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Rapportarkivet

Bergvesenet rapport nr BV 503	Intern Journal nr	Internt arkiv nr	Rapport lokalisering Trondheim	Gradering Åpen
Kommer fra ..arkiv Falconbridge	Ekstern rapport nr Sul 373-75-20	Oversendt fra Sulfidmalm a.s.	Fortrolig pga	Fortrolig fra dato:
Tittel Investigations at the Vakkerlien nickel deposit and surrounding areas Kvikne. Vol 1. Summary and conclusions.				
Forfatter J B Gammon, F Nixon, R Sivertsen, F Hansen, D Ellen		Dato 1975	Bedrift Sulfidmalm A/S	
Kommune Tynset	Fylke Hedmark	Bergdistrikt Finnmark	1: 50 000 kartblad 16203	1: 250 000 kartblad Røros
Fagområde Oppredning, geologi, geofysikk, geokjemi	Dokument type Rapport	Forekomster Vakkerlien, Kaltberget, Olkar		
Råstofftype Malm/metall	Emneord Ni Cu Au Ag Pt Pd Rh Co			
Sammendrag To eksemplarer i Trondheim Rapporten omtaler Vakkerlien Ni forekomst (UTM 665,341) som ligger i en gabbro som er mineralisert i 1250m lengde, 40m bredde og 10m tykkelse. Mineraliseringen består av po/pn/cpy korn i forholdet 10:1:1,5, med frie pentlandittkorn. Med en "cut-off" på 0,4% Ni har man en forekomst på 450 000 tonn med 0,98% Ni og 0,35% Cu. Flottasjonsforsøk (Lakefield Research) på to prøver med henholdsvis: A) 1,12 %Ni og 0,41% Cu B) 0,59%Ni og 0,23% Cu ga god gjennvinning og gode konsentrater. Flottasjonsforsøk på NTH bekrefter dette, riktignok med noe dårligere konsentrater men med bedre gjennvinning. Rapporten nevner Ni mineraliseringene i Kaltberget hvor det er 3m med 0,92% Ni samt "grab samples" fra Olkar med 1,5% Ni og 1,6% Cu. På Vakkerlien er det også utført edelmetall- og platinmetallanalyser				

FOR FALCONBRIDGE NIKKELVERK A/S

A/S SULFIDMALM

PROJECT 905-20N

Investigations at the Vakkerlien
nickel deposit and surrounding
areas, Kvikne, Norway

1975

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SUMMARY AND CONCLUSIONS

- 1) The Vakkerlien showing which was first discovered to be nickel bearing by Sulfidmalm in 1974 lies in a metagabbroic body enclosed by mica schists belonging to the Gula schist group - an extensive unit of supposed Cambrian age.

Within the immediate region of Vakkerlien two similar Ni bearing showings are known, these are the Kaltberget and Olkar showings. At Kaltberget a mineralized ultrabasic returned 0.92% Ni over 3 m in a short, sampling drill hole. At Olkar grab samples from outcrop returned up to 1.5% Ni and 1.6% Cu. Both showings have been staked but have yet to be investigated in detail.

- 2) The Vakkerlien metagabbro body with its contained mineralization has been proved by drilling to have a strike length of 1250 m with an average width of 40 m and average thickness of 10 m. The gabbro has an ellipsoidal cross section. It is elongated in a 135° direction and has a plunge of 4° to the SE. On grid the gabbro comes to surface on line 150S, drilling and geophysics have proved continuous mineralization from 150S to 1250S. Around 1300S the gabbro is cut out by an acid intrusive (Trondhemite) but appears again on line 1400S.
- 3) The mineralization consists of pyrrhotite, pentlandite and chalcopyrite with some minor pyrite. The ratio po:pn:cp is approx. 10:1:0,5. Pentlandite is mostly in the form of isolated blocky grains. Like the gabbro the mineralization, which is continuous from 150S-1250S, also has an ellipsoidal form and can be divided into a high grade core with a low grade enclosing zone.
- 4) Operating with a 0.4% Ni cut off the tonnage of the deposit so far indicated is 450,000 tons of 0.98% Ni and 0.35% Cu (allowing 16% dilution).

- 5) Apart from the initial discovery, the subsequent tracing of the Vakkerlien body has been achieved by geophysics and is essentially a VLF discovery. VLF data clearly indicates a narrow good conductor stretching from 150S-1250S. Magnetic data gives a clear anomaly from 150S to 800S but indications become weaker as the body gets deeper and only weak anomalies are picked up between 800S-1100S. Slingram only picks up the body as far south as 500S.

Mise-à-la-masse surveys prove a continuous mineralized body from 150S to 1250S.

In the southern part of the grid Turam measurements have been carried out and indicate good correlation with the main anomaly down to 1250S - further south the anomaly pattern is very diffuse but may indicate a continuation of the anomaly to 1700S.

- 6) Flotation tests were carried out at Lakefield Research on two bulk samples from the Vakkerlien property. Head sample assays were sample A - 1.12% Ni and 0.41% Cu, sample B - 0.59% Ni and 0.23% Cu. Both samples responded well to the flotation procedure used and a high grade concentrate with good recovery was obtained as summarized below.

Test No	Sample	Scavenger Tailing %-200 mesh	Product	Weight %	Assays %		% Dist	
					Cu	Ni	Cu	Ni
1	A	80.0	3rd.CI.conc.	5.07	7.62	17.7	93.3	79.0
			Rougher conc.	13.83	2.88	7.39	96.1	89.9
			Scavenger conc.	8.20	0.048	1.18	1.0	8.5
			Scavenger Tail.	77.97	0.016	0.024	2.9	1.6
2	B	77.9	3rd.CI.conc.	2.52	8.00	17.4	90.8	78.3
			Rougher conc.	11.62	1.79	4.32	93.9	89.6
			Scavenger conc.	13.52	0.040	0.30	2.4	7.3
			Scavenger tail.	74.86	0.011	0.023	3.7	3.1

The 3rd cleaner concentrate from tests 1 and 2 assayed.

	<u>Test 1</u>	<u>Test 2</u>
Copper	7.62%	8.00%
Nickel	17.7 %	17.4 %
Fron	30.8 %	32.9 %
Cobalt	0.41%	0.40%
Sulphur	29.8 %	31.7 %
Platinum	0.014 02/ton	0.023 02/ton
Palladium	0.031 02/ton	0.027 02/ton
Rhodium	0.002 02/ton	0.002 02/ton
Gold	0.010 02/ton	0.007 02/ton
Silver	0.43 02/ton	0.43 02/ton

Flotation tests were also carried out at the Norwegian Technical Highschool (N.T.H.) in Trondheim on two samples of Vakkerlien ore which gave slightly higher recoveries but lower grade concentrates than the Lakefield tests.

- 7) A preliminary feasibility study based on Canadian costs, current metal prices, the assumption that the concentrate produced would be shipped to Sudbury for smelting via the Falcon and returned to Norway for refining and that the deposit be mined by open pit, was carried out by G. A. Vary in October 75. He concluded that by taking a reserve of 250,000 metric tons at 1.04% Ni and 0.36% Cu, diluted 20% to 300,000 metric tons at 0.87% Ni and 0.30% Cu then this indicates a before tax return of 20%. On a capital and pre-production cost of \$2,206,000 the project should generate a net-back from smelting and refining of \$8,618,000 for an operating profit of \$3,743,000 over a 5 year preproduction and operating life.

Since this feasibility study was carried out it is clear that the body can not be mined in its entirety by open pit, in the southernmost profiles the ore is some 40-60 m below surface. However the indicated tonnages and grades are better than those considered in Vary's report and should form the basis of a new preliminary feasibility study.

- 8) The discovery of nickel bearing sulphides at Vakkerlien, Kaltberget and Olkar in basic - ultrabasic rocks in the Gula schist group has opened up new horizons for nickel prospecting in Norway.

From our previous work in the Kvikne region we have already covered a portion of the Gula schist group with a helicopter EM and mag. survey and a regional stream sediment survey (summary map 1:100 000).

Several basic to ultrabasic bodies are known in the area, most of them with coincident Mag-, EM- and stream sediment Ni anomalies. Strong stream sediment Ni anomalies are also obtained in areas where no basic to ultrabasic bodies are known (summary map 1:100 000).

- 9) The following is planned for 1976
- a) Geophysical work. VLF, EM and mag. to be carried out in the spring in the area around the Vakkerlien showing and sensitive EM surveys with the aim of extending the zone to the south.
 - b) Follow up of existing Ni stream sediment anomalies.
 - c) Regional and detailed prospecting and mapping in the continuations of the Vakkerlien area.
 - d) Detailed investigations of Kaltberget and Olkar showings.
 - e) Outlining the Vakkerlien deposit to the south where it is still open by further drilling.
 - f) Prospecting all known basic bodies in the Gula schist group.
 - g) Regional structural and geological studies.
 - h) Extension of the regional stream sediment survey.

Δ 877

The map shows a winding river. A black circle with a cross inside is located on the left bank of the river, indicating the sampling point. A red line segment extends from the right bank towards the sampling point.

A diagram showing a set of five parallel lines intersected by two transversal lines. A point is marked on one of the parallel lines, with a small circle around it.

△
953

Claimed area, —
VAKKERLIEN

△ 971

- • • VAKKERLIEN RECOGNIZING GRID,
WINTER 75.
- VAKKERLIEN GRID, SUMMER 75.
- - AREA COVERED BY TURAM.
- DRILLED SECTIONS.
- o SEPARATE DDH
- SHOWING

$C_{\alpha} \frac{I_0}{C_{\beta}} N_i$ STREAM SEDIMENT ANOMALIES FOR Ni.

- VLF EM ANOMALY TRACE, strong.
- " " " " " " , weak.
- MAG ANOMALY TRACE, strong.
- " " " " " " , weak.
- SLINGRAM ANOMALY TRACE.
- MISE A LA MASSE ANOMALY TRACE.
- TURAM ANOMALY TRACE, strong.
- " " " " " " , weak.

Cu	Zn
Co	Ni

 STREAM SEDIMENT ANOMALIES FOR Ni.

VLF EM ANOMALY TRACE, strong.
 MAG ANOMALY TRACE, strong.
 SLINGRAM ANOMALY TRACE.
 MISE A LA MASSE ANOMALY TRACE
 TURAM ANOMALY TRACE, strong.
 _____, weak.

SCALE 1:10.000	OBS. RS	12-75
	DRAW. RS	2-76
	TRAC. BB	2-76
	CHK. JBC	2-76

MAP NO.

MAP SHEET

A.s Terrkopi. 3000. Ar1. E 9 gl. 10-71. Sentrum Trykkeri



**Sulphide occurrences
in the
Kvikne - Innset
Stören - Budal area**

- Kvikne type "Chalcopyrite"
- Budal "Pyrite"
- ⊙ Nickel showing
- ⊕ Lead showing

Helicopter survey area

Geochemistry sampled area 75

Nickel stream sediment
anomaly area

- Greenstone - } STÖREN GROUP
- Siltstone
- Greenstone
- Graphite schist
- Schist
- Ultrabasic Gabbro
- Acid intrusives TRONDHEJMEITE - OPDALITE

CLAIM BLOCKS

0 5 10 km

**KVIKNE AREA
LOCATION AND SUMMARY MAP**

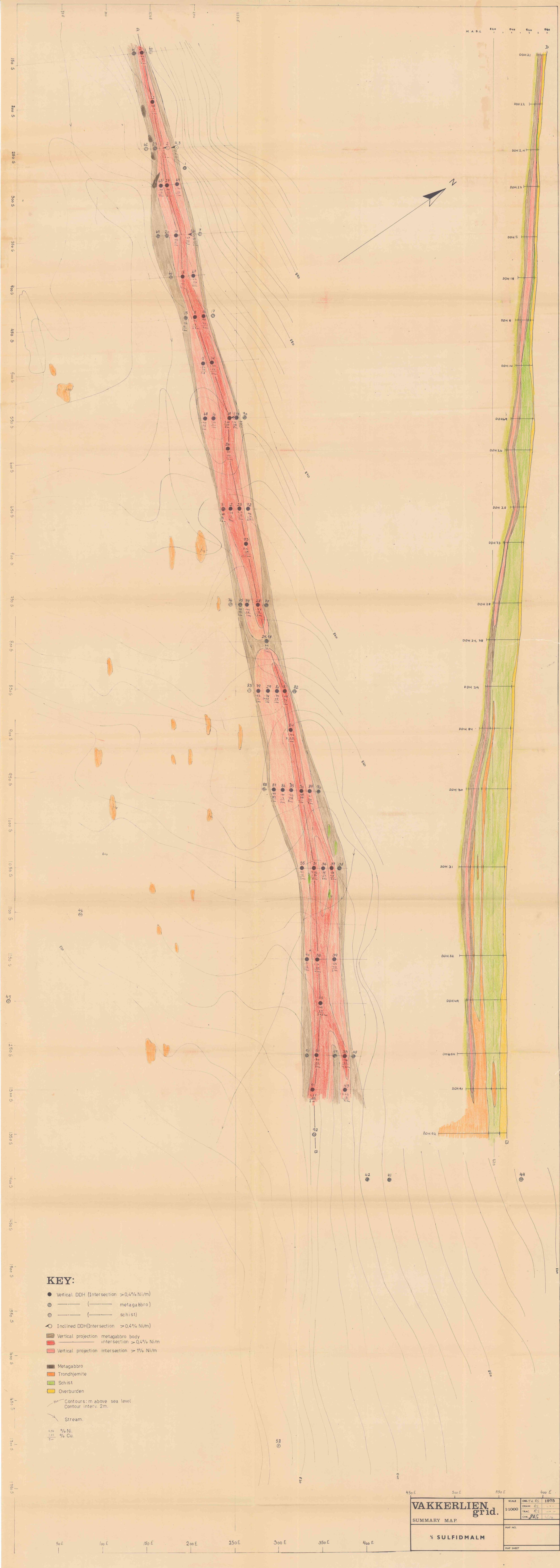
SCALE	OBS.	O. Nilsen
1: 100 000	DRAW.	..
	TRAC.	LN
	CHK.	

MAP NO.

20-74-A1

MAP SHEET

1/2 SULFIDMALM



KEY:

- Vertical DDH (Intersection $> 0.4\%$ Ni/m)
- — (— metagabbro)
- — (— schist)
- Inclin. DDH (Intersection $> 0.4\%$ Ni/m)
- Vertical projection metagabbro body intersection $> 0.4\%$ Ni/m
- Vertical projection intersection $> 1\%$ Ni/m
- Metagabbro
- Trondhjemite
- Schist
- Overburden
- Contours: m above sea level
- Contour interv. 2m.
- Stream.

4.5%
1.8%
0.9%
% Ni
% Cu

VAKKERLIEN grid.		SCALE	1:1000	DATE	1975
SUMMARY MAP.		DRAWN	RS	TRAC	RS
		CHK	RS	CHK	RS
		MAP NO.			
		MAP SHEET			

% SULFIDMALM