Bergvesenet

Postboks 3021, 7002 Trondheim

Rapportarkivet

Bergvesenet rapport nr	Intern Journal nr	Internt arkiv nr	Rapport lokalisering	Gradering
BV 994			Trondheim	**Åpen**
Kommer fra ..arkiv	Ekstern rapport nr	Oversendt fra	Fortrolig pga	Fortrolig fra dato:
Falconbridge	Sul 81-69-7			

Tittel

A/S Sulfidmalm Evje Iveland Project.
Catalogue of Sulphide prospects

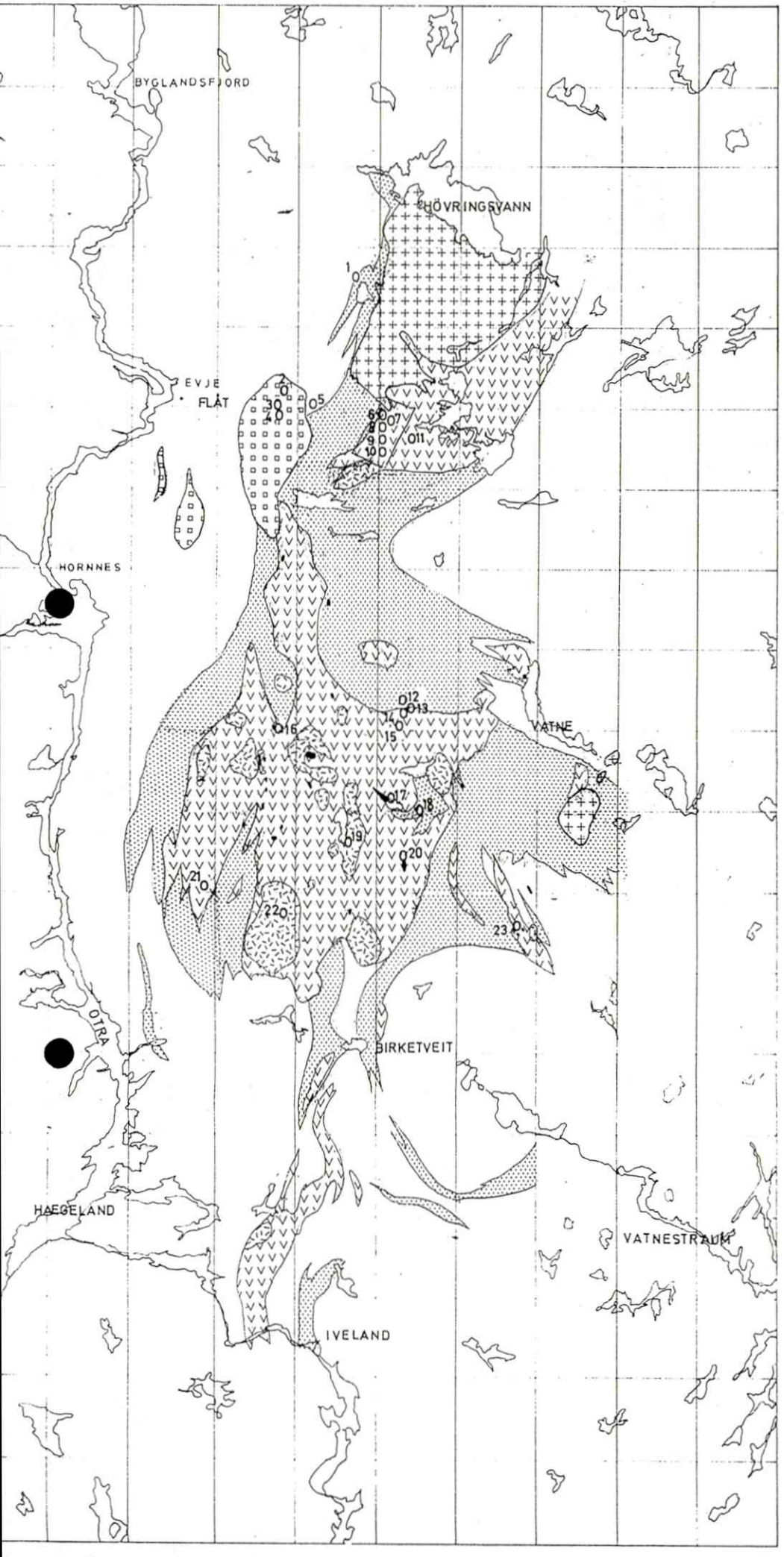
Forfatter	Dato	Bedrift
F Nixon	17.02 1969	Sulfidmalm

Kommune	Fylke	Bergdistrikt	1: 50 000 kartblad	1: 250 000 kartblad
Evje og Hornnes Iveland	Aust-Agder	Østlandske	15124 15133	Mandal Arendal

Fagområde	Dokument type	Forekomster
Geologi	Rapport	Elshaugen skj, Skripeland skj, Kjettevann skj, Stemmen?, Orreknappen mine, Bekken skj,Paasche skj, Litjern skj, Lomtjern skj, Guldregn skj, Byttingsmyr skj, Heståsen skj, Langtjern skj,
Råstofftype	Emneord	
Malm/metall	Ni Co Cu Fe S	

Sammendrag

Se også BV 1219



EVJE-IVELAND AREA

GRANITIC AND DIORITIC GNEISS

AMPHIBOLITE FOLIATED AND MASSIV

HORNBLENDE GNEISS

GABBRO

HORNBLENDE DIORITE

ULTRABASIC

GRANITE

1 st. AAFLAU PROSPECT
2 FLATERYGD "
3 FLÅT MINE
4 MYKLEÅSEN PROSPECT
5 STABBESTEN "
6 HESTÅSEN "
7 LANGTJERN "
8 LOMTJERN "
9 GULREGN "
10 BYTTINGSMYR "
11 VIKSTÖL "
12 N. PAASCHE "
13 S. PAASCHE "
14 BEKKEN "
15 ORREKNAPPEN "
16 LITJERN "
17 KLEPPTJERN "
18 EPTEVASSMYR "
19 MÖLLAND "
20 HAALAND "
21 LANDAAS "
22 SKRIPELAND "
23 ELSHAUGEN

AAVITSLANDSHEIA GRID AREA

0 1 2 3 4 5KM

A/S SULFIDMALM

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BV 994

A/S SULFIDMALM EVJE IVELAND PROJECT

CATALOGUE OF SULPHIDE PROSPECTS

rapport 81-69-7

EVJE-IVELAND PROJECT

CATALOGUE No. ..1....

FALCONBRIDGE NIKKELVERK, AKTIESELSKAP

LOCATION

Name: - Elshaugen Prospect Pit. Map unit G12. Air photograph 1-61 64.2334 (Nor Fly). Access by road, the pit lies about 80 m north of Elshaugen farm.

STATUS

"Anmeldt" (claimed) 29th May, 1968 by A/S SULFIDMALM.

HISTORY

Very little is known of the history of this small prospect pit. The man with the best first hand knowledge is Orest Landsverk. Regional mapping, scale 1:15'000, was carried out by Nixon in 1967.

GEOLOGICAL SETTING

The prospect lies in a belt of basic rocks: - meta gabbros and massive amphibolites with some scattered ultrabasics. The belt lies roughly ESE/WNW. The rocks to the NE of the belt are essentially granitic in nature, those to the south being more dioritic and hornblenditic. Pegmatites are fairly common and they are for the most part elongated parallel to the basic zone. The actual prospect pit is situated in the middle of an area of pasture and the outcrops in the immediate vicinity are poor. The rock exposed in the pit is a fine/med. grained amphibolite, very sheared in places and cut by quartz veins.

STRUCTURES

Two distinct shear zones are seen in the actual pit, the dominant one striking 300/90 and being 80 cm wide. The rock in this zone is very sheared and rusty but no sulphides were seen. A smaller shear strikes 320/90.

CHARACTERISTICS OF ORE

No ore is seen in the actual pit and side rocks. From the look of the specimens on the dumps the ore seems to be confined to a sheared rock consisting almost entirely of biotite and ore minerals. The sulphides (pyrrhotite and a little chalcopyrite) are arranged in layers parallel to the schistosity of the sheared rock.

ANALYSES

Specimen No.	Ni	Co	Cu	Fe	S	
55G12	0.04	0.02	0.22	25.5	17.2	ore

Analysis carried out at FN K'sand, Feb. 1968.

WORK DONE AND TIME SPENT in examination:

5½ days spent in detailed mapping in the Elshaugen area. New samples collected.

NAME of examiner: Frank Nixon

FN/hm Feb. 17, 1969.

LOCATION

SKRIPELAND prospect situated beside the road 150 m SE of Northern Skripeland farm (414 m a.s.l.) in Iveland kommune. In the north-eastern part of map unit D12 on air photograph No. 1-61 64-2342. The farm is reached by car along a 3 km long road from Fossheim, a crossroad 1 km N of Birketveit in Iveland.

STATUS

"Anmeldt" (claimed) by A/S SULFIDMALM the 20th December, 1967.

HISTORY

The prospect is described in H. Bjørlykke's diary (Dagbok for arbeide for A/S Raffineringsverket, Evje. Sommeren 1940) and is briefly mentioned by Tom F.B. Barth in NGU publication 168a: "The nickeliferous Iveland-Evje amphibolite and its relation." Frank Nixon carried out regional mapping in the area in 1967 (see diary). Judging by the weathering of ore blocks and by the overgrowth the pit was probably blasted around the turn of the century.

GEOLOGICAL SETTING

The prospect is situated within a massif of meta-gabbro/massive amphibolite coinciding with an aeromagnetic anomaly high. It is situated around 700 m to the east of the Skripeland-Li lineament and within a heavily granitized part of the basic massif where patches of more or less basic and massive rocks occur together with hornblende gneisses (see geophysical map of Skripeland-Li lineament in scale 1:2'000 and geophysical map 2/electromagnetic map 1 from Ni prospect at Skripeland in scale 1:1'000). The prospect which is situated in the corner of a meadow consists of a 5 m long and 3½ m wide open cut and a 3½ x 3 m pit filled with trees and water. The depth of the latter is estimated to 2 - 3 meters. The mineralization is confined to a wedge of massive amphibolite, surrounded by hornblende gneiss. This rock is fine-medium grained and exhibits an equigranular texture. A thin section consisted mainly of hornblende and plagioclase (labrador with 57% An) in equal amounts. Minor constituents were hypersthene (3%), biotite (2%), Opaques (2%). The texture is allotriomorphic.

The pyroxene occurs as kernels within the amphibole, and a few remnants of clinopyroxene seem to be present. The plagioclase has partly bent lamellas and is slightly sericitized. Most of the opaques are oxides. The rock is classified as a meta-norite or meta-hyperite. 25 m to the south of the prospect is situated a 10 m wide dark gabbroic rock which has been described as a dyke of hyperite or as a diabase. A thin section shows it is a medium-grained cataclastic meta-hyperite with mortar texture containing approximately 50% of long and very bent plagioclase laths (labrador), 20% hornblende, 20% polygonized grains of hypersthene and augite/diopside in equal amounts, 5% actinolite, 3% opaques (mainly oxides) and carbonate, spinel and biotite as accessories. Similar varieties of the basic intrusive with high and irregulary distributed magnetite content occur further towards the SE as well as near the northern farm.

STRUCTURES

In the Skripeland area the strike of foliations is dominantly N-S with mainly steep dips to the east. In the environments of the farms, however, the strike is very irregular, and E-W directions are very common with dips to the north from less than 30° up to 80°. Near the prospect the strike varies from 300° - 335° and dips from 20° - 60° towards NE.

Jointing is frequent at the pit with a major system with average strike 190° and dip 80° - 85° to W. Minor systems have strike 105° with dip 50° - 70° to S and strike 285° and dip 70° to N. A flat shear with strike approximately 190° and dip 12° to W seems to contain small fragments of sulphides and hence should be younger than the mineralization.

Sulphides, mainly pyrrhotite occur as more or less massive pods or as fracture fillings related to the jointing at the prospect (see Fig. 1).

It can be mentioned that the longest conductor outlined by the EM survey has a strike nearly parallel to the major joint system. The intersection line between the joints 190°/82° - 105°/60° gives a plunge of 60° in direction 203° which also is practically parallel to the conductor.

CHARACTERISTICS OF ORE

Most of the weathered ore samples on the dumps consist of massive sulphides (pyrrhotite, pyrite, minor chalcopyrite), but some of disseminated sulphides as well. Magnetite was noticed in most of the samples as well as in outcrops in and near the pit where it occurs together with sulphides and also in irregular distribution in barren rock.

Sulphide mineralization which is tectonically controlled, is visible only in the rock-walls of the pit. A polished section of a pyrrhotite-rich sample taken from the dumps contained:

Pyrrhotite	= 60%
Marcasite	= 2%
Chalcopyrite	= 2%
Pentlandite	accessory
Magnetite + Ilmenite	= 5%
Gangue silicates	= 30%

The massive pyrrhotite is to some extent altered to marcasite, mainly along fractures. Chalcopyrite occurs as individual grains and as fracture fillings in silicates, oxydes and in a few cases in pyrrhotite. Magnetite and ilmenite with average grain size of 0.3 mm (anhedral) seem to be replaced by sulphides. Some grains are intersected by veins of chalcopyrite and pyrrhotite. Pentlandite occurs as scattered exsolution laths or blades in the pyrrhotite parallel to its parting planes. Maximum length is 0.08 mm and the average = 0.03 mm. This shows that the sulphide fluid was very poor in nickel which is also confirmed by chemical assays.

FALCONBRIDGE NIKKELVERK, AKTIESELSKAP

ANALYSES

Specimen No.	Ni	Co	Cu	Fe	S	Cu/Ni	Ni/Co	S-Sch/Ni
10 D12 Sample from dumps with disseminated sulphides	0.07	0.02	0.10	13.1	1.8	1.43	3.5	24.25
11a/68 - D12a Weathered sample from dumps of massive sulphides	0.88	0.16	0.19	47.2	31.4	0.216	5.5	36.0
11b/68 - D12a Sample of massive amphibolite from dumps with disseminated pyrrhotite	0.086	0.014	0.081	17.5	2.9	0.94	9.0	31.0

The assays were carried out at FN K'sand in February and September 1968.

NAME of examiner: .....

WORK DONE AND TIME SPENT in examination:

Geological investigation of prospect and neighbourhood: about half a day.
Geophysical work with assistants: 1½ days.

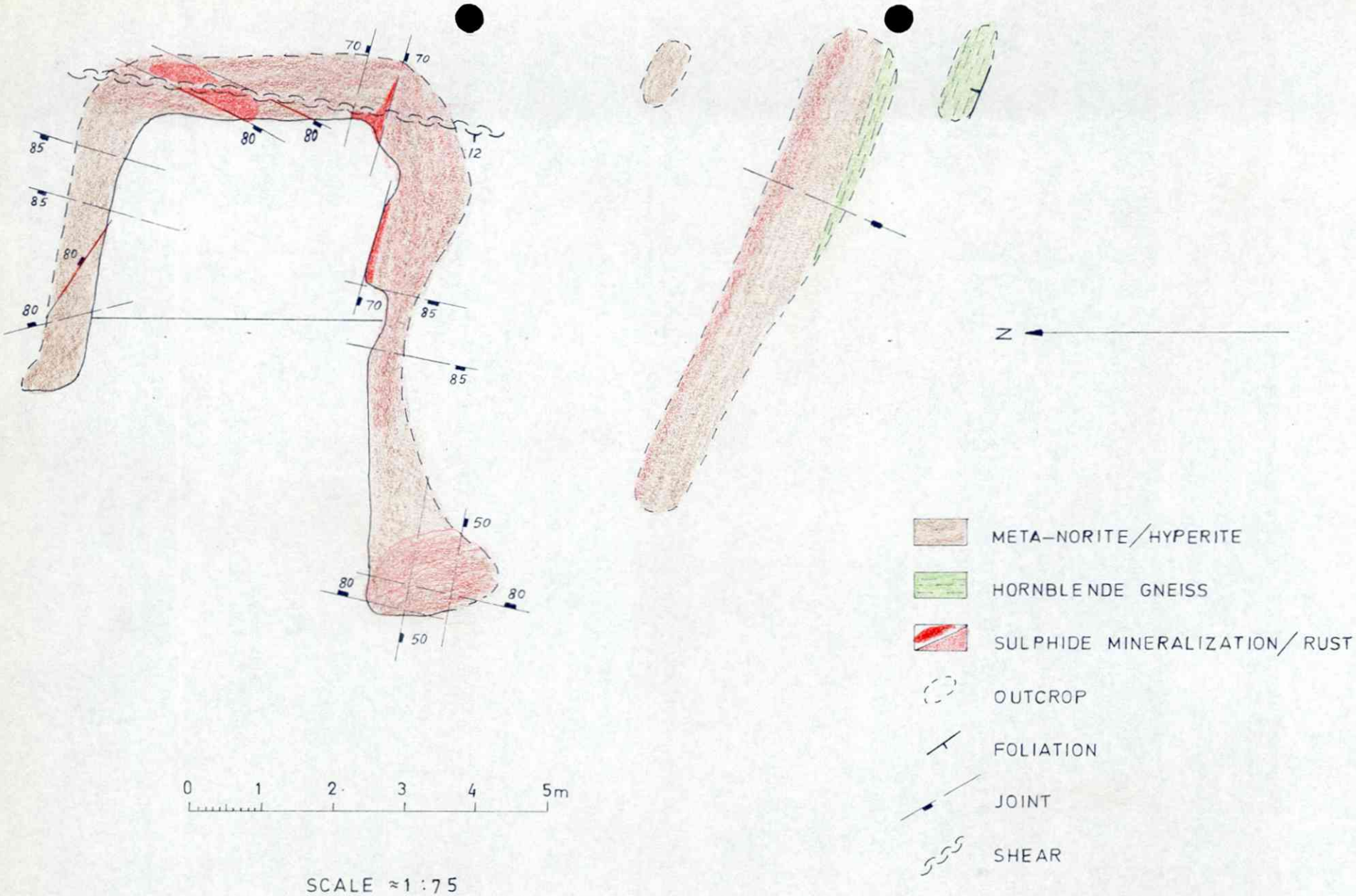
EOv/hm 14th February, 1969

Photo E.O. 1.8.1968.

Looking N towards Skripeland prospect (X) which cannot be seen because of covering trees and bushes. Small ore dump is seen S of the prospect near the road.

Photo E.O. 1.8.1968.

Looking E at open cut and pit near Skripeland. Massive pods of mainly pyrrhotite occur on both sides of flatlying shear seen on upper part of rock face. Sulphides also occur as fracture fillings and minor disseminations in the meta-norite.



SKETCH MAP OF SKRIPELAND PROSPECT

FIG. 1

E.O. Febr. 1969

FALCONBRIDGE NIKKELVERK, AKTIESELSKAP

LOCATION

One vertical shaft and a drift, two small pits and one exposed mineralized zone, are all located close to the eastern shore of lake Kjettevann near its southern end by "stemmen" (dam). The dam which is situated about 1/2 km NW of the Mølland farms in Iveland kommune (municipality) can be reached by car by following the road Haaland - Støldal to a small crossroad some hundred metres W of the farms from where a narrow "pegmatite road" leads up to the lake (see geological map from the Mølland area in scale 1:5'000).
Kjettevann (357 m.a.s.l.) is situated on the northern part of map unit Ell and is covered by air photograph No. 1-61 64-2439.

STATUS

According to a list published each year by the Minister of Mines the Government holds 7 different points at Mølland. One seems to be the pit near the farm, another is the face of the drift and two others almost certainly refer to the two pits near the eastern shore of Kjettevann. A fifth point ("Mølland grube nr. 3") is situated approximately 650 m north of the dam at Kjettevann and two others on the eastern shore of "Møllandsvannet" which probably is the same as Kjettevannet.

According to an agreement between the Government and A/S Sulfidmalm full exploration rights of these prospects are given for a period of 5 years with a first option on an economic ore deposit.

HISTORY

The two last points were the first ones to be claimed (mutet) in 1908. The others, except for the one in the drift (1938) were claimed during the years 1918 - 1919.

In a report (Ang. Mølland in Iveland) of May 16th, 1938, by S. Smith Meyer, RAFFINERINGSVERKET A/S, Avd. Evje, a review is given of the various prospecting work at Mølland up to this date. From 1907 to 1918 the following work had been carried out:

1. A magnetometer survey was carried out in winter time on Kjettevann and later extended to the land east of the lake (no maps exist). Several more or less irregular anomalies were detected of which the two most dominant were located 340 - 390 m and 480 m N of the dam and 130 m and 120 m respectively E of the shore. The first strikes N-S. The latter strikes SW-NE and was drilled. According to Smith Meyer the 3 holes seemed to have been put down incorrectly, compared to the anomaly position.

2. Minor blasting in a mineralized zone on the eastern shore of the lake some 60 - 70 m NE of the dam as well as blasting of 2 small trenches with pits some 60 m and 90 m further to the NE.
An exploration shaft E of the dam which had been sunk to minor depth was completed in 1917 at a depth of 19.5 m as well as a 50 m long drift to the NW below Kjettevann. According to an old report (Febr. 1918) which is not available, the last 4 m were in disseminated mineralization.

3. Diamond drilling of 16 holes with a total length of 690.89 m (see copy of Smith Meyer's sketch map from 1938).

- cont'd -

No.	Length	Dip Vertical?	Height above Kjettevann	Location
1	58.15 m	50°	3.47 m	See sketch map
2	79.44 "	85½°	3.47 "	" " "
3	70.45 "	66.3/4°	4.63 "	" " "
4	57.10 "	90°	4.68 "	" " "
5	46.50 "	50°	9.37 "	" " "
6	40.50 "	50°	≈ 9.00 "	" " "
7	41.00 "	77.3/4°	≈ 9.00 "	" " "
8	30.30 "	50°	≈ 8.00 "	" " "
9	40.00 "	50°		Mag. anomaly 480 m N of dam
10	25.00 "	50°		" " " " " " "
11	58.00 "	66.3/4°		E of exploration shaft E of dam
12	15.50 "	100°		Mag. anomaly 480 m N of dam
13	13.30 "	39°	≈ 3.50 "	See sketch map
14	39.60 "	50°		W of exploration shaft E of dam
15	35.25 "	44½°		S " " " " " "
16	23.80 "	100°		N " " " " " "

According to the given dip angle of the hole, the horizontal projections of holes Nos. 2 and 7 should be much shorter than shown on the sketch map. Comments on the drill results will be given in later chapters.

In 1937 the Svenska Malmletningsbolaget made an electric survey along the eastern shore of the lake S of the mentioned magnetic anomalies. The results were negative.
In April 1938 two holes were drilled (see sketch map).

No.	Length	Dip	Height above Kjettevann	Location
20	89.15 m	1 : 2	≈ 6 m	See sketch map
21	108.21 "	1 : 1	≈ 6 "	" " "

In the diary of Harald Bjørlykke from 1940 (Dagbok for arbeide for A/S Raffineringsverket, Evje. Sommeren 1940) a description is given on pages 5, 6 and 8 from a geological reconnaissance around Kjettevann. In his Summary report from 1940 (Rapport over geologiske undersøkelser ved Flaat grube) the extension of the mineralization is discussed on pages 6 - 8. Bjørlykke also mentions the possibilities of the ore having a southerly plunge with a possible extension beyond the exploration shaft. A map in scale 1:5'000 based on Smith Meyer's sketch map from 1938 together with some sections based on previous drilling follows the report.

In the NGU publications No. 168a (page 25) and 168b (pages 20 - 22) both Tom F.W. Barth and H. Bjørlykke describe the Mølland area, Barth describes the host rocks and Bjørlykke gives a mineralogical description of the ore.

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Mølland is mentioned by J.H.L. Vogt in Econ. Geol. Vol. 18, 1923 "Nickel in igneous rocks".
A.O. Poulsen has written a report on "Nikkelmalmfeltet i Iveland" 23rd Sept., 1955.
Frank Nixon carried out regional mapping in the area in 1967.

An EM survey was carried out by Sulfidmalm crew on land in 1967 and on the frozen lake in 1968. Both were negative (see EM map from Kjettevann near Mølland in Iveland).

Detailed geological mapping in scale 1:5'000 was carried out by F. Nixon and E. Overwien in 1968 (see geological map from the Mølland area 1968).

In 1967 and 1968 R.B. Band in connection with a thesis: "Dispersion of nickel and molybdenum from mineralisation in glaciated terrain S. Norway" (PhD Royal School of Mines 1969) carried out a geochemical investigation around the old workings at Kjettevann.

In 1969 a Sulfidmalm crew carried out a mag survey covering an area of 670 x 240 m as well as a geochem survey (soil sampling) in an area to the south of the known mineralized zone (see magnetic and geochemical maps of Kjettevann area, Mølland, Iveland in scales 1:1'000). The same year 4 holes (Ax) with a total length of 634.63 m were drilled by A/S Grunnboring, Oslo (see Preliminary Report on Diamond Drilling at Kjettevann, Mølland Farm, Iveland by Frank Nixon as well as map showing the location of diamond drillholes at Kjettevann, Mølland, Iveland in scale 1:1'000).

No.	Length	Direction	Dip	Height above Kjettevann	Location
1-1969	145.90 m	270°	53°	10.82 m	13.60 S / 8.68 E
2-1969	185.42 "	"	70°	10.82 "	13.60 S / 9.00 E
3-1969	116.50 "	"	70°	ca. 11.3 "	13.60 S / 25.78 E
4-1969	186.81 "	"	65°	19.82 "	75.19 S / 28.74 E

Drilling will continue in 1970.

When Raffineringsverket A/S in 1946 closed down the mine at Flåt in Evje the company did not maintain its rights to its various old mines and prospects. According to a special law all these, including the Mølland area, were automatically taken over by the state.
The ground at Kjettevann belongs to the westernmost Mølland farm (gnr. 45, bnr. 1) with owner Knut Mølland.

GEOLOGICAL SETTING

The mineralized area at Kjettevann is situated in the centre of the Evje-Iveland basic massif near the western margin of the Mølland gabbro complex (norite-hyperite). This multiple intrusive complex extending for a distance of approximately 1.5 km in the N-S direction and 500 m in the E-W direction is to a great extent surrounded by mainly N-S striking amphibolites and gneisses with moderate to steep inward dips. Amphibolites and hornblende gneisses locally exhibit banding and migmatitic structures as does the less frequent occurring dioritic gneiss. No sharp contact has been observed between the massive gabbro complex and the more foliated surrounding rocks. There is normally a gradual transition from fresh and basic igneous rocks to more acid and foliated gneisses via metagabbroic rocks - massive amphibolites and foliated amphibolites.

- cont'd -

In some localities they just pass into more or less massive amphibolites. Most of the gneisses are believed to belong to an older sequence into which the basic magma intruded.

The main variety of the basic intrusive is a massive mediumgrained rock with a noritic to hyperitic composition depending on the relative amounts of hypersthene and augite. It has a variable plagioclase content, usually 40 - 60% with composition corresponding to andesine-labrador. As the amount of feldspar decreases this rock passes into ultrabasic types. As one moves east- and north-eastwards from the lake shore more coarsegrained varieties are seen where andesine feldspar together with up to cm large aggregates of small hornblende needles are the main constituents. The feldspar seems to be introduced.

The above-mentioned rocks can in drill cores be seen to be cut by younger irregular patches and pods consisting of hypersthene-clino-pyroxene and amphiboles.

All these basic-ultrabasic intrusive rocks have near the lake shore been more or less subjected to a certain degree of metasomatism and may contain sulphides. Sericitization of plagioclase and alteration of pyroxenes to hornblende-actinolite-anthopyllite and certain amounts of chlorite and biotite seems to be more frequent along the supposed contact of the massive at the eastern shore of Kjettevann than elsewhere in the intrusive and especially compared to the inner parts of it. It is in this area the nickeliferous sulphides occur. The youngest evidence of basic intrusion is probably seen as fine-mediumgrained dykes and small massifs which cut and crisscross the basic massif as well as the surrounding gneisses. They have a noritic-hyperitic composition with up to 10% magnetite and like the older rocks shows deformation of twin lamellaes, and locally, polygonization along grain boundaries. The younger pegmatites mainly occur outside the Mølland basic complex.

STRUCTURES

General strike of the foliated rocks near the prospects on the south-eastern shore of Kjettevann is N-S to N 20° E, and the dip is steep to the east (see maps already referred to plus geological sections across the Mølland Basic Complex, Iveland in scale 1:2'000).

Joint measurements within the basic massif close to the mineralized area (≈150 points) give the following systems in order of frequency.

1.	0 - 22°	with dips	65 - 90°	to	E and W
2.	278 - 295°	" "	70 - 90°	"	S " N
3.	68 - 85°	" "	60 - 80°	"	N " S
4.	30 - 40°	" "	70 - 90°	"	SE and NW
5.	305 - 320°	" "	70 - 90°	"	NE " SW

Small shears recognized in the drill cores seem to have a strike and dip parallel to the foliation in the vicinity.
A few observations of mineral lineation in the foliated rocks indicates a plunge of 40 - 45° to the south.

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The shape of Kjettevann with its N-S direction must be caused by the relatively well foliated and steeply dipping gneisses underlying the lake compared to the more massive basic rocks on the hills to the W, SW and E.

On the air photographs there is a pronounced NW structural feature starting near the crossroads west of Mølland farm and following the slope of the high hill SW of the lake. The direction co-insides with one of the minor joint systems developed east of the lake, but the topographic feature could be caused by a transition from foliated to more homogenous rocks as the gneisses seem to form a wedge into the massive basic rocks to the south. Within the basic complex east of the lakes small gullies co-inside with the joint systems, especially 68 - 85° and 280 - 295°.

CHARACTERISTICS OF ORE

H. Bjørlykke states that "the nickel ore deposit at Mølland in Iveland consists of many small ore bodies seggregated in a rock of noritic composition near the border against a gneiss flake". Surface observations, and former diamond drilling as well as drilling carried out in 1969 support the opinion that the sulphides are irregularly distributed giving rise to several small and separated mineralized bodies.

After the drilling in 1969 sulphides are known to occur over a distance of 120 m in N-S direction, but not as a consistent mineralized zone. The sulphides, mainly pyrrhotite, pyrite, pentlandite and chalcopyrite occur from fine disseminations to blebs in all the basic to ultrabasic rocks mentioned, except the younger and usually magetite-rich basic dyke-rock as well as later acid dykes and veins. Sulphides also occur as stringers and fracture-fillings, and on the dumps at one of the prospect pits a few specimens indicate a more massive texture.

The mineralization occur in and near the transitional zone from massive to more foliated basic rocks. To the west the latter turns into well foliated amphibolites and hornblendegneisses, and it is likely that this zone indicates the contact between old gneisses and a younger intrusive to the east. R. Band in his thesis states that the sulphide mineralization is associated to the contact between thenorite and amphibolite at the lake shore - this western boundary being the upper contact of the intrusive. The latter conclusion as well as the suggestion that, what is by Band called metagabbro to the east and north-east of the prospects, is an older intrusive than the more fresh noritic body can be argued.

Northernmost Prospect pit at 107 N

An approximately 2 x 2 m pit which is probably 5 m deep has been sunk in a mediumgrained, massive basic to ultrabasic phase of the Mølland intrusive. Based on the specimens found on the dump the rock contains weak dissemination of mainly pyrrhotite and chalcopyrite.

Some samples look comparatively fresh with well preserved pyroxenes while others contain needlelike amphiboles. A specimen of the latter contained around 60% (volume) of 1 - 2 mm long fibres of anthofyllite in a ground mass of clinoamphibole (≈ 45%), probably actinolite, and minor phlogopite. Accessories are talc, zircon, sericite and opaques. Most of the opaques are small grains of sulphides that are uniformly distributed among the amphiboles and mica.

- cont'd -

The outcrop surrounding the pit is intersected by joints 11°/85° and 280°/85°. Along a joint 320°/75° a minor horizontalmovement must have taken place. Striaes and grooves indicate that the western block moved north-westwards in relationship to the eastern. Very weak dissemination of sulphides, up to 2 - 3 %, are only seen near the southern wall of the pit.

Prospect pit at 90 N

A small pit probably 2 m deep, is blasted in a similar but slightly more altered rock than described from the pit 17 m to the north. The feldspar content varies locally from 0 - 50% within the small outcrop, but generally it is very low or zero.

The pit is situated in a small valley or lineament intersecting the Mølland basic intrusive in an E-W direction. At the pit the rock is intersected by several joints belonging to the following systems: 260°/65°, 316°/65° and 5° with steep deeps to E and W. Although several specimens from the dump contain nice sulphide dissemination and even a few of massive sulphides the mineralization in the pit bedrock is very local. Impregnation of 2 - 5% sulphides can be seen close to the N-S striking joints. A thin vein of pyrite is parallel to these joints. A thin section of a mineralized sample shows the following composition:

Minerals	Est. % by Vol.	Grain size range (mm)
Hornblende	40	0.5 - 2
Anthofyllite	30	0.5 - 2
Plagioclase (An 58%)	12	0.5 - 2.5
Opaques	8	0.2 - 0.7
Chlorite	< 6	
Quartz	2	- 0.1
Biotite	accessory	- 0.1

The plagioclase is somewhat sericitized, has slightly bent lamellaes and is to some degree polygonized. Anthofyllite seems to be altered to green hornblende which again is partly altered to chlorite along the grain boundaries especially along contacts with sulphides. The latter displaces the amphiboles and often seemsto be surrounded by a thin rim of quartz as well as chlorite. The rock which exhibits an equigranular to allo-triomorphic texture, is probably an altered and completely recrystallized variety of the basic faces of the Mølland norite-hyperite that also has been subjected to a weak tectonization.
A similar rock which by Buchan is classified as an amphibolite contained 84% colourless to pale green amphibole (probably deriving from pyroxene), 4% quartz, minor amounts of chlorite and biotite, 8% pyrite and 1% each of pentlandite, chalcopyrite and ilmenite.

Buchan concludes "2 sulphide assemblages seem to be present, the main variety consisting of subhedral to euhedral pyrite set in fresh amphibolite. The other and probably later sulphide occurance with coarse patches of chalcopyrite and pentlandite is associated to and enclosed by partly altered amphibole with intergranular patches of quartz and occasional biotite. The latter sulphide assemblage could be related to the introduction of quartz and partial recrystallization of amphibole."

- cont'd -

Polished sections of two other samples showed the following composition of opaques.

Minerals	Est. % by Vol.		Grain size range (mm)	
	a. Heavy dissemination	b. Dissemination	a. Heavy dissemination	b. Dissemination
Pyrite	3	5	0.04-1.5	< 0.8
Pyrrhotite	20	3	0.2-1.0	< 1.2
Pentlandite	6	1	flamy 0.04-0.1	flamy < 0.1
Violarite		< 2	blocky 0.05-0.35	blocky < 0.6
Chalcopyrite	< 1	1	0.03-0.3	< 0.6
Ilmenite	< 1	1	0.05-0.1	aver. 0.1
Magnetite	? traces	1		0.05-0.7

Ilmenite which locally contains hematite lamellaes, as well as magnetite occur as single grains distributed within the silicate mass. Euhedral to subhedral pyrite form aggregates, usually with a streaky appearance parallel to the elongated amphiboles. Pyrite replaces and intersects magnetite.

Pyrrhotite seldom occurs together with the pyrite, but has occasionally the same appearance interstitial between the silicate needles. Both seem to replace the silicates and contain some of the latters as inclusions.

Chalcopyrite mainly occurs as individual grains together with pyrrhotite and to a less extent with pyrite, but is also seen as small inclusions in the latter.

Pentlandite which is associated to pyrrhotite, appears both as individual blocky grains and as small exsolution blades less than 0.1 mm long near the grain boundaries of the latter. The pyrrhotite seems to be bleached close to the flamy blades of pentlandite, but also where pentlandite is not identified. These light blades within the pyrrhotite, the exsolution flamy pentlandite as well as the blocky are heavily altered to violerite which occur more frequently than pentlandite in the two samples investigated. The octahedron partition planes are well preserved in the blocky violarite which often contains remnants of pentlandite.

In the sulphide-richest sample the volume proportion between exsolution blade and blocky type pentlandite/violarite is approximately 1:4. Although some euhedral pyrite occurs together with the other sulphides, it certainly seems to make up an individual sulphide assemblage in relationship to the other sulphide minerals present.

- cont'd -

Mineralized zone at eastern shore of Kjettevann

Approximately 50 m NE of the dam (stemmen) at Kjettevann there is situated a mineralized zone along the shore in a comparatively massive but jointed amphibolitic rock with varying feldspar content. Towards west this 5 m wide rock passes into more foliated amphibolite with apparently concordant hornblenditic schlieren and to the east into a lighter and partly foliated rock (dioritic?) which further eastwards passes into massive norite-hyperite.

A thin section of the mediumgrained equigranular host rock shows the following approximate volume composition:
40% plagioclase (andesine), 40% amphibole (actinolite), 5% chlorite, 5% quartz, 5% opaques, 1% biotite and as accessories apatite and titanite?

The plagioclase is heavily sericitized with bent lamellaes, and the amphibole is usually polygonized and is to some extent altered to chlorite. The opaques, mainly sulphides, occur together with heavily chloritized amphibole, quartz and biotite similar to mineralized samples from the pit at 90 N.

The rock which in the writer's opinion is an altered and weakly tectonized gabbroic rock, is intersected by joints 20°/80°, 126°/75°-90° and minor 220°/35°. The in average 2 m wide mineralized zone parallels after a length of 22 m the joints with strike 20° which is the strike of foliation of the surrounding rocks as well. To the south the mineralization becomes covered, but minor sulphides (< 2%) present in a similar rock 35 - 45 m along the strike to the south, indicate a total extension of the zone of approximately 65 m.

Another zone, about 1 m wide and 13 m long, parallels the main zone. A smaller rust-zone within the more foliated lighter rock to the east is connected with this zone. The mineralization consists of fine dissemination of sulphides (5 - 10%) pyrite being the main ore mineral. Pyrite and chalcopyrite are also seen as mm thin veins following the joint system 220°/35° and to a less extent 126°/90°. A polished section of a nice mineralized sample from the main zone showed the following ore minerals:

Minerals	Est. % by Vol.	Grain size range (mm)
Pyrite	7	0.15 - 0.8
Millerite?	2	aver. 0.6
Chalcopyrite	< 1	
Pyrrhotite	< 0.5	" 0.5
Ilmenite	accessory	0.15 - 0.5
Magnetite	"	

Except for the millerite which so far has not been recognized at Mølland, the texture and mineral paragenesis is very much like the one described from the pit at 90 N although pentlandite and violarite occur as well in samples from the latter. The millerite is seen as distinct grains together with pyrite, as minor inclusions within it and to a less extent together with pyrrhotite. Chalcopyrite is often situated between grains of pyrite and millerite. The latter is probably an alteration product of pentlandite via violarite.

- cont'd -

Diamond drilling (see report of Dec. 11th, 1969 by F. Nixon)

The former diamond drilling shows that the mineralizations at the two prospect pits are of local nature (drillholes 5, 8, 13). Holes 1, 2 and 3 have been put down to investigate the zone at the lake shore at depth. Information on the dips of the holes varies in old reports and on maps, but assay reports show that irregular mineralizations which most likely represents the rust-zone at a deeper level, have been encountered at a depth of maximum 55 m below Kjettevann. Main intersection in hole 2 is between 37.85 m and 56.40 of which only 2.56 m were analyzed (≈14%) with Ni-content between 0.40 and 1.00%. Holes 6 and 7 about 20 m N of the exposed mineralization hit a few and very thin zones in the strike continuation, of which the widest on 37 cm contained 4.45% Ni.

Drilling of holes 20 and 21 in 1938 intersectedmineralizations at depths down to 15 m and 40 m respectively below the lake and about 20 m S of the exposed zone more or less along its supposed continuation towards the south. Sulphides occur over a 24.34 m long section in drillhole 20 of which 15.17 m (≈62%) has been analyzed with content varying between 0.18 - 0.60%. What is probably the same zone was intersected in hole 21 at a deeper level in the same profile between 49.14 m and 71.46 m of which 8.67 m were assayed (≈ 39%) with samples containing 0.18 - 0.35% Ni. In hole 21 scattered sulphides were encountered within a zone between 82.25 m and 97.04 as well. From this section 7.30 m were analyzed (≈ 49%) of which most samples contained disseminated sulphides assaying 0.15% - 1.03% Ni and minor massive ore with samples showing 0.98% - 2.05% Ni. This zone was not traced in hole 20 at a higher level.

From old drill logs it is apparent that most sulphide intersections contain disseminations of the ore minerals and only minor massive sulphides.

Three drillholes were put down during the autumn of 1969 in a profile about 22 m to the S of holes 20 and 21 in order to find out whether the known mineralized zone continues in this direction working out from a hypothesis that a mineralized body would have a plunge in this direction. Hole 1/69 showed weak and scattered disseminations together with minor stringer sulphides mainly in various massive basic rocks (hyperite-norite with varying feldspar content) containing 0.13% - 0.28% Ni and 0.04% - 0.1% Cu. However, no distinct zone was cut that could be directly tied up with the zones to the N.

In a steeper hole (No. 2/69) an interesting sulphide zone was intersected which carried 0.48% Ni and 0.15% Cu from 56 m to 65 m. The mediumgrained massive noritic rock seems to have been intruded by thin irregular veins and stringers consisting of a coarse pyroxene/amphibole fraction with pyrrhotite, pyrite and chalcopyrite. Another zone of disseminated sulphides carrying 0.21% Ni and 0.06% Cu between 84 m and 91.3 m was cut in a massive basic gabbroic rock. None of these sulphide intersections were traced over to hole No. 3/69 which was put down to investigate the zones at a deeper level. A hole No. 4/69 about 60 m further S was barren containing only in a few places minor disseminated sulphides (<2%), pyrite being the main ore mineral. In all holes drilled during 1969 it has been noticed that pyrite dominates in the poor disseminations encountered to the west and especially within the more foliated rocks that occur here.

- cont'd -

Further drilling will be carried out in 1970 to get a better picture of the distribution of the sulphides in an attempt to outline an economic deposit at Mølland.

It can be mentioned that an E.M. survey indicates that the Mølland type of mineralization does not respond as a conductor, and a magnetic survey gives a somewhat obscure pattern with a limited mag high over the rust-zone near the shore and other highs of which some are known to be caused by consentrations of magnetite (especially near the transition zone from massive to foliated rocks S of the lake near 40 W).

ANALYSES

The following table shows some analyses of various mineralized samples collected from bedrocks and ore dumps during the mapping as well as analyses of drillcores. With regard to the latters average grades have been calculated for some intersections cut by the old drillholes although just parts of the sections have been analyzed. The remaining parts are regarded as barren.

Locality/Sample Number	Ni	Co	Cu	Fe	S	Cu/Ni	S-Sch/Ni	Analyzed by
Pit 90N Mø-2 FN	2.6	0.09	2.3	32.3	19.3	0.89	6.5	F.N. A/S
Mø-E11/2	0.6	0.02	0.15	8.8	3.1	0.25	4.95	"
Mø-E11/3	0.7	0.03	0.16	18.9	8.0	0.23	11.2	"
Rustzone 5/68-E11a	0.53	0.02	0.14	17.5	2.9	0.26	5.00	"
30N/o 6/68-E11a	0.28	0.011	0.12	12.4	1.4	0.43	4.55	"
Pit 90N 9/68-E11a	0.89	0.033	0.19	17.3	5.7	0.21	6.2	"
Pit 107N 12/68-E11a	0.31	0.013	0.43	12.3	2.2	1.39	5.7	"
D.D.H.2. 37.85-56.40 m (14% assayed 0.4-1.0% Ni)	0.092		0.029			0.32		Raff. A/S
D.D.H. 20. 33.08-57.42 m (62% assayed 0.18-0.6% Ni)	0.245		0.065			0.27		"
D.D.H. 21 49.14-71.46 m (39% assayed 0.18-0.35%Ni)	0.100		0.029			0.26		"
D.D.H. 21 82.25 - 97.04 m (49% assayed 0.15-2.05% Ni)	0.293		0.061			0.20		"
D.D.H.1/69 37.0-38.0 m	0.13	0.01	0.04	9.1	0.52	0.31	3.69	F.N. A/S
" 65.8-66.8 m	0.09	0.01	0.04	7.6	0.69	0.44	7.21	"
" 81.0-82.0 m	0.28	0.01	0.10	10.3	1.6	0.34	5.35	"
" 86.0-87.4 m	0.17	0.01	0.06	9.0	1.1	0.42	6.11	"

- cont'd -

Locality/Sample Number	Ni	Co	Cu	Fe	S	Cu/Ni	S-Sch/Ni	Anal. by
D.D.H. 2/69 55.0-56.0 m	0.033	0.0055	0.03	5.2	0.37	0.91	10.29	F.N.A/S
" " 56.0-65.0 m	0.48	0.012	0.15	11.5	2.9	0.31	5.82	"
" " 80.42-81.42 m	0.21	0.012	0.06	9.1	0.86	0.29	3.80	"
" " 84.0 -90.0 m	0.21	0.013	0.06	9.4	1.0	0.29	4.47	"
" " 90.3 -91.3 m	0.19	0.012	0.08	7.7	1.6	0.42	7.97	"
" " 170.65-171.72 m	0.13	0.011	0.02	11.7	0.84	0.15	6.31	"
D.D.H. 3/69 65.5-66.5 m	0.06	0.008	0.04	5.4	0.62	0.74	9.6	"
" 4/69 137.0-138.0 m	0.113	0.009	0.09	7.4	0.55	0.77	4.08	"
" " 141.0-142.0 m	0.084	0.007	0.06	6.3	0.60	0.74	6.40	"

The table confirms the fact that the hitherto known mineralization at Mølland consists of a rather lowgrade copper-nickel ore. Most of the samples have a low content of sulphide minerals, but the concentration of nickel in the sulphide phase is high. For 74 samples investigated the average ratio (S-Sch):Ni which is the lowest of all known deposits in Evje-Iveland, is 6.25 while H. Bjørlykke gives an average ratio of 6.1 (46 samples). Flåt mine shows 8.73 (359 samples).
The ratio Ni:Co was calculated to ≈ 28.4:1 (30 samples). For Flåt mine Bjørlykke found the quotient to be 8:1 for the raw ore.
The average ratio Cu:Ni is calculated from 74 samples to 0.27 (Bjørlykke 0.22) which is below the half of the corresponding ratio for Flåt mine.

FINAL REMARKS

The nickeliferous sulphide mineralization at Kjettevann near Mølland is related to the transitional zone between a comparatively fresh norite-hyperite massif to the east of the lake and more foliated amphibolites and gneisses in the lake. The sulphides which mainly occur as disseminations seem to a certain degree to prefer a basic variety of the intrusive, although they appear in the more foliated rocks as well. In the latter case pyrite seems to be the dominant sulphide mineral.

Band has from 10 samples calculated the mean Ni content of the norite-hyperite (no sulphides) to 0.0455% while Barth gives approximately 0.07%. This is high for a norite magma and supports the field observations that the average composition of the intrusive is more basic than a noritic magma. The fact that the sulphides mainly occur in altered rocks together with minerals like hornblende, actinolite, anthofyllite, chlorite, biotite and probably secondary quartz could indicate a relationship between metasomatism and sulphide mineralization.
It is possible that sulphur was introduced into the nickel-rich intrusive and some nickel extracted out of the basic silicate minerals for thereafter to go into the sulphide phase. It has been noticed that minor sulphides occur in the gneisses to the west.

One should bear in mind that metamorphism has taken place after the intrusion of the norite-hyperite. The contact zone where the mineralization occur is located not far from more acid gneisses to the west and could have been subjected to some metasomatism. However, only minor redistribution of eventually primary sulphides might have taken place and not a real sulphurization.

Although sulphides occur as accessories in the intrusive east of the known mineralization as well the magma probably had a low sulphur

- cont'd -

content. It is possible that some of the sulphur within the weakly mineralized zone near the western margin of the norite-hyperite, was picked up by the magma when it intruded the amphibolites and more acid gneisses. These latter rocks contain minor sulphides, dominantly pyrite. However, the sulphide content is so low that it is difficult to envisage enough sulphur being present to form a major sulphide-rich deposit.

Surface observations indicate a relationship between mineralization and joints. Even though a small amount of the sulphides are deposited along joints the main dissemination type as well seem to be located close to the 0 - 22° joints and form elongated zones after this direction. The supposed contact zone which seems to parallel the foliation strikes approximately in the same direction as these joints, and could have been more important for the structural control of the mineralization.

In drillhole No. 2/69 the most interesting sulphide intersection shows pyrrhotite, chalcopyrite and pyrite sitting in irregular veins consisting of a pyroxene-amphibole fraction which seems to intrude the mediumgrained and massive norite-hyperite. This points to a relationship between at least some of the sulphides and a probably late ultrabasic phase of the magma which intruded the mediumgrained norite-hyperite whilst this was in a semi solid state (see F. Nixon's drill report of Dec. 11th, 1969). It is possible that this ultrabasic phase was richer in nickel and sulphur than the more widespread norite-hyperite. It should be mentioned that drilling has shown that what is interpreted as primary layering occurs in basic varieties as well as in normal varieties of the norite-hyperite (both containing local sulphides) near the transitional zone to more foliated rocks to the west. This basic to ultrabasic type contrary to the variety described from drillhole 2/69 seems to represent an early differentian phase of the magma.

Even though the main factor controlling the deposition of the sulphides at Mølland is somewhat obscure, it has been stated that the mineralization is located near and along the western margin of the basic multiple intrusive. Most of the basic to ultrabasic varieties of this intrusive seem to occur close to the same alignment as well, especially from 200 N to 75 S. Thus the most obvious potential area would cover the ground along and close to the eastern shore of Kjettevann from the pegmatite near 300 N to the dam including the area where exploration already has taken place. Attention should also be given to the area further S towards the main Støledalen road following a possible extension of the eastern side of the Kjettevann gneiss wedge in this direction. With a possible southerly plunge of an ore, mineralization would have to be located at deeper levels in this direction. As already suggested it seems as if there was not sufficient sulphur present to form a sulphide-rich deposit at the time the mineralization took place.

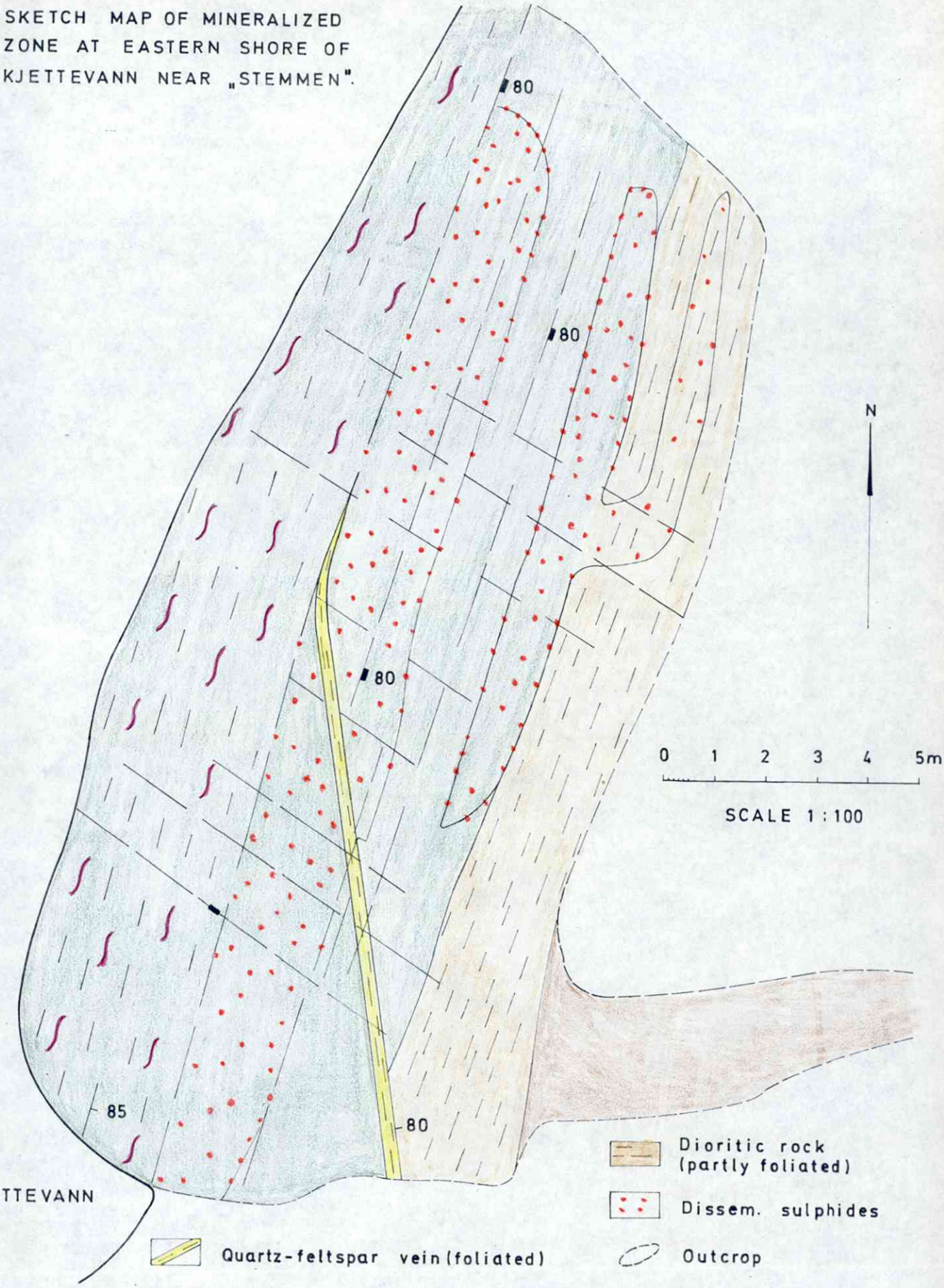
NAME of examiner: .....

WORK DONE AND TIME SPENT in examination:

Geological investigation of prospect with detailed mapping of the Mølland intrusive exclusive geophysical work and soil sampling: 9 days.

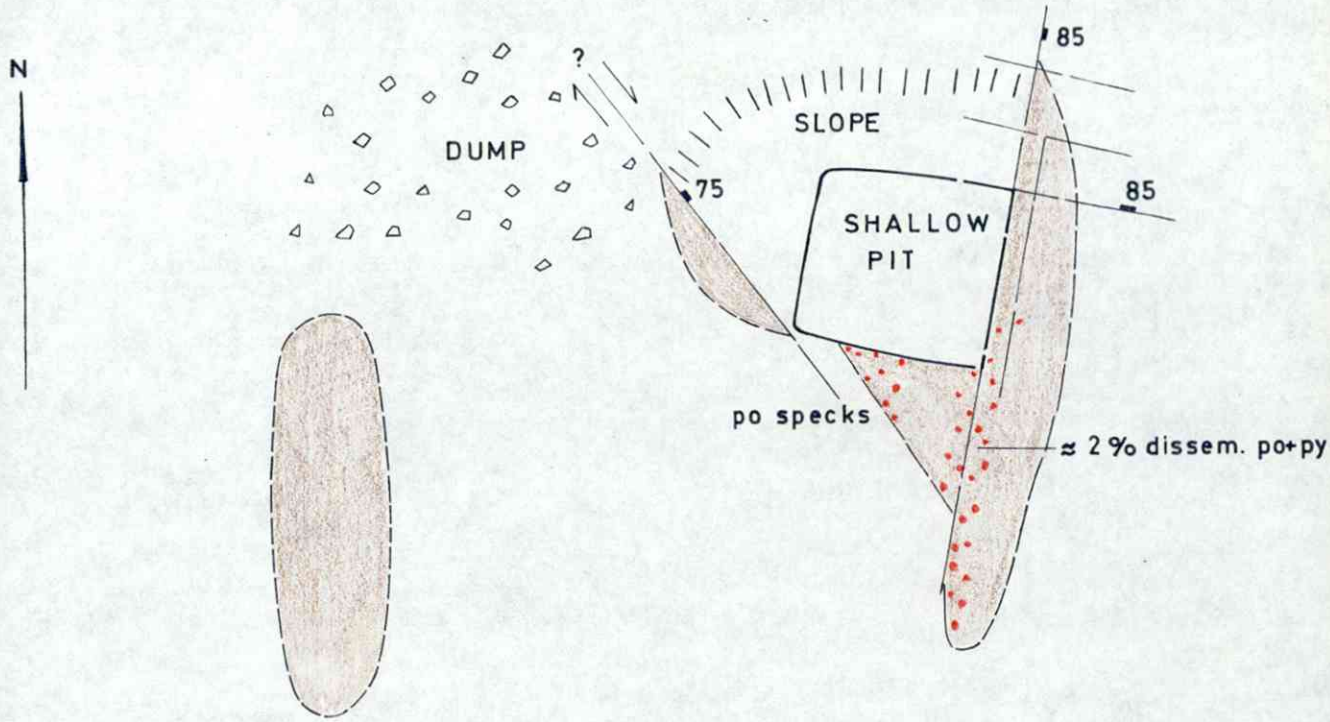
March 6th, 1970
EOv/hm

SKETCH MAP OF MINERALIZED ZONE AT EASTERN SHORE OF KJETTEVANN NEAR „STEMMEN".

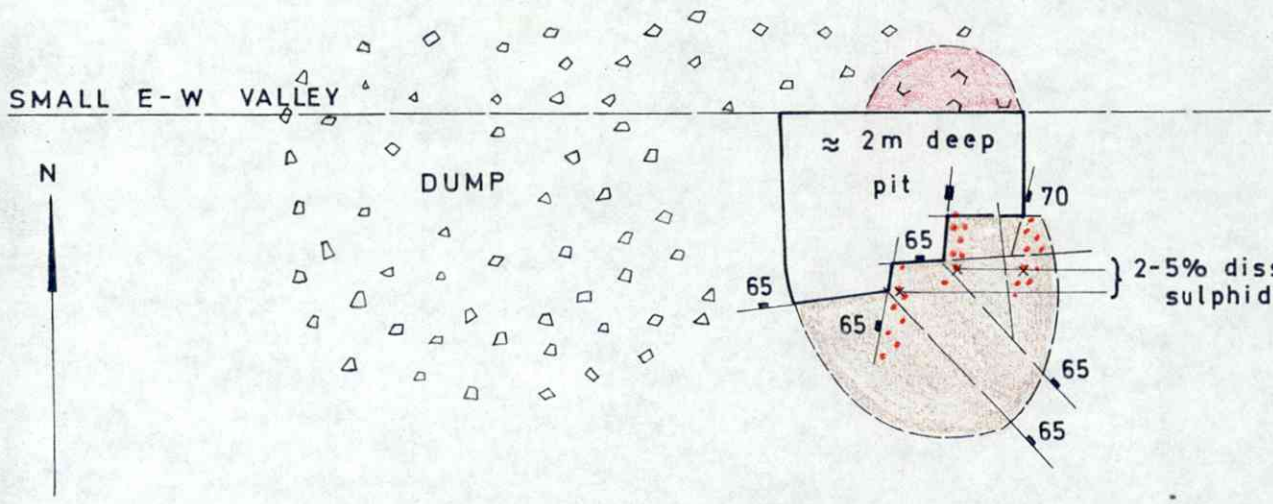


Drawn by E.O.

NORTHERNMOST PROSPECT (107 N) KJETTEVANN, MÖLLAND.



PROSPECT AT 90 N KJETTEVANN, MÖLLAND.



PEGMATITE

2-5 % DISSEM. SULPHIDES

BASIC PHACE OF NORITE

OUTCROP

JOINT

0 1 2 3 4 5

SCALE 1 : 75

SKETCH MAP OF MÖLLAND
PROSPECT PITS.

DRAWN BY E.O.

PLATE I

Photo E.O. Aug. 1968.

Looking NE from "stemmen" towards rustzone (r) at lake shore.
Cabin on peninsula and high hill with pegmatites (p) in background.

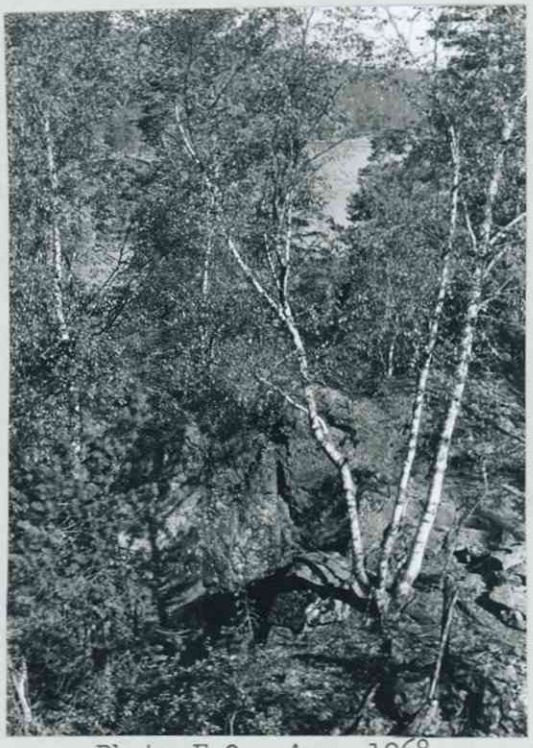


Photo E.O. Aug. 1968.

Looking NW at exploration shaft with Kjettevann between trees in background.

Photo E.O. Aug. 1968.

Looking E at small prospect at 90 N.
Picture shows joints 260°/65° in massive altered basic rock.

FALCONBRIDGE NIKKELVERK, AKTIESELSKAP

LOCATION

Name: ORREKNAPPEN MINE. Map unit F9. Air photograph No. 1-61 64-2629. Access is by road. The mine lies about 30 m to the west of the road to Aukland farm, approx. half way between the farm and where the road joins the main Frikstad-Vatne road.

STATUS

A government holding.

HISTORY

Mutet 22.6.1916. Trial exploration was carried out from 1869-72 when a 1½ m deep pit was sunk. In 1907 the mine was pumped empty of water and sampling was carried out. In 1917 trial work was carried out by Evje Nikkelverk A/S. The shaft was sunk to a depth of 15 m and a cross-cut 80 m long was driven in the direction of the ores foliation. Two diamond drill holes proved to be barren. 285 t of ore with a Ni content of 2% were produced. Work was continued until 1918 but then abandoned.

Published records

Barth, T.F.W. The Nickeliferous Evje-Iveland Amphibolite and its relation. N.G.U. No. 168a. 1947.

Bjørlykke, H. Flåt Nickel Mine. N.G.U. No. 168b. 1947.

Vogt, J. Om nikkel, navnlig om muligheten at gjenoptage den norske bergverksdrift paa nikkel. Tekn. Ugeblad 1901 og 1902 pp 1-38. Et tiårstilleg i T.U. 1911.

Unpublished records

Bjørlykke, H. Dagbok for arbeide for A/S Raffineringsverket, Evje sommeren 1940, p. 7. Sulfidmalm files Evje-Iveland file 1.

Bjørlykke & Carstens. Rapport over geologiske undersøkelser ved Flåt grube 1940. Sulfidmalm files. Evje-Iveland file 1.

Poulsen, A.O. Nikkelmalmfeltet i Iveland. N.G.U. Bergarkiv rapport nr. 2608. Copy in Sulfidmalm files.

GEOLOGICAL SETTING

The orreknappen mine lies within, but near the eastern margin of the more massive, basic rocks of the Iveland-Evje complex. The rocks that outcrop in the immediate vicinity of the mine are amphibolites and coarse hb. diorite. The amphibolites are mostly med./fine grained. Pegmatites are fairly abundant in the area. The mine lies 400 m south of a strong east-west structural feature and 250 m north west of a strong NE/SW structural feature.

Most of the exposed rock around the shaft is fine- to medium-grained amphibolite in part containing a little biotite and a little quartz. Ore minerals were found associated with these amphibolites, mostly as small grains in aggregates of felspar and quartz grains.

Most of the visible ore at the mine is connected with shears. On one rock face a distinct shear 120/27 cuts the rocks, which are for the most part amphibolites although modifications occur. In the actual main shear zone the rock is a strongly schistose, lustry black hornblendite. Massive ore occurs below this shear zone both as veins and massive clumps. There are also sulphides developed along joint surfaces and as veins parallel to the shear.

Ultrabasic rocks (meta. pyroxenites) also occur as a thin coating (10 cm) on a plane 125/69 which is possibly a shear.

STRUCTURES

The foliation in the Orreknappen area varies but the main trend is roughly NW/SE falling towards the west. In the actual mine area the foliation proved difficult to measure because of the rather massive nature of the rocks. The three measurements made were 293/90, 198/85 NW, and 225/90. Lineations were recorded in two places, both reflecting the linear arrangement of mineral grains (hornblende and biotite). The lineations recorded were 230/30 SW, and 240/32 SW.

As stated above some of the ore seems to be connected to a rather flat flying shear striking 120/27 SW. A dominant shear (joint) on 125/69 SW was noted and on this face were veins of chalcopyrite striking 137/90.

From the old records it seems that the mine has been worked to a vertical depth of 70 m probably following a vertical or near vertical orebody. It could be possible that the mineralization is controlled by the intersection of two different structures and in this respect it is interesting to note that the intersections of the joint 125/69 with the foliation 198/85 gives a linear structure trending 225 and 70.

CHARACTERISTICS OF ORE

The massive ore consists mainly of pyrrhotite with minor pyrite and chalcopyrite. The main mineralizations visible were -

a) connected with shears
b) as veins
c) as concentrations along joint surfaces
d) as disseminations

The smaller veins are rich in pyrite and chalcopyrite whereas larger veins are rich in pyrrhotite - usually having more chalcopyrite towards the border. In places the massive ore has inclusions of amphibolite which is slightly sheared and contains disseminated ore minerals. A polished section of a sample of massive pyrrhotite gave the following minerals:

	Est. % by Vol.
Pyrrhotite	74
Marcasite	7
Chalcopyrite	1
Pentlandite + Violarite	2
Goethite	4
Gangue silicates	12

In hand specimen the sample shows coarse parting planes of pyrrhotite over 3 cms in diameter. In polished section, the pyrrhotite shows development of marcasite blades along these parting planes. Exsolution blebs of pentlandite, now altered to violarite, are difficult to distinguish from the marcasite, since they follow along the same crystallographic directions. Chalcopyrite is a minor constituent, occurring as blebs and streaks in the pyrrhotite and adjacent to patches of gangue.

Veinlets of secondary goethite transact the section and often rim the subhedral grains of silicate inclusions.

FALCONBRIDGE NIKKELVERK, AKTIESELSKAP

ANALYSES

Specimen No.	Ni	Co	Cu	Fe	S
O/Birk 1	0.6	0.04	0.4	31.8	17

Analysis carried out at FN K'sand, February 1968.

Specimen No.	Ni	Co	Cu	Fe	S	
2 68 E9a	1.43	0.066	0.07	51.5	36	massive ore
3 68 E9	0.86	0.053	1.38	44.2	22	ultrabasic + po & cp.
4 68 E9	1.45	0.05	0.06	53.0	37	massive ore

Analyses carried out at FN K'sand, September 1968.

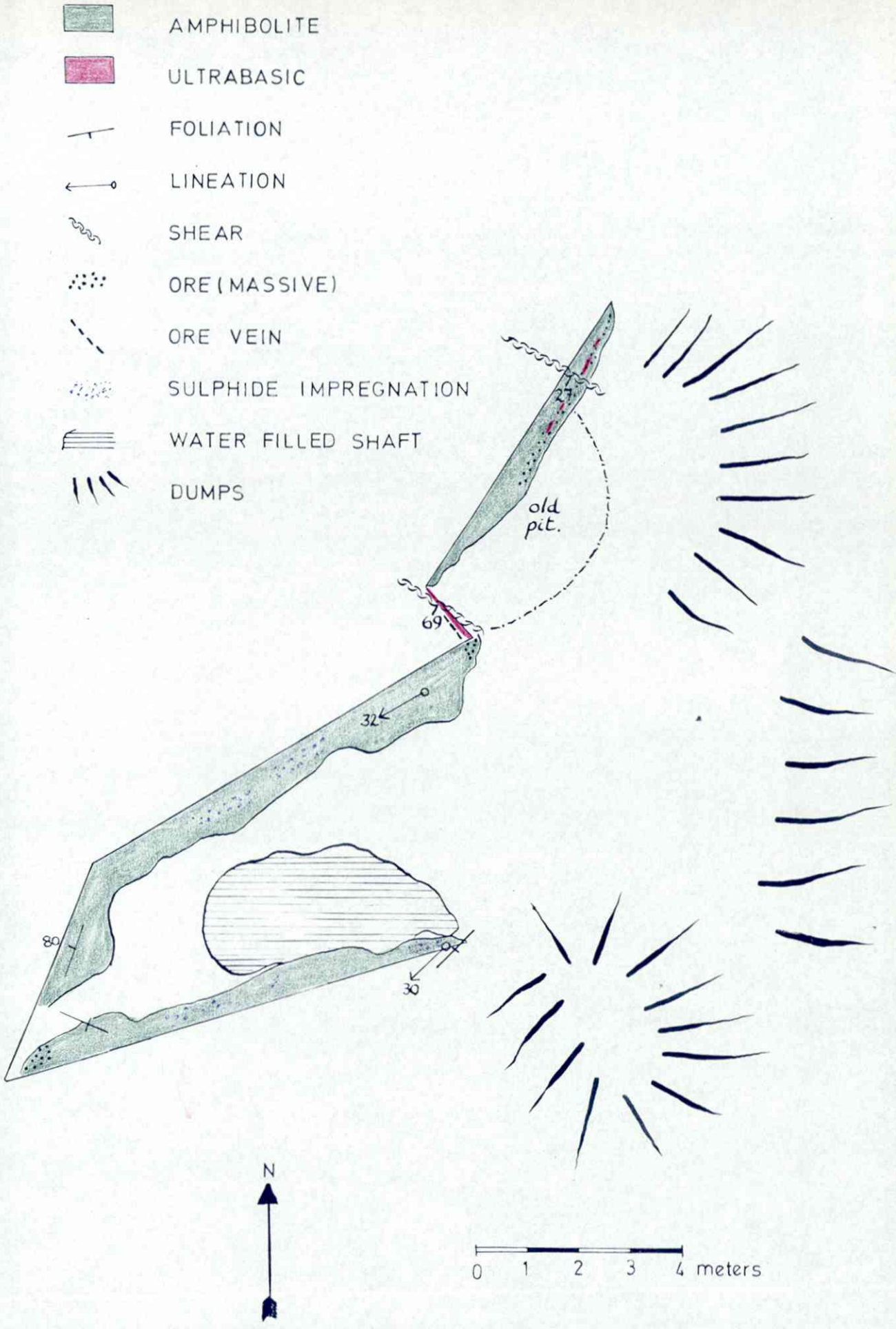
Specimen No.	Ni	Co	Cu	Fe	S
2 68 F9a	1.43	0.066	0.07	51.5	36.0[1]
3 68 F9	0.86	0.053	1.38	44.2	22.0[2]
4 68 F9	1.45	0.05	0.06	53.0	37.0[3]

1) massive pyrrhotite.
2) meta ultrabasic-rich in pyrrhotite and chalcopyrite.
3) massive pyrrhotite.

Analyses carried out at FN K'sand 28.9.1968.

NAME of examiner: Frank Nixon

FN/hm February 15, 1969.



ORREKNAPPEN MINE

FALCONBRIDGE NIKKELVERK, AKTIESELSKAP

EVJE-IVELAND PROJECT

CATALOGUE No. 5....

LOCATION

Name, Bekken Prospect Pit. Map unit F9. Air photograph I 61 64-2629. The prospect pit lies on the south side of Birkeland stream about 200 m ENE of Aukland farm. (Refer EM map Birkeland - Aukland.)

STATUS

A government holding.

HISTORY

It is known to have been worked in 1897 (see Beretning om Evje Nikkelverk 1872 - 1897). The first owners were A/S Evje Nikkelverk, the prospect was taken over by A/S Raffineringsverket in 1925. Now belongs to the State. Men with best first hand knowledge are Albert Frikstad and Orest Landsverk.

Unpublished records.

Bjørlykke H. Dagbok for arbeide for A/S Raffineringsverket, Evje, sommeren 1940. Sulfidmalm files.

GEOLOGICAL SETTING

A small water filled prospect 2 m x 3 m that regionally speaking lies on the border zones of the main basic complex of the Evje-Iveland area. The rocks outcropping in the immediate vicinity of the pit are mostly amphibolites these becoming more gneissic as one moves north and east.

The prospect lies immediately north of a shear that strikes parallel to the stream. The stream itself seems to follow a strong tectonic feature and it was rather a surprise to find amphibolites striking across this stream. These amphibolites are well foliated, medium grained and contained in part disseminated pyrite.

STRUCTURES

Shearing parallel to the stream is very dominant and in the amphibolite behind the prospect three shears occur, 94/24 S, 90/28 S, and 92/38 S. Amphibolites strike obliquely in this amphibolite being 165/20 W and 170/24 W, a lineation in the amphibolite plunged 85° towards 262.

CHARACTERISTICS OF ORE

Massive ore was seen in situ at one place only - in connection with meta ultrabasics in a shear zone. The ore consisted of irregular clumps of pyrrhotite with minor pyrite. From the ore on the dumps a lot of the mineralization seemed to be in the form of veins. Minor disseminations of pyrrhotite and pyrite occur in the amphibolites.

FALCONBRIDGE NIKKELVERK, AKTIESELSKAP

ANALYSES

An analysis carried out by A. Merry Jnr. in 1897 gave 1.41% Ni and 0.38% Cu.

Specimen No.	Ni	Co	Cu	Fe	S	Ca	Mg
VHW 2b	0.35	0.04	0.26	26.1	12.6	1.8	7.5[x1]
VHW 2	1.3	0.11	0.12	53.5	40.0[x2]		

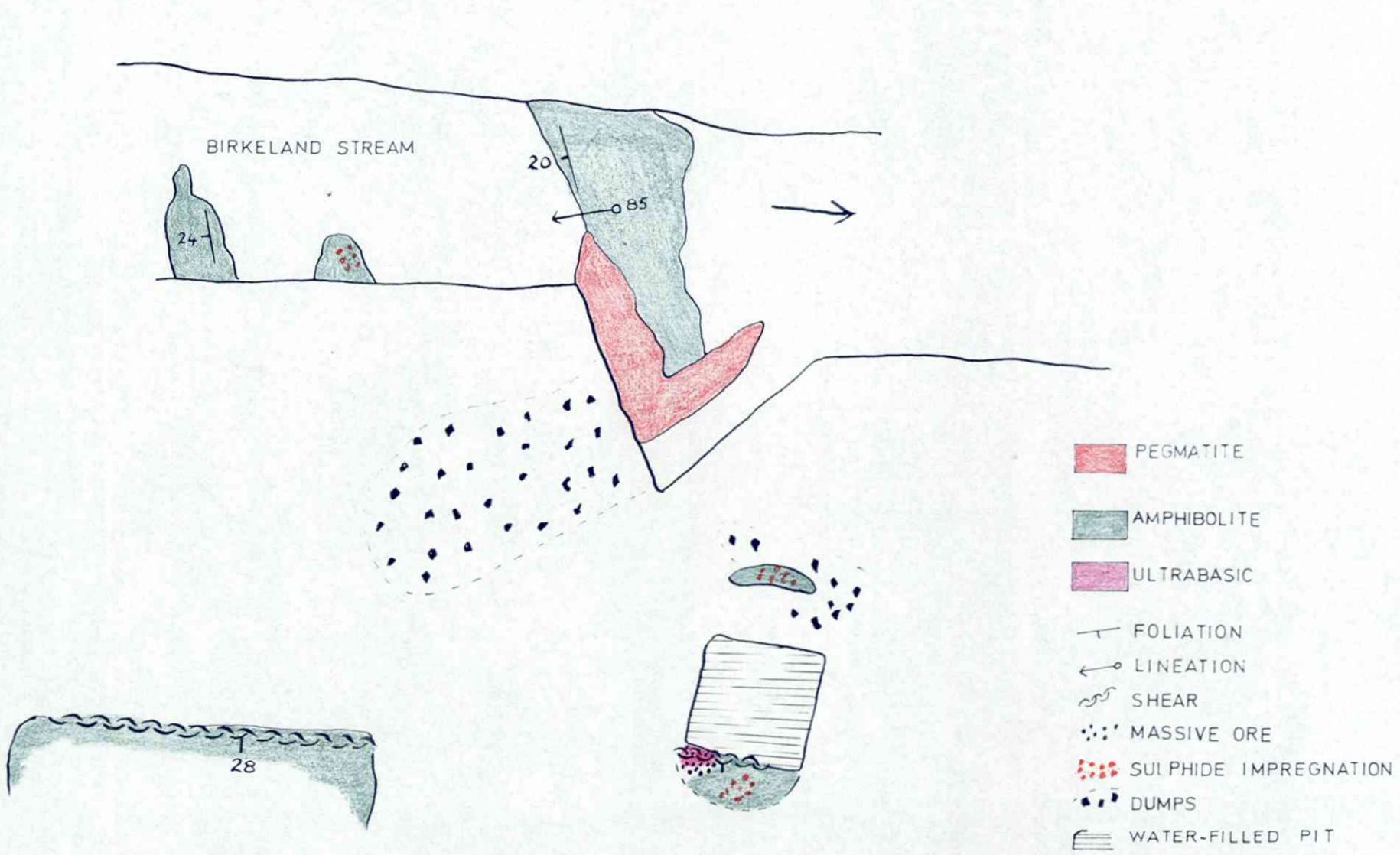
x1: impregnated ultrabasic

x2: ore: - massive pyrrhotite.

Analyses carried out at FN K'sand, February 1968.

NAME of examiner: Frank Nixon

FN/hm Feb. 15, 1969



BEKKEN PROSPECT PIT

EVJE-IVELAND PROJECT

CATALOGUE No. 6...

LOCATION

Name, Paascheskjerp south. Map unit F9. Air photograph I-61 64-2629. Lies about 20 m east of Bekken prospect pit on the northern side of Birkeland stream and about 200 m ENE of Aukland farm. (Ref. Birkeland E.M. map).

STATUS

Unknown.

HISTORY

Very little known, mentioned in a few early reports on the area. Regional mapping in scale 1:15'000 was carried out here in 1967 by Wiik, an electromagnetic survey was run in the same year by a A/S Sulfidmalm team. The present study was undertaken in the summer of 1968.

GEOLOGICAL SETTING

Two small prospect pits that are filled with water outcrops being very limited. The main rock type is an amphibolite which is medium grained and at times has a meta gabbroic appearance. In places the amphibolites are well sheared, rust but no sulphides is associated with these shears. Ultrabasic rocks were noted as A. thin bands parallel to the foliation. B. black sheared bands. Type A. are green hornblenditic/meta pyroxenitic rocks and of an intrusive origin. Type B. are considered to be shear products, they consist of a lustrous black hornblende orientated parallel to the plane of shearing.

STRUCTURES

The foliation in the rocks around the prospect is 125/50 SW, two dominant shears also trend in more or less the same direction being measured at 120/28 SW and 125/48 SW.

CHARACTERISTICS OF ORE

As no mineralization can be seen in present day outcrops it is perhaps useful to quote Bjørlykke's diary for 140. He hade presumably more opportunity to observe actual mineralization than we have today.

"At the prospect one can see "dykes" of pyrrhotite with big pyrite crystals, these dykes are about 5 cm thick. The smaller veins are richer in copper and pyrite. There are inclusions in the pyrrhotite of bullet shaped lumps of gabbro which are impregnated with pyrrhotite and chalcopyrite. The gabbro in the area of the pits has in places a weak dissemination.

ANALYSES

Specimen No.	Ni	Co	Cu	Fe	S	
O/BIRK 7	0.6	0.06	0.11	39.9	19.0	x1
O/BIRK 6	0.1	0.01	0.06	20.6	2.7	x2

x1 massive pyrrhotite in meta pyroxenite

x2 pyrrhotite in meta pyroxenite.

Analyses carried out at F.N., Kristiansand, February 1968.

Name of examiner .....

March 12, 1970
FN/hm

LOCATION

Prospect ca. 800 m NE of northend Litjern in "Iveland Kommune". No specific name. On southern border of map unit D9. Air photograph Nos. 1-61 64-2540 and 1-61 64-2633. The prospect consists of a small open cut and pit. It is reached on foot from the Evje-Frikstad road: from the road bend 400 m E of Litjern, a footpath is followed in a northerly direction along a stream for 300 m to a little swamp. After crossing the stream, the path first follows the swamp in a NNW direction then turns N along a narrow, steep valley for about 400 m.

STATUS

"Anmeldt" (claimed) by A/S SULFIDMALM in November 1967. 20/12

HISTORY

Little is known about the history of this prospect. The place was probably opened up about 50 years ago judging by the overgrowth and general appearance of the rock face and pit. It was shown to V.H. Wiik by Orest Landsverk in July 1967.

GEOLOGICAL SETTING

Generally speaking, the prospect is situated in the Litjern zone on the west side of the center of the Iveland-Evje amphibolite complex. The Litjern zone of dominantly amphibolitic rocks changes in a northerly direction into hornblende gneiss and dioritic gneiss, and the prospect is actually within a few hundred meters of this area of mixed gneisses.

The rock exposed at the prospect is dioritic gneiss and sheared meta-ultrabasics. The latter are referred to as meta-pyroxenite, but on account of shearing and weathering there is a wide range of alteration products. One sample was identified by V.H. Wiik as cummingtonite rock in the Lab. (cf. ANALYSES).

The pit below the 3 m high rock face is 2 x 1.5 m and about 1 m deep. There are outcrops of amphibolite under a large sheet of pegmatite, about 30 m to the N and 40 m to the E of the pit. Pegmatites are very numerous in the neighbourhood. Detailed geological observations are recorded on Fig.1 and Plates I & II.

STRUCTURES

Locally, the strike of the foliation varies from 185° to 217°, and the dip is at 80° to 85° to W or NW. Shearing parallel to foliation planes was noted. The prospect lies 250 m west of a conspicuous structural feature (strike 10°) observed on air photographs. A shear in the meta-ultrabasics at the prospect strikes 150°-155° and dips at 65° to SW. The alignment of this shear can be noticed in the terrain over a distance of at least 200 m.

The intersection of the SSE-striking shear with a certain horizon in the country rock, or shear parallel to the foliation, controls the mineralization. Since the intersection is a steeply plunging linear feature, the resulting "ore body" has a long, cylindrical or pipe-like shape with a very small diameter. The lack of lateral extent of the mineralization may explain why EM-test profiles both over the foliation and shear alignments were negative.

CHARACTERISTICS OF ORE

The visible lateral extent of the mineralization is very small. Disseminated sulphides and thin ore veins, dominantly pyrrhotite and minor chalcopyrite, occur in sheared meta-ultrabasics. A minor dissemination of pyrrhotite was noted in hard, dioritic gneiss. The best ore samples were collected on the dump.

ANALYSES

Specimen No.	Ni	Co	Cu	Fe	S	Ca	Mg
No.1-D10a * (ore)	0.13	0.07	0.61	25.2	12.0		
17(A)D9 ** Cummingtonite rock	0.04	<0.01	0.03	14.4	0.17	1.1	12.5

* Carried out at FN K'sand July 1968.
**Carried out at FN K'sand March 1968.

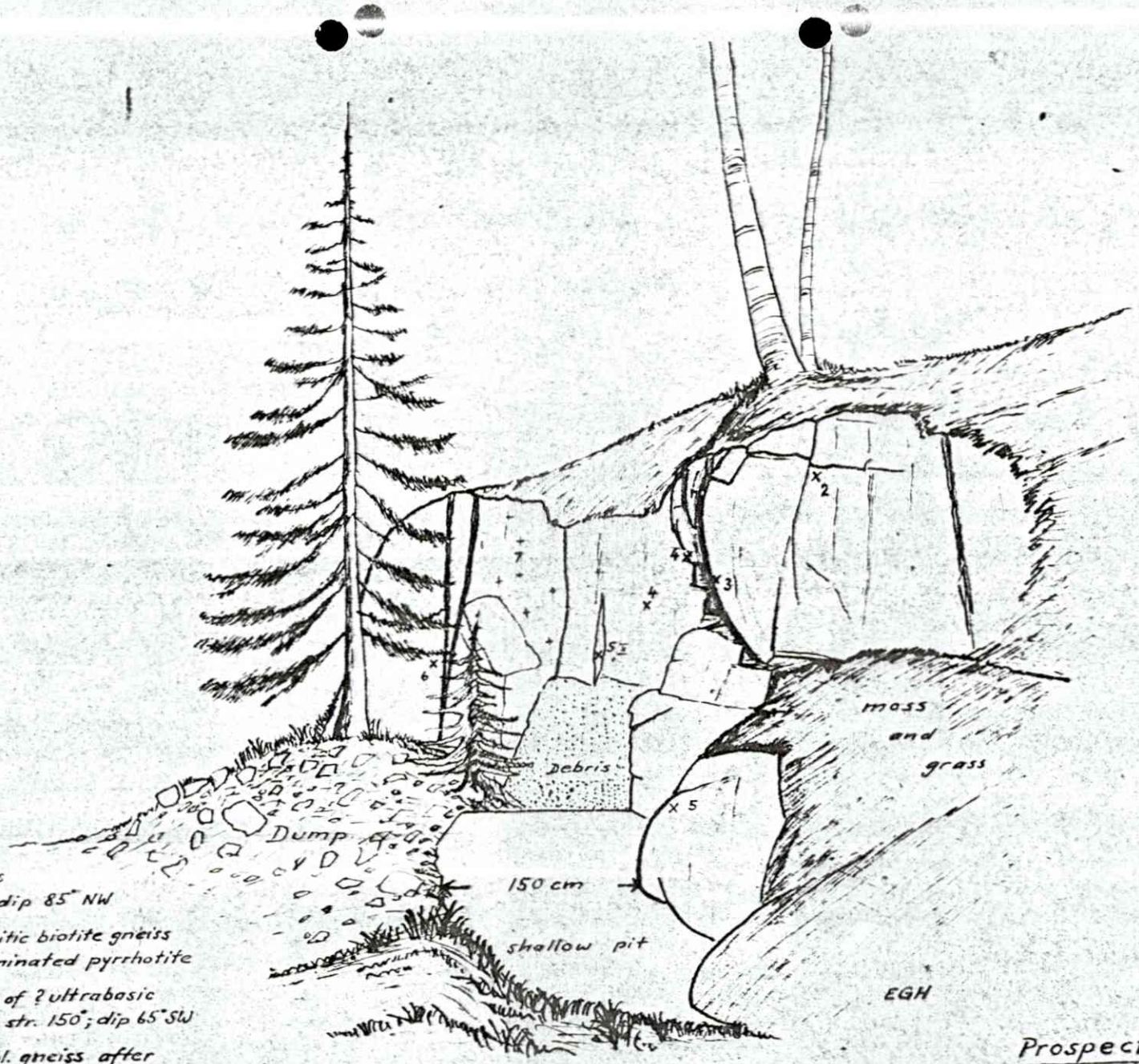
NAME of examiner: E.G. Haldenman

WORK DONE AND TIME SPENT in examination:

Geological investigation of prospect and neighbourhood; about 6 hours.
EM- tests with E. Overwien and party: about 2 hours.

EGH/8.November, 1968.

Fig. 1



2 Dioritic gneiss
Strike 217°; dip 85° NW

3 Very hard, dioritic biotite gneiss w. little disseminated pyrrhotite

4 Sheared rocks of ? ultrabasic origin. Shear str. 150°; dip 65° SW

5 Biotite-hornbl. gneiss after basic rock.

6 Meta-pyroxenite

7 Pegmatite: 10 cm thick sheet in shear (4)

Prospect 800 m NE of Litjern

View in northerly direction uphill

FALCONBRIDGE NIKKELVERK, AKTIESELSKAP

LOCATION

Name. LOMTJERN exploration shaft. Map unit F6. Air photograph 1-61 64-2927. Access: - with car along the Evje-Gautestad road to the big sand pit just beyond Aavesland, from here on foot in a SSE direction for approx. 1.4 km. The shaft lies at the eastern end of Lomtjern (dried up).

STATUS

A government holding.

HISTORY

Mentioned in "Beretning om Evje Nikkelverk 1872-1897". The first owners were A/S Evje Nikkelverk, taken over by Raffineringsverket A/S in 1925. Both magnetometer work (see Fig. 1) and drilling (Fig. 2) were carried out in 1914. Four holes were bored. Hole No. 1 found impregnation but no ore. Hole No. 2 found ore at 12 m, 1.5 m of pure ore and aplite holding 2% Ni. Holes 3 and 4 proved to be barren.

Drilling was taken up again in 1938 when 6 holes were put down. (See Fig. 2 and below)

HOLE No. 1

Depth	Ni	Cu	S	
15 m	0	0.05	2.20	impregnated gabbro
17 m	0.18	0.05	5.51	" "
21 m	0.15	0.05	5.5	" "

HOLE No. 2

Depth	Ni	Cu	S	
7 m	0.13	0.20	1.61	impregnated gabbro
10 m	0.63	0.44	13.10	ore

HOLE No. 3

Depth	Ni	Cu	S	
14 m	0.10	0.18	1.77	impregnated gabbro
15 m	0.13	0.16	1.92	" "

HOLE No. 4

Barren.

HOLE No. 5

Depth	Ni	Cu	S	
5 m	0.00	0.04	1.68	mica rich rock
7 m	0.05	0.08	5.51	" " "

HOLE No. 6

Depth	Ni	Cu	S	
6 m	0.03	0.08	3.30	compressed gabbro

Geophysical work was carried out by A/S SULFIDMALM in Aug. 1967 and further work was done on frozen lakes in March 1968. The results are combined on "Electromagnetic map of Lomtjern in Aaveslandsheia, Evje, Norway" scale 1:1'000.

The area was mapped by Wiik in 1967 on a scale of 1:15'000. Mapping on a scale of 1:5'000 was carried out by Nixon in 1968.

Unpublished records

Mørch Olsen, H. Rapport over Aavitslandsheiens skjærp. Sulfidmalm files. Evje-Iveland file 3.

GEOLOGICAL SETTING

The Lomtjern exploration shaft measures roughly 2 m x 5 m. It is water filled and its depth is estimated at beting about 8 m.

Generally speaking the shaft is situated in an area of predominantly amphibolitic rocks. The dominant rock type is a massive amphibolite. This is invariably a small to medium grained granular to granoblastic rock, often with a slight linear structure. In the hand specimen hornblende and plagioclase seem to be the major minerals.

A thin section of the rock outcropping at the actual pit shows the texture to be xenomorphic granular. Equant grains of fresh well twinned plagioclase (Albite, Carlsbad, Pericline twins) separate irregular aggregates of hornblende in a state of polygonization and recrystallization. Orthopyroxene and clinopyroxene are present as minor constituents. The plagioclase is fresh, the hornblende in a state of recrystallization, this is probably related to the conversion pyroxene - amphibole which is practically complete.

The area around the shaft is also rich in a fine grained intrusive granite.

Small amounts of ultrabasic rocks were confined exclusively to shear zones and are highly sheared and weathered.

STRUCTURES

Around the shaft the rocks when not sheared or altered are quite massive and structures are generally absent. A dominant shear at the prospect strikes 62° and dips 50° E.

CHARACTERISTICS OF ORE

Massive pyrrhotite was in visible outcrop confined to the shear zone. Minor disseminations of pyrrhotite, chalcopyrite, and pyrite were noted. The best ore samples were seen on the dumps, where pyrrhotite rich ore and chalcopyrite rich ore were abundant.

FALCONBRIDGE NIKKELVERK, AKTIESELSKAP

A polished section of massive pyrrhotite gave the following minerals:

	Est. % by Vol.
Pyrrhotite	68
Marcasite	12
Chalcopyrite	2
Pentlandite + Violarite	1
Pyrite	tr.
Magnetite + Ilmenite	1
Goethite	6
Gangue silicates	10

This sample in hand specimen shows massive pyrrhotite with coarse parting planes. In polished section chalcopyrite occurs as blebs often associated with grains of gangue, and altered pantlandite occurs in exsolution blades in the pyrrhotite. Magnetite and ilmenite occur in scattered rounded grains and pyrite seems to have developed in secondary patches with marcasite.

ANALYSES

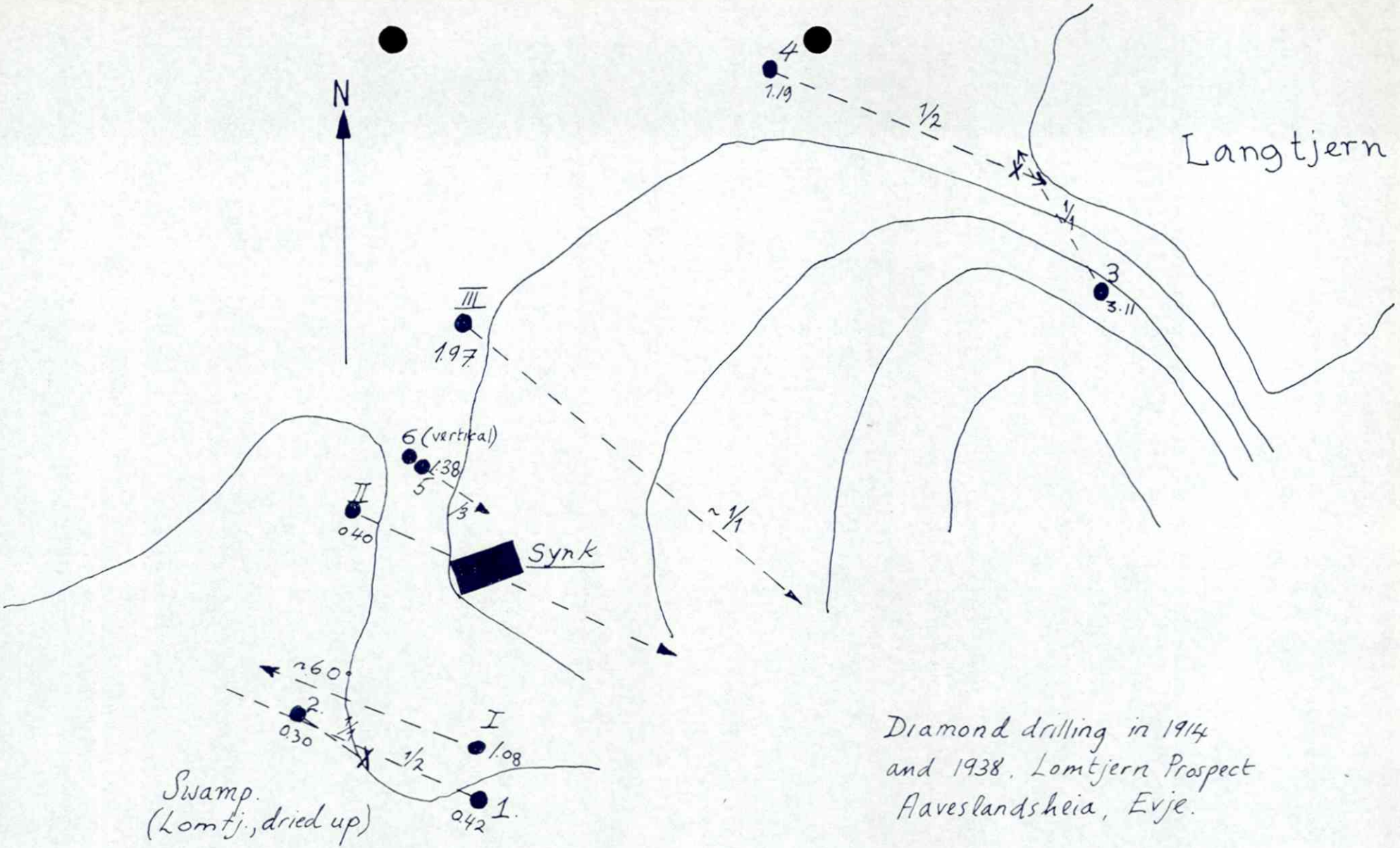
Specimen No.	Ni	Co	Cu	Fe	S
29.68 F6[x]	1.64	0.086	0.12	44.0	32.0
29.68 F6b[xx]	0.11	0.011	0.12	13.0	1.9
29.68 F6c[x]	1.61	0.064	0.19	42.7	24.0

x - ore sample
xx - impregnated amphibolite/m. gabbro.

Analyses carried out at FN K'sand 28.9.1968.

Name of examiner: Frank Nixon

FN/hm Feb. 17, 1969.



Diamond drilling in 1914 and 1938. Lomtjern Prospect Aaveslandsheia, Evje.

Scale 1:500.

I II III from 1914
1.2.3.4.5.6. from 1938.

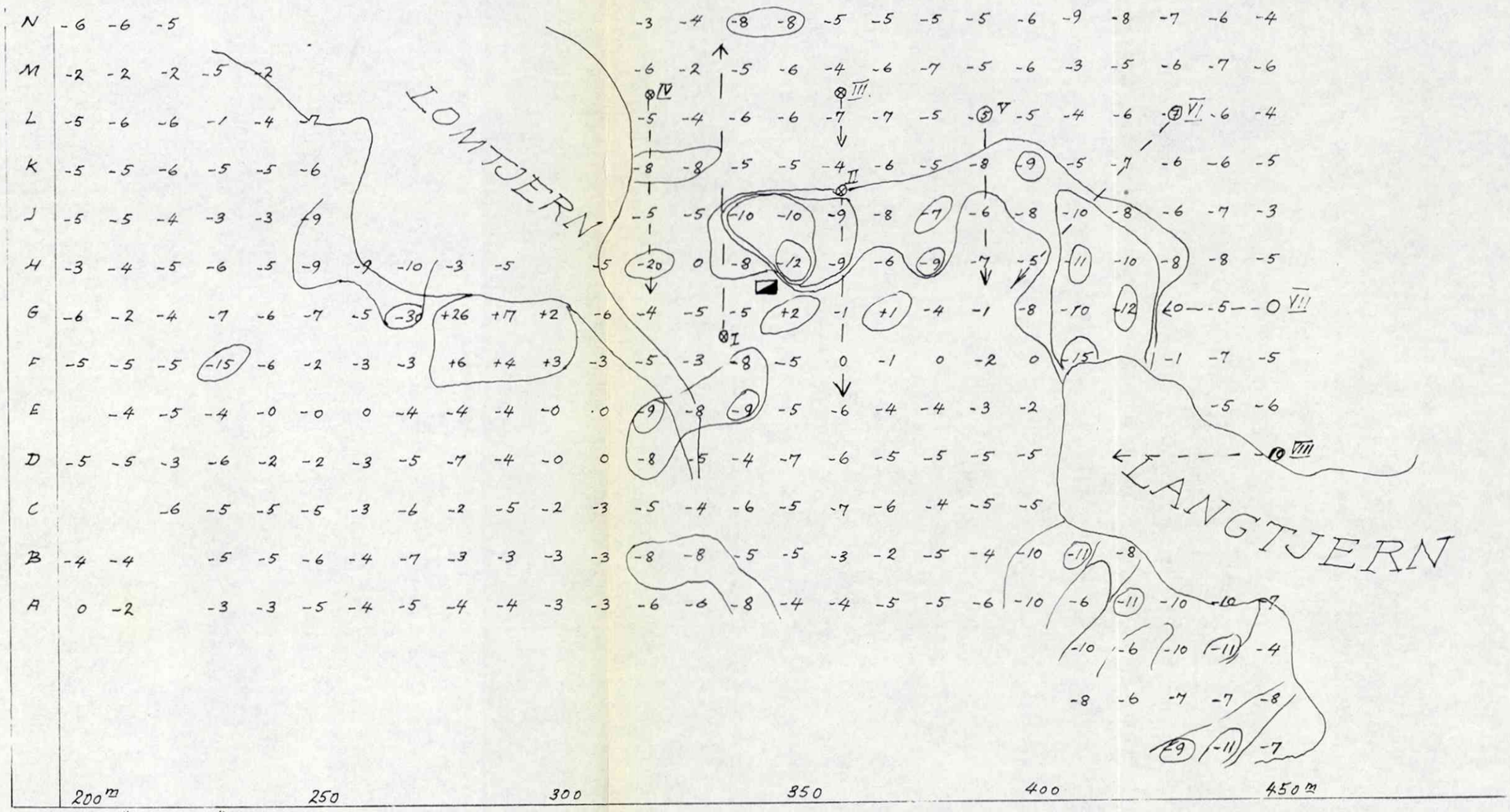
Fig. 2.

MAGNETOMETER KART

from

LOMTJERN SKJÆRP

Scale 1:1000 H. MO.



⊗---------→ - proposed bore hole. vertical intensity is given in degrees.

H. MÖRCH-OLSEN 1914.

Plate 1

Photo F.N. 29.7.1968

Lomtjern Exploration Shaft.
Photo taken looking in a NW direction.
All the visible outcrops consist of a fairly massive amphibolite. To the left of the picture (red line) there is a shear strike, 210, dip 69° NW. The amphibolite in this shear has been converted into a black lustrous hornblendite.

Plate 2

Photo F.N. 29.7.1968

Lomtjern Exploration Shaft.
Photo taken looking in an easterly direction.
The red line indicates a shear zone, strike 60, dip 50 SE, which contains meta pyroxenite and massive pyrrhotite.

Plate 3

Photo F.N. 29.7.1968

General view of Lomtjern Exploration shaft. Photo taken looking west. The swamp in the background is the drained bed of Lomtjern lake.

FALCONBRIDGE NIKKELVERK, AKTIESELSKAP

EVJE-IVELAND PROJECT

CATALOGUE No. 9....

LOCATION

Name, GULDREGN. Map unit F6. Air photograph 1 61 64-2927. The prospect lies about 300 m SW of Lomtjern skjerp, on the south side of a swamp. Can also be reached via Undeland.

STATUS

A government holding.

HISTORY

Mutet 27.3.1905. Originally was owned by A/S Evje Nikkelverk, taken over in 1925 by Raffineringsverket A/S. Mentioned in Mörch Olsens 1914 report on the pits in the Aaveslands area.

GEOLOGICAL SETTING

Outcrops in the vicinity of the pit are poor and granite pegmatites form the most frequent outcrops. Massive amphibolite outcrops to the north and east.

The pit measures 5 m x 5 m x 2 m deep and is sunk in medium grained amphibolites some of which are quartz rich. Outcrops are confined to the sides of the pit and no mineralization could be located here. On the east side a shear striking on 232 was observed.

CHARACTERISTICS OF ORE

No massive ore was seen either in outcrop or on the dumps. The dumps show mostly amphibolite some containing disseminated pyrrhotite and chalcopyrite, often enriched along cracks.

NAME of examiner: Frank Dixon

FN/hm Feb. 18, 1969.

FALCONBRIDGE NIKKELVERK, AKTIESELSKAP

EVJE-IVELAND PROJECT

CATALOGUE No. 10...

LOCATION.

Name, BYTTINGSMYR. Map unit F6. Air photograph 1-61 64-2927. Lies about 200 m south of Guldregn pit on top of a small hill. It can also be reached via Undeland farm.

STATUS

A government holding.

HISTORY

Mutet 24.10.1874. Original owners were A/S Evje Nikkelverk, later taken over by Raffineringsverket A/S. Mentioned in Mörch Olsen's 1914 report on the pits in the Aaveslands area.

GEOLOGICAL SETTING

The pit lies on top of a small hill. To the west are outcrops of a very dark massive amphibolite. The actual pit which measures 5 m x 3 m x 2 m deep is sunk in amphibolites some of which have a very meta gabbroic look about them. The outcrops are confined to the pit and a few patches around. A trace of a foliation (shearing?) was seen on the east side of the pit, this "shear" strikes on 200°.

CHARACTERISTICS OF ORE

Pyrrhotite and chalcopyrite are seen as disseminations in the amphibolite. No massive ore can be seen. From the outcrops or the dumps it is difficult to find any pattern for the disseminations.

ANALYSES

Specimen No.	Ni	Co	Cu	Fe	S	
0/203 E6	0.15	0.023	0.29	13	4.6	dissem. amphibolite

Analysis carried out at FN, K'sand, September 1968.

NAME of examiner: Frank Dixon

FN/hm Feb. 18, 1969.

FALCONBRIDGE NIKKELVERK, AKTIESELSKAP

LOCATION

Name, HESTAASEN. Map unit F6. Air photograph I 61 64-2927. Access - with car along Evje-Gautestad road to big sand pit just beyond Aavitsland, from here on foot in a SSE direction for roughly 1 km. The prospect lies 20 m to the west of a new pegmatite mine and about 300 m north of the western end of Lomtjern.

STATUS

A government holding.

HISTORY

Mutet 27.5.1916. Original owners A/S Evje Nikkelverk, taken over in 1925 by Raffineringsverket A/S.

Little is known about the history of the Hestaasen prospect. It is mentioned by H. Mörch-Olsen in a report about the various prospects in the Aavitslandsheia area. The prospect has evidently been drilled as drill core is found near the dumps.

Unpublished records

Mörch-Olsen H. Rapport over Aavitslandsheiens skjærp. 1914?
Sulfidmalm files. Iveland-Evje file 3.

GEOLOGICAL SETTING

The Hestaasen prospect consists of two smallish pits 8 - 9 m apart connected by a small trench (see Fig. 1). The prospect lies in an area of predominantly amphibolitic rocks. At the actual pits there is not much outcrop to see, but the mineralization seems to be connected to ultrabasic rocks (meta pyroxenites) and amphibolites.

The southernmost pit is approximately 4 m (N/S direction) x 3 m (E/W direction). The depth is difficult to estimate as the pit is filled with water, probably from the look of the dumps about 4 - 5 m.

On the eastern side of the pit there is a conspicuous shear zone on 70/20 which is in part occupied by a quartz vein 20 cm wide. Below this shear the rocktype is ultrabasic whilst above the shear are outcrops of massive amphibolite.

On the western side of the pit those rocks that were accessible proved to be basic amphibolites, some being quite sheared. A foliation 182/58 was obtained here.

Outcrops were both visible and accessible in the trench, amphibolites and ultrabasics occurring. In the outcrops marked sample A in Fig. 1 disseminated sulphides occur in the ultrabasic. On the west side of the trench disseminated specks of pyrite and pyrrhotite occur in amphibolite. A shear is also present on the west side of the trench, this running 220/80 (see Fig. 2).

The most northerly prospect pit is 3 m x 2½ m x 2 - 3 m deep. The outcrops around the pit are poor but on the western side there seems to be a shear running on 215 and falling east, probably being related to the shear in the trench.

STRUCTURE

Shearing is dominant and shearing and foliation intersections may be important as an ore control.

CHARACTERISTICS OF ORE

Massive pyrrhotite and clumps of pyrrhotite/pyrite are found on the dumps but none are found in outcrop. The ore seen in outcrop is disseminated impregnations of pyrrhotite and pyrite in both ultrabasic and amphibolite.

ANALYSES

A. Merry (1897)

2.353% Ni 0.054% Cu

In Mörch Olsen's 1914 report assays are quoted as follows:

Ni	Cu
2.50	0.19
2.12	0.16
2.26	0.18

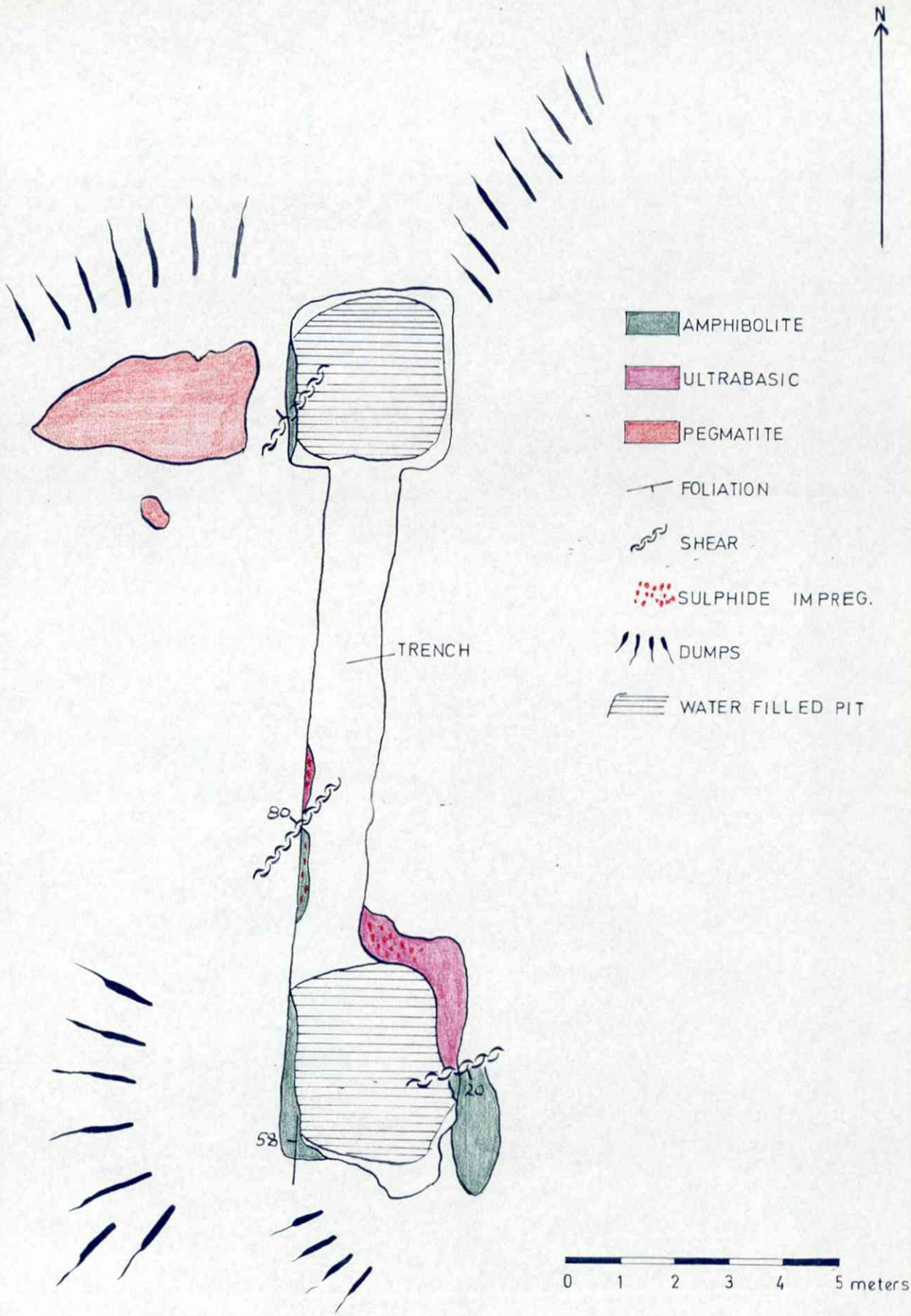
Analyses carried out at FN K'sand in September 1968 gave the following results:

Specimen No.	Ni	Co	Cu	Fe	S	
2868F6a	0.93	0.068	0.2	31	19.8	Pyrrhotite in ultrabasic
2868F6	0.40	0.031	0.46	20.4	8.7	Dissem. m. pyroxenite

4 hours spent examining the prospect. Detailed mapping carried out in the general area.

NAME of examiner: Frank Nixon

FN/hm Feb. 18, 1969.



HESTAASEN PROSPECT

Plate 1

Photo F.N. 1.8.1968

The southerly prospect pit at Hestaasen. Red line marks a shear zone strike 71°, dip 20°E in the eastern wall of the pit. The shear is partly occupied by a quartz vein 20 cms wide. The rocks below the shear are meta pyroxenites impregnated with pyrrhotite. Above the shear are massive amphibolites.

Plate 2

Photo F.H. 1.8.1968

Close up of shear on western wall of the southern pit. U indicates the meta ultrabasics, Q the quartz vein and A massive amphibolites.

Plate 3

Photo F.N. 1.8.1968

The northern prospect pit at Hestaasen. The picture gives a good impression of the lack of outcrop at this prospect pit.

FALCONBRIDGE NIKKELVERK, AKTIESELSKAP

EVJE-IVELAND PROJECT

CATALOGUE No. 12...

LOCATION

Name, LANGTJERN SKJERP. Map unit F6. Air photograph I-61 64-2927. Access, - with car along the Evje-Gautestad road to the big sand pit just beyond Aavesland, from here on foot in a SSE direction for approximately 1.4 km. The pit lies near the northern tip of Langtjern, and about 170 m NE of the Lomtjern prospect.

STATUS

A government holding.

HISTORY

Mutet 12.5.1906. Originally owned by A/S Evje Nikkelverk. Mentioned in Mörch Olsen's 1914 report on the pits in this area. Olsen writes - "Small diggings in a very weak impregnation zone. Magnetometer readings are small and uneven. No further work is justified here at the present time."

GEOLOGICAL SETTING

The pit lies in fairly massive amphibolites which outcrop quite extensively to the immediate south and to the south west and west. To the east and south east are ridges of fine grained granite. The prospect pit measures 6 m x 1 m and is about 1 m deep. Outcrops in the actual pit are poor but a shear in amphibolites is visible on the western wall of the pit (shear 30/69 E).

STRUCTURES

As mentioned above a shear is in the western wall of the pit. Foliation in the amphibolites to the immediate south is 205/90. Joints in the pit ran in two directions, these being 285/85 and 19/76.

CHARACTERISTICS OF ORE

No ore was visible in the pit so samples were taken from the dumps. A few lumps of massive pyrrhotite plus some pyrite were seen, along with disseminated pyrrhotite, chalcopyrite, and pyrite in amphibolite.

ANALYSES

Specimen No.	Ni	Co	Cu	Fe	S	
19.68F6	0.16	0.02	0.61	12.7	3.9	impreg. amphib.

Analysis carried out at FN K'sand, September 1968.

NAME of examiner: Frank Nixon

FN/hm Feb. 18, 1969.

FALCONBRIDGE NIKKELVERK, AKTIESELSKAP

EVJE-IVELAND PROJECT

CATALOGUE No. 13...

LOCATION

Prospect pit on west side of swamp between Langtjern and Store Øygårdsvn. Map unit F6. Air photograph I 61 64-2927. Access - with car along Evje-Gautestad road to big sand pit just beyond Aavesland, from here on foot in a SSE direction for approximately 1.4 km to the south end of Langtjern, over pegmatite ridge to the east and down into NW/SE running swamp. The prospect lies about 40 m SE of small lake in this swamp.

STATUS

Nothing known. Sulfidmalm have been calling this prospect Vikstøl. It now seems certain that this name is not correct. It is possible that this prospect is called Tellismyr or Rusåsen in which case it is a government holding.

HISTORY

Nothing known.

GEOLOGICAL SETTING

A small prospect pit in amphibolite in a predominantly acid area. The pit measures approximately 5 m x 3 m x 2 m deep. The outcrops in the actual pit are of a medium grained amphibolite, in part sheared and in part slightly granitized. To the north of the pit are outcrops of fine grained granitized amphibolite which is intruded by fine grained granite which forms a ridge running in a NNW/SSE direction. Quite a lot of material on the dumps is pegmatitic and outcrops of pegmatite occur to the west.

STRUCTURES

The general trend of the granitic rocks in this area is NW/SE. Foliation in the amphibolite at the pit is 54/50E. There is also a small shear zone in the pit that trends 360/10E.

CHARACTERISTICS OF ORE

The amount of sulphides seen in actual outcrop was very limited. In the accessible outcrops sulphides were noted at one place only, these being disseminated chalcopyrite and pyrite in a very rusty sheared amphibolite. One piece of massive pyrrhotite was found on the dumps.

ANALYSES

Specimen No.	Ni	Co	Cu	Fe	S	
2468F6	1.58	0.07	0.35	49	32.5	massive ore from dump

Analysis carried out at FN K'sand, Sept. 1968.

NAME of examiner: Frank Dixon...

FN/hm Feb. 15, 1969.