No map, diagrams, photos or proper interpretation of x-ray data.

GEOLOGY 409 REPORT

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MINERALOGY OF THE TOOTSEE RIVER LEAD-SILVER DEPOSIT

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INTRODUCTION

The enclosed report is based on an examination of massive galena specimens from the lead-silver deposit near Tootsee River, in northern British Columbia.

Microscopic, petrographic, X-ray, and microchemical methods were employed to identify minerals contained within the specimens.

Assay values containing up to 300 oz. of silver per ton have been reported from this property. The purpose of this study was to identify the ore minerals from this prospect and to discover any textural relationships and mineral associations which may exist and serve as a guide to the localization of silver values.

LOCATION

The Tootsee River property lies near the intersection of latitude 59 degrees 50 minutes and longtitude 130 degrees 30 minutes, just south of the British Columbia-Yukon border. The Alaska Highway is within ten miles of this property and provides a major access route to the area.

HISTORY

The Tootsee River deposit was first discovered in 1956 by a group of

Hungarian prospectors. The property was then optioned to the Conwest Exploration Co. whose northern office is at Whitehorse in the Yukon Territory. Conwest carried out an exploration program in the summer of 1957 and during this time a road linking the property to the Alaska Highway was built. At present the option held by Conwest has expired and has not to the author's knowledge been renewed.

MINERALOGY-DESCRIPTION OF THE ORE MINERALS

GALENA

Galena is the most abundant ore mineral on the property and occurs in massive, well crystallized veins. Judging from the suite of specimens examined oxidization has been intense near the surface and in places much of the galena has been replaced by secondary minerals.

PYRRHOTITE

Pyrrhotite was identified in polished section by its brown to creamish color, positive reactions to etch tests with HNO_3, HCl, and KOH, hardness of D, and strong anisotropism.

It's modes of occurrence are: 1) as large euhedral crystals contained within galena and in some places disrupting the cleavge traces of galena, 2) as irregular shaped grains exhibiting smooth contacts with galena and containing an occassional small rounded bleb of galena, 3) as irregular shaped, smooth bordered grains in contact with quartz and in places crudely rimming quartz, 4) in contact with pyrite and exhibiting smooth boundaries, 5) as corroded grains in contact with anglesite which have a seriate texture, 6) as smooth bounded grains in contact with anglesite and exhibiting a core or atoll texture.

Pyrrhotite was a common mineral in polished sections examined but is not abundant.

PYRITE

Pyrite was identified in polished section by it's poor polish, yellow color, hardness of 6, and crystal form.

Though not abundant, pyrite was identified in most polished sections examined and occurs in greater abundance than pyrrhotite.

Pyrite occurs as small isolated euhedral cubes less than 5 microns in size and as larger cubes, generally found in clusters, which can been seen in hand specimen. In both occurrences it is contained within galena. The larger clustered cubes of pyrite are generally fractured and separated by galena. Some cubes exhibit what appears to be a relict texture suggesting they have been replaced by galena.

Pyrite was also noted in contact with quartz and pyrrhotite. Where it was seen in contact with quartz it occured as smooth bounded grains which project into the quartz and occassionaly as isolated grains within the quartz. Where it was in contact with pyrrhotite the mutual boundaries were smooth and regular.

TETRAHEDRITE

Tetrahedrite can best be identified in polished section by etching the entire section with HNO_3. Using this reagent the galena tarnishes black while the tetrahedrite tarnishes faintly brown or remains white.

Using the above method minor quantities of tetrahedrite was identified in several polished sections. It occurs as small rods, rounded blebs and as irregular shaped, smooth bounded grains. In size these grains and rods range from 9 microns to minute blebs which when seen under high power appear as pin points.

The tetrahedrite is contained within the galena and generally shows a random distribution. In one section, however, the small pin point blebs showed a tendancy to line up parallel to the cleavage traces of the galena. This

tendancy was not well developed and most of blebs were randomly distributed but the orientation was striking in some areas of the section. (Precipitation from solid solution ?).

SPHALERITE

In one section several grains of sphalerite were identified. These grains average 10 microns in size and show smooth boundaries. They are now in contact with anglesite but originally were probably contained within the galena.

In the sections examined sphalerite was rare in occurrence.

ANGLESITE

Anglesite was noted in polished section where it occurs as a peplacement of galena and pyrrhotite.

Where it has replaced the galena it occurs primarly as veins guided by the cleavage traces of that mineral. However, it also occurs as irregular blebs within the galena and in one section is prominent as a colloform mass rimming galena.

The anglesite seen in contact with pyrrhotite has been described above. In some places the pyrrhotite has been completely replaced and the anglesite is now pseudomorphous after that mineral.

JAROSITE GROUP

The oxidized earthy material which occurs as encrustations of the surface of the weathered specimens was examined in an effort to identify minerals of the jarosite group.

Small amounts of this oxidized material were dusted off the surface of the specimens and in an oil immersion of index 1.7191 [redacted] examined under high power with a petrographic microscope. Most of the specimens contained small light-brown to yellowish-brown hexagonal plates with an index of refraction greater than that of the oil. These plates ~~indicate~~ suggest the presence of the jarosite group.

The author has estimated that 20 of the largest such plates seen would be required to form a line across the microscopic field. The majority of the plates were much smaller, however, than those described above. Size in microns

One particular type of oxidized material contained more than an occassional hexagonal plate of jarosite. This jarosite-rich material has a fine-grained earthy appearance which is soft and crumbly to the touch. In color it differs from limonite-rich material. Whereas the limonite-rich material has a red to rusty appearance the jarosite material is a dull light-brown color.

This material was tested for silver using microchemical methods and gave a positive reaction.

X-ray patterns of this material indicate the presence of a jarosite but conclusive results have been obscured by the presence of extraneous material.

Petrographic, microchemical, and x-ray tests indicate the presence of a mineral within the jarosite group. The problem as to which specific jarosite mineral (ie. jarosite, plumbojarosite, argentojarosite, or argentiferous jarosite or plumbojarosite) has not been resolved. Any or all of the above minerals may be present and the author strongly suspects the presence of a silver-bearing jarosite.

LIMONITE

Limonite is an abundant mineral occuring on the surface of weathered galena as well along fractures and within pockets in the galena.

CERUSSITE

Cerussite was identified in specimens of material that had been x-rayed for jarosite. It is probably intermingled with limonite and jarosite material and has the same modes of occurrence.

PARAGENESIS OF ORE DEPOSITION

The mineral assemblage of the Tootsee River deposit contain minerals characteristic of both hypothermal and mesothermal deposits.

The textural evidence, though not conclusive, suggests two phases of deposition have occured and have been followed by a period of supergene alteration. Minerals believed deposited during these phases are:

1) quartz, pyrite, pyrrhotite (hypothermal) — out on a limb

2) sphalerite, galena, tetrahedrite (mesothermal)

3) anglesite, cerussite, jarosite, limonite (supergene)

CONCLUSIONS

While assay returns of up to 300 oz. of silver per ton strongly suggests the presence of a silver mineral none has been identified. The silver then is probably contained primarly within the galena. The contribution of the tetrahedrite must be considered of minor importance since galena comprises more than 95 per cent of the ore examined.

A guide to the localization of silver values is not apparent from the specimens studied. Possibly the sphalerite to galena ratio may be of more significance at depth, as is the case with deposits in the Slocan area. Another possibility may be the tetrahedrite- galena association. Perhaps the tetrahedrite may indicate high silver values. More work correlating polished sections to assay returns must be done if a guide to the zoning of the silver values, (which has been reported from the property), is to be discovered.

The presence of a silver-bearing jarosite is strongly indicated. The presence of this mineral is significant in that its contribution to the silver values cannot be recovered by milling techinques now in existance.

The future of the property depends upon the persistance of silver values within the galena. If high values are maintained then the galena can be shipped

directly without milling. The price of lead is not sufficient to support a mine in this remote area as transportation costs are prohibitive.

X-RAY DATUM

Sample	I	R	L	Sum	2 ∅	d
# 2330	3	5.36	35.1	88.7	18.5	6.03
	2	57.4	31.6	89.0	25.8	4.34
	10	60.0	28.7	88.7	31.3	3.59
	6	62.6	25.9	88.5	36.7	3.08
	8	67.2	21.5	88.7	45.7	2.49
	1	69.8	19.2	89.0	50.6	2.27
	4	72,0	16.6	88.6	55.4	2.08
	2	73.4	15.3	88.7	58.1	1.995
	2	74.4	14.2	88.6	60.2	1.931
	3	75.8	12.8	88.6	63.0	1.854
	2	36.4	55.0	91.4	18.6	5.99
# 2339	1	32.4	58.9	91.3	26.5	4.23
	18	30.1	61.4	91.5	31.3	3.59
	2	29.6	61.8	91.4	32.2	3.49
	2	29.0	62.6	91.6	33.6	3.35
	8	27.4	64.0	91.4	36.3	3.11
	5	22.9	68.6	91.5	45.72.	2.49
	3	18.0	73.4	91.4	55.4	2.08
	3	15.6	75.8	91.4	60.2	1.931
	3	16.2	77.2	91.4	63.0	1.854
	1	24.0	67.6	91.6	43.6	2.64

Useless as it.

Actually alunite + a jarosite mineral.