                | gneiss    | gneiss    | gneiss    | pl gneiss | mp gneiss | pl gneiss  | gneiss     | gneiss    | gneiss    |
| Additional Data                | Op gneiss | Op gneiss | Op gneiss | Op gneiss | Op gneiss | Bi gneiss  | Bi gneiss  | Bi gneiss | Bi gneiss |
| Age                            | Archaean  | Archaean  | Archaean  | Archaean  | Archaean  | Archaean   | Archaean   | Archaean  | Archaean  |
| Bibliog. ref.                  | 5         | 5         | 5         | 5         | 5         | 5          | 5          | 5         | 5         |
| SiO <sub>2</sub>               | 76.00     | 74.30     | 54.50     | 58.50     | 58.40     | 71.70      | 76.40      | 74.20     | 70.20     |
| TiO <sub>2</sub>               | 0.53      | 0.73      | 0.97      | 0.57      | 0.66      | 0.51       | 0.22       | 0.16      | 0.42      |
| Al <sub>2</sub> O <sub>3</sub> | 10.92     | 9.90      | 18.82     | 18.05     | 14.49     | 13.45      | 12.43      | 13.83     | 15.40     |
| Fe <sub>2</sub> O <sub>3</sub> | 0.41      | 0.69      | 3.24      | 2.33      | 2.98      | 0.89       | 0.71       | 0.68      | 1.34      |
| FeO                            | 1.22      | 1.48      | 4.91      | 3.40      | 3.93      | 2.53       | 0.98       | 0.93      | 1.97      |
| MnO                            | 0.02      | 0.02      | 0.10      | 0.10      | 0.10      | 0.04       | 0.02       | 0.03      | 0.04      |
| MgO                            | 3.39      | 5.48      | 3.37      | 3.58      | 4.00      | 0.83       | 0.25       | 0.36      | 1.11      |
| CaO                            | 1.21      | 1.78      | 6.83      | 5.22      | 5.57      | 2.96       | 1.31       | 1.70      | 3.63      |
| Na <sub>2</sub> O              | 5.05      | 3.90      | 4.72      | 5.27      | 4.03      | 3.58       | 3.15       | 3.72      | 4.90      |
| K <sub>2</sub> O               | 1.01      | 0.79      | 0.82      | 2.59      | 3.43      | 2.49       | 4.68       | 4.19      | 0.97      |
| P <sub>2</sub> O <sub>5</sub>  | 0.02      | 0.02      | 0.28      | 0.43      | 0.52      | 0.13       | 0.02       | 0.04      | 0.13      |
| H <sub>2</sub> O <sup>+</sup>  | 0.28      | 0.33      | 0.26      | 0.34      | 0.48      | 0.17       | 0.18       | 0.30      | 0.44      |
| H <sub>2</sub> O <sup>-</sup>  | 0.02      | 0.02      | 0.09      | 0.11      | 0.06      | 0.07       | 0.03       | 0.02      | 0.06      |
| CO <sub>2</sub>                |           |           |           |           |           |            |            |           |           |
| Rest                           | 0.12      | 0.15      | 0.18      | 0.49      | 0.56      | 0.16       | 0.19       | 0.15      | 0.14      |
| TOTAL                          | 100.20    | 99.59     | 99.09     | 100.98    | 99.21     | 99.51      | 100.57     | 100.31    | 100.75    |
| Ba                             | 171       | 240       | 374       | 1970      | 2430      | 648        | 942        | 788       | 504       |
| Rb                             | 12        | 12        | 3         | 17        | 52        | 67         | 141        | 97        | 9         |
| Sr                             | 82        | 70        | 557       | 1560      | 1480      | 103        | 59         | 115       | 320       |
| Pb                             | 2         | 9         | 6         | 29        | 30        | 18         | 26         | 25        | 8         |
| Th                             | 5         | 2         | <1        | <1        | 1         | 18         | 54         | 20        | 3         |
| U                              | <1        | <1        | <1        | <1        | <1        | 2          | 4          | 2         | <1        |
| Zr                             | 412       | 568       | 37        | 191       | 156       | 196        | 139        | 111       | 157       |
| Nb                             | 24        | 24        | 5         | 2         | 3         | 8          | 7          | 1         | 4         |
| Y                              | 34        | 38        | 14        | 12        | 21        | 20         | 25         | 2         | 3         |
| La                             | 20        | 47        | 24        | 43        | 55        | 42         | 69         | 34        | 23        |
| Ce                             | 35        | 72        | 41        | 67        | 94        | 68         | 105        | 48        | 37        |
| Nd                             |           |           |           |           |           |            |            |           |           |
| Sn                             | <1        | <1        | 1         | <1        | 1         | <1         | 1          | <1        | <1        |
| V                              | 27        | 18        | 126       | 65        | 102       | 37         | 9          | 14        | 37        |
| Cr                             | 32        | 7         | 80        | 102       | 134       | 10         | 5          | 7         | 11        |
| Ni                             | 36        | 19        | 36        | 39        | 45        | 8          | 2          | <2        | 6         |
| Cu                             | 3         | 5         | 17        | 7         | 10        | 36         | 26         | 3         | 5         |
| Zn                             | 13        | 29        | 90        | 69        | 82        | 46         | 27         | 26        | 50        |
| Ga                             | 11        | 12        | 24        | 20        | 18        | 15         | 12         | 15        | 17        |

Napier Complex Garnet-Quartz-Feldspar Gneisses

| Sample Number                  | 76283029               | 76283064           | 76283070           | 76283088               | 76283096               | 76283202           | 76283211           | 76283229           | 76283234           | 76283272           |
|--------------------------------|------------------------|--------------------|--------------------|------------------------|------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| Area                           | Enderby                | Enderby            | Enderby            | Enderby                | Enderby                | Enderby            | Enderby            | Enderby            | Enderby            | Enderby            |
| Locality                       | Land                   | Land               | Land               | Land                   | Land                   | Land               | Land               | Land               | Land               | Land               |
|                                | Mount                  | Mount              | Mount              | Proclam-               | Mount                  | Mount              | Mount              | Mount              | Mount              | Mount              |
|                                | Douglas                | Pardoe             | Hurley             | ation Is.              | Selwood                | Ryder              | Denham             | Paish              | Torckler           | Stadler            |
| Rock type                      | Gt-qz-pl-<br>kf gneiss | Gt-qz-mp<br>gneiss | Gt-qz-mp<br>gneiss | Gt-qz-pl-<br>kf gneiss | Op-gt-qz-<br>mp gneiss | Gt-qz-mp<br>gneiss | Gt-qz-mp<br>gneiss | Gt-qz-mp<br>gneiss | Gt-qz-mp<br>gneiss | Gt-qz-kf<br>gneiss |
| Additional Data                | Gt gneiss              | Gt gneiss          | Gt gneiss          | Gt gneiss              | Gt gneiss              | Gt gneiss          | Gt gneiss          | Gt gneiss          | Gt gneiss          | Gt gneiss          |
| Age                            | Archaean               | Archaean           | Archaean           | Archaean               | Archaean               | Archaean           | Archaean           | Archaean           | Archaean           | Archaean           |
| Bibliog. ref.                  | 5,6                    | 5,6,19             | 5,6                | 5,6                    | 5,6                    | 5,6                | 5,6,19             | 5,6                | 5,6                | 5,6,19             |
| SiO <sub>2</sub>               | 66.90                  | 74.30              | 73.70              | 72.70                  | 70.00                  | 74.50              | 74.50              | 74.20              | 73.90              | 76.20              |
| TiO <sub>2</sub>               | 0.55                   | 0.09               | 0.05               | 0.30                   | 0.43                   | 0.07               | 0.10               | 0.04               | 0.17               | 0.44               |
| Al <sub>2</sub> O <sub>3</sub> | 15.15                  | 13.30              | 13.87              | 13.04                  | 14.03                  | 13.57              | 13.40              | 13.87              | 13.57              | 10.98              |
| Fe <sub>2</sub> O <sub>3</sub> | 1.70                   | 1.16               | 1.08               | 1.11                   | 2.21                   | 0.97               | 0.87               | 0.27               | 0.46               | 2.23               |
| FeO                            | 3.38                   | 0.67               | 0.40               | 2.37                   | 2.52                   | 0.91               | 0.67               | 0.79               | 1.38               | 2.80               |
| MnO                            | 0.09                   | 0.04               | 0.05               | 0.05                   | 0.08                   | 0.07               | 0.04               | 0.02               | 0.03               | 0.09               |
| MgO                            | 1.74                   | 0.17               | 0.42               | 1.47                   | 1.81                   | 0.65               | 0.22               | 0.12               | 0.32               | 0.18               |
| CaO                            | 2.84                   | 1.33               | 1.02               | 1.48                   | 2.93                   | 1.36               | 1.05               | 0.88               | 1.12               | 1.71               |
| Na <sub>2</sub> O              | 3.75                   | 3.71               | 3.33               | 2.30                   | 3.50                   | 3.40               | 3.77               | 3.99               | 3.94               | 2.15               |
| K <sub>2</sub> O               | 2.32                   | 4.56               | 5.71               | 4.41                   | 1.93                   | 4.62               | 5.27               | 5.68               | 4.84               | 3.23               |
| P <sub>2</sub> O <sub>5</sub>  | 0.04                   | <0.01              | 0.08               | 0.03                   | 0.05                   | 0.03               | 0.02               | 0.03               | 0.04               | 0.01               |
| H <sub>2</sub> O+              |                        |                    |                    |                        |                        |                    |                    |                    |                    |                    |
| H <sub>2</sub> O-              |                        |                    |                    |                        |                        |                    |                    |                    |                    |                    |
| CO <sub>2</sub>                |                        |                    |                    |                        |                        |                    |                    |                    |                    |                    |
| Rest                           | 0.26                   | 0.23               | 0.27               | 0.26                   | 0.21                   | 0.22               | 0.13               | 0.12               | 0.16               | 0.25               |
| TOTAL                          | 98.72                  | 99.55              | 99.98              | 99.52                  | 99.70                  | 100.37             | 100.04             | 100.01             | 99.93              | 100.27             |
| Ba                             | 927                    | 1410               | 1840               | 1220                   | 769                    | 1220               | 613                | 496                | 624                | 1360               |
| Rb                             | 45                     | 120                | 129                | 145                    | 30                     | 156                | 191                | 205                | 263                | 65                 |
| Sr                             | 529                    | 101                | 265                | 78                     | 371                    | 147                | 61                 | 65                 | 54                 | 76                 |
| Pb                             | 20                     | 36                 | 39                 | 47                     | 17                     | 43                 | 45                 | 39                 | 35                 | 27                 |
| Th                             | 6                      | 46                 | <1                 | 54                     | 3                      | 33                 | 6                  | 4                  | 31                 | 3                  |
| U                              | <1                     | 4                  | <1                 | 3                      | <1                     | 2                  | <1                 | <1                 | 3                  | 1                  |
| Zr                             | 214                    | 82                 | 18                 | 292                    | 141                    | 85                 | 65                 | 55                 | 118                | 334                |
| Nb                             | 7                      | 2                  | <1                 | 12                     | 4                      | 3                  | 1                  | <1                 | 11                 | 4                  |
| Y                              | 42                     | 42                 | 24                 | 68                     | 17                     | 37                 | 19                 | 11                 | 24                 | 63                 |
| La                             | 24                     | 39                 | 38                 | 82                     | 37                     | 42                 | 48                 | 46                 | 56                 | 55                 |
| Ce                             | 36                     | 56                 | 43                 | 143                    | 64                     | 77                 | 74                 | 71                 | 103                | 68                 |
| Nd                             |                        |                    |                    |                        |                        |                    |                    |                    |                    |                    |
| Sn                             | <1                     | <1                 | <1                 | 1                      | <1                     | 3                  | 1                  | 2                  | 2                  | 1                  |
| V                              | 57                     | 2                  | 3                  | 14                     | 64                     | 4                  | 2                  | <1                 | 4                  | <1                 |
| Cr                             | 94                     | 3                  | 10                 | 20                     | 114                    | 17                 | 9                  | 6                  | 8                  | <3                 |
| Ni                             | 42                     | <2                 | 2                  | 10                     | 34                     | 12                 | 9                  | 3                  | 2                  | 4                  |
| Cu                             | 20                     | 3                  | 3                  | 10                     | 23                     | 32                 | 3                  | 2                  | 2                  | 6                  |
| Zn                             | 34                     | 25                 | 3                  | 21                     | 42                     | 10                 | 5                  | 8                  | 13                 | 56                 |
| Ga                             | 15                     | 14                 | 11                 | 16                     | 15                     | 12                 | 14                 | 15                 | 17                 | 17                 |

Napier Complex Garnet-Quartz-Feldspar Gneisses

| Sample Number                  | 76283283        | 77283417         | 77283435        | 77283913        | 77283944        | 77283965           | 77284306        | 77284832        | 77284842        | 77283963           |
|--------------------------------|-----------------|------------------|-----------------|-----------------|-----------------|--------------------|-----------------|-----------------|-----------------|--------------------|
| Area                           | Enderby         | Enderby          | Enderby         | Enderby         | Enderby         | Enderby            | Enderby         | Enderby         | Enderby         | Enderby            |
| Locality                       | Land            | Land             | Land            | Land            | Land            | Land               | Land            | Land            | Land            | Land               |
|                                | Mount Jewell    | Mt Riiser-Larsen | Mount Soucek    | Tonaqh Island   | Mount Pardoe    | Mount Charles      | Mount Biscoe    | Mount Trail     | McIntyre Island | Debenham Peak      |
| Rock type                      | Gt-qz-mp gneiss | Gt-qz-mp gneiss  | Gt-qz-mp gneiss | Gt-qz-mp gneiss | Gt-qz-mp gneiss | Bi-gt-qz-mp gneiss | Gt-qz-mp gneiss | Gt-qz-kf gneiss | Gt-qz-mp gneiss | Op-gt-qz-mp gneiss |
| Additional Data                | Gt gneiss       | Gt gneiss        | Gt gneiss       | Gt gneiss       | Gt gneiss       | Gt gneiss          | Gt gneiss       | Gt gneiss       | Gt gneiss       | Gt gneiss          |
| Age                            | Archaean        | Archaean         | Archaean        | Archaean        | Archaean        | Archaean           | Archaean        | Archaean        | Archaean        | Archaean           |
| Bibliog. ref.                  | 5,6             | 5,6              | 5,6             | 5,6             | 5,6             | 5,6                | 5,6             | 5,6             | 5,6             | 5,6                |
| SiO <sub>2</sub>               | 75.20           | 74.90            | 73.80           | 74.50           | 74.90           | 73.30              | 76.10           | 75.00           | 75.10           | 73.90              |
| TiO <sub>2</sub>               | 0.02            | 0.04             | 0.06            | 0.13            | 0.15            | 0.31               | 0.02            | 0.11            | 0.06            | 0.84               |
| Al <sub>2</sub> O <sub>3</sub> | 13.13           | 13.09            | 13.58           | 13.49           | 13.61           | 12.05              | 13.70           | 13.39           | 13.58           | 11.20              |
| Fe <sub>2</sub> O <sub>3</sub> | 0.27            | 1.59             | 0.66            | 0.97            | 1.27            | 3.10               | 0.17            | 1.18            | 0.27            | 1.59               |
| FeO                            | 0.95            | 1.02             | 1.02            | 0.38            | 1.28            | 2.01               | 0.40            | 0.86            | 0.67            | 3.07               |
| MnO                            | 0.07            | 0.05             | 0.01            | 0.05            | 0.04            | 0.05               | 0.01            | 0.03            | 0.03            | 0.04               |
| MgO                            | 0.19            | 0.64             | 0.60            | 0.41            | 0.65            | 2.20               | 0.09            | 0.16            | 0.24            | 0.95               |
| CaO                            | 1.09            | 1.42             | 1.63            | 1.48            | 2.05            | 1.20               | 1.77            | 1.05            | 1.27            | 1.79               |
| Na <sub>2</sub> O              | 3.42            | 2.20             | 3.72            | 3.42            | 3.46            | 2.27               | 3.49            | 3.05            | 2.99            | 2.88               |
| K <sub>2</sub> O               | 5.14            | 5.09             | 3.53            | 4.49            | 2.87            | 2.75               | 4.29            | 5.55            | 5.66            | 3.16               |
| P <sub>2</sub> O <sub>5</sub>  | 0.03            | 0.03             | 0.04            | 0.01            | 0.03            | 0.04               | 0.06            | 0.02            | 0.03            | 0.27               |
| H <sub>2</sub> O+              |                 | 0.43             | 0.17            | 0.11            | 0.10            | 0.25               | 0.18            | 0.20            | 0.21            | 0.19               |
| H <sub>2</sub> O-              |                 | 0.12             | 0.06            | 0.09            | 0.01            | 0.10               | 0.01            | 0.03            | 0.02            | 0.11               |
| CO <sub>2</sub>                |                 |                  |                 |                 |                 |                    |                 |                 |                 |                    |
| Rest                           | 0.11            | 0.18             | 0.15            | 0.28            | 0.13            | 0.20               | 0.19            | 0.13            | 0.15            | 0.25               |
| TOTAL                          | 99.62           | 100.80           | 99.03           | 99.81           | 100.55          | 99.83              | 100.48          | 100.76          | 100.28          | 100.24             |
| Ba                             | 540             | 1040             | 736             | 1850            | 361             | 428                | 1140            | 539             | 818             | 987                |
| Rb                             | 167             | 145              | 77              | 111             | 89              | 87                 | 82              | 165             | 153             | 51                 |
| Sr                             | 60              | 109              | 177             | 196             | 80              | 62                 | 204             | 73              | 96              | 69                 |
| Pb                             | 44              | 49               | 59              | 66              | 31              | 41                 | 50              | 45              | 45              | 9                  |
| Th                             | 2               | 3                | 15              | 15              | 36              | 45                 | 3               | 16              | 18              | 13                 |
| U                              | <1              | <1               | 7               | <1              | 2               | 5                  | 3               | 1               | <1              | <1                 |
| Zr                             | 27              | 106              | 77              | 64              | 204             | 266                | 85              | 113             | 64              | 527                |
| Nb                             | <1              | <1               | 1               | 2               | 1               | 22                 | <1              | <1              | <1              | 23                 |
| Y                              | 22              | 46               | 13              | 22              | 35              | 114                | 19              | 4               | 13              | 88                 |
| La                             | 17              | 28               | 32              | 45              | 68              | 84                 | 17              | 61              | 32              | 68                 |
| Ce                             | 28              | 41               | 52              | 72              | 112             | 134                | 24              | 85              | 49              | 114                |
| Nd                             |                 |                  |                 |                 |                 |                    |                 |                 |                 |                    |
| Sn                             | <1              | <1               | <1              | 1               | 1               | <1                 | <1              | <1              | <1              | 1                  |
| V                              | <1              | 3                | 15              | 10              | 8               | 50                 | 2               | 1               | 4               | 20                 |
| Cr                             | 13              | 6                | 24              | 9               | 6               | 177                | 5               | 4               | 6               | 9                  |
| Ni                             | <2              | 2                | 5               | 5               | 3               | 11                 | 2               | 2               | 5               | 6                  |
| Cu                             | 4               | 3                | 10              | 3               | 3               | 6                  | 2               | 3               | 3               | 4                  |
| Zn                             | 4               | 8                | 12              | 13              | 15              | 27                 | 2               | 12              | 7               | 25                 |
| Ga                             | 9               | 12               | 13              | 13              | 15              | 17                 | 14              | 12              | 13              | 17                 |

## Napier Complex Garnet-Quartz-Feldspar Gneisses

| Sample Number                  | 77284320               | 77284337               | 77284627               | 77284850               | 78285030           | 80285034D              |
|--------------------------------|------------------------|------------------------|------------------------|------------------------|--------------------|------------------------|
| Area                           | Enderby<br>Land        | Enderby<br>Land        | Enderby<br>Land        | Enderby<br>Land        | Enderby<br>Land    | Enderby<br>Land        |
| Locality                       | Mount<br>Brockelsby    | Gage<br>Ridge          | Mount<br>Hardy         | Latham<br>Peak         | Mount<br>George    | Mount<br>Hardy         |
| Rock type                      | Gt-qz-pl-<br>kf gneiss | Op-gt-qz-<br>mp gneiss | Op-gt-qz-<br>mp gneiss | Op-gt-qz-<br>kf gneiss | Gt-qz-mp<br>gneiss | Gt-op-qz-<br>mp gneiss |
| Additional Data                | Gt gneiss              | Gt gneiss              | Gt gneiss              | Gt gneiss              | Gt gneiss          | Gt gneiss              |
| Age                            | Archaean               | Archaean               | Archaean               | Archaean               | Archaean           | Archaean               |
| Bibliog. ref.                  | 5,6                    | 5,6                    | 5,6                    | 5,6                    | 5,6                | 5,6                    |
| SiO <sub>2</sub>               | 72.80                  | 70.50                  | 71.40                  | 74.50                  | 71.50              | 72.90                  |
| TiO <sub>2</sub>               | 0.48                   | 0.49                   | 0.46                   | 0.10                   | 0.29               | 0.46                   |
| Al <sub>2</sub> O <sub>3</sub> | 11.41                  | 13.45                  | 13.41                  | 12.93                  | 14.64              | 12.50                  |
| Fe <sub>2</sub> O <sub>3</sub> | 0.87                   | 2.74                   | 1.32                   | 0.86                   | 1.07               | 0.48                   |
| FeO                            | 4.42                   | 2.00                   | 3.40                   | 0.75                   | 1.50               | 4.25                   |
| MnO                            | 0.09                   | 0.09                   | 0.06                   | 0.02                   | 0.02               | 0.05                   |
| MgO                            | 0.71                   | 1.86                   | 1.89                   | 0.39                   | 0.58               | 1.91                   |
| CaO                            | 1.65                   | 2.32                   | 2.60                   | 1.03                   | 3.41               | 1.89                   |
| Na <sub>2</sub> O              | 2.24                   | 2.63                   | 3.11                   | 2.70                   | 5.09               | 3.04                   |
| K <sub>2</sub> O               | 4.79                   | 3.38                   | 1.85                   | 6.02                   | 1.05               | 2.51                   |
| P <sub>2</sub> O <sub>5</sub>  | 0.07                   | 0.02                   | 0.05                   | 0.03                   | 0.08               | 0.03                   |
| H <sub>2</sub> O+              | 0.56                   | 0.24                   | 0.37                   | 0.22                   |                    |                        |
| H <sub>2</sub> O-              | 0.07                   | 0.13                   | 0.02                   | 0.02                   |                    |                        |
| CO <sub>2</sub>                |                        |                        |                        |                        |                    |                        |
| Rest                           | 0.24                   | 0.19                   | 0.17                   | 0.14                   | 0.11               | 0.19                   |
| TOTAL                          | 100.40                 | 100.04                 | 100.11                 | 99.71                  | 99.34              | 100.21                 |
| Ba                             | 1280                   | 539                    | 500                    | 615                    | 330                | 688                    |
| Rb                             | 119                    | 120                    | 39                     | 206                    | 7                  | 53                     |
| Sr                             | 76                     | 85                     | 248                    | 68                     | 256                | 205                    |
| Pb                             | 27                     | 31                     | 19                     | 58                     | 4                  | 20                     |
| Th                             | 16                     | 16                     | 5                      | 8                      | 2                  | 3                      |
| U                              | 2                      | 1                      | <1                     | 1                      | 1                  | 1                      |
| Zr                             | 268                    | 214                    | 123                    | 66                     | 123                | 141                    |
| Nb                             | 10                     | 13                     | 4                      | 1                      | 2                  | 4                      |
| Y                              | 34                     | 40                     | 18                     | 23                     | 5                  | 17                     |
| La                             | 55                     | 69                     | 32                     | 56                     | 24                 | 39                     |
| Ce                             | 80                     | 114                    | 53                     | 83                     | 37                 | 56                     |
| Nd                             |                        |                        |                        |                        | 12                 | 22                     |
| Sn                             | <1                     | <1                     | <1                     | 1                      |                    |                        |
| V                              | 4                      | 42                     | 82                     | 5                      | 22                 | 81                     |
| Cr                             | 6                      | 136                    | 92                     | 7                      | <3                 | 80                     |
| Ni                             | 11                     | 43                     | 44                     | 4                      | 7                  | 48                     |
| Cu                             | 3                      | 13                     | 23                     | 3                      | 6                  | 25                     |
| Zn                             | 80                     | 33                     | 55                     | 14                     | 41                 | 59                     |
| Ga                             | 15                     | 16                     | 16                     | 13                     | 15                 | 14                     |



## Napier Complex Mafic Granulites

| Sample Number                  | 77283438  | 77283454  | 77283456  | 77283921  | 77283922  | 77283975  | 77283987  | 77284308   | 77284309   | 77284697  |
|--------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------------|------------|-----------|
| Area                           | Enderby   | Enderby   | Enderby   | Enderby   | Enderby   | Enderby   | Enderby   | Enderby    | Enderby    | Enderby   |
| Locality                       | Land      | Land      | Land      | Land      | Land      | Land      | Land      | Land       | Land       | Land      |
|                                | Peacock   | Ntk ENE   | Ntk ENE   | Tonagh    | Tonagh    | Mount     | Grimsley  | Mount      | Mount      | Mount     |
|                                | Ridge     | of 945    | of 945    | Island    | Island    | Bennett   | Peaks     | Biscoe     | Biscoe     | Henry     |
| Rock type                      | Cp-cp-pl  | Op-cp-pl  | Op-pl     | Cp-op-pl  | Gt-op-pl  | Cp-op-pl  | Cp-op-pl  | Hb-px-pl   | Hb-px-pl   | Cp-op-pl  |
|                                | granulite | granulite | granulite | granulite | granulite | granulite | granulite | granulite  | granulite  | granulite |
| Additional Data                |           |           |           |           |           |           |           | Metagabbro | Metagabbro |           |
| Age                            | Archaean  | Archaean  | Archaean  | Archaean  | Archaean  | Archaean  | Archaean  | Archaean   | Archaean   | Archaean  |
| Bibliog. ref.                  | 5,13      | 5,13      | 5,13      | 5,13      | 5,13      | 5,13      | 5,13      | 5,13       | 5,13       | 5,13      |
| SiO <sub>2</sub>               | 52.30     | 59.40     | 51.30     | 51.60     | 52.50     | 50.00     | 52.20     | 53.20      | 51.10      | 51.30     |
| TiO <sub>2</sub>               | 0.51      | 1.39      | 0.89      | 0.97      | 1.69      | 0.97      | 0.86      | 0.49       | 1.11       | 0.63      |
| Al <sub>2</sub> O <sub>3</sub> | 15.04     | 13.61     | 13.94     | 13.34     | 14.46     | 14.60     | 14.82     | 16.06      | 18.13      | 14.04     |
| Fe <sub>2</sub> O <sub>3</sub> | 2.35      | 1.01      | 1.95      | 2.18      | 3.23      | 2.90      | 1.33      | 1.15       | 1.91       | 2.54      |
| FeO                            | 7.93      | 6.10      | 13.67     | 10.56     | 12.50     | 11.34     | 10.16     | 6.82       | 7.81       | 7.91      |
| MnO                            | 0.22      | 0.10      | 0.18      | 0.19      | 0.24      | 0.23      | 0.20      | 0.14       | 0.14       | 0.18      |
| MgO                            | 9.19      | 5.17      | 9.37      | 8.64      | 7.46      | 8.64      | 7.28      | 7.61       | 4.99       | 7.98      |
| CaO                            | 9.23      | 10.27     | 5.89      | 9.37      | 4.42      | 9.03      | 9.66      | 10.22      | 9.65       | 11.96     |
| Na <sub>2</sub> O              | 2.70      | 2.46      | 1.82      | 2.25      | 2.93      | 1.79      | 3.13      | 3.09       | 3.17       | 2.66      |
| K <sub>2</sub> O               | 0.30      | 0.33      | 0.21      | 0.41      | 0.36      | 0.09      | 0.31      | 0.31       | 0.45       | 0.21      |
| P <sub>2</sub> O <sub>5</sub>  | 0.05      | 0.21      | 0.08      | 0.12      | 0.14      | 0.09      | 0.09      | 0.10       | 0.32       | 0.07      |
| H <sub>2</sub> O+              | 0.22      | 0.22      | 0.62      | 0.30      | 0.24      | 0.28      | 0.10      | 0.27       | 0.37       | 0.20      |
| H <sub>2</sub> O-              | 0.07      | 0.03      | 0.13      | 0.12      | 0.12      | 0.04      | 0.05      | 0.05       | 0.02       | 0.03      |
| CO <sub>2</sub>                |           |           |           |           |           |           |           |            |            |           |
| Rest                           | 0.16      | 0.16      | 0.19      | 0.23      | 0.21      | 0.24      | 0.16      | 0.14       | 0.16       | 0.13      |
| TOTAL                          | 100.27    | 100.46    | 100.24    | 100.28    | 100.50    | 100.24    | 100.35    | 99.65      | 99.33      | 99.84     |
| Ba                             | 59        | 130       | 71        | 71        | 71        | 374       | 190       | 72         | 141        | 63        |
| Rb                             | 8         | 1         | 2         | 4         | 4         | 1         | 2         | 3          | 7          | <1        |
| Sr                             | 82        | 151       | 66        | 97        | 69        | 213       | 207       | 230        | 302        | 107       |
| Pb                             | 5         | 5         | 4         | 3         | 5         | 16        | 5         | 5          | 3          | 1         |
| Th                             | <1        | <1        | 2         | 2         | 2         | 2         | 1         | 1          | 1          | <1        |
| U                              | <1        | <1        | <1        | <1        | 2         | 1         | 1         | <1         | <1         | <1        |
| Zr                             | 23        | 63        | 47        | 45        | 81        | 64        | 55        | 15         | 89         | 39        |
| Nb                             | 5         | 7         | 4         | 4         | 4         | 2         | 3         | 13         | 8          | 3         |
| Y                              | 18        | 56        | 18        | 24        | 30        | 22        | 25        | 51         | 24         | 19        |
| La                             | 5         | 25        | 19        | 11        | 9         | 5         | 12        | 10         | 15         | 9         |
| Ce                             | 3         | 58        | 26        | 11        | 15        | 8         | 15        | 18         | 26         | 14        |
| Nd                             |           |           |           |           |           |           |           |            |            |           |
| Sn                             | 1         | 3         | <1        | 1         | <1        | 2         | 2         | 1          | 4          | 1         |
| V                              | 215       | 327       | 296       | 312       | 614       | 252       | 211       | 118        | 197        | 200       |
| Cr                             | 445       | 97        | 375       | 620       | 162       | 241       | 203       | 187        | 74         | 241       |
| Ni                             | 110       | 95        | 179       | 224       | 192       | 101       | 82        | 145        | 63         | 108       |
| Cu                             | 9         | 7         | 109       | 37        | 10        | 10        | 17        | 92         | 132        | 38        |
| Zn                             | 99        | 84        | 84        | 101       | 107       | 441       | 124       | 72         | 88         | 70        |
| Ga                             | 16        | 20        | 22        | 18        | 19        | 22        | 17        | 18         | 21         | 14        |

## Napier Complex Mafic Granulites

| Sample Number                  | 76283019              | 76283060              | 76283076              | 76283206              | 76283224              | 76283239              | 76283261              | 76283275              | 77284280              | 77284353           |
|--------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|--------------------|
| Area                           | Enderby<br>Land       | Enderby<br>Land       | Enderby<br>Land       | Enderby<br>Land       | Enderby<br>Land       | Enderby<br>Land       | Enderby<br>Land       | Enderby<br>Land       | Enderby<br>Land       | Enderby<br>Land    |
| Locality                       | Seavers<br>Ridge      | Mount<br>Pardoe       | Mount<br>Codrington   | Mount<br>Ryder        | Mount<br>Smethurst    | Mount<br>Torckler     | Ntk 945               | Mount<br>Jewell       | Hydrogra-<br>pher Is. | Wyers Ice<br>Shelf |
| Rock type                      | Cp-op-pl<br>granulite | Cp-op-pl<br>granulite | Cp-op-pl<br>granulite | Cp-op-pl<br>granulite | Cp-op-pl<br>granulite | Op-cp-pl<br>granulite | Op-cp-pl<br>granulite | Cp-op-pl<br>granulite | Gt-cp-pl<br>granulite | Gt-cp<br>granulite |
| Additional Data                |                       |                       |                       |                       |                       |                       |                       |                       |                       |                    |
| Age                            | Archaean              | Archaean              | Archaean              | Archaean              | Archaean              | Archaean              | Archaean              | Archaean              | Archaean              | Archaean           |
| Bibliog. ref.                  | 5,13                  | 5,13                  | 5,13                  | 5,13                  | 5,13                  | 5,13                  | 5,13                  | 5,13                  | 5,13                  | 5,13               |
| SiO <sub>2</sub>               | 51.10                 | 48.00                 | 49.80                 | 50.70                 | 49.70                 | 48.20                 | 49.40                 | 50.30                 | 43.10                 | 44.00              |
| TiO <sub>2</sub>               | 1.83                  | 1.29                  | 1.03                  | 1.09                  | 1.47                  | 0.64                  | 0.66                  | 0.77                  | 0.27                  | 0.52               |
| Al <sub>2</sub> O <sub>3</sub> | 13.42                 | 14.97                 | 14.43                 | 12.07                 | 14.56                 | 15.64                 | 11.56                 | 14.62                 | 14.54                 | 12.80              |
| Fe <sub>2</sub> O <sub>3</sub> | 3.89                  | 3.91                  | 1.84                  | 4.95                  | 1.58                  | 4.60                  | 3.20                  | 1.58                  | 1.68                  | 3.04               |
| FeO                            | 10.89                 | 9.23                  | 9.85                  | 10.75                 | 10.76                 | 7.17                  | 8.84                  | 10.01                 | 19.50                 | 9.80               |
| MnO                            | 0.23                  | 0.22                  | 0.18                  | 0.29                  | 0.24                  | 0.19                  | 0.31                  | 0.20                  | 0.34                  | 0.57               |
| MgO                            | 3.96                  | 7.88                  | 7.43                  | 10.28                 | 7.75                  | 9.05                  | 9.08                  | 7.57                  | 7.45                  | 11.83              |
| CaO                            | 8.31                  | 10.75                 | 10.12                 | 6.18                  | 9.67                  | 12.01                 | 14.12                 | 11.17                 | 10.63                 | 15.76              |
| Na <sub>2</sub> O              | 3.75                  | 2.59                  | 2.46                  | 1.86                  | 2.88                  | 1.77                  | 1.96                  | 2.63                  | 0.97                  | 0.45               |
| K <sub>2</sub> O               | 1.08                  | 0.27                  | 0.62                  | 0.69                  | 0.29                  | 0.05                  | 0.30                  | 0.32                  | 0.09                  | 0.03               |
| P <sub>2</sub> O <sub>5</sub>  | 0.26                  | 0.10                  | 0.18                  | 0.17                  | 0.17                  | 0.06                  | 0.02                  | 0.06                  | 0.24                  | 0.03               |
| H <sub>2</sub> O <sup>+</sup>  |                       |                       |                       |                       |                       |                       |                       |                       | 0.17                  | 0.25               |
| H <sub>2</sub> O <sup>-</sup>  |                       |                       |                       |                       |                       |                       |                       |                       | 0.06                  | 0.05               |
| CO <sub>2</sub>                |                       |                       |                       |                       |                       |                       |                       |                       |                       |                    |
| Rest                           | 0.19                  | 0.14                  | 0.17                  | 0.26                  | 0.18                  | 0.16                  | 0.30                  | 0.14                  | 0.14                  | 0.09               |
| TOTAL                          | 98.91                 | 99.35                 | 98.11                 | 99.29                 | 99.25                 | 99.54                 | 99.75                 | 99.37                 | 99.18                 | 99.22              |
| Ba                             | 182                   | 66                    | 164                   | 330                   | 100                   | 35                    | 56                    | 78                    | 56                    | 48                 |
| Rb                             | 7                     | 2                     | 18                    | 21                    | 3                     | <1                    | <1                    | 4                     | 2                     | 1                  |
| Sr                             | 151                   | 215                   | 129                   | 285                   | 134                   | 115                   | 109                   | 95                    | 23                    | 14                 |
| Pb                             | 6                     | 2                     | 9                     | 4                     | 3                     | 1                     | 1                     | 3                     | 1                     | 1                  |
| Th                             | <1                    | <1                    | 1                     | 2                     | 1                     | <1                    | <1                    | 1                     | 4                     | 4                  |
| U                              | 1                     | <1                    | 1                     | <1                    | <1                    | <1                    | <1                    | 1                     | 2                     | 1                  |
| Zr                             | 242                   | 75                    | 86                    | 127                   | 116                   | 68                    | 46                    | 53                    | 92                    | 117                |
| Nb                             | 20                    | 4                     | 6                     | 10                    | 10                    | 2                     | 1                     | 2                     | 1                     | 5                  |
| Y                              | 55                    | 19                    | 33                    | 21                    | 30                    | 17                    | 14                    | 19                    | 160                   | 56                 |
| La                             | 84                    | 5                     | 19                    | 19                    | 17                    | 7                     | 7                     | 5                     | 29                    | 24                 |
| Ce                             | 147                   | 14                    | 42                    | 40                    | 38                    | 20                    | 14                    | 14                    | 67                    | 52                 |
| Nd                             |                       |                       |                       |                       |                       |                       |                       |                       |                       |                    |
| Sn                             | 1                     | 3                     | 7                     | 3                     | 2                     | 1                     | 2                     | 1                     | 2                     | 15                 |
| V                              | 110                   | 271                   | 236                   | 182                   | 224                   | 169                   | 140                   | 199                   | 314                   | 41                 |
| Cr                             | 71                    | 76                    | 173                   | 531                   | 395                   | 375                   | 1240                  | 262                   | 88                    | 180                |
| Ni                             | 152                   | 86                    | 133                   | 186                   | 77                    | 191                   | 307                   | 133                   | 35                    | 35                 |
| Cu                             | 55                    | 15                    | 59                    | 34                    | 41                    | 30                    | 140                   | 40                    | 15                    | 3                  |
| Zn                             | 134                   | 89                    | 72                    | 123                   | 99                    | 61                    | 65                    | 76                    | 95                    | 64                 |
| Ga                             | 20                    | 20                    | 16                    | 18                    | 19                    | 17                    | 11                    | 17                    | 15                    | 14                 |

Napier Complex Mafic Granulites

| Sample Number                  | 77284816              | 77284817              | 77284510              | 77283413              | 77283701           | 77283920              | 77284322              | 77283692         | 77284629         | 77284628         |
|--------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|--------------------|-----------------------|-----------------------|------------------|------------------|------------------|
| Area                           | Enderby               | Enderby               | Enderby               | Enderby               | Enderby            | Enderby               | Enderby               | Enderby          | Enderby          | Enderby          |
| Locality                       | Land                  | Land                  | Land                  | Land                  | Land               | Land                  | Land                  | Land             | Land             | Land             |
|                                | Gromov                | Gromov                | Fyfe                  | Mount                 | Howard             | Tonagh                | Mount                 | Bunt Is.         | Mount            | Mount            |
|                                | Ntks                  | Ntks                  | Hills                 | Marsland              | Hills              | Island                | Brockelsby            |                  | Hardy            | Hardy            |
| Rock type                      | Op-gt-cp<br>granulite | Hb-gt-px<br>granulite | Gt-px-pl<br>granulite | Cp-ol-op<br>granulite | Cp-op<br>granulite | Cp-ol-op<br>granulite | Cp-ol-op<br>granulite | Leuco-<br>norite | Leuco-<br>gabbro | Anortho-<br>site |
| Additional Data                |                       |                       |                       |                       |                    |                       |                       |                  |                  |                  |
| Age                            | Archaean              | Archaean              | Archaean              | Archaean              | Archaean           | Archaean              | Archaean              | Archaean         | Archaean         | Archaean         |
| Bibliog. ref.                  | 5,13                  | 5,13                  | 5,13                  | 5,13                  | 5,13               | 5,13                  | 5,13                  | 5                | 5                | 5                |
| SiO <sub>2</sub>               | 44.00                 | 41.30                 | 47.90                 | 47.30                 | 52.40              | 46.90                 | 44.10                 | 47.40            | 50.00            | 50.80            |
| TiO <sub>2</sub>               | 1.26                  | 1.54                  | 1.12                  | 0.19                  | 0.25               | 0.12                  | 0.51                  | 0.04             | 1.03             | 0.43             |
| Al <sub>2</sub> O <sub>3</sub> | 13.60                 | 13.47                 | 14.10                 | 3.58                  | 3.66               | 4.76                  | 5.14                  | 26.85            | 19.55            | 25.10            |
| Fe <sub>2</sub> O <sub>3</sub> | 2.56                  | 5.89                  | 2.94                  | 3.16                  | 3.42               | 2.04                  | 4.01                  | 0.72             | 3.62             | 2.62             |
| FeO                            | 14.40                 | 13.60                 | 11.63                 | 6.13                  | 11.22              | 6.68                  | 10.81                 | 3.00             | 5.59             | 2.68             |
| MnO                            | 0.30                  | 0.24                  | 0.29                  | 0.16                  | 0.18               | 0.16                  | 0.23                  | 0.10             | 0.13             | 0.06             |
| MgO                            | 9.37                  | 9.84                  | 7.66                  | 34.50                 | 26.90              | 31.90                 | 29.00                 | 6.51             | 5.74             | 2.54             |
| CaO                            | 12.82                 | 12.20                 | 11.23                 | 3.95                  | 0.70               | 5.28                  | 4.44                  | 13.74            | 11.37            | 11.81            |
| Na <sub>2</sub> O              | 0.65                  | 1.33                  | 2.31                  | 0.16                  | 0.04               | 0.32                  | 0.16                  | 1.19             | 2.79             | 3.15             |
| K <sub>2</sub> O               | 0.04                  | 0.40                  | 0.05                  | 0.02                  | 0.02               | 0.20                  | 0.11                  | 0.12             | 0.15             | 0.58             |
| P <sub>2</sub> O <sub>5</sub>  | 0.32                  | 0.17                  | 0.16                  | 0.01                  | 0.01               | 0.01                  | 0.05                  | 0.01             | 0.19             | 0.02             |
| H <sub>2</sub> O <sup>+</sup>  | 0.25                  | 0.51                  | 0.37                  | 0.54                  | 0.16               | 0.48                  | 0.75                  | 0.15             | 0.18             | 0.26             |
| H <sub>2</sub> O <sup>-</sup>  | 0.08                  | 0.03                  | 0.07                  | 0.04                  | 0.09               | 0.08                  | 0.10                  | 0.03             | 0.08             | 0.06             |
| CO <sub>2</sub>                |                       |                       |                       |                       |                    |                       |                       |                  |                  |                  |
| Rest                           | 0.12                  | 0.16                  | 0.13                  | 0.66                  | 0.66               | 0.69                  | 0.96                  | 0.04             | 0.14             | 0.25             |
| TOTAL                          | 99.77                 | 100.68                | 99.96                 | 100.40                | 99.70              | 99.62                 | 100.37                | 99.90            | 100.56           | 100.36           |
| Ba                             | 23                    | 46                    | 22                    | 16                    | 26                 | 42                    | 59                    | 68               | 56               | 186              |
| Rb                             | <1                    | <1                    | 1                     | <1                    | 1                  | 5                     | 3                     | 4                | <1               | 8                |
| Sr                             | 46                    | 32                    | 112                   | 16                    | 2                  | 23                    | 58                    | 52               | 206              | 215              |
| Pb                             | <1                    | <1                    | <1                    | <1                    | <1                 | <1                    | <1                    | 3                | 4                | 11               |
| Th                             | <1                    | 1                     | 1                     | <1                    | <1                 | <1                    | 4                     | 1                | <1               | <1               |
| U                              | <1                    | <1                    | <1                    | <1                    | <1                 | <1                    | 1                     | <1               | <1               | <1               |
| Zr                             | 108                   | 164                   | 77                    | 10                    | 28                 | 12                    | 52                    | 6                | 124              | 26               |
| Nb                             | 6                     | 9                     | 3                     | <1                    | <1                 | 2                     | 3                     | 1                | 5                | 1                |
| Y                              | 37                    | 42                    | 31                    | 6                     | 28                 | 5                     | 11                    | 3                | 29               | 14               |
| La                             | 12                    | 18                    | 6                     | <2                    | 2                  | 3                     | 9                     | 7                | 9                | 7                |
| Ce                             | 18                    | 41                    | 11                    | <3                    | <3                 | <3                    | <3                    | 10               | 17               | 10               |
| Nd                             |                       |                       |                       |                       |                    |                       |                       |                  |                  |                  |
| Sn                             | 3                     | 1                     | <1                    | <1                    | <1                 | <1                    | 12                    | 1                | 3                | 1                |
| V                              | 267                   | 423                   | 239                   | 96                    | 115                | 87                    | 128                   | 38               | 202              | 166              |
| Cr                             | 56                    | 68                    | 158                   | 2900                  | 3670               | 3230                  | 4590                  | 28               | 123              | 969              |
| Ni                             | 74                    | 76                    | 91                    | 1670                  | 576                | 1470                  | 1730                  | 53               | 84               | 63               |
| Cu                             | 29                    | 17                    | 58                    | 22                    | 8                  | 2                     | 128                   | 3                | 44               | 16               |
| Zn                             | 134                   | 129                   | 111                   | 24                    | 133                | 17                    | 34                    | 24               | 66               | 36               |
| Ga                             | 19                    | 20                    | 17                    | 4                     | 13                 | 4                     | 7                     | 13               | 22               | 22               |

Napier Complex Ultramafic Granulites

|                                |            |            |
|--------------------------------|------------|------------|
| Sample Number                  | R25664     | R25839A    |
| Area                           | Enderby    | Enderby    |
|                                | Land       | Land       |
| Locality                       | McIntyre   | Hydrogra-  |
|                                | Island     | pher Is.   |
| Rock type                      | Peridotite | Pyroxenite |
|                                | gneiss     | gneiss     |
| Additional Data                |            |            |
| Age                            | Archaean   | Archaean   |
| Bibliog. ref.                  | 23         | 23         |
| SiO <sub>2</sub>               | 40.75      | 51.22      |
| TiO <sub>2</sub>               | 1.07       | 0.26       |
| Al <sub>2</sub> O <sub>3</sub> | 4.70       | 2.06       |
| Fe <sub>2</sub> O <sub>3</sub> | 18.47      | 13.59      |
| FeO                            |            |            |
| MnO                            | 0.18       | <0.01      |
| MgO                            | 27.02      | 18.77      |
| CaO                            | 3.69       | 12.17      |
| Na <sub>2</sub> O              | 0.44       | 0.51       |
| K <sub>2</sub> O               | 1.33       | 0.21       |
| P <sub>2</sub> O <sub>5</sub>  | 0.27       | 0.03       |
| H <sub>2</sub> O+              |            |            |
| H <sub>2</sub> O-              |            |            |
| CO <sub>2</sub>                |            |            |
| Rest                           | 0.77       | 0.35       |
| TOTAL                          | 98.69      | 99.16      |
| Ba                             | 103        | 61         |
| Rb                             | 56         | 12         |
| Sr                             | 29         | 58         |
| Pb                             |            |            |
| Th                             |            |            |
| U                              |            |            |
| Zr                             | 150        | 35         |
| Nb                             |            |            |
| Y                              |            | 15         |
| La                             |            |            |
| Ce                             | 86         | 49         |
| Nd                             | 41         | 32         |
| Sn                             |            |            |
| V                              | 154        | 7          |
| Cr                             | 4589       | 2129       |
| Ni                             |            |            |
| Cu                             |            |            |
| Zn                             | 137        | 80         |
| Ga                             |            |            |

## Napier Complex Metasediments

| Sample Number                  | 77283997 | 77284158A | 77284158B | 77284215   | 77284493 | 76283265 | 76283350A | 76283350B | 76283355  | 76283362  |
|--------------------------------|----------|-----------|-----------|------------|----------|----------|-----------|-----------|-----------|-----------|
| Area                           | Enderby  | Kemp      | Kemp      | Enderby    | Enderby  | Enderby  | Enderby   | Enderby   | Enderby   | Enderby   |
| Locality                       | Land     | Land      | Land      | Land       | Land     | Land     | Land      | Land      | Land      | Land      |
|                                | Mount    | Wallis    | Wallis    | Mount      | Thorp    | Ntk 945  | Ntk 945   | Ntk 945   | Ntk 945   | Ntk 945   |
| Rock type                      | Maines   | Ntk       | Ntk       | Codrington | Ridges   |          |           |           |           |           |
|                                | Op-cd    | Si-cd-gt  | Cd-gt-si  | Op-cd      | Bi-gt-cd | Sp-gt    | Sa-gt-os  | Gt-os     | Bi-gt-op- | Si-gt-sa- |
|                                | pelite   | pelite    | pelite    | pelite     | pelite   | pelite   | pelite    | pelite    | os pelite | os pelite |
| Additional Data                |          |           |           |            |          |          |           |           |           |           |
| Age                            | Archaean | Archaean  | Archaean  | Archaean   | Archaean | Archaean | Archaean  | Archaean  | Archaean  | Archaean  |
| Bibliog. ref.                  | 3,5      | 3,5       | 3,5       | 3,5        | 3,5      | 3,4,5    | 3,4,5     | 3,4,5     | 3,4,5     | 3,4,5     |
| SiO <sub>2</sub>               | 76.10    | 55.10     | 69.30     | 71.10      | 73.00    | 32.00    | 47.50     | 68.80     | 49.90     | 67.10     |
| TiO <sub>2</sub>               | 1.19     | 1.64      | 0.82      | 0.97       | 0.15     | 0.88     | 1.26      | 0.68      | 0.62      | 0.74      |
| Al <sub>2</sub> O <sub>3</sub> | 11.17    | 23.44     | 18.52     | 10.65      | 12.39    | 38.70    | 31.70     | 17.22     | 14.97     | 20.80     |
| Fe <sub>2</sub> O <sub>3</sub> | 0.39     | 1.53      | 1.11      | 0.59       | 0.65     | 6.44     | 2.21      | 0.80      | 1.67      | 1.06      |
| FeO                            | 2.75     | 6.20      | 2.70      | 5.60       | 2.30     | 9.90     | 5.95      | 4.48      | 12.50     | 2.26      |
| MnO                            | 0.05     | 0.10      | 0.04      | 0.02       | 0.03     | 0.19     | 0.06      | 0.06      | 0.29      | 0.04      |
| MgO                            | 5.97     | 5.42      | 2.00      | 4.79       | 2.24     | 6.93     | 9.21      | 5.77      | 17.40     | 5.84      |
| CaO                            | 0.37     | 1.75      | 2.00      | 0.73       | 0.58     | 0.46     | 0.02      | 0.02      | 0.23      | <1.00     |
| Na <sub>2</sub> O              | 0.31     | 1.15      | 1.30      | 2.49       | 1.80     | 0.39     | 0.12      | 0.11      | 0.03      | 0.12      |
| K <sub>2</sub> O               | 0.98     | 0.74      | 0.94      | 1.63       | 4.96     | 2.16     | 1.10      | 1.04      | 0.72      | 1.02      |
| P <sub>2</sub> O <sub>5</sub>  | 0.20     | 0.01      | 0.01      | 0.05       | 0.01     | <0.01    | 0.01      | 0.01      | 0.01      | <0.01     |
| H <sub>2</sub> O+              | 0.68     | 0.59      | 0.49      | 0.46       | 0.37     | 0.87     | 0.65      | 0.77      | 0.52      | 0.54      |
| H <sub>2</sub> O-              | 0.06     | 0.19      | 0.21      | 0.04       | 0.14     | 0.03     | 0.03      | 0.07      | 0.10      | 0.09      |
| CO <sub>2</sub>                |          |           |           |            |          | 0.06     | 0.05      | 0.04      | 0.06      | 0.06      |
| Rest                           | 0.15     | 0.21      | 0.14      | 0.21       | 0.1      | 0.53     | 0.32      | 0.17      | 0.45      | 0.19      |
| TOTAL                          | 100.37   | 98.07     | 99.58     | 99.33      | 98.73    | 99.53    | 100.19    | 100.04    | 99.47     | 98.85     |
| Ba                             | 276      | 206       | 205       | 782        | 417      | 426      | 84        | 80        | 38        | 76        |
| Rb                             | 33       | 41        | 29        | 23         | 141      | 25       | 52        | 60        | 53        | 42        |
| Sr                             | 3        | 68        | 89        | 57         | 33       | 94       | 10        | 12        | 5         | 11        |
| Pb                             | 2        | 13        | 17        | 9          | 26       | 8        | <1        | <1        | 1         | 2         |
| Th                             | 20       | 14        | 8         | 28         | 22       | 1        | 2         | 1         | 2         | 4         |
| U                              | 3        | 3         | 2         | 4          | 2        | <1       | <1        | <1        | <1        | 1         |
| Zr                             | 471      | 210       | 188       | 418        | 97       | 77       | 435       | 327       | 99        | 340       |
| Nb                             | 20       | 22        | 14        | 17         | 8        | 8        | 85        | 35        | 8         | 17        |
| Y                              | 77       | 49        | 36        | 71         | 17       | 63       | 52        | 34        | 18        | 18        |
| La                             | 36       | 47        | 48        | 79         | 39       | 5        | 4         | 2         | 5         | 10        |
| Ce                             | 65       | 80        | 82        | 124        | 65       | <3       | 7         | <3        | <3        | 18        |
| Nd                             |          |           |           |            |          |          |           |           |           |           |
| Sn                             | 3        | <1        | <1        | 1          | <1       | <1       | <1        | <1        | <1        | <1        |
| V                              | 95       | 284       | 140       | 53         | 7        | 438      | 243       | 114       | 211       | 98        |
| Cr                             | <3       | 236       | 87        | 3          | 4        | 1620     | 1020      | 463       | 2020      | 495       |
| Ni                             | 5        | 45        | 31        | 3          | 7        | 706      | 183       | 70        | 466       | 151       |
| Cu                             | 3        | 42        | 35        | 3          | 3        | 88       | 6         | 4         | 4         | 8         |
| Zn                             | 36       | 132       | 33        | 9          | 20       | 146      | 25        | 19        | 189       | 18        |
| Ga                             | 20       | 28        | 24        | 16         | 18       | 67       | 47        | 21        | 24        | 26        |



Napier Complex Metasediments

| Sample Number                  | 76283364 | 76283368A | 77283450 | 77284249  | 77284347 | 77284348 | 77284633 | 77283971 | 77283469 | 77283946  |
|--------------------------------|----------|-----------|----------|-----------|----------|----------|----------|----------|----------|-----------|
| Area                           | Enderby  | Enderby   | Enderby  | Enderby   | Enderby  | Enderby  | Enderby  | Enderby  | Enderby  | Enderby   |
| Locality                       | Land     | Land      | Land     | Land      | Land     | Land     | Land     | Land     | Land     | Land      |
|                                | Ntk 945  | Ntk 945   | Ntk ENE  | Mount     | Gage     | Gage     | Mount    | Mount    | Mount    | Priestley |
|                                |          |           | of 945   | Dungey    | Ridge    | Ridge    | Hardy    | Charles  | Sones    | Peak      |
| Rock type                      | Gt-op    | Sa-gt-os  | Sp-gt    | Sa-bi-op- | Sa-gt-os | Gt-os-si | Op-sa-cd | Gt-si-op | Gt-si    | Gt-si     |
|                                | pelite   | pelite    | pelite   | os pelite | pelite   | pelite   | pelite   | pelite   | pelite   | pelite    |
| Additional Data                |          |           |          |           |          |          |          |          |          |           |
| Age                            | Archaean | Archaean  | Archaean | Archaean  | Archaean | Archaean | Archaean | Archaean | Archaean | Archaean  |
| Bibliog. ref.                  | 3,4,5    | 3,4,5     | 3,4,5    | 3,4,5     | 3,4,5    | 3,4,5    | 3,4,5    | 3,5      | 3,5      | 3,5       |
| SiO <sub>2</sub>               | 45.40    | 50.60     | 56.20    | 73.40     | 88.00    | 71.40    | 68.20    | 73.20    | 62.80    | 62.60     |
| TiO <sub>2</sub>               | 1.23     | 1.24      | 1.01     | 0.72      | 0.46     | 0.35     | 0.94     | 0.55     | 0.80     | 1.05      |
| Al <sub>2</sub> O <sub>3</sub> | 23.30    | 28.00     | 23.30    | 11.42     | 7.19     | 15.10    | 13.09    | 13.41    | 21.81    | 23.66     |
| Fe <sub>2</sub> O <sub>3</sub> | 1.44     | 2.40      | 1.22     | 0.12      | 0.39     | 0.46     | 1.08     | 0.61     | 0.44     | 0.74      |
| FeO                            | 9.80     | 5.95      | 3.33     | 1.75      | 1.50     | 5.45     | 5.55     | 2.97     | 6.02     | 5.73      |
| MnO                            | 0.25     | 0.07      | 0.05     | 0.01      | 0.02     | 0.08     | 0.03     | 0.01     | 0.05     | 0.05      |
| MgO                            | 9.56     | 8.63      | 2.18     | 4.55      | 2.45     | 3.86     | 10.57    | 5.42     | 4.21     | 2.89      |
| CaO                            | 5.30     | 0.05      | 2.77     | 0.70      | 0.04     | 0.11     | 0.06     | 0.39     | 0.40     | 0.33      |
| Na <sub>2</sub> O              | 2.09     | 0.10      | 4.80     | 2.34      | 0.05     | 0.22     | 0.07     | 0.78     | 0.82     | 0.44      |
| K <sub>2</sub> O               | 0.53     | 0.90      | 4.74     | 2.20      | 0.30     | 1.68     | 0.01     | 2.76     | 2.53     | 1.74      |
| P <sub>2</sub> O <sub>5</sub>  | 0.13     | <0.01     | 0.06     | 0.02      | 0.07     | 0.04     | 0.02     | 0.03     | 0.02     | 0.02      |
| H <sub>2</sub> O+              | 0.67     |           | 0.25     | 0.62      | 0.34     | 0.26     | 0.63     | 0.42     | 0.31     | 0.34      |
| H <sub>2</sub> O-              | 0.03     |           | 0.07     | 0.13      | 0.12     | 0.14     | 0.12     | 0.05     | 0.06     | 0.13      |
| CO <sub>2</sub>                | 0.06     |           | 0.02     | 0.03      | 0.01     | 0.02     | 0.03     | 0.01     |          |           |
| Rest                           | 0.28     | 0.29      | 0.24     | 0.28      | 0.14     | 0.14     | 0.04     | 0.11     | 0.30     | 0.27      |
| TOTAL                          | 100.07   | 98.22     | 100.24   | 98.29     | 101.08   | 99.31    | 100.44   | 100.72   | 100.57   | 99.99     |
| Ba                             | 98       | 57        | 1170     | 1880      | 62       | 291      | 8        | 344      | 721      | 490       |
| Rb                             | 13       | 39        | 82       | 51        | 14       | 43       | <1       | 89       | 72       | 49        |
| Sr                             | 111      | 10        | 123      | 37        | 3        | 19       | 1        | 14       | 51       | 110       |
| Pb                             | 11       | 1         | 48       | 1         | 1        | 3        | <1       | 7        | 7        | 11        |
| Th                             | 22       | 2         | 9        | <1        | 12       | <1       | 13       | 38       | 4        | 4         |
| U                              | 3        | <1        | 2        | <1        | 2        | 1        | 1        | 2        | <1       | 2         |
| Zr                             | 267      | 512       | 230      | 355       | 671      | 299      | 171      | 201      | 221      | 244       |
| Nb                             | 17       | 40        | 17       | 7         | 11       | 6        | 19       | 7        | 19       | 16        |
| Y                              | 60       | 50        | 30       | 1         | 29       | 35       | 21       | 41       | 45       | 20        |
| La                             | 71       | <2        | 59       | 4         | 29       | 6        | 23       | 46       | 36       | 41        |
| Ce                             | 122      | 4         | 95       | 4         | 52       | 7        | 38       | 72       | 40       | 59        |
| Nd                             |          |           |          |           |          |          |          |          |          |           |
| Sn                             | <1       | <1        | 3        | 4         | <1       | 1        | <1       | 4        | <1       | <1        |
| V                              | 198      | 177       |          |           |          |          |          |          | 152      | 188       |
| Cr                             | 862      | 908       | 112      | 10        | 134      | 171      | 4        | 6        | 706      | 596       |
| Ni                             | 57       | 168       | 19       | 36        | 38       | 81       | 3        | 17       | 122      | 64        |
| Cu                             | 5        | 4         | 3        | 2         | 3        | 27       | 3        | <2       | 43       | 67        |
| Zn                             | 45       | 21        | 13       | 22        | 7        | 24       | 14       | 39       | 29       | 36        |
| Ga                             | 23       | 44        |          |           |          |          |          |          | 26       | 31        |

Napier Complex Metasediments

| Sample Number                  | 77284125        | 79285058           | 82285081           | 77284338           | 77284340            | 77284343A             | 77284343B             | R31169             | 8020.159            | R31136              |
|--------------------------------|-----------------|--------------------|--------------------|--------------------|---------------------|-----------------------|-----------------------|--------------------|---------------------|---------------------|
| Area                           | Enderby<br>Land | Enderby<br>Land    | Enderby<br>Land    | Enderby<br>Land    | Enderby<br>Land     | Enderby<br>Land       | Enderby<br>Land       | Enderby<br>Land    | Enderby<br>Land     | Enderby<br>Land     |
| Locality                       | Brusilov<br>Ntk | Mount<br>Bartlett  | Gage<br>Ridge      | Gage<br>Ridge      | Gage<br>Ridge       | Gage<br>Ridge         | Gage<br>Ridge         | Fyfe<br>Hills      | Khmara<br>Bay       | Fyfe<br>Hills       |
| Rock type                      | Os<br>pelite    | Sa-op-os<br>pelite | Gt-si-sp<br>pelite | Sa-op<br>granulite | Sa-phl<br>granulite | Cd-sa-op<br>granulite | Cd-sa-op<br>granulite | Sa-op<br>granulite | Calc-sil.<br>gneiss | Calc-sil.<br>gneiss |
| Additional Data                |                 |                    |                    |                    |                     |                       |                       |                    |                     |                     |
| Age                            | Archaean        | Archaean           | Archaean           | Archaean           | Archaean            | Archaean              | Archaean              | Archaean           | Archaean            | Archaean            |
| Bibliog. ref.                  | 3,4,5           | 3,4,5              | 3,5                | 5,21               | 5,21                | 5,21                  | 5,21                  | 23                 | 23                  | 23                  |
| SiO <sub>2</sub>               | 77.00           | 58.40              | 77.70              | 37.00              | 36.20               | 39.40                 | 36.40                 | 40.67              | 53.33               | 46.89               |
| TiO <sub>2</sub>               | 0.05            | 0.65               | 0.01               | 0.73               | 0.12                | 0.27                  | 0.46                  | 0.39               | 0.29                | 1.01                |
| Al <sub>2</sub> O <sub>3</sub> | 13.38           | 20.50              | 13.33              | 32.20              | 26.70               | 31.20                 | 31.70                 | 23.14              | 10.43               | 12.76               |
| Fe <sub>2</sub> O <sub>3</sub> | 0.39            | 1.22               | <0.05              | 0.21               | 1.04                | 0.19                  | 2.06                  | 3.74               | 7.26                | 12.52               |
| FeO                            | 1.24            | 3.35               | 0.61               | 0.36               | 0.79                | 0.47                  | 4.70                  |                    |                     |                     |
| MnO                            | 0.01            | 0.08               | 0.02               | 0.01               | 0.03                | 0.02                  | 0.12                  | <0.01              | 0.04                | 0.95                |
| MgO                            | 0.01            | 0.08               | 0.02               | 0.01               | 0.03                | 0.02                  | 0.12                  | <0.01              | 0.04                | 0.95                |
| MgO                            | 3.53            | 11.09              | 0.06               | 27.90              | 24.60               | 25.50                 | 20.20                 | 28.43              | 4.36                | 5.23                |
| CaO                            | 0.24            | 0.22               | 0.67               | 0.13               | 0.06                | 0.07                  | 0.78                  | 1.62               | 18.35               | 19.78               |
| Na <sub>2</sub> O              | 0.91            | 1.79               | 3.98               | 0.09               | 0.27                | 0.15                  | 0.92                  | 0.15               | 0.94                | 1.39                |
| K <sub>2</sub> O               | 2.61            | 3.01               | 4.44               | 0.68               | 6.80                | 0.64                  | 0.16                  | 0.63               | 0.60                | 0.18                |
| P <sub>2</sub> O <sub>5</sub>  | 0.03            | 0.05               | 0.07               | 0.04               | 0.03                | 0.02                  | 0.03                  | 0.13               | 0.03                | 0.16                |
| H <sub>2</sub> O+              | 0.40            | 0.23               |                    | 0.54               | 1.18                | 0.68                  | 0.50                  |                    |                     |                     |
| H <sub>2</sub> O-              | 0.09            | 0.05               |                    | 0.02               | 0.09                | 0.07                  | 0.09                  |                    |                     |                     |
| CO <sub>2</sub>                |                 |                    |                    |                    |                     |                       |                       |                    |                     |                     |
| Rest                           | 0.09            | 0.29               | 0.04               | 0.17               | 0.16                | 0.09                  | 0.13                  | 0.26               | 0.15                | 0.16                |
| TOTAL                          | 99.97           | 100.93             | 100.88             | 100.08             | 98.07               | 98.77                 | 98.25                 | 99.15              | 95.78               | 101.03              |
| Ba                             | 434             | 1160               | 110                | 27                 | 507                 | 10                    | 133                   | 18                 | 610                 | 136                 |
| Rb                             | 88              | 89                 | 105                | 35                 | 530                 | 49                    | 5                     | 38                 | 17                  | 9                   |
| Sr                             | 21              | 60                 | 16                 | 5                  | 13                  | 2                     | 29                    | 59                 | 58                  | 271                 |
| Pb                             | 10              | 9                  | 18                 | 26                 | 7                   | 9                     | 15                    |                    |                     |                     |
| Th                             | 7               | 20                 | <1                 | 240                | 23                  | 84                    | 101                   |                    |                     |                     |
| U                              | <1              | <1                 | 1                  | 8                  | 1                   | 3                     | 3                     |                    |                     |                     |
| Zr                             | 82              | 563                | 25                 | 732                | 103                 | 250                   | 281                   | 479                | 30                  | 125                 |
| Nb                             | 1               | 15                 | <1                 | 44                 | 10                  | 11                    | 26                    |                    | 11                  |                     |
| Y                              | 6               | 5                  | 4                  | 10                 | 38                  | 5                     | 14                    | 105                | 7                   | 30                  |
| La                             | 15              | 134                | 14                 | 38                 | 22                  | 47                    | 73                    |                    |                     |                     |
| Ce                             | 23              | 208                | 19                 | 73                 | 37                  | 82                    | 127                   | 897                | 40                  | 116                 |
| Nd                             |                 |                    | 5                  |                    |                     |                       |                       | 301                | 15                  | 39                  |
| Sn                             | 1               | 2                  |                    | 1                  | 4                   | 1                     | 1                     |                    |                     |                     |
| V                              | 2               | 22                 | <1                 | 50                 | 32                  | 32                    | 61                    | 131                | 40                  | 200                 |
| Cr                             | 5               | 12                 | <3                 | 7                  | 4                   | 6                     | 14                    | 15                 | 174                 | 199                 |
| Ni                             | <2              | 8                  | 4                  | 22                 | 45                  | 21                    | 31                    |                    | 116                 |                     |
| Cu                             | 3               | 5                  | 3                  | 7                  | 4                   | 41                    | 12                    |                    | 27                  |                     |
| Zn                             | 23              | 108                | 10                 | 3                  | 13                  | 5                     | 49                    | 20                 | 70                  | 85                  |
| Ga                             | 18              | 23                 | 16                 | 9                  | 11                  | 8                     | 19                    |                    | 18                  |                     |

Napier Complex Metasediments

|                                |            |           |           |
|--------------------------------|------------|-----------|-----------|
| Sample Number                  | 8020.122   | 8020.31   | 8020.292  |
| Area                           | Enderby    | Enderby   | Enderby   |
|                                | Land       | Land      | land      |
| Locality                       | Fyfe       | Khmara    | Khmara    |
|                                | Hills      | Bay       | Bay       |
| Rock type                      | Mn-Ba meta | Meta-     | Meta-     |
|                                | ironstone  | ironstone | ironstone |
| Additional Data                |            |           |           |
| Age                            | Archaean   | Archaean  | Archaean  |
| Bibliog. ref.                  | 23         | 23        | 23        |
| SiO <sub>2</sub>               | 32.02      | 42.45     | 53.51     |
| TiO <sub>2</sub>               | 0.76       | 0.34      | 0.02      |
| Al <sub>2</sub> O <sub>3</sub> | 6.91       | 0.61      | 0.15      |
| Fe <sub>2</sub> O <sub>3</sub> | 31.54      | 49.15     | 43.77     |
| FeO                            |            |           |           |
| MnO                            | 16.87      | 0.07      | 0.09      |
| MgO                            | 3.13       | 1.94      | 2.28      |
| CaO                            | 9.10       | 1.26      | 0.61      |
| Na <sub>2</sub> O              | 0.27       | 0.15      | 0.10      |
| K <sub>2</sub> O               | 0.03       | 0.01      | 0.01      |
| P <sub>2</sub> O <sub>5</sub>  | 0.09       | 0.04      | 0.11      |
| H <sub>2</sub> O+              |            |           |           |
| H <sub>2</sub> O-              |            |           |           |
| CO <sub>2</sub>                |            |           |           |
| Rest                           | 0.45       | 0.22      | 0.01      |
| TOTAL                          | 101.17     | 96.24     | 100.66    |
| Ba                             | 2564       | 10        | 11        |
| Rb                             | 30         | 20        | 14        |
| Sr                             | 71         | 31        | 14        |
| Pb                             |            |           |           |
| Th                             |            |           |           |
| U                              |            |           |           |
| Zr                             | 51         | 19        | 7         |
| Nb                             |            |           |           |
| Y                              | 39         | 14        | 9         |
| La                             |            |           |           |
| Ce                             | 89         | 4         | <3        |
| Nd                             | 47         | 1         | <1        |
| Sn                             |            |           |           |
| V                              | 172        | 13        | <1        |
| Cr                             | 249        | <3        | <3        |
| Ni                             | 148        | 3         | <2        |
| Cu                             | 78         |           |           |
| Zn                             | 90         | 1607      | 34        |
| Ga                             | 40         | 12        | 6         |

Napier Complex Granitic Intrusives

| Sample Number                  | 77284527           | 77284286           | 77284284           | 77284376               | 77283978         | 77284574          | 77284575          | 77284106         | 77284108         | 80285032         |
|--------------------------------|--------------------|--------------------|--------------------|------------------------|------------------|-------------------|-------------------|------------------|------------------|------------------|
| Area                           | Enderby<br>Land    | Enderby<br>Land    | Enderby<br>Land    | Enderby<br>Land        | Enderby<br>Land  | Enderby<br>Land   | Enderby<br>Land   | Enderby<br>Land  | Enderby<br>Land  | Enderby<br>Land  |
| Locality                       | Wilkinson<br>Peaks | Wilkinson<br>Peaks | Wilkinson<br>Peaks | Zubchatyy<br>Ice Shelf | Mount<br>Bennett | Armstrong<br>Peak | Armstrong<br>Peak | Simmers<br>Peaks | Simmers<br>Peaks | Simmers<br>Peaks |
| Rock type                      | Op tonal<br>gneiss | Gt-op<br>tonalite  | Op-pl<br>xenolith  | Op<br>granite          | Gt<br>granite    | Bi-op<br>granite  | Bi<br>granite     | Bi<br>granite    | Bi<br>granite    | Bi<br>granite    |
| Map Sheet                      |                    |                    |                    |                        |                  |                   |                   |                  |                  |                  |
| Age                            | Archaean           | Archaean           | Archaean           | Archaean               | ?Archaean        | Archaean          | Archaean          | Archaean         | Archaean         | Archaean         |
| Bibliog. ref.                  | 5,6                | 5,6                | 5,6                | 5,6                    | 5,6              | 5,6,22            | 5,6,22            | 5,6,22           | 5,6,22           | 5,6,22           |
| SiO <sub>2</sub>               | 57.40              | 63.70              | 50.00              | 73.20                  | 76.20            | 66.20             | 71.20             | 68.60            | 69.70            | 69.30            |
| TiO <sub>2</sub>               | 0.26               | 0.71               | 0.84               | 0.14                   | 0.01             | 0.74              | 0.63              | 0.77             | 0.65             | 0.67             |
| Al <sub>2</sub> O <sub>3</sub> | 18.34              | 12.97              | 18.77              | 14.16                  | 13.20            | 15.86             | 13.68             | 13.52            | 14.01            | 13.49            |
| Fe <sub>2</sub> O <sub>3</sub> | 1.02               | 5.24               | 3.35               | 0.79                   | 0.18             | 1.33              | 0.81              | 1.47             | 1.13             | 1.14             |
| FeO                            | 6.36               | 5.90               | 7.52               | 0.60                   | 0.35             | 3.33              | 2.65              | 3.23             | 2.76             | 2.86             |
| MnO                            | 0.08               | 0.16               | 0.10               | 0.01                   | 0.03             | 0.05              | 0.02              | 0.04             | 0.04             | 0.03             |
| MgO                            | 5.62               | 4.94               | 6.75               | 0.28                   | 0.10             | 1.06              | 0.60              | 0.70             | 0.70             | 0.77             |
| CaO                            | 7.68               | 3.73               | 7.88               | 1.40                   | 0.54             | 2.05              | 1.48              | 1.81             | 1.70             | 1.68             |
| Na <sub>2</sub> O              | 2.33               | 1.48               | 2.36               | 3.55                   | 4.36             | 3.12              | 2.76              | 2.58             | 2.67             | 2.59             |
| K <sub>2</sub> O               | 0.45               | 0.61               | 0.59               | 5.35                   | 4.65             | 6.28              | 6.00              | 5.45             | 5.67             | 5.50             |
| P <sub>2</sub> O <sub>5</sub>  | 0.42               |                    | 0.61               | 0.03                   | 0.03             | 0.12              | 0.20              | 0.32             | 0.29             | 0.27             |
| H <sub>2</sub> O+              | 0.40               | 0.76               | 0.83               | 0.29                   | 0.12             | 0.36              | 0.52              | 0.66             | 0.74             | 0.48             |
| H <sub>2</sub> O-              | 0.05               | 0.09               | 0.02               | 0.07                   | 0.07             | 0.06              | 0.05              | 0.04             | 0.10             | 0.04             |
| CO <sub>2</sub>                |                    |                    |                    |                        |                  |                   |                   |                  |                  | 0.24             |
| Rest                           | 0.14               | 0.21               | 0.18               | 0.19                   | 0.08             | 0.43              | 0.29              | 0.33             | 0.33             | 0.30             |
| TOTAL                          | 100.55             | 100.50             | 99.80              | 100.06                 | 99.92            | 100.99            | 100.89            | 99.52            | 100.49           | 99.36            |
| Ba                             | 209                | 359                | 275                | 960                    | 250              | 1470              | 764               | 912              | 960              | 828              |
| Rb                             | 3                  | 12                 | 7                  | 156                    | 188              | 141               | 218               | 259              | 239              | 233              |
| Sr                             | 256                | 109                | 260                | 151                    | 39               | 162               | 83                | 124              | 122              | 116              |
| Pb                             | 11                 | 5                  | 13                 | 64                     | 63               | 56                | 50                | 48               | 43               | 43               |
| Th                             | 4                  | <1                 | <1                 | 46                     | 7                | 228               | 120               | 110              | 138              | 111              |
| U                              | <1                 | 1                  | <1                 | 4                      | 4                | 5                 | 6                 | 3                | 2                | 3                |
| Zr                             | 4                  | 101                | 8                  | 115                    | 36               | 538               | 512               | 566              | 504              | 535              |
| Nb                             | 4                  | 8                  | 9                  | 1                      | <1               | 22                | 21                | 43               | 38               | 35               |
| Y                              | 42                 | 43                 | 27                 | <1                     | 29               | 25                | 28                | 43               | 38               | 36               |
| La                             | 34                 | 11                 | 35                 | 40                     | 12               | 302               | 181               | 168              | 202              | 168              |
| Ce                             | 61                 | 6                  | 61                 | 56                     | 21               | 536               | 329               | 295              | 358              | 292              |
| Nd                             |                    |                    |                    |                        |                  |                   |                   |                  |                  |                  |
| Sn                             | <1                 | 1                  | 1                  | <1                     | 1                | <1                | <1                | <1               | 2                | <1               |
| V                              | 110                | 180                | 220                | 8                      | 1                | 25                | 19                | 28               | 25               | 19               |
| Cr                             | 140                | 382                | 222                | 4                      | 4                | 9                 | 6                 | 11               | 11               | 12               |
| Ni                             | 44                 | 162                | 66                 | 2                      | 12               | 3                 | 2                 | 7                | 6                | 5                |
| Cu                             | 24                 | 102                | 21                 | 2                      | 2                | 7                 | 8                 | 15               | 11               | 10               |
| Zn                             | 96                 | 61                 | 116                | 22                     | 5                | 53                | 48                | 60               | 51               | 55               |
| Ga                             | 22                 | 13                 | 26                 | 16                     | 15               | 21                | 17                | 19               | 19               | 22               |

## Napier Complex Granitic Intrusives

| Sample Number                  | 77283796        | 82285033         | 77284684        | 77284685           | 77284686           | 77284756           | 77284687        | 77284754          |
|--------------------------------|-----------------|------------------|-----------------|--------------------|--------------------|--------------------|-----------------|-------------------|
| Area                           | Enderby<br>Land | Enderby<br>Land  | Enderby<br>Land | Enderby<br>Land    | Enderby<br>Land    | Enderby<br>Land    | Enderby<br>Land | Enderby<br>Land   |
| Locality                       | Mount<br>Bride  | Mount<br>Bride   | Felton<br>Head  | Felton<br>Head     | Felton<br>Head     | Waratah<br>Island  | Felton<br>Head  | Waratah<br>Island |
| Rock type                      | Bi<br>granite   | Bi-gt<br>granite | Gt-op<br>granod | Gt-hb-op<br>granod | Gt-hb-bi<br>granod | Cp-hb-op<br>granod | Bi<br>granite   | Bi<br>granite     |
| Additional Data                |                 |                  |                 |                    |                    |                    |                 |                   |
| Age                            | Archaean        | Archaean         | ?Protero        | ?Protero           | ?Protero           | ?Protero           | ?Protero        | ?Protero          |
| Bibliog. ref.                  | 5,6,22          | 5,6,22           | 5,6             | 5,6                | 5,6                | 5,6                | 5,6             | 5,6               |
| SiO <sub>2</sub>               | 72.60           | 73.00            | 56.50           | 55.40              | 57.20              | 60.00              | 77.50           | 70.00             |
| TiO <sub>2</sub>               | 0.27            | 0.01             | 1.92            | 2.04               | 1.88               | 1.89               | 0.63            | 0.16              |
| Al <sub>2</sub> O <sub>3</sub> | 13.70           | 13.69            | 14.78           | 14.26              | 14.04              | 13.58              | 11.30           | 13.95             |
| Fe <sub>2</sub> O <sub>3</sub> | 0.32            | 0.26             | 2.95            | 3.09               | 3.92               | 3.09               | 0.60            | 0.51              |
| FeO                            | 1.33            | 2.34             | 7.76            | 8.09               | 6.56               | 6.87               | 0.87            | 1.10              |
| MnO                            | 0.01            | 0.03             | 0.13            | 0.15               | 0.12               | 0.12               | 0.02            | 0.02              |
| MgO                            | 0.74            | 0.23             | 1.75            | 1.88               | 1.75               | 1.77               | 0.17            | 1.80              |
| CaO                            | 1.56            | 1.40             | 6.28            | 6.52               | 5.54               | 5.39               | 0.64            | 0.87              |
| Na <sub>2</sub> O              | 2.21            | 2.62             | 2.82            | 2.73               | 2.30               | 3.16               | 1.91            | 1.87              |
| K <sub>2</sub> O               | 5.96            | 5.39             | 2.89            | 2.66               | 3.15               | 2.67               | 6.15            | 7.96              |
| P <sub>2</sub> O <sub>5</sub>  | 0.11            | 0.07             | 1.18            | 1.30               | 1.18               | 0.80               | 0.07            | 0.04              |
| H <sub>2</sub> O+              | 0.84            | 0.49             | 0.35            | 0.34               | 0.90               | 0.50               | 0.28            | 1.18              |
| H <sub>2</sub> O-              | 0.08            | 0.04             | 0.01            | 0.09               | 0.11               | 0.05               | 0.07            | 0.02              |
| CO <sub>2</sub>                |                 | 0.27             |                 |                    |                    |                    |                 |                   |
| Rest                           | 0.24            | 0.16             | 0.46            | 0.47               | 0.44               | 0.46               | 0.43            | 0.15              |
| TOTAL                          | 99.97           | 100.00           | 99.78           | 99.02              | 99.09              | 100.35             | 100.64          | 99.63             |
| Ba                             | 988             | 648              | 1880            | 1820               | 1660               | 1340               | 3040            | 423               |
| Rb                             | 133             | 109              | 67              | 61                 | 70                 | 60                 | 138             | 216               |
| Sr                             | 150             | 148              | 418             | 409                | 361                | 327                | 332             | 212               |
| Pb                             | 66              | 60               | 20              | 18                 | 19                 | 19                 | 24              | 26                |
| Th                             | 70              | 29               | 2               | 5                  | 4                  | 9                  | <1              | 16                |
| U                              | 4               | 3                | <1              | 1                  | 1                  | 2                  | 1               | 3                 |
| Zr                             | 246             | 117              | 666             | 748                | 692                | 998                | 136             | 159               |
| Nb                             | 6               | <1               | 41              | 51                 | 46                 | 65                 | 16              | 13                |
| Y                              | 21              | 86               | 68              | 78                 | 73                 | 70                 | 1               | 11                |
| La                             | 96              | 50               | 142             | 158                | 145                | 200                | 16              | 48                |
| Ce                             | 164             | 85               | 263             | 289                | 260                | 374                | 17              | 71                |
| Nd                             |                 | 31               |                 |                    |                    |                    |                 |                   |
| Sn                             | <1              |                  | 2               | <1                 | 1                  | <1                 | <1              | 1                 |
| V                              | 21              | 4                | 69              | 71                 | 77                 | 74                 | 16              | 6                 |
| Cr                             | 11              | 3                | 13              | 14                 | 14                 | 15                 | 5               | 6                 |
| Ni                             | 8               | 2                | 9               | 11                 | 9                  | 7                  | 2               | 5                 |
| Cu                             | 4               | 3                | 19              | 32                 | 19                 | 19                 | 4               | 2                 |
| Zn                             | 16              | 7                | 129             | 135                | 136                | 126                | 21              | 25                |
| Ga                             | 12              | 12               | 21              | 21                 | 20                 | 20                 | 11              | 16                |



## Napier Complex Mafic Intrusives

| Sample Number                  | 76283244           | 73283250           | 76283259           | 76283276           | 77283924           | 77283927           | 77284363           | 77284827           | 77284828           | 77283504           |
|--------------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| Area                           | Enderby<br>Land    | Enderby<br>Land    | Enderby<br>Land    | Enderby<br>Land    | Enderby<br>Land    | Enderby<br>Land    | Enderby<br>Land    | Enderby<br>Land    | Enderby<br>Land    | Enderby<br>Land    |
| Locality                       | Mount<br>McGhee    | Burch<br>Peaks     | Ntk 945            | Mount<br>Jewell    | Tonagh<br>Island   | Tonagh<br>Island   | Mount<br>Renouard  | Mount<br>Pardoe    | Mount<br>Pardoe    | Mount<br>McLennan  |
| Rock type                      | Pyroxenite<br>dyke | Pyroxenite<br>dyke | Pyroxenite<br>dyke | Pyroxenite<br>dyke | Meta-<br>tholeiite | Meta-<br>tholeiite | Meta-<br>tholeiite | Meta-<br>tholeiite | Meta-<br>tholeiite | Meta-<br>tholeiite |
| Additional Data                |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |
| Age                            | Archaean           | Archaean           | Archaean           | Archaean           | Protero            | Protero            | Protero            | Protero            | Protero            | Protero            |
| Bibliog. ref.                  | 5                  | 5                  | 5                  | 5                  | 5,9                | 5,9                | 5,9                | 5,9                | 5,9                | 5,9                |
| SiO <sub>2</sub>               | 48.40              | 51.70              | 48.90              | 50.90              | 52.00              | 52.00              | 50.40              | 50.10              | 50.80              | 51.70              |
| TiO <sub>2</sub>               | 1.12               | 0.50               | 1.05               | 0.54               | 1.35               | 1.26               | 1.32               | 2.02               | 0.93               | 1.14               |
| Al <sub>2</sub> O <sub>3</sub> | 4.78               | 4.37               | 5.97               | 2.94               | 13.07              | 13.31              | 13.46              | 12.82              | 13.53              | 14.08              |
| Fe <sub>2</sub> O <sub>3</sub> | 5.19               | 2.05               | 3.31               | 4.41               | 4.42               | 4.68               | 3.19               | 8.67               | 2.67               | 3.30               |
| FeO                            | 11.80              | 11.53              | 14.14              | 11.33              | 9.74               | 9.04               | 10.05              | 7.92               | 9.21               | 9.87               |
| MnO                            | 0.25               | 0.25               | 0.32               | 0.28               | 0.22               | 0.21               | 0.22               | 0.25               | 0.20               | 0.20               |
| MgO                            | 16.74              | 16.09              | 16.01              | 20.13              | 5.23               | 5.96               | 6.17               | 5.10               | 7.54               | 6.08               |
| CaO                            | 7.84               | 10.05              | 8.08               | 7.58               | 9.40               | 10.05              | 10.46              | 9.65               | 11.83              | 10.11              |
| Na <sub>2</sub> O              | 0.51               | 0.96               | 0.48               | 0.51               | 2.80               | 2.58               | 2.41               | 2.65               | 2.24               | 2.49               |
| K <sub>2</sub> O               | 1.46               | 0.71               | 0.12               | 0.39               | 0.67               | 0.68               | 0.60               | 0.75               | 0.40               | 0.67               |
| P <sub>2</sub> O <sub>5</sub>  | 0.05               | 0.02               | 0.11               | 0.01               | 0.25               | 0.21               | 0.12               | 0.23               | 0.11               | 0.13               |
| H <sub>2</sub> O+              |                    |                    |                    |                    | 0.67               | 0.34               | 0.31               | 0.18               | 0.30               | 0.19               |
| H <sub>2</sub> O-              |                    |                    |                    |                    | 0.03               | 0.03               | 0.08               | 0.04               | 0.05               | 0.07               |
| CO <sub>2</sub>                |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |
| Rest                           | 0.53               | 0.49               | 0.52               | 0.44               | 0.26               | 0.17               | 0.17               | 0.19               | 0.15               | 0.18               |
| TOTAL                          | 98.67              | 98.72              | 99.01              | 99.56              | 100.11             | 100.52             | 98.96              | 100.57             | 99.96              | 100.21             |
| Ba                             | 556                | 342                | 183                | 165                | 318                | 277                | 219                | 292                | 165                | 164                |
| Rb                             | 43                 | 18                 | 4                  | 15                 | 13                 | 14                 | 17                 | 21                 | 11                 | 23                 |
| Sr                             | 607                | 225                | 146                | 113                | 237                | 233                | 228                | 207                | 186                | 105                |
| Pb                             | 3                  | 7                  | 2                  | 1                  | 673                | 3                  | 2                  | 4                  | 1                  | 5                  |
| Th                             | <1                 | 3                  | <1                 | <1                 | 1                  | <1                 | 1                  | 2                  | 1                  | 5                  |
| U                              | 1                  | 1                  | <1                 | <1                 | <1                 | <1                 | <1                 | <1                 | <1                 | 2                  |
| Zr                             | 74                 | 78                 | 74                 | 62                 | 113                | 96                 | 85                 | 139                | 60                 | 100                |
| Nb                             | 8                  | 2                  | 13                 | 5                  | 5                  | 5                  | 3                  | 5                  | 1                  | 5                  |
| Y                              | 15                 | 13                 | 62                 | 27                 | 34                 | 28                 | 25                 | 37                 | 21                 | 29                 |
| La                             | 22                 | 25                 | 17                 | 17                 | 19                 | 16                 | 16                 | 16                 | 9                  | 15                 |
| Ce                             | 53                 | 48                 | 39                 | 52                 | 35                 | 28                 | 26                 | 32                 | 16                 | 26                 |
| Nd                             |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |
| Sn                             | 3                  | 2                  | 2                  | 2                  | 70                 | <1                 | <1                 | <1                 | <1                 | <1                 |
| V                              | 134                | 120                | 123                | 80                 | 294                | 292                | 312                | 303                | 250                | 308                |
| Cr                             | 1300               | 1850               | 2120               | 1510               | 20                 | 25                 | 57                 | 69                 | 84                 | 137                |
| Ni                             | 989                | 741                | 816                | 1025               | 27                 | 28                 | 54                 | 41                 | 51                 | 95                 |
| Cu                             | 97                 | 4                  | 11                 | 83                 | 58                 | 81                 | 109                | 64                 | 111                | 132                |
| Zn                             | 118                | 91                 | 121                | 96                 | 102                | 104                | 94                 | 115                | 81                 | 97                 |
| Ga                             | 6                  | 7                  | 12                 | 6                  | 19                 | 18                 | 19                 | 19                 | 16                 | 17                 |

## Napier Complex Mafic Intrusives

| Sample Number                  | 77284099            | 77284589           | ANT3431              | ANT4948            | ANT4963               | 8055.12a           | R16320             | 77284155                | 77284699                | 77284134                |
|--------------------------------|---------------------|--------------------|----------------------|--------------------|-----------------------|--------------------|--------------------|-------------------------|-------------------------|-------------------------|
| Area                           | Enderby<br>Land     | Enderby<br>Land    | Enderby<br>Land      | Enderby<br>Land    | Enderby<br>Land       | Enderby<br>Land    | Enderby<br>Land    | Kemp<br>Land            | Enderby<br>Land         | Enderby<br>Land         |
| Locality                       | Mount<br>Stansfield | Ward<br>Rocks      | Mt Riiser-<br>Larsen | Ward<br>Rock       | Hydrogra-<br>pher Is. | Khmara<br>Bay      | Bowl Is<br>Area    | Bird<br>Ridge           | Mount<br>Henry          | Brusilov<br>Ntks        |
| Rock type                      | Meta-<br>tholeiite  | Meta-<br>tholeiite | Meta-<br>tholeiite   | Meta-<br>tholeiite | Meta-<br>tholeiite    | Meta-<br>tholeiite | Meta-<br>tholeiite | High-Mg ol<br>tholeiite | High-Mg ol<br>tholeiite | High-Mg qz<br>tholeiite |
| Additional Data                |                     |                    |                      |                    |                       |                    |                    |                         |                         |                         |
| Age                            | ?Archaean           | Protero            | Protero              | Protero            | Protero               | Protero            | Protero            | Protero                 | Protero                 | Protero                 |
| Bibliog. ref.                  | 5                   | 5,9                | 5                    | 5                  | 5                     | 23                 | 23                 | 5,9                     | 5,9                     | 5,9                     |
| SiO <sub>2</sub>               | 49.60               | 53.00              | 49.40                | 55.90              | 53.40                 | 53.51              | 50.49              | 53.80                   | 51.40                   | 55.88                   |
| TiO <sub>2</sub>               | 1.60                | 1.07               | 2.07                 | 1.38               | 0.75                  | 0.64               | 1.67               | 1.02                    | 0.52                    | 0.54                    |
| Al <sub>2</sub> O <sub>3</sub> | 9.13                | 14.19              | 12.43                | 13.29              | 14.16                 | 13.85              | 12.69              | 9.69                    | 8.86                    | 11.93                   |
| Fe <sub>2</sub> O <sub>3</sub> | 3.43                | 2.81               | 5.32                 | 3.68               | 2.05                  | 11.08              | 16.70              | 2.06                    | 2.15                    | 1.66                    |
| FeO                            | 10.60               | 10.28              | 9.75                 | 9.27               | 8.31                  |                    |                    | 10.28                   | 8.27                    | 8.19                    |
| MnO                            | 0.21                | 0.23               | 0.21                 | 0.20               | 0.17                  | 0.21               | 0.21               | 0.18                    | 0.18                    | 0.17                    |
| MgO                            | 13.59               | 6.36               | 5.44                 | 4.43               | 6.06                  | 6.87               | 4.91               | 8.82                    | 17.93                   | 10.64                   |
| CaO                            | 8.40                | 10.14              | 9.31                 | 8.08               | 10.31                 | 10.62              | 8.85               | 9.43                    | 7.25                    | 7.78                    |
| Na <sub>2</sub> O              | 1.83                | 2.83               | 3.25                 | 2.48               | 3.12                  | 1.94               | 2.97               | 3.03                    | 1.34                    | 1.57                    |
| K <sub>2</sub> O               | 1.19                | 0.70               | 0.64                 | 0.74               | 0.66                  | 0.60               | 0.89               | 1.25                    | 0.54                    | 1.01                    |
| P <sub>2</sub> O <sub>5</sub>  | 0.18                | 0.17               | 0.67                 | 0.25               | 0.09                  | 0.23               | 0.09               | 0.17                    | 0.07                    | 0.09                    |
| H <sub>2</sub> O <sup>+</sup>  | 0.34                | 0.40               | 0.63                 | 0.79               | 0.51                  |                    |                    | 0.39                    | 0.37                    | 0.55                    |
| H <sub>2</sub> O <sup>-</sup>  | 0.04                | 0.04               |                      |                    |                       |                    |                    | 0.02                    | 0.08                    | 0.11                    |
| CO <sub>2</sub>                |                     |                    | <0.05                | 0.14               | <0.05                 |                    |                    |                         |                         |                         |
| Rest                           | 0.42                | 0.15               | 0.22                 | 0.18               | 0.15                  | 0.17               | 0.18               | 0.33                    | 0.51                    | 0.27                    |
| TOTAL                          | 100.56              | 102.37             | 99.29                | 100.81             | 99.69                 | 99.72              | 99.65              | 100.47                  | 99.47                   | 99.44                   |
| Ba                             | 460                 | 232                | 327                  | 385                | 181                   | 163                | 317                | 483                     | 234                     | 249                     |
| Rb                             | 40                  | 14                 | 23                   | 13                 | 21                    | 21                 | 27                 | 46                      | 20                      | 47                      |
| Sr                             | 223                 | 231                | 135                  | 203                | 163                   | 156                | 221                | 401                     | 162                     | 100                     |
| Pb                             | 4                   | 4                  | 5                    | 6                  | 5                     |                    |                    | 6                       | 2                       | 9                       |
| Th                             | 7                   | 3                  | 2                    | 3                  | 3                     |                    |                    | 4                       | 2                       | 7                       |
| U                              | 1                   | <1                 | 1                    | 1                  | 1                     |                    |                    | 2                       | <1                      | 1                       |
| Zr                             | 155                 | 73                 | 215                  | 183                | 77                    | 68                 | 113                | 94                      | 55                      | 88                      |
| Nb                             | 9                   | 4                  | 10                   | 11                 | 3                     |                    |                    | 5                       | 2                       | 4                       |
| Y <sub>n</sub>                 | 24                  | 25                 | 48                   | 37                 | 16                    | 12                 | 23                 | 15                      | 11                      | 18                      |
| La                             | 24                  | 13                 | 20                   | 24                 | 13                    |                    |                    | 17                      | 9                       | 19                      |
| Ce                             | 40                  | 23                 | 49                   | 48                 | 28                    | 78                 | <3                 | 32                      | 15                      | 26                      |
| Nd                             |                     |                    | 30                   | 26                 | 11                    | 43                 | <1                 |                         |                         |                         |
| Sn                             | <1                  | <1                 |                      |                    |                       |                    |                    | 1                       | <1                      | <1                      |
| V                              | 230                 | 245                | 336                  | 276                | 223                   | 228                | 413                | 226                     | 181                     | 183                     |
| Cr                             | 1220                | 20                 | 101                  | 9                  | 155                   | 203                | 24                 | 747                     | 2220                    | 876                     |
| Ni                             | 418                 | 19                 | 79                   | 17                 | 66                    |                    |                    | 178                     | 628                     | 189                     |
| Cu                             | 100                 | 74                 | 106                  | 19                 | 25                    | 26                 | 70                 | 132                     | 42                      | 62                      |
| Zn                             | 89                  | 94                 | 120                  | 104                | 72                    | 98                 | 92                 | 84                      | 60                      | 68                      |
| Ga                             | 13                  | 17                 | 19                   | 21                 | 16                    | 15                 | 22                 | 15                      | 10                      | 14                      |

## Napier Complex Mafic Intrusives

| Sample Number                  | 77284162                | 77284318                | 77284625                | 77284758                | 76283105                | 76283258                | 76283277                | ANT3889                 | ANT3899                 | ANT4969                 |
|--------------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| Area                           | Kemp<br>Land            | Enderby<br>Land         | Enderby<br>Land         | Enderby<br>Land         | Kemp<br>Land            | Enderby<br>Land         | Enderby<br>Land         | Enderby<br>Land         | Enderby<br>Land         | Enderby<br>Land         |
| Locality                       | Wallis<br>Ntks          | Mount<br>Charles        | Mount<br>Hardy          | Rayner<br>Glacier       | Rippon<br>Depot         | Mount<br>Stadler        | Mount<br>Jewell         | Dick<br>Peaks           | Dick<br>Peaks           | 3km W of<br>Fyfe Hills  |
| Rock type                      | High-Mg qz<br>tholeiite | High-Mg qz<br>tholeiite | High-Mg qz<br>tholeiite | High-Mg qz<br>tholeiite | High-Mg qz<br>tholeiite | High-Mg qz<br>tholeiite | High-Mg qz<br>tholeiite | High-Mg qz<br>tholeiite | High-Mg qz<br>tholeiite | High-Mg qz<br>tholeiite |
| Additional Data                |                         |                         |                         |                         |                         |                         |                         |                         |                         |                         |
| Age                            | Proterozoic             | Proterozoic             | Proterozoic             | Proterozoic             | Proterozoic             | Proterozoic             | Proterozoic             | Proterozoic             | Proterozoic             | Proterozoic             |
| Bibliog. ref.                  | 5,9                     | 5,9                     | 5,9                     | 5,9                     | 5,9                     | 5,9                     | 5,9                     | 5                       | 5                       | 5                       |
| SiO <sub>2</sub>               | 55.40                   | 55.60                   | 55.20                   | 55.00                   | 54.50                   | 55.70                   | 54.40                   | 53.20                   | 53.90                   | 60.40                   |
| TiO <sub>2</sub>               | 1.40                    | 1.29                    | 0.55                    | 0.62                    | 1.33                    | 0.75                    | 1.34                    | 0.84                    | 0.88                    | 0.59                    |
| Al <sub>2</sub> O <sub>3</sub> | 10.72                   | 10.52                   | 12.26                   | 14.09                   | 12.27                   | 13.08                   | 12.48                   | 13.94                   | 14.23                   | 12.46                   |
| Fe <sub>2</sub> O <sub>3</sub> | 1.11                    | 3.19                    | 2.27                    | 1.74                    | 3.21                    | 1.20                    | 1.69                    | 3.78                    | 2.32                    | 1.76                    |
| FeO                            | 11.10                   | 9.20                    | 7.53                    | 7.90                    | 8.91                    | 9.32                    | 10.69                   | 7.46                    | 8.76                    | 9.18                    |
| MnO                            | 0.17                    | 0.17                    | 0.17                    | 0.17                    | 0.14                    | 0.17                    | 0.20                    | 0.18                    | 0.18                    | 0.13                    |
| MgO                            | 6.06                    | 7.59                    | 10.58                   | 7.60                    | 5.94                    | 7.36                    | 5.89                    | 5.84                    | 5.87                    | 4.94                    |
| CaO                            | 9.37                    | 8.67                    | 7.92                    | 8.68                    | 9.14                    | 8.06                    | 9.00                    | 9.97                    | 9.96                    | 5.25                    |
| Na <sub>2</sub> O              | 0.46                    | 0.71                    | 1.61                    | 1.69                    | 2.93                    | 1.94                    | 2.45                    | 1.85                    | 1.84                    | 2.03                    |
| K <sub>2</sub> O               | 1.21                    | 1.38                    | 1.01                    | 1.14                    | 1.13                    | 1.39                    | 1.27                    | 0.90                    | 1.01                    | 2.60                    |
| P <sub>2</sub> O <sub>5</sub>  | 0.16                    | 0.17                    | 0.08                    | 0.09                    | 0.15                    | 0.10                    | 0.14                    | 0.11                    | 0.10                    | 0.09                    |
| H <sub>2</sub> O <sup>+</sup>  | 0.20                    | 0.37                    | 0.50                    | 0.46                    | 0.16                    |                         |                         | 0.48                    | 0.71                    | 0.48                    |
| H <sub>2</sub> O <sup>-</sup>  | 0.11                    | 0.06                    | 0.08                    | 0.08                    | 0.12                    |                         |                         |                         |                         |                         |
| CO <sub>2</sub>                |                         |                         |                         |                         |                         |                         |                         | 0.91                    | 0.07                    | 0.07                    |
| Rest                           | 0.22                    | 0.27                    | 0.27                    | 0.20                    | 0.18                    | 0.22                    | 0.24                    | 0.16                    | 0.17                    | 0.19                    |
| TOTAL                          | 100.69                  | 99.19                   | 100.03                  | 99.46                   | 100.11                  | 99.29                   | 99.79                   | 99.62                   | 100.00                  | 100.17                  |
| Ba                             | 299                     | 379                     | 258                     | 237                     | 319                     | 311                     | 310                     | 248                     | 256                     | 497                     |
| Rb                             | 55                      | 54                      | 47                      | 57                      | 52                      | 66                      | 55                      | 24                      | 39                      | 88                      |
| Sr                             | 207                     | 236                     | 106                     | 109                     | 205                     | 116                     | 206                     | 106                     | 110                     | 101                     |
| Pb                             | 10                      | 9                       | 9                       | 13                      | 11                      | 13                      | 12                      | 11                      | 10                      | 17                      |
| Th                             | 10                      | 7                       | 7                       | 8                       | 8                       | 10                      | 9                       | 8                       | 7                       | 4                       |
| U                              | 3                       | 2                       | 2                       | 3                       | 2                       | 2                       | 3                       | 2                       | 2                       | 1                       |
| Zr                             | 164                     | 158                     | 87                      | 93                      | 159                     | 115                     | 159                     | 109                     | 109                     | 80                      |
| Nb                             | 8                       | 8                       | 5                       | 5                       | 10                      | 7                       | 9                       | 7                       | 6                       | 4                       |
| Y                              | 24                      | 24                      | 16                      | 17                      | 29                      | 20                      | 24                      | 23                      | 23                      | 12                      |
| La                             | 23                      | 27                      | 18                      | 18                      | 26                      | 14                      | 21                      | 21                      | 23                      | 21                      |
| Ce                             | 45                      | 46                      | 31                      | 30                      | 44                      | 37                      | 49                      | 40                      | 43                      | 37                      |
| Nd                             |                         |                         |                         |                         |                         |                         |                         | 17                      | 18                      | 14                      |
| Sn                             | 2                       | <1                      | 2                       | 2                       | 4                       | 2                       | 3                       |                         |                         |                         |
| V                              | 233                     | 192                     | 187                     | 197                     |                         | 189                     | 220                     | 265                     | 265                     | 141                     |
| Cr                             | 301                     | 552                     | 818                     | 462                     | 329                     | 446                     | 308                     | 38                      | 38                      | 259                     |
| Ni                             | 134                     | 178                     | 190                     | 139                     | 111                     | 142                     | 127                     | 95                      | 99                      | 66                      |
| Cu                             | 21                      | 13                      | 62                      | 20                      | 15                      | 30                      | 158                     | 49                      | 110                     | 64                      |
| Zn                             | 86                      | 93                      | 68                      | 70                      | 87                      | 75                      | 81                      | 75                      | 78                      | 55                      |
| Ga                             | 20                      | 16                      | 14                      | 15                      |                         | 18                      | 20                      | 18                      | 18                      | 15                      |

Napier Complex Mafic Intrusives

| Sample Number                  | 77283713            | 77283845            | 77283940            | 77283941            | 77284362            | 77284387               | 77284695            | 77284009            | 77284065            | 77284079            |
|--------------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|------------------------|---------------------|---------------------|---------------------|---------------------|
| Area                           | Enderby<br>Land     | Enderby<br>Land     | Enderby<br>Land     | Enderby<br>Land     | Enderby<br>Land     | Enderby<br>Land        | Enderby<br>Land     | Enderby<br>Land     | Enderby<br>Land     | Enderby<br>Land     |
| Locality                       | Howard<br>Hills     | Mount<br>Charles    | Mount<br>Pardoe     | Mount<br>Pardoe     | Mount<br>McGhee     | Zubchatyy<br>Ice Shelf | Mount<br>Henry      | Bunt<br>Island      | Johnston<br>Peak    | Pythagoras<br>Peak  |
| Rock type                      | Quartz<br>tholeiite | Quartz<br>tholeiite | Quartz<br>tholeiite | Quartz<br>tholeiite | Quartz<br>tholeiite | Quartz<br>tholeiite    | Quartz<br>tholeiite | Quartz<br>tholeiite | Quartz<br>tholeiite | Quartz<br>tholeiite |
| Additional Data                | Group I             | Group I             | Group I             | Group I             | Group I             | Group I                | Group I             | Group I             | Group I             | Group I             |
| Age                            | Protero             | Protero             | Protero             | Protero             | Protero             | Protero                | Protero             | Protero             | Protero             | Protero             |
| Bibliog. ref.                  | 5,9                 | 5,9                 | 5,9                 | 5,9                 | 5,9                 | 5,9                    | 5,9                 | 5,9                 | 5,9                 | 5,9                 |
| SiO <sub>2</sub>               | 50.00               | 50.20               | 49.40               | 49.70               | 50.30               | 49.60                  | 50.20               | 49.80               | 49.50               | 50.00               |
| TiO <sub>2</sub>               | 2.53                | 2.48                | 2.60                | 2.68                | 2.19                | 2.49                   | 2.49                | 2.43                | 2.41                | 2.19                |
| Al <sub>2</sub> O <sub>3</sub> | 13.68               | 13.72               | 13.61               | 13.71               | 15.06               | 13.56                  | 13.44               | 13.47               | 13.67               | 14.47               |
| Fe <sub>2</sub> O <sub>3</sub> | 4.64                | 4.32                | 4.60                | 4.24                | 4.51                | 3.49                   | 5.42                | 3.80                | 3.13                | 2.82                |
| FeO                            | 8.99                | 9.33                | 9.29                | 9.85                | 7.90                | 10.50                  | 8.29                | 9.78                | 9.68                | 10.96               |
| MnO                            | 0.19                | 0.19                | 0.18                | 0.19                | 0.17                | 0.19                   | 0.19                | 0.20                | 0.20                | 0.20                |
| MgO                            | 5.81                | 5.79                | 5.66                | 5.06                | 5.40                | 5.84                   | 5.71                | 5.82                | 6.13                | 5.91                |
| CaO                            | 9.83                | 9.88                | 9.91                | 9.57                | 10.35               | 9.90                   | 9.74                | 9.76                | 9.79                | 9.82                |
| Na <sub>2</sub> O              | 2.31                | 2.40                | 2.20                | 2.48                | 2.24                | 2.18                   | 2.45                | 2.34                | 2.27                | 2.79                |
| K <sub>2</sub> O               | 0.80                | 0.82                | 0.81                | 0.91                | 0.76                | 0.74                   | 0.85                | 0.86                | 0.75                | 0.81                |
| P <sub>2</sub> O <sub>5</sub>  | 0.32                | 0.30                | 0.31                | 0.35                | 0.28                | 0.29                   | 0.32                | 0.31                | 0.28                | 0.26                |
| H <sub>2</sub> O <sup>+</sup>  | 0.87                | 0.66                | 0.82                | 0.75                | 0.63                | 0.86                   | 0.66                | 0.62                | 1.06                | 0.44                |
| H <sub>2</sub> O <sup>-</sup>  | 0.10                | 0.06                | 0.06                | 0.02                | 0.08                | 0.16                   | 0.06                | 0.02                | 0.07                | 0.04                |
| CO <sub>2</sub>                |                     |                     |                     |                     |                     |                        |                     |                     |                     |                     |
| Rest                           | 0.23                | 0.24                | 0.23                | 0.24                | 0.22                | 0.24                   | 0.24                | 0.23                | 0.22                | 0.21                |
| TOTAL                          | 100.30              | 100.39              | 99.68               | 99.75               | 100.09              | 100.04                 | 100.06              | 99.44               | 99.16               | 100.92              |
| Ba                             | 310                 | 320                 | 324                 | 350                 | 313                 | 291                    | 347                 | 318                 | 240                 | 290                 |
| Rb                             | 23                  | 24                  | 24                  | 26                  | 21                  | 21                     | 25                  | 22                  | 20                  | 20                  |
| Sr                             | 409                 | 408                 | 416                 | 417                 | 450                 | 377                    | 416                 | 398                 | 354                 | 330                 |
| Pb                             | 4                   | 2                   | 3                   | 4                   | 3                   | 4                      | 3                   | 2                   | 3                   | 3                   |
| Th                             | 3                   | 2                   | 2                   | 3                   | 3                   | 2                      | 4                   | 3                   | 3                   | 4                   |
| U                              | <1                  | <1                  | <1                  | <1                  | <1                  | 1                      | <1                  | <1                  | 2                   | <1                  |
| Zr                             | 173                 | 178                 | 160                 | 186                 | 149                 | 173                    | 172                 | 160                 | 154                 | 141                 |
| Nb                             | 15                  | 16                  | 14                  | 17                  | 13                  | 14                     | 15                  | 15                  | 14                  | 12                  |
| Y                              | 27                  | 27                  | 27                  | 29                  | 23                  | 28                     | 28                  | 28                  | 28                  | 27                  |
| La                             | 22                  | 27                  | 20                  | 31                  | 19                  | 24                     | 25                  | 25                  | 20                  | 22                  |
| Ce                             | 42                  | 52                  | 46                  | 55                  | 40                  | 48                     | 52                  | 48                  | 42                  | 43                  |
| Nd                             |                     |                     |                     |                     |                     |                        |                     |                     |                     |                     |
| Sn                             | 3                   | <1                  | 2                   | 1                   | <1                  | <1                     | <1                  | 1                   | <1                  | <1                  |
| V                              | 337                 | 341                 | 383                 | 372                 | 284                 | 353                    | 328                 | 346                 | 342                 | 289                 |
| Cr                             | 74                  | 75                  | 69                  | 38                  | 79                  | 82                     | 69                  | 66                  | 83                  | 109                 |
| Ni                             | 65                  | 74                  | 51                  | 59                  | 58                  | 85                     | 68                  | 56                  | 84                  | 59                  |
| Cu                             | 99                  | 98                  | 65                  | 109                 | 55                  | 126                    | 100                 | 96                  | 122                 | 77                  |
| Zn                             | 101                 | 112                 | 100                 | 113                 | 94                  | 112                    | 111                 | 105                 | 129                 | 112                 |
| Ga                             | 20                  | 19                  | 19                  | 20                  | 20                  | 19                     | 20                  | 18                  | 16                  | 17                  |

## Napier Complex Mafic Intrusives

| Sample Number                  | 77284541            | 76283010            | 76283242            | ANT3631             | ANT3839             | ANT4905             | 77283961             | 77284373               | ANT4933              | ANT4953              |
|--------------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|----------------------|------------------------|----------------------|----------------------|
| Area                           | Enderby<br>Land     | Enderby<br>Land     | Enderby<br>Land     | Enderby<br>Land     | Enderby<br>Land     | Enderby<br>Land     | Enderby<br>Land      | Enderby<br>Land        | Enderby<br>Land      | Enderby<br>Land      |
| Locality                       | Mount<br>Bergin     | Seavers<br>Ridge    | Mount<br>McGhee     | Harvey<br>Ntks      | Mount<br>Charles    | Seavers<br>Ridge    | Debenham<br>Peak     | Zubchatyy<br>Ice Shelf | Gromov<br>Ntks       | Edward<br>Island     |
| Rock type                      | Quartz<br>tholeiite | Quartz<br>tholeiite | Quartz<br>tholeiite | Quartz<br>tholeiite | Quartz<br>tholeiite | Quartz<br>tholeiite | Olivine<br>tholeiite | Olivine<br>tholeiite   | Olivine<br>tholeiite | Olivine<br>tholeiite |
| Additional Data                | Group I             | Group I             | Group I             | Group I             | Group I             | Group I             | Group II             | Group II               | Group II             | Group II             |
| Age                            | Protero             | Protero             | Protero             | Protero             | Protero             | Protero             | Protero              | Protero                | Protero              | Protero              |
| Bibliog. ref.                  | 5,9                 | 5,9                 | 5,9                 | 5                   | 5                   | 5                   | 5,9                  | 5,9                    | 5                    | 5                    |
| SiO <sub>2</sub>               | 50.30               | 51.50               | 49.70               | 51.60               | 50.10               | 50.00               | 48.50                | 48.20                  | 48.40                | 49.70                |
| TiO <sub>2</sub>               | 2.52                | 2.66                | 2.81                | 2.00                | 2.54                | 2.46                | 1.44                 | 1.78                   | 1.37                 | 0.93                 |
| Al <sub>2</sub> O <sub>3</sub> | 13.98               | 13.55               | 13.95               | 14.20               | 13.69               | 13.53               | 13.98                | 13.35                  | 14.58                | 14.51                |
| Fe <sub>2</sub> O <sub>3</sub> | 6.56                | 6.12                | 4.95                | 2.61                | 4.37                | 3.01                | 2.82                 | 3.53                   | 2.84                 | 2.36                 |
| FeO                            | 7.70                | 8.45                | 9.65                | 10.27               | 9.33                | 10.13               | 10.31                | 9.89                   | 9.90                 | 8.94                 |
| MnO                            | 0.20                | 0.24                | 0.22                | 0.18                | 0.18                | 0.19                | 0.21                 | 0.22                   | 0.20                 | 0.19                 |
| MgO                            | 5.97                | 3.85                | 4.58                | 5.55                | 5.35                | 5.23                | 6.98                 | 6.93                   | 7.13                 | 7.65                 |
| CaO                            | 9.85                | 8.16                | 9.09                | 9.55                | 9.54                | 9.41                | 11.46                | 11.28                  | 12.14                | 12.70                |
| Na <sub>2</sub> O              | 2.27                | 2.48                | 2.47                | 2.36                | 2.30                | 2.40                | 2.33                 | 2.43                   | 2.22                 | 1.90                 |
| K <sub>2</sub> O               | 0.79                | 1.28                | 0.99                | 0.62                | 0.83                | 1.02                | 0.18                 | 0.24                   | 0.19                 | 0.34                 |
| P <sub>2</sub> O <sub>5</sub>  | 0.30                | 0.61                | 0.35                | 0.21                | 0.31                | 0.32                | 0.11                 | 0.18                   | 0.11                 | 0.06                 |
| H <sub>2</sub> O <sup>+</sup>  | 0.41                |                     |                     | 0.90                | 1.13                | 0.98                | 0.58                 | 0.37                   | 0.95                 | 0.67                 |
| H <sub>2</sub> O <sup>-</sup>  | 0.08                |                     |                     |                     |                     |                     | 0.09                 | 0.04                   |                      |                      |
| CO <sub>2</sub>                |                     |                     |                     | 0.11                | <0.05               | 1.43                |                      |                        | <0.05                | 0.14                 |
| Rest                           | 0.24                | 0.26                | 0.25                | 0.23                | 0.24                | 0.25                | 0.17                 | 0.17                   | 0.16                 | 0.18                 |
| TOTAL                          | 101.17              | 99.16               | 99.01               | 100.39              | 99.86               | 100.36              | 99.16                | 98.61                  | 100.14               | 100.27               |
| Ba                             | 337                 | 530                 | 413                 | 309                 | 332                 | 474                 | 74                   | 88                     | 38                   | 138                  |
| Rb                             | 20                  | 35                  | 28                  | 16                  | 22                  | 24                  | 4                    | 5                      | 4                    | 8                    |
| Sr                             | 379                 | 459                 | 424                 | 298                 | 377                 | 367                 | 167                  | 186                    | 134                  | 157                  |
| Pb                             | 2                   | 5                   | 4                   | 4                   | 3                   | 6                   | 1                    | 1                      | 2                    | 2                    |
| Th                             | 3                   | 4                   | 4                   | 3                   | 3                   | 2                   | 1                    | 2                      | <1                   | 1                    |
| U                              | <1                  | 1                   | 1                   | 1                   | <1                  | <1                  | <1                   | <1                     | <1                   | 1                    |
| Zr                             | 164                 | 287                 | 204                 | 154                 | 192                 | 194                 | 72                   | 108                    | 80                   | 55                   |
| Nb                             | 14                  | 28                  | 19                  | 14                  | 20                  | 19                  | 3                    | 7                      | 2                    | 2                    |
| Y                              | 29                  | 41                  | 29                  | 23                  | 26                  | 26                  | 22                   | 28                     | 26                   | 19                   |
| La                             | 25                  | 43                  | 29                  | 22                  | 26                  | 27                  | 7                    | 9                      | 3                    | 4                    |
| Ce                             | 51                  | 91                  | 68                  | 46                  | 56                  | 59                  | 13                   | 20                     | 16                   | 17                   |
| Nd                             |                     |                     |                     | 25                  | 31                  | 32                  |                      |                        | 10                   | 8                    |
| Sn                             | <1                  | 2                   | 2                   |                     |                     |                     | 1                    | 1                      |                      |                      |
| V                              | 390                 | 241                 | 339                 | 322                 | 369                 | 348                 | 329                  | 294                    | 364                  | 300                  |
| Cr                             | 69                  | 23                  | 43                  | 95                  | 58                  | 62                  | 120                  | 166                    | 168                  | 264                  |
| Ni                             | 73                  | 24                  | 48                  | 56                  | 54                  | 61                  | 100                  | 79                     | 70                   | 86                   |
| Cu                             | 119                 | 50                  | 80                  | 193                 | 79                  | 72                  | 182                  | 124                    | 102                  | 118                  |
| Zn                             | 101                 | 126                 | 116                 | 99                  | 97                  | 104                 | 91                   | 98                     | 85                   | 70                   |
| Ga                             | 17                  | 21                  | 22                  | 22                  | 21                  | 19                  | 18                   | 18                     | 20                   | 18                   |



Napier Complex Mafic Intrusives

| Sample Number                  | 77283947  | 77283957B | 77284104  | 77284113  | 77284310  | 77284624  | 77284659  | 77284757  | 77284859  | 77284590  |
|--------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Area                           | Enderby   | Enderby   | Enderby   | Enderby   | Enderby   | Enderby   | Enderby   | Enderby   | Kemp      | Enderby   |
| Locality                       | Land      | Land      | Land      | Land      | Land      | Land      | Land      | Land      | Land      | Land      |
| Rock type                      | Priestley | Priestley | Mount     | Mount     | Mount     | Mount     | Geoffrey  | Waratah   | Wallis    | Ward      |
| Additional Data                | Peak      | Peak      | Bride     | Arthur    | Biscoe    | Dyke      | Hills     | Island    | Ntk       | Rocks     |
| Age                            | Quartz    | Quartz    | Quartz    | Quartz    | Quartz    | Quartz    | Quartz    | Quartz    | Quartz    | Quartz    |
| Bibliog. ref.                  | tholeiite | tholeiite | tholeiite | tholeiite | tholeiite | tholeiite | tholeiite | tholeiite | tholeiite | tholeiite |
|                                | Group II  | Group II  | Group II  | Group II  | Group II  | Group II  | Group II  | Group II  | Group II  | Group II  |
|                                | Protero   | Protero   | Protero   | Protero   | Protero   | Protero   | Protero   | Protero   | Protero   | Protero   |
|                                | 5,9       | 5,9       | 5,9       | 5,9       | 5,9       | 5,9       | 5,9       | 5,9       | 5,9       | 5,9       |
| SiO <sub>2</sub>               | 49.90     | 49.90     | 47.80     | 49.70     | 49.10     | 49.80     | 51.90     | 51.30     | 48.70     | 50.10     |
| TiO <sub>2</sub>               | 1.39      | 1.61      | 2.17      | 1.19      | 1.69      | 1.30      | 1.18      | 0.75      | 1.42      | 1.63      |
| Al <sub>2</sub> O <sub>3</sub> | 13.70     | 13.50     | 12.30     | 14.19     | 13.34     | 13.81     | 13.64     | 12.89     | 13.51     | 13.30     |
| Fe <sub>2</sub> O <sub>3</sub> | 3.23      | 6.02      | 2.99      | 4.45      | 3.32      | 4.15      | 2.85      | 2.77      | 5.31      | 2.96      |
| FeO                            | 9.68      | 8.00      | 13.22     | 7.89      | 9.68      | 9.16      | 10.66     | 11.69     | 8.42      | 11.15     |
| MnO                            | 0.21      | 0.23      | 0.24      | 0.21      | 0.21      | 0.22      | 0.21      | 0.23      | 0.23      | 0.22      |
| MgO                            | 6.97      | 6.35      | 5.80      | 6.74      | 6.53      | 6.70      | 6.06      | 6.40      | 6.23      | 6.93      |
| CaO                            | 11.30     | 10.90     | 10.29     | 11.90     | 10.65     | 11.45     | 10.28     | 10.54     | 11.19     | 10.54     |
| Na <sub>2</sub> O              | 2.46      | 2.41      | 2.13      | 2.32      | 2.39      | 2.48      | 2.52      | 2.47      | 2.97      | 2.27      |
| K <sub>2</sub> O               | 0.41      | 0.59      | 0.42      | 0.33      | 0.43      | 0.35      | 0.56      | 0.36      | 0.29      | 0.43      |
| P <sub>2</sub> O <sub>5</sub>  | 0.13      | 0.16      | 0.23      | 0.09      | 0.19      | 0.13      | 0.12      | 0.08      | 0.12      | 0.16      |
| H <sub>2</sub> O <sup>+</sup>  | 0.45      | 0.42      | 1.04      | 0.49      | 0.97      | 0.32      | 0.57      | 0.45      | 0.39      | 0.39      |
| H <sub>2</sub> O <sup>-</sup>  | 0.12      | 0.03      | 0.06      | 0.15      | 0.08      | 0.01      | 0.04      | 0.06      | 0.02      | 0.07      |
| CO <sub>2</sub>                |           |           |           |           |           |           |           |           |           |           |
| Rest                           | 0.16      | 0.18      | 0.19      | 0.16      | 0.19      | 0.16      | 0.17      | 0.15      | 0.16      | 0.19      |
| TOTAL                          | 100.11    | 100.30    | 98.88     | 99.81     | 98.77     | 100.04    | 100.76    | 100.14    | 98.96     | 100.34    |
| Ba                             | 107       | 158       | 106       | 70        | 202       | 82        | 231       | 139       | 82        | 154       |
| Rb                             | 16        | 18        | 13        | 14        | 12        | 14        | 15        | 11        | 11        | 9         |
| Sr                             | 134       | 125       | 136       | 120       | 230       | 119       | 143       | 79        | 142       | 209       |
| Pb                             | 1         | 3         | 6         | <1        | 3         | 2         | 5         | 4         | 2         | 2         |
| Th                             | 1         | 1         | 2         | 2         | 1         | 1         | 2         | 3         | 1         | 2         |
| U                              | <1        | <1        | 1         | <1        | 1         | <1        | <1        | 1         | <1        | <1        |
| Zr                             | 92        | 110       | 135       | 75        | 101       | 85        | 88        | 55        | 84        | 101       |
| Nb                             | 2         | 4         | 5         | 1         | 5         | 2         | 5         | 1         | 2         | 7         |
| Y                              | 31        | 36        | 45        | 28        | 30        | 31        | 29        | 29        | 30        | 26        |
| La                             | 8         | 9         | 10        | 7         | 12        | 7         | 15        | 11        | 5         | 12        |
| Ce                             | 16        | 19        | 22        | 11        | 19        | 14        | 21        | 15        | 9         | 23        |
| Nd                             |           |           |           |           |           |           |           |           |           |           |
| Sn                             | 1         | 1         | 1         | <1        | <1        | 1         | 1         | <1        | 1         | <1        |
| V                              | 366       | 395       | 340       | 313       | 286       | 338       | 264       | 278       | 386       | 321       |
| Cr                             | 78        | 58        | 217       | 152       | 184       | 113       | 59        | 101       | 72        | 154       |
| Ni                             | 59        | 60        | 66        | 72        | 73        | 58        | 71        | 69        | 53        | 81        |
| Cu                             | 139       | 186       | 80        | 158       | 102       | 171       | 150       | 136       | 81        | 157       |
| Zn                             | 82        | 104       | 153       | 81        | 99        | 82        | 98        | 109       | 92        | 104       |
| Ga                             | 17        | 17        | 19        | 16        | 18        | 17        | 17        | 16        | 16        | 17        |

## Napier Complex Mafic Intrusives

| Sample Number                  | 80285046A | ANT3851   | ANT3883   | ANT3887   | ANT66     | 77283415  | 77284317  | 77284835  | 77284591  | 78285051  |
|--------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Area                           | Enderby   | Enderby   | Enderby   | Enderby   | Enderby   | Enderby   | Enderby   | Enderby   | Enderby   | Enderby   |
| Locality                       | Land      | Land      | Land      | Land      | Land      | Land      | Land      | Land      | Land      | Land      |
|                                | Cape      | Mount     | Mount     | Ntk W of  | Newman    | Mount     | Mount     | Mount     | Howard    | Beaver    |
|                                | Batterbee | Maines    | Dyke      | Mt Dyke   | Ntks      | Marsland  | Oldfield  | Trail     | Hills     | Island    |
| Rock type                      | Quartz    | Quartz    | Quartz    | Quartz    | Quartz    | Olivine   | Olivine   | Olivine   | Olivine   | Olivine   |
|                                | tholeiite | tholeiite | tholeiite | tholeiite | tholeiite | tholeiite | tholeiite | tholeiite | tholeiite | tholeiite |
| Additional Data                | Group II  | Group II  | Group II  | Group II  | Group II  |           |           |           |           |           |
| Age                            | Protero   | Protero   | Protero   | Protero   | Protero   | Protero   | Protero   | Protero   | Protero   | Protero   |
| Bibliog. ref.                  | 5,9       | 5         | 5         | 5         | 5         | 5,9       | 5,9       | 5,9       | 5,9       | 5,9       |
| SiO <sub>2</sub>               | 51.30     | 50.80     | 49.60     | 50.00     | 49.60     | 47.20     | 44.80     | 47.50     | 45.60     | 46.20     |
| TiO <sub>2</sub>               | 1.01      | 1.41      | 2.15      | 1.35      | 2.14      | 2.19      | 3.31      | 2.28      | 3.29      | 2.94      |
| Al <sub>2</sub> O <sub>3</sub> | 12.16     | 12.45     | 12.82     | 14.06     | 12.41     | 14.65     | 15.13     | 14.66     | 15.20     | 14.19     |
| Fe <sub>2</sub> O <sub>3</sub> | 3.30      | 3.20      | 2.35      | 4.10      | 3.01      | 2.77      | 4.79      | 4.57      | 3.97      | 5.07      |
| FeO                            | 13.90     | 13.26     | 13.19     | 9.18      | 13.39     | 11.83     | 10.13     | 10.41     | 11.12     | 11.94     |
| MnO                            | 0.22      | 0.23      | 0.23      | 0.22      | 0.23      | 0.20      | 0.22      | 0.19      | 0.22      | 0.26      |
| MgO                            | 4.88      | 4.83      | 5.60      | 6.57      | 5.61      | 6.42      | 5.93      | 6.30      | 5.61      | 5.31      |
| CaO                            | 9.72      | 9.66      | 10.00     | 11.49     | 10.11     | 9.44      | 8.78      | 9.43      | 8.70      | 8.36      |
| Na <sub>2</sub> O              | 2.51      | 2.26      | 2.18      | 2.15      | 2.20      | 2.66      | 2.84      | 2.61      | 2.70      | 2.46      |
| K <sub>2</sub> O               | 0.34      | 0.24      | 0.40      | 0.36      | 0.36      | 0.98      | 1.66      | 1.05      | 1.83      | 1.48      |
| P <sub>2</sub> O <sub>5</sub>  | 0.11      | 0.13      | 0.23      | 0.10      | 0.22      | 0.33      | 1.01      | 0.34      | 1.04      | 0.36      |
| H <sub>2</sub> O+              |           | 1.11      | 0.81      | 0.46      | 0.71      | 0.38      | 0.59      | 0.18      | 0.64      | 0.63      |
| H <sub>2</sub> O-              |           |           |           |           |           | 0.09      | 0.11      | 0.09      | 0.02      | 0.04      |
| CO <sub>2</sub>                |           | <0.05     | 0.44      | 0.11      | <0.05     |           |           |           |           |           |
| Rest                           | 0.14      | 0.17      | 0.19      | 0.17      | 0.18      | 0.23      | 0.33      | 0.24      | 0.32      | 0.25      |
| TOTAL                          | 99.59     | 99.70     | 100.19    | 100.32    | 100.12    | 99.37     | 99.63     | 99.85     | 100.26    | 99.49     |
| Ba                             | 140       | 91        | 132       | 80        | 121       | 571       | 1330      | 615       | 1330      | 661       |
| Rb                             | 10        | 7         | 8         | 13        | 9         | 25        | 39        | 27        | 39        | 43        |
| Sr                             | 59        | 72        | 132       | 111       | 120       | 240       | 480       | 240       | 430       | 237       |
| Pb                             | 3         | 3         | 4         | 2         | 3         | 7         | 2         | 7         | 4         | 7         |
| Th                             | 4         | 2         | 2         | 2         | 2         | 7         | 4         | 6         | 6         | 8         |
| U                              | 1         | 1         | 1         | 1         | 1         | <1        | 1         | 1         | <1        | 1         |
| Zr                             | 65        | 96        | 166       | 86        | 140       | 162       | 130       | 177       | 139       | 202       |
| Nb                             | 2         | 3         | 9         | 3         | 8         | 12        | 27        | 13        | 31        | 24        |
| Y                              | 32        | 40        | 41        | 28        | 39        | 34        | 28        | 36        | 29        | 49        |
| La                             | 13        | 4         | 12        | 6         | 10        | 30        | 40        | 30        | 39        | 43        |
| Ce                             | 13        | 15        | 30        | 19        | 28        | 54        | 69        | 49        | 73        | 68        |
| Nd                             |           | 11        | 19        | 10        | 18        |           |           |           |           |           |
| Sn                             |           |           |           |           |           | <1        | <1        | <1        | <1        | <1        |
| V                              | 277       | 399       | 329       | 359       | 364       | 203       | 247       | 229       | 252       | 285       |
| Cr                             | 76        | 44        | 114       | 121       | 118       | 130       | 90        | 118       | 65        | 41        |
| Ni                             | 60        | 51        | 75        | 56        | 56        | 118       | 52        | 116       | 31        | 51        |
| Cu                             | 111       | 179       | 144       | 171       | 91        | 46        | 36        | 46        | 37        | 57        |
| Zn                             | 136       | 123       | 124       | 76        | 119       | 118       | 110       | 115       | 100       | 139       |
| Ga                             | 17        | 18        | 19        | 20        | 20        | 21        | 19        | 20        | 17        | 20        |

## Napier Complex Mafic Intrusives

| Sample Number                  | 76283012             | ANT3440              | ANT3837              | 77283430             | 77283917            | 77283977            | 77284619            | 77284707            | 76283030            | ANT3856             |
|--------------------------------|----------------------|----------------------|----------------------|----------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| Area                           | Enderby<br>Land      | Enderby<br>Land      | Enderby<br>Land      | Enderby<br>Land      | Enderby<br>Land     | Enderby<br>Land     | Enderby<br>Land     | Enderby<br>Land     | Enderby<br>Land     | Enderby<br>Land     |
| Locality                       | Seavers<br>Ridge     | Seavers<br>Ridge     | Debenham<br>Peak     | Mt Riiser-<br>Larsen | Tonagh<br>Island    | Mount<br>Bennett    | Dick<br>Peaks       | Mount<br>Berrigan   | Mount<br>Douglas    | Mount<br>Oldfield   |
| Rock type                      | Olivine<br>tholeiite | Olivine<br>tholeiite | Olivine<br>tholeiite | Quartz<br>tholeiite  | Quartz<br>tholeiite | Quartz<br>tholeiite | Quartz<br>tholeiite | Quartz<br>tholeiite | Quartz<br>tholeiite | Quartz<br>tholeiite |
| Additional Data                |                      |                      |                      |                      |                     |                     |                     |                     |                     |                     |
| Age                            | Protero              | Protero              | Protero              | Protero              | Protero             | Protero             | Protero             | Protero             | Protero             | Protero             |
| Bibliog. ref.                  | 5,9                  | 5                    | 5                    | 5,9                  | 5,9                 | 5,9                 | 5,9                 | 5,9                 | 5,9                 | 5                   |
| SiO <sub>2</sub>               | 46.40                | 46.60                | 49.10                | 49.40                | 50.10               | 52.80               | 53.70               | 49.30               | 52.50               | 48.80               |
| TiO <sub>2</sub>               | 3.10                 | 3.00                 | 1.42                 | 2.16                 | 1.67                | 1.52                | 0.82                | 2.66                | 1.21                | 2.83                |
| Al <sub>2</sub> O <sub>3</sub> | 14.31                | 14.24                | 14.30                | 12.57                | 14.02               | 12.92               | 14.00               | 13.17               | 13.95               | 12.27               |
| Fe <sub>2</sub> O <sub>3</sub> | 4.68                 | 3.38                 | 1.66                 | 5.61                 | 3.57                | 5.45                | 1.74                | 2.66                | 3.42                | 5.00                |
| FeO                            | 12.70                | 13.58                | 11.19                | 10.43                | 9.15                | 9.75                | 9.26                | 11.61               | 9.34                | 12.01               |
| MnO                            | 0.28                 | 0.26                 | 0.21                 | 0.24                 | 0.18                | 0.21                | 0.18                | 0.22                | 0.21                | 0.22                |
| MgO                            | 4.85                 | 5.18                 | 7.35                 | 5.27                 | 6.28                | 4.55                | 6.07                | 6.37                | 5.63                | 4.67                |
| CaO                            | 8.28                 | 8.33                 | 12.10                | 9.65                 | 10.37               | 8.59                | 10.19               | 10.30               | 9.49                | 8.78                |
| Na <sub>2</sub> O              | 2.75                 | 2.56                 | 1.93                 | 2.74                 | 2.12                | 2.55                | 1.82                | 2.40                | 2.83                | 2.61                |
| K <sub>2</sub> O               | 1.53                 | 1.52                 | 0.11                 | 0.80                 | 0.65                | 1.17                | 0.96                | 0.56                | 0.84                | 1.00                |
| P <sub>2</sub> O <sub>5</sub>  | 0.35                 | 0.36                 | 0.07                 | 0.72                 | 0.20                | 0.24                | 0.11                | 0.27                | 0.13                | 0.47                |
| H <sub>2</sub> O+              |                      | 0.79                 | 0.54                 | 0.31                 | 0.40                | 0.39                | 0.22                | 1.00                |                     | 0.73                |
| H <sub>2</sub> O-              |                      |                      |                      | 0.07                 | 0.08                | 0.13                | 0.03                | 0.05                |                     |                     |
| CO <sub>2</sub>                |                      | 0.33                 | <0.05                |                      |                     |                     |                     |                     |                     | 0.07                |
| Rest                           | 0.27                 | 0.27                 | 0.16                 | 0.21                 | 0.21                | 0.23                | 0.17                | 0.23                | 0.17                | 0.26                |
| TOTAL                          | 99.50                | 100.40               | 100.09               | 100.18               | 99.00               | 100.50              | 99.27               | 100.80              | 99.72               | 99.72               |
| Ba                             | 845                  | 750                  | 46                   | 321                  | 286                 | 478                 | 272                 | 139                 | 376                 | 390                 |
| Rb                             | 48                   | 45                   | 1                    | 30                   | 18                  | 33                  | 44                  | 12                  | 18                  | 33                  |
| Sr                             | 245                  | 230                  | 152                  | 147                  | 360                 | 250                 | 117                 | 277                 | 187                 | 144                 |
| Pb                             | 7                    | 7                    | 1                    | 3                    | 3                   | 6                   | 8                   | <1                  | 5                   | 5                   |
| Th                             | 7                    | 7                    | <1                   | 1                    | 1                   | 4                   | 7                   | 2                   | 4                   | 3                   |
| U                              | 1                    | 1                    | <1                   | 1                    | <1                  | <1                  | 2                   | 1                   | <1                  | 1                   |
| Zr                             | 212                  | 234                  | 39                   | 200                  | 107                 | 124                 | 101                 | 170                 | 121                 | 196                 |
| Nb                             | 27                   | 32                   | 3                    | 8                    | 7                   | 5                   | 6                   | 13                  | 5                   | 12                  |
| Y                              | 47                   | 49                   | 16                   | 55                   | 22                  | 33                  | 24                  | 32                  | 25                  | 50                  |
| La                             | 41                   | 45                   | <2                   | 20                   | 20                  | 19                  | 26                  | 17                  | 18                  | 18                  |
| Ce                             | 78                   | 83                   | 9                    | 40                   | 36                  | 36                  | 38                  | 41                  | 37                  | 47                  |
| Nd                             |                      | 38                   | 5                    |                      |                     |                     |                     |                     |                     | 27                  |
| Sm                             | 3                    |                      |                      | 1                    | <1                  | 2                   | 1                   | 1                   | 1                   |                     |
| V                              | 279                  | 295                  | 357                  | 332                  | 294                 | 412                 | 255                 | 375                 | 232                 | 564                 |
| Cr                             | 30                   | 41                   | 169                  | 88                   | 78                  | 41                  | 43                  | 180                 | 39                  | 37                  |
| Ni                             | 31                   | 58                   | 94                   | 60                   | 76                  | 61                  | 98                  | 75                  | 48                  | 50                  |
| Cu                             | 43                   | 55                   | 120                  | 117                  | 134                 | 68                  | 110                 | 201                 | 63                  | 133                 |
| Zn                             | 120                  | 134                  | 81                   | 137                  | 94                  | 116                 | 78                  | 110                 | 87                  | 142                 |
| Ga                             | 22                   | 23                   | 20                   | 18                   | 18                  | 18                  | 16                  | 20                  | 18                  | 21                  |

Napier Complex Mafic Intrusives

| Sample Number                  | ANT4908          | 77283949C         | 77283949D         | 77283950          | 77283951A         | 8055.450          | 8055.479       |
|--------------------------------|------------------|-------------------|-------------------|-------------------|-------------------|-------------------|----------------|
| Area                           | Enderby          | Enderby           | Enderby           | Enderby           | Enderby           | Enderby           | Enderby        |
| Locality                       | Land             | Land              | Land              | Land              | Land              | Land              | Land           |
| Rock type                      | Seavers Ridge    | Priestley Peak    | Priestley Peak    | Priestley Peak    | Priestley Peak    | Khmara Bay        | Khmara Bay     |
| Additional Data                | Quartz tholeiite | Alk. mela-syenite | Alk. mela-syenite | Alk. mela-syenite | Alk. mela-syenite | Qz alkali syenite | Alkali granite |
| Age                            | Protero          | Ordovician        | Ordovician        | Ordovician        | Ordovician        | Ordovician        | Ordovician     |
| Bibliog. ref.                  | 5                | 5,8               | 5,8               | 5,8               | 5,8               | 23                | 23             |
| SiO <sub>2</sub>               | 58.30            | 52.60             | 49.60             | 50.40             | 52.00             | 58.60             | 67.25          |
| TiO <sub>2</sub>               | 1.96             | 3.40              | 3.27              | 3.52              | 2.85              | 1.04              | 0.90           |
| Al <sub>2</sub> O <sub>3</sub> | 13.37            | 8.67              | 9.10              | 8.95              | 8.74              | 9.36              | 10.00          |
| Fe <sub>2</sub> O <sub>3</sub> | 2.74             | 2.03              | 2.45              | 1.97              | 3.19              | 8.18              | 6.98           |
| FeO                            | 7.28             | 4.12              | 4.06              | 4.63              | 3.39              |                   |                |
| MnO                            | 0.17             | 0.09              | 0.08              | 0.10              | 0.11              | 0.09              | 0.09           |
| MgO                            | 3.31             | 7.43              | 8.77              | 8.55              | 7.29              | 2.89              | 1.21           |
| CaO                            | 6.53             | 4.97              | 5.32              | 5.47              | 4.54              | 3.50              | 1.73           |
| Na <sub>2</sub> O              | 2.50             | 0.73              | 0.89              | 0.85              | 1.90              | 0.80              | 0.31           |
| K <sub>2</sub> O               | 2.56             | 8.32              | 9.83              | 8.49              | 8.34              | 9.84              | 8.33           |
| P <sub>2</sub> O <sub>5</sub>  | 0.38             | 3.05              | 3.28              | 3.32              | 2.76              | 1.85              | 0.68           |
| H <sub>2</sub> O+              | 0.62             | 0.77              | 0.84              | 0.86              | 0.88              |                   |                |
| H <sub>2</sub> O-              |                  | 0.05              | 0.06              | 0.02              | 0.04              |                   |                |
| CO <sub>2</sub>                | 0.18             | 0.16              | 0.02              | 0.02              | 0.06              |                   |                |
| Rest                           | 0.37             | 2.48              | 1.87              | 1.96              | 2.24              | 1.67              | 0.85           |
| TOTAL                          | 100.27           | 98.87             | 99.44             | 99.11             | 98.33             | 97.82             | 98.33          |
| Ba                             | 1605             | 15100             | 9700              | 10100             | 13600             | 11340             | 4870           |
| Rb                             | 45               | 252               | 314               | 284               | 186               | 214               | 166            |
| Sr                             | 284              | 2910              | 2950              | 2950              | 2350              | 1472              | 489            |
| Pb                             | 11               | 24                | 58                | 28                | 83                |                   |                |
| Th                             | 1                | 7                 | 48                | 21                | 10                |                   |                |
| U                              | 1                | 7                 | 6                 | 10                | 8                 |                   |                |
| Zr                             | 423              | 1770              | 1420              | 1780              | 1690              | 976               | 1334           |
| Nb                             | 21               | 59                | 43                | 63                | 49                |                   |                |
| Y                              | 32               | 32                | 36                | 39                | 29                | 85                | 79             |
| La                             | 55               | 172               | 138               | 173               | 153               |                   |                |
| Ce                             | 95               | 294               | 268               | 335               | 273               |                   |                |
| Nd                             | 46               |                   |                   |                   |                   |                   |                |
| Sn                             |                  | <1                | 1                 | 1                 | <1                |                   |                |
| V                              | 206              | 168               | 143               | 152               | 170               | 90                | 50             |
| Cr                             | 39               | 274               | 348               | 362               | 249               | 71                | 24             |
| Ni                             | 38               | 243               | 298               | 300               | 220               | 54                | 39             |
| Cu                             | 46               | 7                 | 80                | 27                | 94                | 67                | 20             |
| Zn                             | 81               | 82                | 86                | 85                | 78                | 125               | 106            |
| Ga                             | 19               | 13                | 15                | 15                | 12                | 27                | 17             |

## Rayner Complex Felsic Gneisses

| Sample Number                  | 76283038           | 77283476        | 77283493        | 77283498           | 77283499           | 77283500           | 77284192           | 77284691           | 77284811           | 77283554           |
|--------------------------------|--------------------|-----------------|-----------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| Area                           | Enderby            | Enderby         | Enderby         | Enderby            | Enderby            | Kemp               | Enderby            | Enderby            | Kemp               | Enderby            |
| Locality                       | Land               | Land            | Land            | Land               | Land               | Land               | Land               | Land               | Land               | Land               |
| Rock type                      | Molodez-hnaya      | Mount Robinson  | Papanin Ntk     | Ward Ntk           | Ward Ntk           | Dismal Mts         | Kitchen-side Gl.   | Forefinger Point   | Georges Island     | Mount Underwood    |
| Additional Data                | Cp-op-qz-pl gneiss | Op-qz-pl gneiss | Op-qz-pl gneiss | Hb-op-qz-pl gneiss | Hb-op-qz-pl gneiss | Op-qz-pl-kf gneiss | Op-qz-pl-kf gneiss | Bi-qz-kf-pl gneiss | Op-qz-pl-kf gneiss | Op-qz-pl-kf gneiss |
| Age                            | Op gneiss          | Op gneiss       | Op gneiss       | Op gneiss          | Op gneiss          | Op gneiss          | Op gneiss          | Op gneiss          | Op gneiss          | Op gneiss          |
| Bibliog. ref.                  | Protero            | Protero         | Protero         | Protero            | Protero            | Protero            | Protero            | Protero            | Protero            | Protero            |
|                                | 5,6                | 5,6             | 5,6             | 5,6                | 5,6                | 5,6                | 5,6                | 5,6                | 5,6                | 5,6                |
| SiO <sub>2</sub>               | 63.80              | 66.30           | 66.40           | 63.70              | 57.00              | 67.30              | 68.10              | 65.70              | 74.40              | 66.40              |
| TiO <sub>2</sub>               | 0.64               | 0.56            | 0.38            | 0.51               | 0.66               | 0.77               | 0.77               | 1.20               | 0.24               | 0.54               |
| Al <sub>2</sub> O <sub>3</sub> | 15.49              | 15.28           | 17.38           | 16.24              | 18.35              | 14.57              | 14.36              | 14.45              | 13.77              | 16.11              |
| Fe <sub>2</sub> O <sub>3</sub> | 2.28               | 1.65            | 1.99            | 2.68               | 3.17               | 1.81               | 2.63               | 3.35               | 1.21               | 0.72               |
| FeO                            | 3.28               | 3.53            | 1.71            | 2.25               | 3.52               | 2.91               | 2.53               | 2.52               | 0.88               | 2.54               |
| MnO                            | 0.12               | 0.18            | 0.04            | 0.10               | 0.12               | 0.07               | 0.04               | 0.06               | 0.02               | 0.17               |
| MgO                            | 3.14               | 1.91            | 0.96            | 2.85               | 3.76               | 0.80               | 1.07               | 1.58               | 0.43               | 1.66               |
| CaO                            | 5.65               | 4.59            | 5.05            | 6.07               | 8.01               | 3.33               | 3.37               | 3.02               | 2.23               | 3.40               |
| Na <sub>2</sub> O              | 3.31               | 3.76            | 3.77            | 3.72               | 4.02               | 2.81               | 2.73               | 3.77               | 3.03               | 3.52               |
| K <sub>2</sub> O               | 1.89               | 1.34            | 1.36            | 0.74               | 0.51               | 4.52               | 4.01               | 2.32               | 4.62               | 4.58               |
| P <sub>2</sub> O <sub>5</sub>  | 0.11               | 0.14            | 0.02            | 0.13               | 0.20               | 0.31               | 0.18               | 0.33               | 0.06               | 0.12               |
| H <sub>2</sub> O <sup>+</sup>  |                    | 0.25            | 0.20            | 0.34               | 0.31               | 0.31               | 0.34               | 0.49               | 0.14               | 0.30               |
| H <sub>2</sub> O <sup>-</sup>  |                    | 0.10            | 0.13            | 0.10               | 0.09               | 0.08               | 0.02               | 0.07               | 0.06               | 0.06               |
| CO <sub>2</sub>                |                    |                 |                 |                    |                    |                    |                    |                    |                    |                    |
| Rest                           | 0.23               | 0.19            | 0.19            | 0.21               | 0.22               | 0.24               | 0.24               | 0.31               | 0.23               | 0.19               |
| TOTAL                          | 99.94              | 99.78           | 99.58           | 99.64              | 99.94              | 99.83              | 100.39             | 99.17              | 101.32             | 100.31             |
| Ba                             | 1060               | 769             | 458             | 643                | 478                | 1020               | 1130               | 1260               | 1420               | 915                |
| Rb                             | 39                 | 9               | 17              | 5                  | 1                  | 141                | 104                | 149                | 101                | 92                 |
| Sr                             | 418                | 344             | 580             | 695                | 918                | 181                | 156                | 296                | 121                | 247                |
| Pb                             | 19                 | 4               | 10              | 4                  | 1                  | 28                 | 13                 | 31                 | 27                 | 9                  |
| Th                             | <1                 | <1              | <1              | <1                 | 1                  | 2                  | 5                  | 6                  | 9                  | 1                  |
| U                              | <1                 | <1              | <1              | <1                 | <1                 | <1                 | <1                 | 1                  | <1                 | <1                 |
| Zr                             | 76                 | 141             | 245             | 91                 | 45                 | 356                | 249                | 384                | 142                | 131                |
| Nb                             | 4                  | 1               | 1               | 6                  | 2                  | 14                 | 7                  | 13                 | <1                 | 8                  |
| Y                              | 12                 | 14              | 2               | 17                 | 10                 | 28                 | 13                 | 19                 | 3                  | 13                 |
| La                             | 10                 | 11              | 37              | 9                  | 7                  | 48                 | 76                 | 55                 | 45                 | 23                 |
| Ce                             | 20                 | 18              | 55              | 18                 | 13                 | 87                 | 99                 | 94                 | 57                 | 46                 |
| Nd                             |                    |                 |                 |                    |                    |                    |                    |                    |                    |                    |
| Sn                             | 1                  | <1              | <1              | 1                  | 1                  | <1                 | 1                  | 1                  | <1                 | <1                 |
| V                              | 98                 | 79              | 32              | 87                 | 126                | 32                 | 52                 | 98                 | 17                 | 19                 |
| Cr                             | 84                 | 33              | 6               | 41                 | 56                 | 7                  | 17                 | 28                 | 6                  | 8                  |
| Ni                             | 24                 | 12              | 12              | 25                 | 27                 | 3                  | 8                  | 15                 | 8                  | 3                  |
| Cu                             | 15                 | 27              | 7               | 15                 | 10                 | 12                 | 12                 | 46                 | 3                  | 4                  |
| Zn                             | 49                 | 67              | 40              | 65                 | 68                 | 66                 | 59                 | 70                 | 34                 | 71                 |
| Ga                             | 17                 | 16              | 22              | 18                 | 19                 | 21                 | 19                 | 18                 | 14                 | 14                 |



## Rayner Complex Felsic Gneisses

| Sample Number                  | 77283564                 | 77283576                 | 77283586                     | 77284577                 | 76283043                  | 76283044                  | 76283050                  | 77283558               | 77283491                | 77283494               |
|--------------------------------|--------------------------|--------------------------|------------------------------|--------------------------|---------------------------|---------------------------|---------------------------|------------------------|-------------------------|------------------------|
| Area                           | Enderby                  | Kemp                     | Kemp                         | Enderby                  | Enderby                   | Enderby                   | Enderby                   | Enderby                | Enderby                 | Enderby                |
| Locality                       | Land<br>Mount<br>Denholm | Land<br>Mount<br>Channon | Land<br>Turbulence<br>Bluffs | Land<br>Wattle<br>Island | Land<br>Molodez-<br>hnaya | Land<br>Molodez-<br>hnaya | Land<br>Molodez-<br>hnaya | Land<br>Mount<br>Flett | Land<br>Krasnaya<br>Ntk | Land<br>Ward<br>Ntk    |
| Rock type                      | Bi-op-qz-<br>pl gneiss   | Bi-op-qz-<br>pl gneiss   | Hb-op-qz-<br>pl gneiss       | Op-qz-kf<br>gneiss       | Bi-hb-qz-<br>pl gneiss    | Bi-qz-pl-<br>kf gneiss    | Bi-qz-pl-<br>kf gneiss    | Bi-hb-qz-<br>pl-kf gn  | Gt-pl-qz-<br>kf gneiss  | Gt-qz-kf-<br>pl gneiss |
| Additional Data                | Op gneiss                | Op gneiss                | Op gneiss                    | Op gneiss                | Bi gneiss                 | Bi gneiss                 | Bi gneiss                 | Bi gneiss              | Gt gneiss               | Gt gneiss              |
| Age                            | Protero                  | Protero                  | Protero                      | Protero                  | Protero                   | Protero                   | Protero                   | Protero                | Protero                 | Protero                |
| Bibliog. ref.                  | 5,6                      | 5,6                      | 5,6                          | 5,6                      | 5,6                       | 5,6                       | 5,6                       | 5,6                    | 5,6                     | 5,6                    |
| SiO <sub>2</sub>               | 59.10                    | 59.70                    | 69.70                        | 75.20                    | 57.40                     | 71.20                     | 66.60                     | 61.70                  | 73.60                   | 71.90                  |
| TiO <sub>2</sub>               | 0.84                     | 1.12                     | 0.42                         | 0.18                     | 0.76                      | 0.19                      | 0.58                      | 1.24                   | 0.22                    | 0.56                   |
| Al <sub>2</sub> O <sub>3</sub> | 16.40                    | 13.73                    | 15.93                        | 14.13                    | 16.31                     | 14.81                     | 16.12                     | 14.87                  | 14.01                   | 13.98                  |
| Fe <sub>2</sub> O <sub>3</sub> | 1.62                     | 1.12                     | 1.81                         | 1.11                     | 3.85                      | 1.70                      | 1.68                      | 2.89                   | 0.79                    | 1.37                   |
| FeO                            | 6.34                     | 9.32                     | 2.08                         | 0.52                     | 4.95                      | 1.07                      | 1.74                      | 4.05                   | 0.80                    | 2.15                   |
| MnO                            | 0.14                     | 0.20                     | 0.04                         | 0.02                     | 0.20                      | 0.04                      | 0.04                      | 0.08                   | 0.03                    | 0.13                   |
| MgO                            | 4.40                     | 5.80                     | 1.08                         | 0.25                     | 4.19                      | 0.45                      | 1.31                      | 2.31                   | 0.55                    | 1.64                   |
| CaO                            | 5.81                     | 5.55                     | 4.71                         | 1.43                     | 6.90                      | 1.35                      | 2.84                      | 4.42                   | 1.25                    | 4.16                   |
| Na <sub>2</sub> O              | 3.54                     | 1.70                     | 4.77                         | 3.82                     | 3.33                      | 3.13                      | 3.50                      | 2.40                   | 2.88                    | 1.11                   |
| K <sub>2</sub> O               | 0.84                     | 0.71                     | 0.21                         | 5.50                     | 1.51                      | 5.97                      | 5.12                      | 4.82                   | 5.88                    | 2.70                   |
| P <sub>2</sub> O <sub>5</sub>  | 0.24                     | 0.20                     | 0.12                         | 0.04                     | 0.17                      | 0.11                      | 0.50                      | 0.42                   | 0.09                    | 0.07                   |
| H <sub>2</sub> O <sup>+</sup>  | 0.54                     | 0.27                     | 0.32                         | 0.17                     |                           |                           |                           | 0.41                   | 0.28                    | 0.66                   |
| H <sub>2</sub> O <sup>-</sup>  | 0.07                     | 0.05                     | 0.11                         | 0.12                     |                           |                           |                           | 0.05                   | 0.07                    | 0.12                   |
| CO <sub>2</sub>                |                          |                          |                              |                          |                           |                           |                           |                        |                         |                        |
| Rest                           | 0.24                     | 0.18                     | 0.15                         | 0.18                     | 0.19                      | 0.20                      | 0.52                      | 0.37                   | 0.20                    | 0.18                   |
| TOTAL                          | 100.12                   | 99.65                    | 101.45                       | 102.67                   | 99.76                     | 100.22                    | 100.55                    | 100.03                 | 100.65                  | 100.73                 |
| Ba                             | 374                      | 378                      | 176                          | 910                      | 531                       | 584                       | 2690                      | 1280                   | 708                     | 835                    |
| Rb                             | 5                        | 17                       | 1                            | 110                      | 131                       | 266                       | 148                       | 159                    | 216                     | 56                     |
| Sr                             | 834                      | 149                      | 651                          | 108                      | 353                       | 156                       | 1196                      | 220                    | 310                     | 213                    |
| Pb                             | 4                        | 7                        | 3                            | 32                       | 16                        | 36                        | 31                        | 19                     | 52                      | 6                      |
| Th                             | 2                        | 2                        | 1                            | 30                       | 3                         | 93                        | 4                         | 10                     | 37                      | 1                      |
| U                              | <1                       | <1                       | <1                           | <1                       | <1                        | 2                         | <1                        | 2                      | 4                       | <1                     |
| Zr                             | 96                       | 104                      | 176                          | 156                      | 51                        | 276                       | 64                        | 622                    | 105                     | 125                    |
| Nb                             | 5                        | 6                        | 2                            | 4                        | 19                        | 5                         | 5                         | 26                     | 7                       | 4                      |
| Y                              | 24                       | 11                       | 4                            | 4                        | 24                        | 10                        | 17                        | 66                     | 6                       | 37                     |
| La                             | 16                       | 15                       | 11                           | 57                       | 17                        | 82                        | 77                        | 106                    | 50                      | 15                     |
| Ce                             | 31                       | 25                       | 19                           | 85                       | 36                        | 142                       | 132                       | 235                    | 80                      | 27                     |
| Nd                             |                          |                          |                              |                          |                           |                           |                           |                        |                         |                        |
| Sn                             | <1                       | <1                       | <1                           | <1                       | 7                         | 2                         | 1                         | <1                     | 1                       | <1                     |
| V                              | 191                      | 221                      | 43                           | 5                        | 150                       | 8                         | 40                        | 99                     | 16                      | 33                     |
| Cr                             | 119                      | 197                      | 14                           | 5                        | 58                        | <3                        | 4                         | 36                     | 14                      | 62                     |
| Ni                             | 28                       | 74                       | 5                            | <2                       | 14                        | 2                         | 7                         | 14                     | 5                       | 30                     |
| Cu                             | 32                       | 14                       | 8                            | 5                        | 12                        | 5                         | 8                         | 26                     | 30                      | 28                     |
| Zn                             | 78                       | 109                      | 45                           | 31                       | 83                        | 37                        | 52                        | 67                     | 19                      | 53                     |
| Ga                             | 15                       | 16                       | 16                           | 15                       | 21                        | 22                        | 16                        | 15                     | 16                      | 13                     |

## Rayner Complex Felsic Gneisses

| Sample Number                  | 77283495               | 77284372               | 77284636               | 77284692            | 77284806               | 77283475               | 77283492               | 77284371               | 77283582               | 65280131               |
|--------------------------------|------------------------|------------------------|------------------------|---------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
| Area                           | Enderby<br>Land        | Enderby<br>Land        | Kemp<br>Land           | Enderby<br>Land     | Kemp<br>Land           | Enderby<br>Land        | Enderby<br>Land        | Enderby<br>Land        | Kemp<br>Land           | Kemp Land              |
| Locality                       | Ward<br>Ntk            | Sandercock<br>Ntk      | Maruff<br>Peaks        | Forefinger<br>Point | Georges<br>Island      | Mount<br>Robinson      | Papanin<br>Ntk         | Sandercock<br>Ntk      | Turbulence<br>Bluffs   | Abrupt<br>Point        |
| Rock type                      | Gt-qz-kf-<br>pl gneiss | Gt-qz-pl-<br>kf gneiss | Gt-qz-pl-<br>kf gneiss | Gt-qz-mp<br>gneiss  | Gt-bi-qz-<br>pl gneiss | Op-qz-pl-<br>kf gneiss | Op-gt-qz-<br>pl gneiss | Gt-qz-pl-<br>kf gneiss | Gt-op-qz-<br>pl gneiss | Gt-cp-qz-<br>pl gneiss |
| Additional Data                | Gt gneiss              | Gt gneiss              | Gt gneiss              | Gt gneiss           | Gt gneiss              | Gt gneiss              | Gt gneiss              | Gt gneiss              | Gt gneiss              | Gt gneiss              |
| Age                            | Protero                | Protero                | Protero                | Protero             | Protero                | Protero                | Protero                | Protero                | Protero                | Protero                |
| Bibliog. ref.                  | 5,6                    | 5,6                    | 5,6                    | 5,6                 | 5,6                    | 5,6                    | 5,6                    | 5,6                    | 5,6                    | 5                      |
| SiO <sub>2</sub>               | 70.60                  | 76.50                  | 59.60                  | 74.00               | 70.40                  | 68.50                  | 65.40                  | 68.90                  | 66.70                  | 57.40                  |
| TiO <sub>2</sub>               | 0.54                   | 0.24                   | 0.49                   | 0.01                | 0.21                   | 0.60                   | 0.70                   | 0.62                   | 0.59                   | 1.40                   |
| Al <sub>2</sub> O <sub>3</sub> | 13.79                  | 11.84                  | 19.16                  | 14.28               | 16.65                  | 14.11                  | 16.63                  | 14.17                  | 16.24                  | 13.85                  |
| Fe <sub>2</sub> O <sub>3</sub> | 0.97                   | 0.84                   | 1.97                   | 0.54                | 0.55                   | 1.60                   | 3.06                   | 1.60                   | 1.47                   | 5.85                   |
| FeO                            | 2.51                   | 0.83                   | 2.74                   | 0.22                | 1.04                   | 3.10                   | 2.35                   | 2.30                   | 2.55                   | 7.90                   |
| MnO                            | 0.11                   | 0.03                   | 0.09                   | 0.05                | 0.02                   | 0.18                   | 0.09                   | 0.06                   | 0.06                   | 0.24                   |
| MgO                            | 1.71                   | 0.24                   | 1.28                   | 0.13                | 0.54                   | 1.19                   | 1.38                   | 0.67                   | 1.44                   | 0.97                   |
| CaO                            | 4.06                   | 0.89                   | 3.44                   | 1.14                | 4.34                   | 2.49                   | 4.65                   | 2.14                   | 5.17                   | 5.22                   |
| Na <sub>2</sub> O              | 2.90                   | 2.67                   | 3.05                   | 4.43                | 4.47                   | 2.65                   | 3.76                   | 2.65                   | 4.64                   | 3.94                   |
| K <sub>2</sub> O               | 2.61                   | 5.26                   | 5.85                   | 4.75                | 1.08                   | 4.87                   | 1.63                   | 5.28                   | 0.40                   | 2.35                   |
| P <sub>2</sub> O <sub>5</sub>  | 0.07                   | 0.05                   | 0.08                   | 0.02                | 0.03                   | 0.18                   | 0.19                   | 0.17                   | 0.18                   | 0.40                   |
| H <sub>2</sub> O <sup>+</sup>  | 0.49                   | 0.22                   | 0.60                   | 0.20                | 0.36                   | 0.32                   | 0.35                   | 0.43                   | 0.39                   | 0.26                   |
| H <sub>2</sub> O <sup>-</sup>  | 0.14                   | 0.06                   | 0.09                   | 0.02                | 0.05                   | 0.07                   | 0.11                   | 0.01                   | 0.08                   | 0.09                   |
| CO <sub>2</sub>                |                        |                        |                        |                     |                        |                        |                        |                        |                        |                        |
| Rest                           | 0.19                   | 0.12                   | 0.24                   | 0.07                | 0.08                   | 0.25                   | 0.18                   | 0.19                   | 0.14                   | 0.31                   |
| TOTAL                          | 100.69                 | 99.79                  | 98.68                  | 99.86               | 99.82                  | 100.11                 | 100.48                 | 99.19                  | 100.05                 | 100.18                 |
| Ba                             | 697                    | 204                    | 1020                   | 164                 | 206                    | 1400                   | 489                    | 623                    | 219                    | 1681                   |
| Rb                             | 50                     | 384                    | 222                    | 201                 | 25                     | 58                     | 41                     | 212                    | 4                      | 41                     |
| Sr                             | 166                    | 45                     | 228                    | 50                  | 196                    | 260                    | 336                    | 115                    | 526                    | 158                    |
| Pb                             | 13                     | 37                     | 44                     | 66                  | 18                     | 10                     | 9                      | 36                     | 5                      | 14                     |
| Th                             | 3                      | 30                     | 18                     | 1                   | <1                     | 1                      | 1                      | 21                     | 2                      | 4                      |
| U                              | <1                     | 2                      | <1                     | 1                   | <1                     | <1                     | <1                     | <1                     | <1                     | 2                      |
| Zr                             | 323                    | 127                    | 157                    | 47                  | 25                     | 153                    | 249                    | 255                    | 177                    | 226                    |
| Nb                             | 18                     | 8                      | 6                      | <1                  | 3                      | 4                      | 7                      | 9                      | 5                      | 20                     |
| Y                              | 21                     | 27                     | 23                     | 20                  | 1                      | 22                     | 42                     | 32                     | 5                      | 67                     |
| La                             | 23                     | 26                     | 44                     | 10                  | 26                     | 12                     | 48                     | 42                     | 19                     | 50                     |
| Ce                             | 41                     | 54                     | 72                     | 16                  | 36                     | 23                     | 81                     | 77                     | 31                     | 84                     |
| Nd                             |                        |                        |                        |                     |                        |                        |                        |                        |                        |                        |
| Sn                             | 1                      | 4                      | <1                     | <1                  | 1                      | <1                     | <1                     | 1                      | <1                     | <1                     |
| V                              | 41                     | 9                      | 51                     | 1                   | 21                     | 44                     | 49                     | 40                     | 39                     | 20                     |
| Cr                             | 34                     | 8                      | 30                     | 3                   | 6                      | 13                     | 7                      | 23                     | 17                     | 16                     |
| Ni                             | 9                      | 5                      | 9                      | 2                   | 9                      | 10                     | 11                     | 9                      | 9                      | 7                      |
| Cu                             | 41                     | 3                      | 5                      | 2                   | 10                     | 36                     | 26                     | 10                     | 16                     | 21                     |
| Zn                             | 54                     | 28                     | 57                     | 4                   | 24                     | 97                     | 39                     | 28                     | 48                     | 205                    |
| Ga                             | 16                     | 16                     | 22                     | 21                  | 19                     | 17                     | 19                     | 19                     | 16                     | 22                     |

## Rayner Complex Mafic Granulites

| Sample Number                  | 77283471              | 77283484              | 65280209              | 65280213                          | 65280220              | 65280221              | 65280224              | 75830004              | 75830008           | 75830012              |
|--------------------------------|-----------------------|-----------------------|-----------------------|-----------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|--------------------|-----------------------|
| Area                           | Enderby<br>Land       | Enderby<br>Land       | Kemp Land             | Kemp Land                         | Kemp Land             | Kemp Land             | Kemp Land             | Kemp Land             | Kemp Land          | Kemp Land             |
| Locality                       | Mount<br>Robinson     | Mount<br>Robinson     | Robert<br>Glacier     | Rayner<br>Peak                    | Else Ntk              | Else Ntk              | Turbulence<br>Bluffs  | Rayner<br>Peak        | Rayner<br>Peak     | Rayner<br>Peak        |
| Rock type                      | Gt-cp-pl<br>granulite | Hb-px-pl<br>granulite | Gt-cp-pl<br>granulite | Gt-px-pl<br>granulite<br>Metadyke | Gt-px-pl<br>granulite | Gt-cp-pl<br>granulite | Hb-px-pl<br>granulite | Gt-px-pl<br>granulite | Gt-cp<br>granulite | Gt-cp-pl<br>granulite |
| Additional Data                |                       |                       |                       |                                   |                       |                       |                       |                       |                    |                       |
| Age                            | Protero               | Protero               | Protero               | Protero                           | Protero               | Protero               | Protero               | Protero               | Protero            | Protero               |
| Bibliog. ref.                  | 5,13                  | 5,13                  | 5,13                  | 5,13                              | 5,13                  | 5,13                  | 5,13                  | 5,13                  | 5,13               | 5,13                  |
| SiO <sub>2</sub>               | 48.10                 | 51.30                 | 46.00                 | 50.90                             | 53.10                 | 48.00                 | 50.20                 | 49.40                 | 34.70              | 49.30                 |
| TiO <sub>2</sub>               | 2.19                  | 1.08                  | 1.73                  | 0.90                              | 0.60                  | 0.56                  | 0.90                  | 0.77                  | 6.18               | 1.97                  |
| Al <sub>2</sub> O <sub>3</sub> | 13.48                 | 16.36                 | 13.53                 | 13.40                             | 14.91                 | 13.58                 | 10.94                 | 13.74                 | 12.43              | 13.08                 |
| Fe <sub>2</sub> O <sub>3</sub> | 3.50                  | 2.70                  | 2.57                  | 1.91                              | 1.61                  | 2.59                  | 3.18                  | 1.42                  | 2.40               | 2.83                  |
| FeO                            | 11.06                 | 6.06                  | 13.10                 | 10.90                             | 8.20                  | 10.20                 | 10.00                 | 9.40                  | 20.60              | 14.20                 |
| MnO                            | 0.21                  | 0.13                  | 0.30                  | 0.21                              | 0.21                  | 0.23                  | 0.26                  | 0.22                  | 0.33               | 0.25                  |
| MgO                            | 6.45                  | 7.61                  | 6.95                  | 6.94                              | 7.21                  | 9.69                  | 8.39                  | 9.19                  | 7.34               | 6.00                  |
| CaO                            | 10.70                 | 9.81                  | 11.27                 | 10.62                             | 10.53                 | 13.15                 | 11.41                 | 12.12                 | 11.95              | 10.65                 |
| Na <sub>2</sub> O              | 2.90                  | 3.50                  | 2.25                  | 2.64                              | 2.90                  | 1.26                  | 2.58                  | 2.39                  | 0.39               | 1.27                  |
| K <sub>2</sub> O               | 0.28                  | 0.57                  | 1.00                  | 0.38                              | 0.19                  | 0.08                  | 0.27                  | 0.44                  | 0.10               | 0.15                  |
| P <sub>2</sub> O <sub>5</sub>  | 0.22                  | 0.17                  | 0.21                  | 0.07                              | 0.08                  | 0.03                  | 0.09                  | 0.07                  | 2.99               | 0.23                  |
| H <sub>2</sub> O+              | 0.13                  | 0.67                  | 0.75                  | 0.28                              | 0.19                  | 0.26                  | 0.71                  | 0.46                  | 0.27               | 0.20                  |
| H <sub>2</sub> O-              | 0.03                  | 0.10                  | 0.06                  | 0.08                              | 0.05                  | 0.07                  | 0.07                  | 0.07                  | 0.07               | 0.09                  |
| CO <sub>2</sub>                |                       |                       |                       |                                   |                       |                       |                       |                       |                    |                       |
| Rest                           | 0.18                  | 0.19                  | 0.17                  | 0.14                              | 0.15                  | 0.11                  | 0.21                  | 0.15                  | 0.20               | 0.15                  |
| TOTAL                          | 99.43                 | 100.25                | 99.89                 | 99.37                             | 99.93                 | 99.81                 | 99.21                 | 99.84                 | 99.95              | 100.36                |
| Ba                             | 80                    | 250                   | 161                   | 102                               | 143                   | 37                    | 110                   | 55                    | 183                | 54                    |
| Rb                             | 1                     | 1                     | 14                    | 3                                 | <1                    | 2                     | 1                     | 5                     | 8                  | 2                     |
| Sr                             | 329                   | 355                   | 157                   | 141                               | 159                   | 52                    | 132                   | 80                    | 58                 | 52                    |
| Pb                             | 1                     | 2                     | 6                     | 7                                 | 4                     | <1                    | 1                     | 2                     | 2                  | <1                    |
| Th                             | <1                    | 1                     | 1                     | 1                                 | 1                     | <1                    | <1                    | 1                     | 1                  | 6                     |
| U                              | <1                    | <1                    | 2                     | <1                                | <1                    | <1                    | <1                    | 1                     | 2                  | 2                     |
| Zr                             | 108                   | 85                    | 84                    | 38                                | 54                    | 38                    | 56                    | 41                    | 210                | 143                   |
| Nb                             | 7                     | 27                    | 16                    | 2                                 | 3                     | 1                     | 5                     | 5                     | 43                 | 10                    |
| Y                              | 23                    | 20                    | 31                    | 23                                | 19                    | 20                    | 31                    | 21                    | 80                 | 48                    |
| La                             | 9                     | 11                    | 14                    | 11                                | 9                     | 2                     | 14                    | 5                     | 85                 | 25                    |
| Ce                             | 24                    | 22                    | 25                    | 15                                | 10                    | <1                    | 27                    | 1                     | 158                | 38                    |
| Nd                             |                       |                       |                       |                                   |                       |                       |                       |                       |                    |                       |
| Sn                             | 1                     | <1                    | 1                     | <1                                | 1                     | 1                     | 2                     | 1                     | 1                  | <1                    |
| V                              | 356                   | 199                   | 408                   | 285                               | 176                   | 247                   | 257                   | 263                   | 368                | 308                   |
| Cr                             | 95                    | 286                   | 72                    | 157                               | 215                   | 97                    | 551                   | 344                   | 89                 | 91                    |
| Ni                             | 65                    | 73                    | 33                    | 64                                | 119                   | 78                    | 136                   | 129                   | 22                 | 55                    |
| Cu                             | 61                    | 11                    | 58                    | 42                                | 63                    | 89                    | 51                    | 5                     | 15                 | 91                    |
| Zn                             | 124                   | 89                    | 113                   | 86                                | 112                   | 85                    | 131                   | 71                    | 117                | 114                   |
| Ga                             | 23                    | 17                    | 18                    | 16                                | 15                    | 12                    | 13                    | 15                    | 13                 | 16                    |

## Rayner Complex Mafic Granulites

| Sample Number                  | 75830019           | 77283581           | 77284647           | 77284813           | 75830271           | 77283755       |
|--------------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|----------------|
| Area                           | Kemp Land          | Kemp Land          | Enderby Land       | Kemp Land          | Kemp Land          | Enderby Land   |
| Locality                       | Rayner Peak        | Turbulence Bluffs  | Forefinger Point   | Georges Island     | Jensen Island      | Amphith. Lakes |
| Rock type                      | Gt-cp-pl granulite | Gt-px-pl granulite | Op-hb-cp granulite | Px-hb-pl granulite | Hb-px-pl granulite | Anorthosite    |
| Additional Data                |                    | Metadyke           |                    | Metadyke           | Metadyke           |                |
| Age                            | Protero            | Protero            | Protero            | Protero            | Protero            | Protero        |
| Bibliog. ref.                  | 5,13               | 5,13               | 5,13               | 5,13               | 5,13               | 5              |
| SiO <sub>2</sub>               | 44.80              | 49.20              | 47.00              | 48.70              | 56.60              | 51.40          |
| TiO <sub>2</sub>               | 2.23               | 1.00               | 1.44               | 1.35               | 0.88               | 0.03           |
| Al <sub>2</sub> O <sub>3</sub> | 12.27              | 13.25              | 7.32               | 13.45              | 12.98              | 30.00          |
| Fe <sub>2</sub> O <sub>3</sub> | 2.45               | 2.05               | 6.04               | 3.41               | 1.02               | 0.17           |
| FeO                            | 15.90              | 9.78               | 10.74              | 10.30              | 10.72              | 0.34           |
| MnO                            | 0.28               | 0.22               | 0.21               | 0.23               | 0.17               | 0.01           |
| MgO                            | 6.82               | 7.73               | 14.17              | 7.10               | 4.08               | 0.37           |
| CaO                            | 11.40              | 12.35              | 11.24              | 11.77              | 8.12               | 14.34          |
| Na <sub>2</sub> O              | 1.40               | 2.82               | 1.11               | 2.02               | 3.43               | 2.59           |
| K <sub>2</sub> O               | 0.36               | 0.23               | 1.08               | 0.24               | 0.74               | 0.46           |
| P <sub>2</sub> O <sub>5</sub>  | 0.23               | 0.08               | 0.27               | 0.10               | 0.13               | 0.01           |
| H <sub>2</sub> O <sup>+</sup>  | 0.43               | 0.58               | 0.64               | 1.31               | 0.37               | 0.17           |
| H <sub>2</sub> O <sup>-</sup>  | 0.06               | 0.05               | 0.14               | 0.05               |                    | 0.03           |
| CO <sub>2</sub>                |                    |                    |                    |                    | 6.50               |                |
| Rest                           | 0.16               | 0.13               | 0.46               | 0.17               | 0.15               | 0.04           |
| TOTAL                          | 98.79              | 99.47              | 101.86             | 100.20             | 99.89              | 99.96          |
| Ba                             | 45                 | 31                 | 491                | 48                 | 341                | 87             |
| Rb                             | 3                  | 6                  | 50                 | 8                  | 8                  | 5              |
| Sr                             | 110                | 100                | 198                | 119                | 125                | 153            |
| Pb                             | 2                  | <1                 | <1                 | 1                  | 2                  | 6              |
| Th                             | <1                 | 2                  | <1                 | 1                  | 1                  | <1             |
| U                              | <1                 | <1                 | <1                 | <1                 | <1                 | <1             |
| Zr                             | 129                | 49                 | 111                | 67                 | 110                | 1              |
| Nb                             | 6                  | 1                  | 8                  | 2                  | 9                  | 1              |
| Y                              | 49                 | 23                 | 20                 | 29                 | 28                 | 3              |
| La                             | 10                 | 4                  | 24                 | 3                  | 21                 | 11             |
| Ce                             | 15                 | 9                  | 42                 | 6                  | 31                 | 15             |
| Nd                             |                    |                    |                    |                    | 15                 |                |
| Sn                             | 1                  | <1                 | 3                  | <1                 |                    | <1             |
| V                              | 403                | 322                | 260                | 414                | 196                | 3              |
| Cr                             | 104                | 142                | 1435               | 85                 | 39                 | 3              |
| Ni                             | 76                 | 56                 | 452                | 71                 | 43                 | 4              |
| Cu                             | 15                 | 48                 | 109                | 224                | 88                 | 9              |
| Zn                             | 127                | 79                 | 136                | 93                 | 97                 | 10             |
| Ga                             | 19                 | 14                 | 14                 | 17                 | 13                 | 15             |

## Rayner Complex Metasediments

| Sample Number                  | 77284648   | 77284651   | 77284653   | 77284654   | 77284655   |
|--------------------------------|------------|------------|------------|------------|------------|
| Area                           | Enderby    | Enderby    | Enderby    | Enderby    | Enderby    |
|                                | Land       | Land       | Land       | Land       | Land       |
| Locality                       | Forefinger | Forefinger | Forefinger | Forefinger | Forefinger |
|                                | Point      | Point      | Point      | Point      | Point      |
| Rock type                      | Si-op-bi-  | Si-op-bi-  | Sa-op-bi-  | Bi-si-cd-  | Gt-op-bi-  |
|                                | cd pelite  | cd pelite  | cd pelite  | op pelite  | cd pelite  |
| Additional Data                |            |            |            |            |            |
| Age                            | Protero    | Protero    | Protero    | Protero    | Protero    |
| Bibliog. ref.                  | 5          | 5          | 5          | 5          | 5          |
| SiO <sub>2</sub>               | 62.80      | 65.40      | 45.00      | 48.70      | 41.20      |
| TiO <sub>2</sub>               | 0.34       | 1.14       | 1.38       | 1.99       | 2.31       |
| Al <sub>2</sub> O <sub>3</sub> | 19.18      | 14.91      | 23.04      | 20.81      | 21.91      |
| Fe <sub>2</sub> O <sub>3</sub> | 0.78       | 1.68       | 1.88       | 0.87       | 3.07       |
| FeO                            | 2.95       | 2.70       | 5.15       | 6.40       | 7.65       |
| MnO                            | 0.09       | 0.04       | 0.05       | 0.06       | 0.15       |
| MgO                            | 7.32       | 9.15       | 17.20      | 15.43      | 15.32      |
| CaO                            | 0.09       | 0.39       | 0.47       | 0.62       | 0.67       |
| Na <sub>2</sub> O              | 1.38       | 1.26       | 0.52       | 1.56       | 0.50       |
| K <sub>2</sub> O               | 3.08       | 0.83       | 3.24       | 1.97       | 4.62       |
| P <sub>2</sub> O <sub>5</sub>  | 0.02       | 0.06       | 0.21       | 0.12       | 0.20       |
| H <sub>2</sub> O <sup>+</sup>  | 0.76       | 0.53       | 1.44       | 0.81       | 1.75       |
| H <sub>2</sub> O <sup>-</sup>  | 0.10       | 0.08       | 0.06       | 0.08       | 0.06       |
| CO <sub>2</sub>                |            |            |            |            |            |
| Rest                           | 0.14       | 0.15       | 0.26       | 0.26       | 0.37       |
| TOTAL                          | 99.03      | 98.32      | 99.90      | 99.68      | 99.78      |
| Ba                             | 272        | 108        | 193        | 150        | 741        |
| Rb                             | 173        | 38         | 241        | 131        | 358        |
| Sr                             | 36         | 19         | 32         | 28         | 41         |
| Pb                             | 15         | 5          | 7          | 8          | 8          |
| Th                             | 51         | 73         | 89         | 113        | 93         |
| U                              | 2          | 12         | 16         | 23         | 9          |
| Zr                             | 270        | 405        | 635        | 677        | 806        |
| Nb                             | 22         | 36         | 29         | 55         | 64         |
| Y                              | 7          | 33         | 40         | 50         | 30         |
| La                             | 51         | 118        | 191        | 177        | 128        |
| Ce                             | 74         | 196        | 321        | 301        | 216        |
| Nd                             |            |            |            |            |            |
| Sn                             | <1         | 1          | 3          | 2          | 4          |
| V                              | 42         | 63         | 98         | 166        | 210        |
| Cr                             | 12         | 20         | 35         | 30         | 38         |
| Ni                             | 10         | 19         | 34         | 32         | 52         |
| Cu                             | 3          | 3          | 3          | 4          | 3          |
| Zn                             | 52         | 20         | 44         | 34         | 83         |
| Ga                             | 34         | 16         | 26         | 28         | 26         |



## Rayner Complex Granitic Intrusives

| Sample Number                  | 77284367       | 77284603                       | 77284680                       | 77284366                     | 77284368                        | 77284601                            | 77284602                        | 77284678                        | 77284679                        | 76283040                |
|--------------------------------|----------------|--------------------------------|--------------------------------|------------------------------|---------------------------------|-------------------------------------|---------------------------------|---------------------------------|---------------------------------|-------------------------|
| Area                           | Enderby        | Enderby                        | Enderby                        | Enderby                      | Enderby                         | Enderby                             | Enderby                         | Enderby                         | Enderby                         | Enderby                 |
| Locality                       | Land           | Land                           | Land                           | Land                         | Land                            | Land                                | Land                            | Land                            | Land                            | Land                    |
| Rock type                      | Sandercock Ntk | Mount Sibiriyakov Hb-bi granod | Vechernyy Hill Hb-bi granod gn | Sandercock Ntk Op-hb granite | Sandercock Ntk Hb-cp-op granite | Mount Sibiriyakov Bi granite gneiss | Mount Sibiriyakov Bi-gt granite | Vechernyy Hill Gt-hb granite gn | Vechernyy Hill Hb-bi granite gn | Molodezhnaya Bi granite |
| Additional Data                |                |                                |                                |                              |                                 |                                     |                                 |                                 |                                 |                         |
| Age                            | Protero        | Protero                        | Protero                        | Protero                      | Protero                         | Protero                             | Protero                         | Protero                         | Protero                         | Cambrian                |
| Bibliog. ref.                  | 5,6            | 5,6                            | 5,6                            | 5,6                          | 5,6                             | 5,6                                 | 5,6                             | 5,6                             | 5,6                             | 5,6                     |
| SiO <sub>2</sub>               | 55.60          | 54.00                          | 53.50                          | 62.80                        | 55.70                           | 71.60                               | 73.20                           | 64.60                           | 64.30                           | 72.80                   |
| TiO <sub>2</sub>               | 0.89           | 2.19                           | 1.90                           | 1.10                         | 1.62                            | 0.22                                | 0.29                            | 1.34                            | 1.44                            | 0.21                    |
| Al <sub>2</sub> O <sub>3</sub> | 21.19          | 15.60                          | 15.55                          | 15.51                        | 16.82                           | 15.13                               | 13.81                           | 13.57                           | 13.65                           | 13.52                   |
| Fe <sub>2</sub> O <sub>3</sub> | 2.05           | 4.54                           | 4.01                           | 2.50                         | 4.38                            | 1.07                                | 0.81                            | 2.86                            | 2.70                            | 1.40                    |
| FeO                            | 3.96           | 5.31                           | 6.98                           | 3.74                         | 4.74                            | 0.92                                | 1.06                            | 3.95                            | 4.50                            | 0.94                    |
| MnO                            | 0.11           | 0.13                           | 0.17                           | 0.11                         | 0.15                            | 0.02                                | 0.03                            | 0.11                            | 0.13                            | 0.03                    |
| MgO                            | 1.69           | 3.95                           | 4.30                           | 1.93                         | 2.31                            | 0.37                                | 0.42                            | 1.22                            | 1.43                            | 0.38                    |
| CaO                            | 6.40           | 6.55                           | 7.29                           | 4.20                         | 5.27                            | 1.27                                | 1.31                            | 3.79                            | 3.66                            | 0.99                    |
| Na <sub>2</sub> O              | 4.06           | 2.63                           | 2.12                           | 3.05                         | 3.17                            | 3.63                                | 2.49                            | 1.82                            | 2.21                            | 2.68                    |
| K <sub>2</sub> O               | 2.44           | 2.55                           | 1.91                           | 4.32                         | 3.92                            | 5.41                                | 6.05                            | 4.83                            | 4.52                            | 6.01                    |
| P <sub>2</sub> O <sub>5</sub>  | 0.36           | 1.24                           | 0.46                           | 0.32                         | 0.53                            | 0.07                                | 0.09                            | 0.34                            | 0.40                            | 0.05                    |
| H <sub>2</sub> O <sup>+</sup>  | 0.73           | 0.74                           | 0.82                           | 0.67                         | 0.46                            | 0.49                                | 0.28                            | 0.41                            | 0.53                            |                         |
| H <sub>2</sub> O <sup>-</sup>  | 0.06           | 0.08                           | 0.11                           | 0.05                         | 0.07                            | 0.04                                | 0.07                            | 0.09                            | 0.12                            |                         |
| CO <sub>2</sub>                |                |                                |                                |                              |                                 |                                     |                                 |                                 |                                 |                         |
| Rest                           | 0.31           | 0.46                           | 0.44                           | 0.30                         | 0.41                            | 0.23                                | 0.22                            | 0.33                            | 0.31                            | 0.49                    |
| TOTAL                          | 99.85          | 99.97                          | 99.56                          | 100.60                       | 99.55                           | 100.47                              | 100.13                          | 99.26                           | 99.90                           | 99.50                   |
| Ba                             | 1310           | 1500                           | 972                            | 1160                         | 1810                            | 881                                 | 924                             | 1320                            | 1180                            | 3530                    |
| Rb                             | 51             | 84                             | 61                             | 159                          | 92                              | 200                                 | 212                             | 214                             | 212                             | 223                     |
| Sr                             | 603            | 1060                           | 384                            | 361                          | 451                             | 142                                 | 189                             | 260                             | 218                             | 382                     |
| Pb                             | 21             | 19                             | 1300                           | 29                           | 22                              | 59                                  | 50                              | 22                              | 23                              | 38                      |
| Th                             | <1             | 8                              | 1                              | 3                            | 2                               | 77                                  | 47                              | 15                              | 30                              | 6                       |
| U                              | <1             | 1                              | <1                             | <1                           | 1                               | 3                                   | 3                               | <1                              | <1                              | <1                      |
| Zr                             | 266            | 207                            | 183                            | 324                          | 543                             | 230                                 | 208                             | 350                             | 330                             | 80                      |
| Nb                             | 9              | 27                             | 12                             | 14                           | 18                              | 11                                  | 7                               | 19                              | 24                              | 2                       |
| Y                              | 22             | 24                             | 36                             | 37                           | 41                              | 6                                   | 8                               | 52                              | 56                              | 7                       |
| La                             | 37             | 125                            | 47                             | 48                           | 69                              | 91                                  | 44                              | 96                              | 104                             | 18                      |
| Ce                             | 65             | 230                            | 99                             | 130                          | 128                             | 137                                 | 77                              | 196                             | 193                             | 24                      |
| Nd                             |                |                                |                                |                              |                                 |                                     |                                 |                                 |                                 |                         |
| Sn                             | <1             | 3                              | 123                            | 2                            | <1                              | 3                                   | 1                               | 3                               | 4                               | <1                      |
| V                              | 47             | 173                            | 182                            | 74                           | 92                              | 11                                  | 18                              | 76                              | 83                              | 18                      |
| Cr                             | 39             | 83                             | 72                             | 37                           | 27                              | 8                                   | 8                               | 10                              | 12                              | <3                      |
| Ni                             | 11             | 36                             | 50                             | 13                           | 11                              | 4                                   | 6                               | 6                               | 7                               | 3                       |
| Cu                             | 9              | 57                             | 43                             | 14                           | 16                              | 4                                   | 6                               | 16                              | 17                              | 5                       |
| Zn                             | 81             | 118                            | 109                            | 79                           | 104                             | 37                                  | 18                              | 86                              | 98                              | 24                      |
| Ga                             | 29             | 21                             | 24                             | 21                           | 24                              | 21                                  | 14                              | 18                              | 20                              | 14                      |

## Rayner Complex Granitic Intrusives

|                 |          |
|-----------------|----------|
| Sample Number   | 76283052 |
| Area            | Enderby  |
|                 | Land     |
| Locality        | Molodez- |
|                 | hnaya    |
| Rock type       | Bi       |
|                 | granite  |
| Additional Data |          |
| Age             | Cambrian |
| Bibliog. ref.   | 5,6      |

|                                |        |
|--------------------------------|--------|
| SiO <sub>2</sub>               | 72.30  |
| TiO <sub>2</sub>               | 0.18   |
| Al <sub>2</sub> O <sub>3</sub> | 14.30  |
| Fe <sub>2</sub> O <sub>3</sub> | 1.73   |
| FeO                            | 0.83   |
| MnO                            | 0.02   |
| MgO                            | 0.31   |
| CaO                            | 1.20   |
| Na <sub>2</sub> O              | 3.24   |
| K <sub>2</sub> O               | 5.79   |
| P <sub>2</sub> O <sub>5</sub>  | 0.05   |
| H <sub>2</sub> O+              |        |
| H <sub>2</sub> O-              |        |
| CO <sub>2</sub>                |        |
| Rest                           | 0.22   |
| TOTAL                          | 100.17 |

|    |     |
|----|-----|
| Ba | 535 |
| Rb | 274 |
| Sr | 128 |
| Pb | 37  |
| Th | 145 |
| U  | 4   |
| Zr | 255 |
| Nb | 6   |
| Y  | 11  |
| La | 144 |
| Ce | 252 |
| Nd |     |
| Sn | 3   |
| V  | 6   |
| Cr | 3   |
| Ni | 2   |
| Cu | 11  |
| Zn | 16  |
| Ga | 22  |