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REPORT ON LAKE DORA COPPER DEPOSITS

Location and Access:

Lake Dora is situated ten miles north-north-east of Queenstown between Tyndall Range on the west and Southern extension of Sticht Range on the east.

Access is gained from Queenstown by way of Lake Margaret tram for seven miles as far as Mount Lyell Mining and Railway Company's electric power station. A foot-track is then followed northerly, generally along the route of Queenstown-Rosebery transmission line for nine miles to the junction with a pack track from Rosebery and Williamsford , on north side of Newton Creek. By traversing the latter easterly Lake Dora may be reached via Lake Rolleston in a further distance of eight miles.

History:

In the year 1891, when the first track was pioneered through the district by T.B. Moore, numerous mineral sections were acquired on the west side of Lake Dora extending north to Lake Rolleston by the Tasmanian Land and Exploration Company and others. At this time little work was achieved but during the period 1896-1899 much prospecting was accomplished by numerous small companies namely, Lake Dora Copper Company, North Dora Mining Company, Mount Dora Mining Company, South Dora Gold, Coppper and Silver Mining Company, Royal Dora Copper Mining Company and Dora Consolidated Mining Company.

Again in 1908 the Walford Peak Copper Prospecting Association was formed and a limited amount of development undertaken.

The field has now been deserted for the past 30 years.

Physiography:

The chief topographical features of the country in the immediated vicinity of Lake Dora consist of low north west-south east trending ridges. These are almost devoid of vegetation and merge, to the north by way of foot hills, with Walford Peak. The latter is a rugged eminence rising to a height of 3300 feet above sea level and represents an eastern outlier of Tyndall Range. The terrain is bounded on the east by the lower southerly extension of Sticht Range. Lake Dora (2,540 feet) lies three quarters of a mile south-east of Walford Peak between the western foot of Sticht Range and the aforesaid ridges. It extends parallel with the latter for slightly over one mile in length and varies in width from 5 to 25 chains. West of the Lake occur four tarns, three of which have been named Fauld's, Michael and Maxfield respectively; the fourth, being much smaller, has remained unnamed. Another small tarn is situated adjacent to Lake Dora at the northern end.

To the north-west of Lake Dora and 1½ miles distant lies Lake Rolleston at a height of 1850 feet above sea-level. This natural reservoir is approximately the same length as Lake Dora but its average width is greater.

The drainage of the area, is to a large extent, indeterminate. Several short streams flow to Lake Dora from Walford Peak and Sticht Range. The lake waters pass out at the south end by way of a creek flowing south-east to Lake Spicer. That this stream has tapped Lake Dora by means of headward erosion is testified by the presence of waterfalls in hard porphyry immediately below the outlet.

Lake Rolleston is drained by Anthony Creek falling northerly to join Murchison River.

Glacial features abound in this region. Lateral moraines occur on both the east and west sides of Lake Rolleston, while at the outlet end terminal moraines are present as distinct parallel ridges across the valley floor. The southern end of this lake occupies the bottom of a well defined glacial cirque, the walls of which rise sheer from the water; the existence of the lake is due to the accumulation of terminal morainal material, at the north end, which has interrupted the drainage.

Lake Dora and its attendant tarns do not appear to be damned by morainal matter. However, numerous glacial erratics in the form of large conglomerate boulders, resting on sheared porphyries, occupy part of the surface in the immediate vicinity, and boulder clay deposits occur on the hill slopes above the eastern shore.

The rock surface of the low ridges to the west of lake Dora, where not covered by button grass and heathy vegetation present a general planed appearance and suggest the nunatak form of glacial topography.

Geology:

1. Pre-Cambrain

These rocks are the oldest in the district and consist chiefly of fine grained quartz schists with, in places, some argillaceous members. Beds of siliceous conglomerates containing stretched pebbles also occur. The rocks show a high degree of schistosity and in some localities are much puckered and contorted. They are confined to a north-north-west trending belt covering the major portion of Sticht Range, along eastern periphery of the area.

To the east of Lake Dora the schists strike at 45° and dip to the north-west at 75°. The schistose planes are approximately at right angles to the bedding and dip 65° S.W.

2. Silurian:

Conglomerates and quartzites of the West Coast Range series are in contact with, and succeed the Pre-Cambrian schists on the west where they unconformably overlie the latter.

The belt to west side of Tyndall Range, but is interrupted by an igneous dyke-like intrusion near the eastern edge.

Near Lake Dora the rocks are prominently exposed on Walford Peak, on hills south west of the lake, and along lower slopes of Sticht Range.

The strike varies from 140° to 168° and the strata dip to the south-west at angles ranging from 45° to 60°.

3. Devonian Igneous Rocks:

A comparatively narrow igneous dyke trends north-north-west from Lake Spicer to the north of Lake Rolleston. It attains a maximum width of ¾ mile at Lake Dora, but narrows appreciably to the north and south.

For the most part it intrudes rocks of the West Coast Range series, but north of Lake Rolleston is in contact with Pre-Cambrain schists to the east.

The character of the rocks comprising the dyke varies within close limits but consists essentially of three main types.

(1) Quartz felspar porphyry.

(1) Sheared and Massive.

(11) "Breccia Conglomerate"

(2) Quartz chloritic schist.

(3) Chloritic schist.

The chloritic types predominate and no sharp demarcation separates the two, whereas the quartz felspar porphyry contact with the other types is, in several places, sharply defined, suggesting a later intrusion rather than a product of differentiation in place.

In view of the complexity of the dyke-like occurrence no attempt has been made to map in detail the areal extent of the individual types but a brief description of each is given here-with.

(1) Quartz Felspar Porphyries:

(1) Sheared and massive

In the hand specimen, the quartz felspar porphyry is a massive to sheared reddish brown rock, with abundant phenocrysts of quartz felspar; the quartz phenocrysts are larger and more abundant than the felspar.

Microscopically, the rock shows alletriomorphic pheno crysts of orthoclase felspar and quartz in a micro-crystalline groundmass, consisting of quartz and sericite with lesser amounts of chlorite and plagioclase felspars. The reddish-brown colour of the rock is due to the presence of abundant hematite filling the inerstices, cracks, and cleavages. Few felspars are fresh but generally they are in various stages of alteration; isolated phenocrysts of felspar have been completely altered to chlorite.

(2) Breccia Conglomerate:

Rocks referrable to this very unusual type occur mainly on the western edge of the belt. They are identical with those described in "The General Geology of the Mt. Lyell District" by officers of the Geological Survey in 1934; beyond making brief reference to the face that the same striking structural relationship occurs in this area, that is, the "breccia conglomerate" appears to be underlying

the conglomerates and quartzites of the West Coast Range series and in contact with a fairly coarse member of the series; further description is unnecessary.

(2) Quartz chloritic schist:

In the hand specimen it consists of a dark green schistose rock with "eyes" of quartz. The blebs of quartz are prominent on weathered surfaces and very characteristic. Microscopically the rock is essentially chlorite and quartz, with phenocrysts mainly of secondary quartz and occasional phenocrysts of a basic felspar, probably labradorite. Sericite is abundant in some sections. Where the more intense alteration occurs the quartz can be seen wholly replacing felspar crystals in a chloritic groundmass.

The mineralised zones occur in this rock type. The sulphide minerals, sphalerite, galena and pyrite occur in isolated patches, probably in tension cracks, in cleavage planes and in veins striking across the general cleavage (in shear planes). Ilmenite occurs with its alteration product leucoxene. The sphalerite appears the earliest, although the galena is probably contemporaneous, while the pyrite is definitely much later.

(3) Chloritic schist:

This rock differs from the above type only in that the "eyes" of quartz are not so well developed. Microscopically it is much the same, although microscrystalline, there are fewer primary quartz phenocrysts.

Sulphide minerals are not so prevalent in this rock type.

These igneous rocks, with some exceptions, have been so altered structurally by dynamic metamorphism since intrusion that certain members now appear as sheared porphyries and others as igneous schists. The latter have undergone further alteration by mineralising solutions which appear to have attacked the more basic members occurring about the middle of the dyke.

The planes of schistosity of the quartz-chloritic schists and chloritic schists have a general strike bearing 320° and dip between 60° and 85° to the south-west, as a rule, but some north-easterly dips are recorded.

(4) Pleistocene:

Glacial deposits of this period in the form of conglomerates and quartzite boulders interspersed with clay, extend over a considerable portion of the area. They are prominent in low lying country to the south of Walford Peak, on lower slopes of Sticht Range to east of Lake Dora, along either sides of northern end of Lake Rolleston and in the valley of Anthony Creek.

ECONOMIC GEOLOGY:

1. Introduction:

The Lake Dora copper deposits are contained in the porphyry dyke and are confined to irregular areas about the middle of the intrusion which has been altered to quartz-chloritic schists and to a less extent chloritic schists.

The mineralised areas which are small and ill defined, are distributed sporadically in the schists extending along a narrow discontinuous belt north-westerly from the south-west end of Lake Dora to the North-East of Lake Rolleston. The mineralisation is not visible at surface and is solely exposed in mine openings. Oxidation had advanced to shallow depths only and the primary zone is penetrated at approximately 18 inches below surface. These areas have been divided for descriptive purposes into zones, the boundaries of which are arbitrary. The zones are separated from each other by belts of schists and porphyry in which mineralisation is not visible.

2 Mineralogy:

Quartz occurs as small irregular veins in the porphyries and schists. It is also present in these rocks as small blebs.

Pyrite is the most conspicuous mineral and occurs as fine crystals disseminated through the schists and as short and narrow veins along the planes of schistosity. The pyrite usually contains small amounts of copper.

Chalcopyrite is closely associated with the pyrite, in minor quantities, as small aggregates and veinlets in the schists. A little covellite and malachite are visible in places and occur as alteration products of chalcopyrite. Magnetite and hamatite appears in some localities, usually as fine crystal grains in association with the sulphide minerals.

Galena and sphalerite are not prominent but are occasionaly present in small amount and fine grain size.

3 The Mineralised Zones:

Zone No.1 On the hill top, 158 feet above and 11 chains west from the south end of Lake Dora (southern portion of abandoned mineral lease 3747/M), a pit has been sunk in a shallow open cut to a depth of three feet, disclosing a little disseminatedpyrite and splashes of covellite. Fifteen chains to the north-west, at northern edge of this hill (west boundary of 819/93M) a deep trench 72 feet long, extends for 53 feet in chloritic schist showing a plentiful distribution of fine grained pyrite with a little chalcopyrite. Near east and west end of trench the schists change abruptly to sheared quartz felspar porphyry against well defined vertical planes, beyond which traces only of mineralisation extend. At north-east end of hill disseminated pyrite is exposed in a cut 40 feet in length. Seventy four feet lower and two chains distant to the north-east an adit was commenced with the apparent object of exploring the mineralised schists below the deep trench and cut described above. The work was discontinued, after 32 feet of driving, in chloritic schists containing a little pyrite in blebs and splashes.

Pyrite impregnations are also disclosed in a pit two chains north-easterly and in aashallow trench and pit 12 and 14 chains respectively to the north-west, outside the section.

Zone No.2 In the middle portion of Section 3747/M above western bank of Fauld's Tarn, a line of workings consisting of 4 shafts and a similar number of trenches extends at intervals over a length of 16½ chains, in a north-westerly direction. The southernmost trench, or cut, exposes much pyrite and some chalcopyrite in the form of disseminations

and veinlets along the schist planes. Towards the north in the other adjacent workings, pyrite gradually decreases in amount and chalcopyrite is rarely visible.

Zone No.3 Quartz chloritic schists containing varying porportions of pyrite and traces of chalcopyrite are exposed in several shallow workings and a shaft immediately south of northern boundary of Section 2009/93M and in section 3747/M - a few chains to the north. Eight chains distant from the shaft to the north-east an adit has been driven on a bearing of 296° for 113 feet in pyritised quartz-chloritic schist. Several small cuts further up the hill to the north-west reveal the same rock type.

Zone No.4 This zone is located on the old mineral sections Nos. 2843.M and 3236/M and considerable prospecting was undertaken by the old Dora Company without much success.

Six chains approximately north-north--east of the south-west corner of Section 2843.M - 15 acres, an adit driven in a westerly direction for 44 feet exposes pyritised quartz chlorite schist.

Two chains north of this adit, an east-west cut exposes narrow bands of more intense pyritisation in the quartz chlorite schist. About one chain north of the cut a shaft has been sunk approximately 100 feet, judging by the amount of spoil on the dump. An examination of the spoil material indicated that although much pyritised quartz chlorite schist had been passed through, a fairly large proportion of the barren quartz felspar porphyry had been intersected also.

On Section 3236/M, two chains west of the north west corner of Section 2843/M, another shaft has been sunk approximately 80 feet and appears to have been in the quartz chlorite schist all the way. North of this shaft, about two chains, are two small cuts taken in bench form which expose some pyritised schist.

The only other work worthy of note in this zone is situated about ten chains north west of the north west corner of 2843/M; it consists of a trench on a north easterly bearing, about 60 feet long. The more intense pyritisation is confined to a section ten feet wide approximately 25 feet from the western end of the trench.

Zone No.5 Outside the western boundary of 3308/M, approximately 17 chains from the south west corner of the section, an adit has been driven well over 100 feet, in a south easterly direction to further test at depth some pyritised schist exposed in a shallow trench farther up the hill. The adit is about 20 feet below the trench and in it are exposed quartz veins containing chlorite. About 60 feet from the portal a winze has been sunk, apparently to a considerable depth but was filled with water and could not be examined nor could any of the workings beyond the winze be examined, owing to the lack of adequate facilities for crossing the winze. An examination of the spoil dump did not disclose any marked variation from the general tenor of the pyritised quartz chlorite schist.

Within Section 3308/M at 15 chains south-east of adit, an open cut has been quarried at right angles to the schist planes, disclosing further disseminations of pyrite.

Zone No.6 This zone is separated from the Lake Dora deposits by a distance of two miles and is only mentioned here for record purposes, since it was not thoroughly examined. It is situated on east side of Anthony Creek, along western foothills of Sticht Range and about ¾ of a mile north of Lake Rolleston.

Scattered pyritised quartz-chloritic and chloritic schists areas, similar to those at Lake Dora, occur on sections 2230/93M and 4422/93M.

The mineralised portions have been opened up by means of three short adits and several small cuts.

Pyrite occurs disseminated in fine grains through the schists and in places is present in the form of bunches, veinlets and webs.

4 Value of the Deposits:

In May 1938 a sampling campaign of the Lake Dora deposits was undertaken by the Mt. Lyell Mining and Railway Company Ltd.

Samples were broken from all the old workings and assayed for copper in the company's laboratory. The highest assay obtained was 1.8% copper. The majority, however, ranged from 0.1% to 0.3% copper, and the average value of 22 samples taken was 0.24% copper.

It will be seen from the above that the deposits are extremely low in their copper content and cannot be considered under present day conditions from an economic viewpoint.

CONCLUSIONS:

Belts of quartz chloritic schists are distributed sporadically along the central parts of a porphyry dyke in the vicinity of Lake Dora.

Six zones have been indicated in which the schists are erratically impregnated with pyrite, and, to a small extent, with chalcopyrite.

The copper content of these deposits has been proved to be so low that they are considered to be valueless under present economic conditions.

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