6. GEOLOGY

6.1 Regional Geology

The Atlin District lies just to the east of the main mass of the Coast Range batholith and is centred in the Atlin Horst. The Silver District lies within a stock of zoned intrusives which lies east of the north end of Atlin Lake and which extends eastward for 50 miles. The eastern geological boundary is denoted by the Teslin Lake lineament. A significant fault complex penetrates the district from Atlin Lake south through O'Keefe Mountain and easterly into the Cassiar District. This extensive zone of weakness is identified by a belt of Permian ultra-basic intrusions termed the Atlin Intrusions.

The mineral bearing stock east of Atlin Lake has been mapped as Jurassic granite and granodiorite with a central core of Cretaceous alaskite and monzonite. The silver-lead-zinc deposits described in this report lie within the Jurassic granites, one to five miles west of the alaskite contact. In the vicinity of these deposits the granite is coarse grained to porphyritic. The contact between the acid core of the stock and the more basic periphery is denoted by an alteration halo and a remenant belt of Palaeozoic formations 2 - 5 miles wide trending northerly into which has been intruded ultra-basic rocks of the Atlin Intrusions in Permian time.

The silver-lead-zinc deposits are marked by wide spaced strong fault-shear zones which strike northeast and dip northwest at 65° to 70°. In the vicinity of Mount Vaughn the fault structures are parallel and

are spaced several hundred feet apart. The systems can be traced individually several thousand feet, the No. 2 system can be traced over a mile by surface trenching and underground workings.

The faults have been intruded by lamprophyre dykes ranging in width from one to fifty feet. The dykes are discontinuous but recur for thousands of feet along strike.

Economic mineralization is always associated with the lamprophyre which is characteristically a dark gray-green, aphanitic to fine crystalline, biotite feldspar rock, which weathers to a black appearance and is oxidized and rusty red near mineralization.

6.2 Economic Geology

The silver-lead-zinc mineral deposits occur either as fissure filling in granite along branch faults, or more commonly as fissure filling through the lamprophyre dyke system or as replacement and breccia ore associated with the latter. The deposits are steeply dipping usually occurring along the major shear zones and generally localized at points of cross and branch fracturing. The deposits are erratic and discontinuous and may grade abruptly into fault gouge.

Several overlapping mineral zones may occur; generally, however, the zone is confined to a single vein or a double vein with a lower grade envelope and centre. Fractured wall rock is common along the hanging wall and footwall accompanied by minor chloritization of the dyke rock.

Both arsenopyrite and pyrrhotite are common generally in the fringe areas of an ore body and these ores are notably deficient in silver, but may carry some gold. Some very high silver values occur at various locations on the property and even in narrow widths this ore can be mined profitably. The high silver values are attributed to wire silver and proustite.

The principal mineral bearing structures in the district are the: -

No. 1 - Silver Fox (Unexplored).

No. 2 - Ruffner explored laterally for 5500 feet and vertically for 2000 feet by surface trenching and underground workings.

No. 3 - Ruffner (Unexplored) Possibly en echelon sections of No. 4.

No. 4 - Ruffner explored both on and off the Company property for 5,000 feet and vertically for 1500 feet by surface trenches and underground workings.

No. 6 - Vulcan - Big Canyon explored laterally for 6,000 feet and 2,000 feet vertically. (The No. 6 system is not controlled by the Company.)

Several additional mineral occurences are known to exist in the vicinity of Mount Leonard and Mount Vaughn not the least of these being Ruby Creek Molybdenum (Adanac).

The No. 2 system has been explored by 6 adits and numerous trenches and is consistently mineralized. Where parallel ore bearing veins merge, usually associated with breccia replacement ore; lenses of good width occur and will accommodate mining widths of 4 to 8 feet.

No. 4 system is very similar to the No. 2 and has been explored on the Company's property, by 3 adits and numerous trenches. The ore in this system usually contains greater amounts of galena and less sphalerite than the No. 2, however, this may be a result of vertical zoning. The No. 4 fault does not appear to be quite as strong as the No. 2 fault where the actual zone of weakness can range up to 5 and 6 feet in width. The No. 2 system including the dyke ranges up to 50 feet in width. Observation of the No. 4 system indicates an aggregate width generally not exceeding 20 feet.

6.3 Mineralogy

The principal sulphide minerals present in the ore are as follows - in order of probable formation during a single stage of epithermal mineralization.

1. Galena - PbS
   Occurs massive in fissure filling to sparsely disseminated in a replacement gangue of lampropyre, calcite and quartz.

2. Sphalerite - ZnS
   Occurs similar to galena and according to (Chamberlain) sphalerite and galena show a mutual boundary relationship under microscopic examination.

3. Arsenopyrite - FeAsS
   Occurs usually finely disseminated in association with galena and sphalerite, is rarely massive and is not always present.

Microscopic examination details arsenopyrite in euhedral crystals rimming sphalerite and galena.

4. Pyrite - FeS_2
   Is present locally as coarse well crystallized aggregates, which may be replaced by marcasite.

5. Chalcopyrite - $CuFeS_2$
   Occurs locally and is usually associated with heavy to massive sphalerite mineralization. Microscopic examination reveals that chalcopyrite occurs along grain boundaries between arsenopyrite and galena and also as blebs in sphalerite.

6. Pyrrhotite - Fe_1xS ($Fe_{(1-x)}S$)
   Occurs quite liberally in association with other sulphide minerals and appears to become quite prevalent near the extremities of an ore zone.

7. Tetrahedrite - $(Cu,Fe,Zn,Ag)_{12}\ Sb_4S_{13}$
   has been observed microscopically in sphalerite.

8. Enargite - $Cu_3A_5S_4$ (Cu_3AsS_4)
   Has been observed microscopically.

9. Ruby Silver (Proustite) Ag_3SbS_3
   Occurs locally in considerable quantities. It is bright blood red in colour on freshly exposed surfaces, and is observed as blobs up to two inches in diameter

within a sulphide mass. Veins and veinlets of massive proustite have also been observed up to one inch in thickness. This mineral is possibly of secondary origin, but substantially up-grades ore shoots wherever it occurs.

10. Native Silver

Occurs rarely but has been observed to occupy vugs in massive sulphide bodies, in the wire silver form. It is usually associated with Proustite and may be of secondary origin.

7.2 TABLE 1

Summary of all Ore Reserves

Vein	Mine Level	Proven	Ag(oz/T)	Probable	Ag(oz/T)
No. 2	3900-2	possible reserves			
No. 2	4100-2	possible reserves			
No. 2	4300-2	21,936	31.7	16,180	24.6
No. 2	5000-2	possible reserves			
No. 2	5600-2			2,520	32.8
No. 4	5150-4	900	28.2	3,730	34.3
No. 4	5300-4			2,090	19.5
No. 4	5700-4	1,800	47.8	1,980	25.0
TOTAL		24,636	32.7	26,500	27.3

Total Proven and Probable	=	51,136 tons (not corrected)
Average Grade	=	29.1 oz. Ag. per ton
Sampling error correction factor	=	less 15% grade
Average Grade	=	24.83 oz. Ag. per ton
Dilution Factor	=	25%
TOTAL PROVEN AND PROBABLE RESERVES	=	63,920 tons (corrected)
Average Grade	=	18.63 oz. Ag. per ton

Assays for lead and zinc have not been included in the above calculations, however, combined lead and zinc will range from 5% to 10%. The head sample used for metallurgical studies is 7%. The corrected value for dilution and sampling error is expected to be 5%.