

DESCRIPTIVE NOTES

Map-area N6 P/4 has rocks of the basement complex in its southern half overlain by the Penrhyn Group to the north. Both successions are cut by major faults that extend beyond the area. The broad expanse of basement complex was mapped only in reconnaissance fashion to outline foliation trends and assess lithologic variations. No mappable units were discovered. Like elsewhere in the fold belt, an intimate and indifferentiable mixture of granodioritic gneiss (Aggn) and foliated and massive plutons (Ap) characterize the complex.

A nearly complete representation of lithologies of the Penrhyn Group is presented. The basal sequence of orthoquartzite (Apo) and minor rusty paragneiss (Apo) lies on the basement complex across the central part of the area, along the quartzite zone and in the northwest corner. The overlying unit (Apo) is thickest in the northwest and thins toward the southern boundary of the group. This unit passes upward into paragneiss (Apo) which contains numerous interbeds of marble and calcium-silicate gneiss (Apo). In the vicinity of Quartzite Lake these interbeds pass northward into a thick massive marble unit. Whether such a transition is a facies change or a result of extensive tight folding and disruption of beds is not known. In the northeastern part of the area, what is believed to be the same marble unit passes into a broad expanse of shallow-dipping calcium-silicate gneiss with interbedded marble. Above this variable unit is paragneiss containing a folded sheet of granitoid gneiss (Aggn). The paragneiss passes upward into massive well bedded quartz-biotite psammite and minor schist (Apo) across an arbitrary contact. Metamorphic grade appears to be uniform throughout the area except in the uppermost psammite unit where in one locality garnet with possible andalusite was noted.

Major structures in the area are two extensive sheets of gneiss of the basement complex. The gneissic sheet northeast of Quartzite Lake extends into map-area N6 P/3 and lies within the upper half of the Penrhyn Group. No clear evidence of its mode of emplacement was observed. Not being mantled by the basal sequence of the group, it does not appear to be a core of a large recumbent fold. Nor is there any evidence of thrust faulting of either its upper or lower contact. It may be a highly deformed granitic sill that intruded the group but if so it has been reconstituted by deformation and metamorphism to exactly resemble gneiss of the basement complex. It presumably has undergone D2 folding with the Penrhyn Group. The gneissic sheet southwest of Quartzite Lake is now probably the core of a recumbent D2 fold modified by thrust faulting as it is partially mantled by orthoquartzite and along its southern margin is apparently faulted against the main mass of the complex. A possible extension of this structure is found to the west in map-area N6 O/1. A recumbent synformal structure possibly complementary to this D2 fold is exposed in the southwestern part of the area, and is illustrated on the cross-section accompanying map-sheet 46 P/3. A thin, tectonically attenuated succession of orthoquartzite, paragneiss, marble and a small unit possibly of acid volcanic rock (Apo) is exposed in the core.

A series of upright and southerly overturned folds formed during D3 and D4 have had major influence on the areal distribution of units in this area and deformed the gneissic sheets and D2 folds described above. Variation in plunge of these structures (easterly in the northeast, westerly in the south and southeast) is presumed to have been caused by folding during D3, but the form of these folds is uncertain. A small domal structure of orthoquartzite cores by gneiss, at the middle of the west border of the area, is likely part of a D3 fold brought up by interference between D4 folding and this late transverse warping. D4 faulting along north-westerly trends produced little detectable offset but may be very prominent geographic lineaments.

Metamorphism of the Penrhyn Group produced two lithologic suites. Most of the group is in uppermost amphibolite facies and contains the assemblages garnet-biotite-sillimanite and cordierite-sillimanite-garnet in paragneiss and in marble, diopside-forsterite-calcite as well as scapolite and a hornblende gneiss. Rocks of the uppermost unit of the group are in greenschist facies and contain chlorite-muscovite-quartz in pelitic units. Porphyroblasts of a mineral tentatively identified as andalusite are common in meta-psammite units and tremolite occurs sporadically in calcareous rocks.

Polyphase structures indicating numerous episodes of deformation of the basement complex and the Penrhyn Group exist throughout the fold belt but unambiguous sequential relationships among them are rare. The earliest phase (D1) is inferred to have affected the basement complex prior to deposition of the Penrhyn Group. Little is known of this phase. The second phase (D2), the earliest observed in the Penrhyn Group, is believed to have formed attenuated isoclinal folds and isoclinal foliation (S2). In all but a few outcrops S2 is parallel to bedding (S0). Meagre evidence suggests that the trend of D2 structures may have been westerly. The effects of D2 on the Penrhyn Group remain problematical, but may be responsible for some of the observed discontinuity of units described above.

The third and fourth phases (D3 and D4) produced prominent meso- and megascopic folds that impose an east-northeast structural grain in the Foxe Fold Belt. D3 folds are tight to nearly isoclinal and usually recumbent. Axial plane foliation (S3) is nearly parallel to limbs (S0) and hence to S2 rendering separation of phases D3 and D4 very difficult. D4 folds are coaxial, or nearly so, with D3 but are more open and generally upright or slightly overturned. Mesoscopic D4 folds can often be observed to have deformed earlier structures.

North to northeasterly trending broad transverse flexures (D5) alter the plunges of pre-existing folds. Few mesoscopic structures associated with this phase were observed. Steeply dipping fractures and faults, many with northerly and northeasterly trends are evidence of the last phase of deformation (D6). Most fault displacements appear to be left-lateral and east-side-up.

Metamorphism is believed to have accompanied all phases of deformation except D3 and D6. It possibly reached its zenith during D3 but mineral recrystallization outlasted much of the penetrative deformation.

Massive and foliated plutonic rocks (Ap) chiefly of hornblende and biotite granodiorite quartz monzonite and granite intrude the basement complex and the Penrhyn Group. Resembling granitoid rocks of the complex, separation of these is based largely on field relationships. Foliated plutonic rocks, except where observed to have intruded the Penrhyn Group, are assigned to the complex (Ap). Where intrusive into the group they (Ap) are considered to be pre- or syntectonic with the main phases of deformation. In some localities intimate mixing with and partial melting of paragneiss has created rock marbles (Am) although millon and fold axes associated with folds observed to have deformed early foliation and/or pre-existing structures.

Available results of radiometric analyses indicate formation of the basement complex prior to 2500 Ma with some events occurring possibly as long as 3000 Ma ago (R.K. Wanless, personal communication, 1976). Deformation of the basement and the Penrhyn Group may have taken place 2134 Ma ago (Jackson and Taylor, 1972) and again during the Hudsonian Orogeny (Cibica 1700 Ma ago). Post-tectonic plutons (1800 Ma old; Heywood, 1966) were emplaced into the fold belt late in the orogenic history. Following extensive uplift and erosion, diabase dykes (Ma) presumed to be part of the Mackenzie dyke swarm of circa 1000 Ma age (Fairbairn, 1970) cut rocks of the fold belt. These are spatially associated with faults and fractures formed during D6 tectonism. Subsequent uplift and erosion was followed by deposition of Ordovician carbonate rocks, remnants of which lie north and south of the fold belt.

REFERENCES: Fairbairn, W.F., 1970. Diabase Dyke Swarms in Geology and Economic Minerals of Canada. Geological Survey of Canada, Economic Geology Report 132, p. 132 - 136.

Heywood, W.M., 1967. Geological Notes Northwestern District of Keewatin and Southern Melville Peninsula, District of Franklin, Northwest Territories (Parts of 46, 47, 56, 57). Geological Survey of Canada, Paper 66-40.

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GENERAL GEOLOGY

The Foxe Fold Belt extends in an east-northeast direction from southern Melville Peninsula to central Baffin Island. It is composed of granitoid gneissic rocks of Archaean age (2500 Ma and older) overlain by meta-sedimentary rocks of Early Proterozoic age (approximately 2200 to 1700 Ma) of the Penrhyn and Pilling Groups. These rocks have undergone deformation and metamorphism mostly during the Hudsonian Orogeny. Generation and emplacement of plutonic rocks preceded, accompanied and followed deformation. Diabase dykes of presumed late Proterozoic age cut older rocks.

The Archaean rocks form a basement complex predominantly of granitoid gneiss (Aggn) and foliated gneiss (Agn) with minor rusty paragneiss (Apo) and hornblende gneiss (Apo) and other meta-sedimentary rocks (Apo-Arb). The gneissic and plutonic rocks are largely of quartz monzonitic to granodioritic composition; leucocratic and mafic varieties of gneiss are also common but do not constitute a large volume of the complex. Gneissic layering and mineral foliation formed of biotite and hornblende are usually clearly visible. Plutonic rocks emplaced during at least three episodes of igneous activity can be differentiated locally but cannot easily be mapped regionally because they are compositionally similar to one another and to the gneiss which appears to be both host and parent to them. Deformed amphibolite bodies, presumed to be dykes, are often observed within the complex and some times at the contact with the Penrhyn Group. With few exceptions they have not been observed within the group and are presumed to pre-date it. Meta-sedimentary and meta-volcanic rocks not demonstrably part of the Penrhyn Group have in some places been assigned to the basement complex but their affinity is uncertain given the evident intricacies of stratigraphy and structure. Some lithologic similarity to rocks of the Prince Albert Group in northern Melville Peninsula exists but such correlation is tenuous at best.

The Penrhyn Group consists of paragneiss (Apo-Ap) and marble (Ar) with some quartz-biotite psammite (Apo-Ap) and calcareous gneiss (Apo) and minor quartzite (Apo). Complete understanding of the stratigraphic succession is lacking as most units are discontinuous and lensoid and the possibility of the existence of facies changes, unconformities and cryptic early structures and deformational relationships is suggested by the units indicated. Nonetheless, in this (50-100 m) basal sequence includes orthoquartzite, rusty sillimanite schist, a suspected meta-regolith and minor amphibolite, marble and quartz-feldspathic gneiss. This sequence is overlain by a predominantly calcareous unit of marble, calc-silicate gneiss and interbedded quartz-biotite-feldspar paragneiss. The calcareous unit is followed by a thick unit of paragneissic rocks with a thin bed of schistose paragneiss at its base, and a unit of marble, calc-silicate gneiss and biotite quartzite. At the highest observed structural and stratigraphic levels is a unit of quartz-biotite-muscovite psammite and greenschist. Commonly interbedded with and passing laterally into unit Apo, includes small beds of unit Apo. Pegmatite of unit Ag is ubiquitous.

The Penrhyn Group appears to lie unconformably on the basement complex. Tectonism has obliterated any angular discordance and unconformable relationships are inferred because of the clear lithologic contrast and the common presence of the thin orthoquartzite unit with base feldspathic grit beds lying upon a variety of rock types in the complex. The uppermost unit of the Penrhyn Group may be separated from the rest of the group by an unconformity. Contrasts in intensity of metamorphism and unrelaxed structural discordance support such an interpretation but rapid transitions or faulting remain viable alternate explanations.

Metamorphism of the Penrhyn Group produced two lithologic suites. Most of the group is in uppermost amphibolite facies and contains the assemblages garnet-biotite-sillimanite and cordierite-sillimanite-garnet in paragneiss and in marble, diopside-forsterite-calcite as well as scapolite and a hornblende gneiss. Rocks of the uppermost unit of the group are in greenschist facies and contain chlorite-muscovite-quartz in pelitic units. Porphyroblasts of a mineral tentatively identified as andalusite are common in meta-psammite units and tremolite occurs sporadically in calcareous rocks.

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LEGEND

- LATE(?) PROTEROZOIC
Mylonitic
Hid Brown weathering, dark green to black, fine to medium grained pyroxene diabase.
Ag Orange and buff weathering, white, tan and grey, massive and foliated, medium to coarse grained, biotite and hornblende granodiorite, quartz monzonite, gneiss and leucocratic equivalents. Like elsewhere in the fold belt, an intimate and indifferentiable mixture of granodioritic gneiss (Aggn) and foliated and massive plutons (Ap) characterize the complex.
Ang Migmatite composed of units Apo and Apo in LIT-FAR-LIT, xenolithic and texturally transitional variations. Minor xenoliths of unit Apo.

- EARLY PROTEROZOIC
Apo White and light green weathering, light grey, massive, layered aphanitic siliceous rock (acid volcanic rock?).
Arvb Green to dark green actinolitic greenschist (basic to intermediate volcanic rock?).
Arqb Grey, fine to medium grained, thin to thick bedded, quartz-muscovite-feldspar psammite, some with andalusite (?) porphyroblasts, muscovite schist, meta-regolith.
Arp Black, fissile, very fine grained, "sooty" pelite.
Arqb Grey, fine to medium grained, thin to thick bedded, quartz-biotite-feldspar psammite and meta-gneiss, some with garnet and rarely cordierite. Granulite contacts with unit Apo in some areas.

- POSSIBLE UNCONFORMITY
Arn Brown, rusty and tan weathering, buff and grey, fine to medium grained, quartz-biotite-feldspar, quartz-feldspar-biotite-garnet-sillimanite and quartz-biotite-feldspar gneiss. A general order to be indicated, nonetheless, in this (50-100 m) basal sequence includes orthoquartzite, rusty sillimanite schist, a suspected meta-regolith and minor amphibolite, marble and quartz-feldspathic gneiss. This sequence is overlain by a predominantly calcareous unit of marble, calc-silicate gneiss and interbedded quartz-biotite-feldspar paragneiss. The calcareous unit is followed by a thick unit of paragneissic rocks with a thin bed of schistose paragneiss at its base, and a unit of marble, calc-silicate gneiss and biotite quartzite. At the highest observed structural and stratigraphic levels is a unit of quartz-biotite-muscovite psammite and greenschist. Commonly interbedded with and passing laterally into unit Apo, includes small beds of unit Apo. Pegmatite of unit Ag is ubiquitous.
Arca Grey and grey-green, medium to coarse grained thin bedded, calc-silicate gneiss and marble-quartzite with quartz-calcite-plagioclase-diopside and accessory scapolite, garnet, hornblende, biotite, cordierite, sillimanite. Commonly interbedded with and passing laterally into unit Apo.

- Arbc White, grey and grey-blue, medium to coarse grained, massive and bedded marble with calcite-diopside-hornblende-quartz and minor cordierite, scapolite, phlogopite, graphite, a hornblende group mineral and tremolite. Interbedded with and passing laterally into unit Apo. Includes small beds of unit Apo. Pegmatite of unit Ag is ubiquitous.
Arnb Brown and rusty weathering, schistose, biotite-garnet-sillimanite paragneiss.
Armc Fine to medium grained, graphitic paragneiss with pyrite and pyrrhotite.
Armd A dark green, fine to medium grained, massive and foliated amphibolite; some biotite-garnet amphibolite.
Arme White to grey-blue, medium to coarse grained, massive and faintly bedded, orthoquartzite with minor feldspar, white mica and phlogopite. Minor orthoquartzitic gneiss and calc-silicate gneiss (meta-regolith?). Biotite-garnet-sillimanite schist and amphibolite.

- PROBABLE UNCONFORMITY
Arnf Grey and grey-blue, medium to coarse grained, massive and foliated amphibolite; some biotite-garnet amphibolite.
Arng White to grey-blue, medium to coarse grained, massive and faintly bedded, orthoquartzite with minor feldspar, white mica and phlogopite. Minor orthoquartzitic gneiss and calc-silicate gneiss (meta-regolith?). Biotite-garnet-sillimanite schist and amphibolite.

- ARCHAEOAN
Ag Orange and buff weathering, grey and pink, medium to coarse grained foliated granodiorite, quartz monzonite, granite and leucocratic varieties; minor quartz biotite, diorite and gneiss. Includes rocks of units Ag and Aggn.
Aggn Orange, grey and tan, medium to coarse grained, layered and foliated, biotite and hornblende granodiorite, quartz monzonite and leucocratic gneiss. Includes rocks of units Ag, Ag, and small bodies of Am.
Am Dark green foliated amphibolite, meta-gabbro and hornblende-plagioclase gneiss.
Aub Dark green, coarse grained, serpentinized pyroxene-bearing ultramafic rock.
An Quartz-biotite-feldspar paragneiss, some with hornblende; migmatite with unit Ag.
Arb Rusty weathering, schistose biotite paragneiss.
Arq White, medium to coarse grained, massive orthoquartzite.

- Geological boundary (defined, approximate)
Boundary of areas extensively drift-covered.

- PLANAR STRUCTURES
Bedding and compositional layering (horizontal, inclined, vertical)
Foliation, schistosity, gneissic layering, cleavage and axial plane foliation (inclined, vertical, dip unknown), earliest or only observed.
Foliation, cleavage and axial planes (inclined, vertical); associated with folds of later phases observed to have deformed bedding or foliation.
Foliation, cleavage and axial planes (inclined, vertical); associated with folds observed to have deformed bedding, early foliation and/or pre-existing structures.
Cleavage and axial planes (inclined, vertical) associated with gentle folds observed to have deformed earlier structures and believed to have formed late in the tectonic history.
Structural form line (on cross-sections).

- LINEAR STRUCTURES
Lineation (plunging, horizontal); formed by bedding-foliation intersection, mineral growth, rodding and millon/earliest or only observed.
Lineation (plunging, horizontal); formed by bedding-foliation and axial plane foliation intersection, mineral growth and fold axes associated with folds observed to have deformed bedding, early foliation and/or pre-existing structures.
Lineation (plunging, horizontal); formed by cleavage-bedding and axial plane foliation intersection, mineral growth and fold axes associated with folds observed to have deformed bedding, early foliation and/or pre-existing structures.

- FAULTS
High angle fault (defined, approximate); arrows indicate apparent relative movement.
Low angle fault (defined, approximate); teeth in direction of dip.
Antiform (defined, approximate).
Recumbent or overturned synform (defined, approximate).
Upright or overturned synform (defined, approximate).
A high degree of uncertainty or interpretation in the position or the nature of the symbol used is indicated.

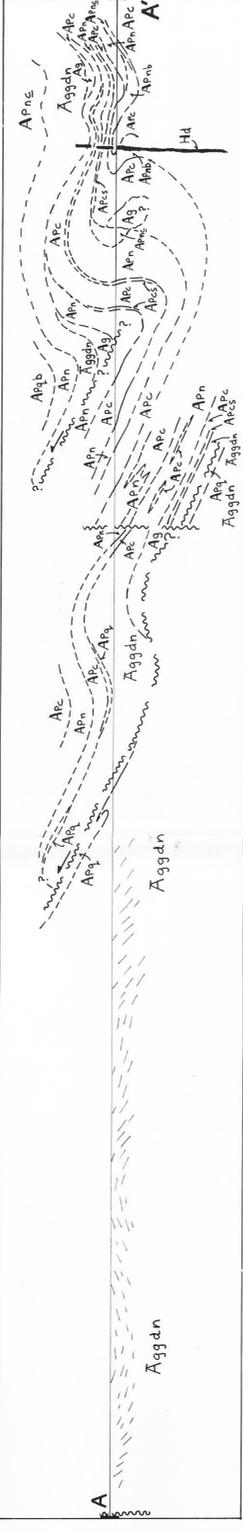
- POSITION OF ENDS OF CROSS-SECTION.
METAMORPHIC MINERALS
A andalusite C cordierite G garnet P phlogopite Sc scapolite T tremolite
Ac actinolite Ch chlorite M muscovite S sillimanite St staurolite

- STRUCTURAL NOTE
Description of structures is facilitated by separation into six phases using criteria such as fold style and orientation and sequential relationships among folds, foliation and lineation. Such separation does not imply presence of discrete events, particularly in the case of phases D2, D3 and D4, which may well be partly or wholly synchronous in some areas. No bounds on the time spans represented by the phases are implied as only the broadest limitations can be placed on the beginnings and ends of orogenic events. Large folds on the map are given numbers corresponding to the phase postulated to be responsible for them. Mesoscopic structures are assigned a position in the tectonic hierarchy based on interpretation of local field relationships only in the unit within which they were observed. This position cannot be directly related to deformational phases which formed the large folds. For these preliminary maps, no attempt has been made to integrate all mesoscopic features into a mesoscopic structural synthesis.

- Cross-sections portray the inferred form of structures and show apparent dips (in the section) of lithologic contacts and foliation. Vertical proportions are not to scale. The horizontal reference line represents an approximate mean elevation along the line of section and is usually within 200 m. of sea level. Structures appearing on cross-sections are highly interpretative. Some features, particularly faults, will often not appear on the map as they were not observed in the field.

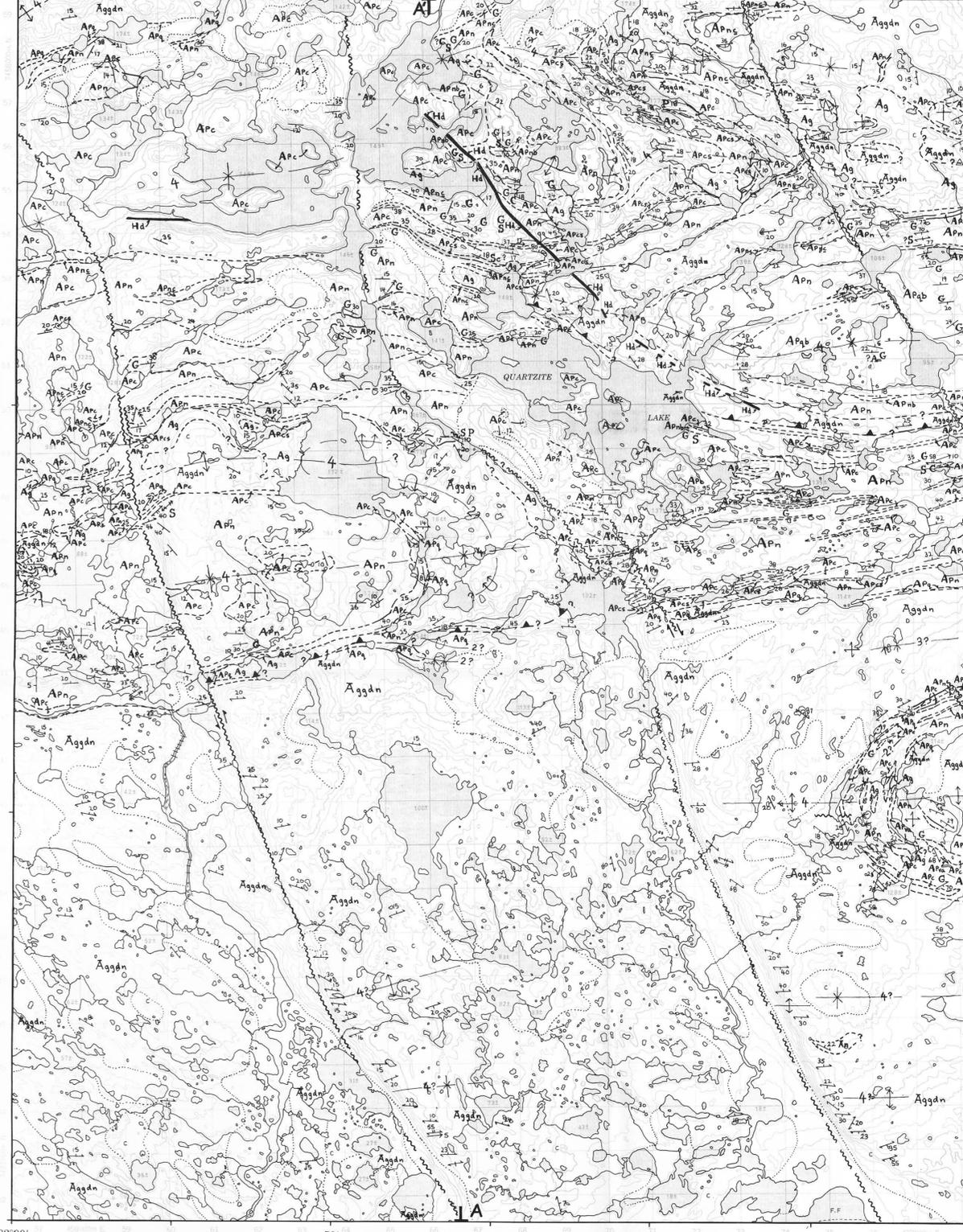
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QUARTZITE LAKE
DISTRICT OF FRANKLIN
NORTHWEST TERRITORIES
ELEVATIONS IN METRES ABOVE MEAN SEA LEVEL
CONTOUR INTERVAL: 10 METRES
Scale 1:50,000 Échelle
ELEVATIONS EN MÈTRES AU-DESSUS DU NIVEAU MOYEN DE LA MER
EQUIVALENT DES COURBES 10 MÈTRES
Système de référence géodésique nord-américain 1983
PROJECTION TRANSVERSE DE MÉRIDIEN

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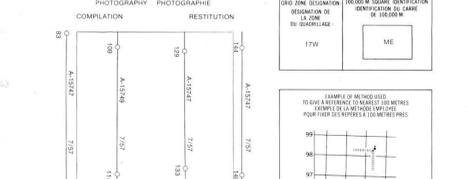
- ROADS AND RELATED FEATURES
ROAD SURFACE
RAILWAY
TRAIL, CUT LINE, PORTAGE
BRIDGE
SEAPLANE BASE, ANCHORAGE
LANDMARK FEATURES
CHURCH, SCHOOL
POST OFFICE
HISTORICAL SITE
WELL, OIL GAS, WATER
TANK, OIL, GASOLINE, WATER
TELEPHONE LINE
POWER TRANSMISSION LINE
CUTTING, EMBANKMENT
DRAINAGE AND SURVEY CONTROL
INTERNATIONAL, PROVINCIAL, COUNTY, DISTRICT, TOWNSHIP, PARISH, SURVEYED BOUNDARY
TOWNSHIP, SECTION, SUBSECTION

- ROUTES ET OUVRAGES CONNEXES
SURFACE PAVÉE, TOUJOURS CONNEXE
GRANDIÈRE
CHEMIN DE TERRE, ÉPIQUE
COURTES EN CONSTRUCTION
CANTON, PERCE, PORTAGE
AGGLOMÉRATION
COURTES EN VUE D'ÉVÉNEMENT, GARE, ARRÊT
PONT
HYDROAÉROPORT, MOULAGE
POINTS DE RÉFÉRE
BOULEVARD
BUREAU DE POSTE
LIÉU HISTORIQUE
COURTES EN VUE D'ÉVÉNEMENT
PUSITS, PÉTROLE, GAZ
RÉSÉROIR, PÉTROLE, ENSEIGNE, EAU
LIGNE TÉLÉPHONIQUE
LIGNE DE TRANSPORT D'ÉNERGIE
MINÉ
DÉBRIS, REMBLAI
CANTON, PAROISSE, DÉPARTEMENT, PAYS, PROVINCE
COMTE, DISTRICT
CANTON, PAROISSE, ARRÊTÉ, DÉPARTEMENT, PAYS, PROVINCE
TOWNSHIP, SECTION, SUBSECTION

- FRONTIÈRES ET POINTS DE RÉFÉRENCES
INTERNATIONALE, PROVINCIALE, COMTE, DISTRICT
CANTON, PAROISSE, ARRÊTÉ, DÉPARTEMENT, PAYS, PROVINCE
TOWNSHIP, SECTION, SUBSECTION

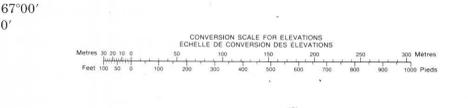
- RELIEF FEATURES
CONTOURS
APPROXIMATE CONTOURS
DEPRESSION CONTOUR
SPOT ELEVATION, APPROXIMATE LAND, WATER
EARTH
FINGED
SAND, SAND/DUNES
PALM, BOG
CLEARED AREA

- RELIEF FEATURES
CONTOURS
APPROXIMATE CONTOURS
DEPRESSION CONTOUR
SPOT ELEVATION, APPROXIMATE LAND, WATER
EARTH
FINGED
SAND, SAND/DUNES
PALM, BOG
CLEARED AREA



ONE THOUSAND METRE
UNIVERSAL TRANSVERSE MERCATOR GRID
ZONE 17
QUADRILLAGE DE MILLE MÈTRES
UNIVERSAL TRANSVERSE DE MÉRIDIEN

Table with 3 columns and 3 rows showing grid coordinates: 46-O/8, 46 P/5, 46 P/6; 46-O/1, 46 P/4, 46 P/3; 46 J/16, 46 J/13, 46 J/14



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