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Tittel

Preliminary report on investigations in the Kviteseid Mineralized belt of central Telemark

Forfatter	Dato	Bedrift
F Nixon	juli 1972	Sulfidmalm A/S

Kommune	Fylke	Bergdistrikt	1: 50 000 kartblad	1: 250 000 kartblad
Tokke Kviteseid	Telemark	Østlandske	15131	Skien

Fagområde	Dokument type	Forekomster
Geologi	Rapport	MORGEDAL: Kleivås skj, Kleivås nye skj, Mostøyl. DALEN: Haugjuvet gruve, Spendivegg gruve, Gjeitenuten gruve, Kjerrstøl gruve. RAUDBERGNUT: Johnsli skj, Listøl gruve, Lishelli gruve, Lindtjern gruve, Drithol gruve.
Råstofftype	**Emneord**	
Malm/metall	Cu Ag Mo	

Sammendrag

FOR FALCONBRIDGE NIKKELVERK A/S

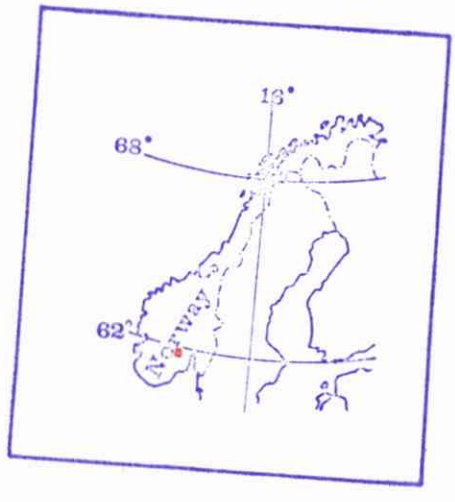
A/S SULFIDMALM

PROJECT 905-6

PRELIMINARY REPORT ON INVESTI - GATIONS IN THE KVITESEID MINERALIZED BELT OF CENTRAL TELEMARK.

July 1972

F. NIXON



BV 454
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INTRODUCTION

A number of old showings and the associated geology have been investigated by the writer together with B. Wilson and T. Lavreau. The deposits are all located in the Bandak group of the Telemark supracrustals of Pre Cambrian age.

Three distinct groups of deposits have been investigated.

a) The Morgedal Copper field

b) The Cu Ag field of Dalene

c) Raudbergnut field

Some of the claims examined in the Raudbergnuten field lie in the so-called Bandak granite.

A) The Morgedal Cu Field

1) Kleivaas I showing

A more or less vertical strongly boudinated quartz with a thickness varying between 20 and 150 cm emplaced in a gneissic porphyritic rock (Porphyry or acid lava of the base of the Bandak group).

Numerous quartz lenses have been found in the porphyry in the vicinity. They proved to be barren as did the county rock.

The mineralization in the quartz vein that was worked consists of bornite and scarce chalcopyrite.

2) Kleivaas "nye skjerp"

Small quartz veins in a gneissic porphyry with small amounts of chalcopyrite.

3) Mostøyl

Completely removed quartz vein in quartzite showing well developed cross bedding (Morgedal formation). The quartz vein seems to have occupied a definite shear or crush zone which is also in part mineralized. Bornite, chalcopyrite and hematite were seen.

Conclusions

The mineralizations seem to be limited to some quartz veins which have a limited lateral extent and their mineralization is erratic. It would seem that the deposits lie in a zone of shearing (the porphyry is very gneissose) and that this has facilitated the intrusion of ore bearing quartz veins.

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The regional extent of the gneissic porphyry might be checked with interest.

The Cu Ag Field of Dalen (B)

This area was described by the writer in a report to Sulfidmalm in 1971. This second visit was made in order to try and define ore controls.

The following mines were visited:

A) Haugjuvet
B) Spendivegg
C) Gjeitenuten
D) Kjerrstøl.

Haugjuvet

Quartzite (with well developed cross bedding) underlying greenstones (accicular pyroxene in a fine grained matrix i Morgedal formation). The contact zone is inclined ± 80 to the SE, fractured and dissected. The quartzite makes irregular patches into the greenstone; this structure is probably contemporaneous with the influx of the lava.

Local development of biotite within the greenstone is responsible for the schistose appearance of the rock in places.

Copper with some subsidiary silver have been found in the quartzite.

Spendivegg

The access to the ore horizon traverses an unaltered massive greenstone. Opposite to the access and in the beginning ØØ the western drive, the quartzite is a hard and massive rock. In the eastern drive the quartzite becomes more phyllitic and earthy after alteration. Raise development appears to be confined to the earthy facies.

The quartzite seems to have slip joints in some places, some of which are mineralized. The depositional environment of the quartzite must have been fairly energetic as evidenced by quartz pebble-casts and variability in morphology.

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Some Cu-rich horizons have been found associated to darker zones in the quartzite. Dendritic patterns of these darker zones have also been observed.

Gjeitenuten og Kjernstøl

These occurrences are similar to the former. An increased sulphide content has, however, been observed.

The contact zone has been followed to the NE some 500 m. Malachite staining and pyrite have been found.

Conclusions

Two models for the genesis of the deposits are proposed.

1) Sedimentary - evaporite model

In the area of deposition there could possibly have been an arid climate. A high rate of evaporation would cause the concentration of metal rich brines. Because of high specific gravity, the metal rich brines tend to reflux along the bottom of the sea floor and even permeate it where possible.

Possibly this situation existed in a juvenile stage when a volcanic erruption sent lava into the basin, covering any existing sediments. Examination of the contact zone showed very little baking of the quartzite due to the rapid cooling of the lava and cooling and insulating effect of water being drawn out of the sandstone.

Along the contact and within the lava inclusions of calcite are found. Calcite is one of the first products formed in an evaporite environment. When the lava flowed over the sediments and caused a change in the direction of heat gradient and hydro dynamic flow and because there were no sulphide reducing agencies present, the metal rich brines were left to form pure metal near the contact zone.

The lack of iron which is usually very prevalent in refluxing brines and the limited extent of the deposits are points against this model.

2) Volcanic model (See Nixon's 1971 report)

Copper and silver are originally contained in a Sulphur poor lava. Some kind of condensation of elements (metals?) takes place under the lava flow, penetrating the quartzite.

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Secondary disturbance during and after sedimention (slumping friction by the flow of lava) could have affected the quartzite , provoding good solution traps for the deposition of metals.

It is intended to carry out detailed chemical analyses of mineralized and unmineralized contact zones, to determine chemical dissimilarities which could explain a chemical reason for localized mineralization.

It is felt that detailed structural and lithological mapping of the quartzite might localize solutions traps.

C) Raudbergnut field

Johnsli Cu showing

In greenstones, small showing. Cp has been concentrated along a shear zone 290/ 60 NE which in outcrop now seems to be only 30-40 cm wide. Possibly has been parallel shears. Cp is also seen 20 m along strike as irregular clumps which seem to be associated a recrystallization of hb and biotite: - the ore also showed some evidence of veining here.

The shear zones and mineralization does not seem to have any strike extent.

Some of the material on the dumps - the good ore zones - are mainly in a sheared biotite rich greenstone with introduced quartz and what looks like small aplite veins, some of which seem to be crosscutting. Magnetite is also present in places as well as developed crystals.

Later quartz veins were seen to contain Mo.

Listøl Mine

Located in greenstones, but in the actual mine some quartzitic material is obviously present. Some time was spent examining the old showings which were fairly extensive and have been worked on two levels. Mineralizations seems to be controlled by intersection shear and fracture zones. Two main shear directions are obviously present. Cp seems to be dominant in these shear zones in hornfels (basic lava), in some of the slopes, however, a biotite rich more banded gneiss rock type was seen and this contained arsenopyrite. Also a sample collected on the floor of this slope showed pink cobalt bloom.

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Outside on dumps a quartzitic rock was extensively seen to contain a good dissemination and often veins of arsenopyrite.

Magnetite and rutile were also noted. Bornite was also fairly dominant.

Lishelli Mo mine

Worked on a quartz vein that has been completely removed.

Lindtjern Mine

A thick quartz vein emplaced in a gneissose to strongly foliated porphyritic rock, bearing important quantities of MoS_2, particularly along the contacts and the miceous xenoliths. Some barren quartz outcrops have been found behind the main vein, but they do not appear to be parallel or connected to the main one.

Drithol Mine

150 cm thick quartz vein, almost completely removed, emplaced in a fine grained granitic to porphyritic rock. In the debris galena and pyrite were found.

Conclusion

The Johnsli - Listøl area showed a number of deposits related to a metamorphosed greenstone with subsidiary quartz veins. The county rock is in a near relationship to granitic rocks.

The following genetic model is proposed.

The Bandak granite is a granitized composite rock originally made of acid and possibly other lavas, belonging to the Morgedal formation. Petrographic and crystallographic evidence could be found for this assumption.

The granitization process has been responsible for the migration of some metals (or ions) in particular zones of the "intruded" formations, leading to the genesis of impregnation deposits deposited into the granitic area or around it.

It would seem that tectonic zones (shear zones, crush zones and intersections of these) acted as traps for the metallic solutions.

Deposits associated to quartz veins are probably of secondary origin.

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This zone is considered worthy of further exploration.

Samples from most of these showings are sent into assay, but because of Summer holidays at the lab, results are not available.

A/S SULFIDMALM

INTER-OFFICE MEMORANDUM

Mottatt - 4 AUG 1972

Date: 3rd August 1972

To: Falconbridge Nikkelverk A/S

cc: A.M. Clarke, D.F. Lochhead, F. Nixon
R. Hovland

From: J.B. Gammon

Subject:

905 - 6, Kviteseid mineralized belt of central Telemark

Please find attached Nixon's report on reconnaissance visits to known showings in this area.

In the Morgedal area the mineralization is connected to quartz veins of very limited extent, and further work is of low priority. The Dalen field was the subject of an earlier report by Nixon. Additional samples of the native copper-silver mineralization were collected and an alternative genetic hypothesis arrived at. Further work in this area is planned, but will await a healthier budget situation. The third section covers the Raudbergnut area, where copper mineralization occurs in sheared greenstones near a granite contact. Further work is recommended, but will await assay results of samples collected during this survey.

J.B. Gammon

A Morgedal Cu field

B Dalane Cu Ag field.

C Rauldbergmuten field.

SELJORD GROUP

N

SELJORDSVATN

LAKE BANDAK

KVITESEID

KVITESEIDVANN

VRÅVATN

KEY

GNEISS AND GRANITE

TELEMARK SUITE

BANDAK GROUP

- eidsborg quarts schists
- gjuve basic lava
- dalen porphyry
- basic lava } morgedal formation
- sandstone }
- røynstaulegg quartzite
- ofte porphyry

SELJORD GROUP

mainly quartzite.

RJUKAN GROUP

acid and basic lavas.

Cu. Ag field

0 1 2 3 4 5 6 7 8 9 10km.

GEOLOGICAL MAP OF THE KVITESEID AREA

TELEMARK (after Neumann & Dons)

SCALE		
1:100000	OBS.	
	DRAW. FN	DEC 71
	TRAC. FN	- -
	CHK. FN	- -

MAP NO.

A/S **SULFIDMALM**

MAP SHEET

A.s Tørrkopi. 1000. A 3. E 9 gl. 10-71. Sentrum Trykkeri.