

The Foxe and Committee Fold Belts extend in an east-northeast direction from southern Melville Peninsula to central Baffin Island. They are composed of igneous and metamorphic rocks overlying by metasedimentary rocks of Early Proterozoic age of the Pennington and Pilling groups. These fold belts suffered polymorphic 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 Archean rocks form a basement complex predominantly of granitoid gneiss (Aggn). Layered quartz-feldspathic gneiss (Agn) and foliated granitic rocks (Ag1, Ag2 and Ag3), within which are relatively minor amounts of amphibolite (Am) and metabasite and metasedimentary rocks of the Pennington Group. The gneisses and plutonic rocks are largely quartz monzonitic to granodioritic in composition. Leucocratic and mafic (Ag3) varieties are common but do not constitute a large volume of the complex. Gneissic layering and mineral foliation formed by biotite and hornblende are ubiquitous but not always clearly visible. Metavolcanic (Amv), mafic (Amv) and metasedimentary (Amn, Amnp and Amr) rocks occurring as discontinuous zones and lenses within the basement complex of the Foxe Fold Belt are correlated with the Pennington Group of the northwesterly adjacent Committee Fold Belt on the basis of considerable lithological similarity.

Amongst the gneissic rocks of the complex are presumed to be some that form the basement to the Pennington Group but unconformably related to it. They are presumed to be of Archean age. Some gneissic units, particularly parts of unit Ag1, may be derived from the Pennington Group or some still older metasedimentary succession by migmatitic processes. Granitoid gneiss units of probable plutonic origin (Ag1, Ag2, Ag3) may be older and younger than the Pennington Group. In the Committee Fold Belt, porphyritic granite resembling that of unit Ag2 has intruded the group (Schau, 1975a). Elsewhere, age relations are commonly equivocal. More detailed studies of the basement complex have been made by Frisch (1974, 1975) and Schau (1975a, 1975b).

The Pennington Group consists of paragneiss (Anp, Anq) and marble (Amc) with some quartz-mica psammite (Anqb, Anqd) and calcilite-sillate gneiss (Amcs). Minor orthogneiss (Ano), amphibolite (Amo), pelite (Apo) and very minor iron formation (Afi) are also present. 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 renders its delineation difficult. A general order to the units can be indicated nonetheless. A thin (50-100 m) basal sequence includes orthogneiss, rusty sillimanite schist, a suspected metaregolith and minor amphibolite, dolomitic marble, quartz-feldspathic gneiss, rusty pyrite-magnetite iron formation and conglomerate with quartz and hematite clasts. This sequence is overlain by a predominantly calcareous unit of marble, calcilite-sillate gneiss and some paragneiss interbeds. The calcareous unit is followed by a thick unit of paragneiss rocks and a unit of marble, calcilite-sillate gneiss and biotite quartzite. At the highest observed structural and stratigraphic levels is a unit of quartz-biotite and/or muscovite psammite and metaregolith. This unit is variable in gross lithology and variously interbedded and compositionally gradational with paragneiss (Anqb) calcilite-sillate gneiss and minor marble. The top of the Pennington Group has not been observed. The relationship between present and original thickness of the group is well disguised by the rival processes of thinning during deformation, repetition by folding and dilatation by syntectonic plutonism.

The Pennington 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 ortho-quartzite unit with rare feldspathic grit and hematite-clast conglomerate beds lying upon a variety of rock types in the complex. Metamorphism in the Foxe Fold Belt produced the assemblages garnet-biotite-sillimanite and cordierite-sillimanite-garnet in paragneiss and in marble, diopside-forsterite-calcite as well as scapolite and a humite group mineral. In pelitic and semi-pelitic rocks, the reactions: muscovite + quartz = sillimanite + K-feldspar + andalusite -> sillimanite can be delineated in restricted areas. Retrograde, or later low grade metamorphism is probable because of extensive alteration of high grade minerals.

Polyspace structures indicating numerous episodes of deformation of the basement complex, the Pennington Group and the Pennington Group exist throughout the two fold belts but unequivocal sequential relationships among them are rare. The earliest deformational phase is inferred to have affected the basement complex prior to deposition of the Pennington Group. Tectonic trends in the basement complex and the Pennington Group within the Foxe Fold Belt are for the most part conformable with those of the overlying Pennington Group and pre-Pennington structures are not readily distinguishable. Structures in the Committee Fold Belt have been described by Campbell (1973, 1974), Frisch (1974), Resor et al. (1975) and Schau (1975, 1974, 1975a, 1975b). Some deformation of the Pennington Group may have also preceded deposition of the Pennington Group. A second phase of folding, the earliest observed in the Pennington Group, is believed to have formed attenuated isoclinal folds and ubiquitous foliation. In all but a few outcrops this foliation is parallel to bedding. Recent evidence suggests that the trend of early Pennington structures may have been northerly. The effects of this folding episode on the Pennington Group remain problematical, but may have resulted in some of the observed discontinuity of units described above.

Later episodes of folding produced prominent meso- and megascopic folds that impose an east-northeast structural grain on the Foxe Fold Belt. Tight to nearly isoclinal, recumbent structures are folded by later nearly coaxial, more open, upright to overturned folds. These later folds can often be observed to have deformed earlier structures.

In numerous places gneissic bodies of the basement complex can be seen to lie on and possibly within the Pennington Group. Such relationships suggest either the presence of large allochthonous nappes or smaller scale, locally overturned folds and thrust faults. The time of movement of the basement masses is uncertain but as they are folded about northerly trending axes, they are presumed to have been emplaced during the early deformation of the Pennington Group.

North to northeasterly trending broad transverse flexures alter the plunges of pre-Pennington structures. These flexures are associated with this phase were observed. It may be related to syn- and post-tectonic plutonic intrusion. Steeply dipping fractures and faults, many with northerly and northeasterly trends, are evidence of the last major phase of deformation. Most fault displacements appear to be left lateral and east-side-up. Minor evidence of east-west faulting that may have affected Late Proterozoic diabase dykes (Hd) has been observed.

Metamorphism is believed to have accompanied all phases of deformation up to the late northeasterly trending open folding. It possibly reached its zenith during the preceding northeasterly trending isoclinal phase, but mineral recrystallization outlasted much of the penetrative deformation. Retrogressive metamorphism may have accompanied latest folding episodes or been post-tectonic. Contact metamorphic aureoles are likely present around post-tectonic granitic plutons (Ag).

DATE OF ABOUT 2700 Ma (R.K. Malles, personal communication, 1977). Deformation of the basement complex and the Pennington Group may have taken place 2330 Ma ago (Jackson and Taylor, 1972) and again during the Hudsonian Orogeny (circa 1700 Ma ago). Post-tectonic plutons (1600 Ma old; Heywood, 1967) were emplaced into the fold belt late in the orogenic history. Following extensive uplift and erosion, diabase dykes (Hd) presumed to be part of the Beckenize dyke swarm of about 1000 Ma age (Farris, 1970), cut across the fold belt. These are especially associated with faults and fractures trending northwest. Subsequent uplift and erosion was followed by deposition of Silurian and Ordovician carbonate rocks (Osd), remnants of which lie north and south of the Committee and Foxe Fold Belts and bordering Foxe Basin.

REFERENCES
Campbell, F.H.A., 1973. Sedimentary Rocks of the Prince Albert Group, District of Kenamin, Geological Survey of Canada, Paper 73-1A, pp. 141-142.

1974. Paragneisses of the Prince Albert Group. Geological Survey of Canada, Paper 74-1A, pp. 159-161.
Farris, W.F., 1970. Diabase Dyke Swarms: An Geology and Economic Minerals of Canada. Geological Survey of Canada, Economic Geology Report Number One, pp. 131-134.
Frisch, T., 1974. Geological Studies in the Prince Albert Hills, Western Melville Peninsula, District of Franklin, Geological Survey of Canada, Paper 74-1A, pp. 165-169.

1975. Geological Studies in Western Melville Peninsula, District of Franklin, Geological Survey of Canada, Paper 75-1A, pp. 323-324.

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

Jackson, G.D. and Taylor, F.C., 1972. Correlation of Major Archean Rock Units in the Northern Canadian Shield. Canadian Journal of Earth Sciences, vol. 9, pp. 1650-1660.

Oulitch, A.V., Gordon, T.M., Henderson, J.R., Resor, J.E., Hutcheon, I.C. and Turay, M., 1977a. 1:50,000 Geological Maps, Geological Survey of Canada, Open Files 433-443.

Oulitch, A.V., Gordon, T.M., Henderson, J.R., Resor, J.E. and Hutcheon, I.C., 1977b. Geology of the Barron River Map-area, Melville Peninsula, District of Franklin, Geological Survey of Canada, Paper 77-1A, pp. 213-215.

Oulitch, A.V., Gordon, T.M., Henderson, J.R., Hutcheon, I.C. and Turay, M., 1975. Geology of the Barron River and Hill Lake Map-areas, Melville Peninsula, District of Franklin, Geological Survey of Canada, Paper 78-1A, in press.

Resor, J.E., LeGéhennant, A.N., Henderson, J.R., 1975. Geology of the Pennington Group Metamorphic Complex, Melville Peninsula, District of Franklin, Geological Survey of Canada, Paper 75-1A, pp. 349-351.

Schau, M., 1973. Volcanic Rocks of the Prince Albert Group, Geological Survey of Canada, Paper 73-1A, pp. 175-177.
1974. Volcanic Rocks of the Prince Albert Group, District of Kenamin, Geological Survey of Canada, Paper 74-1A, pp. 187-188.

1975a. Volcanic Rocks of the Prince Albert Group, Melville Peninsula (78-1A), District of Franklin, Geological Survey of Canada, Paper 75-1A, pp. 329-331.
1975b. Gneiss Distinctions in the Hayes River Region, Magnetic and Geophysical Parameters, Geological Survey of Canada, Paper 75-1B, pp. 89-95.

Map-area 46 P/13 contains a small area of outcrop mainly of Pennington Group carbonate rocks bordered on the west by gneiss of the basement complex. Quaternary and recent alluvium fill the Jermyan River valley and form the lowlands of Cape Jermyan, built by long shore tidal currents. Foliated amphibolite (Ag1) containing small scattered xenoliths of amphibolite appears to pass eastward gradationally through a migmatitic zone containing progressively more paragneiss. Assignment of the latter to either the basement complex (Anq) or the Pennington Group (Amn) is uncertain. Syntectonic intrusion of the basement complex and the Pennington Group could have taken place locally near their contact.

The lowest unit of the Pennington Group is muscovite-garnet schist (part of unit Anq). It is followed, in an easterly overturned succession, by biotite quartzite (Anqb) containing small marble lenses (Amc) and massive to faintly foliated, buff colored dolomitic marble (Arl). The main mass of this thick unit, which contains beds of calcite-scapolite marble, calcium silicate gneiss (Amcs) and biotite quartzite (Apo), lies south along the south-central edge of the area. Complex polyphase structures can be observed within the carbonate succession. Two phases of isoclinal folds are followed by an episode of upright, northeasterly trending folding. These latter phase is intense, earlier isoclinal fold axes are transposed into the northeast trend. A prominent scapolite mineral lineation parallels the late fold axes and is the subject of a detailed study by M. L. Hill, Department of Geology, Carleton University, Ottawa, Ontario. A folded isoclinal megascopic fold, cored by unit Anqb, trending chiefly northerly, is evident near the centre of the outcrop area. It is but one of several such structures in this area and in map-areas 46 P/12 and 0/9.

Lamination (plunging, horizontal): formed by bedding-foliation and foliation-foliation intersection (X); mineral growth or folding (H) and (D) only observed.

Linear structures
Lamination (plunging, horizontal): formed by bedding-foliation and foliation-foliation intersection (X); mineral growth or folding (H) and (D) only observed.

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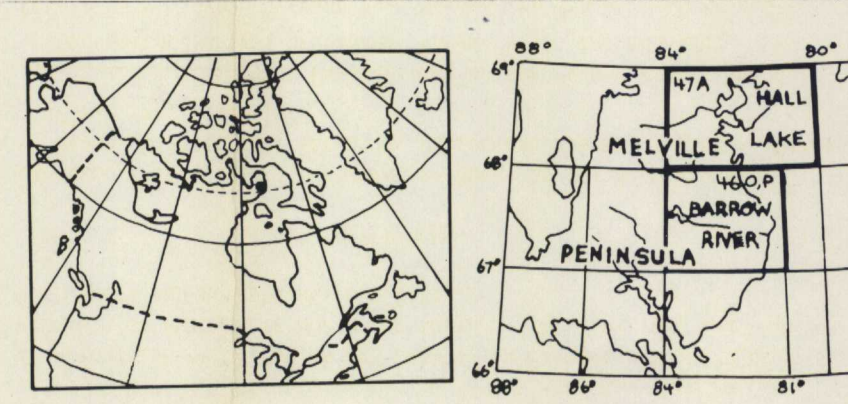


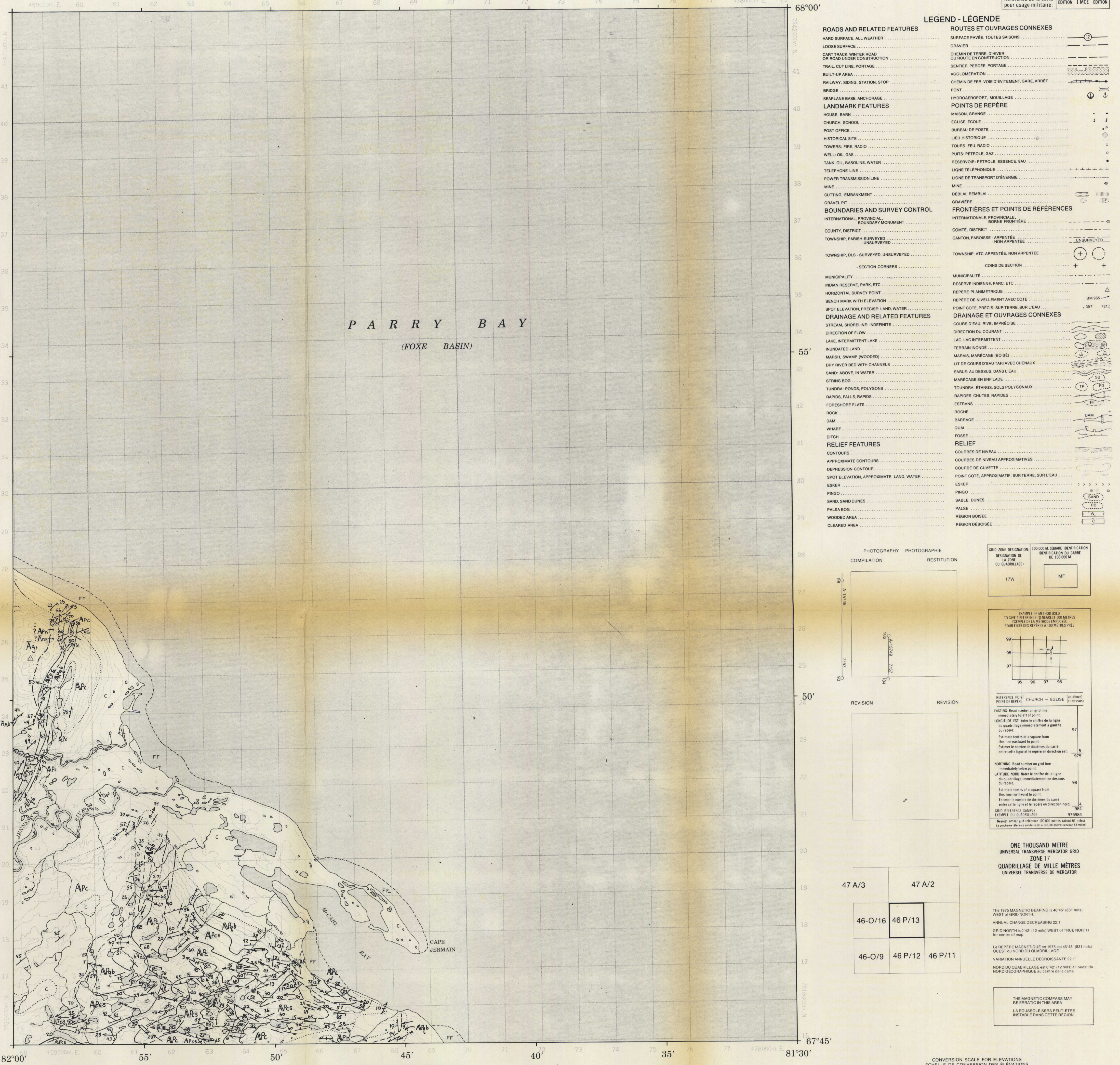
Table with geological symbols and descriptions. Includes units like Osc, Hd, Ag, An, Am, and Ar, with their respective lithological characteristics.

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McCaig Bay DISTRICT OF FRANKLIN NORTHWEST TERRITORIES
ELEVATIONS IN METRES ABOVE MEAN SEA LEVEL
CONTOUR INTERVAL 10 METRES
Scale 1:50,000 Echelle
ELEVATIONS EN METRES AU-DESSUS DU NIVEAU MOYEN DE LA MER
EQUIDISTANCE DES COURBES 10 METRES
ETABLI PAR LA DIRECTION DES LEVES ET DE LA PHOTOGRAPHIE AERIEENNE, COMMISSION GEOLOGIQUE, OTTAWA EN 1974
CONVERSION SCALE FOR ELEVATIONS
Echelle de conversion des elevations
METERS 0 100 200 300 400 500
Feet 0 100 200 300 400 500
Le present dossier d'archives est en 1975 au 46 P/13
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