Petrographic descriptions of thin sections of drill cuttings from KCM No. 1 Forest Federal Well, Hidalgo County, NM (see also Circular 152) by Antonius J. Budding and Ronald F. Broadhead

92 pp.

Petrographic descriptions of thin sections of drill cuttings from KCM No. 1 Forest Federal well, Hidalgo County, New Mexico

OF 75

by

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75

Introduction

This report contains petrographic descriptions of thin sections prepared from drill cuttings of the KCM No. 1 Forest Federal well, Hidalgo County, New Mexico. The descriptions are intended to be used in conjunction with the thin sections and can serve as a guide to their study. Each description is accompanied by a photomicrograph and sketches of pertinent parts of the thin section.

The reader is referred to Circular 152 of the New Mexico Bureau of Mines and Mineral Resources, entitled "Geology, Petroleum Source Rocks, and Thermal Metamorphism in KCM No. 1 Forest Federal Well, Hidalgo County, New Mexico", compiled by Sam Thompson III, for additional information.

Thin sections prepared from drill cuttings of KCM No. 1 FF-well.

Depth in ft.	Rock Name
50	Silty micritic limestone
210	Quartz Latite
230	Quartz Latite
270a	Sandy dolomitic Limestone
270b	Sandy dolomitic Limestone
320	Argillaceous Limestone
380	Limestone
450	Biomicritic Limestone
480	Biomicritic Limestone
520	Micritic Limestone
640	Limestone
760	Dolomitic Limestone
800	Calcareous Mudstone
1080	Calcareous Mudstone
1210	Calcareous Mudstone
1230	Sandy, Calcareous Mudstone
1810	Argillaceous Limestone
1920	Micritic Limestone
2010	Tremolite-bearing Limestone
2280	Diopside Marble
2360	Diopside-wollastonite Marble
2460	Wollastonite hornfels and Quartz Monzonite
2640	Wollastonite Marble
2660	Cherty Limestone
2820a	Wollastonite Marble
2820b	Wollastonite Marble
2960	Quartz Monzonite
3130a	Quartz Monzonite
3130b	Quartz Monzonite
3380	Diopside Marble
3680a	Diopside Marble
3680b	Wollastonite Marble
3740a	Marble
3740b	Marble
3750	Tremolite Marble
3780	Diopside Hornfels
4000	Diopside Hornfels
4010	Quartz Monzonite
4040	Diopside Hornfels
4350	Quartz Monzonite
4460	Quartz Monzonite

Thin Section Number: KCMIFF-50

Rock Name: Silty micritic limestone

Composition:

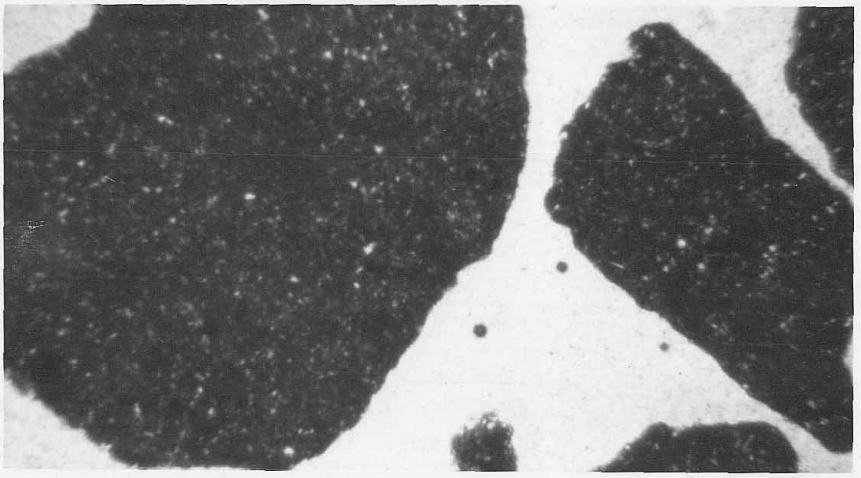
Calcite - Micrite: (cryptocrystalline brown calcite)
Golden brown color; homogeneous with abundant random "inclusions" of silty quartz.

Quartz:
Silt-sized, as "inclusions" in micrite

Hematite:
Separate grains and as a coating on the carbonate.

Texture: Grain sizes: Quartz - length .038 mm, width .018 mm
or .025 x .025 mm, equant.

KCM1FF-50



0.5 cm

Silty, micritic ls.

Thin Section Number: KCMIFF-210

Rock Name: Quartz latite

Composition:

Matrix: 67%
A cryptocrystalline brown mass which shows no extinction under crossed nicols. Its index of refraction is greater than that of quartz. It appears to be highly altered.

Matrix: 13%
Quartz occurs in parts of the matrix.

Potash Feldspar: 6%
Occurs as phenocrysts.

Quartz: 6%
Anhedral, rounded crystals which show undulatory extinction and are phenocrysts in the matrix. The quartz crystals sometimes have fine fractures at the grain boundaries with the matrix in places. These commonly have a single, preferred orientation (see sketch 1).

Plagioclase Feldspar - Albite: 4%
These crystals are present as elongate, subhedral phenocrysts. These crystals are sometimes zoned.

Hematite: 3%
Occurs as small, black euhedral crystals in quartz and feldspar grains and as larger translucent, blood-red splotches with needle-like internal texture. These blood-red splotches are contained within the matrix, not within the feldspar and quartz crystals. The crystals appear primary. The red translucent variety appears secondary. The alteration (?) zones (i.e. red translucent variety) contain some hexagonal crystals.

Biotite: trace
The biotite crystals appear as phenocrysts in the matrix.

Zeolite (?): trace
Appears as a few fibrous crystals inside the matrix.

Calcite: trace
Occurs as twinned phenocrysts in the matrix (see sketch 2).

Pyroxene (?): trace
Pyroxene occurs as phenocrysts in the matrix.

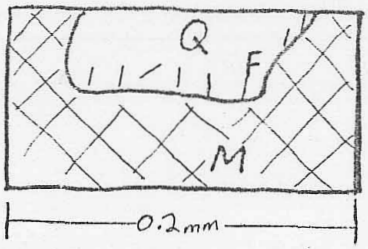
Arsenopyrite (?): trace
Black opaque which is silver-grey in reflected light. It occurs as crystals inside the hematite (see sketch 3).

Texture: Average grain size of phenocrysts is 0.15 mm. The matrix is cryptocrystalline and individual crystals cannot be distinguished with the microscope.

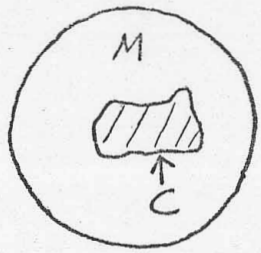
Thin Section Number: KCMIFF-210 (continued)

Remarks: This may be a feeder dike to a volcanic structure. The potash feldspar may be responsible for a low blip on the radioactivity log.

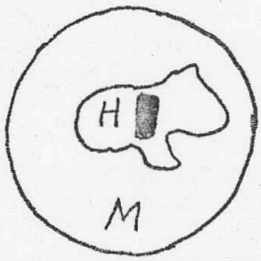
KCMIFF-210



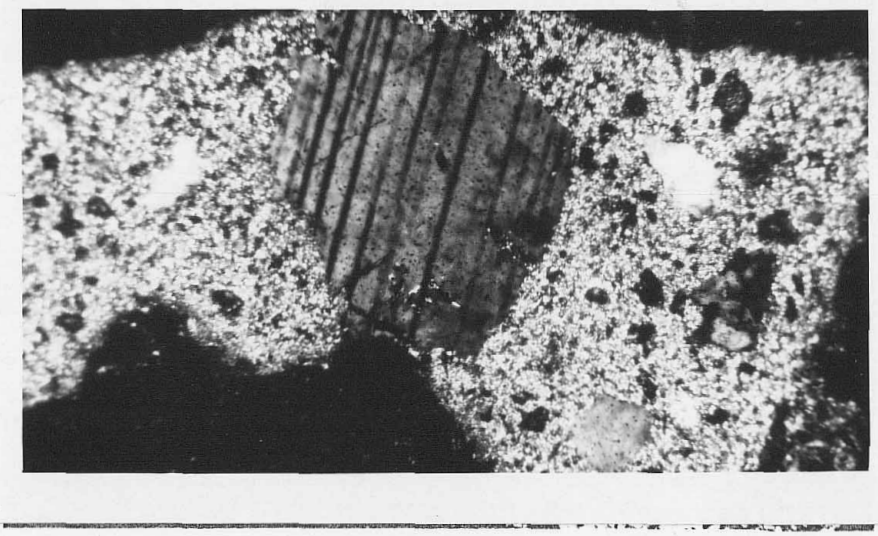
Sketch 1: Quartz phenocryst (Q) in matrix (M) showing preferred orientation of fractures (F) in the quartz. Crossed nicols.



Sketch 2: Calcite (C) in matrix (M). x80, crossed nicols.



Sketch 3 (left): Hematite (H) in matrix (M) showing included crystal of arsenopyrite (dark area). Reflected light.

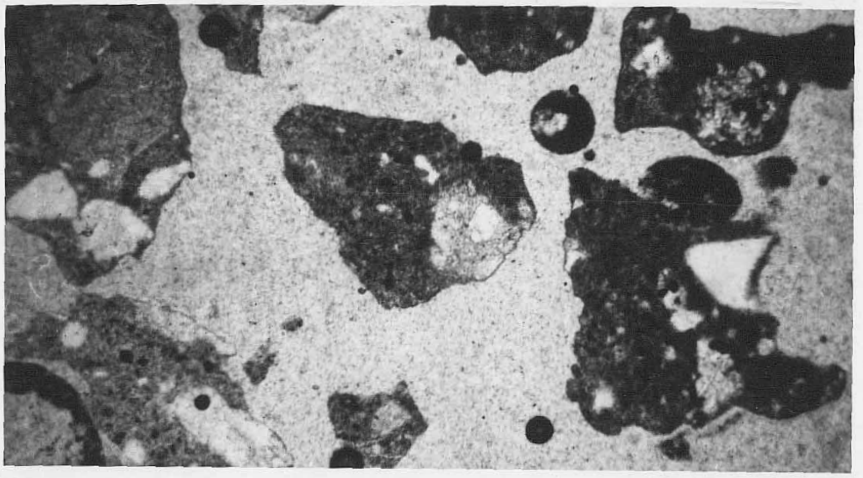


0.1 mm

crossed nicols

A large crystal (phenocryst) of plagioclase is shown.

KCM IFF-210



1.0 mm

Parallel light

OTR 75 #10

Thin Section Number: DCMIFF-230

Rock Name: Quartz latite

Composition:

Quartz:
present as a fine mosaic of anhedral crystals. Often, larger crystals are prophyritic in a much smaller size ground mass (see sketch 1) of quartz and feldspar. Quartz often shows undulatory extinction.

Potash Feldspar:
This is less abundant than quartz. It shows gridiron twinning.

Muscovite:
Occurs as small, clear, colorless, elongate crystals (see sketch 2).

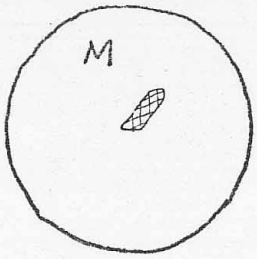
Fluorite:
Occurs as anhedral, colorless crystals.

Hematite:
Red to orange translucent stains in the rock. Stains some fragments (cuttings) completely. Does not stain some other fragments at all.

Calcite:
Calcite occurs as extremely small crystals scattered throughout the quartz.

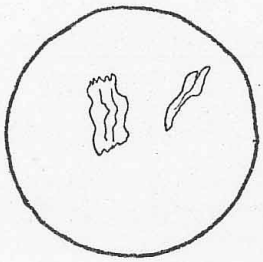
Texture: The average grain size is 0.1 mm.

KCMIFF-230

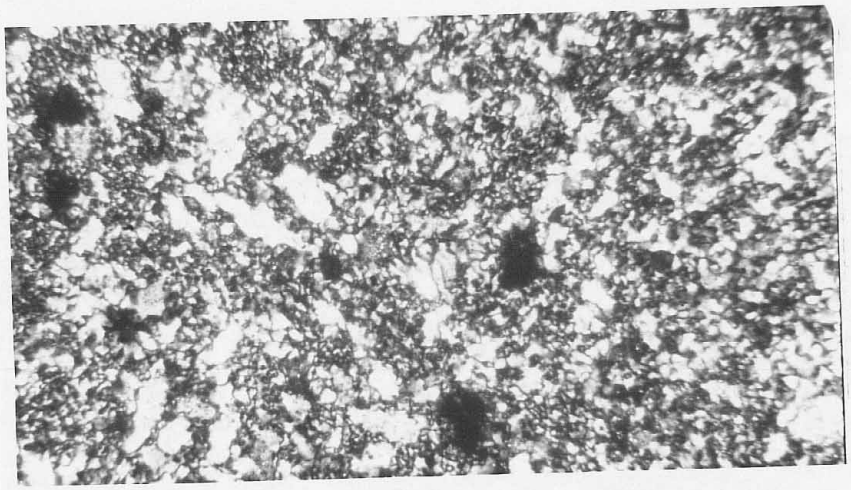


Sketch 1 (left): Phenocryst of quartz (crossed-hatched) in matrix (M) of smaller quartz and feldspar crystals. x320, plane light.

X



Sketch 2 (left): Typical appearance of clear, colorless, elongate crystals of muscovite. x450, plane light.



1.0 mm

Crossed nicols

Groundmass of intergrown quartz and feldspar

OFR 75-#12

Thin Section Number: KCMIFF-270a

Rock Name: Sandy dolomitic limestone

Composition:

Cryptocrystalline brown calcite: 73%
This is a brownish colored matrix material in the limestone which is brownish colored.

Microspar: 15%
Average grain size is 0.05 mm. This is microspar or neomorphic spar which occurs in the micritic matrix.

Detrital Quartz, Chert: 11%
Average grain size is 0.05 mm. Occurs as small, anhedral, subangular to subrounded clasts. Sometimes there is a preferred orientation of elongate quartz clasts in the micrite (see sketch 1).

Cryptocrystalline clear calcite: 1%

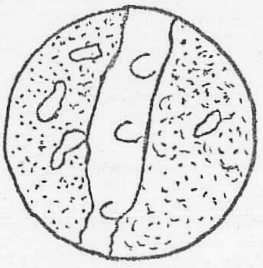
Sparry calcite: trace
Occurs as straight "veins" of clear, colorless calcite. Dark material frequently found in the bordering micrite. This dark material (organic material?) is sometimes arranged as if layered (see sketch 2 and 3). The calcite "veins" often cross-cut this layering at nearly right angles. Quartz clasts are not present in the calcite veins.

Pyrite: trace
Appears as amorphous masses (see sketch 1).

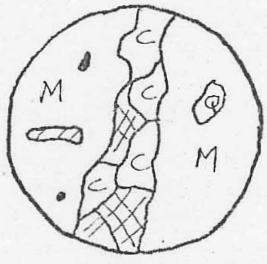
Plagioclase Feldspar: trace
- detrital clasts

Potash Feldspar: trace
- detrital clasts

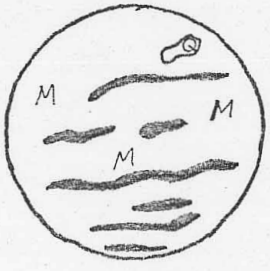
KCMIFF-270a



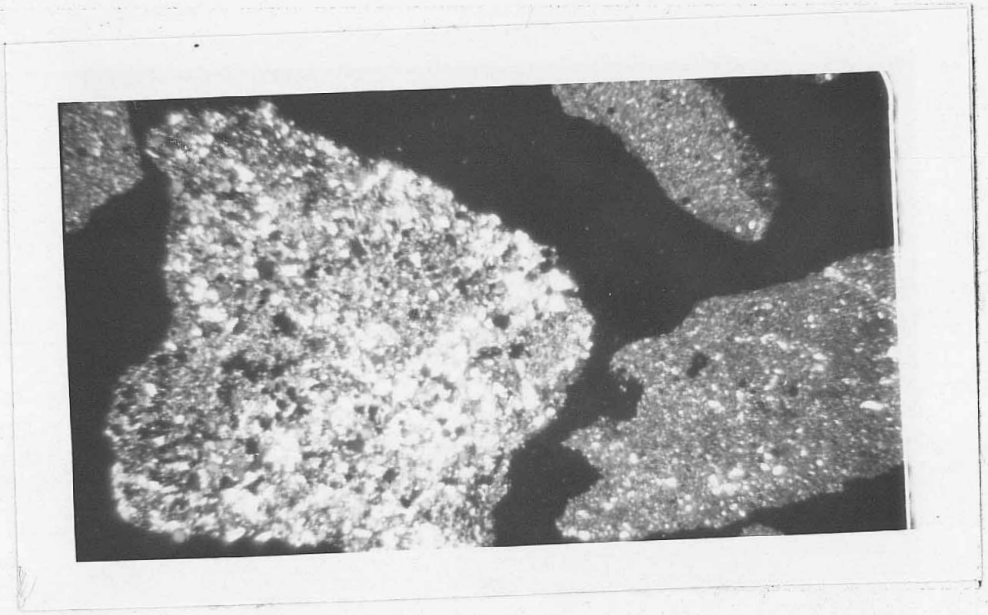
Sketch 1 (left): Detrital quartz (clear areas) and calcite vein (C) in brown matrix of cryptocrystalline calcite (stippled pattern). Plane light, x80.



Sketch 2 (left): Cryptocrystalline brown calcite matrix (M) containing pyrite (black areas), quartz (Q) and a veinlet and separate crystal of calcite (C and striated areas). x40, crossed nicols.



Sketch 3 (left): Dark organic (?) material (dark areas) which seem to be layered and a quartz clast (Q) in matrix of cryptocrystalline brown calcite (M). x100, plane light.



0.5 cm

Crossed nicols

Clastic quartz and calcite cement

Thin Section Number: KCMIFF-270b

Rock Name: Sandy dolomitic limestone

Composition:

Cryptocrystalline brown calcite: 66%
Acts as a matrix for detrital quartz. It is brown and contains many black spots. Contains some eolites (?) or pelloids (?).

Detrital quartz, chert: 20%
Average grain size is 0.02 mm for individual crystals. Shows undulatory extinctions. Minor small calcite crystals occur in the chert aggregates. Could this be reworked Paleozoic chert?

Microspar: 8%
Average grain size is 0.02 mm.

Detrital quartz: 3%
Average grain size is 0.05 mm. Occurs as small clasts in the matrix of cryptocrystalline brown calcite. These are angular.

Sparry calcite: 1%
Average crystal size is 0.6 mm. Rhombohedral, brownish calcite which occurs in large aggregates of euhedral to subhedral crystals (see sketch 1).

Hematite: 1%
This occurs as fracture filling and between quartz grains in the chert aggregates.

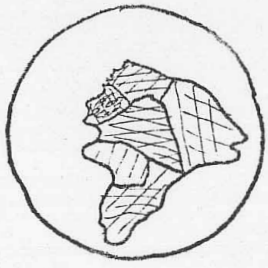
Plagioclase Feldspar: trace
Has albite twinning. Occurs in the chert aggregates.

Clays: trace

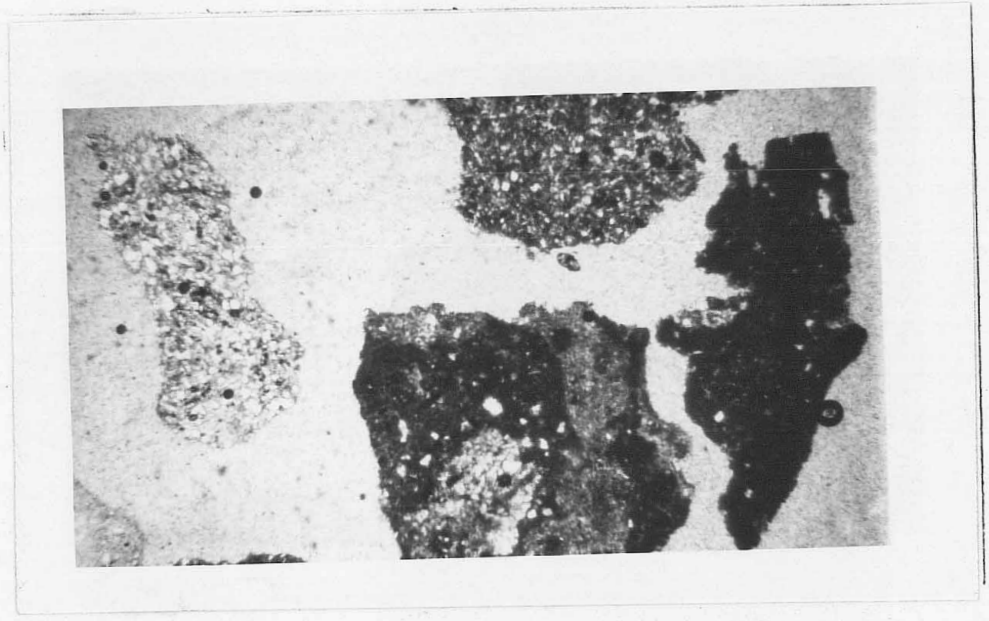
Limonite: trace
Occurs as a stain and a coating throughout the rock.

Remarks: Is the micrite being silicified or is the chert reworked Paleozoic chert?

KCMIFF-270b



Sketch 1 (left): Large, sparry calcite crystals showing rhombohedral cleavage. x20, crossed nicols.



0.5 cm

Parallel light

Partly recrystallized limestone

Thin Section Number: KCMIFF-320

Rock Name: Argillaceous limestone

Composition:

Microspar: 67%
Average crystal size is 0.01 mm. Occurs as small elongate crystals which are separated by black and brown material (clays). These elongate crystals have a preferred orientation.

Clays: 21%
Black opaque material.

Cryptocrystalline brown calcite: 6%

Sparry calcite: 2%
Crystals with rhombohedral cleavage.

Chert: 2%
Average grain size is 0.01 mm for individual crystals. The chert comes in small aggregates which sometimes come in line contacts with sparry calcite. It contains anhedral calcite crystals.

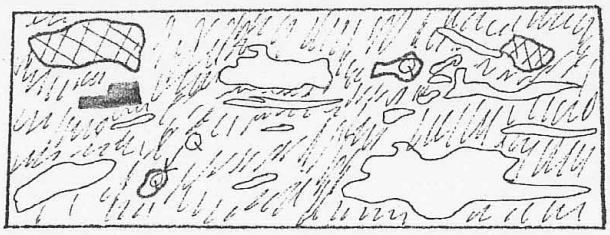
Detrital quartz: 2%
Average grain size is 0.01 mm. Occurs as small, angular includions (clasts) in the clay.

Pyrite: trace
Occurs in the clay.

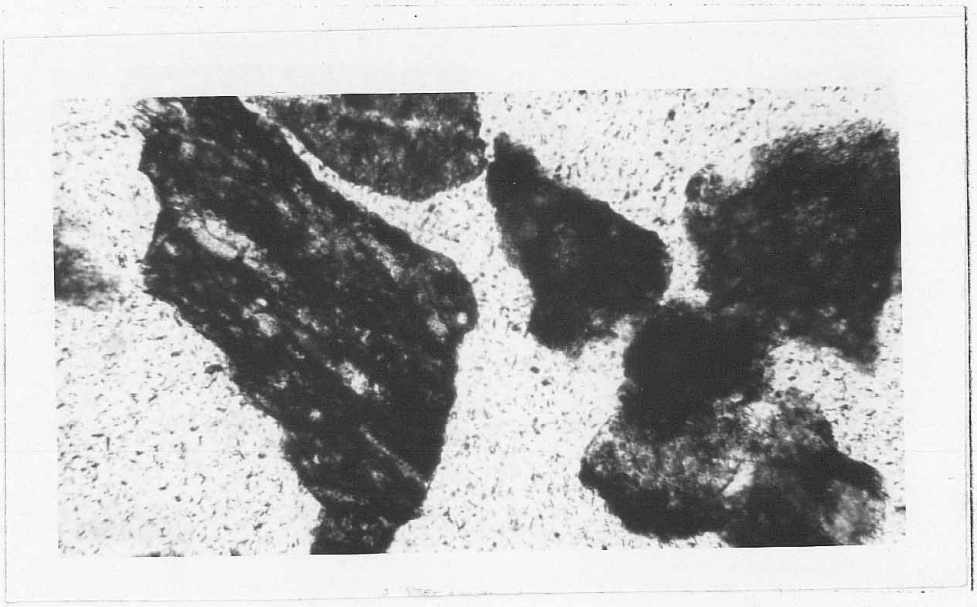
Hematite: trace

Texture: The clays and elongated microspar give the impression of layering. Some small veins of calcite cut across this "layering" (see sketch 1).

KCMIFF-320



Sketch 1 (above): Detrital quartz (Q) and pyrite (dark areas) along with calcite (clear and cross-hatched areas) showing preferred orientation in a matrix of clays and cryptocrystalline brown calcite (shaded areas). x500, crossed nicols.



1.0 mm

Parallel light

Thin Section Number: KCMIFF-380

Rock Name: Limestone

Composition:

Microspar: 65%
Average grain size is 0.01 mm. Occurs associated with cryptocrystalline brown calcite. The sparry crystals are irregular which tends to suggest that it is neomorphic spar. The microspar is often light-brown or tan colored. Microspar has a blocky texture.

Sparry calcite: 18%
Average grain size is 0.2 mm. Clear, colorless crystals with rhombohedral cleavage.

Cryptocrystalline brown calcite: 14%
Associated with microspar as noted above.

Chert: 2%
Fragments which contain fine-grained, subhedral to anhedral quartz crystals and some small, anhedral calcite crystals.

Detrital quartz: 1%
Angular to subangular chert-sized fragments imbedded in the microspar.

Plagioclase feldspar: trace
- detrital, altering to a brown clay

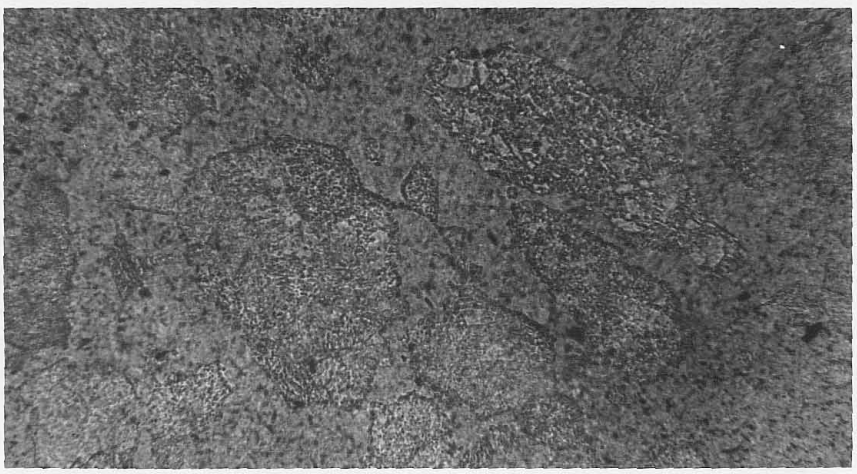
Hematite: trace
Small, black opaque to translucent red pseudocubic crystals.

Clay minerals: trace
Loose on slide and as attached to micritic and sparite fragments.

Chlorite (?): trace, a single crystal

Texture: In the chert, there may be a replacement involved with the calcite, but it is not clear what the relationship is. Silica is probably being replaced by calcite.

KCMIFF-380



1.0 mm

Parallel light

Thin Section Number: KCMIFF-450

Rock Name: Biomicritic limestone

Composition:

Calcite:
Occurs mainly as cryptocrystalline brown calcite which in places is recrystallized to microspar or even sparry calcite. Average grain size of microspar and spar is 0.025 mm.

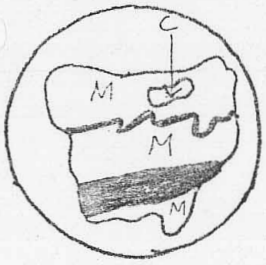
Clays (?) or Organic material (?):
This occurs as dark streaks in the micrite (see sketch 1).

Detrital quartz:
Average grain size is 0.075 mm x 0.038 mm. This occurs as randomly oriented silt-sized clasts in the micritic material.

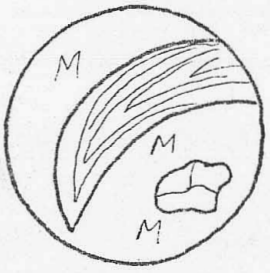
Fossils: (see sketches 2 and 3) Abundant fusulinids are present along with an echinoid spine and a crinoid columnal and perhaps a molluscan fragment.

Texture: Many calcite veinlets run through the microspar.

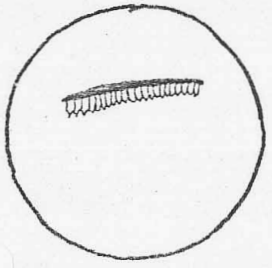
RCMIFF-450



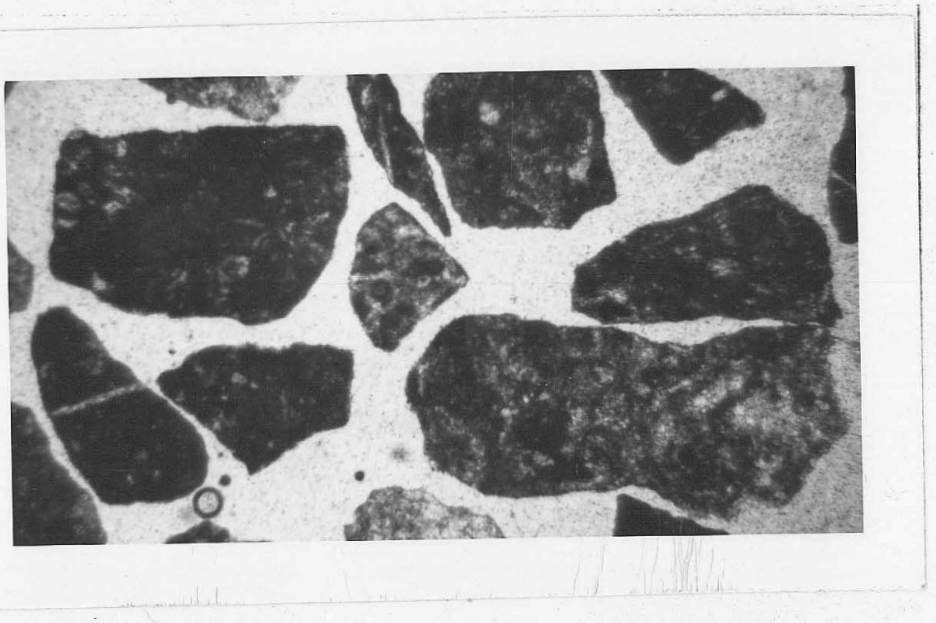
Sketch 1 (left): Clays (?) or Organic Material (?) (dark areas) as dark streaks in the cryptocrystalline brown calcite (M) and a microspar crystal (C). x 80, plane light.



Sketch 2: Organic-looking structure (mollusc ?) which has become micritized and a patch of microspar (clear area) in a matrix of cryptocrystalline brown calcite (M). x 80, plane light.



Sketch 3: Type of wall structure seen in fusulinids. x 80, plane light.



0.5 cm

Parallel light

Fossils in limestone

Thin Section Number: KCMIFF-480

Rock Name: Biomicritic limestone

Composition:

Cryptocrystalline brown calcite:
It is light brown to almost black and acts as a matrix for fossils and microspar.

Calcite-Microspar Veinlets:
Branching veinlets of microspar. Could these represent plant remains? (see sketch 1)

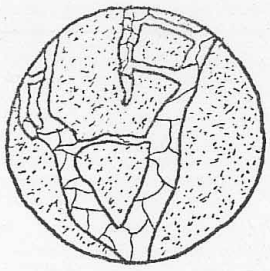
Microspar and Spar:
Average grain size of microspar is 0.038 mm. Average grain size of spar is 0.15 mm. These are present as recrystallization products of cryptocrystalline brown calcite.

Chert: minor amounts
Average grain size is 0.050 mm.

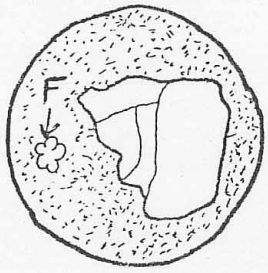
Magnetite:
Amorphous forms associated with the microspar

Fossils: Abundant fusulinids with wall structure similar to those in thin section KCMIFF-450. Recrystallized crinoid ossicle (?). Coralline algae (?). The fossils occur mostly in unaltered cryptocrystalline brown calcite (see sketch 2).

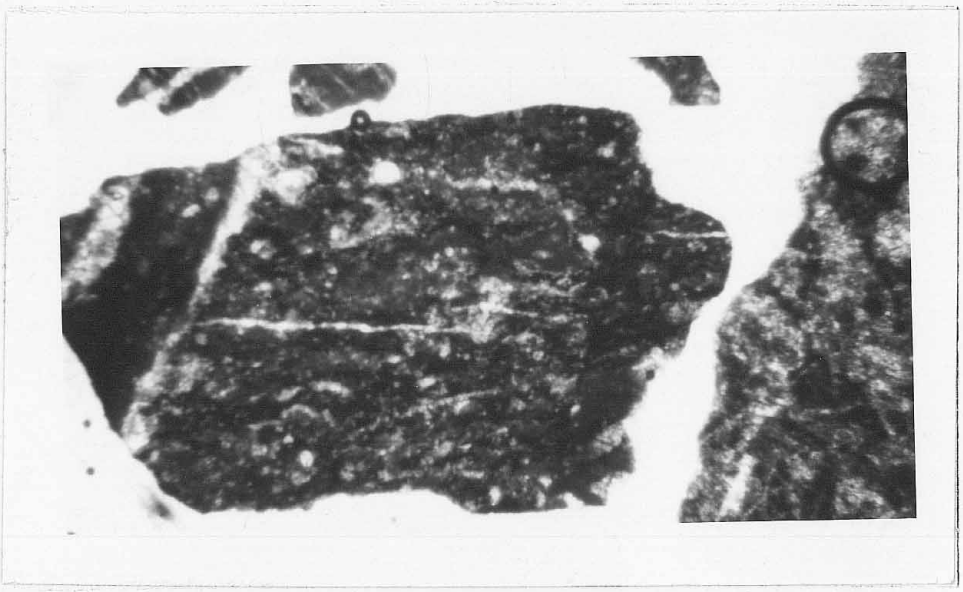
KCMIFF-480



Sketch 1: Branching veinlets of microspar in a matrix of cryptocrystalline brown calcite (stippled). x80, plane light.



Sketch 2: Microspar (~~clear~~) and a foram (F) showing typically separate occurrences in a matrix of cryptocrystalline brown calcite (stippled). x70, plane light.

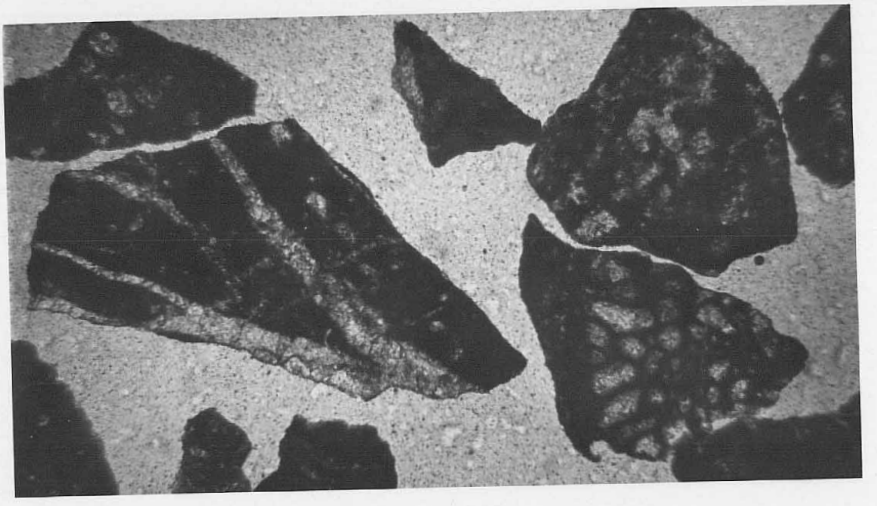


0.5 cm

Parallel light

Laminated limestone

KCMIFF-480



0.5cm

Parallel light

Fossils and cross-cutting calcite veins in limestone

Thin Section Number: KCMIFF-520

Rock Name: Micritic limestone

Composition:

Cryptocrystalline brown calcite: micrite

Microspar and Spar:
Average grain size of microspar is 0.050 mm. Average grain size of spar is 0.32 mm. These are alteration products of micrite. Some crystals are very small and hexagonal in cross section.

Dolomite:
Average grain size is 0.013 mm. Some fragments of micrite contain a few dolomite rocks.

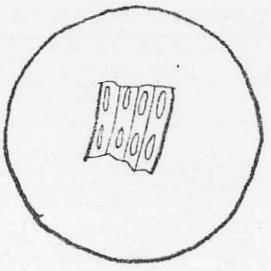
Quartz: minor

Chert and Chalcedony: minor

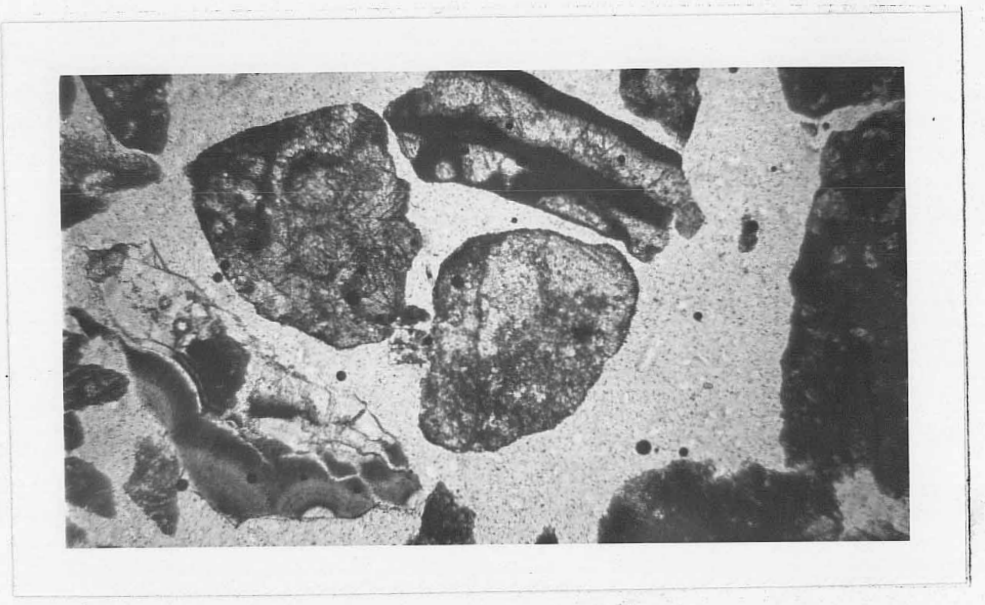
Organic material:
Spherical material which shows both a concentric and radial structure and has no X-ray diffraction pattern.

Fossils: Fusulinids and forams (wall structure as in KCMIFF-450). Echinoid spine (?) (see sketch 1). Also, recrystallized brachiopod (?) or molluscan (?) fragments.

KCMIFF-520



Sketch 1: Fossil fragment, an echinoid spine? x70, plane light



0.5 mm

Parallel light

Chert, calcite, and fossils

Thin Section Number: KCMIFF-640

Rock Name: Limestone

Composition: (percentages are visual estimates)

Cryptocrystalline brown calcite: 60%

Microspar: 25%
Probably results from recrystallization of cryptocrystalline brown calcite (i.e., it is neomorphic). Average grain size is 0.01 mm.

Sparry calcite: 10%
Clear crystals with rhombohedral cleavage. Sometimes it appears to be recrystallized to microspar. Average grain size is 0.3 mm.

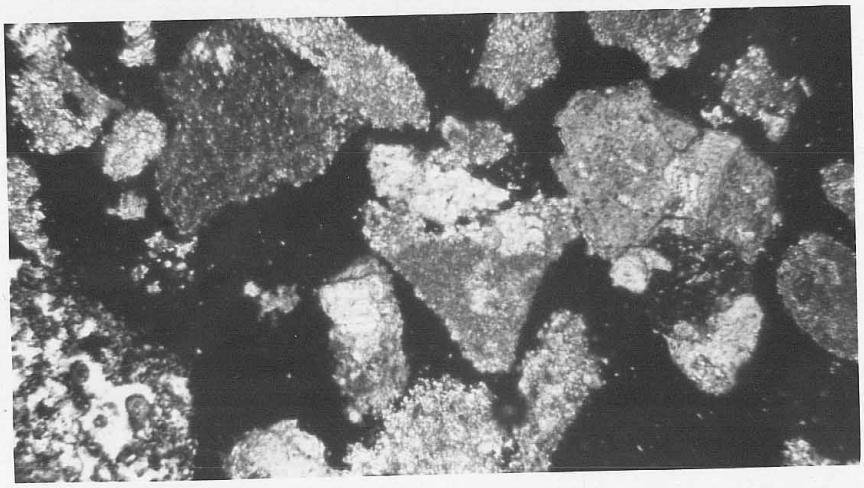
Chert: 5%
A few aggregates of fine-grained quartz are present. The average grain size of the individual crystals is 0.01 mm.

Hematite: trace
This occurs both as cubic (pseudocubic (?)) black opaque crystals and as red-translucent staining on microspar and crystocrystalline brown calcite.

Zeolite (?): trace
A single fibrous crystal

Texture: The aggregates of microspar and micrite are reminiscent of "Structure Grumeleuse."

KCMIFF-640



1.0 mm

Crossed nicols

Calcite and chert occurring in same cutting, lower left hand corner

Thin Section Number: KCMIFF-760

Rock Name: Dolomitic limestone

Composition:

Cryptocrystalline brown calcite:
Acts as a matrix for fossils.

Microspar:
Average grain size is 0.05 mm. This is probably a neomorphic recrystallization product of micrite.

Sparry calcite:
Average grain size is 0.3 mm. A few crystals are present. It is probably a recrystallization product; sizes grade into microspar. Twinned calcite also occurs as cross-cutting veins.

Clays:
Black material which is separated by microspar.

Chalcedony:
Minor amounts of radiating, fibrous silica

Chert:
Average grain size of individual quartz crystals is 0.04 mm. Occurs in the micrite. It may locally replace the micrite.

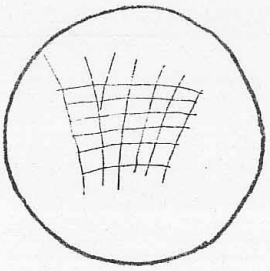
Dolomite:
A few dolomite rhombs exist in some cuttings which are largely or wholly microspar with no cryptocrystalline brown calcite.

Pyrite and Magnetite: trace
These occur near fossils.

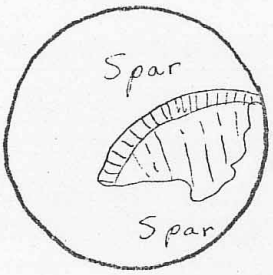
Fossils: Fusilinids, crinoid columnal, molluscan fragments, brachiopod fragments, coralline algae, forams. Also, a bryozoan fragment (?) (see sketch 1).

Texture: Possibly a recrystallized ooid is present (see sketch 2).

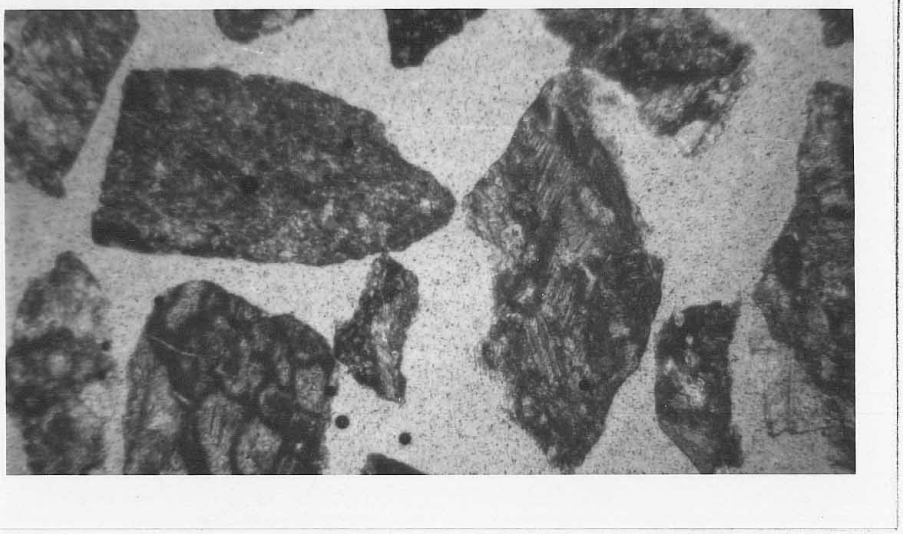
KCMIFF-760



Sketch 1: Crude representation of organic remains showing structural attitudes. Is this a bryozoan fragment? x400



Sketch 2: Possible remains of an ooid which shows a slight concentric and a slight radial structure. x100



0.5cm

Parallel light

#31

Thin Section Number: KCMIFF-800

Rock Name: Calcareous medstone

Composition:

Clays: 52%
Brown to black opaque material in transmitted plane light. Acts as a matrix.

Microspar: 37%
Average grain size is 0.05 mm. The microspar crystals occur in the clay matrix and are elongated and have a preferred orientation. It also occurs in veins which randomly cut across the rock. These veins cross-cut all other features.

Cryptocrystalline brown calcite: 7%

Detrital quartz: 1%
Average grain size is 0.075 mm. Occurs as angular, subspherical clasts of silt-sized quartz in the clay matrix, with random distribution. The presence of detrital quartz is generally exclusive of the presence of large amounts of calcite in a single cutting.

Sparry Calcite: 1%
Average grain size is 0.35 mm. The sparry calcite has the same occurrence as for microspar.

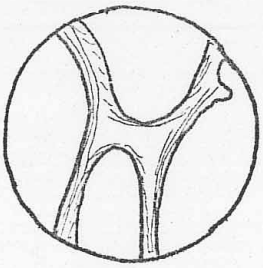
Chert: trace
Average size of individual quartz crystals is less than 0.01 mm. This is generally associated with microspar.

Chalcopyrite: trace
This occurs as minute grains inside small patches of microspar (see sketch 1).

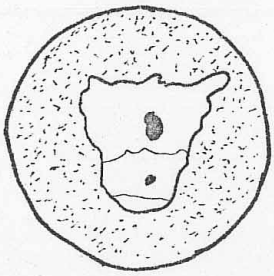
Fossils: 2% Fossils include brachiopod fragments and bryozoan (?) fragments (see sketch 2).

Texture: The rock is laminated; the layers are made up of micrite. This lamination is very locally disrupted, could this be due to bioturbation?

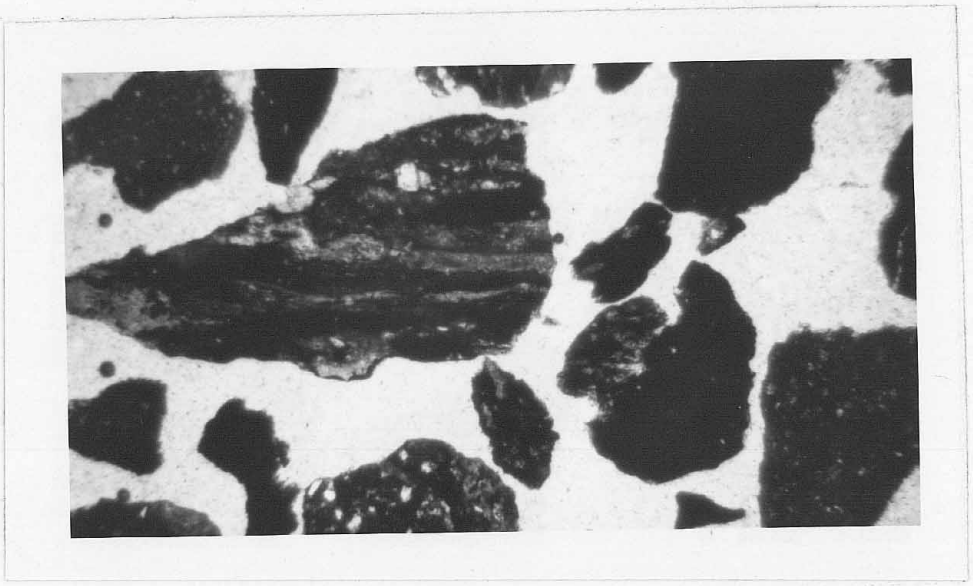
KCMIFF-800



Sketch 1: Bryozoan fragment(?), x80.



Sketch 2: Occurrence of chalcopyrite (dark area), microspar (clear area), and clay matrix (stippled). x80, plane light.



0.5 cm

Parallel light

Quartz, clay, and calcite in calcareous mudstone

Thin Section Number: KCMIFF-1080

Rock Name: Calcareous mudstone

Composition:

Microspar: 45%
Average grain size is 0.1 mm. The microspar occurs as patches in the clay matrix. In some places, microspar may be the result of degrading neomorphism of crinoid ossicles; in other places, it appears to be the result of aggrading neomorphism of cryptocrystalline brown calcite. The microspar often appears as elongate "rods" in the clay matrix (see sketch 1). The microspar also occurs in veins which cross-cut the layering.

Clays: 40%
In some cuttings, the clay is interlayered with the microspar; in others, it acts as a matrix for patches of microspar (see sketch 1).

Sparry calcite: 10%
Average grain size is 1.3 mm. This is the same occurrence as for microspar, except that it is less abundant.

Cryptocrystalline brown calcite: 3%
This appears to be altering to microspar.

Quartz: 1%
Average grain size is 0.04 mm. Detrital quartz, appears as angular clasts within the clay matrix and in the microspar. Also, in some chaloedony-filled veinlets.

Chert: trace
Average grain size is 0.03 mm for individual quartz crystals. The chert appears in some cuttings as being intermixed with calcite (microspar).

Chalcopyrite: trace

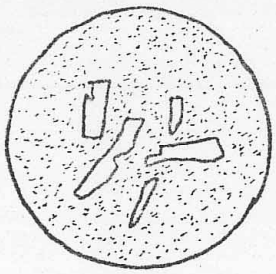
Hematite: trace

Dolomite: trace (?); presence questionable
There may be a few dolomite rhombs in a microspar matrix.

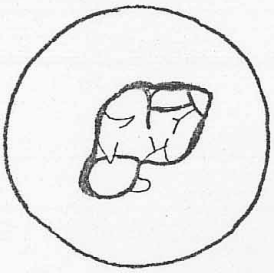
Fossils: Foram (?); (see sketch 2). Crinoid ossicle, undergoing degrading neomorphism to microspar.

Texture: The microspar and the clays seem to be interlayered in some cutting. One cutting looks bioturbated; there is no order to the different ingredients at all; the clays appear in swirls in a matrix of amorphous calcite. In some places, the microspar appears to recrystallize into spar.

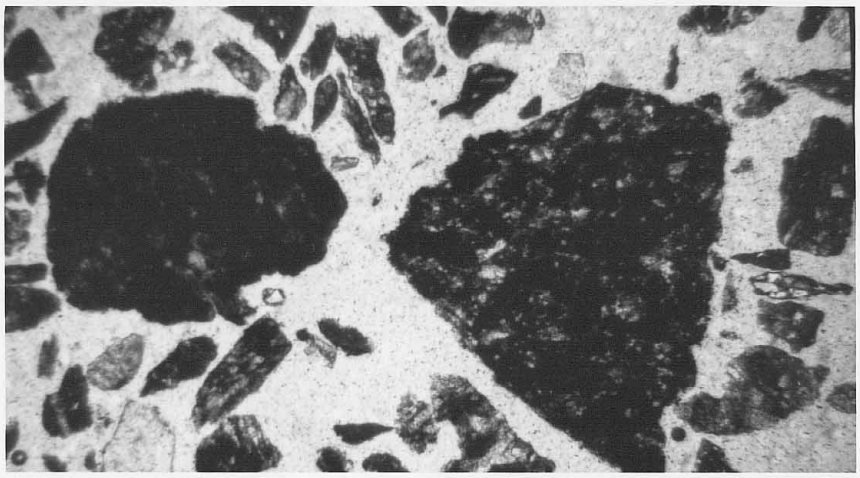
KCMIFF - 1080



Sketch 1: Rodlike appearance of microsparic calcite (clear areas) in the clay matrix (stippled). ×320, crossed nicols.



Sketch 2: Organic structure, a foraminifera? ×320

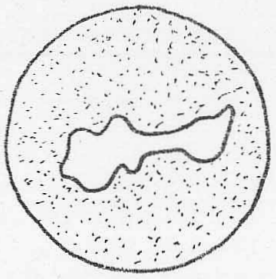


0.5cm

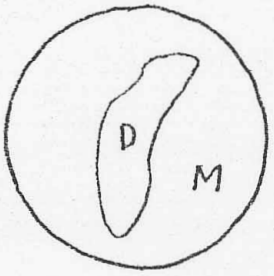
Parallel light

#55

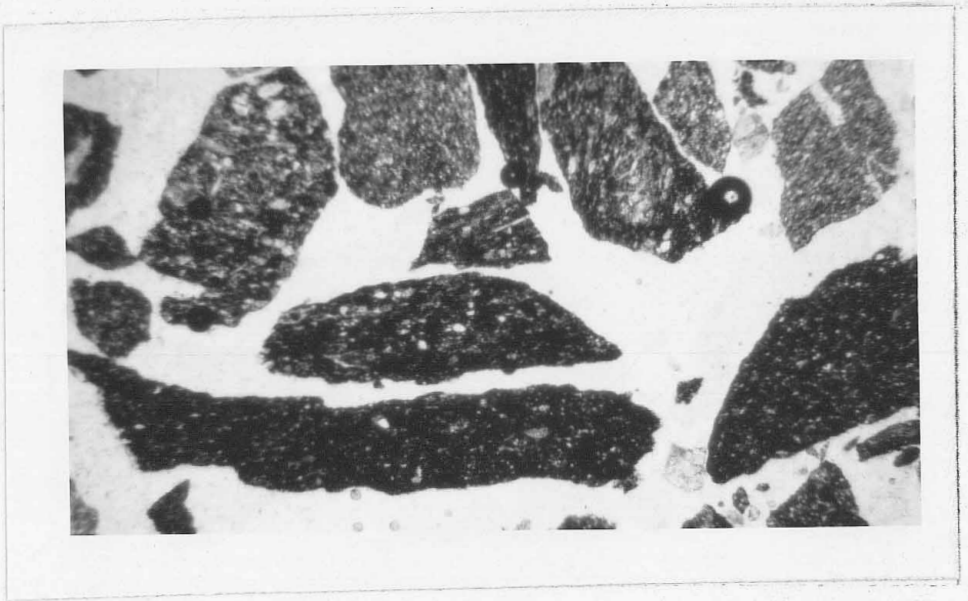
KCMIFF-1210



Sketch 1: Detrital quartz (clear) in clay matrix (stippled). The shape of this grain suggests that it has been partially dissolved or corroded. x640, crossed nicols.



Sketch 2: Coarse-grained, drusy microspar (D) in a matrix of finer-grained drusy microspar (M). Is this an organic structure? x100, crossed nicols.



0.5 cm

Parallel light

Quartz, clay, and calcite in calcareous mudstone

#36

Thin Section Number: KCMIFF-1230

Rock Name: Sandy, Calcareous mudstone

Composition:

Microspar: 30%
Average grain size is 0.1 mm. Dominant constituent.

Cryptocrystalline brown calcite: 26%

Clays: 25%

Quartz: 18%
Average grain size is 0.075 mm. Detrital quartz - corroded, angular, silt-sized grains which are set in a microspar matrix, there is a "wacke" texture. Where quartz grains come into contact with one another, point and concavo-convex contacts are present. Some quartz is cherty and associated with red iron stains.

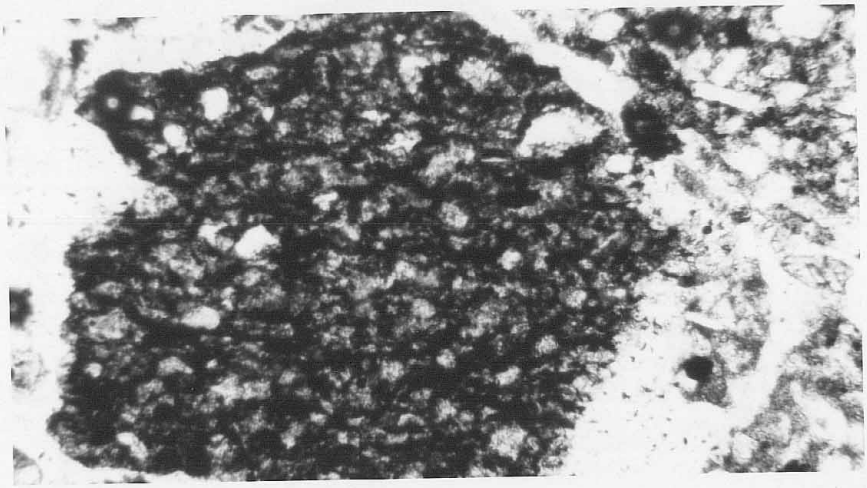
Sparry calcite: trace

Pyrite: trace
euhedral crystals

Hematite: trace

Texture: Microspar is dominant constituent, some places are cryptocrystalline brown calcite indicating that the latter has probably undergond aggrading neomorphism.

KCMIFF-1230



1.0 mm

Parallel light

Quartz, clay, and calcite in sandy, calcareous mudstone

Thin Section Number: KCMIFF-1810

Rock Name: Argillaceous limestone

Composition:

Microspar: 57%
Average grain size is 0.08 mm. Large patches of microspar are elongate and parallel the layering. Veins of spar and microspar cut across layering.

Clay: 18%
Present as "layers" (patches) alternating with the microspar.

Spar: 12%
Average grain size is 0.4 mm. A result of recrystallization of microspar?

Chert: 11%
Average size of individual quartz crystals: the crystal size is gradational from 0.1 mm to <0.001 mm. In places, chert replaces sparry calcite, microspar and cryptocrystalline brown calcite. Occurs in veins, small pockets and irregular patterns.

Quartz: 1%
Average grain size is 0.05 mm. Small quartz crystals associated with chert, possibly a result of silica recrystallization? Also, direct replacement of calcite by quartz with no chert evident (?). Detrital quartz: a few pieces of quartz are angular, silt-sized clasts in an argillaceous carbonate (usually micritic) matrix.

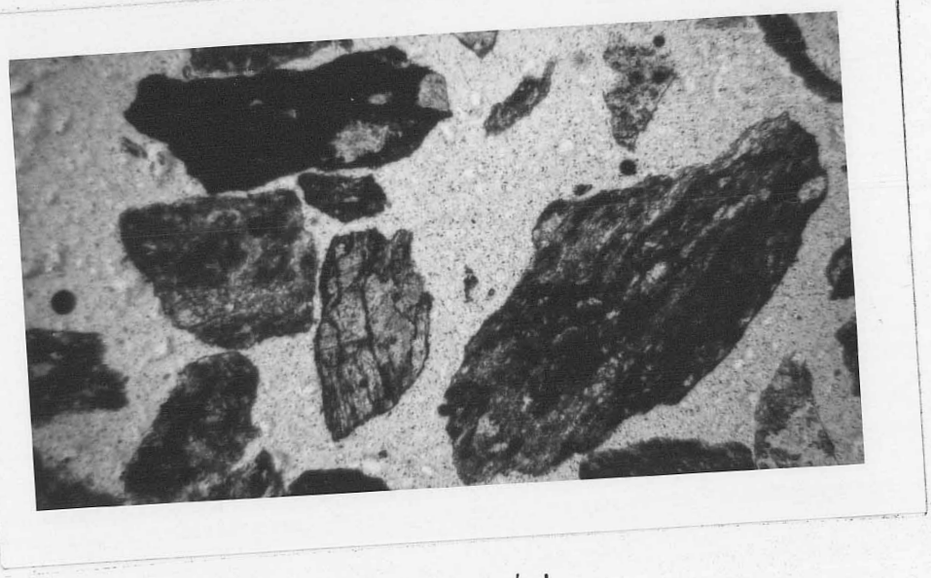
Cryptocrystalline brown calcite: 1%
Some cuttings are almost entirely cryptocrystalline brown calcite except for veins and pockets of microspar.

Pyrite: trace

Dolomite: trace
A few zoned dolomite rhombs exist in the cutting which are dominantly microspar.

Texture: The clays are generally more abundant at the edges of the spar than the microspar, therefore, the clays may well have been insoluble residue which was separated first as a result of the aggradation of micrite to microspar and later of microspar to spar. Planar boundaries between two different lithologic parts of a cutting are common. Burrow (?): possible J-shaped silicified (chert) burrow in micrite. Probably bioturbated.

KCMIFF-1810



Parallel light

0.5 cm

Clay and calcite in argillaceous limestone

Thin Section Number: KCMIFF-1920

Rock Name: Micritic limestone

Composition:

Calcite:
Mostly micrite (cryptocrystalline brown calcite)

Calcite: microspar
Average grain size is 0.04 mm. Occur as lenses in the micrite. A few microspar veins which cut across layering are also present.

Calcite: sparry calcite
Average grain size is 0.4 mm. This spar is generally full of insols. This spar comes from recrystallization of microspar.

Chert:
Average size of individual crystals is 0.04 mm. Some microspar and micrite have been replaced by chert.

Hematite: trace
Both red-translucent and black opaque varieties.

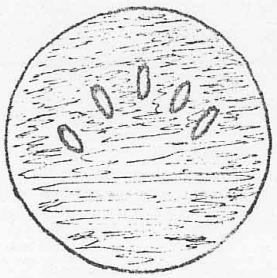
Pyrite: trace

Fluorite: trace

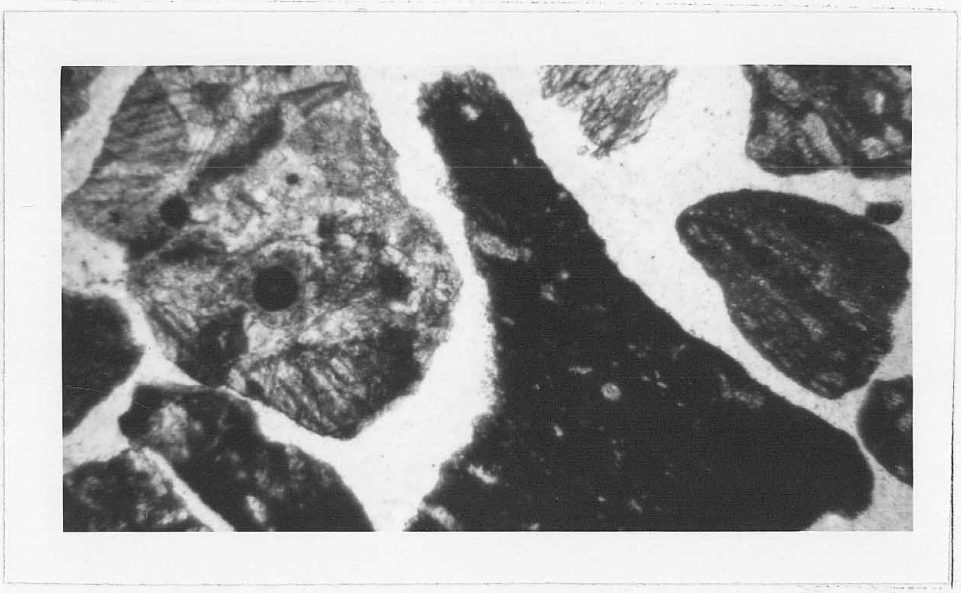
Fossils: Foram (fusulinid (?)) - walls recrystallized. Bryozoan? (see sketch 1).

Texture: Some stylolites exist in the rock, with black insols concentrated along them. When microspar entirely makes up one cutting, crystals show a preferred orientation in one direction.

KCMIFF-1920



Sketch 1: Pattern of microspar (clear areas) embedded in a matrix of cryptocrystalline brown calcite (shaded). Is this possibly the remains of a bryozoan?
×80, plane light



0.5 cm

Parallel light

Clay and calcite in argillaceous limestone

Thin Section Number: KCMIFF-2010

Rock Name: Tremolite-bearing limestone

Composition:

Microspar: 54%
Average grain size is 0.05 mm. Associated with black (organic or clay) material. Microspar occurs in elongate lenses (see sketch 1).

Cryptocrystalline brown calcite: 33%

Sparry calcite: 6%
Average grain size is 0.2 mm. Recrystallized from microspar and cryptocrystalline brown calcite. Black material (organic or clay) not associated with this lithology.

Chert: 5%
Average size of individual quartz crystals is 0.01 mm. Small fragments of chert which are stained black. Chert replacing micritic fragments.

Cryptocrystalline clear calcite: 2%

Pyrite and chalcopyrite: trace
Associated with black (organic or clay) material.

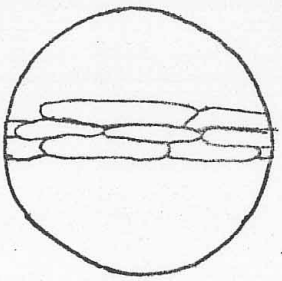
Muscovite: trace

Tremolite: trace

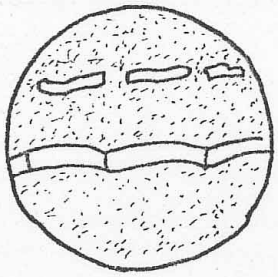
Fossils: Coralline algae - associated with black material.

Texture: Coarser-grained "clear" calcite is sometimes interlayered with micrite (organically rich?) (see sketch 2).

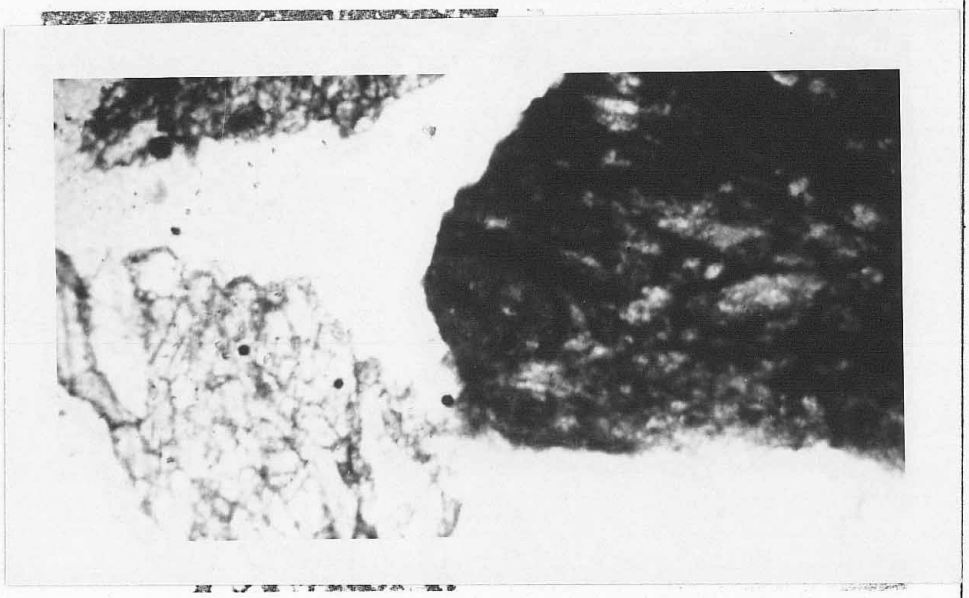
KCMIFF - 2010



Sketch 1: Typical appearance of microspar in elongate lenses. x80, crossed nicols.



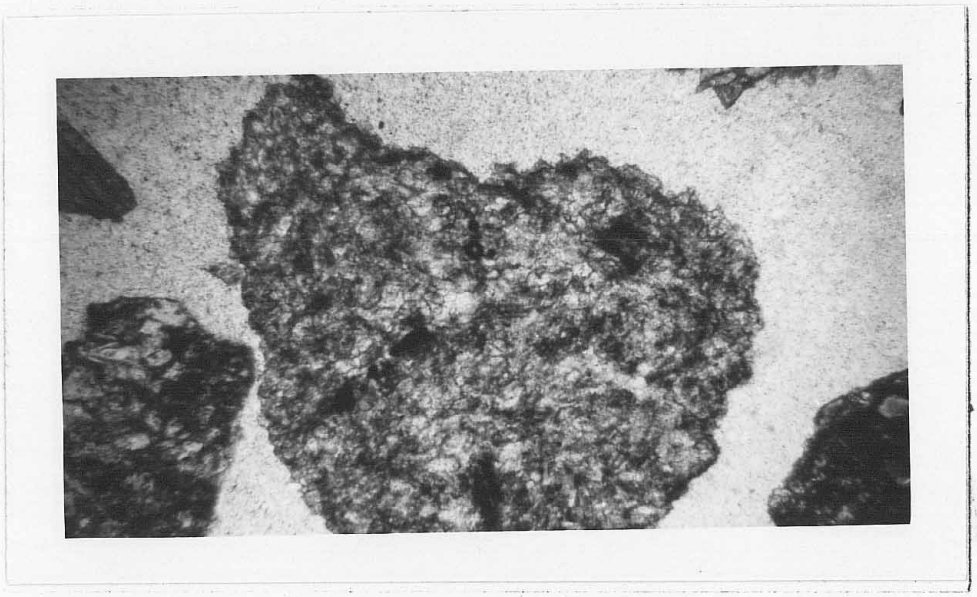
Sketch 2: This shows the occurrence of microspar and spar (clear areas) and cryptocrystalline brown calcite (stippled) which suggests interlayering. x80, plane light.



1.0 mm

Parallel light.

KCMIFF - 2010



0.5 cm

Parallel light

Calcite and tremolite in tremolite-bearing limestone

Thin Section Number: KCMIFF-2280

Rock Name: Diopside Marble

Composition:

Chert:

Average size of individual quartz crystals is 0.01 mm. Small quartz crystals surround anhedral sparry calcite which shows cleavage (see sketch 1). Only a few chert fragments are present. Replacement of calcite by chert is suggested.

Calcite:

Average grain size of spar is 0.2 mm. Sparry, anhedral crystals occur in large aggregates. These are clear and show no organic material. Other calcite in the slide is much finer and more irregularly shaped. It is characterized by brown staining.

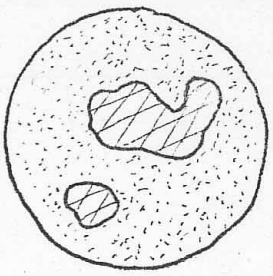
Diopside:

Average grain size is 0.3 mm. Two idioblastic crystals. Other smaller crystals are also present.

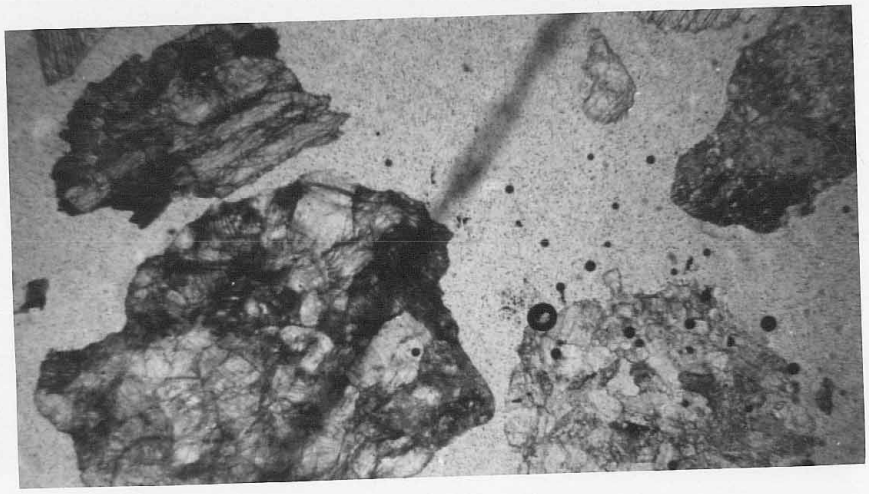
Chalcopyrite:

Small crusting forms. Occurs in those rocks which are organically (?) stained brown.

KCMIFF -2280



Sketch 1: Anhedral, embayed spar fragments (clear and cross-hatched) surrounded by chert (stippled).
x60, plane light



0.5 cm

Parallel light

Calcite and diopside in upper right hand corner

Thin Section Number: KCMIFF-2360

Rock Name: Diopside-Wollastonite Marble

Composition:

Spar: 43%
Average grain size is 1.0 mm. Occurs in large blocks of clear, colorless spar.

Microspar: 32%

Chert: 12%
Average size of individual quartz crystals is 0.02 mm. Chert aggregates contain small anhedral crystals of calcite, small plates of muscovite, and anhedral diopside crystals.

Wollastonite: 6%
Average length of fibers is 2.0 mm. Average width of fibers is 0.2 mm. Occurs in fibrous aggregates. $2V_x = 36°$.

Diopside: 4%
Average grain size is 0.2 mm. Associated with wollastonite and chert.

Cryptocrystalline clear calcite: 1%

Cryptocrystalline brown calcite: trace

Muscovite: trace
Average length of crystals is 0.30 mm. Average width of crystals is 0.15 mm.

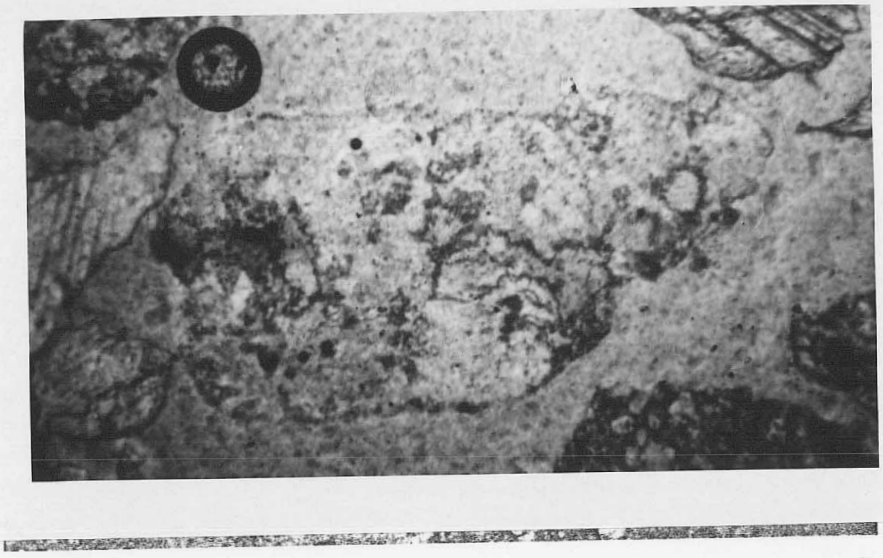
Hematite: trace

Pyrite: trace

Potash Feldspar: trace

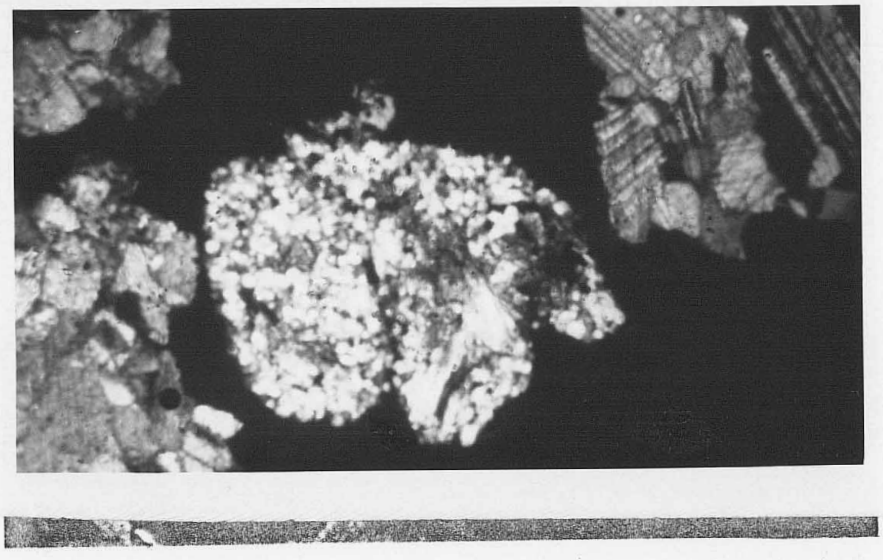
Plagioclase Feldspar: trace

KCMIFF-2360



1.0 mm

Parallel light.



1.0 mm

Crossed nicols.

Fibrous wollastonite is shown at center. Coarse calcite is at the upper right.

Thin Section Number: KCMIFF-2460

Rock Name: Wollastonite hornfels + Quartz monzonite

Composition:

Quartz monzonite and chert: 63%
Groundmass is fine-grained. Encloses porphyritic, anhedral quartz crystals and small, anhedral calcite crystals. Encloses large crystals of potash feldspar.

Plagioclase Feldspar: 10%
Albite, altering to sericite.

Wollastonite: 10%
Fibrous, radiating.

Quartz - individual crystals: 6%

Microspar: 3%
Occurs in chert aggregates. Dolomite (?)

Spar: 2%
A few large blocky crystals are present.

Cryptocrystalline brown calcite: 1%

Pyrite: 1%

Diopside: 1%
Crystals are associated with wollastonite.

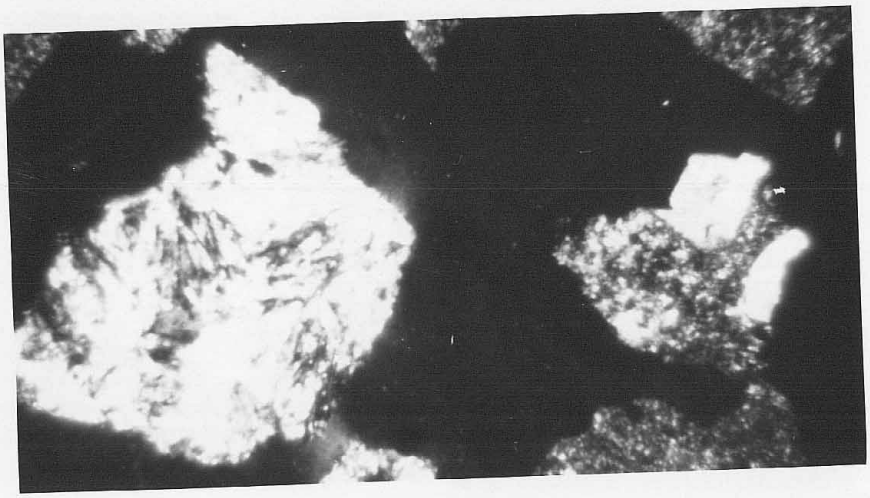
Muscovite: trace

Hematite: trace

Potash Feldspar: trace
With small vein running through it.

Texture: Average grain size of phenocrysts is 0.8 mm.

KCM1FF-2460



0.5 cm

Crossed nicols

Wollastonite (upper left) and quartz latite (right)

Thin Section Number: KCMIFF-2640

Rock Name: Wollastonite Marble

Composition:

Spar: 44%
Average grain size is 0.8 mm. Pieces of large, blocky, twinned, anhedral crystals.

Cryptocrystalline brown calcite: 31%
Brown, large masses, recrystallized into sparite.

Microspar: 12%

Chert: 4%
Average grain size of individual quartz crystals is 0.01 mm. Chert fragments contain diopside, fibrous wollastonite, varying amounts of calcite which has a poikiloptic texture. One chert fragment contains about 20% anhedral calcite with no other impurities. In chert fragments, the non-chert minerals are usually concentrated.

Cryptocrystalline clear calcite: 3%

Wollastonite: 3%
Average length of crystals is 0.3 mm. Average width of crystals is 0.01 mm. Occurs as crystals in radiating, fibrous aggregates.

Fibrous calcite: 1%

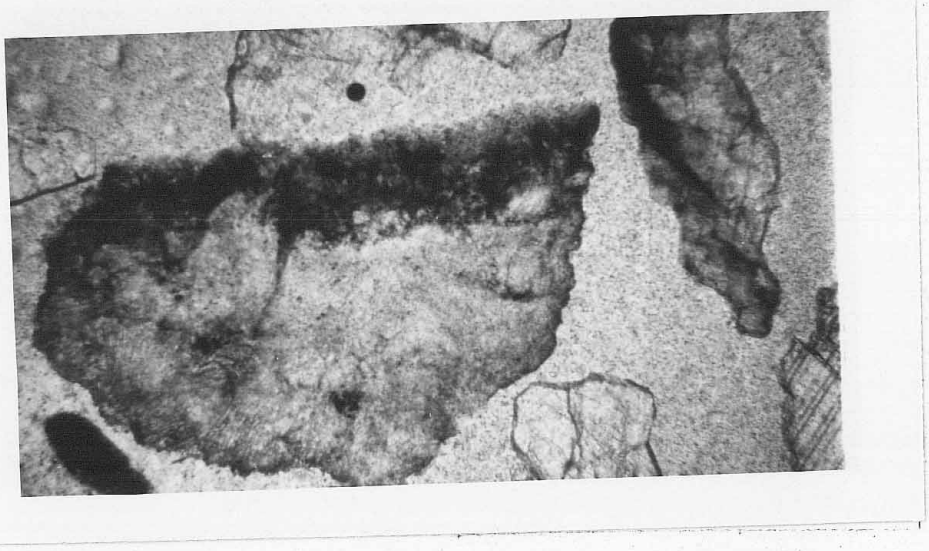
Diopside: 1%
Average grain size is 0.3 mm. Associated with wollastonite and cryptocrystalline brown calcite.

Pyrite: trace
Present in calcite, especially in cryptocrystalline brown calcite which has not been greatly recrystallized.

Fluorite: trace

Apatite: trace

KCM1FF-2640



0.5 cm

Parallel light

Wollastonite (left) and calcite (right)

Thin Section Number: KCMIFF-2660

Rock Name: Cherty Limestone

Composition:

Cryptocrystalline brown calcite: 45%

Microspar: 29%
Average grain size is 0.05 mm. Neomorphic spar.

Chert: 16%
Chert replaces calcite.

Cryptocrystalline clear calcite: 6%

Hematite: 2%
Trace of hematite as a red, translucent staining. Also appears as black opaque crystals in chert.

Spar: 1%

Pyrite: 1%
Some cubic crystals disseminated in dark black material.

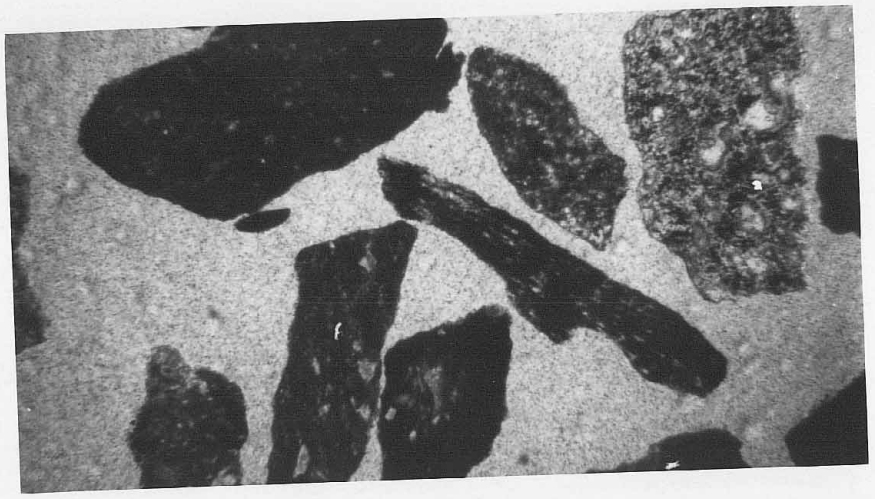
Fossils: Foraminifera and bryozoa.

Textures: In some places, the calcite looks as if it is a dirty micrite in an organic structure which is being replaced by sparry calcite and neomorphic spar.

Remarks: There are no signs of metamorphism in this slide.

KCMIFF - 2660

(11)



0.5 cm

Parallel light

Thin Section Number: KCMIFF-2820a

Rock Name: Wollastonite Marble

Composition:

Calcite:
Microspar, crystals have a preferred orientation in some fragments; this is probably neomorphic spar.

Diopside: in aggregates

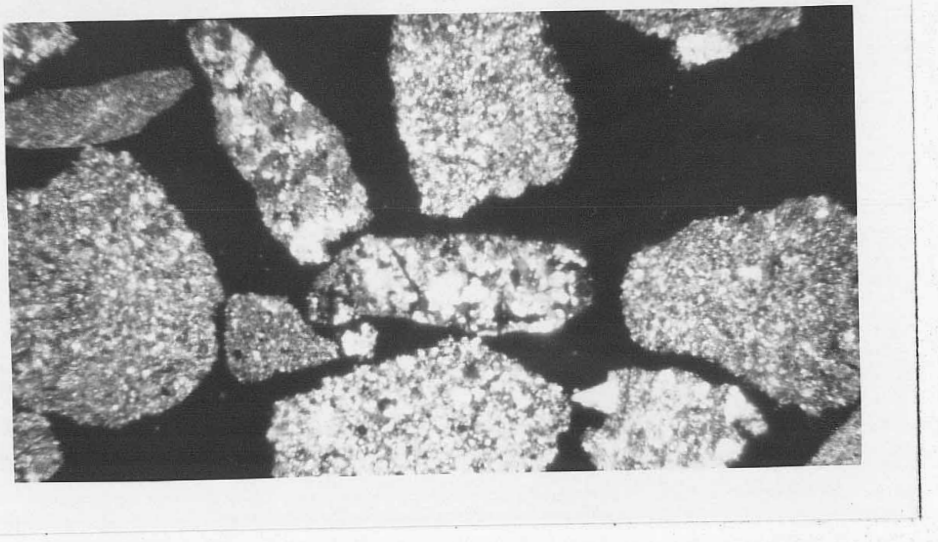
Wollastonite:
small radiating fibers associated with diopside

Pyrite: trace

Fluorite: trace

Texture: Average grain size is 0.02 mm.

KCMIFF -2820a



0.5 cm

Crossed nicols

Wollastonite (center) surrounded by calcite

Thin Section Number: KCMIFF-2820b

Rock Name: Wollastonite Marble

Composition:

Chert:
Occurs in masses. Corroded, anhedral microspar occurs in patches in these masses of chert, along with corroded crystals of diopside and tremolite. Chert appears laminated due to size differentiation.

Calcite:
Occurs as aggregates of recrystallized calcite which is microspar and probably was originally cryptocrystalline brown calcite. Calcite also occurs as cryptocrystalline brown calcite which is partially recrystallized to neomorphic spar. Large blocks of calcite spar also occur. These adjoin the cryptocrystalline brown calcite (see sketch 1).

Wollastonite:
Occurs in chert aggregates.

Diopside:
Occurs in chert aggregates.

Pyrite: trace

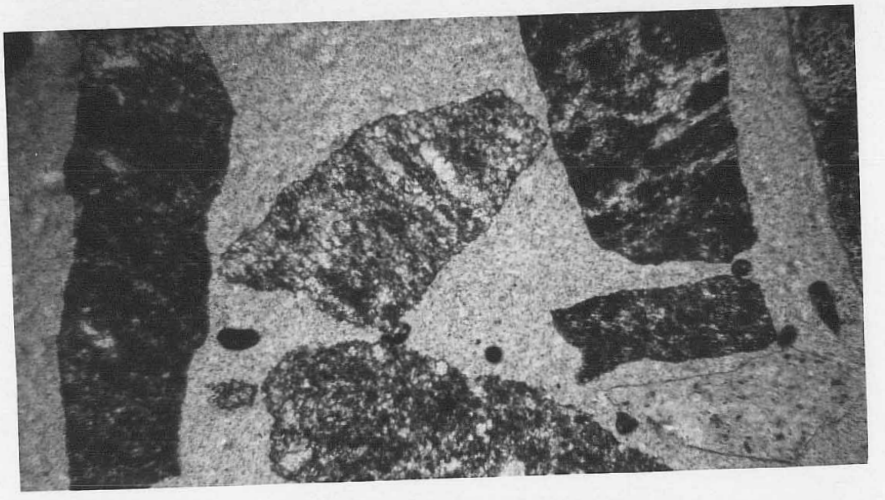
Hematite: trace

Muscovite and Sericite: trace

Prehnite (?): trace
Shows second order interference colors.

Texture: The average grain size is 0.02 mm.

KCM1FF-2820b



0.5 cm

Parallel light

Thin Section Number: KCMIFF-2960

Rock Name: Quartz monzonite

Composition:

Quartz-Chert:
Average size of quartz crystals is 0.06 mm. Chert has angular inclusions of potash feldspar and plagioclase. It also has inclusions of rounded quartz. Quartz is intergrown in a micrographic (runic) texture with potash feldspar and some plagioclase. Larger-grained quartz and potash feldspar often comes into sharp contact with masses of micrographic intergrowths of quartz and feldspar (see sketch 1).

Potash Feldspar:
Kspar more abundant than plagioclase. Alters to clay minerals (possibly sericite). Sanidine (?) is present.

Plagioclase Feldspar:
Composition is An_4. Shows albite twinning. Alters to clay minerals (possibly sericite).

Sericite:
Alteration product of decaying feldspars. It is aligned along cleavage traces of the feldspars.

Pyrite: trace

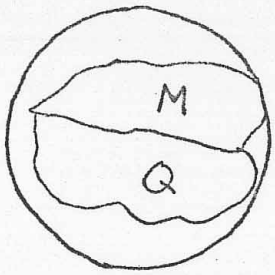
Fluorite: trace

Zircon: trace

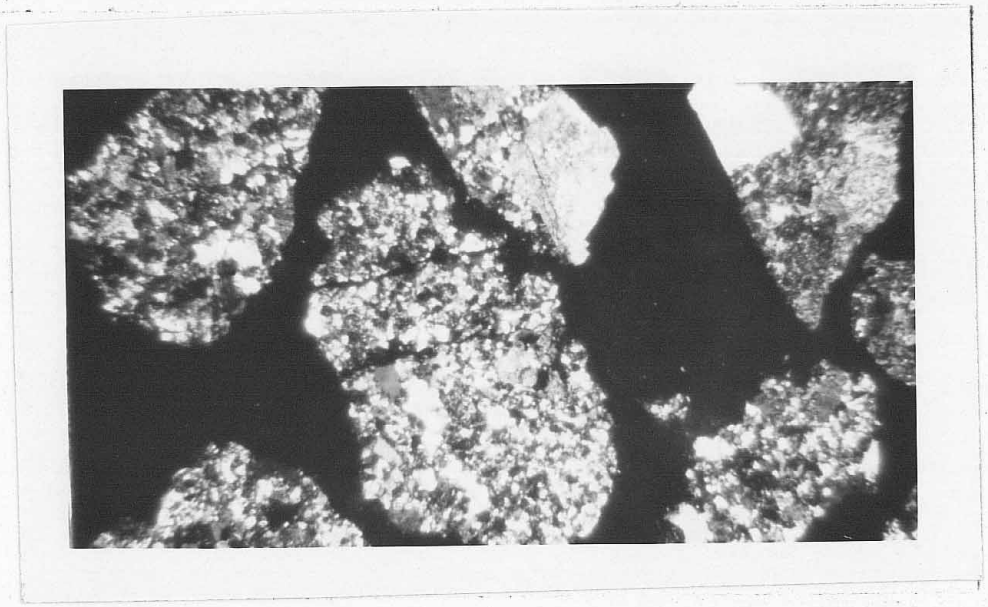
Calcite: large-grained spar crystals which are probably cavings.

Texture: The average grain size of the major constituents other than chert is 0.35 mm.

KCMIFF-2960



Sketch 1: Diagram to show how micrographic intergrowths of (M) quartz and feldspar sharply adjoin quartz phenocrysts (Q) x 40, crossed nicols.



0.5 cm

Crossed nicols

Quartz and potash feldspar (upper middle) in ground mass of quartz and feldspar.

Thin Section Number: KCMIFF-3130a

Rock Name: Quartz monzonite

Composition:

Quartz:

Potash Feldspar:
$2V_x = 50°$

Perthitic Feldspar:

Plagioclase Feldspar:
Na-rich (albite (?)). Alters to sericite + chlorite + hematite

Pyrite:

Biotite:
Alters to chlorite + hematite.

Sericite:
Alteration product of feldspars.

Chlorite:
Pleochroic yellow-green.

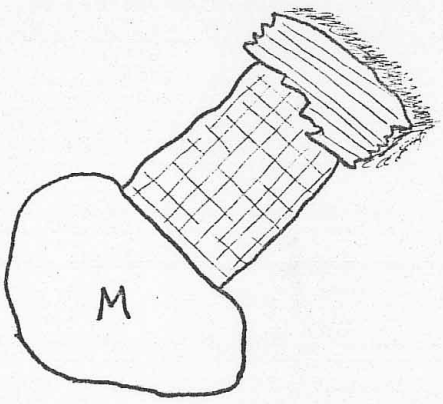
Zircon:

Hornblende:
Pleochroic, associated with pyrite.

Calcite:
Present in minor amounts associated with micrographic intergrowths of quartz and potash feldspar.

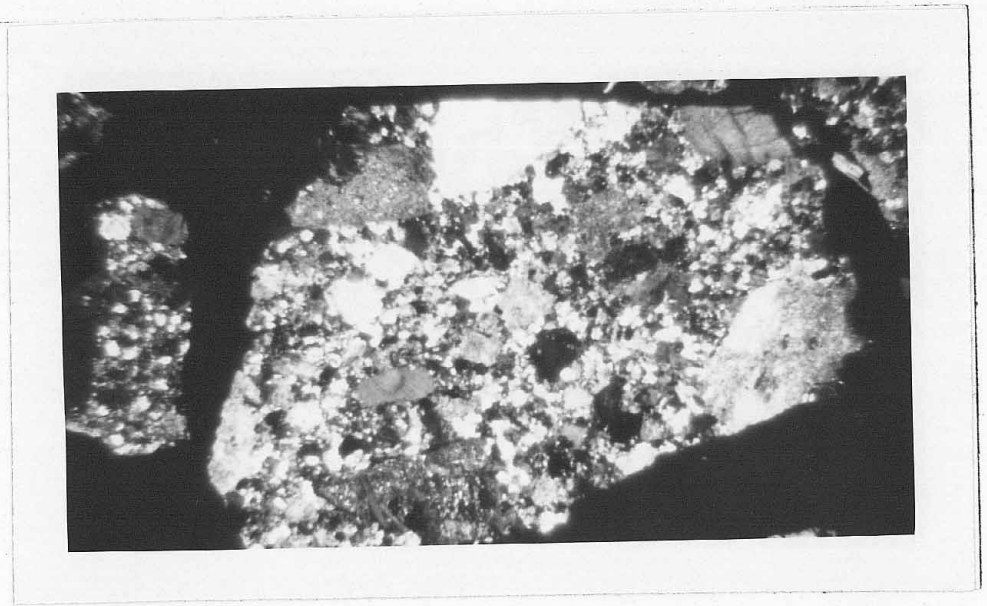
Texture: Average grain size of crystals in micrographic intergrowths is 0.12 mm. Average grains size of other major minerals (quartz, Kspar and plagioclase) is 0.45 mm. Micrographic intergrowths of quartz and potash feldspar forms a matrix in which large crystals of quartz, potash feldspar, perthite, and plagioclase are set. The micrographic intergrowths commonly came into sharp contact with large crystals of quartz and feldspar (see sketch 1).

KCM1FF-3130a



Sketch 1: Typical occurrence of potash feldspar (crossed-hatched), plagioclase feldspar (striated), sericite (shaded boundary on plagioclase), and micrographic intergrowth body of quartz and potash feldspar (M).

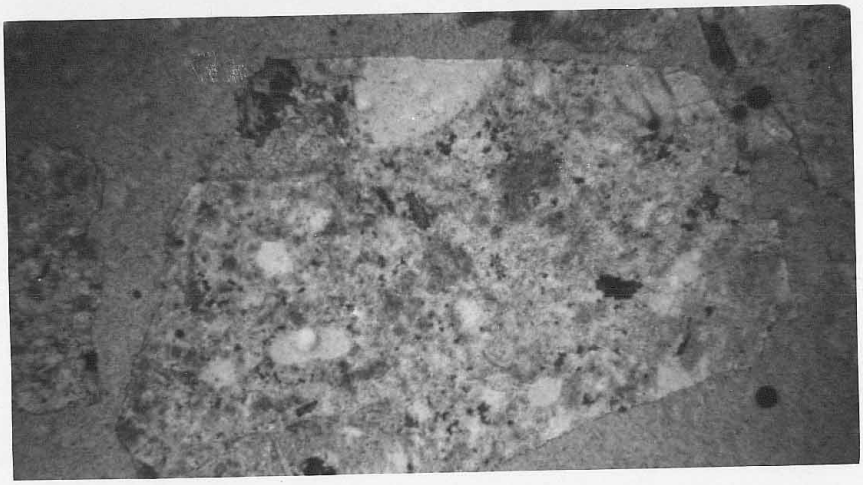
x 20, crossed nicols.



crossed nicols

0.5 cm

KCMIFF - 3130a



0.5 cm

Parallel light

Thin Section Number: KCMIFF-3130b

Rock Name: Quartz monzonite

Composition:

Potash Feldspar:

Quartz:

Potash feldspar and quartz are present both as large crystals and in micrographic intergrowths. Large crystals of quartz are rounded. Potash feldspar is angular, anhedral to subhedral.

Plagioclase Feldspar:

Severely altered to sericite. Plagioclase is present both as large single crystals and in the micrographic intergrowths. Na-rich (albite (?)).

Perthitic Feldspar:

Present as large crystals

Biotite:

Alters to chlorite + pyrite.

Chlorite:

Generally platy as an alteration product of biotite. It is also fibrous and radiating when associated with large, sparry calcite. Brown chlorite intergrowths with quartz.

Pyrite:

Calcite:

Minor amounts are associated with the micrographic intergrowths of quartz and potash feldspar. One large sparry fragment is also present.

Zircon:

As inclusions in the biotite

Hematite:

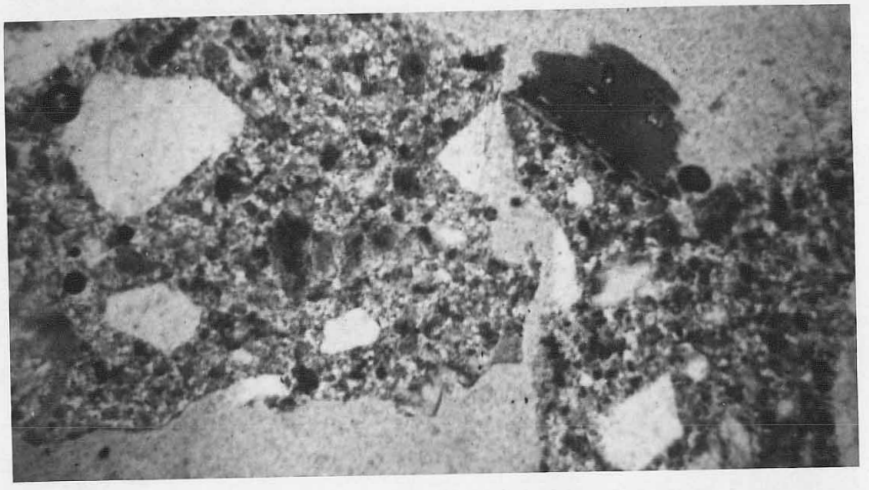
Fluorite:

Penninite (?):

Pleochroic red-brown-colorless, associated with pyrite.

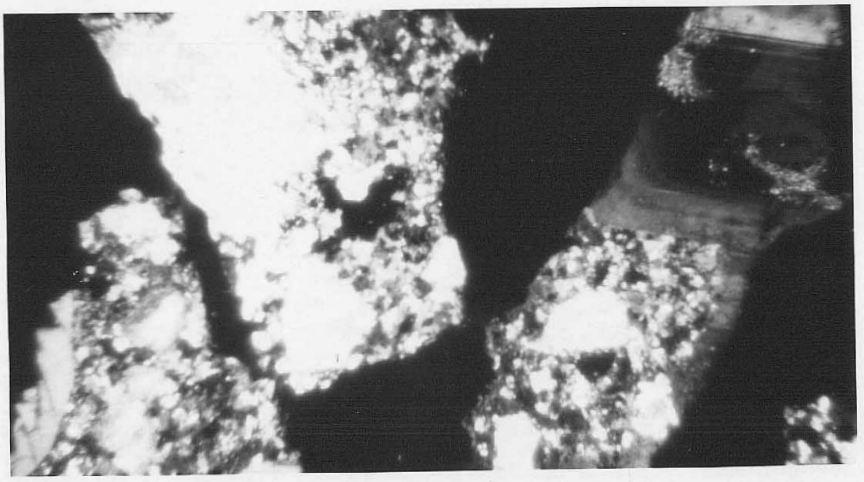
Texture: Average grain size of crystals in micrographic intergrowths is 0.09 mm. Average grain size of other major minerals is 1.0 mm.

KCMIFF - 3130b



1.0 mm

Parallel light



0.5 cm

Crossed nicols

Zoned plagioclase in upper right hand corner.
Potash feldspar at lower left.

Thin Section Number: KCMIFF-3380

Rock Name: Diopside Marble

Composition:

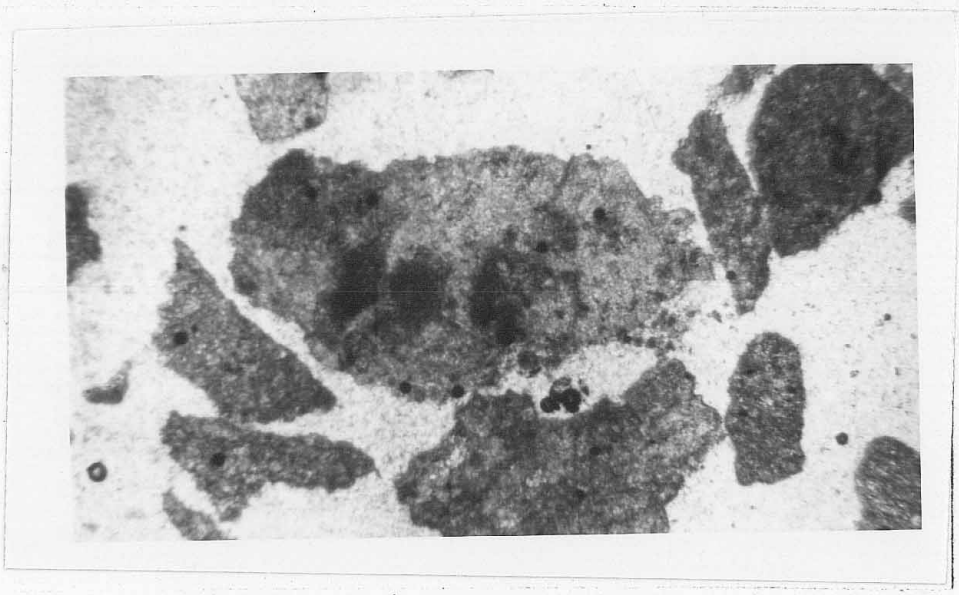
Calcite:
Mostly spar

Chert:
Fine-grained

Diopside:
Alters to chlorite

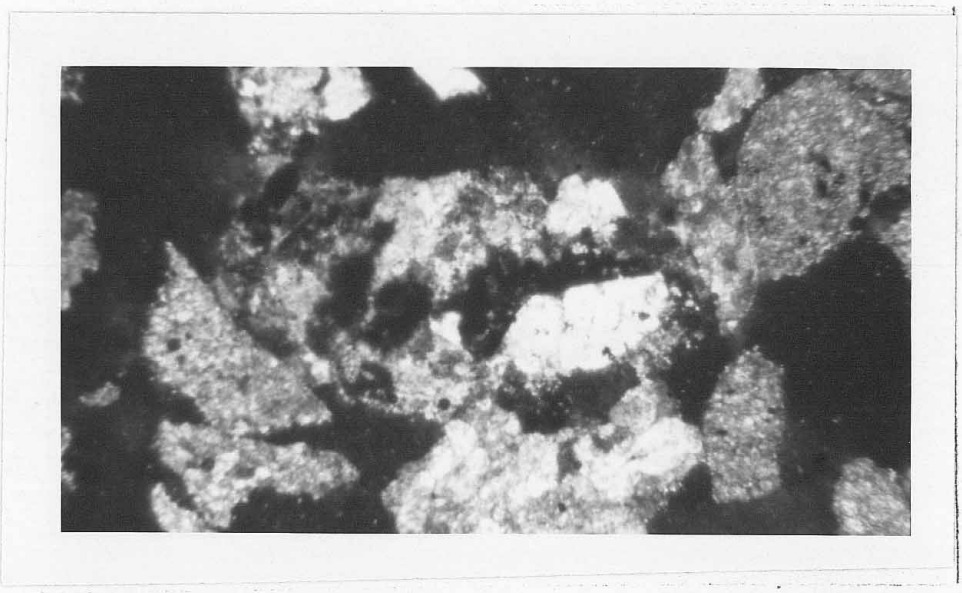
Associations:
Calcite + quartz
Diopside + quartz
Diopside + calcite

KCMIFF - 3380



0.5cm

Parallel light.



0.5cm

Crossed nicols.

Same photograph as above but with crossed nicols.
Diopside (dark) shows up at the center of the photograph.

Thin Section Number: KCMIFF-3680a

Rock Name: Diopside marble

Composition:

Microspar: 43%
Twinned, sparry, anhedral crystals. One piece of limestone is brown, laminated, micritic (caving (?)).

Spar: 20%
Same occurrence as microspar.

Diopside and Olivine: 20%
Diopside > Olivine (Forsterite). Diopside is mineral with high relief and brownish birefringence.

Quartz - individual crystals: 4%
This has two forms: (1) Larger, separate, anhedral crystals, (2) Anhedral crystals which are smaller than spar and are mixed with calcite.

Potash Feldspar: 2%
A large subhedral crystal occurs which is associated with calcite. It has inclusions of calcite.

Chert: 2%
In aggregates

Chlorite: 2%
An alteration product of diopsode; occurs as small veins cross-cutting the diopside. Pennite.

Plagioclase Feldspar: 1%

Amphibole: 1%

Cryptocrystalline clear calcite: 1%

Pyrrhotite and Pyrite: 1%

Zircon: trace

Hematite: trace

Apatite: trace

Tourmaline: trace

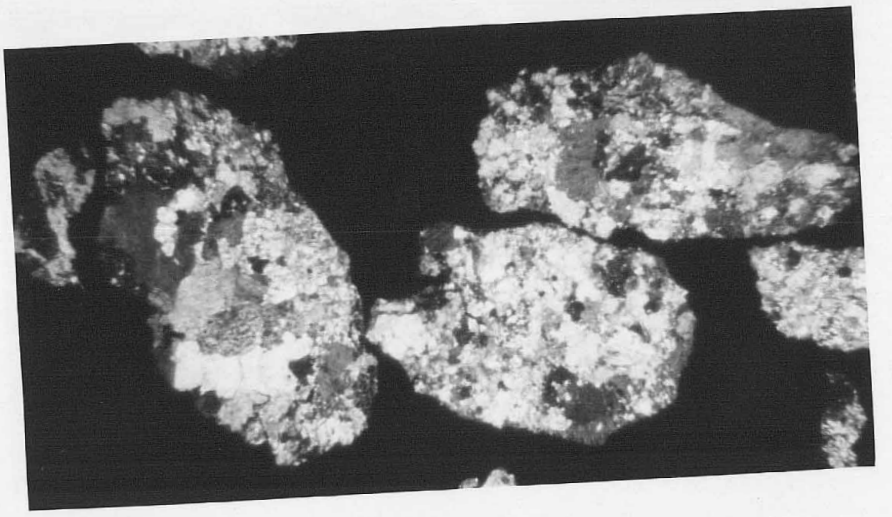
Muscovite: trace

Thin Section Number: KCMIFF-3680a (continued)

Texture: Average grain size of small crystals is 0.03 mm. Average grain size of large crystals is 0.8 mm. Large crystals include quartz, feldspar, and calcite.

Remarks: This thin section is contaminated by limestone cavings.

KCM1FF-3680a



0.5 cm

Crossed nicols

Diopside and coarse calcite

Thin Section Number: KCMIFF-3680b

Rock Name: Wollastonite Marble

Composition:

Spar: 56%
Large, blocky spar crystals with rhombohedral cleavage.

Microspar: 22%
Some cuttings which are dominantly micrite contain patches of spar and microspar.

Wollastonite: 5%

Forsterite: 5%
Occurs in calcite

Cryptocrystalline brown calcite: 4%
Some cuttings are predominantly cryptocrystalline brown calcite and are laminated.

Chert: 4%
In aggregates combined with plagioclase and much larger crystals of potash feldspar.

Cryptocrystalline clear calcite: 2%

Plagioclase Feldspar: 1%

Potash Feldspar: trace

Quartz - individual grains: trace

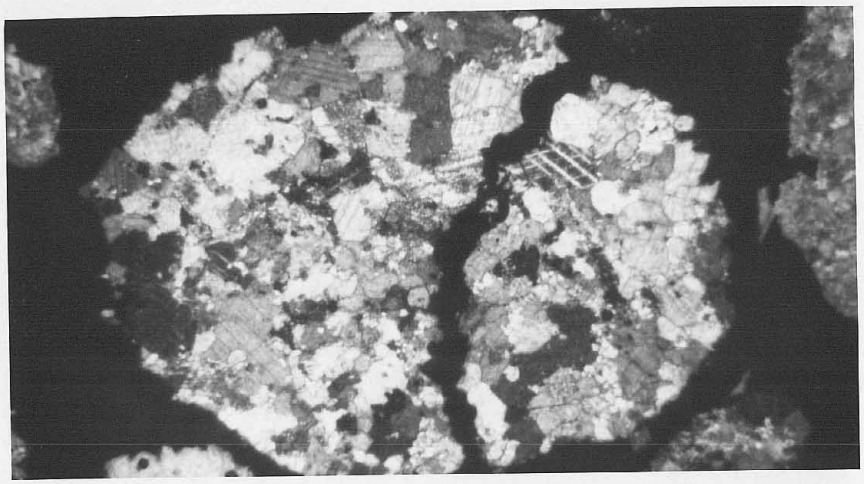
Muscovite: trace

Gypsum: trace

Pyrrhotite: trace

Texture: Average size of larger crystals is 1.3 mm. Average size of smaller crystals is 0.05 mm. Larger crystals are sparry calcite, quartz, and feldspar.

KCMIFF-36806



1.0 mm

Crossed nicols.

Thin Section Number: KCMIFF-3740a

Rock Name: Marble

Composition:

Microspar: 51%
Neomorphic alteration of cryptocrystalline brown calcite.

Spar: 29%
Large aggregates of blocky, anhedral spar.

Cryptocrystalline brown calcite: 16%

Cryptocrystalline clear calcite: 1%

Chert: 1%
Aggregates of chert contain corroded sparry calcite.

Muscovite: trace

Pyrite: trace

Zircon: trace

Pyroxene: trace

Texture: Average size of larger crystals is 1.5 mm. Average size of smaller crystals is 0.13 mm.

KCM1FF-3740a

1.0 mm

Parallel light

Thin Section Number: KCMIFF-3740b

Rock Name: Marble

Composition:

Microspar: 78%
Average grain size is 0.04 mm. Associated with cryptocrystalline brown calcite. It is probably strongly recrystallized. In some places it is large and blocky.

Cryptocrystalline brown calcite: 7%

Cryptocrystalline clear calcite: 7%

Diopside: 3%
Average grain size if 0.04 mm. Second-order interference colors. Appears in a matrix of recrystallized calcite.

Spar: 2%

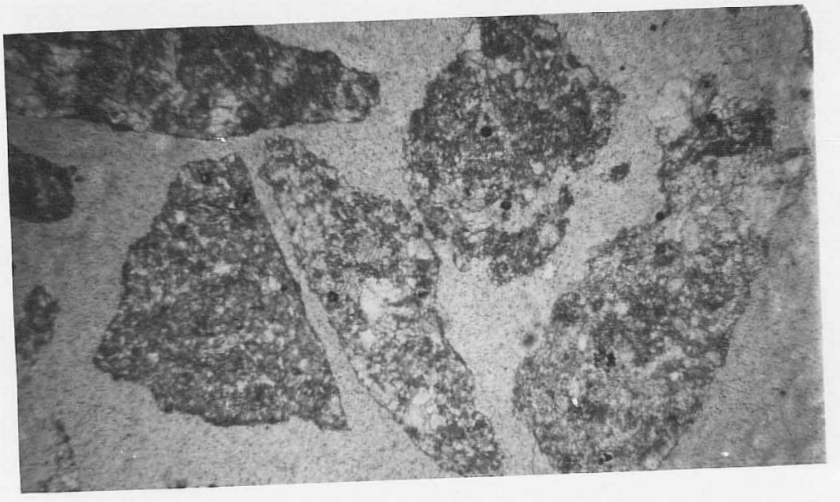
Chalcopyrite: 1%
Associated with cryptocrystalline brown calcite.

Potash Feldspar: 1%
In ore fragment, Kspar and chert are intergrown; in this fragment, anhedral calcite crystals are present.

Chert: trace
Some chert is present in cuttings in which the calcite is highly recrystallized.

Fluorite: trace

KCMIFF-37406



Parallel light

0.5 cm

Thin Section Number: KCMIFF-3750

Rock Name: Tremolite Marble

Composition:

Calcite:
Most fragments are microspar. Some fragments are anhedral spar crystals. Occasional patches of cryptocrystalline brown calcite occur in fragments which are dominantly microspar.

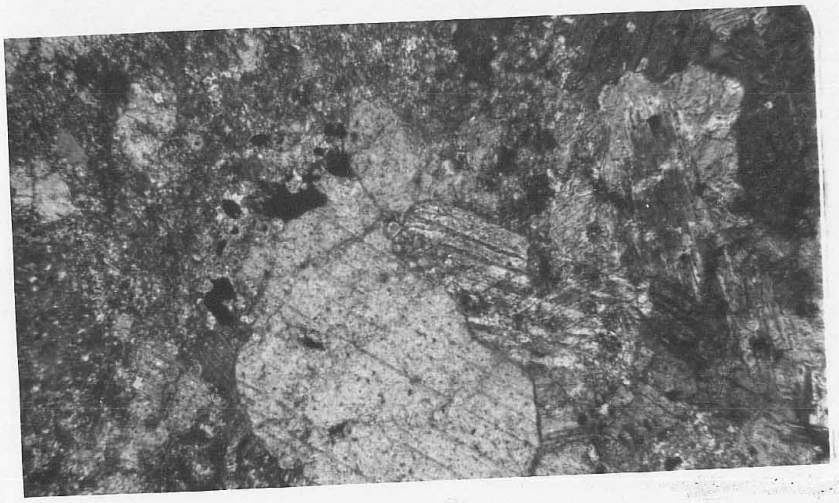
Tremolite:
Small anhedral crystals in calcite

Pyrrhotite: trace

Muscovite: trace

Texture: Average size of sparry calcite is 0.5 mm. Average size of all smaller crystals is 0.05 mm.

KCMIFF-3750



1.0 mm

Crossed nicols.

Fibrous tremolite at right.

Thin Section Number: KCMIFF-3780

Rock Name: Diopside Hornfels (Metamorphic chert horizon)

Composition:

Chert:
Average size of individual crystals is 0.01 mm. Fine-grained quartz associated with small pyroxenes.

Quartz:
Average size of crystals is 0.2 mm. Large, anhedral quartz crystals which occur in a chert matriz; these crystals appear corroded.

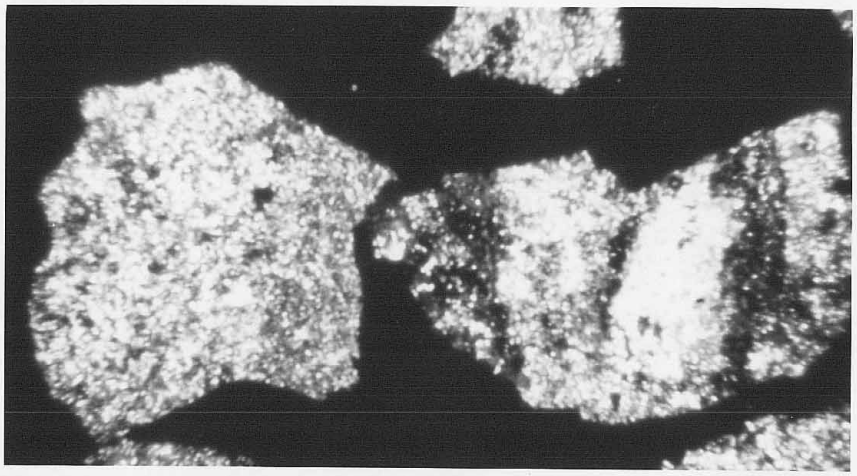
Calcite:
Small anhedral crystals

Diopside:
Small anhedral to subhedral crystals

Zircon:

Muscovite:
Corroded

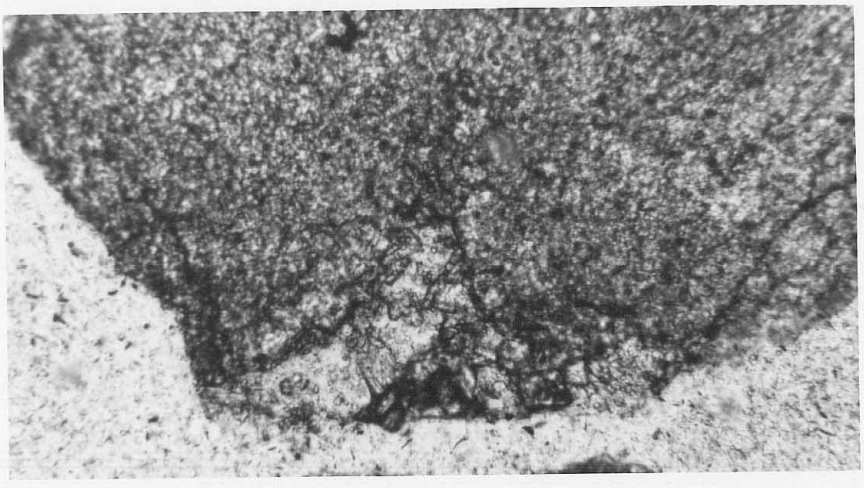
KCM1FF-3780



0.5cm

Crossed nicols.

Chert and some diopside.

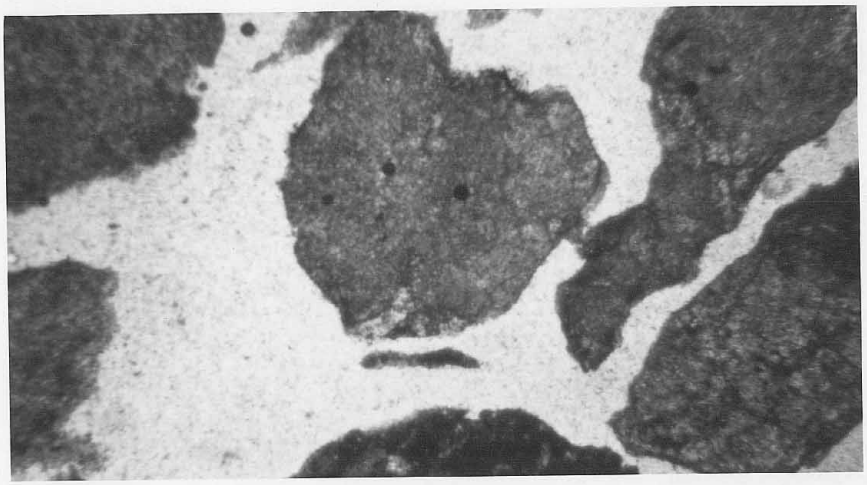


1.0mm

Parallel light.

Some diopside is shown (high relief).

KCMIFF-3780



Parallel light

1.0 mm

Thin Section Number: KCMIFF-4000

Rock Name: Diopside Hornfels

Composition: The rock is essentially 100% diopside

Diopside:
Average grain size is 0.02 mm. Occurs in large masses.

Chert:
Small chert veinlets cut through the diopside.

KCMIFF-4000

1.0mm

Parallel light.

Diopside, quartz, and calcite are shown.

Thin Section Number: KCMIFF-4010

Rock Name: Quartz monzonite

Composition:

Potash Feldspar: 40%
Found as micrographic intergrowths with quartz and as longer, solitary crystals. The potash feldspar sometimes contains small inclusions of carbonate (see sketch 1). Also, the potash feldspar is occasionally perthitic.

Plagioclase Feldspar: 35%
Has combined Carlsbad-albite twinning. Na-rich. Altering to sericite.

Biotite: 1%

Hematite: 1%
A small intergrowth with quartz and fledspar is present.

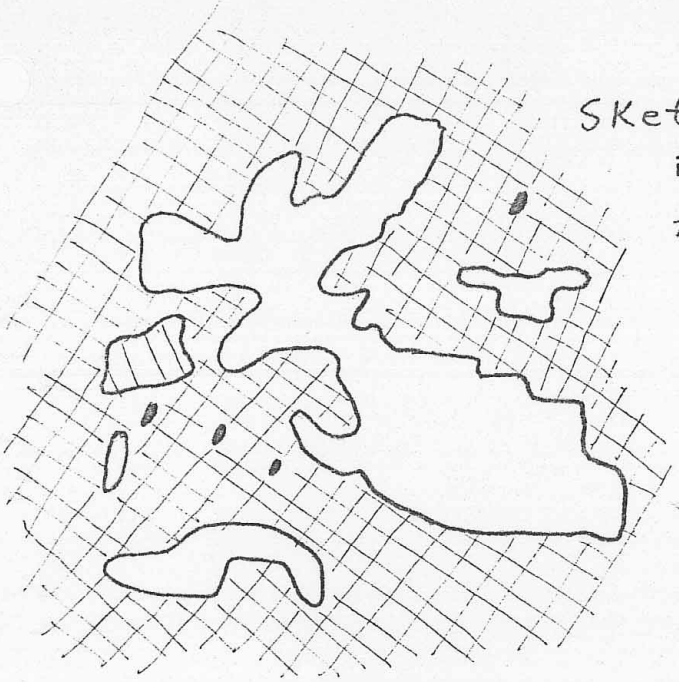
Pyrite: trace
A few euhedral crystals inside quartz crystals

Carbonate:
Extremely small euhedral to anhedral crystals are found as inclusions in quartz, potash feldspar, and plagioclase.

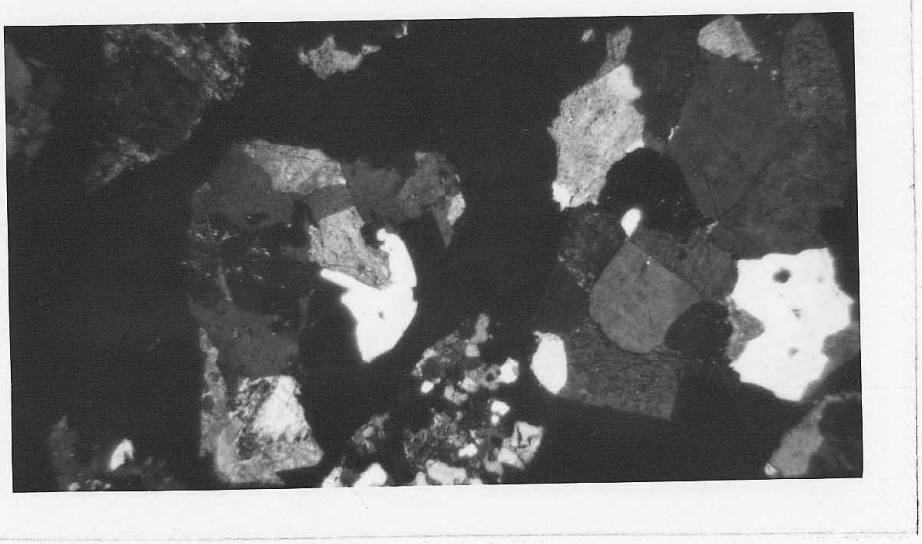
Sericite: trace
An alteration product of plagioclase.

Texture: The average grain size is about 0.5 mm.

KCMIFF-4010



Sketch 1: Sketch showing micrographic intergrowths of quartz and potash feldspar (Quartz = clear areas, potash feldspar = cross-hatched) showing carbonate inclusions (black spots) and a crystal of plagioclase feldspar (striated). x320, crossed nicols.



0.5 cm

Crossed nicols.

Quartz, plagioclase, and perthitic potash feldspar are shown.

Thin Section Number: KCMIFF-4040

Rock Name: Diopside Hornfels

Composition:

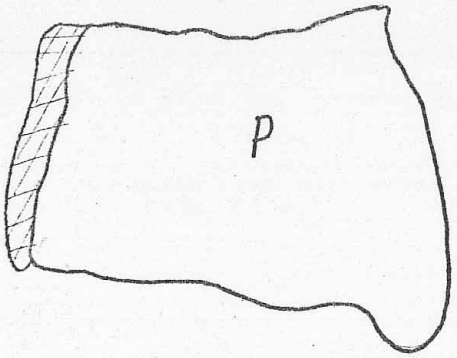
Diopside: 51%
Small euhedral to subhedral crystals with a slightly greenish cast. $\gamma \wedge Z = 40°$. Associated with chert in masses (see sketch 1).

Quartz-Chert: 40%
Small anhedral (occasionally subhedral) crystals. Associated with diopside.

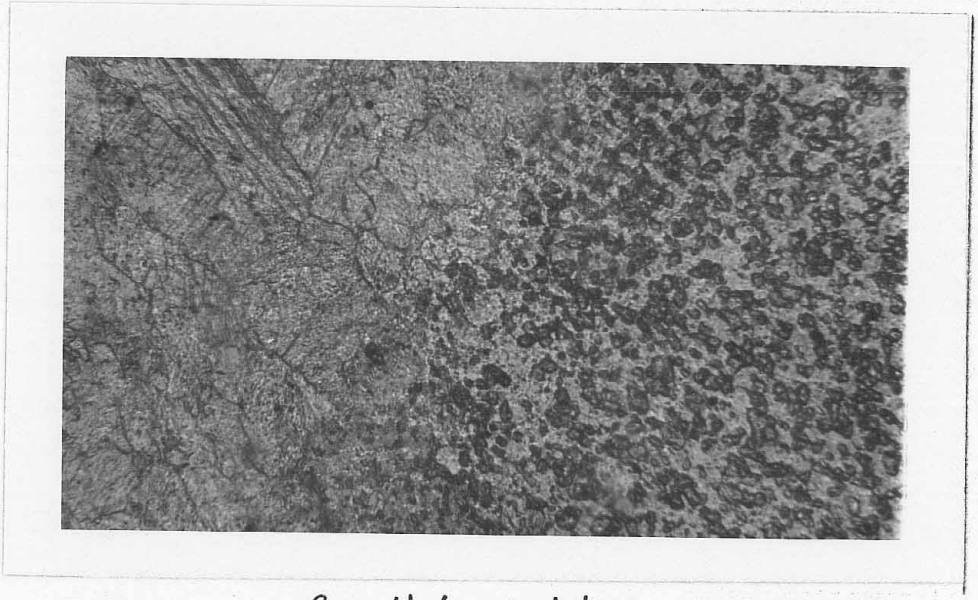
Calcite: 9%
Small crystals present as borders to masses of diopside and quartz. This shows rhombic cleavage. (see sketch 1 for occurrence).

Texture: The average grain size of the quartz and the diopside is 0.01 mm.

KCMIFF-4040



Sketch 1: Masses of pyroxene and quartz (P) and its association with calcite (crossed-hatched) showing rhombohedral cleavage.
x100, crossed nicols



1.0 mm

Parallel light.

Coarse calcite is shown on the left.
Diopside and quartz are shown on the right.

Thin Section Number: KCMIFF-4350

Rock Name: Quartz monzonite

Composition:

Quartz: 32%
Intergrown with plagioclase and potash feldspar. The quartz crystals are smaller and more rounded than those of potash feldspar.

Potash Feldspar: 31%
Associated with quartz and plagioclase.

Plagioclase Feldspar: 24%
Composition is An_5. Intergrown with quartz and potash feldspar.

Perthitic Feldspar: 12%
Dominantly potash feldspar.

Biotite: 1%
Elongate brown, clear crystals which alter to green pseudomorphic chlorite. Leucoxene (?) in cleavage plans of crystals which have altered to chlorite.

Hematite: trace
As a primary intergrowth with quartz and feldspar.

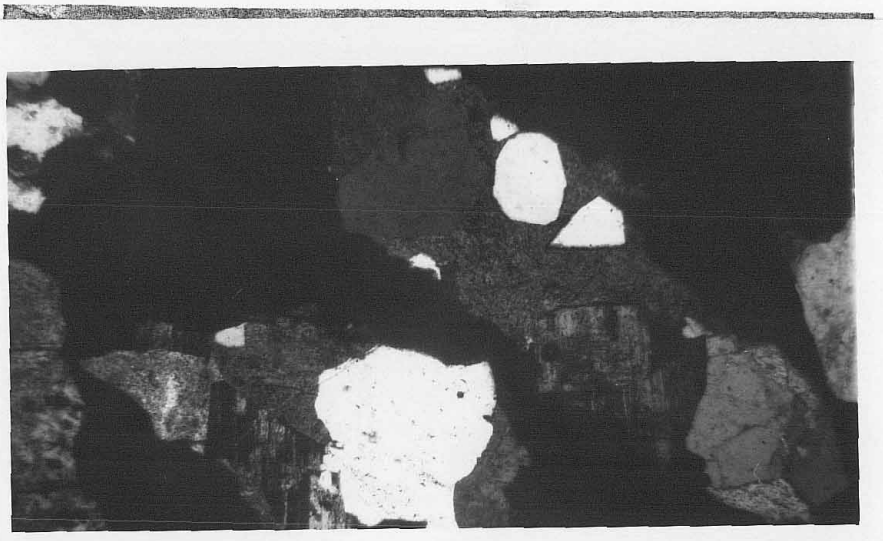
Calcite: trace
Minor amounts as inclusions in quartz

Fluorite: trace

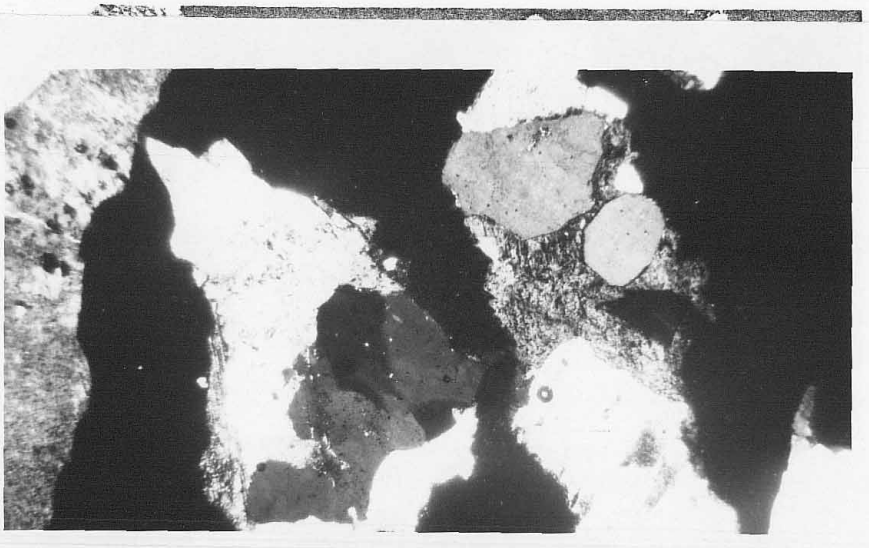
Chlorite:
As an alteration product of biotite, usually pseudomorphic after biotite but sometimes as radiating crystals.

Texture: Average grain size is 0.5 mm.

KCMIFF - 4350



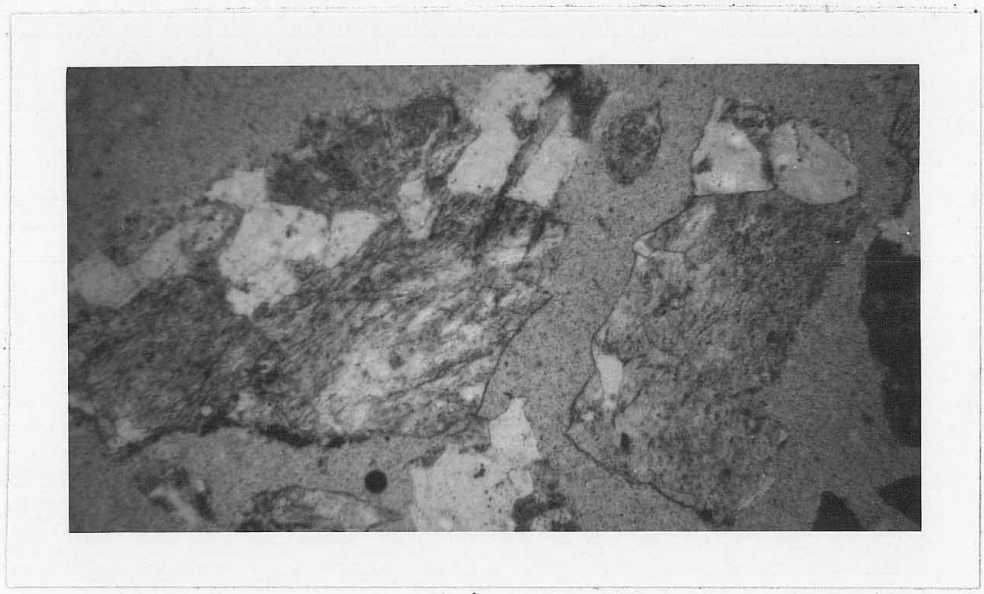
1.0 mm Crossed nicols.
Plagioclase, quartz, and potash feldspar are shown.



1.0 mm Crossed nicols.

Same as above, but a different extinction position is shown.

KCMIFF - 4350



0.5 cm

Parallel light.

Quartz and potash feldspar are shown.

Thin Section Number: KCMIFF-4460

Rock Name: Quartz monzonite

Composition:

Plagioclase Feldspar: 30%
Na-rich (albite). Has combined Carlsbad-albite twinning.

Potash Feldspar: 28%

Quartz: 27%

Perthitic Feldspar: 10%

Biotite: 2%
Present as euhedral crystals and a few strands. It is altered or altering to green chlorite.

Hematite: 1%
Present as both the translucent red and black varieties. It is primary as it is intergrown with quartz.

Calcite: 1%
Present on (in ?) quartz and fledspar crystals. Also present as a large, twinned crystal.

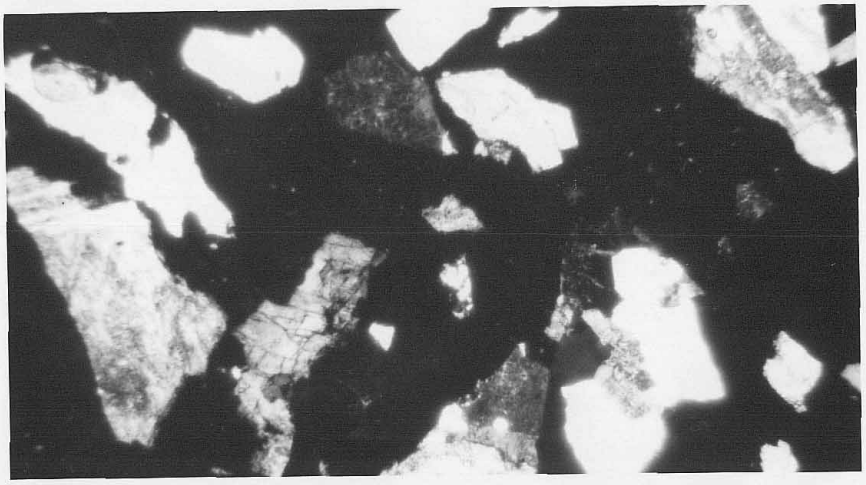
Apatite: trace

Zircon: trace

Garnet (?): trace
Zoned, green

Texture: The average grain size is 0.5 mm.

KCMIFF - 4460



0.5cm

Crossed nicols.

Plagioclase, potash feldspar, and quartz are shown.