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Rapportarkivet

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Tittel

The Klepptjern area, Iveland

Forfatter	Dato	Bedrift
	Mars 1969	Sulfidmalm A/S

Kommune	Fylke	Bergdistrikt	1: 50 000 kartblad	1: 250 000 kartblad
Iveland	Aust-Agder	Østlandske	15114	

Fagområde	Dokument type	Forekomster
Geologi		
Råstofftype	Emneord	
Malm/metall		

Sammendrag

THE KLEPPTJERN AREA (F.N.)

The Klepptjern area to the NE of the Mölland massif is shown on the geological map of the Mölland area 1:5'000. E.M. work has been carried out here both on land in summer, and over the frozen lake in winter.

The most striking feature of the area is a zone of ultrabasic rocks that runs in a NW/SE direction from the shores of Klepptjern for a distance of about 600 m north-westwards. The width of the zone is difficult to establish but from its widest point of about 150 m just north of Klepptjern it narrows rapidly nortwards.

At the north-west end of Klepptjern a trench approx. 15 m x 12 m has been worked in the ultrabasic. Diamond drilling has also been carried out and 3 holes can be seen (see E.M. map of Klepptjern). The outcrops in this trenched area are so overgrown that it cannot be said with certainty if they are outcrops or not; moreover, the rock is so weathered that fresh samples are difficult to obtain. Where sulphides are visible, they seem to be irregularly distributed in the rock as an impregnation.

A fairly fresh sample from this trench was examined by Buchan (Min. Section Report No. 564) who reported the following minerals.

Mineral	Est. % by vol.
Olivine	20
Orthopyroxene	18
Amphibole	22
Serpentine	22
Chlorite	3
Biotite	Tr.
Carbonate	Tr.
Spinel	< 1
Pyrrhotite	3
Violarite-Pentlandite	1
Pyrite-Marcasite	1
Magnetite	9

"In thin section, this sample exhibits textures that are typical of an altered peridotite. Olivine grains are partly pseudomorphed by serpentine. Orthopyroxene and colourless amphibole (after clinopyroxene) occur in coarse intergranular plates, and secondary magnetite occurs with serpentine in streaky development. Traces of chlorite, bleached biotite, carbonate and deep green spinel (prob. chromiferous) complete the translucent assemblage. Scattered irregular patches of sulphides consist mainly of pyrrhotite enclosing areas of heavily violaritized pentlandite and partly digested pyrite. Other areas of iron sulphides consist of secondary marcasite probably formed under supergene conditions from pyrrhotite."

Two analyses of the Klepp ultrabasics carried out in Kristiansand gave the following results.

Ni	Co	Cu	Fe	S	$\frac{S-SCu}{Ni}$	%Pn	%Cu	%Po	$\frac{Ni}{Cu}$	$\frac{Ni}{Co}$
0.18	0.01	0.06	11.0	0.69	3.45	0.5	0.17	0.71	3	18
0.15	0.02	0.03	10.3	0.30	1.8	0.4	0.08	0.2	5	7.5

Analyses also showed that the ultrabasics in this area are richer in Mg than any so far investigated in the Iveland-Evje Region.

The NW/SE alignment of this ultrabasic zone may well reflect some tectonic feature - this NW/SE direction falls into the regional pattern developed over the entire region.

Generally speaking there is an irregular distribution of sulphides throughout the ultrabasics.

Small outcrops of meta-ultrabasic rocks are also found near the south-west shore of Klepptjern and possibly they are part of the same zone. If so this would increase the zone to a length of ca. 900 m. The ultrabasics here are medium- to fine-grained, grey-green in colour and rich in anthophyllite and chlorite. Small amounts of pyrite are present, these being mainly connected to joints and cracks. Other small outcrops of ultrabasic rocks occur, the most important being situated 600 m due east of Klepptjern. Here, completely surrounded by a banded dioritic gneiss is a small (300 m^2) occurrence which in hand specimen is a grey-green anthophyllite-rich type. It is quite coarse grained but becomes finer grained towards the borders. At the contact, the gneiss is strongly foliated and hornblende rich, the grain size varies. About 1 m from the contact the gneiss becomes once again more lighter and dioritic. The contact plane cuts the foliation plane. A sample of this rock was also sent to Thornhill and Buchan reported the following minerals:

Minerals	Est. % by vol.
Amphibole	60
Anthophyllite	22
Biotite	3
Pyrrhotite	4
Pentlandite	2
Chalcopyrite	1
Pyrite	Tr.
Magnetite	8

In hand specimen the iron "sulphides occur in coarse blebs scattered throughout the rock. In PTS they are seen to consist of pyrrhotite with blocky pentlandite and chalcopyrite. Pyrite occurs in a few relict grains, which have been mainly replaced by pyrrhotite. Several blades of exsolution-type pentlandite occur in the pyrrhotite, but these form less than 2% of the total pentlandite present".

From the textures observed this rock appears to have been a meta-pyroxenite which has undergone subsequent recrystallization with the formation of euhedral anthophyllite.

An analysis of this rock carried out in Kristiansand gave the following results:

Ni	Co	Cu	Fe	S	$\frac{S-SCu}{Ni}$	%Pn	%Cu	%Po	$\frac{Ni}{Cu}$	$\frac{Ni}{Co}$
0.35	0.02	0.17	11.1	2.1	5.5	1.0	0.5	2.4	2.1	17.5

Comparing the calculated percentages of Pn, Cu, Po, by analytical methods with those obtained by microscopic examination, it is seen that the latter are twice as large as the former. This could be indicative of nickel in the silicates.

The two most dominant rock types that occur in the area are amphibolite and dioritic gneiss. Both massive and foliated varieties of amphibolite are present, plus a fine grained variety, and a medium grained variety with a relict igneous texture. Both of the first two types of amphibolite are medium to small grained rocks with a granoblastic appearance suggesting that they reached their present crystalline state under regional metamorphism, the foliated types being subjected to a shearing stress whereas the massive types crystallized under more hydrostatic conditions. The fine-grained variety differs from the above mentioned types by its inferior grain size and massive granular appearance. In places, these fine grained types can clearly be seen to cut the foliation of the dioritic gneisses and probably represent a rather young intrusive phase.

Massive amphibolite with, in part, a relict igneous texture occurs to the north-east and east of Klepptjern. It is dominantly medium grained but coarser grained parts are also present. This amphibolite was probably originally a gabbroic rock.

The dioritic rocks in the area are often quite confusing. To the north of Klepptjern, the gneisses are well foliated, light grey, medium grained rocks, dioritic in composition. To the south of Klepptjern, more massive varieties occur together with the foliated varieties, with no clear distinction between the two. Some of these dioritic rocks are in fact very similar to gabbroic rocks seen in the Iveland area, being small grained and massive with a granular/granoblastic texture. A thin section of this rock gives the following minerals.

Plagioclase	50% - An 40
Hornblende	30 - 40%
Quartz	5 - 10%
Opaques	< 10%

The texture is granular/granoblastic with slight cataclastic and reaction textures superimposed. Anhedral, equidimentional grains of plagioclase occur, the majority rather fresh and well twinned and some strongly sericitized. The hornblende occurs in anhedral aggregates which probably were older hornblende grains. The opaques are associated with these femic aggregates.

This problem of the massive and foliated dioritic rocks south of Klepptjern is still not entirely solved, but it is possible that the more massive varieties are associated to an intrusive phase.

Structurally speaking the area to the north and east is relatively simple the dominant foliation being NW/SE with dips to the west. In the dioritic rocks south of the lake, however, the foliation is much more irregular (compare geol. map 1:5'000).

11th March, 1969
FN/hm

N

KLEPPTJERN.

LEGEND.

- ULTRABASIC.
- AMPHIBOLITE.
- DIORITIC GNEISS.
- META GABBRO.
- PEGMATITE.

GEOLOGICAL MAP.
KLEPPTJERN.
IVELAND.

SCALE			
1:5000	OBS.		
	DRAW.	F. N.	MAY 72
	TRAC.	J. J.	//
	CHK.	F. N.	//

A/S SULFIDMALM

MAP NO.

MAP SHEET

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

N

KLEPPTJERN.

LEGEND.

- ULTRABASIC.
- AMPHIBOLITE.
- DIORITIC GNEISS.
- META GABBRO.
- PEGMATITE.

GEOLOGICAL MAP,
KLEPPTJERN.
IVELAND.

SCALE			
1:5000	OBS.		
	DRAW.	F. N.	MAY 72
	TRAC.	J J	//
	CHK.	F. N	//

MAP NO.

A/S **SULFIDMALM**

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GEOLOGICAL MAP.
KLEPPTJERN.
IVELAND.

A/S **SULFIDMALM**

SCALE	OBS.	
1:5000	DRAW. F. N.	MAY 72
	TRAC. J. J	//
	CHK. F. N.	//

MAP NO.

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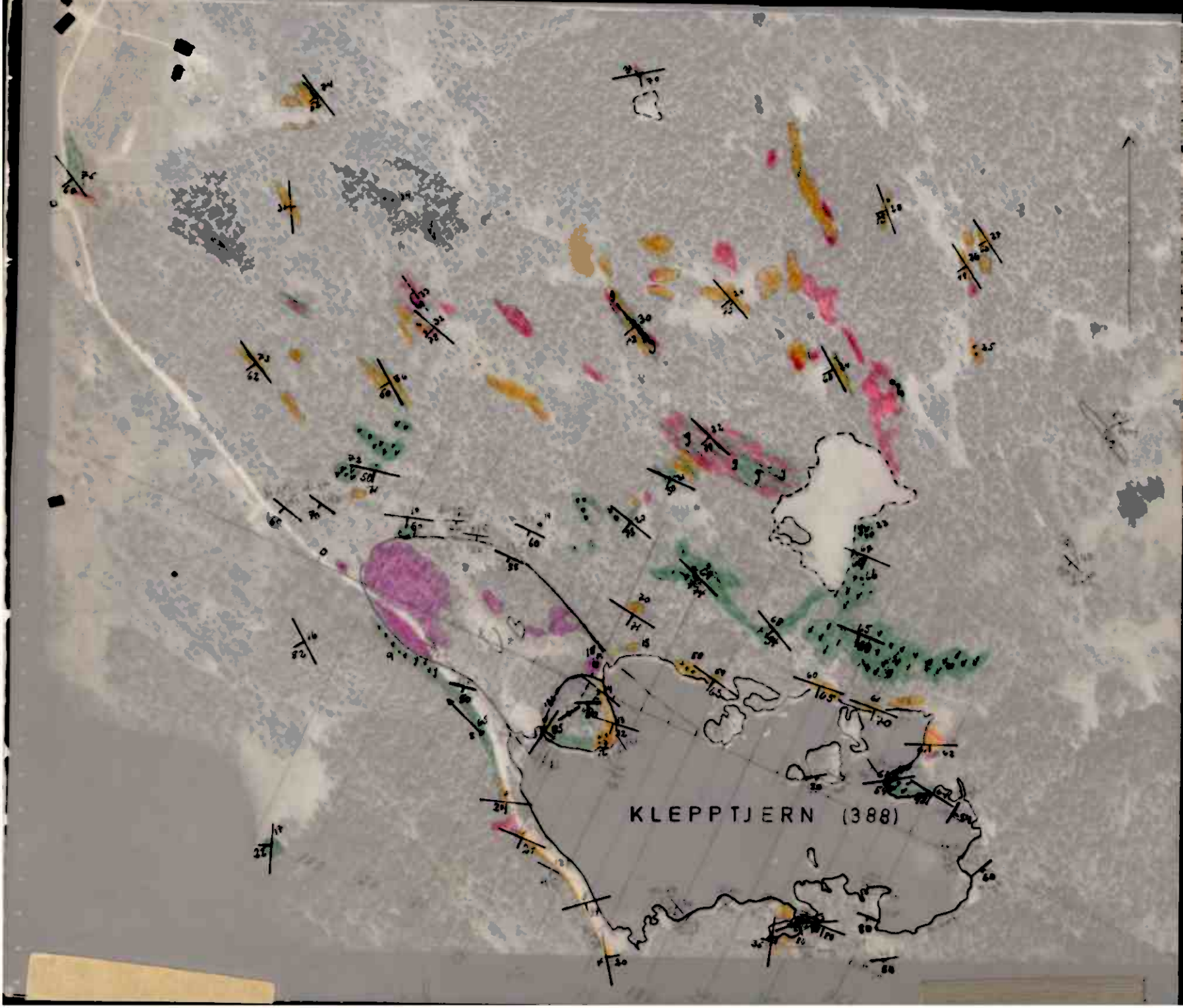
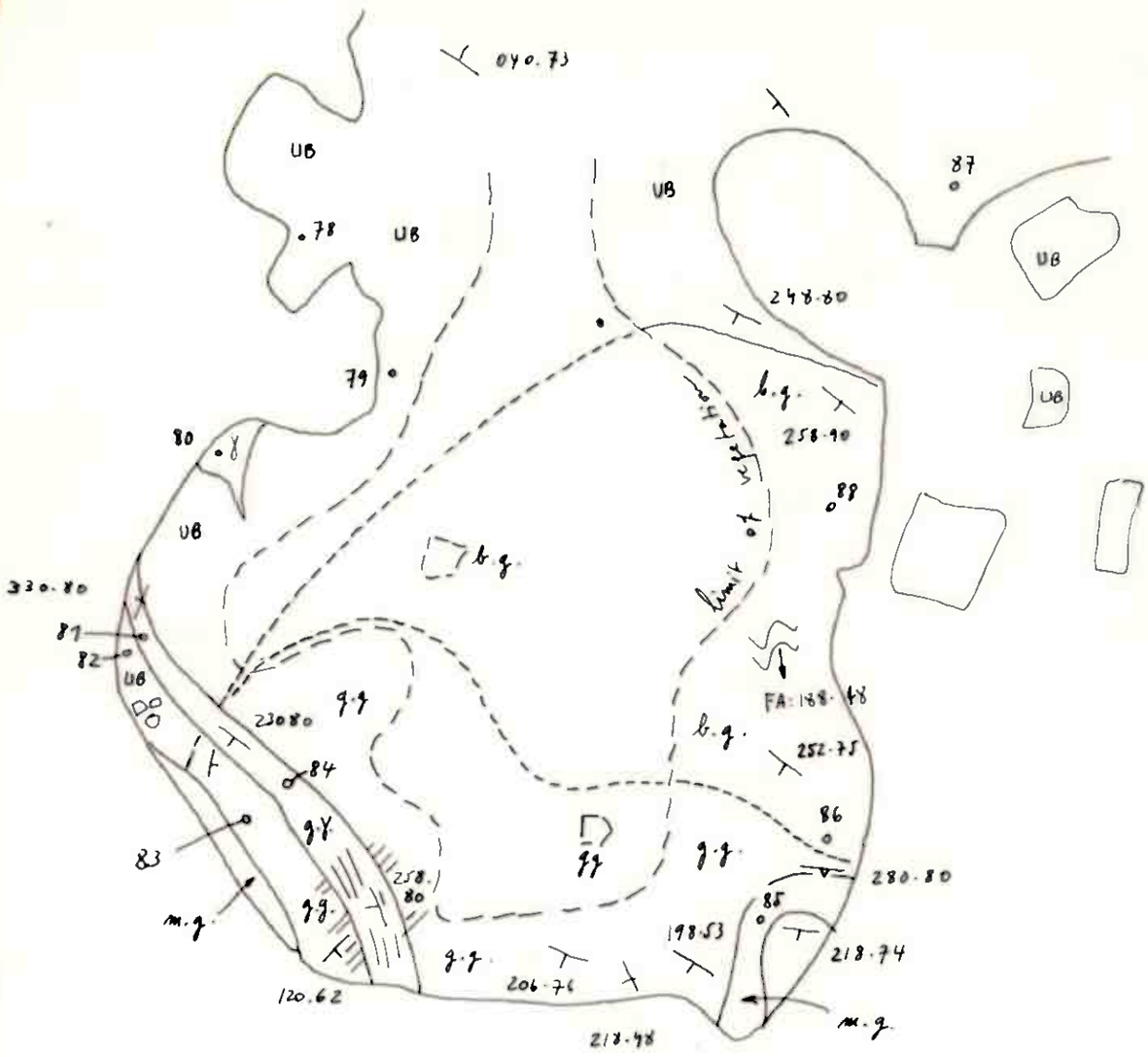
A.s Tørrkopi. 1000 A 3. E 9 gl. 10-71. Sentrum Trykkeri.


KLEPPTJERN (388)



KLEPPTJERN

UB: Ultrabasic rock/ite
m.g.: matrix fine grained gabbro
g.g: gabbroic gneiss
γ: granite (coarse gr.)
g.γ: gneissoid granite
218.48: strike of dip - dip

€ bis.

Detail map. Island Norðlem Klepptjern.	Målestokk ~ 1:100	Tegn.	
		Trac. JL	0972
		Kfr.	
	Erstatning for:		
A/S Sulfidmalm	LAVREAU		
	Erstattet av:		