OPAL LAKE, B.C.

600036

MEGASCOPIC DESCRIPTION:-

The host rock of the mineralization is a massive banded blue and green opal with a vitreous lustre and a hardness of five. It is a brittle rock and shows numerous hairline fractures possibly due to dessication On the weathered surfaces are patches of rusty iron stain and green annabergite.

The mineralization is dominantly millerite, a bronze yellow in color, which appears in radial bursts, with a diameter of one millimeter, along undulating or straight bands about Two millimeters wide which randomly cut the rock.

There is no fluorescence.

MICROSCOPIC DESCRIPTION:-

The minerals found in this suite were millerite, magnetite and bravoite.

Millerite :- millerite has a pale yellow color with very strong anisotropism (yellow to violet), cross-section is isotropic, hardness of C^t. It occurs commonly as needle shaped crystals, often curved. Assosciated minerals are magnetite and bravoite.

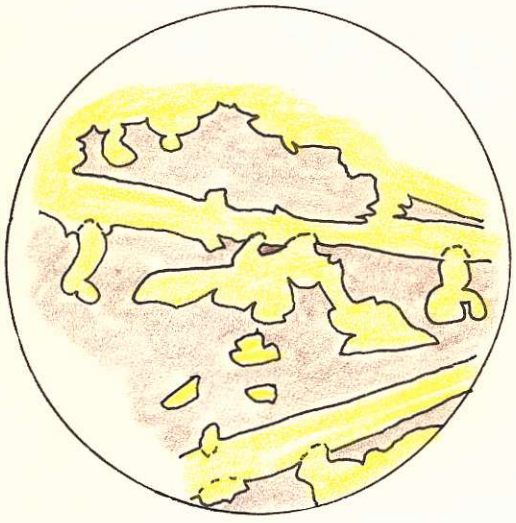
Magnetite : magnetite has a medium-grey color with a brownish tint. Hardness is 6 and leaves a smooth groove when scratched with a needle. It is isotropic (sometimes weakly anisotropic) and magnetic.

Bravoite : bravoite has a pinkish cream color (sometimes with a violet tint) and is isotropic. It has a hardness of about 6.

MILLERITE - MAGNETITE.

The millerite (yellow) occurs as bands which cut across the sections as seen at the top, and as irregular sinuous fracture fillings where it appears as radial bursts and small blebs which are often end sections of other crystals. The magnetite, dark grey, occurs as rounded and broken fragments which are often aligned with the banding of the opal, and sometimes cut by millerite veins.

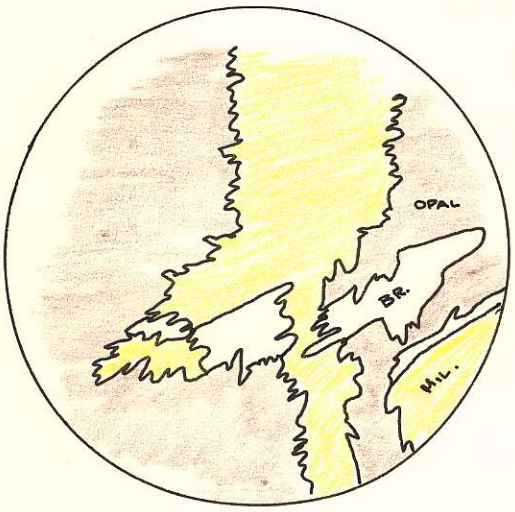
MILLERITE.



HIGH POWER.

Millerite occurs as straight needle-like crystals extending into the opal matrix (brown), and also as small rounded patches and blebs. Under crossed nicols the small rounded patches appear to be earlier as their outline can be seen to extend into the long needle crystals as shown by the dotted lines. There may be two different ages of mineralization or it may be just growth interference of the crystals.

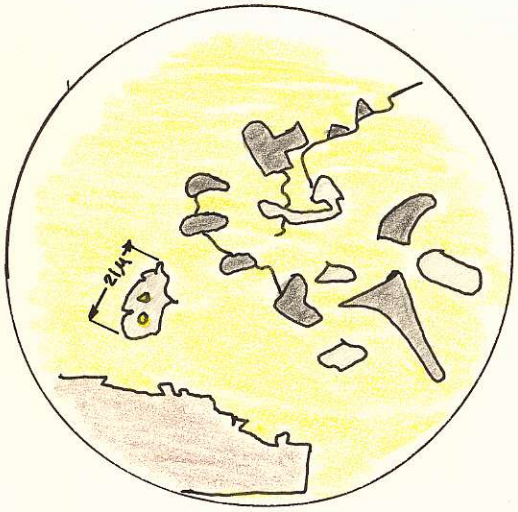
BRAVOITE - MILLERITE



MEDIUM POWER.

Bravoite occurs as small blebs assosciated with millerite. In some cases it has replaced the millerite along the outer edges of crystals but it is also found in the center of large millerite masses.
In the above diagram bravoite has replaced the outer edge of the millerite. (bottom right side).
In the center of the diagram the bravoite may have replaced the millerite.
The millerite exhibits a serrate contact with the opal suggesting the opal has been replaced by millerite.

UNIDENTIFIED MINERALS:-



HIGH POWER.

Small light grey inclusions occur within the millerite. They are isotropic and about as hard as millerite as there is no relief difference. They range in size from 5μ to 25μ. Occasionally a grey inclusion will include a small yellow bleb.

Another unidentified mineral not shown here occurs within the millerite commonly along the opal-millerite contact. It is low relief, yellow white, isotropic and ranges in size from 4μ to 20μ.

Primary Minerals:-

Millerite --- 5%
Bravoite --- <1%
Magnetite --- <1%

Origin of Minerals:

Millerite :- Millerite is commonly a low temperature mineral often as an alteration product of other nickel minerals.
In this suite, it may have entered in a solution and been deposited with or shortly after the opal.

Bravoite :- Bravoite is typically a low temperature mineral which has probably been deposited in the presence of surface or circulating ground water. It is commonly an alteration product of other Ni-Fe sulfides.

Clarke and Kullerud suggest that bravoite formed below 136° in sedimentary rocks which they studied.

Opal :- Opal forms inorganically from shallow low temperature hypogene solutions, directly from hot springs & by chemical decomposition of rocks and deposition of circulating meteoric waters.
It is believed to be formed in the range of 100°C → 150°C.

Temperature of Deposit:-

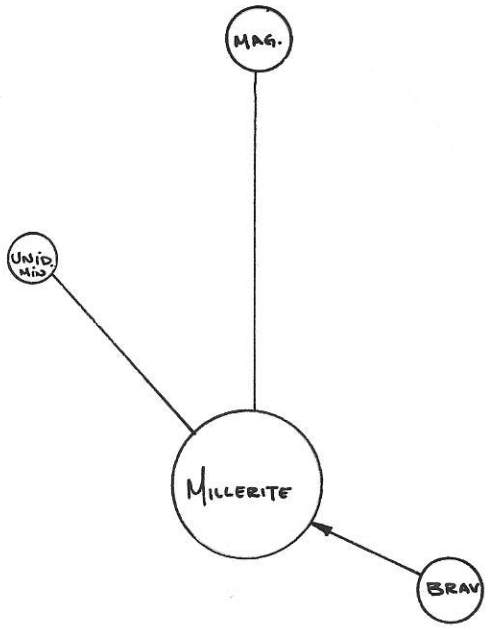
The temperature of the deposit is low, probably below 150°c.
The opal forms at 100°c → 150°c and the bravoite at ~136°c. The millerite is Typically low temperature. The magnetite poses a problem. It may be a residual mineral from an altered parent rock.

Paragenetic Sequence:-

Magnetite :- Magnetite appears to be the first mineral formed (possibly a residual mineral) as it fractured and rounded with fragments often aligned with the banding of the rock.

Millerite :- Millerite is later than magnetite as it cuts the trains of magnetite fragments. There may be two ages of millerite as some millerite cuts other elongated millerite crystals. This may be just growth interference.

Bravoite :- Bravoite replaces millerite around the edges of some crystals, but also occurs within the millerite.



VANDEVEER DIAGRAM.

OPAL LAKE, B.C.

References:-

Clarke, L.A. and Kullerud, G. (1963) - "The Sulfide Rich Portion of the Fe-Ni-S. system", Ec. Geol. Vol. 58.

Frondel, Dana's System of Mineralogy - Seventh Edition, Vol. III.