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PETROGRAPHIC REPORT
ON ROCKS FROM
MITCHELL CREEK AREA

Map 1 Loc. of Rock Specimens

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April 6,1976

SPECIMEN 32

ROCK TYPE: Albite Porphyry (trachyte)

MACROSCOPIC DESCRIPTION:

The rock is holocrystalline and porphyritic. It is composed mainly of light, greenish-grey feldspar (medium-grained; 2-5 mm.) with small aggregates of epidote and chlorite (plus sericite). Small grains of pyrite mantled with hematite are disseminated throughout the rock. A trace of chalcopyrite and malachite is present.

MICROSCOPIC DESCRIPTION:

Major Minerals

1. ALBITE- Subhedral to euhedral phenocrysts, slightly sericitized and carbonatized.
2. K-feldspar- Euhedral to subhedral phenocrysts; slight clay alteration.
3. MATRIX- Fine-grained intergrowth of albite and K-feldspar.

ACCESSORY MINERALS

1. PYRITE- Euhedral to subhedral grains of pyrite mantled with hematite. In some cases, better described as hematite with remnant cores of pyrite.
2. APATITE- A few small, euhedral crystals.
3. PSEUDOMORPHS- A number of subhedral pseudomorphs resembling amphibole crystals have been completely replaced by aggregates of chlorite and carbonate ($\pm$ epidote).

ALTERATION

Albite is slightly sericitized and carbonatized. Epidote occurs throughout the rock, appearing to have formed at the expense of plagioclase both in phenocrysts and matrix. It occurs as anhedral crystal aggregates with chlorite and carbonate.

Mineralization consists of finely desseminated pyrite mantled with hematite and a trace of chalcopyrite with malachite.

SPECIMEN 370

ROCK TYPE: Albite porphyry (trachyte)

MACROSCOPIC DESCRIPTION:

The rock is holocrystalline and porphyritic. It is composed of white phenocrysts of feldspar (medium-grained, 4-6 mm.) in a pale grey matrix. Fine carbonate-filled fractures.

MICROSCOPIC DESCRIPTION:

Major Minerals

1. ALBITE- Subhedral to euhedral phenocrysts; some crystals show antiperthitic texture, as a result of replacement by K-feldspar. Slight sericitization and carbonatization.
2. PSEUDOMORPHS- Elongate, anhedral pseudomorphs composed of aggregates of carbonate, chlorite, leucoxene and sericite. Probably originally amphibole.
3. MATRIX- A fine-grained intergrowth of albite and K-feldspar. Finely disseminated patches of white opaque material are present throughout the rock. (probably leucoxene) Patches of very fine ilmenite or titaniferous magnetite are associated with some of the patches.

ACCESSORY MINERALS

1. APATITE- Very fine, euhedral crystals.

ALTERATION

Albite is slightly sericitized and carbonatized. The feldspathic matrix is also slightly sericitized and carbonatized. Patches of

leucoxene occuring throughout the matrix are probably altered ilmenite or titaniferous magnetite. Mafic minerals have been completely replaced by carbonate, chlorite, sericite and leucoxene.

Veinlets of chlorite-leucoxene and chlorite-sericite-carbonate traverse the rock.

SPECIMEN 135

ROCK TYPE: Albite Porphyry (Trachyte)

MACROSCOPIC DESCRIPTION:

The rock is holocrystalline and porphyritic. It is composed mainly of greenish-white feldspar phenocrysts and a greenish-grey matrix. Small aggregates of chlorite occur throughout the rock. Many fine fractures are present and small, euhedral crystals of pyrite are disseminated throughout the rock.

MICROSCOPIC DESCRIPTION:

Major Minerals

1. ALBITE- Euhedral to subhedral phenocrysts; major replacement by sericite.
2. K-feldspar- Anhedral crystals of relatively unaltered feldspar.
3. MATRIX- Fine-grained intergrowth of albite and K-feldspar.

ACCESSORY MINERALS

1. PSEUDOMORPHS- Irregular patches containing aggregates of chlorite, sericite are probably pseudomorphic after amphibole.
2. APATITE- Small, euhedral crystals.

ALTERATION

The rock has undergone moderately intense alteration. Plagioclase has been strongly sericitized, the mafics have been replaced by chlorite and sericite, and the matrix has been partly altered to chlorite and sericite. The rock is tranversed by a network of small fractures containing sericite, quartz and pyrite. Considerable amounts of fine-grained, euhedral to subhedral pyrite are also disseminated throughout the rock.

SPECIMEN 142

ROCK TYPE: Albite Porphyry (Trachyte)

MACROSCOPIC DESCRIPTION:

The rock is holocrystalline and porphyritic. The rock is composed mainly of pink and pale green feldspar phenocrysts in a pale green matrix containing irregular aggregates of chlorite. Traces of fine pyrite are disseminated throughout the rock.

MICROSCOPIC DESCRIPTION:

Major Minerals

1. K-feldspar- Euhedral crystals of relatively unaltered feldspar; contains finely disseminated hematite; microperthite texture due to exsolved albite.
2. ALBITE- Euhedral to subhedral phenocrysts; moderate sericitization and some replacement by carbonate.
3. MATRIX- Fine-grained intergrowth of albite, K-feldspar, quartz, carbonate, chlorite and leucoxene.

ACCESSORY MINERALS

1. PSEUDOMORPHS- Elongate anhedral to subhedral aggregates of chlorite, leucoxene and carbonate.
2. MAGNETITE- Small, euhedral crystals.
3. SPHENE- Small, euhedral crystals disseminated throughout rock; some are mantled with hematite and are closely associated with chlorite.

ALTERATION

Plagioclase has undergone moderate sericitization and carbon-

atization. K-feldspar (microperthite) is slightly hematitized. Mafic minerals (probably amphibole) have been completely pseudomorphed by chlorite, carbonate and leucoxene.

The matrix has been silicified, chloritized and carbonatized. Fine-grained pyrite is present throughout the rock. Both pyrite and magnetite have hematitized rims.

SPECIMEN 554

ROCK TYPE: Granite Porphyry

MACROSCOPIC DESCRIPTION:

The rock is holocrystalline and porphyritic. It is composed mainly of pink and white feldspar and quartz. The feldspars commonly show color zoning with pink cores or rims. A little pyrite and chalcopyrite with chalcocite are present. Malachite also observed.

MICROSCOPIC DESCRIPTION:

Major Minerals

1. MICROPERTHITE- Coarse phenocrysts of microperthite with exsolved albite; some Carlsbad twinning.
2. QUARTZ- Anhedral grains of quartz are interstitial to the microperthite.

ACCESSORY MINERALS

1. APATITE- Small, euhedral crystals.
2. MAGNETITE- Irregular patches commonly associated with chlorite and leucoxene, may be replacing previous mineral.
3. PLAGIOCLASE- A little subhedral plagioclase (probably albite) occures with quartz interstitial to K-feldspar.

ALTERATION

The microperthite is slightly hematitized. The somewhat cloudy crystals may also have incipient clay alteration. Magnetite and chlorite appear to be a replacement of some previous unknown mineral. Mineralization consists of trace amounts of chalcopyrite mantled with iron oxides and closely associated with chalcocite?

SPECIMEN 539

ROCK TYPE: Arkosic siltstone

MACROSCOPIC DESCRIPTION:

The rock is grey and buff, fine-grained and traversed by at least two ages of fractures. Alteration has obliterated the original texture. Pyrite and chalcopyrite are finely disseminated throughout rock and in fractures.

MICROSCOPIC DESCRIPTION:

Major Minerals

Fragments- Subangular fragments of quartz, albite and possibly K-feldspar. The boundaries are, in some cases, outlined by thin bands of matrix and in other cases are sutured possibly by recrystallization of quartz.

2. MATRIX- Is almost entirely fine-grained sericite with some iron oxide. The matrix constitutes about 15% of the rock.

ACCESSORY MINERALS

1. CARBONATE- Mainly irregular patches throughout rock but also in veinlets. Rhoubic shape of some crystals indicative of dolomite.

2. PYRITE- Subhedral to anhedral grains disseminated throughout rock and in fractures.

3. CHALCOPYRITE- Fine, anhedral grains with pyrite.

ALTERATION

The rocks have undergone at least two periods of fracturing and hydrothermal alteration. The first consisted of carbonate veining, the second mainly of quartz. Mineralization by sulfides appears to have been associated with both.

Some recrystallization of quartz fragments appears to have occurred and the matrix has been reconstituted to sericite. Some carbonatization of the rock has also taken place.

SPECIMEN 480

ROCK TYPE: Arkosic Siltstone (brecciated)

MACROSCOPIC DESCRIPTION:

The rock is fine-grained and equigranular. It is pink and green and contains abundant red iron oxides. One end of the rock specimen is green due tothe presence of large amounts of chlorite and appears to be strongly brecciated. Pyrite and chalcopyrite are disseminated throughout.

MICROSCOPIC DESCRIPTION:

Major Minerals

1. FRAGMENTS- Subangular fragments of quartz and albite (and possibly K-feldspar). Grain boundaries are, in some cases outlined by thin layers of chlorite and sericite. In other instances, the grain boundaries are sutured possibly as a result of partial recrystallization.
2. MATRIX- Composed of chlorite and sericite with some iron oxide. It constitutes about 15% of the rock.

ACCESSORY MINERALS

1. MAGNETITE- Occurs with chlorite in fractures and aggregates.
2. APATITE- A few euhedral to subhedral crystals.
3. PYRITE- Euhedral to subhedral crystals in fractures and also disseminated.
4. CHALCOPYRITE- A little anhedral chalcopyrite with pyrite.

ALTERATION

The original rock has been strongly brecciated and chloritized. Mineralization consists of pyrite and chalcopyrite in fractures and disseminations. Carbonatization accompanied mineralization.

SPECIMEN 105

ROCK TYPE: Arkosic Siltstone

MACROSCOPIC DESCRIPTION:

The rock is very fine-grained and pale greenish-grey. It is traversed by pyrite veinlets and a complex network of carbonate veins. A little chalcopyrite occurs with pyrite.

MICROSCOPIC DESCRIPTION:

Major Minerals

1. QUARTZ- Very fine sub-angular fragments.
2. ALBITE- Very fine sub-angular fragments with quartz.

ACCESSORY MINERALS

1. SERICITE - Fine-grained white mica oriented sub-parallel to a plane.
2. CARBONATE- Occurs in small, irregular patches throughout the rock.
3. PYRITE- Euhedral to anhedral grains disseminated and in fractures.
4. CHALCOPYRITE- A little anhedral chilcopyrite occurs with pyrite.
5. LEUCOXENE- Very small anhedral grains scattered throughout rock.

ALTERATION

Intensive fracturing followed by mineralization of fractures and adjacent wall rock with pyrite, chalcopyrite and abundant carbonate. A number of veinlets show cross-cutting relationships indicating several periods of fracturing and carbonate veining.

SPECIMEN 83

ROCK TYPE: Arkosic Siltstone

MACROSCOPIC DESCRIPTION:

The rock is fine-grained and pale greenish-grey. It is traversed by a complex network of fractures which contain carbonate, quartz, pyrite and/or chlorite. Pyrite also occurs disseminated throughout the rock. Traces of chalcopyrite and malachite are also associated with pyrite. A few coarse fragments of pink feldspar are present.

MICROSCOPIC DESCRIPTION

Major Minerals

1. ALBITE- Very fine, subangular particles.
2. QUARTZ- Very fine, subangular particles.

ACCESSORY MINERALS

1. CHLORITE- occurs as irregular patches throughout the rock and in fractures with pyrite, quartz and magnetite.
2. APATITE- Small subhedral crystals
3. PYRITE- Anhedral to euhedral grains in fractures and disseminated throughout the rock.
4. LEUCOXENE- Small irregular patches throughout the rock.
5. CARBONATE- Disseminated throughout the rock and in fractures.
6. MAGNETITE- A few subhedral grains associated with pyrite in veins.

ALTERATION

The original rock has been thoroughly fractured and moderately altered. The quart-feldspar fragments appear to have been partly re-

crystallized, chloritized and carbonatized. A few of the coarser grains of albite show chlorite replacement along twin planes.

Mineralization consists of pyrite with traces of chalcopyrite and magnetite. Some of the chalcopyrite has been altered to malachite.

Veinlets or fracture-fillings are of several types. Carbonate-quartz, chlorite-pyrite, sericite and quartz-pyrite (hematite)-magnetite-chlorite.

SPECIMEN 428

ROCK TYPE: Arkosic Siltstone

MACROSCOPIC DESCRIPTION:

The rock is very fine-grained and is light greenish-white. Most of the exposed surfaces are limonite-coated fractures with traces of pyrite. Some coarse, angular fragments (green) contain abundant disseminated pyrite.

MICROSCOPIC DESCRIPTION:

Major Minerals

The rock is composed of very fine angular fragments of quartz and feldspar in a matrix of chlorite and sericite. Abundant white opaque material is disseminated throughout the rock.

ACCESSORY MINERALS

Euhedral pyrite is present in fractures and disseminated within coarse fragments composed of fine angular particles of quartz and feldspar. The particles in these coarse fragments are less fine-grained than those in the rest of the rock and chlorite and sericite is also coarser and more abundant.

ALTERATION

Sericitization, silicification and chloritization of the rock matrix have taken place. Veinlets of chlorite-quartz-iron oxide and quartz are present. The latter quartz veinlets are earlier.

SPECIMEN 9

ROCK TYPE: Greywacke

MACROSCOPIC DESCRIPTION:

The rock is fine-grained and light grey. Fine pyrite is abundant, both in fractures with quartz and disseminated throughout the rock. The rock is composed mainly of fine angular particles which have a rough sub-parallel orientation.

MICROSCOPIC DESCRIPTION:

Major Minerals

The rock is composed mainly of a very fine-grained matrix composed of an intergrowth of sericite and chlorite. Angular particles of quartz and others of feldspar, which have been completely replaced by sericite are present.

Veinlets of quartz-pyrite and sericite cut the rock. The latter are later.

Subhedral to euhedral pyrite is distributed abundantly throughout the rock in fractures and in streaks and patches which are subparallel to the particle orientation.

ALTERATION

The original rock has undergone intense sericitization, silicification, and pyritization.

SPECIMEN 59

ROCK TYPE: Albite Porphyry (trachyte)

MACROSCOPIC DESCRIPTION:

The rock is fine-grained and light grey. Fine pyrite is abundant and is contained both in fractures and disseminated throughout the rock. No structure is apparent in hand specimen.

MICROSCOPIC DESCRIPTION

Major Minerals

1. ALBITE- Subhedral to euhedral phenocrysts, strongly sericitized.
2. MATRIX- Very fine-grained feldspathic in teyrowth.

ACCESSORY MINERALS

1. PYRITE- Euhedral pyrite is disseminated throughout the rock and also occurs in veinlets with quartz and sericite.
2. LEUCOXENE- A few irregular patches are present.
3. QUARTZ- Occurs in patches or aggregates of grains and also in veinlets.
4. SERICITE- Occurs in veinlets and in abundance as an alteration product of plagioclase phenocrysts and feldspathic matrix.
5. APATITE- A few small subhedral to euhedral crystals.

ALTERATION

Albite is moderately sericitized. The matrix is more strongly replaced by sericite and pyrite.

SPECIMEN 54

ROCK TYPE: Arkosic Sandstone

MACROSCOPIC DESCRIPTION:

The rock is fine-grained and very pale grey. Fine pyrite is disseminated sparsely throughout the rock. No structure is apparent in hand specimen.

MICROSCOPIC DESCRIPTION

Major Minerals

The rock is composed mainly of subangular particles of quartz and feldspar (albite) in a matrix of sericite and fine-grained feldspathic material. The quartz fragments have sutured grain boundaries as though partly recrystallized.

ACCESSORY MINERALS

1. PYRITE- Fine pyrite is disseminated throughout the rock.
2. SERICITE- Occurs as a replacement of the albite phenocrysts and of the feldspathic matrix.

ALTERATION

Sericitization of the albite particles and feldspathic matrix. Pyrite and possibly a trace of chalcocite occur as disseminations.

SPECIMEN 80

ROCK TYPE: Albite Porphyry (Trachyte)

MACROSCOPIC DESCRIPTION:

The rock is light grey, fine-grained and is traversed by numerous rusty fractures filled mainly with quartz and carbonate. Fine-grained pyrite is disseminated throughout the rock with small amounts of chalcopyrite and specular hematite. Some malachite is present in fractures.

MICROSCOPIC DESCRIPTION

Major Minerals

1. ALBITE- subhedral to euhedral phenocrysts, sericitized and carbonatized.
2. K-FELDSPAR- subhedral phenocrysts, some microperthite texture; partly replaced by carbonate.
3. MATRIX- Very fine-grained feldspathic intergrowth.

ACCESSORY MINERALS

1. PYRITE- Euhedral to subhedral crystals are disseminated throughout the rock.
2. APATITE- Very small subhedral crystals.
3. SERICITE- Alteration of feldspar phenocrysts and matrix.
4. QUARTZ-CARBONATE- In numerous veinlets traversing the rock.

ALTERATION

Sericitization and carbonatization of feldspar, both in phenocrysts and matrix, is moderately strong. Quartz-carbonate veining is prevalent. In some cases, quartz appears contemporaneous with carbonate and in others, it appears to be later.

Mineralization consists of disseminated pyrite with minor chalcopyrite (malachite) and specularite.

SPECIMEN 192

ROCK TYPE: Felspathic greywacke

MACROSCOPIC DESCRIPTION:

The rock is fine-grained and pale grey. Small angular fragments are oriented subparallel to a plane. Very fine-grained pyrite is disseminated throughout the rock.

MICROSCOPIC DESCRIPTION

Major Minerals

The rock is composed mainly of subangular particles of quartz and angular particles of feldspar which have been completely replaced by sericite. The sericitic particles show subparallel alignment with each other and also appear to have been stretched in the same direction. The matrix is composed of carbonate, sericite and chlorite and comprises about 50% of the rock.

ACCESSORY MINERALS

1. PYRITE- Euhedral to subhedral grains disseminated throughout the rock.
2. APATITE- Few small crystals.

ALTERATION

Sericitization of feldspar particles and matrix along with carbonatization and chloritization. Mineralization consists of finely disseminated pyrite.

SPECIMEN 312

ROCK TYPE: Arkosic Sandstone

MACROSCOPIC DESCRIPTION:

The rock is pale grey and fine-grained. No structure is evident. Fine-grained pyrite is disseminated throughout the rock.

MICROSCOPIC DESCRIPTION:

Major Minerals

The rock is composed mainly of subangular particles of quartz and feldspar (albite) in a matirx of sericite, carbonate, chlorite and fine-grained feldspathic material.

ACCESSORY MINERALS

1. PYRITE- Fine-grained, euhedral to subhedral pyrite is disseminated throughout the rock.
2. ZIRCON- Small equant grain.
3. SERICITE- Replaces both feldspar particles and metrix with chlorite and carbonate.
4. CARBONATE- in matrix and particles as well as in small veinlets.
5. CHLORITE- In matrix.

ALTERATION

Sericitization of feldspars in particles and matrix. Carbonatization and chloritization of matrix. Mineralization consists of pyrite.

SPECIMEN 566

ROCK TYPE: Arkosic Siltstone

MACROSCOPIC DESCRIPTION:

The rock is dark grey and medium-grained with rusty, siliceous fractures. Pyrite is finely disseminated throughout the rock with minor chalcopyrite and malachite.

MICROSCOPIC DESCRIPTION

Major Minerals

1. FRAGMENTS- The rock is composed mainly of subangular particles of quartz and albite (and possible K-feldspar). Grain boundaries are sutured probably as a result of some recrystallization.
2. MATRIX- Composed of greenish-brown biotite with some iron oxide.

ACCESSORY MINERALS

1. PYRITE- Euhedral to subhedral crystals mantled with hematite.
2. APATITE- Small euhedral to subhedral crystals.

ALTERATION

Biotite grade metamorphism and silicification (quartz veinlets with pyritization).

SPECIMEN 584

ROCK TYPE:

MACROSCOPIC DESCRIPTION:

The rock is pale grey and fine-grained. It is traversed by a network of fine quartz-carbonate veinlets. Pyrite is finely disseminated throughout the rock.

MICROSCOPIC DESCRIPTION

Major Minerals

1. FRAGMENTS- The rock is composed mainly of subangular particles of quartz and albite.
2. MATRIX- Composed of very fine-grained sericite. Irregular patches of carbonate are also present.

ACCESSORY MINERALS

1. PYRITE- Fine euhedral to subhedral grains of pyrite are scattered throughout the rock.
2. ZIRCON- A few equant grains.
3. APATITE- Small subhedral crystals.
4. QUARTZ-CARBONATE- Veinlets.

ALTERATION

Carbonatization and silicification. Mineralization consists of pyrite.

SPECIMEN 24

ROCK TYPE: Arkosic Siltstone

MACROSCOPIC DESCRIPTION:

The rock is white and grey with a visible clastic texture. Aggregates of pyrite crystals mantled by iron oxide are sparsely distributed throughout the rock. The rock is quite porous with many small cavities.

MICROSCOPIC DESCRIPTION:

Major Constituents.

Subangular particles of quartz and albite in a fine-grained matrix of chlorite, carbonate, and leucoxene.

Minor Constituents.

1. Pyrite- subhedral crystals mantled with iron oxides occur in round aggregates sparsely distributed throughout the rock.

Alteration.

Carbonatization and chloritization mainly of the matrix.

SPECIMEN 111

ROCK TYPE: Arkosic Sandstone

MACROSCOPIC DESCRIPTION:

The rock is pale green, medium-grained and porphyritic. Pyrite is disseminated throughout the rock. The rock is cut by numerous carbonate-filled fractures.

MICROSCOPIC DESCRIPTION:

Major Constituents.

A. Fragments.

1. Plagioclase- coarse, subangular fragments of albite with Albite and Carlsbad twinning.

2. Quartz- a few coarse, subangular particles.

B. Matrix.

The matrix is made up of a fine-grained mixture of feldspar and quartz with the minor constituents described below.

Minor Constituents.

1. Carbonate- occurs in streaks, patches and small veinlets throughout the rock.

2. Sericite- occurs in veinlets with chlorite and pyrite.

3. Chlorite- occurs in veinlets with sericite, pyrite and leucoxene.

4. Leucoxene- occurs as white, opaque streaks and patches in veinlets and throughout the rock.

5.Pyrite- occurs in veinlets and as small, euhedral crystals mantled by iron oxides.

Alteration:

The original rock has been moderately carbonatized; carbonate occurs in veinlets cutting the rock and disseminated throughout the rock. A later generation of fractures contains chlorite, sericite, pyrite and leucoxene.

SPECIMEN 597

ROCK TYPE: Sericitized Siltstone

MACROSCOPIC DESCRIPTION:

The rock is pale greenish-grey and fine-grained. It has a subparallel streakiness or very fine schistosity. Pyrite is distributed abundantly throughout the rock.

MICROSCOPIC DESCRIPTION:

Major Constituents.

The rock is composed mainle of sericite with subparallel schistosity. Elongate, lense-shaped patches sub[illegible] to the schistosity are composed of quartz grains or aggregates of quartz grains. Carb[illegible]e is present in coarse patches and fine disseminations throughout the rock. One unidentified mineral occu[illegible] close association with calcite.

Minor Constituents.

1. Pyrite- coarse, euhedral pyrite with secondary "cockscomb" quartz overgrowths parallel to the foliation.
2. C[illegible] a few irregular patches are present.
3. Leucoxene- [illegible] hes are distributed throughout the rock.
4. Unidentified- a colorless mineral , equigranular, low birefringence (B=0.007), high relief (n close to calcite- about 1.7).

Alteration.

It appears to be an intense sericitization and pyritization of an original siltstone.

SPECIME 611

ROCK TYPE: Albite Porphyry (Trachyte)

MACROSCOPIC DESCRIPTION:

The rock is pale pink, green and white, medium-grained (1-4mm) and porphyritic. The rock is cut by fine chlorite-filled fractures.

MICROSCOPIC DESCRIPTION:

Major Constituents.

A. Phenocrysts.

1. Plagioclase- subhedral to euhedral crystals of plagioclase (albite); considerable replacement by sericite; clear albitic borders.

2. Microperthite- anhedral grains with strings of perthitic albite enclosed.

B. Matrix.

1. Quartz- anhedral grains closely associated with K-feldspar.

2. K-feldspar- anhedral grains with quartz.

Minor Constituents.

1. Sericite- fine-grained sericite mica replaces much of the plagioclase.

2. Chlorite- small, irregular patches occur in the rock matrix.

3. Apatite- small, euhedral crystals distributed throughout the rock.

4.Magnetite- trace of anhedral magnetite grains.

5.Leucoxene- small patches distributed throughout the rock.

Alteration.

Plagioclase is largely altered to sericite mica. Clear albitic rims indicate the possibility of some albitization. The microperthite is relatively unaltered. A little chloritization of the matrix minerals has taken place. A number of quartz veinlets and chlorite veinlets are present.

SPECIMEN 616

ROCK TYPE: Syenite

MACROSCOPIC DESCRIPTION:

The rock is pink, white and green, medium-grained (1-4mm)and, for the most part, equigranular. A black, lustrous mineral resembling specularite is finely disseminated throughout the rock.

MICROSCOPIC DESCRIPTION:

Major Constituents.

1. Microperthite- subhedral to anhedral grains of microperthite contain strings, rods and patches of albite.
2. Plagioclase- subhedral grains of plagioclase (albite); many of the grains show traces of earlier zoning by the presence of aligned inclusions, but the grains now appear to be entirely of albite; sericitic cores may have been an original more calcic plagioclase.
3. Pyroxene- pale green euhedral crystals.

Minor Constituents.

1. Sphene- small, euhedral crystals distributed throughout the rock.
2. Apatite- small, euhedral crystals.
3. Specularite?- subhedral to anhedral grains abundantly distributed throughout the rock.
4. Sericite- finely disseminated throughout some of the

plagioclase and along grain boundaries.

5.Chlorite- small, irregular patches throughout rock.

Alteration.

Plagioclase cores have been sericitized. The original plagioclase may have been replaced largely by albite. The microperthite shows only slight clay alteration and the pyroxene is unaltered.

SPECIMEN 620

ROCK TYPE: Granite

MACROSCOPIC DESCRIPTION:

The rock is pale pink and grey, medium-grained (1-3mm) and equigranular. A few small fractures cut the rock. They contain quartz and iron oxides. A trace of pyrite is disseminated throughout the rock.

MICROSCOPIC DESCRIPTION:

Major Constituents.

1.Microperthite- subhedral to anhedral grains of microperthite contain coarse strings, rods and patches of albite.

2.Quartz- anhedral crystals of quartz contain numerous tiny inclusions. Many of the grains are fractured and show uneven extinction.

3.Plagioclase- a minor amount occurs as small grains (albite?) interstitial to microperthite.

Minor Constituents.

1.Sericite- a very minor amount of fine-grained sericite occurs in fine fractures and along grain boundaries.

2.Chlorite- occurs in very fine-grained aggregates with iron oxides, pyrite and leucoxene. Appears to be pseudomorphic after some earlier mineral.

3.Pyrite- minor amounts finely disseminated throughout the rock.

4.Magnetite- a minor amount with chlorite and pyrite.

Alteration.

Microperthite is slightly clouded with clay minerals. Considerable replacement albite appears to have enlarged the original exsolved strings. Chloritization and pseudomorphing of an earlier mineral is apparent. Mineralization, which is sparse, consists of minor pyritization.

SPECIMEN 640

ROCK TYPE: Arkosic Siltstone

MACROSCOPIC DESCRIPTION:

The rock is pale-grey, fine-grained and structureless. It is cut by numerous rusty fractures. The rock is quite porous with many small cavities containing quartz or iron oxides. Pyrite is finely disseminated throughout the rock.

MICROSCOPIC DESCRIPTION:

Major Constituents.

The rock is composed mainly of feldspar (albite) and quartz grains. The grains are subangular but with sutured borders. Part of the rock has been replaced by patches and streaks of sericite.

Minor Constituents.

1. Chlorite- a few small patches are distributed throughout the rock.
2. Apatite- a few, small, subhedral crystals are present.
3. Pyrite- small, euhedral crystals are irregularly disseminated throughout the rock.

Alteration.

Some recrystallization of feldspar grains has taken place. Minor sericitization, chloritization is accompanied by pyrite mineralization.

SPECIMEN 657

ROCK TYPE: Arkosic Sandstone

MACROSCOPIC DESCRIPTION:

The rock is composed of reddish-colored fragments (1-4mm) and white fragments (1-4mm) in a fine grained grey matrix.

MICROSCOPIC DESCRIPTION:

Major Constituents.

A. Fragments.

1. Microperthite- angular to subangular grains of K-feldspar with strings and rods of perthitic albite. Some simple twins are present.

2. Quartz- subangular grains of quartz with numerous fine inclusions.

B. Matrix.

The matrix is composed of a fine-grained mixture of albite, K-feldspar, quartz and sericite.

Minor Constituents.

1. Pyrite- a little euhedral pyrite mantled by iron oxide is present.

2. Leucoxene- irregular small patches associated with magnetite.

Alteration.

The rock is unaltered.

SPECIMEN 669

ROCK TYPE: Granite

MACROSCOPIC DESCRIPTION:

The rock is pink and grey, medium-grained (1-4mm) and mostly equigranular. A few of the larger (4mm) pink feldspar grains could be considered as phenocrysts. Several very fine fractures containing iron oxides cut the rock.

MICROSCOPIC DESCRIPTION:

Major Constituents.

1. Microperthite- subhedral grains of microperthite containing coarse rods, patches and strings of perthitic albite. In some instances, the entire boundary region of the grains consists of albite.
2. Quartz- anhedral grains of quartz occur interstitial to microperthite. The grains contain numerous tiny inclusions.
3. Plagioclase- small, anhedral grains of plagioclase (albite) occur with quartz interstitial to microperthite.

Minor Constituents.

1. Sericite- a small amount occurs in fractures with carbonate and along grain boundaries. It also replaces albite in some cases.
2. Carbonate- occurs in fine fractures with sericite and in small irregular patches with iron oxides.

3.Pyrite- fine-grained pyrite in veinlets with iron oxides.

Alteration.

Microperthite is slightly cloudy with clay alteration. Extensive replacement of microperthite by albite has taken place. Some plagioclase grains have been altered to aggregates of sericite, carbonate, and probably albite. Mineralization consists of pyritization and carbonate veining.

SPECIMEN 685

ROCK TYPE: Arkosic Siltstone

MACROSCOPIC DESCRIPTION:

The rock is pale-grey, fine-grained and structureless. It is traversed by a veinlet containing pyrite, quartz and chlorite. An earlier fracture contains a little chalcopyrite (+chalcocite) and quartz. This fracture also contains numerous open cavities.

MICROSCOPIC DESCRIPTION:

Major Constituents.

The rock is composed of feldspar (albite) and quartz particles. The particles are subangular and the intergranular spaces are filled with smaller grains of the same minerals. Sericite has replaced a considerable part of the rock. a quartz vein containing "cockscomb" quartz, pyrite and minor chlorite traverses the rock.

Minor Constituents.

1. Leucoxene- irregular patches are distributed throughout the rock.
2. Apatite- small, euhedral grains are disseminated throughout the rock.
3. Chlorite- occurs in small streaks in the quartz vein.

4. Pyrite- occurs in euhedral to anhedral crystals in veinlets and in the adjacent rock.

Alteration.

The rock has been moderately sericitized and silicified. Mineralization consists of pyrite and minor chalcopyrite.

SPECIMEN 690

ROCK TYPE: Granite

MACROSCOPIC DESCRIPTION:

The rock is pale pink and grey, medium-grained (1-2.5mm) and equigranular. A small (1.5mm) quartz veinlet with minor pyrite traverses the rock. Smaller weathered fractures carry abundant iron oxides with minor quartz and pyrite.

MICROSCOPIC DESCRIPTION:

Major Constituents.

1. Microperthite- subhedral grains of microperthite containing mostly finely-distributed exsolved albite. Some of the grains contain coarser rods and braids of albite.
2. Quartz- anhedral quartz grains are interstitial to the microperthite. Some of the quartz grains show uneven or "strain" extinction. Many very small inclusions are present.

Minor Constituents.

1. Sericite- fine-grained aggregates of sericite occur along grain boundaries and in fine fractures with quartz and minor traces of pyrite.
2. Pyrite- a few small, anhedral grains occur in fractures.

Alteration.

The rock is only slightly altered. Microperthite is slightly cloudy with fine inclusions which are probably hematite and clay minerals. A little sericitization has taken place along fractures and grain boundaries. Most of the perthitic albite appears to be exsolved but the coarser rods and braids may be partly replacement. Mineralization of fine fractures includes quartz, sericite and pyrite.

SPECIMEN 701

ROCK TYPE: Arkosic Siltstone

MACROSCOPIC DESCRIPTION:

The rock is pale grey, fine-grained and structureless. It is cut by numerous rusty fractures containing pyrite. The rock is very porous with cavities partly filled by pyrite and quartz.

MICROSCOPIC DESCRIPTION:

Major Constituents.

The rock is composed mainly of very fine-grained feldspar (probably albite) and minor quartz grains with a mixture of sericite and chlorite. The feldspar grains have sutured contacts. Some larger grains appear to be poikiloblastic metacrysts of secondary albite enclosing smaller grains. Sericite and chlorite occur in fractures and in intergranular spaces.

Minor Constituents.

1. Chlorite- in veins with pyrite and sericite and disseminated throughout the rock.
2. Apatite- small, subhedral crystals scattered throughout the rock.
3. Pyrite- euhedral to anhedral crystals in veinlets and disseminations throughout the rock.

Alteration.

The rock appears to be a recrystallization of feldspar ($\pm$ quartz) particles with little intergranular clay. Some of the sericite/chlorite has likely been introduced with pyrite via fractures.

SPECIMEN 711

ROCK TYPE: Siltstone

MACROSCOPIC DESCRIPTION:

The rock is pale grey, fine-grained and structureless. It is cut by very fine rusty fractures containing quartz. Pyrite is finely disseminated throughout the rock. A little chalcopyrite mantled by chalcocite? is present.

MICROSCOPIC DESCRIPTION:

Major Constituents.

The rock is composed mainly of fine grains of quartz with minor feldspar (albite) and sericite. The quartz grains are subangular with sutured borders. Sericite is abundantly distributed throughout the rock in streaks and large patches. Quartz also occurs in numerous veinlets traversing the rock.

Minor Constituents.

1. Pyrite- occurs in euhedral crystals mantled by iron oxide and in aggregates with hematite and leucoxene. A little pyrite is also present in the quartz veinlets.
2. Hematite- minor anhedral grains.
3. Leucoxene- in small irregular patches and with pyrite.

Alteration.

The original rock has been intensely silicified and sericitized. The original texture appears to have been that

of subangular particles of quartz and minor feldspar subsequently partly recrystallized and altered. Pyrite and minor chalcopyrite mineralization appear related to silicification.

SPECIMEN 720

ROCK TYPE: Orthoquartzite?

MACROSCOPIC DESCRIPTION:

The rock is very pale grey, fine-grained and structureless. Numerous fine fractures, some of which contain pyrite, sericite and chlorite cut the rock. A little chalcopyrite mantled by chalcocite? is present. A trace of specularite is also present.

MICROSCOPIC DESCRIPTION:

Major Constituents.

The rock is composed almost entirely of quartz grains. The grains are extremely irregular in shape and show a great range in size. The larger grains occur in irregular bands or patches and have sutured borders. Some of those intermediate in size are elongate and subparallel.

Minor Constituents.

1. Pyrite- very fine anhedral pyrite grains are scattered throughout the rock.
2. Sericite- a minor amount of sericite occurs in small irregular patches and grains throughout the rock.
3. Hematite- a little anhedral hematite is present.

Alteration.

Alteration appears to have been mainly recrystallization

of quartz, and pyrite/chalcopyrite mineralization.

SPECIMEN 724

ROCK TYPE: Albite Porphyry (Trachyte)

MACROSCOPIC DESCRIPTION:

The rock is pale pink, white and green, medium-grained (1-6 mm.) and porphyritic. Rusty fractures contain quartz, iron oxides and a trace of chalcopyrite.

MICROSCOPIC DESCRIPTION:

Major Constituents.

A. Phenocrysts

1. Microperthite- subhedral to anhedral phenocrysts containing strings and rods of perthitic albite.

2. Plagioclase(Albite)- subhedral phenocrysts showing complex and albite twinning; considerable replacement by sericite and chlorite.

B. Matrix

1. Plagioclase(Albite)- small subhedral crystals showing albite Carlsbad twinning; less sericitization.

2. K-feldspar(Microperthite)- anhedral grains with small patches of perthitic albite.

3. Quartz- anhedral grains interstitial to microperthite and plagioclase.

Minor Constituents.

1. Chlorite- occurs in small patches in plagioclase; in pseudomorphs with leucoxene, carbonate and hematite; and

in irregular crystal aggregates.

2.Carbonate- minor patches occur with chlorite.

3.Leucoxene- in irregular patches with chlorite and a sulfide resembling pyrrhotite.

4.Apatite- small, euhedral crystals distributed throughout the rock.

5.Opaques- anhedral to subhedral grains of hematite? in association with chlorite and leucoxene.

Alteration.

Plagioclase has been moderately sericitized and slightly chloritized. Many grains have unaltered albitic rims, possibly a secondary growth. It appears that the original mafic mineral has been entirely replaced by pseudomorphs of chlorite, leucoxene, carbonate and an opaque mineral resembling hematite. Several small fractures contain sericite.

SPECIMEN 726

ROCK TYPE: Granite

MACROSCOPIC DESCRIPTION:

The rock is pale grey and brick red, medium-grained (1-2 mm.) and equigranular. Many small fractures contain iron oxides and minor quartz. One small quartz vein (1 mm.) contains traces of malachite.

MICROSCOPIC DESCRIPTION:

Major Constituents.

1. Microperthite- subhedral to anhedral grains of microperthite containing abundant strings and rods of albite.
2. Quartz- anhedral grains of quartz are interstitial to microperthitic grains. Many of the grains are fractured and show uneven extinction.
3. Plagioclase- a minor amount of plagioclase (probably albite) occurs in small grains interstitial to microperthite. The grains are anhedral and show Albite twinning.

Minor Constituents.

1. Sericite- occurs in fractures and along grain boundaries with iron oxide and quartz.
2. Magnetite- anhedral grains of magnetite are irregularly distributed throughout the section.
3. Pyrite- irregular grains of pyrite occur with quartz in fractures.

Alteration.

Microperthite is slightly clouded with clay minerals. Minor sericitization has occurred in fractures and along grain boundaries. Most of the perthitic albite is of the exsolution type but some replacement is possible. Mineralization consists of quartz veinlets with sericite, minor pyrite and magnetite.

SPECIMEN 733

ROCK TYPE: Arkosic Siltstone

MACROSCOPIC DESCRIPTION:

The rock is pale grey, fine-grained and structureless. Pyrite is finely disseminated throughout the rock and in veinlets. The rock is cut by many fractures filled mainly with carbonate. A little chalcopyrite and malachite was also detected in a fracture with pyrite.

MICROSCOPIC DESCRIPTION:

Major Constituents.

The rock is composed of very fine particles of feldspar and quartz (with a few coarser grains of those minerals) which has been largely replaced by carbonate, sericite, quartz and pyrite. The carbonate occurs in irregular patches throughout the rock and in small veinlets with quartz. Sericite occurs in streaks and patches throughout the rock.

Minor Constituents.

1. Pyrite- euhedral crystals occur in carbonate/quartz veins and in disseminations.
2. Leucoxene- small, irregular patches occur throughout the rock.

Alteration.

Moderately intense sericitization, carbonatization and

silicification with pyrite and minor chalcopyrite mineralization.

SPECIMEN 741

ROCK TYPE: Arkosic siltstone

MACROSCOPIC DESCRIPTION:

The rock is pale grey and pink and medium-grained. Pyrite is finely disseminated throughout the rock. The rock contains many stringers and patches of iron oxides. A trace of chalcopyrite and malachite is present in one fracture.

MICROSCOPIC DESCRIPTION:

Major Constituents.

The rock is composed of very fine particles of feldspar and quartz, much of which has been replaced by sericite, carbonate and pyrite. Sericite occurs in fractures and in matrix of quartz and feldspar. Carbonate occurs in irregular patches and streaks.

Minor Constituents.

1. Pyrite- euhedral pyrite crystals occur in subparallel streaks with sericite.
2. Iron oxide- occurs in braided fractures with quartz and remnant pyrite.

Alteration.

The original rock has been largely replaced as a result of sericitization, silicification and carbonatization accompanied by pyrite and minor chalcopyrite mineralization.

SPECIMEN 786

ROCK TYPE: Albite [illegible] (Trachyte)

MACR[illegible]IC DESCRIPTION:

The rock is pale-green, medium-grained. Pyrite is finely disseminated throughout the rock and in rusty fractures with quartz.

MICROSCOPIC DESCRIPTION:

Major Constituents.

A. Phenocrysts

1. Plagioclase- subhedral phenocrysts of albite with albite and complex twinning; moderately sericitized.

B. Matrix

The matrix consists of a fine-grained intergrowth of feldspar and quartz with the minor constituents described below.

Minor Constituents.

1. Sericite- sericite is moderately abundant in fine fractures throughout the rock and finely disseminated in plagioclase phenocrysts.

2. Pyrite- fine, euhedral grains of pyrite are disseminated throughout the rock.

3. Chlorite- small, irregular patches of chlorite are present [illegible].

Alteration.

Moderate sericitization of the rock has been accompanied by pyritization and minor chloritization. Several quartz/albite veinlets traverse the rock.

SPECIMEN 790

ROCK TYPE: Arkosic Siltstone

MACROSCOPIC DESCRIPTION:

The rock is very pale-grey, fine-grained and structureless. The rock is cut by a great many rusty fractures which are almost entirely leached out. Traces of pyrite still remain in a few places. A minor amount of chalcopyrite is also present.

MICROSCOPIC DESCRIPTION:

Major Constituents.

The rock is composed mainly of albite and quartz fragments in a matrix of finer-grained feldspar and quartz. The fragments are subangular and the matrix contains abundant sericite, iron oxides and leucoxene. Many leached fractures are present with pyrite casts.

Minor Constituents.

1. Pyrite- subhedral to euhedral crystals mantled by iron oxide.
2. Sericite- small amounts of sericite in streaks and patches occur in matrix.
3. Leucoxene- occurs in streaks in fractures with iron oxides.

SPECIMEN 840

ROCK TYPE: Arkosic Sandstone

MACROSCOPIC DESCRIPTION:

The rock is composed of pale pink fragments (1-6 mm.) in a medium-grey matrix. Pyrite is finely disseminated throughout the rock. A little malachite stain is present.

MICROSCOPIC DESCRIPTION:

Major Constituents.

A. Fragments

1. Plagioclase- coarse, subangular fragments of untwinned feldspar (probably albite).

B. Matrix

The matrix is composed of a fine-grained mixture of feldspar and quartz with the minor constituents described below.

Minor Constituents.

1. Pyrite- small, euhedral grains occur disseminated throughout the rock and in abundance in a small vein with quartz and sericite.

2. Carbonate- occurs in many fractures throughout the rock (sometimes with quartz).

3. Sericite- occurs in numerous small fractures throughout the rock.

SPECIMEN 1074

ROCK TYPE: Albite Porphyry (Trachyte)

MACROSCOPIC DESCRIPTION:

The rock is grey, green and white, medium-grained (1-5 mm.) and porphyritic. Rusty fractures contain iron oxides and sericite. Minor pyrite occurs disseminated throughout the rock.

MICROSCOPIC DESCRIPTION:

Major Constituents.

A. Phenocrysts

1. Plagioclase- large, euhedral phenocrysts of albite; partly altered and replaced by sericite, carbonate and epidote. Albite and complex twinning are present.

B. Matrix

The matrix is composed of a fine-grained intergrowth of plagioclase, K-feldspar? and quartz with the various minor constituents described below.

Minor Constituents.

1. Sericite- occurs as a minor replacement of plagioclase in very fine grains and also in fine fractures.

2. Carbonate- occurs as irregular patches in plagioclase phenocrysts and in the matrix (abundant throughout the rock).

3. Epidote- occurs as anhedral grains with carbonate rep-

lacing plagioclase; in pseudomorphs with chlorite and carbonate.

4.Apatite- euhedral crystals throughout the rock.

5.Chlorite- occurs in pseudomorphs with leucoxene, epidote and carbonate.

6.Leucoxene- in pseudomorphs with chlorite.

7.Pyrite- euhedral to anhedral pyrite mantled by iron oxides scattered throughout the rock.

Alteration.

Plagioclase has been partly replaced by sericite, carbonate and epidote. An original mafic mineral, possibly amphibole, has been pseudomorphed by chlorite, leucoxene, epidote and carbonate.

J.H.Montgomery, Ph.D., P.Eng.

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'ancouver, B.C., Canada V6E 2K3

#1 Sketch Map showing
Locations of Rocks
for which Petrographic
Reports are submitted

GRANDUC MINES LTD.
Claim Map & Sample Sites
488 acres
1689 acres
1976
CLC

Snow
Tedray 2
1 unit
Tedray 3
3 units
Tedray 1
2 units
Tedray 4
5 units
Glacier
Mitchell
Steep Moraine
Ice Front 1956
1974 (approximate)
Grace
6 units
Tedray 5
10 units
Tedray 6
15 units
Steep Moraine
Tedray 7
2 units
Tedray 6
Snow
2 units
Ed 1
Tedray 8
1 unit
Tedray 9
2 units
Ed 2
1 unit
Tedray 10
3 units
Inaccessible
Tedray 11
4 units
Inaccessible
Tedray 12
15 units
Tedray 13
6 units
Tedray 9
Tedray 14
15 (approximate)
1974
1975 ice front (approx)
Sulphurets
Glacier
Ice Front 1956
Steep Moraine
Hanging Glacier

19,600 N
16,000 N
12,000 N
8,000 N
4,000 N
00
4,000 S
8,000 S
2,000 E
6,000 E
10,000 E
14,000 E
18,000 E

5958
M-1

Department of
Mines and Petroleum Resource
ASSESSMENT REPORT
NO. 5958 MAP #1

FIGURE 1.
CLAIM MAP & SAMPLE SITES
Showing Locations of Rocks Described in:
Petrographic Report on Rocks from
MITCHELL - SULPHURETS CREEKS AREA,
Skeena M.D. B. C.
to accompany
by. J. H. Montgomery, PhD, P. Eng/