

FOR FALCONBRIDGE NIKKELVERK A/S

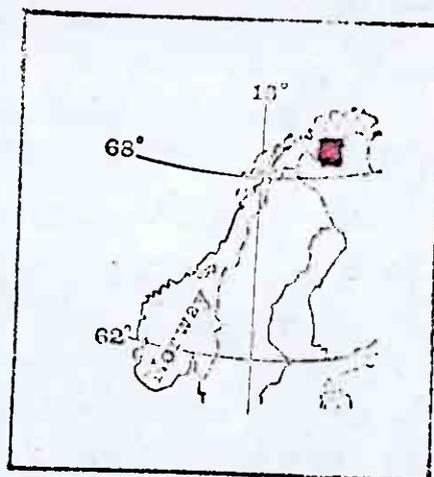
A/S SULFIDMALM

PROJECT 905-17

REPORT ON OBSERVATIONS AT
INGAJOKKA PROSPECT

1973.

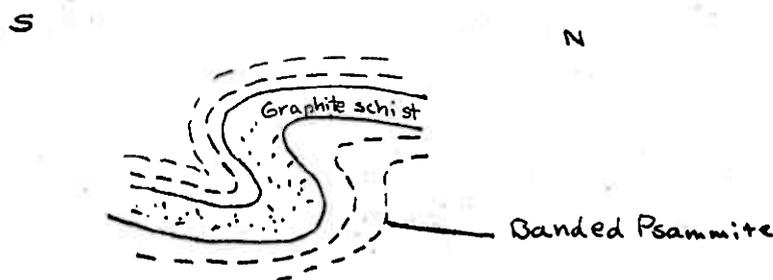
PROF. B. A. STURTEVANT



REPORT NR. 280/73/17

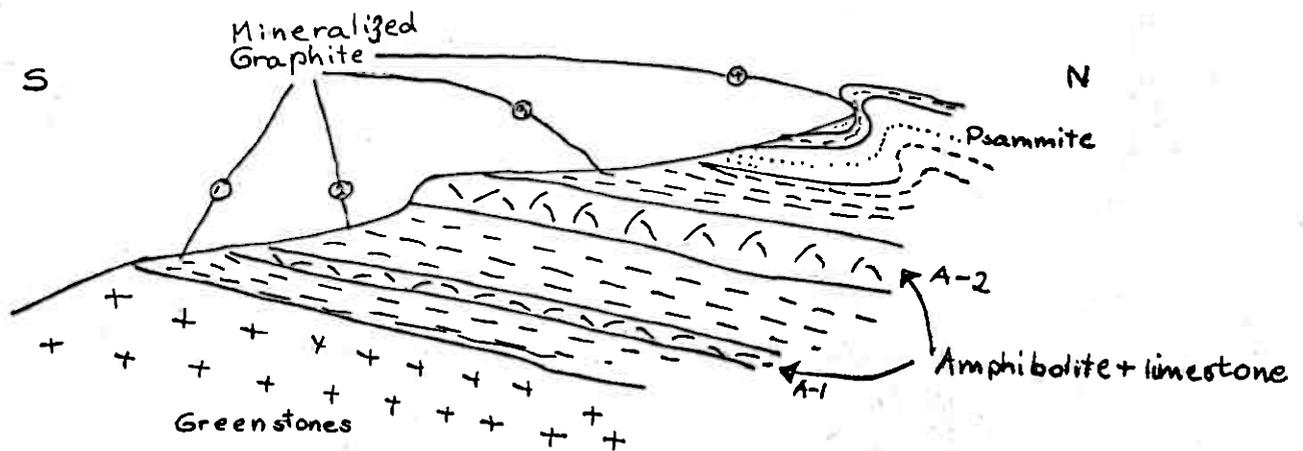
This description is of the sequence and ore-bearing zone in the stream section at Ingajokka.

The first exposure of mineralized graphite schist (proceeding down stream) is a band some 3m thick which is involved in folding on an 080 axis:



The fold is overturned in the downstream direction, and the general sheet dip is gentle upstream. The fold of the graphite schist has a well developed axial plane cleavage which produces a pronounced intersection lineation with the layering and trends parallel to the fold axis. This lineation is refolded by a set of later asymmetric folds on a 320° trend.

In the upstream section we had proceeded through a banded sequence of micaceous psammites which contain occasional thin limestone ribs, similar psammites occur down stream from the graphite schist, though this latter is repeated in the gently dipping rock of the flow of the stream. Some 150m down stream the psammites pass down-wards into a major development of heavily mineralized graphite schist and thence to amphibolite with thin limestone ribs which form a small waterfall with a drop of some 2m. Beneath the waterfall an extensive development of the mineralized graphite schist is again exposed. The problem defined here is whether or not the lower graphite schist is repeated by normal faulting, with the fault defining the waterfall. Investigation showed that the succession was in fact continuous without repetition of graphite schist by faulting. This establishes that the ore-bearing zone is considerably thicker than previously considered, as there must be two graphite schist bands at this locality separated by the limestone/amphibolite horizon, down stream again the lower graphite schist passes down into amphibolite then to graphite schist and eventually to greenstones.



This in fact means that in the waterfall section there are four mineralized graphite schist horizons as shown above. The following description can be made of the succession.

GREENSTONES

These are fairly uniform amphibole-chlorite-plagioclase rocks with reasonably well-developed foliation. Only minute occasional grains of sulphide observed.

GRAPHITE SCHIST

In each of the four zones this is seen to be a highly brecciated rock with sulphide filling the inter-fragment spaces. The original rock is seen to have been a fine grained graphitic "shale" which frequently develops a pronounced sedimentary lamination. This latter is well seen in the collected sample from zone 2. The mineralization of zones 2, 3 and 4 is essentially pyrrhotite, though zone 1 is essentially pyrite. In addition to the breccia infilling which is coarse grained there is also a fine-grained dissemination throughout much of the schist.

As mentioned previously the graphite schist zones are strongly deformed. The host-rock is strongly brecciated, and the breccia fragments often bear polish, the foliation surfaces frequently have a pronounced slickenside lineation orientated N-S. It was not possible to observe whether or not the sulphides were deformed in the direction of slickenside *grooving*. The graphite schists are folded by at least two generations of fold structures:

1. Infrequent ~~much~~ broken up small isoclines with strong axis-parallel intersection lineation trending 270.

- 2. Well-marked and obvious set of asymmetrical folds on sub-horizontal 300-320 axes.



These re-fold the prominent E-W lineation. In detail these folds are non-cylindrical having gently curving fold axes.

Both sets of folding predate the late brittle deformation.

THE AMPHIBOLITES WITH LIMESTONE

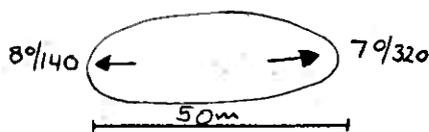
The horizons of these were observed shown in the sketch-section on p.2. They both appear to represent sedimentary amphibolites. They are composed essentially of black lustrous amphibole, which on exposed foliation surfaces has a pronounced garbenscheifer texture. There are many thin (up to 5cm) discontinuous bands of limestone and lenses of calcite in the rock, also the amphibolites have occasional micaceous partings. They show differences in degree of mineralization:

- Band A-1 contains only a very weak sulphide dissemination
- Band A-2 contains quite reasonable sulphide dissemination

THE PSAMMITES

These are impure micaceous sandstones with mica-schist development along the banding. They are sometimes quite feldspathic, and where strongly deformed the feldspar grains show a pronounced stretching lineation parallel to 100°. They occasionally have thin limestone bands (approx. 1-3cm thick).

Proceeding downstream from the waterfall section it is possible to see that the greenstones form an elongated elliptical dome whose axis trends 320.



This direction fits well with the 320° trend observed for the second folds in the waterfall section.

About 100m downstream from the greenstone outcrop sulphide impregnated graphite schist is again encountered which may represent zone 1 of the waterfall section. These are underlain some 100m downstream by amphibolites now dipping gently northwards at about 10° that may probably be correlated with the greenstones.

We proceeded further downstream to another graphite schist outcrop with marked pyrrhotite mineralization which is cut by massive vein quartz which also bears chalcopyrite. From the amphibolite locality to this graphite schist occurs a sequence of interbanded limestones, calc-silicates and quartzites dipping 15° N/Str 240° .

CONCLUSION

1. The graphite schists with strong mineralization do not represent a single band repeated by faulting.
2. There is a well differentiated sequence.

Top. Psammite
Graphite Schist 4
Psammite
Graphite Schist 3
Amphibolite with limestone A-2
Graphite Schist 2
Amphibolite with limestone A-1
Graphite Schist 1
Greenstone/amphibolite
Mixed sequence of limestone/calc-silicates/quartzites
Base. Graphitic Schist

3. This succession can only be given as a structural succession, no original sedimentary structures being observed.
4. In the length of section investigated there are at least 5 horizons of mineralized graphite schist.
5. Graphite Schist Band 1 has pyrite mineralization, whilst the others dominantly pyrrhotite.
6. The graphite schist bands have suffered considerable brittle deformation, and the main one occurs as breccia filling.
7. The rocks have been affected by at least 2 phases of folding.

A/S SULFIDMALM
INTER-OFFICE MEMORANDUM

Date: 28th September, 1973
To: Falconbridge Nikkelverk A/S ✓
cc: A.M. Clarke, H.T. Berry, R.B. Band,
E. Kreivi, B.A. Sturt
From: J. B. Gammon
Subject:

905-17, Ingajokka Prospect. Report No. 258/73/17.

Please find attached Sturt's notes on a visit to the Ingajokka locality described by Kreivi in report no. 215/72/17. The structural observations made indicate that the succession is appreciably thicker than previously recognized with at least 5 sulphide bearing graphite schist horizons being present.

J. B. Gammon
