Report on Examination of Ore Specimens from The Olympic Gold Mines Ltd.

by

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I. Geology of the showing.

The showing near the portal of the Leckie tunnel of is a strong quartz vein ten feet wide, heavily mineralized with pyrite and arsenopyrite. In a distance of 35 feet, it narrows down to three or four feet, and for the next 120 feet consists of a number of isolated lenses in a very strong and wide shear. The MacGee tunnel follows a strong quartz vein dipping 70 - 80 degrees to the southwest. Near the end of the Leckie tunnel is a fine-grained felsite dyke, striking north 69 degrees and dipping south 80 degrees.

The rocks encountered are altered beyond recognition and consist of calcite, quartz, actinolite, serpentine and sericite, with a liberal dissemination of pyrite, pyrrhotite and arsenopyrite.

II. General description of the ore.

The ore consists largely of sphalerite and pyrite with arsenopyrite as well. Smaller amounts of chalcopyrite and pyrrhotite are present. Small amounts of galena, and traces of tetrahedrite may also be found.

III. Table of assay results.

Arsenopyrite	0.4 oz./ton.
Pyrite (crystalline)	nil
Chalcopyrite (pure)	trace
Sphalerite (pure)	trace
Sphalerite and chalcopyrite	0.05 oz./ton.
Magnetite and massive pyrite	0.1 oz./ton.

The above results may be slightly inaccurate due to the necessity of assaying very small quantities.

IV. Size of individual mineral fragments.

After numerous tests, it was estimated that the average size of the smaller grains of pyrite was .28 mm. and the remainder of the minerals .14 mm. To unlock these grains, grinding to 50 mesh or to 100 mesh respectively would be required.

V. Paragenesis of the ore.

The oldest mineral is the pyrite. Next in age is the sphalerite. Since the arsenopyrite veins the sphalerite and is cut by all the other minerals, it is probably the next youngest. In view of the fact that the chalcopyrite is so closely associated with the sphalerite, and also that it cuts

the arsenopyrite (see specimen 0.6, figs. 1 and 2), it was the next one deposited. Tetrahedrite might have come in at the time the chalcopyrite was deposited, since it is very closely associated with it. However, the very small quantities make this hard to determine. The galena was the next mineral to be deposited since it cuts all the above minerals. Quartz of two different ages was noticed, the secondary quartz cutting all the other minerals. Calcite was the last mineral to be deposited as veins of calcite run through the whole mass.

VI. Description of ore specimens, megascopically and by microscope.

Six specimens of ore were examined, five from the Olympic mine and one from the Peerless mine. A polished section was made of each.

Specimen 0.5

In the megascopic examination of the sample, the following minerals were identified:

Metallic	Non metallic
Arsenopyrite	Quartz
Sphalerite	Calcite
Chalcopyrite	
Pyrite	
Covellite	

The pyrite appeared to be of the massive type and is disseminated through the quartz in fine grains. The arsenopyrite occurs in large masses, crystalline in texture, twinning of crystals being clearly visible to the naked eye. The chalcopyrite, present in small amounts, is apparently associated with the sphalZerite. In places it had altered to covellite.

Small amounts of quartz of the milky white variety, are visible. Cutting through all the other minerals are parallel veins of somewhat discolored calcite.

Microscopic examination showed the following minerals in polished sections.

Pyrite
SphalZerite
Chalcopyrite
Galena
Quartz

The pyrite shows definite crystal forms, but is badly shattered. Cutting it are veins of quartz. The sphalZerite and chalcopyrite are closely associated. The larger particles of chalcopyrite occur when the sphallerite is pitted and fractured. However,it is to be noted that the chalcopyrite also occurs in the sphalZerite itself, either as small particles just visible under the x100 power of the microscope, disseminated all through the sphalZerite, or as small veinlets in it which usually occur in two directions at

60^{o} to each other. Quartz often occurs in the same veins as the chalcopyrite as if both were of the same age. Other veins of quartz cut both sphalZerite and chalcopyrite. In one portion of this specimen, the sphallerite is veined by the pyrite. Chalcopyrite veins are also cut by this pyrite vein. (See figs. 0, 5, 1.)

Specimen 0.12

In the megascopic examination of the ore the following minerals were identified.

Metallic	Non metallic
SphalZerite	Calcite
Pyrite	Quartz
Chalcopyrite	

The specimen consists mostly of sphalZerite with pyrite and a little chalcopyrite disseminated through it. The pyrite is fine-grained. Small stringers of calcite cut the sphalZerite and pyrite.

On examination under the microscope the polished section showed sphalZerite, chalcopyrite, pyrite, galena, quartz and calcite. The sphalZerite is much fractured and crushed. Masses of chalcopyrite occur in between the sphalZerite grains, usually separated from the sphalZerite by calcite. In one or two places, the close junction between sphalZerite and chalcopyrite may be observed. Chalcopyrite also occurs in very small particles in the sphalZerite, near the boundary of the sphalZerite grains.

Pyrite is the next mineral in quantity shown in this section. It is very much fractured, and no crystal boundaries may be detected. Cutting it are masses of galena, sphalZerite, chalcopyrite and calcite.

Only small amounts of galena are present. It occurs cutting both the sphalZerite and pyrite.

Calcite veins all the other minerals.

Specimen 0.10.

When examined megascopically the following minerals were determined.

Metallic	Non metallic
Chalcopyrite	Quartz
Pyrite	
SphalZerite	
Galena	
Magnetite	
Hematite	

In this specimen the pyrite has crystallized in large cubes up to 1 inch. Chalcopyrite occurs in large masses, associated with pyrite of a massive variety. Magnetite also is found in the specimen and included in it are small grains of pyrite. Where the magnetite surrounds a large crystal of pyrite, a thin layer of hematite occurs next to the crystal face. The whole specimen is extremely brittle, due to its crystalline structure.

Microscopic: This section is composed mostly of

chalcopyrite and pyrite. The chalcopyrite is massive and is not much fractured. The pyrite shows definite crystal form, but is much fractured, quartz filling the interstices. The chalcopyrite is veined with quartz as well. Galena and sphalerite occur in small quantities.

Specimen 0.3

When examined megascopically, the following minerals were identified: Arsenopyrite, galena, sphalerite, chalcopyrite, quartz, calcite.

The specimen is composed mostly of arsenopyrite and sphalerite. The arsenopyrite veins the sphalerite but occurs also as masses containing large crystals.

Microscopic examination revealed that most of the section was arsenopyrite. Included in the arsenopyrite are small amounts of sphalerite, with chalcopyrite disseminated through it. Cutting the arsenopyrite are veins of galena, which in turn are cut by quartz.

Specimen 0.6

The minerals identified in the hand specimen were chalcopyrite, pyrite, pyrrhotite, sphalerite, arsenopyrite, limonite, quartz and calcite. The specimen consists mostly of arsenopyrite and chalcopyrite with scattered masses of sphalerite. Fine-grained pyrite appears disseminated through the chalcopyrite and quartz. Thin parallel veins of discolored calcite cut the whole specimen.

Microscopic examination: The section consists mostly of arsenopyrite and sphalerite. Other minerals identified are chalcopyrite, galena, tetrahedrite and quartz. The tetrahedrite is included in the arsenopyrite and occurs only in small amounts. Associated with the tetrahedrite is chalcopyrite, which is also associated with the sphalerite but in much smaller particles. Veins of secondary quartz cut through all the other minerals.

Specimen P 1.

A sample from the Peerless mine was examined as well.

Megascopic examination: It is composed mostly of sphalerite. Massive pyrite is disseminated through the sphalerite. Small amounts of chalcopyrite are present as well. Calcite stringers show throughout the specimen.

Microscopic examination: The minerals identified in section were chalcopyrite, pyrite, sphalerite, galena and calcite. The sphalerite, chalcopyrite and pyrite show evidence of much fracturing. No crystals of pyrite can be detected. The chalcopyrite appears in a massive form, cutting the pyrite and sphalerite. It also appears disseminated through the sphalerite near the edge of the sphalerite grains. Galena is present in small amounts. Calcite and quartz fill the interstices, with the calcite cutting the quartz. Evidence of movement is shown by two large bodies of

massive pyrite which are connected by a narrow band of pyrite fragments. It would appear that the two bodies of pyrite were dragged apart, leaving a band of pyrite along their plane of movement. In this case the calcite fills in between the grains of pyrite.

Bibliography.

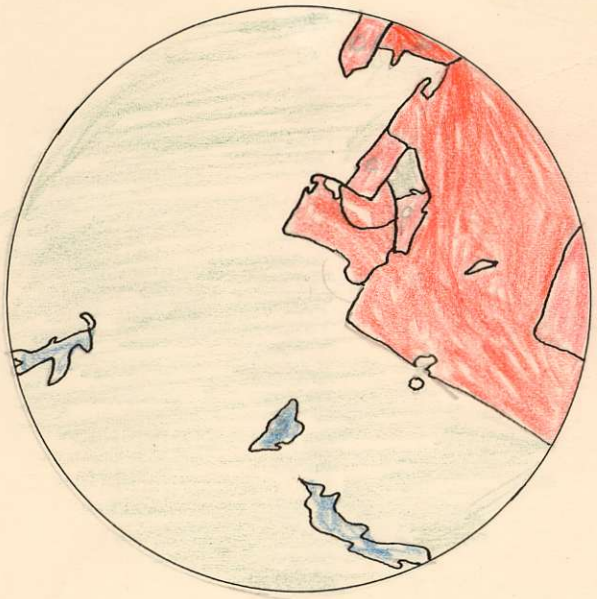
Report on Leckie and McGee tunnels,
Olympic Gold Mines Ltd.
Dr. Dolmage.

Acknowledgments.

The work was done in the University of British Columbia laboratories, using the University equipment and supplies, under the supervision of Dr. H.V. Warren.

Specimen O 10

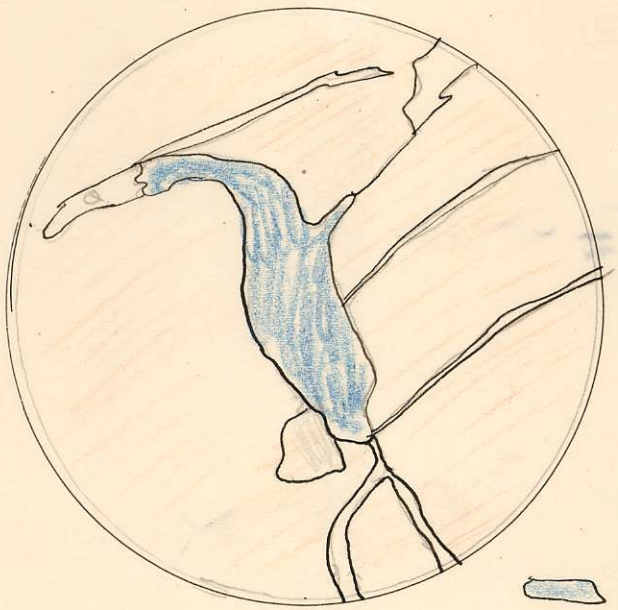
x50



Sphalerite
Chalcopyrite
Galena
Quartz
Pyrite

Specimen O. 3

X 50



1

Galena

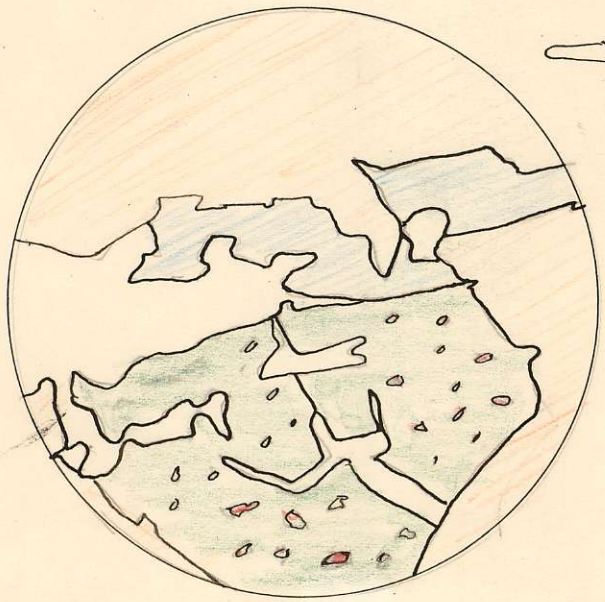
Arsenopyrite

Sphalerite

Chalcopyrite

Quartz

X 50



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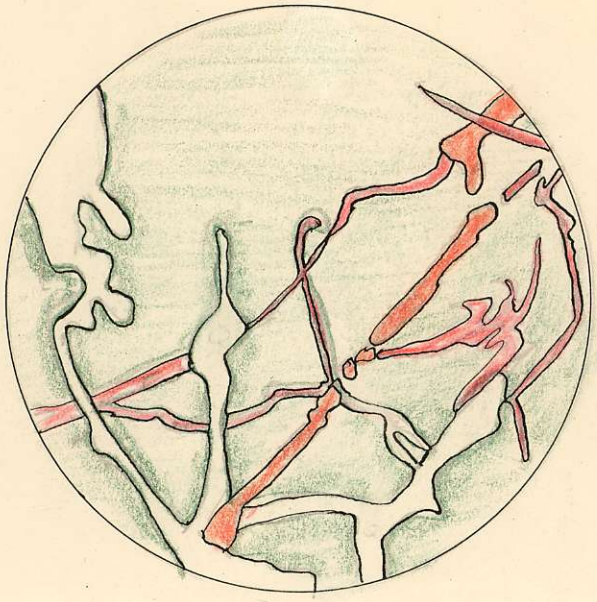
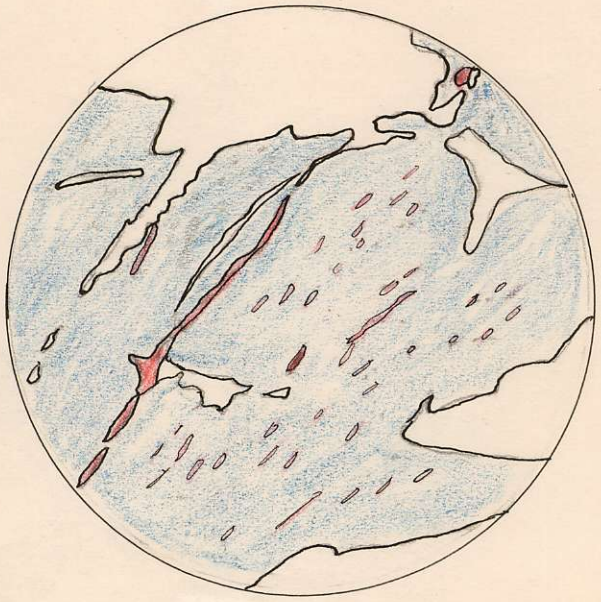
Specimen 0.5



x 50

Specimen 0.6

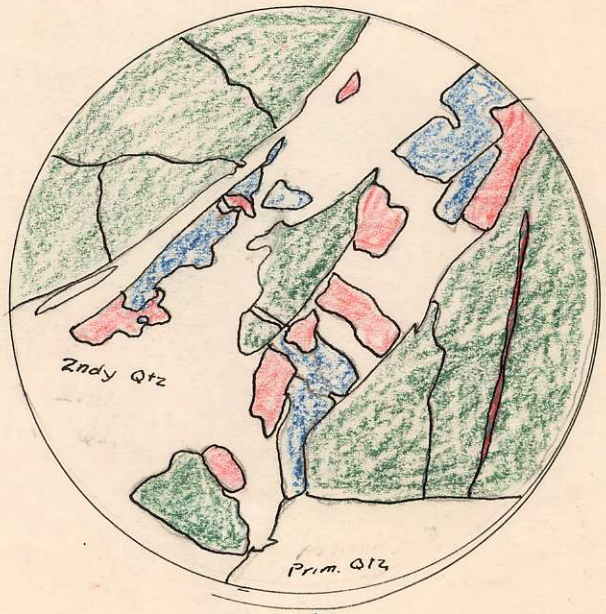
X 50



Spha.lerite
Chalcopyrite
Quartz

1.

X 150



Arsenopyrite
Tetrahedrite
Chalcopyrite
Quartz

2