

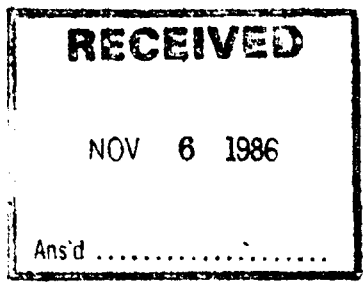


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Rea Gold

Vanadium Petrographic Ltd.



Invoice #6070

November 4th, 1986

Report for: Ian D. Pirie,
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6415 - 64th St.,
DELTA, B.C.
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Samples:

9 samples of mineralized drill core for petrographic description. Sample numbers and preparation type are as follows:

| | |
|----------|-----------------------|
| TR3-00 | Polished section |
| 64-89.5 | " |
| 89.9 | Polished thin section |
| 65-76.3 | " " |
| 71-106.3 | " " |
| 108.1 | " " |
| 120.9 | " " |
| 77-289.6 | " " |
| 81-266.4 | " " |

Summary:

The samples of this suite are all of similar type except for the intensity of mineralization.

This is a suite of weakly to strongly mineralized samples in which the sulfide assemblage is basically similar throughout.

Components occurring in potentially economic proportions in most samples are sphalerite, galena and tetrahedrite. Pyrite is also a common constituent. Traces of chalcocite are seen in some cases.

The sulfides occur as disseminated fine-grained streaks and bands, intergranular networks and irregular impregnations, and semi-massive to massive concentrations.

The silicate matrix is of two principal types: most commonly a texturally heterogenous aggregate of (metasomatic?) quartz showing shear and recrystallization features; and a foliaceous, fine-grained sericite aggregate. The quartzose form contains minor accessory carbonate and sericite.

Sulfide/silicate relationships are obscure but, for the most part, suggest

concomittent or overlapping sulfide deposition, silicification and deformation.

The resultant intimate sulfide/silicate and sulfide/sulfide intergrowths will probably require grinding to 200 mesh or better to achieve good liberation in milling.

No specific mineral phases could be seen to account for the high Ag contents. The values are presumably contained in the tetrahedrite and/or galena, both of which are notably homogenous.

Individual descriptions of the samples are attached. Details of the textural relationships are probably best conveyed through photomicrographs. An appropriate set of these can readily be taken if you so desire.

A handwritten signature in cursive script, appearing to read 'J.F. Harris'.

J.F. Harris Ph.D.

Sample TR-3 00

Estimated mode

| | |
|--------------|-------|
| Galena | 84 |
| Sphalerite | 10 |
| Tetrahedrite | 2 |
| Pyrite | 1 |
| Chalcopyrite | 1 |
| Arsenopyrite | trace |
| Gangue | 2 |

This sample consists essentially of massive sulfides.

Galena is the dominant constituent and forms a matrix to small ragged 'islands' of the other constituents.

Of the latter, sphalerite is the principal accessory, occurring as individual equant to ovoid/elongate grains mainly in the size range 0.1 - 1.0mm, but also as finer grains down to 0.01mm and, occasionally, as coarser ones to 3.0mm. For the most part the sphalerite is homogenous except for rather sparse tiny chalcopyrite exsolution bodies and, rarely, tiny pyrite inclusions or veinlets of gangue.

Other constituents are minor and finer-grained.

Tetrahedrite is rather evenly distributed as small, rounded individuals, 0.01 - 0.3mm in size. Mostly these are free of associated phases, but are occasionally seen as composites with sphalerite or gangue.

Chalcopyrite has a similar mode of occurrence, though less abundant and mainly as a few relatively coarse grains. These commonly contain peripheral inclusions of tiny pyrite euhedra. Pyrite is generally as very small grains (not exceeding 0.2mm) but even so these are, for the most part, individual and not intergrown with the other phases.

Arsenopyrite is as rare minute euhedra.

The gangue forms trains of ragged, often elongate, small grains 0.02 - 0.5mm.

Salient features of the sample are the homogeneity of the galena matrix (apparently without exsolved phases or other minute inclusions) and the mutually well-segregated nature of the various accessory sulfides and gangue. These accessory constituents typically occur as somewhat elongate grains and/or are concentrated in parallel trains, defining a weak foliation.

Sample 64-89.5

Estimated mode

| | |
|--------------|----|
| Tetrahedrite | 28 |
| Sphalerite | 23 |
| Pyrite | 5 |
| Galena | 3 |
| Chalcopyrite | 1 |
| Gangue | 40 |

This is a banded, semi-massive ore. One end of the slide consists of a zone of schistose, sericitic material with disseminated pyrite; the central portion is polymetallic sulfides with abundant intergrown quartzose gangue, grading at the far end to more massive sulfides with a lower gangue content.

The schistose zone consists of pyrite euhedra, 0.01 - 0.3mm in size, randomly disseminated through a streaky sericitic matrix. Minor amounts of very fine-grained sphalerite are present as elongate wisps paralleling the foliation and, with intergrown galena, moulded on to some of the coarser pyrite grains.

The polymetallic zone consists of tetrahedrite and sphalerite intimately intergrown in cogenetic, 'island/interstitial' texture on a scale of 0.02 - 0.5mm, together with quartzose gangue as a third component. The gangue is extensively involved in the finer intergrowths but also forms large, irregular/elongate sulfide-free patches, 1.0mm or more in size. There is a minor component of sericitic gangue which forms intimate flaky intergrowths, especially with the sphalerite.

In fact there is a definite tendency for silicate/sulfide intergrowth to be concentrated within the sphalerite, leaving the tetrahedrite relatively well-segregated.

Fine-grained galena occurs as small inclusions and networks in both sphalerite and tetrahedrite. Chalcopyrite concentrates as exsolved blebs around the fringes of the sphalerite patches but is also present as flecks within tetrahedrite.

The contact of the sericite-pyrite band and the polymetallic zone is somewhat gradational and, in this area, granular pyrite becomes an additional component in the complex sulfide/gangue intergrowth.

One rounded, 7 micron bleb of gold was observed as an inclusion in tetrahedrite. Both tetrahedrite and galena appear homogenous and free of any segregated Ag-bearing phases.

This is a fine-grained, complex ore which will require grinding to 50 microns or better to achieve reasonable liberation. Fortunately, the most likely Ag-carrier (the tetrahedrite) shows the best degree of segregation.

Sample 64-89.9

Estimated mode

| | |
|--------------|-------|
| Quartz | 60 |
| Sericite | 3 |
| Carbonate | trace |
| Sphalerite | 20 |
| Tetrahedrite | 14 |
| Galena | 2 |
| Chalcopyrite | 1 |

This sample is a disseminated/network impregnation of sulfides in a weakly foliated, siliceous host.

The latter consists of an aggregate of quartz of widely varying grain size. This is dominantly an anhedral, locally platy/elongate mosaic of grain size 0.1 - 0.5mm, with abundant patches, wisps and networks of finer material down to 0.02mm. Sericite occurs segregated as occasional discontinuous, sub-parallel lenses or sinuous schlieren and also as sparsely disseminated small wisps throughout.

One end of the slide includes an irregular 3mm band or lens of evenly microgranular quartz with disseminated poikilitic rhombs of carbonate. This is texturally distinct from the rest of the rock and contains no sulfides.

The bulk of the slide has abundant sulfides. These show distinct streaky elongation in the sericitic zones; elsewhere they form essentially random clumps and network impregnations on the scale 0.05 - 1.0mm, mainly showing little relation to the crude foliation of the host rock.

The sulfides are dominantly sphalerite and tetrahedrite with accessory galena. These form an intimate 4-component intergrowth with the gangue.

The sphalerite shows some tendency to segregate as rather rounded to equant grains, 0.05 - 0.2mm in size (and coalescent clumps thereof) as does the tetrahedrite - though the latter commonly shows intimate, emulsion-type intergrowth with galena. Similar fine-grained inclusions of galena are also seen with sphalerite.

Chalcopyrite is concentrated as tiny exsolved blebs around the fringes of sphalerite inclusions in tetrahedrite, and as scattered individual small grains within tetrahedrite.

A notable feature of this particular sample is the total absence of pyrite.

Small islands and clusters of gangue occur throughout the sulfides, and this rather intimate intergrowth will require a grind of at least 100% minus 200 mesh to achieve reasonable liberation of the various sulfides from each other and from the gangue.

Sample 65-76.3

Estimated mode

| | |
|--------------|-------|
| Sericite | 54 |
| Quartz | 1 |
| Carbonate | trace |
| Sphalerite | 20 |
| Tetrahedrite | 10 |
| Pyrite | 10 |
| Galena | 5 |

In this sample the matrix is composed essentially of compact foliaceous sericite. For the most part this consists of a very fine-grained (1 - 5 micron) aggregate of minute, well-oriented flakes, grading to somewhat coarser, more irregular pockets (with individual flakes to 0.5mm) in association with the clumps of sulfides.

The well-defined, silky schistosity shows local deformation in the vicinity of the sulfide clusters.

The sulfides occur as augen-like lenticular clumps and coalescent networks, 0.4 - 2.0mm in size. These show distinct elongation parallel to the foliation but, even so, are basically granular. There is limited inter-foliar intergrowth with the matrix, mainly by sphalerite which also shows included wispy/flaky sericite.

Sphalerite, tetrahedrite and galena form an intimate 3-component intergrowth, in which sphalerite (being dominant) tends to form the host to irregular emulsion-like clusters and networks of tetrahedrite and galena on the scale 0.02 - 0.2mm. The latter two minerals are hardly ever seen independently segregated from sphalerite. Chalcopyrite is apparently absent.

The pyrite in this sample is of distinctive type. It occurs as individual grains, 0.02 - 0.2mm in size, which are quite strongly anisotropic and typically in the form of pyritohedra or modified cubes rather than the simple cubes seen in the other samples. These are commonly clustered as small rounded/ovoid masses of polygonal mosaic, and are rather evenly disseminated throughout.

The pyrite appears to show no particular relation to the sphalerite/tetrahedrite impregnations. Sometimes it occurs separate from them; sometimes it shows minor associated sphalerite etc. in moulded-on relationship; and sometimes it occurs within the sphalerite-tetrahedrite patches.

Traces of granular quartz and lesser carbonate are associated with the sulfides.

Sample 71-106.3

Estimated mode

| | |
|--------------|-------|
| Quartz | 92 |
| Carbonate | 6 |
| Plagioclase | trace |
| Sericite | trace |
| Chlorite | trace |
| Tetrahedrite | 1 |
| Sphalerite | 1 |
| Pyrite | trace |

This is a weakly mineralized sample consisting essentially of a crudely banded aggregate of somewhat strained quartz.

This is dominantly a crenulate-margined anhedral mosaic of grain size 0.2 - 0.5mm, with intergrown lenses and patches of much finer chert-textured material of grain size 0.02 - 0.05mm, plus irregular bands and patches of coarser, sometimes elongate, comb-structured quartz up to 1 or 2mm in size. The fine-grained zones exhibit a weak preferred orientation but the coarser segregations are often quite discordant to this direction, and sometimes appear as vein-like bodies cementing brecciated remnants of the finer quartz. Overall there is little or no grain elongation and the fabric is essentially non-foliated.

Intergranular carbonate is rather common, as irregular anhedral grains, commonly coalescing to form networks of granular mosaic.

Traces of sericite and chlorite are seen, as scattered non-oriented flakes, sometimes associated with the carbonate.

The sulfides occur as irregular grains 0.02 - 0.5mm. They consist of sphalerite and tetrahedrite, mainly separate but locally intergrown. Pyrite is a minor associate.

The sulfides show a close, though not exclusive, association with the pockets of carbonate. They commonly show angular, euhedral faces against carbonate but more irregular contacts with quartz. They clearly have an interstitial/intergranular relationship to the matrix. Where the disseminated sulfide grains coalesce to form semi-continuous networks, these show a general elongation parallel to the weak banding.

The pockets and veinlets of coarsest quartz, which appear superimposed on the finer aggregate, are essentially free of carbonate and sulfides.

Sample 71-108.1

Estimated mode

| | |
|------------|----|
| Sericite | 62 |
| Quartz | 3 |
| Sphalerite | 20 |
| Pyrite | 9 |
| Galena | 6 |

This is a distinctly foliated rock in which the matrix (as in 65-76.3) consists essentially of compact, fine-grained sericite. It is, in fact, very similar to 65-76.3 except for an apparently higher degree of shearing. This is apparent in the form of close-spaced, parallel planes which divide the rock into thin slices (micro-imbricate or phyllonitic structure). Within these the general parallel orientation of the felted sericite is sometimes somewhat oblique to the direction of the shear-fracture partings.

The sulfides in this sample show a more intimate relationship to the textural features of the host than they do in 65-76.3. They form ragged, blocky/elongate patches, 0.2 - 1.0mm thick, sometimes connected by thin films extending along the shear planes. Within the sphalerite, which is the dominant constituent of these strongly oriented pockets and schlieren, galena forms intimate foliaceous wisps and networks paralleling the shear-foliation direction of the host.

Pyrite, on the other hand, forms apparently undeformed equant grains to 0.5mm, sometimes within the sphalerite-galena streaks and sometimes in the adjacent sericite. In the latter situation they often, though not invariably, show adhering pockets of sphalerite in a pressure-shadow relationship. Fine-grained inclusions of galena in the pyrite are relatively common.

This sample is one of the few which contain no tetrahedrite.

The origin of the sulfide/host textural relationships in this sample are uncertain. They could be the result of replacement and infilling of incipient openings in a strongly sheared and deformed micaceous host, or they may be original laminated or disseminated sulfides which have been sheared along with the host rock. Under these circumstances the form of the sphalerite and galena could be explained as the result of flowage redistribution, and that of the pyrite as typifying that mineral's stress-resistant character.

Sample 71-120.9

Estimated mode

| | |
|--------------|-------|
| Quartz | 79 |
| Carbonate | 1 |
| Sericite | trace |
| Pyrite | 9 |
| Sphalerite | 5 |
| Tetrahedrite | 5 |
| Galena | 1 |
| Chalcopyrite | trace |

This sample consists of sub-parallel sulfide stringers and trains of disseminated grains in a crudely banded grey and white quartzose matrix.

The latter is texturally very heterogenous, ranging in grain size from 0.02 - 5.0mm. Much of it consists of a fairly regular anhedral mosaic in which shadowy polarization, strongly crenulate grain boundaries and intergranular microgranular development attest to extensive recrystallization. Grain elongation is common but follows no consistent direction, and is sometimes oblique or perpendicular to the weak banded foliation. There is also extensive local development of ribbon-type, lamellar crystallization (sometimes showing kinks and contortions) especially in association with sulfide clusters.

The slide contains a central zone of sulfide-free, white quartz which is of intensely strained, coarse, comb-structured material showing extensive intergranular micro-recrystallization.

The sulfides in this sample show laminar variations in mineralogy and texture.

At one end tetrahedrite is the principal component, forming grain boundary networks in the quartz, and irregular equant grains 0.1 - 0.2mm, coalescing to clusters and pockets up to 2.0mm in size. It contains minor inclusions of galena and sphalerite.

This is followed by a thin band of close-packed euhedral pyrite 'sand' (cubic grains 0.02 - 0.1mm), interstitially cemented in part by tetrahedrite and sphalerite, and in part by ribbon-textured cherty silica.

Next comes the 1 - 2cm zone of white comb quartz which is flanked by a string of coarser pyrite euhedra (0.2 - 0.6mm) and polycrystalline clusters.

This is succeeded by a zone of irregular sulfide disseminations, pockets and networks, similar to the first band described except that the dominant constituent is sphalerite, sometimes containing abundant tiny pyrite inclusions, and sometimes with inclusions or peripheral concentrations of galena and tetrahedrite. The latter form grades to pockets in which tetrahedrite/galena intergrowths are the principal constituent.

The sulfide impregnations are pockety in form and show irregular orientation.

Sample 77-289.6

Estimated mode

| | |
|------------|----|
| Quartz | 60 |
| Sericite | 8 |
| Pyrite | 20 |
| Sphalerite | 8 |
| Galena | 4 |

The slide includes two distinct textural varieties.

The more minor of these is in the form of what appears to be a somewhat deformed band or inclusion. It is composed of a rather even anhedral aggregate of quartz of grain size 0.02 - 0.05mm. This locally shows grain elongation and looks recrystallized and somewhat sheared. It contains sub-oriented, lency wisps of sericite (which probably define remnant internal contortions) and very fine-grained, irregularly disseminated pyrite which concentrates in wisps and patches.

The bulk of the slide consists of coarser disseminated sulfides in a highly heterogenous quartzose matrix. The latter ranges in grain size from 0.05 - 1.0mm and displays crenulate/diffuse grain boundaries, strain polarization and abundant, randomly oriented platy or ribbon textures. It has minor intergrown sericite as scattered, vari-directional wisps and occasional, more extensive, irregular pockets of felted material.

The sulfides are dominantly pyrite as abundant individual, cubic, euhedral-subhedral grains, 0.05 - 1.0mm in size, often clustered. This appears randomly distributed without reference to the textural/mineralogical variations in the matrix.

Accessory sphalerite occurs as irregular patches up to 3.0mm in size, either well-segregated, or moulded onto pyrite grains; the independent patches sometimes have peripheral concentrations of small pyrite grains. It locally shows wispy intergrowth with the platy/foliaceous elements of the matrix.

Galena occurs in similar mode, locally penetrating the grain boundaries of the quartzose host. To a minor degree it is seen intergrown with sphalerite, but the majority occurs as a matrix or cement to clusters to pyrite - locally replacing and veining that mineral via microbreccia fractures. The more extensive pockets of galena in this association commonly contain abundant ragged inclusions of silicates.

Sample 81-266.4

Estimated mode

| | |
|--------------|----|
| Quartz | 83 |
| Carbonate | 3 |
| Sericite | 3 |
| Pyrite | 5 |
| Sphalerite | 3 |
| Tetrahedrite | 2 |
| Galena | 1 |

This sample consists of crudely-banded streaks and lenses of fine-grained sulfides in a patchy grey-white quartzose matrix.

The latter is seen in thin section to be extremely heterogenous in texture, ranging in grain size from 0.02 - 3.0mm. It consists essentially of elongate lenses and irregular clumps of coarser grain size set in a very fine cherty matrix. Stress and recrystallization features abound, with crenulate and micro-granulated grain boundaries, strain polarization and local patches of sheared, strongly oriented fabric.

The textural aspect of the rock is suggestive of total silicification of a brecciated, fragmental or possibly porphyritic original rock, probably under conditions of active stress.

Interstitial carbonate is relatively common, mainly, though not exclusively, in the coarser quartz patches. The other accessory, sericite, concentrates as very fine-grained wisps and occasional coarser schlieren in the finer cherty component, defining a perceptible foliation.

The various sulfide seams tend to be distinctive in their mineralogy.

Those in the central section of the slide are of polymetallic sulfides as irregular to elongate pockets and intergranular networks. They consist of sphalerite, tetrahedrite and galena in various degrees of intergrowth, but including relatively well-segregated patches up to 0.5mm in size. Pyrite is also present, as individual cubes and clusters, and the other sulfides sometimes occur in cementing relationship to these.

The other sulfide streaks are largely of fine-grained euhedral pyrite with minor traces of intergrown sphalerite.

The relationship of the sulfides to the enclosing quartz is somewhat inconsistent and the sulfide clumps commonly have fringes of ribbon-textured chert indicative of co-genesis or post-sulfide textural readjustment. In general, the sulfides occur in the finer areas of quartz and are absent from the coarsest lenses and patches.