

August 4, 1965

802576

W. Springer, Esq.
Camden-Bighland Ball Mines
300 - 399 West Pender Street
Vancouver 1, B. C.

PETROLOGICAL NOTES
Specimen Description

Hand Specimen

Light grey, fine - medium grained, well indurated greywacke. Finely disseminated sulphides apparent on cut and freshly broken surfaces, very magnetic - pyrrhotite.

Thin Section

Minerals

Quartz	30 - 40%
Plagioclase	30%
Chlorite)	
Smectite) Clay minerals - matrix	30%
Illite)	
Fe sulphides - pyrrhotite and oxides in accessory amounts up to 5%	

Texture

Sedimentary - poorly sorted, larger fragments of sub-angular quartz and fresh plagioclase in very fine grained matrix of clay minerals with a cement of finely crystalline quartz. Fe sulphides tend to be concentrated along minor fractures and attain fair crystal shape. Rock fragments are rare.

Remarks

This is a relatively unmetamorphosed rock, showing the typical dirty matrix of a greywacke. All alteration is basically due to induration and diagenesis.

W 2

Hand Specimen

Very fine grained, grey, indurated shaley siltstone or sub-greywacke. Slight reaction with dilute hydrochloric acid and a faint banding visible in the slide, probably equivalent to bedding.

Thin Section

Minerals

Quartz	50%
Calcite	5 - 10%
Sericite)	
White Mica)	
Chlorite)	30%
Illite)	

Fe sulphides, epidote and rutile in accessory amounts.

Texture

Very fine-grained, relatively well sorted, but still a high preponderance of clay fraction minerals in matrix. Patches of very finely crystalline calcite showing no major recrystallization. No visible feldspar as may be expected in such a fine grained rock, all being reduced to sericitic clay fraction.

Remarks

Sub-greywacke.

W 3

Hand Specimen

Grey, medium-grained greywacke, marked foliation in hand specimen. Slightly magnetic rock powder is due to pyrrhotite or possibly magnetite not visible in hand specimen.

Thin Section

Minerals

Quartz	30 - 40%
Plagioclase	20%
Chlorite)	
Sericite)	Clay minerals - matrix 30%
Illite)	

Fe oxides and sulphides in accessory amounts

Slightly more rock fragments and incipient new chlorite and minor muscovite, probably less plagioclase than W1.

Texture

Angular to sub-rounded quartz and plagioclase in matrix of clay minerals and very fine grained quartz. Groundmass clearly shows an imbricate structure enhanced by incipient oriented chlorite and muscovite lathes.

Fe ores present, magnetism suggests pyrrhotite and/or magnetite.

Remarks

This rock has clearly undergone post diagenetic deformation, possibly localized in fold nose or in a minor shear but could be a regional feature - compare geographical location of W3 and W1.

W 4

Hand Specimen

Grey, medium-grained greywacke, very similar to W3 but no visible foliation.

Thin Section

Minerals

As W1. Slightly more plagioclase with deteriorations in the oligoclase/andesine range as may be expected.

Texture

Ill sorted angular to sub-angular quartz feldspar crystals and rock fragments in a typically dirty matrix of chlorite, illite and sericite. Larger plagioclase crystals, relatively fresh. Fe ores are noticeably less common in this specimen.

Remarks

Good example of standard greywacke.

W 5

As W4 in all details.

W 6Hand Specimen

Fine grained greywacke with marked colour banding, almost certainly equivalent to bedding. Powdered rock is magnetic.

Thin SectionMinerals

Quartz	30 - 40%
Plagioclase	10 - 20%
: Chlorite)	
Illite) Clay Fraction	30 - 40%
Sericite)	
Fe ores	5 - 10% (magnetic)

Texture

Obviously sedimentary with ill sorted angular to sub-angular quartz grains set in a very fine-grained matrix. Banding due to slight differences in grain size and a reduction of iron ores in the narrow, light coloured bands. A faint foliation is picked out by alignment of chlorite and mica which cuts across the banding at a sharp angle.

Remarks

The foliation noted in thin-section is probably equivalent to an axial plane slaty cleavage, the banding being equivalent to bedding. The rock type can be described as a dirty siltstone or fine-grained sub-greywacke.

W 7Hand Specimen

Light grey, banded, calcareous shaley siltstone or sub-greywacke. Slight reaction to diluted HCl in light bands. Contorted banding definitely sedimentary pre-consolidation, typical of greywacke environment.

Thin SectionMinerals

Quartz	30 - 40%
Feldspar	10 - 20%

Clay Fractions)	
Mica)	20 - 30%
Chlorite)	
Calcite	10%
Fe Ores	<5%

Texture

Typically sedimentary well banded rock, the banding defined by coarser and finer grained material. The fine grained bands consist mainly of quartz with a little chlorite and clay micas, coarser grained bands have more iron ores and chlorite, typical greywacke in appearance. Irregular patches of fine grained calcite are also concentrated in the coarser bands. Plagioclase occurs in a groundmass only.

Remarks

This rock can be referred to either as a dirty calcareous siltstone or sub-greywacke.

General Notes

The whole suite of rocks is characteristic of the greywacke, sub-greywacke environment. The magnetic qualities of the rocks are clearly due to pyrrhotite in some specimens. Where the rocks are fine-grained, the iron ores are difficult to determine, and magnetism could be due to either magnetite and/or pyrrhotite. The main alteration effects in these rocks are diagenetic but the presence of foliation in at least two specimens suggests folding and slight metamorphism but only to the very lowest chlorite grade.

The presence of minor amounts of calcite in some specimens is not unusual in this environment, and iron sulphides could well be syngenetic in origin and not necessarily introduced at some later stage.

JS 1

Hand Specimen

Medium - coarse grained, light grey rock with a patchy texture due to alteration of feldspars and subsequent fracture and introduction of quartz vein material. Red oxides, presumably after sulphides occur in one very altered fracture. Pyrite is apparent along fracture lenses and cracks.

Thin Section

Minerals

Quartz	50 - 60%
Completely sericitized feldspar	20 - 30%
Muscovite	5 - 10%
Fe ore (pyrite)	1%

Texture

The rock has a patchy appearance with large patches of sericite almost certainly after feldspar (crystal shapes not discernible), set in a groundmass of fairly equigranular, sub-angular, fine grained quartz with minor muscovite flakes and clay minerals. Iron sulphides are scattered in somewhat irregular blobs with iron oxide staining along a late fracture.

Remarks

The mineralogy of this rock is consistent with that of a micaceous quartzite or altered feldspathic quartzite. Recrystallization has been sufficient to mask the precise origin of the rock which could be either an altered acid volcanic or feldspathic sandstone.

JS 2

Hand Specimen

A very small sample of light grey rock, much fractured and with altered feldspar. A small quartz vein takes up much of the specimen. Pyrite is concentrated along one side of this vein. Pyrite is also concentrated along other fractures in the specimen.

Thin Section

Minerals

Quartz	70 - 80%
Sericite	10%
Muscovite	10%
Pyrite	1 - 2%

Texture

Groundmass of recrystallized quartz with minor flakes of muscovite and small patches of sericite. Some slight recrystallization, probably after sericite originally from feldspar stock. Quartz crystals show irregular boundaries indicating recrystallization under a condition of stress. Quartz vein is much coarser crystalline material with a concentration of skeletal pyrite along one edge.

Remarks

This rock is very similar to JS 1 and is equally undiagnostic as to origin and on its basic mineralogy could also be termed a feldspathic quartzite.

JS 3

This is essentially the same as specimen JS 1 with larger patches of sericitic alteration. The rock is very fractured but the fractures are sealed with recrystallized, coarser-grained quartz. The groundmass consists of fine-grained recrystallized quartz with minor muscovite and illitic micas.

JS 4

Again, this specimen is very similar to those previously described with basically a little more sericite, late quartz sealing fractures is also evident in this specimen. Again, basically an altered feldspathic quartzite.

JS 5

Again, this is essentially the same rock, however, the patches of sericite appear to be pseudomorphs, definitely after feldspar. The well retained crystal shapes suggest that the original rock may well be of volcanic origin, something in the nature of a rhyolite porphyry.

JS 6

Specimen six is almost identical to specimens 3 and 4. A sequence of shearing and recrystallization of quartz in vein fillings is evident in this specimen. The abundant sulphides are cemented along late fractures and consist entirely of pyrite.

JS 7

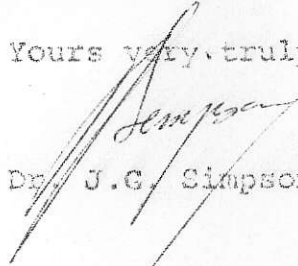
Has been forwarded for polished sections and is not yet available. The black mineral queried is almost certainly a manganese oxide and the sulphide is essentially pyrite.

General Remarks

Generally, these rocks can be termed as fractured and recrystallized, altered micaceous quartzites or feldspathic quartzites. The origin is somewhat obscure due to the simple mineralogy and the general state of recrystallization. There is, however, little doubt that the original composition of the rock was acidic as there is no sign of mafic material or mafic alteration minerals. The possible original rock types are either acid porphyry or waterlain acid tuff or a feldspathic sandstone. The presence of remnant well shaped sericitic pseudomorphs obviously after feldspar, in at least one specimen suggests that this rock may well have been a rhyolite porphyry. If a tuffaceous origin is considered, the general lack of shards and rock fragments suggests a waterlain rather than an aerially disposed tuff. It is important that the field relationships be closely investigated with the above possibilities in mind and, if possible, fresh specimens secured. The fractured nature of the rock and the presence of quartz veins sealing the fractures suggest that these rocks are located on or near a dislocation zone. If this is so, specimens of fresher rock away from the dislocation should be forwarded, particularly so that any fresh feldspars can be diagnosed.

Descriptions of polished samples and specimen JS 10 brought in a few days ago will be forwarded as soon as the information becomes available. Please advise whether you wish us to retain the slides and specimens.

Yours very truly,


Dr. J.G. Simpson.

JCS/ph