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Rapportarkivet

Bergvesenet rapport nr BV 537	Intern Journal nr	Internt arkiv nr	Rapport lokalisering Trondheim	Gradering Åpen
Kommer fra ..arkiv Falconbridge	Ekstern rapport nr Sul 461-77-23	Oversendt fra Sulfidmalm A/S	Fortrolig pga	Fortrolig fra dato:
Tittel Diamond drilling in the Petsamo Formation, Skogfoss Arch, Pasvik, june - august 1977				
Forfatter R B Band B Lieungh K Mørk		Dato Aug 1977	Bedrift Sulfidmalm A/S	
Kommune Sør-Varanger	Fylke Finnmark	Bergdistrikt Finnmark	1: 50 000 kartblad 24334	1: 250 000 kartblad Kirkenes
Fagområde Boring	Dokument type Rapport	Forekomster		
Råstofftype Malm/metall	Emneord Ni Cu			
Sammendrag Ett borhull l på 103m i Stallvann grid og to borhull på 143 og 99 m i Oksfjell øst grid.				

FOR FALCONBRIDGE NIKKELVERK A/S
A/S SULFIDMALM

PROJECT 905-23

Diamond drilling in the Petsaamo Formation,
Skogfoss Arch, Pasvik, June - August 1977.

By

R. B. Band
B. Lieungh
K. Mørk

Report No. 461/77/23.

1. INTRODUCTION.

The 1977 programme in Pasvik was heavily weighted in favour of exploration in the Pre-Petsaamo Formation gneisses to the south of the Skogfoss Arch. Investigations within the Petsaamo Formation in 1977 were restricted to two localities, namely:

- a) The Oksfjell East grid, to follow up indications from the 1976 deep moraine and bedrock geochemistry programme (Rpt. 442/76/23); and
- b) The Stallvann anomaly in the Skogfoss East Grid (Rpt.370/75/23).

Locations for these areas are shown in Fig.1.

The Stallvann locality DDH 32/77 was drilled to test a combined magnetic-VLF target. The length of this hole was 103.70 m.

At the Oksfjell East locality a restricted, detailed VLF-EM survey was carried out over the 1976 geochemical sampling grid (B. Lieungh), and two diamond drill-holes (33/77 and 34/77) were put down to test combined bedrock geochemistry/VLF-EM anomalies. Hole lengths for DDH 33/77 and DDH 34/77 were respectively 143.00 m and 98.70 m.

Diamond drilling was carried out by Trøndelag Diamantboring A/S, during the period June 30 - Aug. 3. Drill supervision was divided between R. Band and K. Mørk (A/S Sydvaranger).

2. OKSFJELL EAST

a) Previous work:

In 1975 DDH 29/75 was drilled in this part of the Oksfjell East grid to test a combined EM, magnetic and shallow till geochemistry target. It intersected 25 m of gabbro underlain by 11 m of strongly magnetic, massive serpentinite. The phyllite sequence beneath the serpentinite included sulphide-rich graphitic phyllites and minor talc-phyllite horizons. The talc phyllite sections gave assays up to 0.30% Ni and 0.16% Cu, which, while low, were among the highest values obtained in the Pasvik programme up to that date. The massive serpentinite gave Ni values between 0.13% and 0.18% Ni.

In 1976 this area was tested further by a programme of basal moraine and bedrock geochemistry (Rpt. 442/76/23). This indicated a ca. 600 m long Ni-enriched zone in bedrock lying to the north of DDH 29/75, and coinciding in part with isolated serpentinite exposures. Bedrock geochemistry data show a maximum zone width of 75 m, with an average width of 25-50 m. There is no magnetic expression over the bedrock geochemistry feature but strong EM anomalies occurred along both flanks. DDH 29/75 was stopped before intersecting the probable extension of this zone in depth.

b) 1977 Results:

A detailed VLF survey was run over the 1976 geochemistry grid to give complete EM-coverage. Results are shown in fig.2. and incorporated into the data summary map, fig.3, which also shows locations of DDH 33/77 and 34/77.

These holes were sited to test the bedrock geochemistry anomaly zone and associated EM anomalies at two localities 450 m apart. Drill hole sections are given in figs. 4 and 5 and detailed logs and assay sheets in Appendix I.

The dominant rock type in both drill holes was a sequence of alternating grey-green phyllites and black highly graphitic phyllites, the latter carrying generally 5-10% pyrrhotite, with occasional traces of chalcopyrite. Extensive assays showed values of always less than 0.10% Ni and 0.05% Cu in the sulphide-rich sections (Appendix I).

DDH 33/77 intersected 6 m of light-grey non-magnetic serpentinite from 83.00-89.00. This carried a uniform estimated 2-3% pyrrhotite. It is cut by a 40 cm wide breccia zone consisting of graphite fragments in a pyrrhotite-pyrite matrix. Assays from the serpentinite and graphite-breccia were extremely low (max. 0.03% Ni, 0.04% Cu).

Both DDH 33/77 and DDH 34/77 intersected repeated talc-carbonate schist units, with individual intersections varying from 2.75 to 13.10 m. These normally carry 1-2% sulphide, in the form of pyrrhotite with subordinate chalcopyrite. Assays show maximum of 0.24% Ni and 0.13% Cu, but are generally less than 0.15% Ni and 0.05% Cu. The talc-carbonate schists are non-magnetic. In addition to pure talc-carbonate schist, some phyllite sections also have a significant talc content, which appears to represent an admixture of ultramafic material in the original tuffaceous sediments of the phyllite sequence.

c) Conclusions.

Although the assay values encountered in the 1977 drilling are very low, the nickel-copper values in the talc carbonate schist sections are adequate to explain the bedrock geochemistry anomaly zone.

The various sulphide-bearing graphite-phyllite horizons explain the VLF-EM anomalies, but are difficult to correlate with individual conductors.

3. STALLVANN.

a) Previous work:

The results of previous work at Stallvann are summarized in fig.6. The Stallvann anomaly was discovered during the course of a mag.-VLF-geochemistry survey over the Skogfoss East Grid during 1975 (Rpt. 370/75/23). Subsequent geological mapping picked up three outcrops of massive, magnetic serpentinite along the margins of a strong magnetic anomaly. Strong VLF-EM anomalies are located along both flanks of this magnetic feature. The EM anomaly pattern for the Skogfoss Grid as whole suggests a marked fold-structure centred on the Stallvann magnetic anomaly. A weak till geochemistry anomaly extends down-ice from the Stallvann geophysical target.

b) 1977 Results:

DDH 32/77 was sited to drill through the magnetic feature and to test the flanking VLF-EM anomalies in the vicinity of the apparent fold hinge. A drill section is presented as fig.7 and the drill-log and assay sheets as Appendix II.

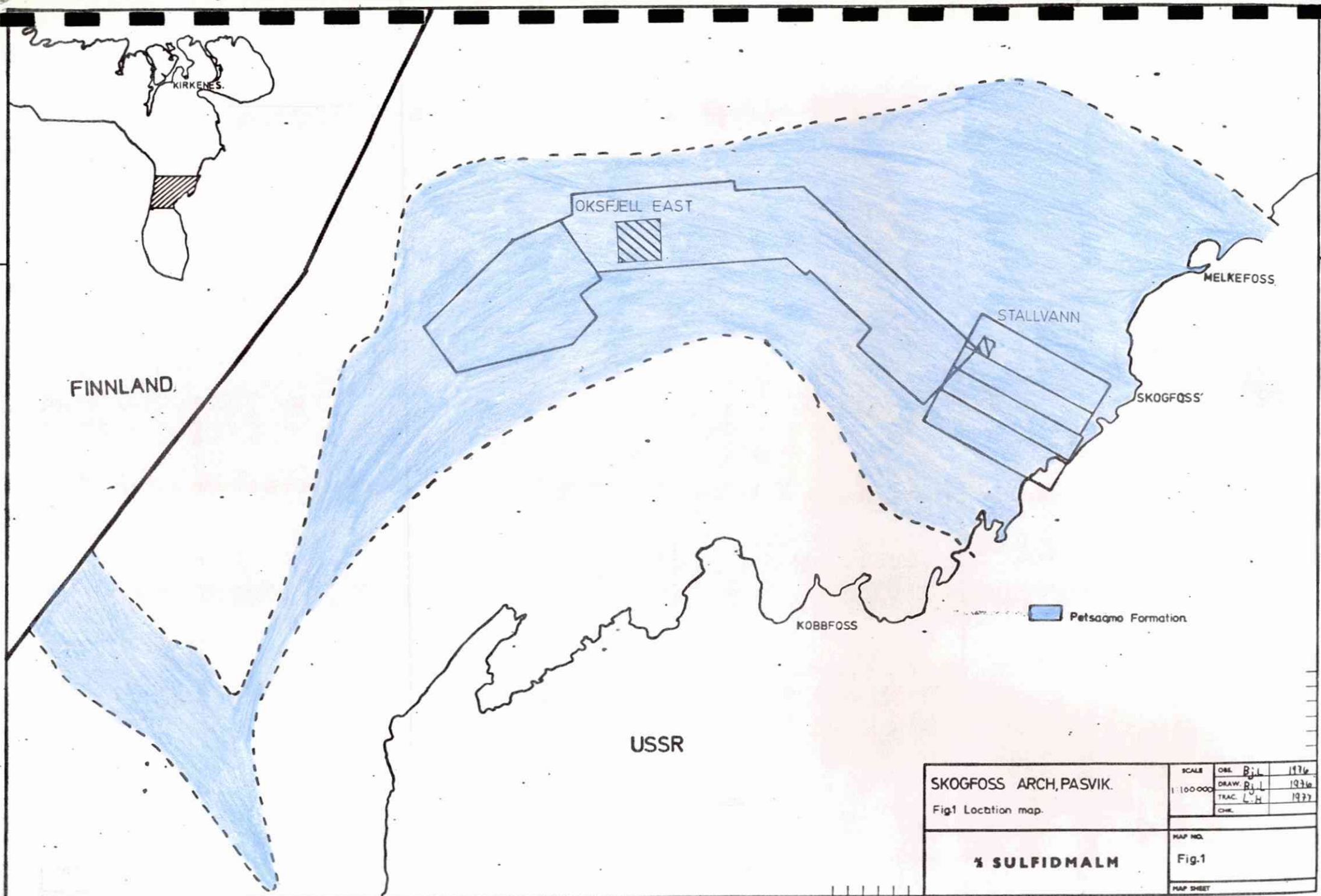
The magnetic anomaly is caused by a strongly magnetic, massive dark grey serpentinite which carries a uniform ca. 1% fine grained disseminated pyrrhotite. Assays show fairly constant values around 0.20% Ni and 0.02% Cu (Appendix II B).

The flanking conductors are caused by graphitic phyllite horizons carrying an estimated 5-20% pyrrhotite. Assays show very low values (max. 0.04% Ni, 0.05% Cu). A 6.60 m metagabbro intersection lying above the serpentinite also gave very low assay values (0.02% Ni, 0.01% Cu).

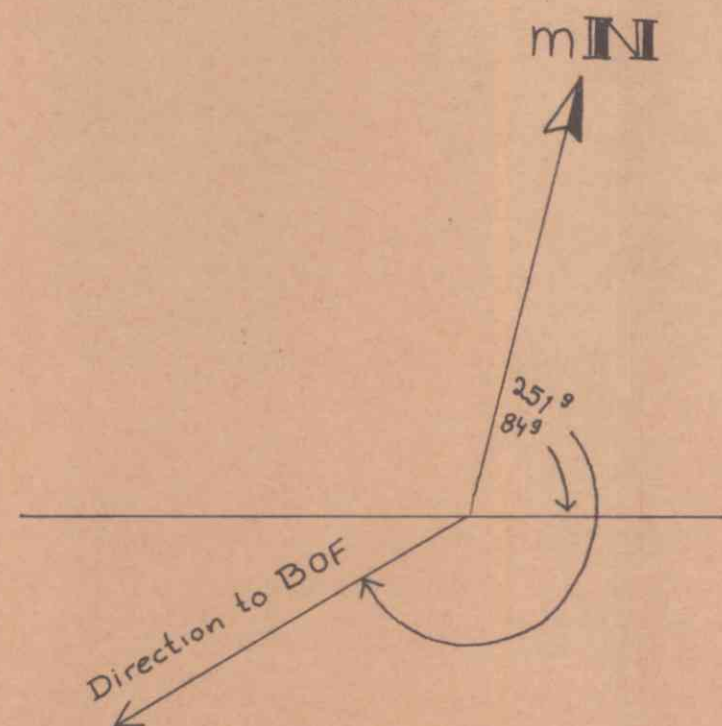
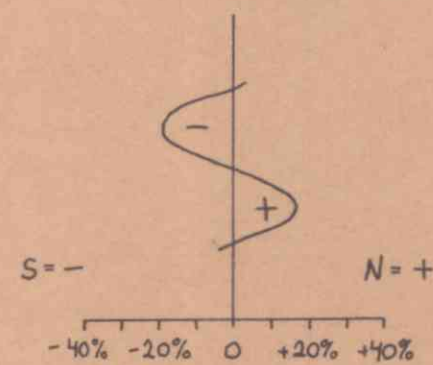
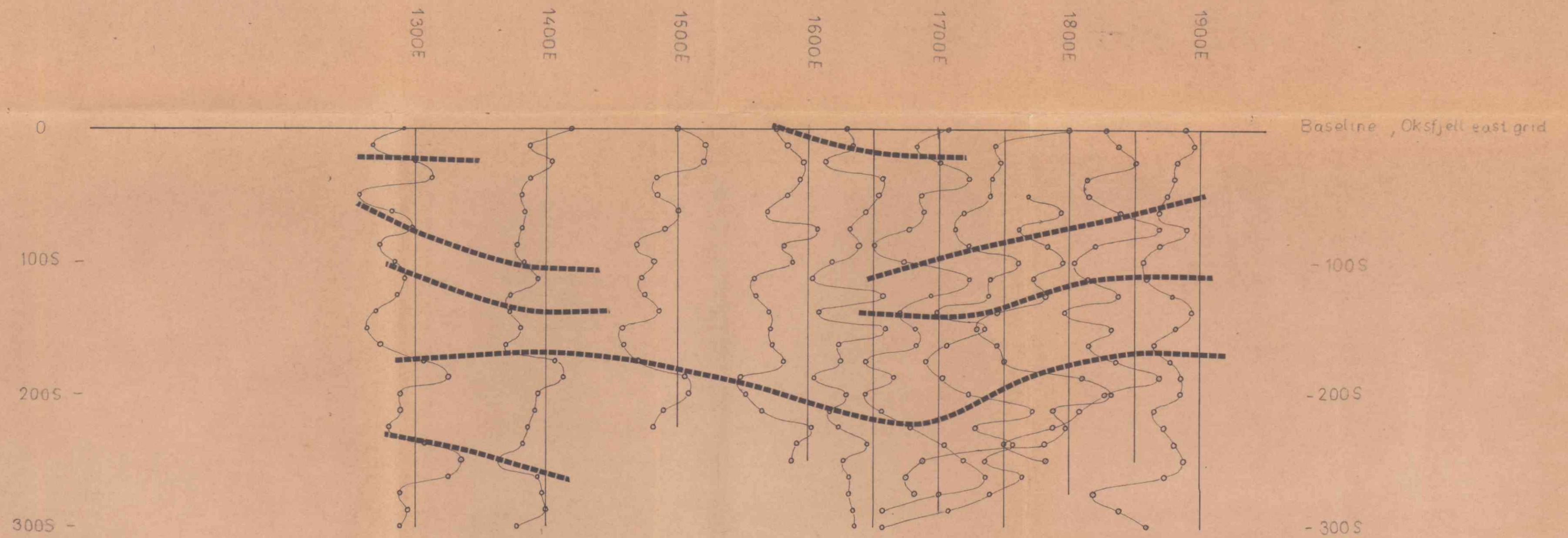
Core-angle measurements indicate that the serpentinite occurs in the core of a synform, the overlying phyllites dipping southwards with an apparent dip of 45° , while core angles below the serpentinite indicate a much flatter dip.

4. SUMMARY AND CONCLUSIONS.

- a) No mineralization of economic interest was intersected during the 1977 drill programme in the Skogfoss Arch.
- b) Drilling at the Oksfjell East locality has explained the bedrock geochemistry anomaly, which was due to non-magnetic talc-carbonate schists carrying an average 0.15% Ni and 0.05% Cu. The strong EM conductors associated with the bedrock geochemistry anomaly zone are due to graphite-phyllite horizons which carry 5-10% barren pyrrhotite.
- c) Drilling at Stallvann has explained the target geophysical anomaly, which is due to a massive, strongly magnetic serpentinite flanked by graphite-phyllites carrying 5-20% barren pyrrhotite.



SKOGFOSS ARCH, PASVIK. Fig.1 Location map.	SCALE	ORIG. B.J.L.	1976
	1:100,000	DRAW. B.J.L.	1976
		TRAC. L.H.	1977
		CHK.	
1 SULFIDMALM	MAP NO.		
	Fig.1		
	MAP SHEET		



VLF-EM "Dip-angle"	SCALE	OBS	BjL	6-77
		DRAW	BjL	6-77
	1:2500	TRAC	BjL	6-77
		CHK		
Oksfjell east grid, Pasvik		Instr: Geonics EM-16		
% SULFIDMALM		MAP NO		

- Ultrabasics
- Talc schist
- Meta gabbro
- Phyllites
- Greenstone/greenschist

1975 Drillhole section.

ppm Ni		ppm Cu		
average	range	average	range	
1250	1000-1400	400	200-700	-C
1983	1000-3000	800	400-1600	-B
1608	1300-1800	233	100-300	-A

DDH Up-dip projection
34/77 of drill hole.

- Strong VLF anomaly.
- Moderate VLF anomaly.

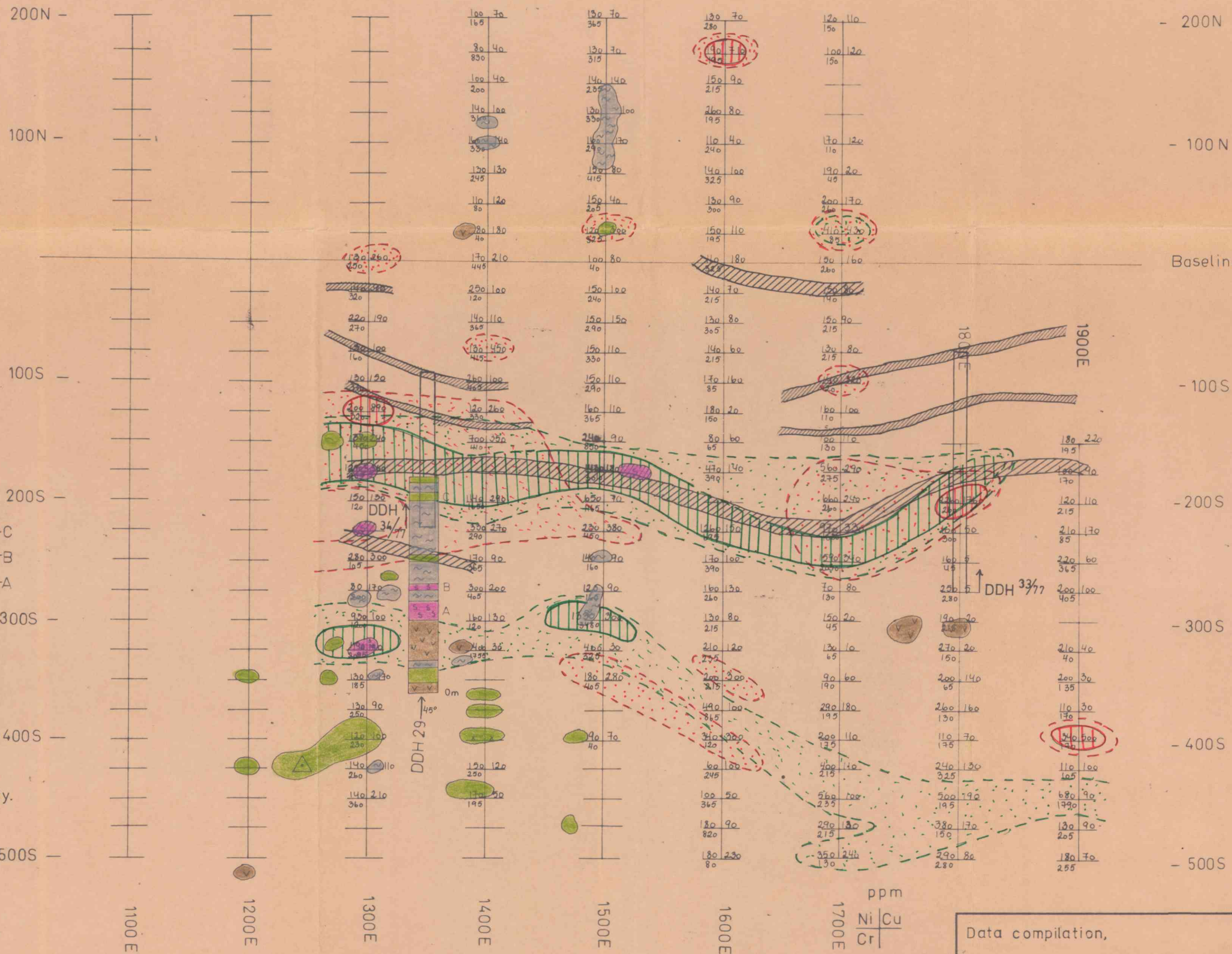
1976 Bedrock sampling data.

Ni

350-1000 ppm
 >1000ppm

Cu

250-500 ppm
 >500ppm



Data compilation,
OKSFJELL EAST AREA,
PASVIK.

SULFIDMALM

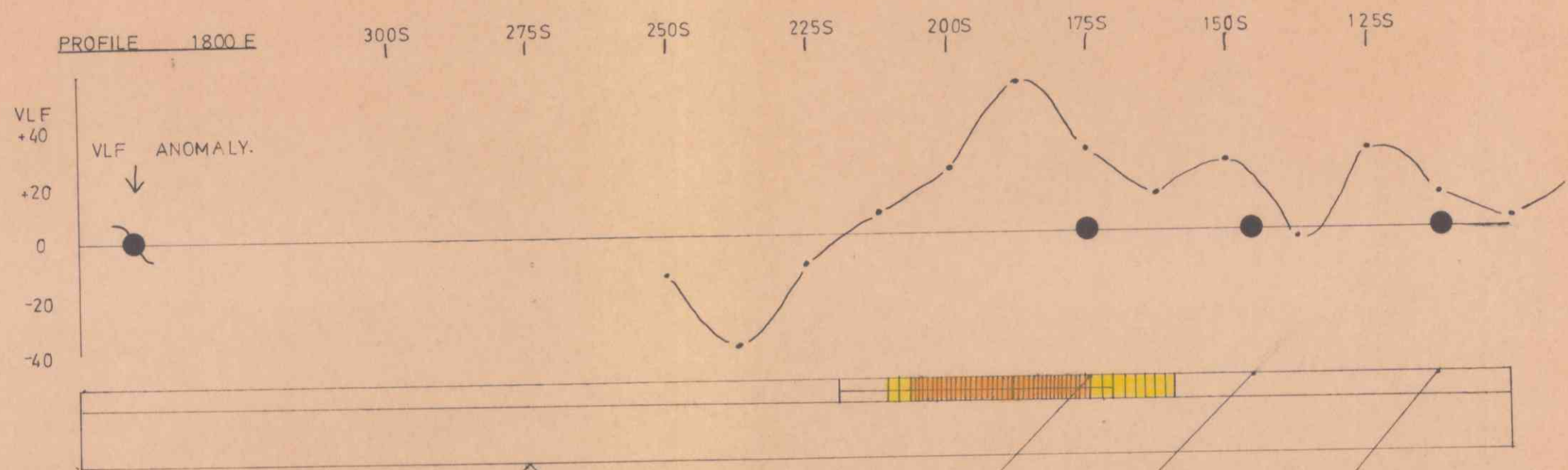
SCALE	OBS.	BjL	6-76
1:2500	DRAW.	---	1-77
	TRAC.	KA-BB	1-77
	CHK.		

MAP NO.
Fig.3 461-7723

MAP SHEET

S

N



KEY

- metagabbro.
- greenstone.
- chlorite-schist.
- graphite-phyllite.
- phyllite.
- graphite-schist.
- talc-carbonate-schist.

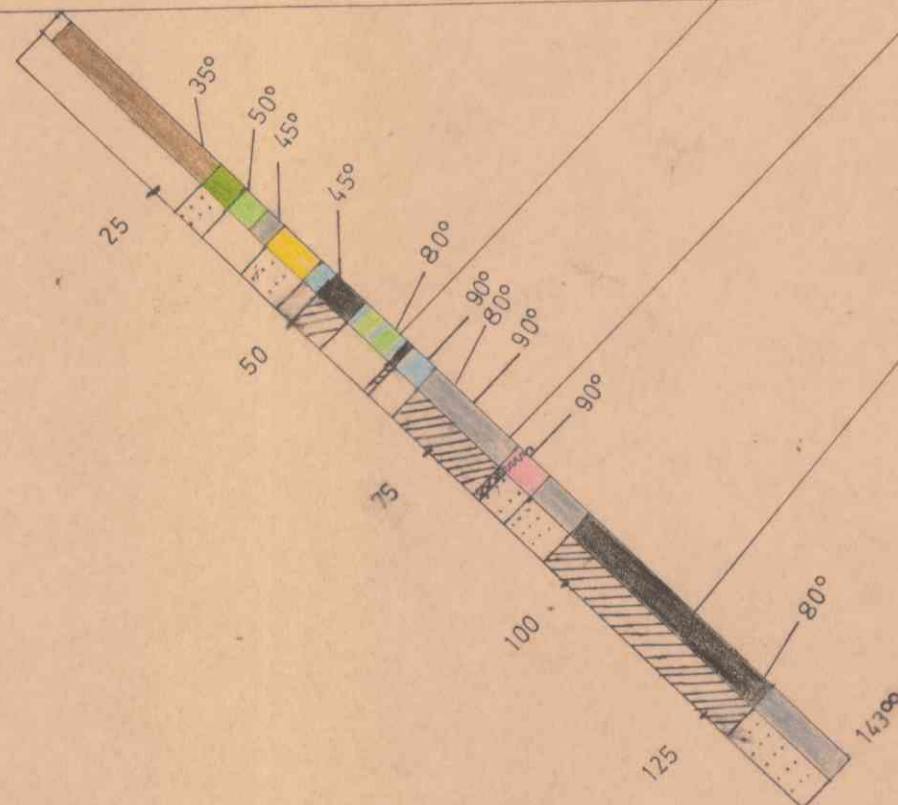
SULPHIDE CONTENTS.

- 1-3 % P_s
- 5-10 % P_s
- >10 % P_s
- breccia zone.

BEDROCK GEOCHEMISTRY.

- 500-1000 ppm Ni.
- >1000 ppm Ni.
- 250-500 ppm Cu.
- >500 ppm Cu.

● cross over from Crone Rødem Survey



A/S SULFIDMALM

PASVIK,
OKSFJELL EAST GRID.

Profile 1800E
DDH 33/77.

Obs. K. Mørk 77

SCALE 1:1000.

DRAWN

DATE

TRACED

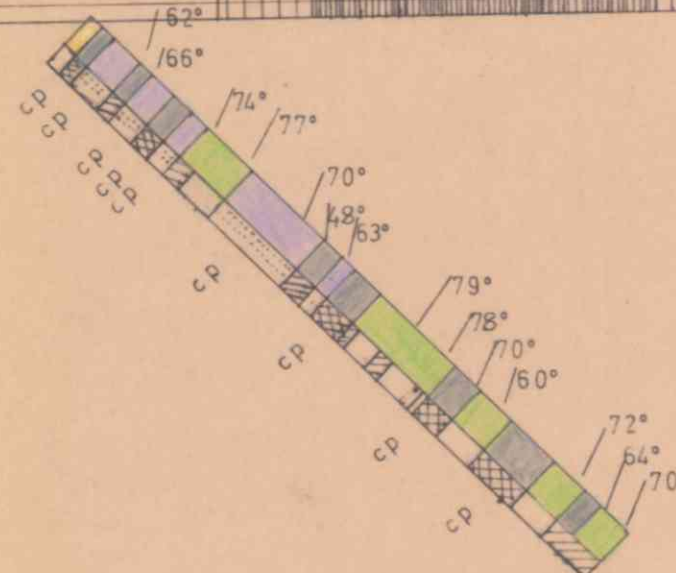
N



cp trace chalcopyrite

 > 500ppm Cu.

● cross over from Crone Radem Survey, June 77.



Section not corrected for elevation.

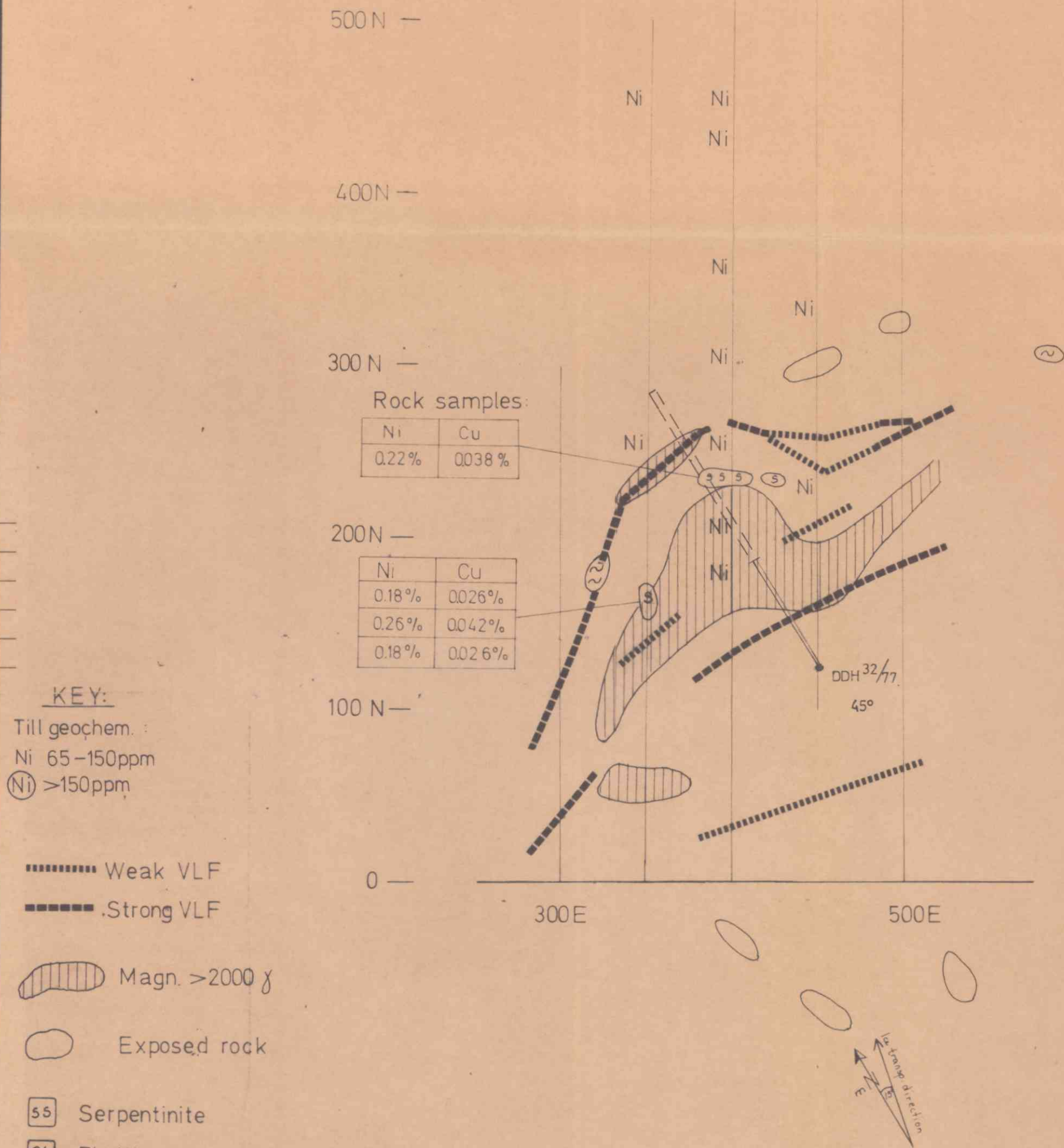
DDH 29/75 & 34/77

$\frac{1}{5}$ SULFIDMALM

CHK.

MAP NO.

MAP SHEET



STALLVANN local grid
SKOGFOSS EAST, PASVIK.
Compilation map
Mag, VLF, Till geochem, Geology.

SCALE 1:2500	OBS. B.J.L.	6-76
	DRAW. B.J.L.	2-77
	TRAC. BB	—
	CHK.	

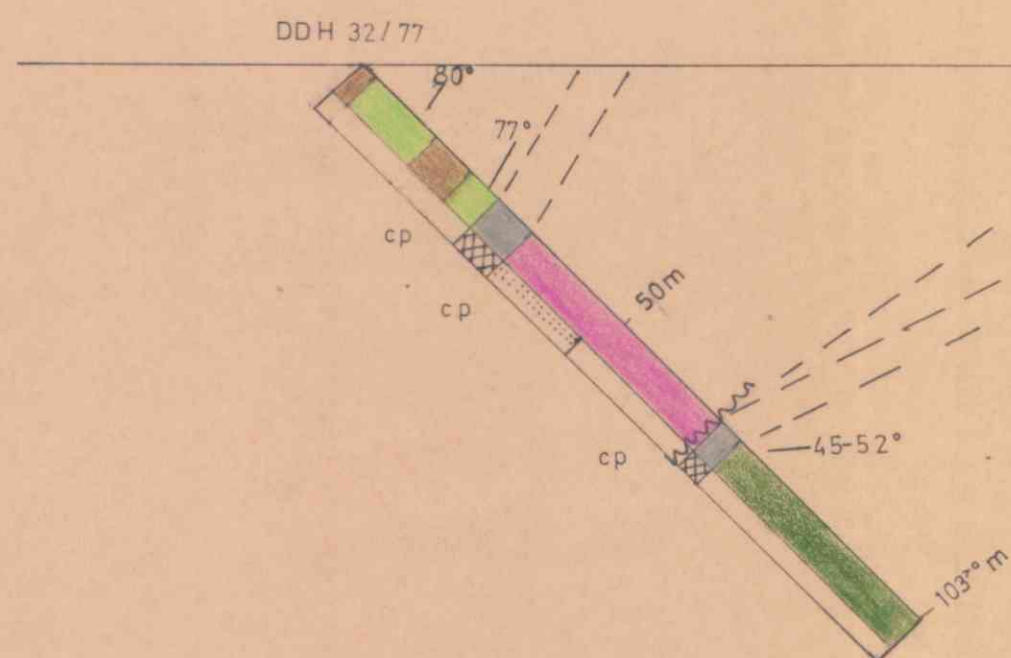
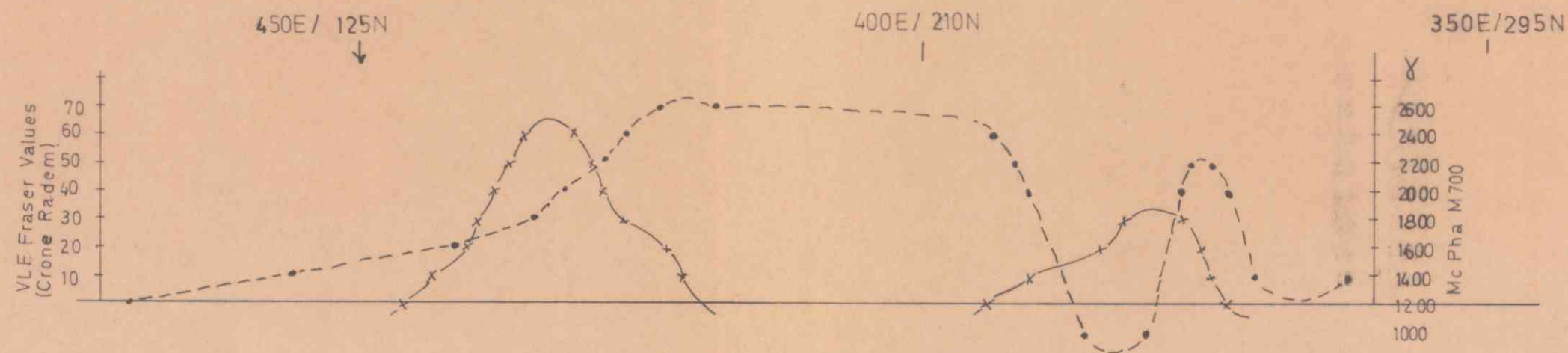
MAP NO.
Fig 6. Rpt. 461/23/77.

MAP SHEET

1/8 SULFIDMALM

S

N



SULPHIDE CONTENTS

- ca 1% pyrrhotite
- 5-10% "
- > 10% "
- cp trace chalcopyrite
- mag
- VLF Fraser

KEY

- overburden
- phyllite
- graphite phyllite
- metagabbro
- serpentinite
- greenschist
- breccia zone

PASVIK:
SKOGFOSS GRID,
DDH 32/77 450E/125N, DIRN 360° mag.

SCALE 1:1000	OBS.	BjL 76
	DRAW.	RB 7/77
	TRAC.	LH 10/77
	CHK.	

% SULFIDMALM

MAP NO.
Fig.7 Rpt.461/23/77.

MAP SHEET

A/s SULFIDMALM

DIAMOND DRILL RECORD

LOCATION: 1800E/275S
 LOGGED BY: K. Mørk
 CASING: 2.00 m
 CORE SIZE: 35 mm

BEARING 360° mag DIP: 45°
 STARTED 20.7.77
 FINISHED 2.8.77
 TESTS (CORRECTED):

HOLE NO: 33/77 SHEET NO: 1
 PROPERTY Pasvik
 Oksfjell East Grid

From	To	Description
0.00	2.00	Casing
2.00	6.90 4.90	<u>Metagabbro</u> Fine-medium grained. Massive, homogenous
6.90	7.90 1.00	<u>Chlorite schist</u>
7.90	25.50 19.60	<u>Metagabbro</u>
25.50	27.20 1.70	<u>Chlorite schist</u> (25.50 m: 35°)
27.20	29.00 1.80	<u>Metagabbro</u>
29.00	35.50 4.50	<u>Greenstone</u> Varying massive parts and chloritized schistosity zones, lime stripes and sheats. Ca. 2% po-impregnation.
33.50	34.50 1.00	<u>Chlorite schist</u> Minor po-impregnation (33.70:50°)
34.50	35.00 0.50	Dense, fine grained dark silicate. Acid(?) Striped po-impregnation and traces of cpy.
35.00	37.60 2.60	<u>Chlorite schist</u> Weak po-impregnation, traces cpy.
37.60	40.50 2.90	<u>Graphite-phyllite:</u> Varying graphite-content, a grey phyllite. Stripes with po-impregnation <1%. (39.00:45°)
40.50	47.50 7.00	<u>Phyllite:</u> Grey schist with some graphite-rich bands at 44.60 m, 44.80 m and 46.70-46.80. Po-impregnation in stripes with varying frequency. Generally <2%.

A/s SULFIDMALM

DIAMOND DRILL RECORD

LOCATION 1800E/275S

LOGGED BY: K. Mørk

CASING: 2.00 m

CORE SIZE: 35 mm

STARTING 260° mag. DIP 45°

STARTED 20.7.77

FINISHED 2.8.77

TESTS (CORRECTED):

HOLE NO. 33/77 SHEET NO. 2

PROPERTY Pasvik

Oksfjell East Grid

From	To	Description
47.50	50.25 2.75	<u>Talc-carbonate-schist:</u> Light grey, shining talc-schist with 1-2 cm carbonate porphyroblasts. Weak po-impregnation. (50.00:45°)
50.25	55.00 4.75	<u>Graphite-schist:</u> Somewhat foliated and broken. 5-10% po as irregular clots.
55.00	62.70 7.70	<u>Chlorite-talc-schist:</u> Grey-green schist. Several parts are "fat"/talc, but generally chlorite dominates. Some stripes with po, traces cpy. (55.30:60°)
62.70	63.60 0.90	<u>Graphite-schist:</u> Ca. 5% po. (60.50:80°)
63.60	67.80 4.20	<u>Talc-carbonate schist:</u> "Fat" schistose silicate with <1 cm carbonate-porphyroblasts. Traces po (66.00:90°)
67.80	83.00 15.20	<u>Graphite-phyllite:</u> Same as above. Varying po-content, but around 5%. (71.00-80°) (74.50:90°)

A/s SULFIDMALM

DIAMOND DRILL RECORD

LOCATION: 1800E/275S

LOGGED BY: K. Mørk

CASING: 2.00 m

CORE SIZE: 35 mm

BEARING 360° mag. DIP: 45°

STARTED 20.7.77

FINISHED 2.8.77

TESTS (CORRECTED):

HOLE NO: 33/77 SHEET NO: 3

PROPERTY Pasvik
Oksfjell East Grid

From	To	Description
SUMMARY		
0.00	2.00	Overburden
2.00	29.00	27.00 Metagabbro
29.00	33.50	4.50 Greenstone/schist. Ca. 2% po-impregnation.
33.50	37.60	4.10 Chlorite schist
37.60	40.50	2.90 Graphite-phyllite. <1% po-impregnation.
40.50	47.50	7.00 Phyllite. 1-2% po-impregnation.
47.50	50.25	2.75 Talc-carbonate-schist. Weak po-impregnation.
50.25	55.00	4.75 Graphite-schist. 5-10% po.
55.00	62.70	7.70 Chlorite-talc-schist.
62.70	63.60	0.90 Graphite-schist. 5% po.
63.60	67.80	4.20 Talc-carbonate-schist. Traces of po.
67.80	83.00	15.20 Graphite-phyllite. 5% po.
83.00	89.00	6.00 Serpentinite. Graphite-breccia: 83.60-84.00 2-3% po. with 20-30% po and py.
89.00	96.00	7.00 Graphite-phyllite 1% po - traces cpy
96.00	129.50	33.50 Graphite-schist. 5-10% po.
129.50	143.00	13.50 Graphite-phyllite. 1% po.

A/s SULFIDMALM

DIAMOND DRILL RECORD

LOCATION: 1800E/275S

LOGGED BY: K. Mørk

CASING: 2.00 m

CORE SIZE: 35 mm

BEARING: 360° mag. DIP: 45°

STARTED 20.7.77

FINISHED 2.8.77

TESTS (CORRECTED):

HOLE NO: 33/77

SHEET NO: 4

PROPERTY: Pasvik

Oksfjell East Grid

From	To		Description
83.00	83.60	0.60	<u>Serpentinite(?)</u> : Massive, light silicate, fine grained, homogenous. 2-3% po in a sheared impregnation.
83.60	84.00	0.40	<u>Breccia</u> : Graphite-fragments in a po- and py- matrix. Relatively rich mineralization.
84.00	85.00	1.00	<u>Serpentinite(?)</u> : Schistosity, light silicate, 2-3% po. (85.00:90°).
85.00	89.00	4.00	<u>Serpentinite</u> : Massive variant. Unmagnetic 2-3% po, in a sheared impregn.
89.00	96.00	7.00	<u>Graphite-phyllite</u> : dark grey, even schistosity Ca. 1% po, traces cpy
96.00	99.50	3.50	<u>Graphite-schist</u> : Tectonized: breccia and little foliated. 10% po - especially as matrix in breccia. Traces cpy.
99.50	110.50	11.50	<u>Graphite-schist</u> : Also little foliated and breccia Somewhat less po-impregnation, but constantly 10 cm zones with almost compact schist.
110.50	123.10	12.60	<u>Graphite-schist</u> : Somewhat little foliated, but less breccia. Ca. 5% po.
123.10	123.50	0.40	Light, fine grained schistose silicate, chlorite and s.s. talc. Minor pyrite impregnation.

A/s SULFIDMALM

DIAMOND DRILL RECORD

LOCATION: 1800E/275S

LOGGED BY: K. Mørk

CASING: 2.00 m

CORE SIZE: 35 mm

BLARING 360° mag. DIP.

STARTED 20.7.77

FINISHED 2.8.77

THESIS (CORRECTED)

1450

HOLE NO: 33/77 SHEET NO: 5

PROPERTY Pasvik

Oksfjell East Grid

From	To	Description
123.50	129.50 6.00	<u>Graphite-schist:</u> Relatively "calm" schistosity <5% po. (127.30:80°)
129.50	136.25 6.75	<u>Graphite-phyllite:</u> Variable graphite-content. Some po-stripes, but decreasing.
136.25	136.30 0.05	<u>Compact po.</u>
136.30	143.00	<u>Graphite-phyllite:</u> Varying graphite-content Some thin stripes with po
The hole was ended at 143.00 m.		

E. H. A. 1000

A/s SULFIDMALM

DIAMOND DRILL RECORD

LOCATION: 1800E/275S
LOGGED BY: K. Mørk
CASING: 2.00 m
CORE SIZE: 35 mm

BEARING 360° Mag. DIP 45°
STARTED 20.7.77
FINISHED 2.8.77
TESTS (CORRECTED):

HOLE NO: 33/77 SHEET NO: 6
PROPERTY: Pasvik
Oksfjell East grid

From	To	Description
<u>Samples for analysis.</u>		
29.00	33.00	Greenstone
33.00	34.50	Chlorite-schist
34.50	35.00	Dark, fine-grained, acid silicate
35.00	38.00	Chlorite-schist
38.00	41.00	Graphite-phyllite
41.00	47.70	Phyllite
47.70	50.25	Talc-carbonate-schist
50.25	55.00	Graphite-schist
55.00	62.70	Chlorite-talc-schist
62.70	63.50	Graphite-schist
63.50	67.80	Talc-carbonate-schist
67.80	83.00	Graphite-phyllite
83.00	83.60	Serpentinite
83.60	84.00	Graphite-breccia
84.00	89.00	Serpentinite
89.00	96.00	Graphite-phyllite
96.00	110.50	Graphite-schist
120.00	121.00	"
130.00	131.00	Graphite-phyllite
136.00	137.00	"

A/s SULFIDMALM

DIAMOND DRILL RECORD

LOCATION: 1350E/225S
 LOGGED BY: RBB
 CASING: 2.50 m
 CORE SIZE: 35 mm

BEARING 360° Mag DIP: 45°
 STARTED: 18.7.77
 FINISHED: 22.7.77
 TESTS (CONDUCTED)

HOLE NO: 34.77 SHEET NO: 1
 PROPERTY Pasvik
 Oksfjell East Grid

From	To		Description
0.00	2.00		<u>OVERBURDEN</u>
2.00	3.80	1.80	<u>GRAPHITE PHYLLITE:</u> ca. 15% Po, 1% Cpy (more than normal for Petsaamo Formation graphite-sulphide horizons) Brecciated with graphitic fragments in sulphide matrix.
3.80	4.45	0.75	<u>GRADATIONAL CONTACT:</u> Alternating bands of grey phyllite, with po and graphite partings and light grey talc-rich serpentinite. Quartz-carbonate breccia with minor po at at 4.33-4.37 and 4.40-4.45.
4.45	9.10	4.65	<u>TALC-CARBONATE SCHIST:</u> Light-grey, schistose and talc-rich serpentinite, with carbonate spots throughout. Fairly uniform ca. 2% sulphide (Po:Cp = 4:1) normally concentrated in foliation, but also remobilised into quartz-calcite veins. Non-magnetic. 6.47-6.56 } Quartz-carbonate veins 7.60-7.85 } Sharp contact against underlying graphite-phyllites.
9.10	11.40	2.30	<u>GRAPHITE PHYLLITE:</u> 5-10% Po. More regularly banded than previous section and not brecciated.

A/s SULFIDMALM

DIAMOND DRILL RECORD

LOCATION: 1350E/225S BEARING: 360° Mag DIP: 45° HOLE NO: 34/77 SHEET NO: 1A
 LOGGED BY: RBB STARTED: 18.7.77 PROPERTY: PASVIK
 CASING: 2.50 m FINISHED: 22.7.77 OKSFJELL EAST GRID
 CORE SIZE: 35 mm TESTS (CORRECTED):

From	To		Description
SUMMARY			
0.00	2.00		Overburden
2.00	3.80		Graphite Phyllite 15% Po, 1% Cpy
3.80	9.10	5.3	Talc-Carbonate Schist 2% sulphides (Po, Cpy)
9.10	11.40		Graphite Phyllite 5-10% Po
11.40	14.75	3.35	Talc Carbonate Schist 2% sulphide (Po, Cpy)
14.75	18.25		Graphite Phyllite 10-15% Po tr. cpy
18.25	21.60	3.35	Talc-Carbonate Schist 1-2% sulphides (Po, Cpy)
21.60	29.30		Phyllite
29.30	42.40	13.10	Talc Carbonate Schist 1% Po-Cpy
42.40	52.85		Graphite Phyllite 10% Po with talc schist bands
52.85	66.40		Phyllite
66.40	98.70		Alternating graphite phyllite and phyllite
	98.70		End of hole
DDH 34.77 was sited to test the deep moraine & Bedrock geochemical anomaly at depth. The talc carbonate schist horizons explain the geochemical anomalies. The pyrrhotite-bearing graphite - phyllite intersections explain the VLF anomalies but are difficult to correlate with individual VLF-anomalies. The talc-carbonate schist carries generally 1-2% sulphide in relation approx. 4:1 pyrrhotite-chalcopyrite. This is more than normally encountered in ultrabasic rocks in the Skogfoss Arch. There is also a higher than normal chalcopyrite content in the Graphite Phyllites.			

A/s SULFIDMALM

DIAMOND DRILL RECORD

LOCATION: 1350E/225S BEARING: 360° mag. DIP: 45° HOLE NO: 34.77 SHEET NO: 2
 LOGGED BY: RBB STARTED: 18.7.77 PROPERTY: Pasvik
 CASING: 2.50 m FINISHED: 22.7.77 Oksfjell East Grid
 CORE SIZE: 35 mm TESTS (CORRECTED):

From	To		Description
11.40	14.75	3.35	<u>TALC-CARBONATE:</u> schist. Ca 2% sulphide Po > Cp. Sulphides concentrated in foliation.
14.75	18.25	3.50	<u>GRAPHITIC PHYLLITE:</u> 10-15% Po, minor local cpy. Highly deformed.
18.25	21.60	3.35	<u>TALC-CARBONATE SCHIST:</u> Ca. 20% carbonate as up to 5 mm "eyes". 1-2% sulphide, Po:Cpy = 4:1, in foliation and in carbonate "eyes".
21.60	29.30	7.70	<u>GREY PHYLLITE:</u> To 24.25 graphitic with ca. 5-10% Po. 24.25-29.30 med. grey phyllite.
29.30	42.40	12.90	<u>TALC-CARBONATE SCHIST:</u> Ca. 30% carbonate. ca. 1% po-cpy mainly in foliation but also in carbonate blebs. 41.00-42.40 Includes some phyllite material, sulphide content 2-3% (Po > Cp) Contact against graphitic phyllite is sharp.
42.40	45.35	2.95	<u>GRAPHITE-PHYLLITE:</u> Ca. 10% Po. traces cpy.
45.35	48.05	2.70	<u>IMPURE TALC-CARBONATE SCHIST:</u> Includes phyllite material throughout and up to 10 cm sections of graphite-po- phyllite. ca. 3% Po concentrated in schistosity planes.

A/s SULFIDMALM

DIAMOND DRILL RECORD

LOCATION: 1350E/225S

LOGGED BY: RBB

CASING: 2.50 m

CORE SIZE: 35 mm

BEARING: 340° mag. DIP: 45°

STARTED: 18.7.77

FINISHED: 22.7.77

TESTS (CORRECTED):

HOLE NO: 34.77 SHEET NO: 3

PROPERTY: Pasvik

Oksfjell East Grid.

From	To		Description
48.05	52.85	4.80	<u>GRAPHITE-PHYLLITE:</u> Ca. 10% Po. Traces Cpy.
52.85	66.40	13.55	<u>GREY PHYLLITE:</u> Includes minor graphite sulphide-rich sections at: 52.80-54.15 5-10% Po 57.80-58.90 5-10% Po trace Cpy 66.00-66.40 5-10% Po
66.40	71.20	4.80	<u>GRAPHITE-PHYLLITE:</u> 5-10% Po, traces cp. Includes up to 80 cm grey phyllite sections. 69.65-69.90 20% Po, 5% Coarse Py, ca. 1% Cpy.
71.20	76.90	5.70	<u>GREY PHYLLITE</u>
76.90	84.80	7.90	<u>GRAPHITE-PHYLLITE:</u> Ca. 5-10% Po, trace Cpy
84.80	90.00	5.20	<u>GREY PHYLLITE</u>
90.00	92.80	2.80	<u>GRAPHITE-PHYLLITE:</u> Ca. 5-10% Po
92.80	98.70	5.90	<u>DARK GREY PHYLLITE:</u> regularly banded, with lower graphite content. ca. 3-5% Po.
98.70			END OF HOLE

A/s SULFIDMALM

DIAMOND DRILL RECORD

LOCATION: 1350E/225S

BEARING: 360° mag DIP: 45°

HOLE NO: 34.77 SHEET NO: 4

LOGGED BY: RBB

STARTED: 18.7.77

PROPERTY: Pasvik

CASING: 2.50m

FINISHED: 22.7.77

Øksfjell East Grid

CORE SIZE: 35 mm

TESTS (CORRECTED):

From	To		Description
			CORE ANGLES
9.10		62°	Talc schist - graphite phyllite contact.
11.90		64°	} Schistosity in talc-carbonate schist
12.20		68°	
21.50		74°	
22.60		70°	} Colour banding in phyllite
28.30		77°	
38.50		70°	
42.40		48°	Talc-carbonate schist/graphite phyllite contact.
46.30		63°	Schistosity
59.50		79°	} Colour banding in phyllite
64.80		78°	
70.50		70°	
75.40		60°	
89.30		72°	
94.30		64°	
98.20		70°	

E. H. A.s 5000 5 73

A/s SULFIDMALM

DIAMOND DRILL RECORD

LOCATION: 450E/125N BEARING: 360° Mag. DIP: 45° HOLE NO: 32/77 SHEET NO: 1A
LOGGED BY: RBB STARTED: 3.7.77 PROPERTY: Pasvik, Skogfoss Grid
CASING: 190 m FINISHED: 13.7.77
CORE SIZE: 35 mm TESTS (CORRECTED):

From	To	Description
		<u>SUMMARY</u>
0	1.40	Overburden
1.40	12.80	Phyllite
12.80	19.40	Metagabbro
19.40	24.30	Phyllite
24.30	30.70	Graphite-Phyllite with 5-20% Po
30.70	66.30	Serpentinite, strongly magnetic ca. 1% diss. po-cpy
66.30	66.50	Breccia
66.50	69.90	Graphitic phyllite with 10-15% Po, minor Py (strongly magnetic)
69.90	103.70	Green schist
103.70		<u>END</u>
		DDH 32.77 was sited to test a strong magnetic anomaly with VLF conductors on both sides. The magnetic anomaly was due to serpentinite carrying uniform ca 1% disseminated po-cpy. The flanking conductors are due to graphitic phyllite horizons with 5-20% Po, and traces cpy. These are strongly magnetic. Core angles indicate 45° dips to south of serpentinite but much flatter dips to north.

DIAMOND DRILL RECORD

BEARING 360° Mag. DIP: 45° HOLE NO: 32/77 SHEET NO: 1
STARTED 3.7.77 PROPERTY Pasvik, Skogfoss Grid
FINISHED 13.7.77
TESTS (CORRECTED)

From	To		Description
0	1.40		OVERBURDEN:
1.40	9.80	8.40	<u>PHYLLITE</u> : dominantly medium grey-green and finely banded, but with occasional 2-10 cm bands of po-bearing graphitic phyllite.
9.80	11.25	2.45	<u>METAGABBRO</u> : Medium grained, schistose minor po (<1%). contacts are fine grained, but nor sharp.
11.25	12.80	1.55	<u>PHYLLITE</u> : includes 10 cm graphitic phyllite with po 11.92-12.02.
12.80	19.40	6.60	<u>METAGABBRO</u> : As above contacts again finer grained but not sharp defined.
19.40	24.30	4.90	<u>PHYLLITE</u> : Medium grey, banded with varying, but low graphite content.
24.30	30.70	6.40	<u>GRAPHITIC PHYLLITE</u> : Sulphide content 5-20%, dominantly po, with very minor cpy. Strongly magnetic. Po-rich sections often deformed and brecciated.

A/s SULFIDMALM

DIAMOND DRILL RECORD

LOCATION: 450E/125N

LOGGED BY: RBB

CASING: 190 m

CORE SIZE: 35 mm

BEARING 360° Mag. DIP: 45°

STARTED: 3.7.77

FINISHED: 13.7.77

TESTS (CORRECTED):

HOLE NO: 32/77 SHEET NO: 2

PROPERTY Pasvik, Skogfoss Grid

From	To		Description
30.70	66.30	35.70	<u>SERPENTINITE:</u> Dark grey serpentinite, flecked and veined with white tremolite. Contact marked by 1 cm apple green serpentine. Strongly magnetic. Uniform ca. 1% fine-grained sulphide minerals, dominantly Po with subordinate cpy. Sulphides usually disseminated, but may be remobilised into joints or veinlets.
		42.40-45.10	Zone of heavy tremolite-talc veining and brecciation.
		45.10-66.40	Serpentinite finer grained and denser, with only minor tremolite flecks. Still strongly magnetic. Sulphides fine grained, ca. 0.5%, and not so uniformly distributed.
66.30	66.50	0.20	<u>BRECCIA:</u> with phyllite and serpentinite? fragments cemented with quartz and carbonate.
66.50	69.90	3.40	<u>GRAPHITIC PHYLLITE:</u> 10-15% sulphides. Po dominant subordinate Py, traces Cpy. Strongly magnetic.
69.90	103.70		<u>GREEN SCHIST:</u> Minor grain size variations but otherwise uniform. Schistosity locally shows small scale folding. Local concentrations of up to 2% Po.
		69.90-71.30	Transition zone from grey phyllite to green schist.

A/s SULFIDMALM

DIAMOND DRILL RECORD

LOCATION: 450E/125N

LOGGED BY: RBB

CASING: 190 m

CORE SIZE: 35 mm

BEARING 360° Mag. DIP: 45°

HOLE NO: 32/77 SHEET NO: 3

STARTED: 3.7.77

PROPERTY Pasvik, Skogfoss Grid

FINISHED: 13.7.77

TESTS (CORRECTED):

From	To	Description
	87.35-87.83	Quartz vein
	88.30-88.70	Quartz-vein
103.70		END OF HOLE
		CORE ANGLES
	9.50 82°	Banding in graphitic phyllite
	11.30 78°	" " " "
	13.70 68°	Schistosity
	14.70 70°	" } in gabbro
	18.50 62°	"
	22.80 78°	Banding in phyllite
	26.50 70°	" " "
	27.70 84°	" " "
	64.00 37°	Veining & joints in serpentinite
	66.50 30°	Minor faults in breccia zone
	70.40 45°	Schistosity
	74.30 52°	"
	79.20 40°	"
	82.50 56°	"
	91.30 30°	" (but minor folding)
	102.70 37°	"

DIAMOND DRILL RECORD

BEARING: 360° Mag. DIP: 45° HOLE NO: 32/77 SHEET NO: 4
 STARTED: 3.7.77 PROPERTY: Pasvik, Skogfoss Grid
 FINISHED: 13.7.77
 TESTS (CORRECTED):

E. H. A. 9009 5 79

Date		Time		K. Mark	
Lat.	Long.	Depth	Alt.	Temp.	Remarks
282		10° - 11°	0.02 0.01		Gabbro
283		25° - 26°	0.02 0.01		Graph. - phyllite
284		26° - 27°	0.03 0.01		
285		27° - 28°	0.03 0.01		
286		28° - 29°	0.03 0.04		
287		29° - 30°	0.04 0.05		
288		30° - 30° 7'	0.03 0.01		
289		30° 7' - 32°	0.12 0.01		Serpentine
290		32° - 33°	0.10 0.01		
291		33° - 34°	0.17 0.03		
292		34° - 35°	0.13 0.01		
293		35° - 36°	0.08 0.01		
294		36° - 37°	0.11 0.01		
295		37° - 38°	0.11 0.01		
296		38° - 39°	0.18 0.05		

DDH 32:77 25.1.77

Sheet No. I-1

23

5.50

Innsendt av: K. Mark

Prøve-	Sted-	Localitet	Prøvetype	Beskr.	Ni	Cu	Bemerk:
297			Borkjerne	3900 - 4000	0,13	0,03	Serpentine
298			— " —	4000 - 4100	0,13	0,01	— " —
299			— " —	4100 - 4200	0,11	0,01	— " —
300			— " —	4200 - 4300	0,13	0,01	— " —
301			— " —	4300 - 4400	0,13	0,02	— " —
302			— " —	4400 - 4500	0,07	0,01	— " —
303			— " —	4500 - 4600	0,15	0,01	— " —
304			— " —	4600 - 4700	0,18	0,02	— " —
305			— " —	4700 - 4800	0,20	0,03	— " —
306			— " —	4800 - 4900	0,21	0,01	— " —
307			— " —	4900 - 5000	0,18	0,01	— " —
308			— " —	5000 - 5100	0,18	0,01	— " —
309			— " —	5100 - 5200	0,17	0,01	— " —
310			— " —	5200 - 5300	0,20	0,03	— " —
311			— " —	5300 - 5400	0,19	0,01	— " —

Innsendt av: K. Mark 5.50

Shipments No. I-2.

23

Date

Inscribed by: K. Mørh

No.	Prove- No.	Localitet	Provetyp	Reskn.	N-	Cu	Remarks
312			Perkierce	5400 - 5500	0,20	0,02	Serpentine
313			— " —	5500 - 5600	0,19	0,02	— " —
314			— " —	5600 - 5700	0,20	0,01	— " —
315			— " —	5700 - 5800	0,20	0,01	— " —
316			— " —	5800 - 5900	0,20	0,02	— " —
317			— " —	5900 - 6000	0,20	0,01	— " —
318			— " —	6000 - 6100	0,20	0,02	— " —
319			— " —	6100 - 6200	0,20	0,01	— " —
320			— " —	6200 - 6300	0,19	0,01	— " —
321			— " —	6300 - 6400	0,18	0,01	— " —
322			— " —	6400 - 6500	0,13	0,01	— " —
323			— " —	6500 - 6600	0,10	0,03	— " —
324			— " —	6650 - 6700	0,01	0,01	Grat. - phyllite
325			— " —	6700 - 6800	0,02	0,01	— " —
326			— " —	6800 - 6900	0,01	0,01	— " —

504 32 : 7.7 : Pasvik

Shipment No. I-3

100-100-22 23

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Inscribed to: K. Monk

~~above~~

Localities

Prototype

Tests:

Ni	Cu
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Discussion

327

Barberne

69⁰⁰ - 69⁹⁹

003 0.0

Graph - phyl/ITC

1. ~~air~~er:

00.4 32 : 77 Pg 54/4

I-3

23

Date

Inscribed on

KMark

№	№	Локалитет	Проветыв	Бескв.	Ni	Cu	Замеч.
328			Бокситов	2 ⁰⁰ - 3 ⁰⁰	0,03	0,09	Graphite - Phyllite
329			- " -	3 ⁰⁰ - 3 ³⁰	0,05	0,07	- " -
330			- " -	3 ⁰⁰ - 4 ⁴⁵	0,05	0,02	Transition
331			- " -	4 ⁴⁵ - 5 ⁴⁵	0,07	0,02	Tr. - Carbonate - Gneiss
332			- " -	5 ⁴⁵ - 6 ⁴⁵	0,10	0,02	- " -
333			- " -	6 ⁴⁵ - 7 ⁴⁵	0,15	0,04	- " -
334			- " -	7 ⁴⁵ - 8 ⁴⁵	0,13	0,04	- " -
335			- " -	8 ⁴⁵ - 9 ¹⁰	0,12	0,03	- " -
336			- " -	9 ¹⁰ - 10 ²⁰	0,03	0,03	Graphite - Phyllite
337			- " -	10 ²⁰ - 11 ⁴⁰	0,07	0,05	- " -
338			- " -	11 ⁴⁰ - 12 ⁴⁰	0,24	0,13	Tr. Carbonate - Gneiss
339			- " -	12 ⁴⁰ - 13 ⁴⁰	0,12	0,05	- " -
340			- " -	13 ⁴⁰ - 14 ⁴⁵	0,08	0,02	- " -
341			- " -	14 ⁴⁵ - 15 ⁴⁵	0,10	0,03	Graphite - Phyllite
342			- " -	15 ⁴⁵ - 16 ⁴⁵	0,11	0,06	- " -

Continued

Date 3.2.22 Desk

Shipments No. I-4.

23

Date

Transmitted by: K. Mørk

No.	Rock No.	Localitet	Provetype	Beskr.	Ni	Cu	Remarks
343			Borkjerne	16 ²⁵ - 17 ²⁵	0,08	0,05	Graphite - Py.
344			— " —	17 ²⁵ - 18 ²⁵	0,10	0,03	
345			— " —	18 ²⁵ - 19 ²⁵	0,10	0,03	Talc-carbonate - S.
346			— " —	19 ²⁵ - 20 ²⁵	0,09	0,02	— " —
347			— " —	20 ²⁵ - 21 ⁰⁰	0,11	0,01	— " —
348			— " —	21 ⁰⁰ - 22 ⁰⁰	0,01	0,01	Graphite - Pyg.
349			— " —	22 ⁰⁰ - 23 ⁰⁰	0,02	0,02	— " —
350			— " —	23 ⁰⁰ - 24 ⁰⁰	0,01	0,02	— " —
351			— " —	29 ³⁰ - 30 ³⁰	0,10	0,04	Talc-carbonate - S.
352			— " —	30 ³⁰ - 31 ³⁰	0,12	0,03	— " —
353			— " —	31 ³⁰ - 32 ³⁰	0,10	0,03	— " —
354			— " —	32 ³⁰ - 33 ³⁰	0,12	0,03	— " —
355			— " —	33 ³⁰ - 34 ³⁰	0,12	0,07	— " —
356			— " —	34 ³⁰ - 35 ³⁰	0,10	0,03	— " —
357			— " —	35 ³⁰ - 36 ³⁰	0,10	0,02	— " —

Remarks:

DDH 34. 77 Pasvik

Shipment No. I-5

23

Date

Innsbruck

K. Mark

No.	Prove	Lokalitet	Provetype	Beskr.	N.	Cu	Remarks
358			Borkjeme	3630 - 3730	010	0.03	Talc. Carbonate. Sch.
359			"	3730 - 3830	012	0.03	"
360			"	3830 - 3930	012	0.04	"
361			"	3930 - 4030	008	0.03	"
362			"	4030 - 4130	011	0.03	"
363			"	4130 - 4240	011	0.02	Talc. Carbonate. phyll.
364			"	4240 - 4340	008	0.02	Graphite. phyll.
365			"	4340 - 4440	006	0.02	"
366			"	4440 - 4535	007	0.02	"
367			"	4535 - 4635	007	0.02	Mixed Talc. carbonate Phyllite
368			"	4635 - 4735	009	0.01	"
369			"	4735 - 4835	007	0.04	"
370			"	4835 - 4935	010	0.06	Graphite. phyll.
371			"	4935 - 5035	006	0.02	"
372			"	5035 - 5135	012	0.01	"

20 H 34 27 Pasvik.

Project no: 23			Date 11/8 -77			Innsenit av: K Nord		
No	Prove-	Lokalitet	Provotype	Beskr.	Ni	Cu	S	
464			Berthorne	29 cc - 30 cc	0,01	0,07		Greenstone
465			"	30 cc - 31 cc	0,01	0,07		
466			"	31 cc - 32 cc	0,01	0,29		
467			"	32 cc - 33 cc	0,01	0,02		
468			"	33 cc - 34 50	0,01	0,02		Chlorite schist
469			"	34 50 - 35 cc	0,02	0,06		Dark, fragmented
470			"	35 cc - 36 cc	0,02	0,03		Chlorite schist
471			"	36 cc - 37 cc	0,01	0,02		"
472			"	37 cc - 38 cc	0,02	0,02		"
473			"	38 cc - 39 cc	0,01	0,02		Graphite - phyllite
474			"	39 cc - 40 cc	0,02	0,01		"
475			"	40 cc - 41 cc	0,01	0,01		"
476			"	41 cc - 42 cc	0,02	0,01		Phyllite
477			"	42 cc - 43 cc	0,01	0,02		"
478			"	43 cc - 44 cc	0,02	0,03		"

Anmerkninger:

DDH 33/77 : Pasvik

Shipment No. II - 1

Project no. 23

Date 11/8-77

Innesent av: K. Mørk

Prove- nr.	Localitet	Provetype	Beskr.	Ni	Cu						Bemerk.
479		Borkjeme	44.00 - 45.00	0.05	0.06						Phyllite
480			45.00 - 46.00	0.04	0.03						"
481			46.00 - 47.00	0.02	0.04						"
482			47.00 - 47.20	0.02	0.04						"
483			47.20 - 49.00	0.16	0.03						Talc - carbonat
484			49.00 - 50.25	0.13	0.02						"
485			50.25 - 51.00	0.06	0.04						Graphite sch
486			51.00 - 52.00	0.05	0.06						"
487			52.00 - 53.00	0.07	0.05						"
488			53.00 - 54.00	0.07	0.05						"
489			54.00 - 55.00	0.08	0.05						"
490			55.00 - 56.00	0.04	0.05						Chlorit: - talc
491			56.00 - 57.00	0.19	0.07						"
492			57.00 - 58.00	0.15	0.07						"
493			58.00 - 59.00	0.05	0.03						"

Anmerkninger:

DDH 33/77 : PASVIK

Shipment No. II-2

Gejakt nr. 23

Dato 11/8-77

Innsendt av: K. Mørk

Prove- nr.	Lokalitet	Provetype	Beskr.	Ni	Cu							Bemerk:
194		Borkjerne	59 ⁰⁰ - 60 ⁰⁰	0,12	0,03							Chlorite-talc-schist
95			60 ⁰⁰ - 61 ⁰⁰	0,11	0,06							"
96		-	61 ⁰⁰ - 62 ⁰⁰	0,15	0,05							"
97			62 ⁰⁰ - 62 ⁷⁰	0,11	0,08							"
98			62 ⁷⁰ - 63 ⁵⁰	0,05	0,07							Graphite-schist
99			63 ⁵⁰ - 65 ⁰⁰	0,12	0,03							Talc-carbonate-schist.
100			65 ⁰⁰ - 66 ⁰⁰	0,13	0,03							"
101			66 ⁰⁰ - 67 ⁰⁰	0,11	0,03							"
102			67 ⁰⁰ - 67 ³⁰	0,12	0,04							"
103			67 ³⁰ - 69 ⁰⁰	0,10	0,04							Graphite-phyllite.
104			69 ⁰⁰ - 70 ⁰⁰	0,05	0,06							"
105			70 ⁰⁰ - 71 ⁰⁰	0,05	0,04							"
106			71 ⁰⁰ - 72 ⁰⁰	0,03	0,04							"
107			72 ⁰⁰ - 73 ⁰⁰	0,06	0,05							"
108			73 ⁰⁰ - 74 ⁰⁰	0,04	0,05							"

Bemerkninger:

DDH 33/77 : PASVIK

Shipment No. II-3

St. nr. 23

Dato 11/8-77

Innsendt av: K. Mørk

Prove- nr.	Lokalitet	Provetype	Beskr.	Ni	Cu						Bemerk:
		Borkjerne	7400 - 7500	0,03	0,03						Graphite - phyllite
			7500 - 7600	0,05	0,03						"
			7600 - 7700	0,03	0,02						"
			7700 - 7800	0,05	0,03						"
			7800 - 7900	0,02	0,02						"
			7900 - 8000	0,03	0,01						"
			8000 - 8100	0,02	0,02						"
			8100 - 8200	0,03	0,03						"
			8200 - 8300	0,01	0,01						"
			8300 - 8360	0,03	0,03						Serpentinite (?)
			8360 - 8400	0,03	0,03						Graphite - breccia
			8400 - 8500	0,03	0,01						Serpentinite (?)
			8500 - 8600	0,01	0,04						"
			8600 - 8700	0,02	0,03						"
			8700 - 8800	0,01	0,03						"

Inger:

DDH 33/77 : PASVIK.

Shipment No. II-4

Objekt nr 23

Dato 11/8-77

Innsendt av: K. Mørk

Prøve- nr.	Localitet	Provetype	Beskr.	Ni	Cu						Bemerk:
524		Barkjema	88 ⁰⁰ - 89 ⁰⁰	0,02	0,01						Serpent. (?)
525			89 ⁰⁰ - 90 ⁰⁰	0,01	0,02						Graphit. phyll.
526			90 ⁰⁰ - 91 ⁰⁰	0,02	0,01						"
527			91 ⁰⁰ - 92 ⁰⁰	0,02	0,10						"
528			92 ⁰⁰ - 93 ⁰⁰	0,02	0,02						"
529			93 ⁰⁰ - 94 ⁰⁰	0,01	0,01						"
530			94 ⁰⁰ - 95 ⁰⁰	0,03	0,01						"
531			95 ⁰⁰ - 96 ⁰⁰	0,02	0,03						"
532			96 ⁰⁰ - 97 ⁰⁰	0,03	0,04						Graphit. schist.
533			97 ⁰⁰ - 98 ⁰⁰	0,03	0,04						"
534			98 ⁰⁰ - 99 ⁵⁰	0,05	0,04						"
535			99 ⁵⁰ - 101 ⁰⁰	0,01	0,02						"
536			101 ⁰⁰ - 102 ⁰⁰	0,03	0,01						"
537			102 ⁰⁰ - 103 ⁰⁰	0,03	0,07						"
538			103 ⁰⁰ - 104 ⁰⁰	0,04	0,03						"

Anmerkninger:

DDH 33 / 77 : PASVIK

Shipment No. II-5

objekt nr. 23

Date 11/8-77

Innsendt av: K. Mark

[illegible]Werkzeug:

DDH 33 / 77 : PASVIK.

Shipment No. II-6