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Rapportarkivet

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Falconbridge	Sul 417-76-20	Sulfidmalm A/S		

Tittel

Investigations in the Kvikne Region, 1976.
Geophysical investgations and diamond drilling. Kaltberget area.

Forfatter	Dato	Bedrift
R Siversten F.Nixon	1976	Sulfidmalm A/S

Kommune	Fylke	Bergdistrikt	1: 50 000 kartblad	1: 250 000 kartblad
Tynset	Hedmark	Østlandske	16203	Røros

Fagområde	Dokument type	Forekomster
Geologi geofysikk boring	Rapport	Kaltberget Grøtberget
Råstofftype	**Emneord**	
Malm/metall	Cu Ni	

Sammendrag

During the 1976 the Kaltberget area was covered by a mag- and VLF survey together with geological mapping. As a result of this Sulfidmalm a.s. discovered a new showing (Grøtberget showing). Grab samples from this returned 2,0 % Ni - 2,1% Ni.
As a consquense a CP survey (surface and down hole) and diamond drilling condfirmed a a small and isolated ultrabasic body with limited mineralisation probably situated as lineated body.
Eigth drillholes intersected ultrabasics but only thre hit ore mineralization. Best section gave 1,6% Ni and 0,3% Cu over 5,5m. Microscopic investigatin indicated favorable metalurgic properties i.e. large free grains and aggregates of pentlandite.
Several other similar orebodies could be discovered by continued (as planned for 1977) prospecting in the area.

FOR FALCONBRIDGE NIKKELVERK A/S
A/S SULFIDMALM

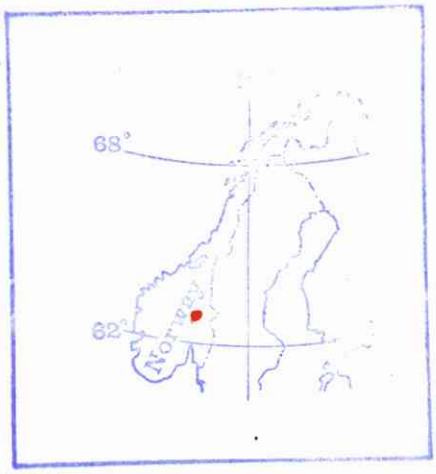
Project 905-20

INVESTIGATIONS IN THE KVIKNE REGION
1976
Geophysical investigations and
diamond drilling
Kaltberget area

By

R. Sivertsen

F. Nixon



Report No. 417/76/20

Ankr. 19.10.77

ELW

A/S SULFIDMALM

INTER-OFFICE MEMORANDUM

Date: 12th October, 1977

To: Falconbridge Nikkelverk A/S

cc: W. D. Harrison, H. T. Berry, R. Jahnsen, F. Nixon, R. Sivertsen

From: J. B. Gammon

Subject:

Report No. 417/76/20. Kaltberget showing, Kvikne area.

Please find attached our report which details work carried out in this area in 1976. A new showing was discovered which returned encouraging nickel values. Subsequent drilling and geophysics suggested it was of limited extent but an attempt is being made in 1977 to cover all possibilities in this interesting area.

J. B. Gammon

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Enclosures:

SUMMARY AND CONCLUSIONS

1. The Kaltberget showing lies in a metaultrabasic body enclosed by mica schists of supposed Cambrian age.

   In 1975 a short sampling drill hole was put down at the Kaltberget showing. This returned 0.92% Ni over 3 m.

2. During 1976 the Kaltberget area was covered by a mag- and V.L.F. - survey together with geological mapping. As a result of this A/S Sulfidmalm discovered a new showing. Grab samples from this returned 2.0-2.1% Ni.

3. As a consequence of high nickel numbers from both showings and an interesting mag anomaly, a C.P. survey and a diamond drill programme were planned.

   The old and the new showing were charged up and surface measurements taken.

   The survey indicates that the old showing at Kaltberget is a small and isolated ultrabasic body, (possibly the tail end of a larger body) and has limited mineralization. This was later confirmed by drilling and subsequent down-hole C.P. measurements.

4. At the new showing neither the C.P. measurement (surface and down hole) nor the diamond drilling gave any clear answer to the geometry of the mineralization. The host ultrabasic however seems to be of considerable extent.

../2

5. Diamond drilling at the new showing gave the following result.
(All 8 holes were drilled in metaultrabasic but only 3 intersected mineralization.)

	%Ni	%Cu	%S	
DDH 6	1.09	0.15	4.4	over 3 m
DDH 8	1.18	0.2	-	over 5 m
DDH 12	1.6	0.3	-	over 5.5 m

6. Microscopic examination of the core indicates favourable metallurgical properties i.e. large free grains and aggregates of pentlandite.

7. Taking drilling, geophysics, geology and topography into consideration our conclusion would be;
   a) The new showing is possibly a lineated body plunging towards SE.

   b) Several similar, small bodies could be discovered in the area.

8. The following is planned for 1977:

   a) Prospecting and mapping in the area between Kaltberget-Kletten.

   b) Outlining the new showing to the SE by drilling and geophysics.

INTRODUCTION

The Kaltberget showing is situated approx. 1 km south of the village of Kvikne and is associated with at least two (possibly more) bodies of metaultrabasic rock exposed 100 m below the crest on the southwestern slope of the Kaltberget mountain.

The area shows a complex structural development with folding and shearing.

The bodies seem to be orientated parallel (long axis) to the dominating lineation direction.

The showing was first sampled in 1974 with good assay results (Report 339/74/20).

In the autumn 1975 two short Winkie drill holes were put down in order to obtain a good sample of the mineralization. The second was put down near the old showing. This hole returned the following result:

WDH2 3 m grading 0.92% Ni
(Report 373/75/20)

During 1976 prospecting work uncovered a new mineralized outcrop approximately 50 m N and 20 m below the old Kaltberget showing. The discovery was given the name Grötberget showing and grab samples taken here gave the following results:

Sample nr.	Ni%	Cu%	S%
20.206	2.1	0.66	12.6
20.207	2.03	1.12	13.2

A diamond drill programme was carried out based on geological results and the results of a V.L.F. and magnetic survey.

The drill programme was followed up by a C.P. survey both on surface and down-hole.

GEOLOGY

The main rock units in the Kaltberget area are banded quartz-biotite schists, metaultrabasic and acid intrusives (trondhjemite and pegmatite).

The rock units are generally dipping 20-25°SE and striking N-S.

The metaultrabasic bodies are enclosed in mica schist and are later intruded by trondhjemite and pegmatite.

Strong deformation, shearing, flattening and folding has obliterated the orginal relation between the metaultrabasic and the enclosing rock.

The metaultrabasic bodies consist mainly of coarse to fine grained amphibole and occasionally some plagioclase. Mica bearing varieties are common.

A grain size variation gives the ultrabasic rock a layered appearance with the individual layers varying in thickness from 1-10 m.

The mineralization at the Grøtberget showing as seen in DDH 6,8,12 occurs un fine grained varieties. Where we have good mineralization (1.0% Ni) we also get a marginal envelope of weaker mineralization (0.1-0.2% Ni). This is in contrast to the rest of the metaultrabasic running 0.01% Ni. In DDH 4 and 5 fine grained varieties are observed in a position co-incident with a supposed south easterly plunging extension of the mineralization seen in holes 6, 8 and 12.

These fine grained varieties carry the same nickel content as in the marginal envelope of the rich mineralization. C.P. measurement (grounding in DDH 8) later indicated that these fine grained varieties could be a part of a body outcroping at the Grötberget showing.

Both observation in the field and data coming from drill holes indicate that the metaultrabasic bodies at Kaltberget are boudinage structures of possibly several generations.

As seen from the geological map the metaultrabasic rock at Kaltberget is striking approx. N-S. If this is also the boudinage direction it would be in contrast with every other structural observation in the area which indicate a SE direction

The strange outcrop pattern of metaultrabasic rock could be explained by:

a) Original sheet (dyke, sill) which has suffered boudinage development, but is not completely separated into individual bodies.
The mag. picture indicate this with an anomalous zone tying up several high values.

b) Original plug sliced up into several "sheets" and later suffered boudinage.

The most interesting observation at Kaltberget in 1976 is that possibly three sheets or boudines occur on top of each other separated by strongly deformed schist. Interesting is also the vertical thickness 60-70 m.

In 1976 the following surveys were carried out:

1. VLF - EM measurements.

2. Magnetic "

3. C.P. measurements both on surface and down hole.

The results are presented on the accompanying maps.

The main magnetic anomaly zone has a strike length of approx. 500 m and is co-incident with the general strike in the area (ie N-S) and consists of several high values.

The VLF-EM survey gave several anomalies - most of them weak, but often co-incident with mag. anomalies.

Charge potential measurement:

On the basis that one was dealing with good conductors, both the old and the new showings were charged up. As the drilling started, and went on, the best mineralized sections in the drill holes were charged up and both surface and down hole measurements were carried out.

Results:

1. Down hole measurement indicates that the old showing is situated in a small and isolated metaultrabasic body. (Also confirmed by the drilling.)

2. The mineralization in DDH 2 and 3 is electrically connected. (Enclosures 9 & 10)

3. No electrical connection between the mineralization in the old showing and the new showing. Considered to be two different bodies.

4. C.P. measurements at the Grötberget showing give no clear results, and only indicate the surface expression of the mineralization. It is thought that this is due to a combination of increasing topographic relief with increasing depth of the mineralization due to plunge, combined with the fact that at and near surface the mineralization has a ruler shape with small cross-sectional area.

KALTBERGET C.P. measurement.

Active electrode in DDH 8

DEPTH	DDH4	DDH5
0 m	-4420	-4270
10 m	-4350	-4130
15 m	-4290	-4040
20 m	-4150	-4050
25 m	-4020	-3900
30 m	-3990	-3540
35 m	-4020	-3340
40 m	-4080	-3140
45 m	-3700	-3080
50 m	-3360	-3060
55 m	-3270	-3150
60 m	-3250	-3150
65 m	-3290	-3020
70 m	-3380	-3220
75 m	-3470	-3420
80 m	-3560	-3570
85 m	-3770	-3790

DRILLING

Based on the geophysical surveys and what was known about geology and structure in the area a drilling programme was carried out in September, 1976.

The main aim with the programme was to test the known mineralization (the old showing and the new showing) and the magnetic anomaly.

All in all a total of 13 holes were drilled with a total length of 609.95 m. The programme was carried out by A/S Terranor.

All drill logs and sections are enclosed.

PROEPERTY: Kaltberget

SUMMARY OF DIAMOND DRILLING RESULTS

LOCATION	HOLE NO	BEARING	DIP	LENGTH	MINERALIZATION						REMARKS
					FROM	TO	LENTGTH	%Ni	%Cu	%S	
116N/58.5E	6	Vert.	90	16.0	0.0	2.4	1.0 m	0.58	0.04	2.2	
					1.0	2.0	1.0 m	2.25	0.36	9.2	
					2.0	3.0	1.0 m	0.44	0.07	1.8	
115N/56.5E	8	90	45	31.9	17.0	18.0	1.0 m	0.6	0.09		
					18.0	19.0	1.0 m	0.35	0.06		
					19.0	20.0	1.0 m	1.52	0.24		
					20.0	21.0	1.0 m	1.75	0.26		
					21.0	22.0	1.0 m	1.7	0.31		
114N/61E	12	Vert.	90	18.4	2.7	3.0	0.3 m	1.05	0.23	6.0	
					3.0	4.0	1.0 m	0.68	0.14	4.0	
					4.0	5.0	1.0 m	2.25	0.50	10.8	
					5.0	6.0	1.0 m	1.62	0.32	7.4	
					6.0	7.0	1.0 m	2.25	0.41	9.9	
					7.0	8.0	1.0 m	1.15	0.23	5.9	

A/s SULFIDMALM

DIAMOND DRILL RECORD

LOCATION: 0-0 BEARING: - DIP: 90 HOLE NO: 1 SHEET NO: 1

LOGGED BY: R.S. STARTED: 26.8.76 PROPERTY KALTBERGET

CASING: 1.5 m FINISHED: 31.8.76

CORE SIZE: 35 mm TESTS (CORRECTED):

From	To		Description
			Summary log
0	1.0		Overburden
1.0	9.7		Quartz - biotite schist
9.7	11.5		Ultrabasic rock
			Weakly mineralized
11.5	18.05		Quartz-biotite schist
18.05	27.4		Pegmatite. Granitic composition
27.4	91.7		Ultrabasic rock
			Sulphides: specks
91.7	98.8		Quartz biotite schist
	98.8		End of hole

A/s SULFIDMALM

DIAMOND DRILL RECORD

LOCATION: 0-0 BEARING: DIP: 90 HOLE NO: 1 SHEET NO: 2

LOGGED BY: R. S. STARTED: 26.8.76 PROPERTY KALTBERGET

CASING: 1.5 m FINISHED: 31.8.76

CORE SIZE: 35 mm TESTS (CORRECTED):

From	To		Description
0	1.0		Overburden
1.0	9.7		Banded quartz - biotite schist with some plagioclase The banding is a result of alternating mica (mainly biotite and some chlorite) rich- and quartz-plag. rich bands.
			The schist has gone through several episodes of deformation. This has resulted in a composite and now very pronounced schistosity. The schistosity seems to be axial foliation to early hight to isoclinal folds.
			Shearing and flatening has in some cases given the schist a cataclatic appearance. Often development of porphyroclasts and a mylonitic foliation which is parallel to the main schistosity.
9.7	11.5		Ultrabasic rock. This rock seems to have gone through the same deformation as the enclosing schist. A very pronounced schistosity marked by dark mica and amphibole and interfolding with the enclosing schist at the lower contact indicate this.
			Sulphides. Specks. Small grains streaked out parallel schistosity. Some concentration of sulphides at the upper contact. Visible both cpy and po.
11.5	18.05		Banded quartz biotite schist with some psammitic layers. The very pronounced schistosity is as a rule parallel to the banding.

DIAMOND DRILL RECORD

LOCATION: 0-0 BEARING: - DIP: 90 HOLE NO: 1 SHEET NO: 3
LOGGED BY: R.S. STARTED: PROPERTY KALTBERGET
CASING: 1.5 m FINISHED:
CORE SIZE: 35 mm TESTS (CORRECTED):

From	To		Description
			The orientation of the banding and the schistosity compared to the vertical core string is changing from more or less parallel (14.2-15.8) to horisontal.
18.05	27.4		Coarse grained pegmatite with a granitic composition occur very frequently.
27.4	91.7		Ultrabasic rock. retrograded
			As a rule there is no schistosity developed except at the contacts to the enclosing schist. This schistosity is probably a result of shearing in the border zone.
			From 55.95 - 56.8 mylonite with plagioclase porphyroclast (1 mm)
			The grain zise vary from medium to coarse grained. In some cases 0.5-1.0 cm amphibol crystalls/ crystall aggregates in a fine grained matrix can be seen. The same can be said about plogophite.
			The plagioclase content change gradually resulting in some metagabbroic sections.
			Several shearplanes in this rock. Brecciation is commonly developed in connection with them. This is strongly developed from 34-38 m 39-40 m, 55-57 m. The shearplanes make an angle with the core string of 20°-40°.

LOCATION: 0-0 BEARING: DIP: 90 HOLE NO: 1 SHEET NO: 4
LOGGED BY: R.S. STARTED: PROPERTY KALTBERGET
CASING: 1.5 m FINISHED:
CORE SIZE: 35 mm TESTS (CORRECTED):

From	To		Description
			Sulphides. specks
			Sulphides po, pe, cpy can be found in nearly
			every meter, but only a few grains with an
			average size of 0.5 mm.
			No meter seem to have > 1% sulphides. Possibly
			best meter 69-70.
91.7	98.8		Banded quartz biotite schist.
			Core angle.
			Banded quartz biotite schist.
			Core angles:
			1.5 m 54° schistosity
			5.5 m 58° "
			8.9 m 75° "
			10.5 m 57° "
			17.3 m 59° "
			40.8 m 70° mylonitic foliation
			56.4 m 63° "
			85.9 m 80° schistosity
			90.6 m 54° "
			91.5 m 57° "
			91.7 m 54° "
			92.8 m 65° "
			96.3 m 65° "
			98.7 m 65° "

DIAMOND DRILL RECORD

LOCATION: 50S/66.5W BEARING: DIP: 90 HOLE NO: 2 SHEET NO: 1

LOGGED BY: R.S. STARTED: 1.9.76 PROPERTY KALTBERGET

CASING: 2.5 m FINISHED: 1.9.76

CORE SIZE: 35 mm TESTS (CORRECTED):

From	To		Description
			Summary log
0	2.0		Overburden
2.0	9.85		Quartz-biotite schist
9.85	27.25		Ultrabasic rock
			Sulphides: specks
27.25	35.7		Quartz-biotite schist

DIAMOND DRILL RECORD

LOCATION: 50S/66.5W BEARING: - DIP: 90 HOLE NO: 2 SHEET NO: 2
LOGGED BY: R.S. STARTED: PROPERTY KALTBERGET
CASING: 2.5 m FINISHED:
CORE SIZE: 35 mm TESTS (CORRECTED):

From	To		Description
0	2.0		Overburden
2.0	9.85		Banded quartz-biotite schist with psamitic layers at 6.5-6.9, 7.3-7.5
			Irregular quartz vein (cross-cutting schistosity) are common. They are often flattened and emphasize the banding.
			The schist has gone through several episodes of deformation including folding with an isoclinal style, shearing which has produced a mylonitic foliation and porphyroclasts, and flattening.
			The mylonitic foliation is more or less parallel to the main schistosity. This schistosity seems to be axial-planar to isoclinal folds.
			at 3.3 granitic pegmatitic (7 cm)
9.85	27.25		Ultrabasic rock. Retrograded.
			Fine to medium grained, with a good schistosity developed. The schistosity is marked by dark mica.
			A mylonitic foliation is often developed, always parallel with the schistosity.
			From 10.6 - 11.65 a possible banded schist mixed with basic-ultrabasic material.
			The plagioclase content vary. As a result of this some parts of the rock can be classified as a metagabbro.

A/s SULFIDMALM

DIAMOND DRILL RECORD

LOCATION: 50S/66.5W
BEARING: - DIP: 90 HOLE NO: 2 SHEET NO: 3
LOGGED BY: R.S.
STARTED: PROPERTY KALTBERGET
CASING: 2.5 m
FINISHED:
CORE SIZE: 35 mm
TESTS (CORRECTED):

From	To		Description
			The plagioclase content change gradually, but a possible sequence would be:
			9.85 - 10.6 ultrabasic
			10.6 - 11.65 schist
			11.65 - 14.05 ultrabasic
			14.05 - 14.4 gabbro
			14.4 - 15.7 ultrabasic
			15.7 - 15.8 gabbro
			15.8 - 17.8 ultrabasic
			17.8 - 18.4 gabbro
			18.4 - 19.9 ultrabasic
			19.9 - 26.3 gabbro
			26.3 - 27.3 contact zone with schist, gabbro and ultrabasic material
			Sulphides: specks.
			10.25 - 10.3 two 1 cm bands with po, cp, pe parallel schistosity
			13.4 and 14.5 same concentration of sulphides - streaks and narrow (mm) bands.
27.3	35.4		Banded quartz-biotite schist with graphite. The graphite is only occuring along late fractures.
	35.4		End of hole

DIAMOND DRILL RECORD

LOCATION: 50S/66.5W BEARING: - DIP: 90 HOLE NO: 2 SHEET NO: 4

LOGGED BY: R.S. STARTED: PROPERTY KALTBERGET

CASING: 2.5 m FINISHED:

CORE SIZE: 35 mm TESTS (CORRECTED):

From	To		Description
			Core angles:
			2.4 m - 65° schistosity
			7.3 " - 63° "
			10.4 " - 59° "
			11.6 " - 82° "
			14.5 " - 70° "
			19.7 " - 58° "
			22.95 " - 62° "
			25.5 " - 61° "
			26.6 " - 45° " and contact
			29.8 " - 63° "
			31.15 " - 65° "
			35.1 " - 67° "

A/s SULFIDMALM

DIAMOND DRILL RECORD

LOCATION: 100S/45W BEARING: - DIP: Vert. HOLE NO: 3 SHEET NO: 1

LOGGED BY: STARTED: 2/9/76 PROPERTY KALTBERGET

CASING: 2.50 m FINISHED: 3/9/76

CORE SIZE: 35 mm TESTS (CORRECTED):

From	To		Description
0	2.40		Overburden
2.40	48.19		Schist dominantly a biotite - plag quartz schist - highly deformed with a strong schistosity but remments of earlier deformation phases.
			Between 2-3 m intermittent occurrence of graphite usually as minute bands parallel to schistosity, sometimes accompanied by small specks of po.
			20.39 - 20.52
			Band of a banded "schist"
			quartz-chlorite rich - could possibly be
			deformed gabbro/ultrabasic???
			21.79 - 21.92 finer grained basic layer in schists but carrying signs of deformation
			40.77 - 40.86 crush zone.
48.19	77.53		Ultrabasic.
			Upper contact schistose and seems more gabbroic over 8 cm.
			48.25 - 48.41 well mineralized massive blebs and stringers of po with minor cp. ca. 10%.
			After first 8 cm ultrabasic is phlogapite rich.
			48.70 Conc. of brown mineral-gedorite?
			49.65 - 49.75 feldspar rich
			Ultrabasic veins in composition throughout length with a certain amount of feldspar (quartz?) giving a more gabbroic composition.
77.53	78.40		Schist contacts with upper ultrabasic and lower fairly sharp.

A/s SULFIDMALM

DIAMOND DRILL RECORD

LOCATION: 100S/45W BEARING: - DIP: Vert. HOLE NO: 3 SHEET NO: 2

LOGGED BY: STARTED: 2/9/77 PROPERTY KALTBERGET

CASING: 2.50 m FINISHED: 3/9/77

CORE SIZE: 35 mm TESTS (CORRECTED):

From	To		Description
78.40	81.69		Ultrabasic finer grained and gabbroic over first 20 cms then becoming coarse and phlogopite rich - this contact is very like the upper contact of the upper ultrabasic.
			78.46 - 78.54 fine grained dissemination of po 2-5%
			Near lower contact becomes more gabbroic
			81.62 - 81.66 2-3% fine grained po dissemination
81.69	81.79		Schist
81.79	82.96		Ultrabasic rock - first 10 cm gabbroic and contain 2% disseminated po.
82.96	87.00		Schist
	87.00		End of hole

A/s SULFIDMALM

DIAMOND DRILL RECORD

LOCATION: 100S/45W BEARING: - DIP: Vert. HOLE NO: 3 SHEET NO: 3

LOGGED BY: STARTED: 2/9/77 PROPERTY KALTBERGET

CASING: 2.5 m FINISHED: 3/9/77

CORE SIZE: 35 mm TESTS (CORRECTED):

From	To		Description
			Core angles:
			3.5 m - 69 schistosity
			5.5 " - 70 "
			9.6 " - 72 "
			11.4 " - 69 "
			15.55 " - 68 "
			18.3 " - 66 "
			21.6 " - 56 "
			24.9 " - 66 "
			29.6 " - 75 "
			31.9 " - 76 "
			35.4 " - 77 "
			38.9 " - 76 "
			41.8 " - 73 "
			45.5 " - 74 "
			48.2 " - 84 " contact schist gabbro
			59.6 " - 37 " banding layering?
			66.3 " - 74 "
			75.8 " - 63 "
			78.05 " - 71 "
			81.7 " - 71 "
			83.7 " - 75 "
			86.8 " - 74 "

A/s SULFIDMALM

DIAMOND DRILL RECORD

LOCATION: 78N/100E BEARING: DIP: 84° HOLE NO: 4 SHEET NO: 1

LOGGED BY: STARTED: 8/9/76 PROPERTY KALTBERGET

CASING: 2.5 m FINISHED: 13/9/76

CORE SIZE: 35 mm TESTS (CORRECTED):

From	To		Description
0	2.0		Overburden
2.0	37.05		Quartz- biotite schist with a strong banding. The width of the individual bands change from 1 mm - 1 cm. Schistosity very distinct, marked by parallel arrangement of mica, and mostly parallel banding.
			Approaching the ultrabasic below the schist gets folds and a mylonithic foliation developed. The folds are always of isoclinal style, possibly well developed drag folds.
			Graphite occur as mm sized bands parallel schistosity and is very common from 23-28 m.
37.05	81.4		Metabasites. The average grain size is medium, but fine grained and coarse grained sections are common. There is also a slight change in plagioclase content, but no part of the rock should be classified as a metagabbro.
			Some parts of the metabasites are rich in biotite, this is most strongly developed, when the rock has gone through some shearing.

A/s SULFIDMALM

DIAMOND DRILL RECORD

LOCATION: 78S/100E BEARING: DIP: 84° HOLE NO: 4 SHEET NO: 2

LOGGED BY: R.S. STARTED: 8/9/76 PROPERTY KALTBERGET

CASING: 2.5 m FINISHED: 13/9/76

CORE SIZE: 35 mm TESTS (CORRECTED):

From	To		Description
			General: No schistosity developed in the metabasites.
			Sulphides: The entire metabasites are very weakly mineralized (specks)
			40.7-41.05 possibly 10% sulphides. Mainly po but also visible pe, cpy. The sulphides are occurring as 1-3 mm grains, random distributed also some 0.5-1.0 m crystal aggregates.
			From 59.0-60.0 possibly 1% sulphides. Mal grains random distributed.
			74.5-75 possibly 1% sulphides.
81.4	86.0		Banded quartz biotite schist with some graphite.
	86.0		End of hole.

A/s SULFIDMALM

DIAMOND DRILL RECORD

LOCATION: 78S/100E
LOGGED BY: R.S.
CASING: 2.5
CORE SIZE: 35 mm

BEARING: - DIP: 84 HOLE NO: 4 SHEET NO: 3
STARTED: 8.9.76 PROPERTY Kaltberget
FINISHED: 13.9.76
TESTS (CORRECTED):

From	To		Description
			Core angles
			3.3 - 77 Schistosity
			7.7 - 78 "
			8.9 - 75 "
			10.5 - 15 Fracture
			11.9 - 75 Schistosity
			15.9 - 78 "
			18.9 - 70 "
			22.8 - 76 "
			25.2 - 75 "
			28.5 - 76 "
			33.9 - 75 "
			57.7 - 63 Schistosity/shears
			85.5 - 73 "

A/S SULFIDMALM

PROPERTY: Kaltberget

HOLE NO: 4

SAMPLE	FROM	TO	LENGTH m	ASSAY			ROCK TYPE/MINERALIZATION
				%Ni	%Cu	%S	
20/314	38.0	39.0	1.0 m	0.03	0.01		Meta ultrabasite
20/315	39.0	40.0	1.0 m	0.01	0.01		"
20/316	40.0	41.0	1.0 m	0.28	0.03		"
20/317	41.0	42.0	1.0 m	0.09	0.02		"
20/318	42.0	43.0	1.0 m	0.08	0.02		"
20/319	55.0	56.0	1.0 m	0.04	0.01		Fine grained
20/320	56.0	57.0	1.0 m	0.05	0.01		Meta ultrabasite
20/321	57.0	58.0	1.0 m	0.03	0.01		"
20/322	58.0	59.0	1.0 m	0.05	0.01		"
20/323	59.0	60.0	1.0 m	0.12	0.02		"
20/324	60.0	61.0	1.0 m	0.12	0.05		"
20/325	61.0	62.0	1.0 m	0.13	0.02		"
20/326	62.0	63.0	1.0 m	0.12	0.02		"
20/327	63.0	64.0	1.0 m	0.10	0.02		"
20/328	64.0	65.0	1.0 m	0.08	0.01		"
20/329	74.0	75.0	1.0 m	0.07	0.01		"

A/s SULFIDMALM

DIAMOND DRILL RECORD

LOCATION: 52N/50E
BEARING: 270° DIP: 75° HOLE NO: 5 SHEET NO: 1
LOGGED BY: R.S.
STARTED:
PROPERTY KALTBERGET
CASING: 2.5 m
FINISHED:
CORE SIZE: 35 mm
TESTS (CORRECTED):

From	To		Description
0	2.35		Overburden
2.35	18.6		Banded quartz - biotite schist. The quartz content is variable. 13.4-16.6 banded quartzite.
			Cataclastic development is common. Porphyroclast of plag are visible.
18.6	81.7		Metabasites.
			The rock is fine to medium grained. Some parts of the core have 0.5-1.0 cm porphyroblasts (amphibole, biotite) in a fine grained matrix rich in chlorite etc.
			The plag content is slightly changing, but no part of the rock would be classified as gabbros, except possibly 78.8-81.7.
			The only visible foliation is late shears partly with development of clay. The late sharing has possibly destroyed earlier schistosity.
			Sulphides: There is a random distribution of small grains 1-5 mm with some concentration from 49.8-57.3 possibly 2-3% sulphides.
			This small concentration of sulphides occurs in a fine grained metabarite, which is lying above a sequence of metabasite rich in amphibole porphyroblasts. At 65.5 two 0.5 cm bands of massive po with some pe, cpy.
81.7	84.5		Banded schist.
	84.5		End of hole.

A/s SULFIDMALM

DIAMOND DRILL RECORD

LOCATION: 52N/50E BEARING: 270° DIP: 75° HOLE NO: 5 SHEET NO: 2

LOGGED BY: R.S. STARTED: PROPERTY KALTBERGET

CASING: 2.5 m FINISHED:

CORE SIZE: 35 mm TESTS (CORRECTED):

From	To		Description
			Core angles
			5.8 - 83 Schistosity
			8.6 - 82 "
			11.2 - 81 "
			16.4 - 78 "
			18.1 - 74 "
			19.1 - 55 "
			30.3 - 60 Shears
			55.2 - 57 "
			83.2 - 68 Schistosity

A/S SULFIDMALM

PROPERTY: Kaltberget

HOLE NO: 5

SAMPLE	FROM	TO	LENGTH m	ASSAY			ROCK TYPE/MINERALIZATION
				%Ni	%Cu	%S	
20/282	50.0	51.0	1.0 m	0.14	0.02		
20/283	51.0	52.0	1.0 m	0.09	0.01		
20/284	52.0	53.0	1.0 m	0.12	0.01		
20/285	53.0	54.0	1.0 m	0.11	0.01		
20/286	54.0	55.0	1.0 m	0.11	0.02		
20/287	55.0	56.0	1.0 m	0.10	0.02		
20/288	56.0	57.0	1.0 m	0.12	0.02		
20/289	57.0	58.0	1.0 m	0.11	0.02		
20/290	58.0	59.0	1.0 m	0.03	0.01		
20/291	59.0	60.0	1.0 m	0.02	0.01		
20/304	60.0	61.0	1.0 m	0.04	0.01		
20/305	61.0	62.0	1.0 m	0.03	0.01		
20/306	62.0	63.0	1.0 m	0.04	0.01		
20/307	63.0	64.0	1.0 m	0.02	0.01		
20/308	64.0	65.0	1.0 m	0.04	0.01		
20/309	65.0	66.0	1.0 m	0.17	0.04		
20/310	66.0	67.0	1.0 m	0.05	0.01		
20/311	67.0	68.0	1.0 m	0.02	0.01		
20/312	68.0	69.0	1.0 m	0.04	0.01		
20/313	69.0	70.0	1.0 m	0.02	0.01		

A/s SULFIDMALM

DIAMOND DRILL RECORD

LOCATION: 116N/58.5E BEARING: DIP: 90 HOLE NO: 6 SHEET NO: 1

LOGGED BY: R.S. STARTED: PROPERTY Kaltberget

CASING: no FINISHED:

CORE SIZE: 35 mm TESTS (CORRECTED):

From	To		Description
0	16.0		Metabasites
			0 -12.05 fine to medium grained
			12.05-16.0 porphyroblastic(amphibol)
			in a fine grained matrix
			The metabasite with porphyroblasts is sheared and
			brecciated.
			Core loss 12.45-14.0
			Sulphides: the fine to medium grained metabasites
			are mineralized.
			0.95- 2.15 30-40% sulphides
			po, cpy, pe
			possibly 2-3% pe, 0.5-1% cpy
			The rest of the fine grained metabasite contain
			less than 5% sulphides.
	16.0		End of hole.
			Core angles:
			1.2- 55°
			8.3- 58°
			13.0- 60°

A/S SULFIDMALM

PROPERTY: Kaltberget

HOLE NO: 6

SAMPLE	FROM	TO	LENGTH m	ASSAY			ROCK TYPE/MINERALIZATION
				%Ni	%Cu	%S	
20/292	0	1.0	1.0 m	0.58	0.04	2.2	
20/293	1.0	2.0	1.0 m	2.25	0.36	9.2	
20/294	2.0	3.0	1.0 m	0.44	0.07	1.8	
20/295	3.0	4.0	1.0 m	0.18	0.02		
20/296	4.0	5.0	1.0 m	0.19	0.02		
20/297	5.0	6.0	1.0 m	0.17	0.02		
20/298	6.0	7.0	1.0 m	0.11	0.02		
20/299	7.0	8.0	1.0 m	0.11	0.02		
20/300	8.0	9.0	1.0 m	0.13	0.02		
20/301	9.0	10.0	1.0 m	0.13	0.02		
20/302	10.0	11.0	1.0 m	0.12	0.02		
20/303	11.0	12.0	1.0 m	0.11	0.02		

A/s SULFIDMALM

DIAMOND DRILL RECORD

LOCATION: 114N/50E BEARING: DIP: 90 HOLE NO: 7 SHEET NO: 1
LOGGED BY: R. Sivertsen STARTED: PROPERTY Kaltberget
CASING: 3.5 m FINISHED:
CORE SIZE: 35 mm TESTS (CORRECTED):

From	To		Description
0	3.3		Overburden
3.3	17.65		Metabasites
			3.3- 8.0 Fine to medium grained rich in chlorite.
			8.0-17.65 Amphibol porphyroblasts often retrograded to biotite in a fine grained matrix of mainly chlorite biotite and fine grained amphiboles. This part of the metabasite is strongly sheared.
			The main planar structure visible in the metabasite is late shear planes. They often occur in zones. clay is common in these zones. 6.6-6.9, 7.3-7.35, 7.85-8.05.
			Sulphides: Small grains random distributed from 3.3-8.0, 1%.
	17.65		End of hole.
			Core Angles
			7.5 - 30° Shearplane

A/s SULFIDMALM

DIAMOND DRILL RECORD

LOCATION: 115N/56.5E BEARING: 90E DIP: 45° HOLE NO: 8 SHEET NO: 1

LOGGED BY: R. Sivertsen STARTED: PROPERTY Kaltberget

CASING: 3.5 m FINISHED:

CORE SIZE: 35 mm TESTS (CORRECTED):

From	To		Description
0	3.0		Overburden
3.0	31.9		Metabasite
			3.0- 9.5 Fine to medium grained.
			9.5-14.0 Porphyroblasts of amphibol in a fine grained matrix. This part of the metabasite has gone through strong shearing.
			14.0-25.0 Fine to medium grained.
			25.0-31.9 Porphyroblasts of amphibol in a fine grained and sheared matrix.
			Schistosity is very weakly developed. Shear planes are common from 9.5-14.0, 25-31.9.
			Sulphides: Most of the sulphides which are visible occur in the fine to medium type.
			3.0- 9.5 Randomly distributed sulphides. Max grain size 5 mm. Mainly po but pn and cpy are visible. The sulphide content < 5%.
			9.5-14.0 Specks.

'Is SULFIDMALM

DIAMOND DRILL RECORD

LOCATION: 115N/56.5E BEARING: 90 DIP: 45° HOLE NO: 8 SHEET NO: 2

LOGGED BY: R. Sivertsen STARTED: PROPERTY Kaltberget

CASING: FINISHED:

CORE SIZE: TESTS (CORRECTED):

From	To		Description
			14.0-25.0 This section is more or less mineralized. Around a core of heavily mineralized metabasite is a zone containing randomly distributed sulphid grains.
			17.6-22.0 30-40% sulphides, possibly 2-3% pn, 1% cpy.
			The sulphides occur as grains ranging from 1 mm to aggregates several mm across. Both pn and cpy are easily visible. The sulphide grains are flattened and orientated parallel to schistosity.
	31.9		End of hole.
			Core Angles
			21.1 - 55° schistosity sulphid grains
			30.5 - 65 schistosity

A/s SULFIDMALM

DIAMOND DRILL RECORD

LOCATION: 109N/51E BEARING: 90 (E) DIP: 45° HOLE NO: 9 SHEET NO: 1

LOGGED BY: R. Sivertsen STARTED: PROPERTY Kaltberget

CASING: 6.0 m FINISHED:

CORE SIZE: 35 mm TESTS (CORRECTED):

From	To		Description
0	5.6		Overburden
5.6	34.05		Metabasite
			5.6-18.0 Fine to medium grained metabasite with blebs and streaks of sulphides. Mainly po, but visible pn, cpy. Total sulphid content < 5%.
			18.0-34.05 Metabasite with porphyroblasts of amphibol? often retrograded to biotite and chlorite. The average size of the porphyroblasts 1.0-1.5 cm. This part of the metabasite is in places strongly sheared with the shearplanes wrapping around the amphibol porphyroblasts, no porphyroclasts.
			30.3-33.5 mylonite developed in the metabasite, foliation is parallel to core string.
			Shear zones/fracture zones with development of clay 27.4-27.6 29.3-29.5

A/S SULFIDMALM

PROPERTY: Kaltberget

HOLE NO: 8

SAMPLE	FROM	TO	LENGTH m	ASSAY			ROCK TYPE/MINERALIZATION
				%Ni	%Cu	%S	
20/262	10.0	11.0	1.0 m	0.05	0.01		
20/263	11.0	12.0	1.0 m	0.31	0.06		
20/264	12.0	13.0	1.0 m	0.25	0.04		
20/265	13.0	14.0	1.0 m	0.10	0.02		
20/266	14.0	15.0	1.0 m	0.17	0.02		
20/267	15.0	16.0	1.0 m	0.04	0.02		
20/268	16.0	17.0	1.0 m	0.05	0.01		
20/269	17.0	18.0	1.0 m	0.60	0.09		
20/270	18.0	19.0	1.0 m	0.35	0.06		
20/271	19.0	20.0	1.0 m	1.52	0.24		
20/272	20.0	21.0	1.0 m	1.75	0.26		
20/273	21.0	22.0	1.0 m	1.70	0.31		
20/274	22.0	23.0	1.0 m	0.14	0.03		
20/275	23.0	24.0	1.0 m	0.09	0.02		
20/276	24.0	25.0	1.0 m	0.13	0.03		
20/277	25.0	26.0	1.0 m	0.07	0.01		
20/278	26.0	27.0	1.0 m	0.06	0.01		
20/279	27.0	28.0	1.0 m	0.07	0.02		
20/280	28.0	29.0	1.0 m	0.08	0.02		
20/281	29.0	30.0	1.0 m	0.06	0.01		

A/s SULFIDMALM

DIAMOND DRILL RECORD

LOCATION: 109N/51E BEARING: 90 (E) DIP: 45° HOLE NO: 9 SHEET NO: 2

LOGGED BY: R.S. STARTED: PROPERTY Kaltberget

CASING: FINISHED:

CORE SIZE: TESTS (CORRECTED):

From	To		Description
			Core Angles
			Schistosity generally weakly developed.
			7.5 - 31 fracture
			9.3 - 43 shears
			15.6 - 45 "
			27.3 - 44 "

A/s SULFIDMALM

DIAMOND DRILL RECORD

LOCATION: 110E/50E BEARING: 55° DIP: 45° HOLE NO: 10 SHEET NO: 1

LOGGED BY: R. Sivertsen STARTED: PROPERTY Kaltberget

CASING: 6.0 m FINISHED:

CORE SIZE: 35 mm TESTS (CORRECTED):

From	To		Description
0	5.5		Overburden
5.5	30.0		Metabasite. Alternating between bands/layers with a fine to medium grained texture and bands with porphyroblasts/blasto-porphyrer/porphyroclasts of amphibol in a fine grained matrix of chlorite, biotite.
			Sulphides are randomly distributed through the entire core with some concentration at:
			7.0- 9.0 < 5%
			18.0-21.0 < 5%
			Mainly po, but visible pn, cpy.
			Shear zones are common, often with development of clay, espec. at:
			21.2-21.5
			Most of early planar structures (schistosity) are destroyed by late shearing.
			Core Angles
			Late shears 60°

A/s SULFIDMALM

DIAMOND DRILL RECORD

LOCATION: 110N/50E BEARING: 55° DIP: 60 HOLE NO: 11 SHEET NO: 1

LOGGED BY: R. Sivertsen STARTED: PROPERTY Kaltberget

CASING: 5.0 m FINISHED:

CORE SIZE: 35 mm TESTS (CORRECTED):

From	To		Description
0	4.5		Overburden
4.5	38.3		Metabasite
			4.5-11.05 Metabasite with 1.0-1.5 cm amphibole crystals in a fine grained matrix of chlorite, biotite and fine grained amphibole.
			11.05-19.2 Metabasite fine to medium grained, rich in chlorite.
			19.2-38.3 Metabasite with 1.0-1.5 cm amphibole crystals in a fine grained matrix. Strong shearing is common often with development of a mylonitic foliation and in places clay.
			19.2-19.3 shearzone
			19.8-20.7 brecciation
			20.7-21.8 clay, core loss
			21.8-26.8 clay, mylonite, breccia
			Sulphides: specks
	38.3		End of hole
			Core angles:
			13.3 45° late shears
			18.3 55° "
			27.8 50° foliation
			32.4 52° "
			34.6 48° "

A/s SULFIDMALM

DIAMOND DRILL RECORD

LOCATION: 114N/61E BEARING: DIP: 90 HOLE NO: 12 SHEET NO: 1
LOGGED BY: R. Sivertsen STARTED: PROPERTY Kaltberget
CASING: 3.0 m FINISHED:
CORE SIZE: 35 mm TESTS (CORRECTED):

From	To		Description
0	2.7		Overburden
2.7	18.4		Metabasite.
			2.7-15.8 Fine to medium grained. Seems to be rich in chlorite.
			15.8-18.4 Metabasite with 1.0-1.5cm large amphibol crystals in a fine grained matrix of chlorite, biotite and amphibole. The amphibol crystals are often retrograded to biotite and chlorite. This lowest part of the metabasite is strongly sheared.
			Sulphides: The sulphides occur in the fine to medium grained part e.g. 2.7-15.8 (po, pn, cpy).
			2.7-7.7 50% sulphides. Possibly 2-3% pn, 0.5-1.0% cpy.
			The rest of the mineralized metabasite contains 3-5% sulphides with visible pn, cpy.
			The sulphides occur as 2-15 mm crystal aggregates of po, cpy, pn.
			The aggregates have an elongated shape and are orientated parallel schistosity.

A/s SULFIDMALM

DIAMOND DRILL RECORD

LOCATION: 114N/61E BEARING: DIP: 90 HOLE NO: 12 SHEET NO: 2

LOGGED BY: R. Sivertsen STARTED: PROPERTY Kaltberget

CASING: FINISHED:

CORE SIZE: TESTS (CORRECTED):

From	To		Description
			The pentlandite occur as max 5 mm grains in the core of larger po aggregates.
			Core loss: 16.6 - 17.0
	18.4		End of hole
			Core Angles
			2.9 - 55° schistosity
			6.3 - 56 "
			9.7 - 62 "
			17.6 - 65 late shears

A/S SULFIDMALM

PROPERTY: Kaltberget

HOLE NO: 12

SAMPLE	FROM	TO	LENGTH m	ASSAY			ROCK TYPE/MINERALIZATION
				%Ni	%Cu	%S	
20.330	2.7	3.0	0.3 m	1.05	0.23	6.0	
20.331	3.0	4.0	1.0 m	0.68	0.14	4.0	
20.232	4.0	5.0	1.0 m	2.25	0.50	10.8	
20.233	5.0	6.0	1.0 m	1.62	0.32	7.4	
20.234	6.0	7.0	1.0 m	2.25	0.41	9.9	
20.235	7.0	8.0	1.0 m	1.15	0.23	5.9	
20.236	8.0	9.0	1.0 m	0.15	0.04		
20.237	9.0	10.0	1.0 m	0.16	0.02		

PROPERTY: Kaltberget

SUMMARY OF DIAMOND DRILLING RESULTS

LOCATION	HOLE NO	BEARING	DIP	LENGTH	MINERALIZATION						REMARKS
					FROM	TO	LENTGTH	%Ni	%Cu	%S	
116N/58.5E	6	Vert.	90	16.0	0.0	2.4	1.0 m	0.58	0.04	2.2	
					1.0	2.0	1.0 m	2.25	0.36	9.2	
					2.0	3.0	1.0 m	0.44	0.07	1.8	
115N/56.5E	8	90	45	31.9	17.0	18.0	1.0 m	0.6	0.09		
					18.0	19.0	1.0 m	0.35	0.06		
					19.0	20.0	1.0 m	1.52	0.24		
					20.0	21.0	1.0 m	1.75	0.26		
					21.0	22.0	1.0 m	1.7	0.31		
114N/61E	12	Vert.	90	18.4	2.7	3.0	0.3 m	1.05	0.23	6.0	
					3.0	4.0	1.0 m	0.68	0.14	4.0	
					4.0	5.0	1.0 m	2.25	0.50	10.8	
					5.0	6.0	1.0 m	1.62	0.32	7.4	
					6.0	7.0	1.0 m	2.25	0.41	9.9	
					7.0	8.0	1.0 m	1.15	0.23	5.9	

"/s SULFIDMALM

DIAMOND DRILL RECORD

LOCATION: 112.5N/61E BEARING: 115° DIP: 50 HOLE NO: 13 SHEET NO: 1

LOGGED BY: R. Sivertsen STARTED: PROPERTY Kaltberget

CASING: FINISHED:

CORE SIZE: TESTS (CORRECTED):

From	To		Description
0	7.0		Overburden
7.0	31.7		Metabasites with 1.0-1.5 cm amphibol crystals in a fine grained matrix of chlorite, biotite and amphibol.
			Shearing zones are common and this is the only visible planar structure.
			Sulphides: specks
	31.7		End of hole.

KALTBERGET C.P. measurement.

Active electrode in DDH 8.

DEPTH	DDH 4	DDH 5
0 m	-4420	-4270
10	-4350	-4130
15	-4290	-4040
20	-4150	-4050
25	-4020	-3900
30	-3990	-3540
35	-4020	-3340
40	-4080	-3140
45	-3700	-3080
50	-3360	-3060
55	-3270	-3150
60	-3250	-3150
65	-3290	-3020
70	-3380	-3220
75	-3470	-3420
80	-3560	-3570
85	-3770	-3790

GEOLOGICAL MAP OF THE TRONDHEIM REGION

GEOLOGISK KART OVER TRONDHEIMSFELTET

1:500000

COMPILED BY FR. CHR. WOLFF AFTER:
SAMMENTEGNET AV FR. CHR. WOLFF ETTER:

T. BIRKELAND, C.W. CARSTENS, H. CARSTENS, J. CHALOUPSKY, G. GRAMMELTVEDT, F. FEDIUK, M. FIŠERA, S. FOSLIE, J. FÆRDEN, A. HAUGEN, H. HEIM, P. HOLMSEN, H.J. KISCH, GHR. OFTEDAHL, J. PEACEY, Z. PELC, D. ROBERTS, I.J. RUI, G. SCHAAR, A. SIEDLECKA, S. SIEDLECKI, T. STRAND, TH. VOGT, FR. CHR. WOLFF.

LEGEND
TEGNFORKLARING

RÖRAGEN BEDS (DEVONIAN)
RÖRAGENFELTET (DEVON)

CONGLOMERATE AND SHALE
KONGLOMERAT OG SKIFER

SLÅGÅN GROUP – HORG GROUP (SILURIAN)
SLÅGÅNGRUPPEN – HORGGRUPPEN (SILUR)

DARK SHALE AND SANDSTONE
MÖRK SKIFER OG SANDSTEIN

KJÖLHAUGEN GROUP – RÖROS GROUP – UPPER HOVIN GROUP (UPPER ORDOVICIAN)
KJÖLHAUGGRUPPEN RÖROSGRUPPEN ÖVRE HOVINGRUPPEN (ÖVRE ORDOVICIUM)

PHYLLITE, METAGRAYWACKES, WITH INCREASING AMOUNTS OF BIOTITE, HORNBLEND AND GARNET TOWARDS THE SOUTHEAST, PARTLY CONGLOMERATIC
FYLLITT, METAGRÅVAKKER MED ÖKENDE MENGDER AV BIOTITT, HORNBLENDE OG GRANAT MOT SYDÖST, DELVIS KONGLOMERATISK

POLYGENOUS CONGLOMERATE
POLYMIKT KONGLOMERAT

SULÅMO GROUP – LOWER HOVIN GROUP (MIDDLE ORDOVICIAN)
SULÅMOGRUPPEN UNDRE HOVINGRUPPEN (MIDTRE ORDOVICIUM)

DARK SHALE AND RHYOLITE TUFF IN WEST, GREENSTONE IN EAST
MÖRK SKIFER OG RHYOLITT TUFF I VEST, GRÖNNSTEN I ÖST

GREY CALCAROUS SANDSTONE AND GREY TO DARK PHYLLITE
GRÅ KALKHOLDIG SANDSTEIN OG GRÅ TIL MÖRK FYLLITT

HÖLONDA, TROMSDALEN, BRENNA AND SIMILAR LIMESTONES
HÖLONDA, TROMSDALEN, BRENNA OG LIGNENDE KALKSTEINER

VENNA, STOKKVOLA, LILLE FUNDSJÖ AND SIMILAR CONGLOMERATES
VENNA, STOKKVOLA, LILLE FUNDSJÖ OG LIGNENDE KONGLOMERATER

FUNDSJÖ GROUP – STÖREN GROUP (LOWER ORDOVICIAN)
FUNDSJÖGRUPPEN – STÖRENGRUPPEN (UNDRE ORDOVICIUM)

GREENSTONES AND QUARTZKERATOPHYRES
GRÖNNSTENER OG KVARTSKERATOFYRER

GRANODIORITIC GNEISS
GRANODIORITTISK GNEISS

SONVATN GROUP – GULA SCHIST GROUP (CAMBRIAN)
SONVATNGRUPPEN – GULASKIFERGRUPPEN (KAMBRIUM)

MICA SCHISTS, OFTEN WITH GARNET
GLIMMERSKIFER, OFTE MED GRANAT

CONGLOMERATES OF THE GUDÅ CONGLOMERATE ZONE
KONGLOMERATER TILHÖRENDE GUDÅKONGLOMERATSONEN

LIMESTONE
KALKSTEIN

CALEDONIAN INTRUSIVES
KALEDONSKE INTRUSIVER

LARGER BODIES OF TRONDHJEMITE
STÖRRE LEGEMER AV TRONDHJEMITT

LARGER BODIES OF GABBRO
STÖRRE LEGEMER AV GABBRO

[illegible] (DYRHAUGEN)

SERPENTINITES
SERPENTINER

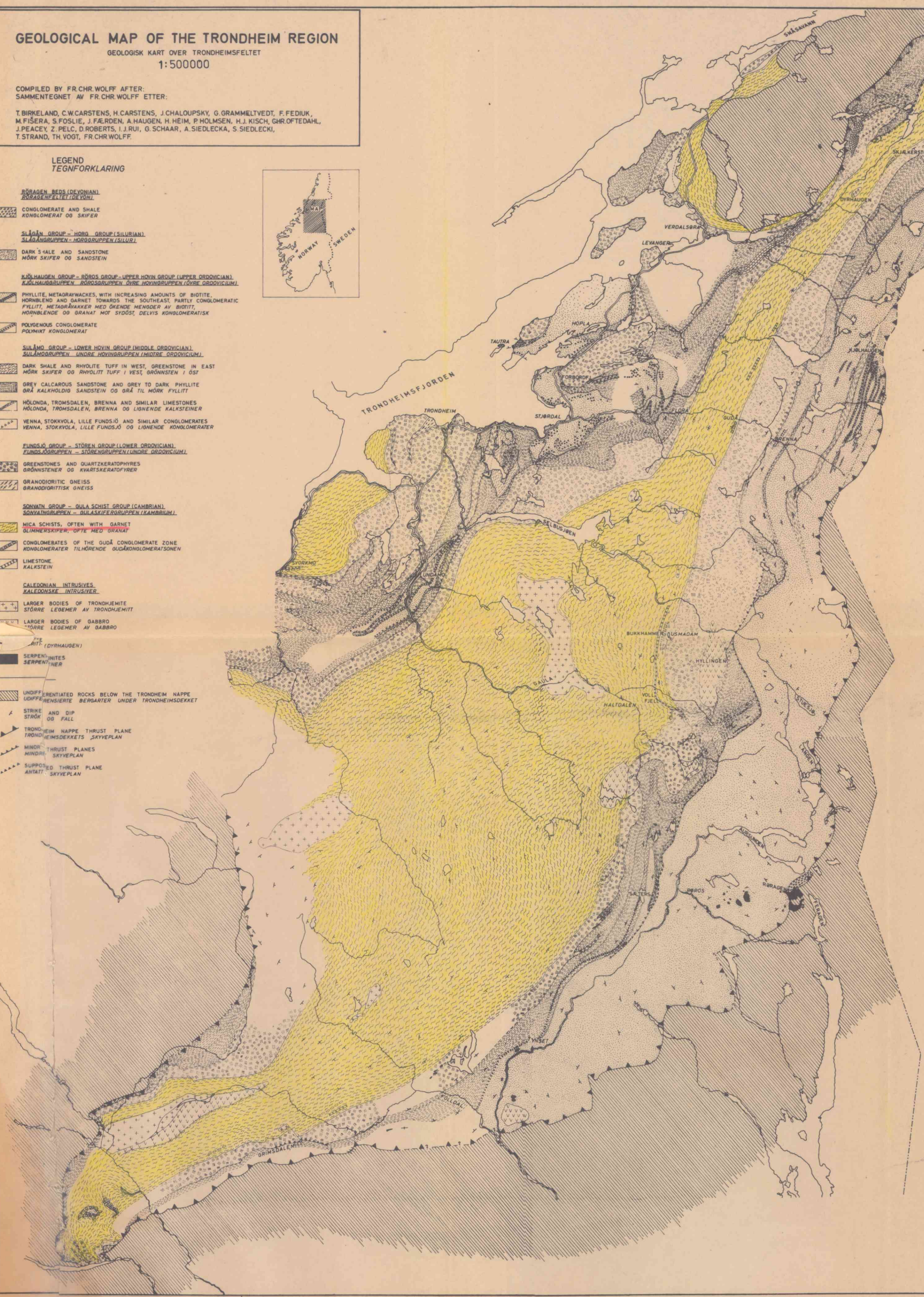
UNDIFFERENTIATED ROCKS BELOW THE TRONDHEIM NAPPE
UDIFFERENSIERTE BERGARTER UNDER TRONDHEIMSDEKKET

STRIKE AND DIP
STRÖK OG FALL

TRONDHEIM NAPPE THRUST PLANE
TRONDHEIMSDEKKETS SKYVEPLAN

MINOR THRUST PLANES
MINDRE SKYVEPLAN

SUPPOSED THRUST PLANE
ANTATT SKYVEPLAN



Gardsjöen

KVIKNE

Svartsjölia

Ya

Kvikne mine area (8 holes drilled 1974)

6 DDH: 269,9m

Olkar grid

13 DDH 609,95m

Kaltberget grid

Vakkerlifjellet

Fuglåstjern

Stormhaugen

Orkla

Kletten
ultrabasic peridotite
Sampled for petrological work

Magnil seter

Myssmørdalen

Gråhö

Röstvangen

Hög Gia

Greenstone
Siltstone
STÖREN GROUP

Greenstone
Graphite schist
Schist
GULA GROUP

Ultrabasic

Gabbro

Acid intrusives

Stream sed sampled area

Helicopter survey area

Claim blocks

Vakkerlien grid summer 1975.

Vakkerlien grid winter 1976.

Detailed geophysical grid summer 1976.

KVIKNE AREA
LOCATION AND SUMMARY

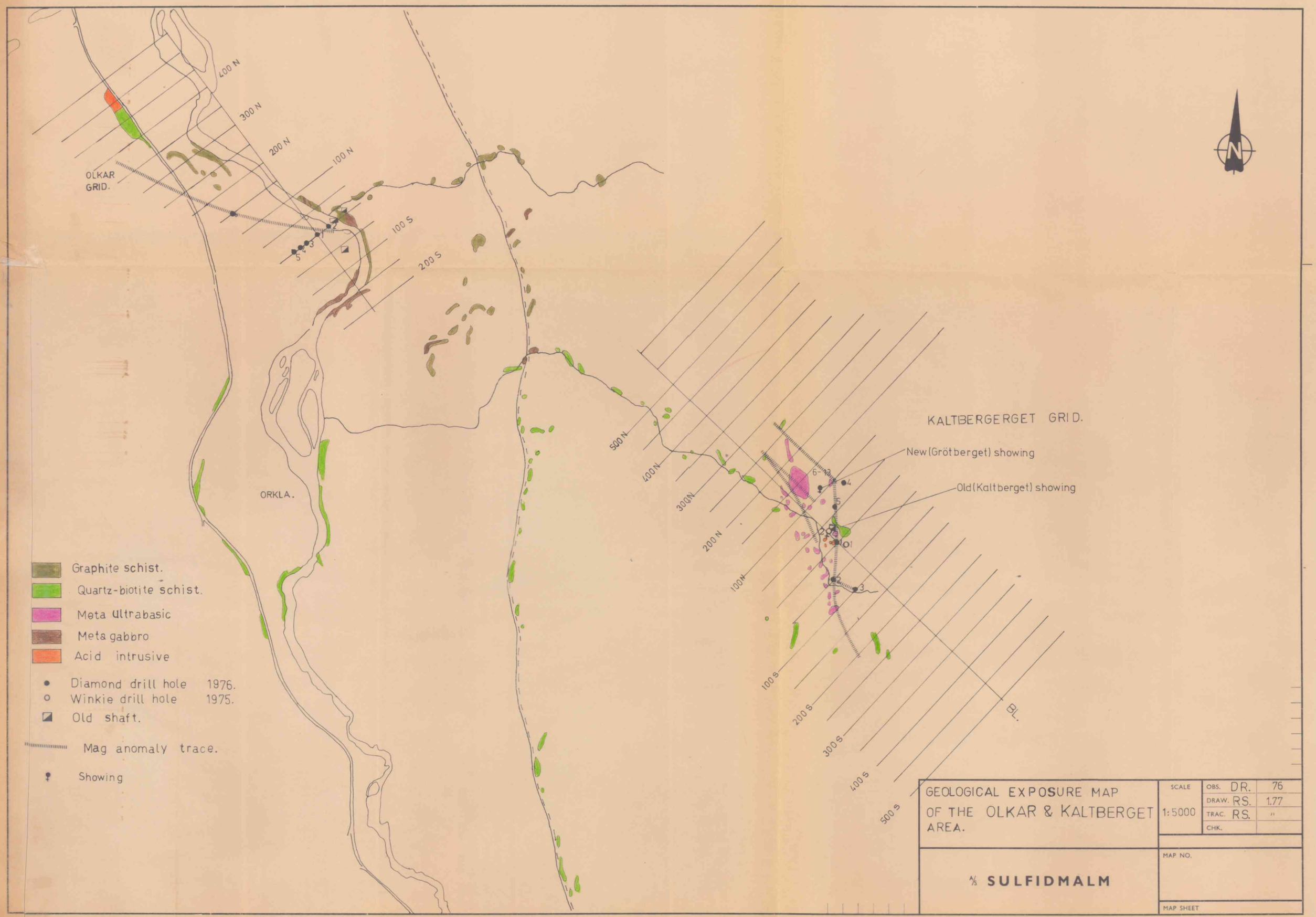
SCALE 1:50000

OBS. O.N.
DRAW. R.S.
TRAC. R.S.
CHK.

MAP NO.

MAP SHEET

SULFIDMALM



GEOLOGICAL EXPOSURE MAP OF THE OLKAR & KALTBERGET AREA.

SCALE 1:5000

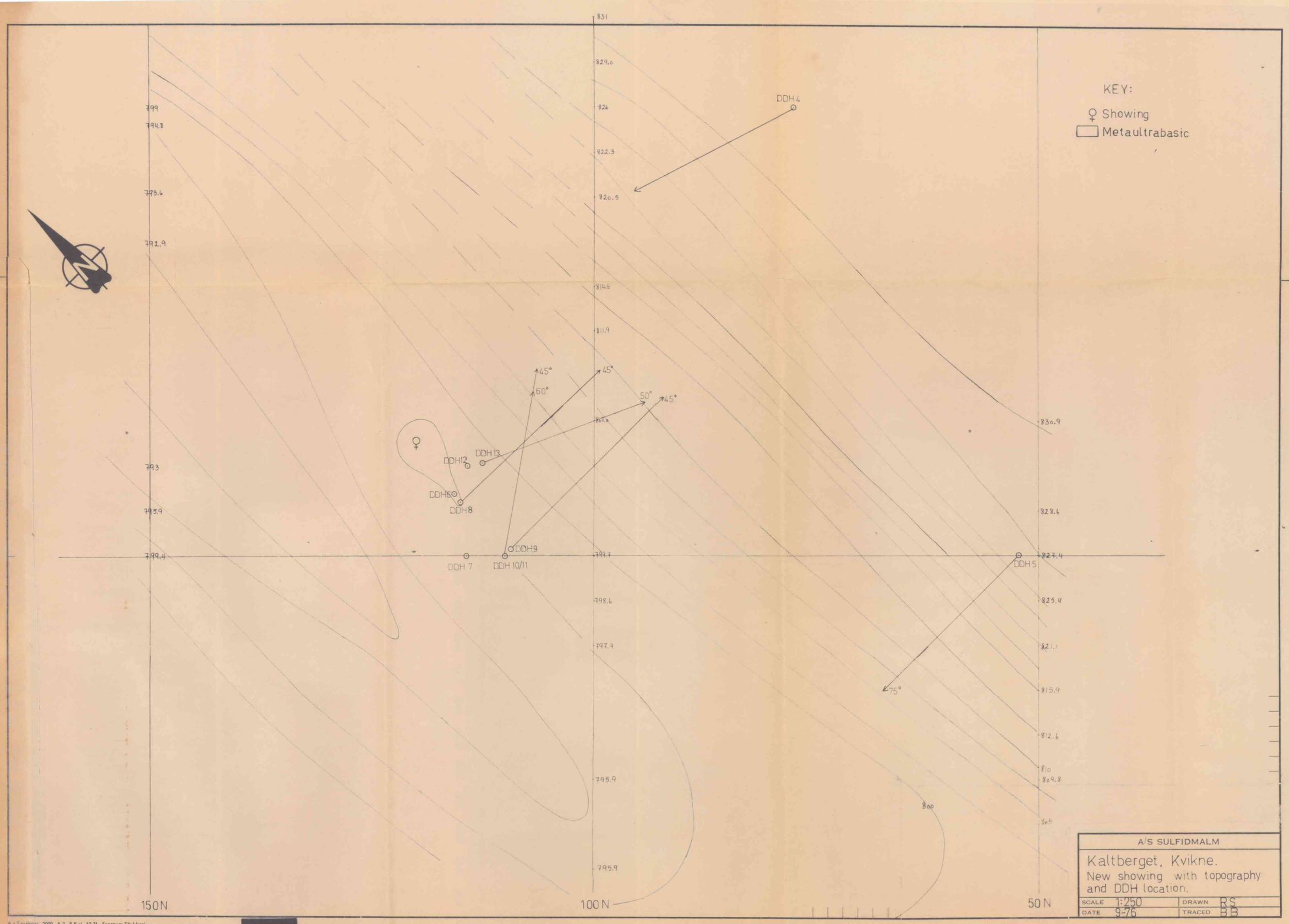
OBS.	DR.	76
DRAW.	RS.	1.77
TRAC.	RS.	"
CHK.		

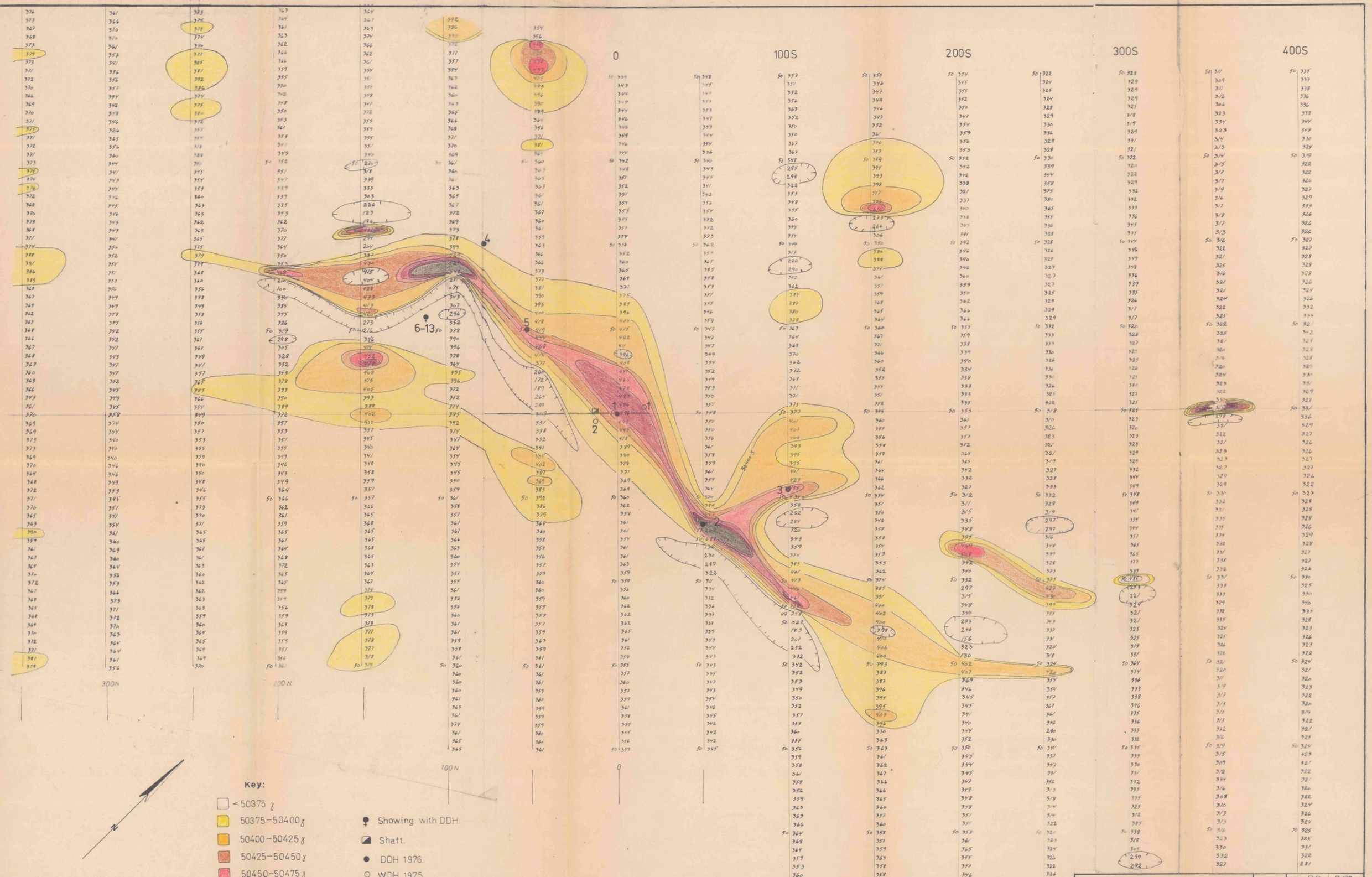
MAP NO.

MAP SHEET

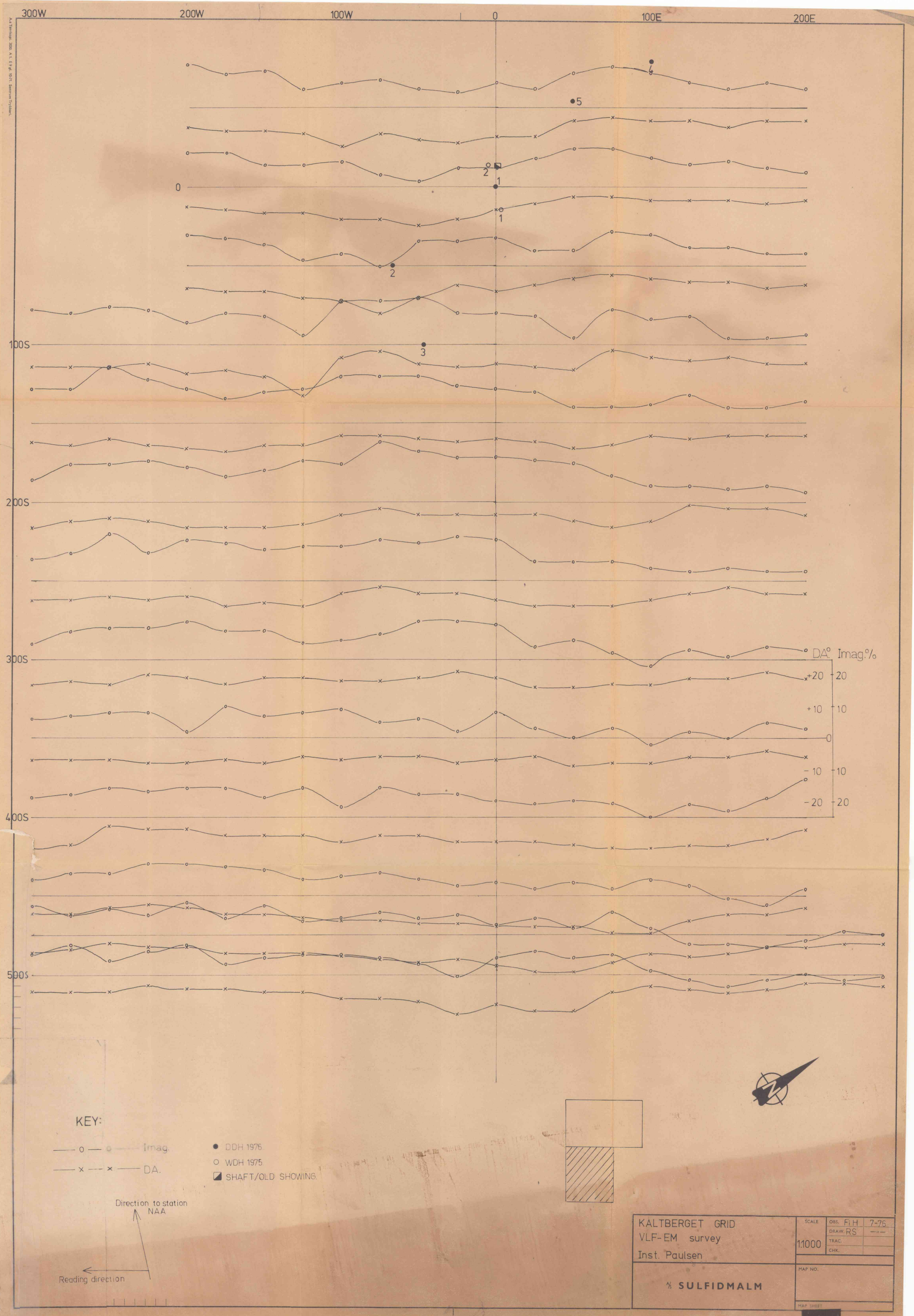
A/S SULFIDMALM

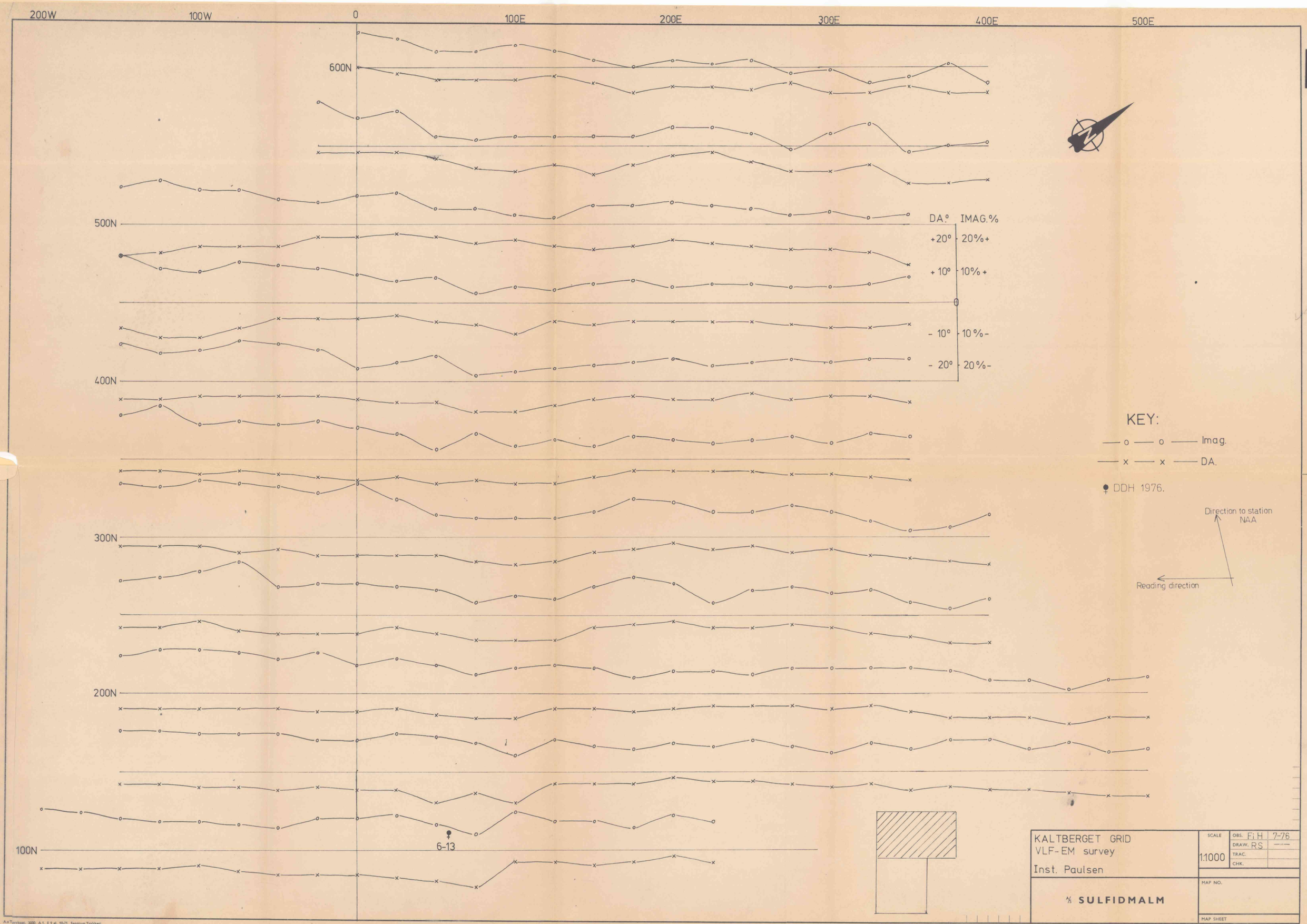
A.s Terrkopi. 2000. A 2. E 9 gl. 10-71. Sentrum Trykkeri.





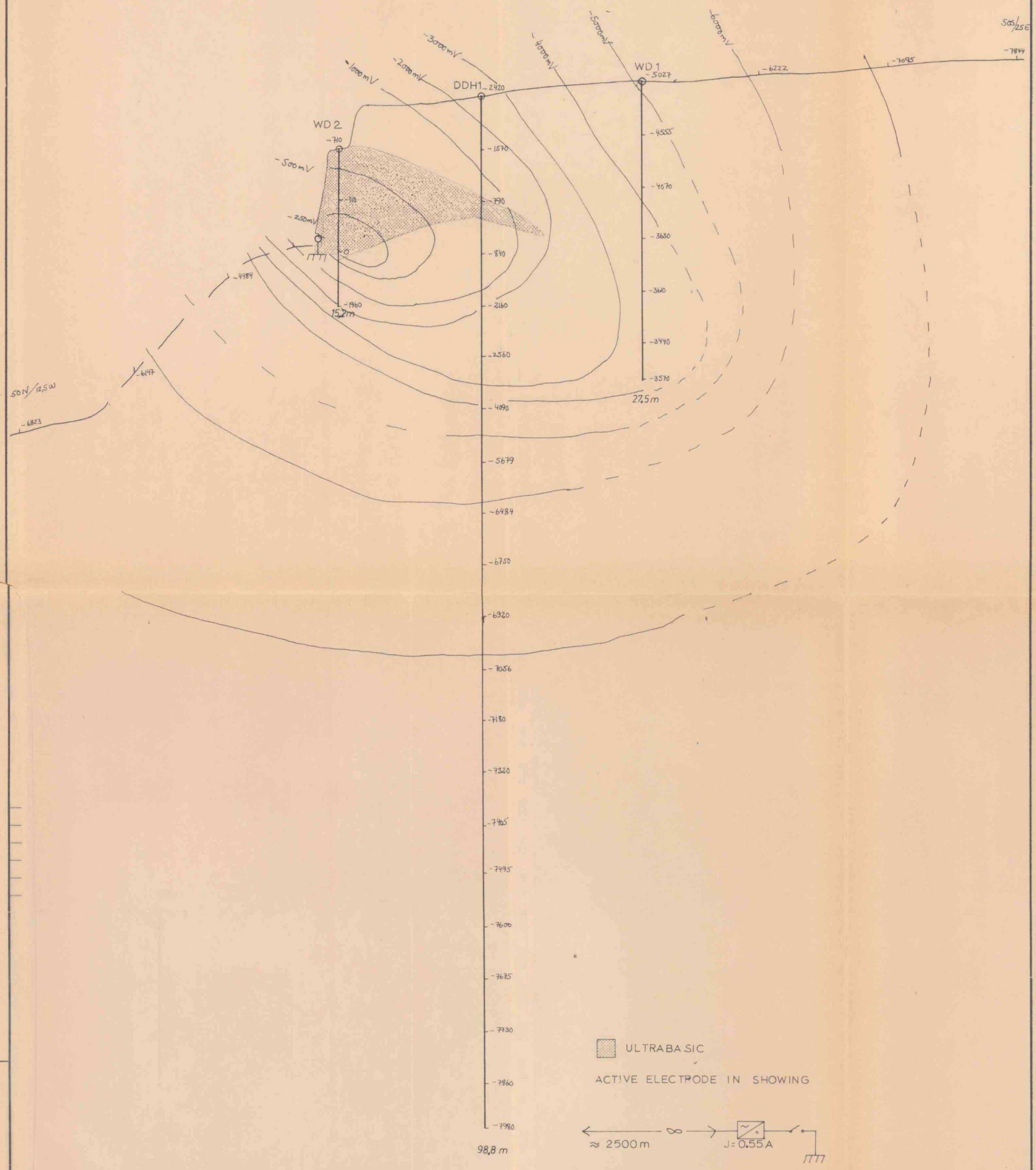
KALTBERGET GRID	SCALE	OBS. RS	7-76
Contoured magnetic map.	1:1000	DRAW. RS	7-76
Inst. Scitrex MP 2		TRAC. RS	8-76
		CHK.	
% SULFIDMALM	MAP NO. 2.		
	MAP SHEET		


300W
200W
100W
0
100E
200E
100S
200S
300S
400S
500S
DA°
Imag.%
+20
+10
0
-10
-20
20
10
10
20
KEY:
Imag.
DA.
DDH 1976
WDH 1975
SHAFT/OLD SHOWING
Direction to station NAA
Reading direction
KALTBERGET GRID
VLF-EM survey
Inst. Paulsen
SCALE
1:1000
OBS. FiH
7-76
DRAW. RS
TRAC.
CHK.
MAP NO.
MAP SHEET
SULFIDMALM



A.s Tønsbergs 3000. A 1. E 9 gl. 10-71. Sentrum Trykkeri.

A.s Terrkopi. 2000. A 2. E 9 gl. 10-71. Sentrum Trykkeri.



KALTBERGET KVIKNE CP. MEASUREMENT

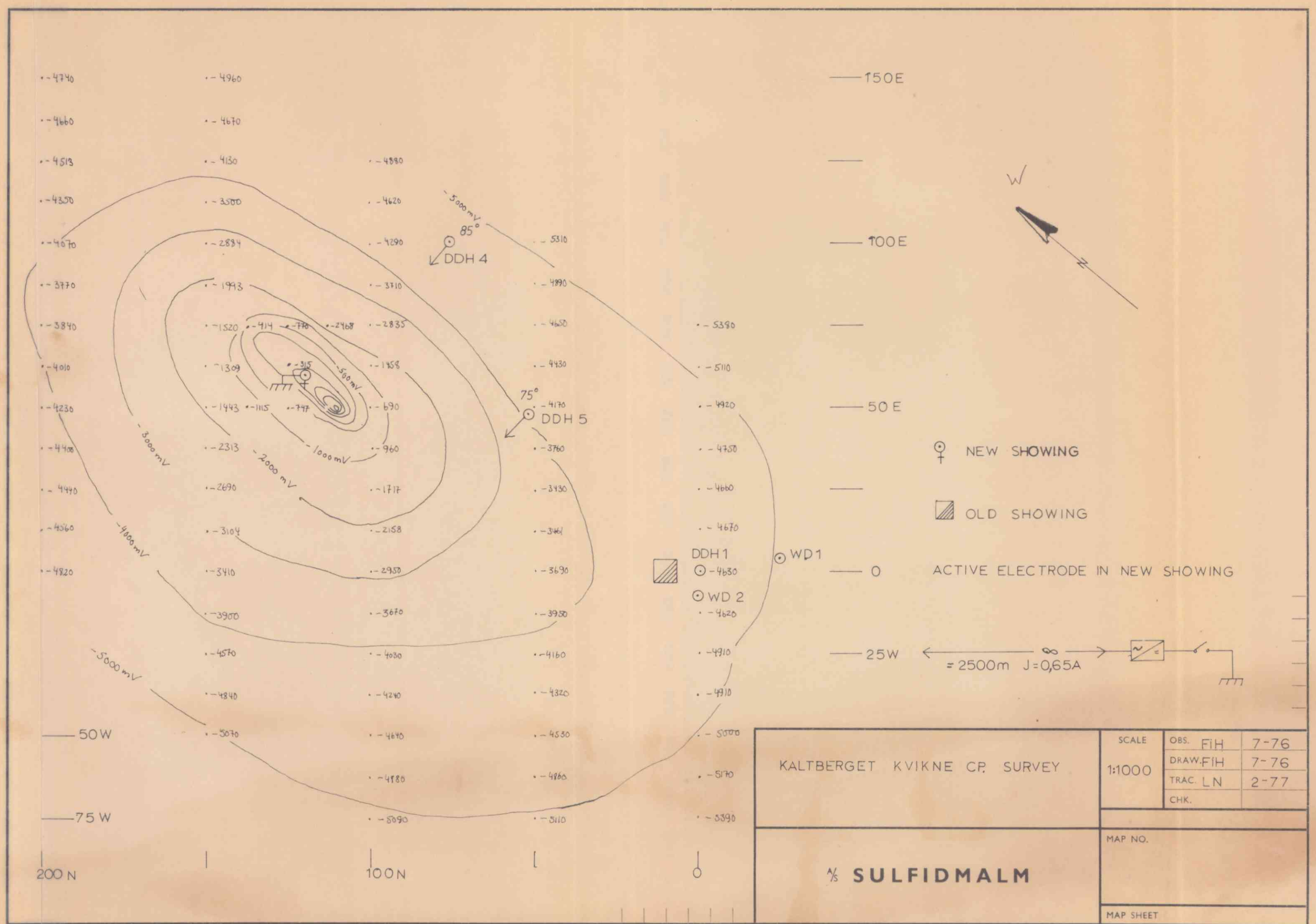
SECTION 50N/125W – 50S/25E.

SCALE	OBS. FIH	7-76
1:250	DRAW. FIH	7-76
	TRAC. LN	2-77
	CHK.	

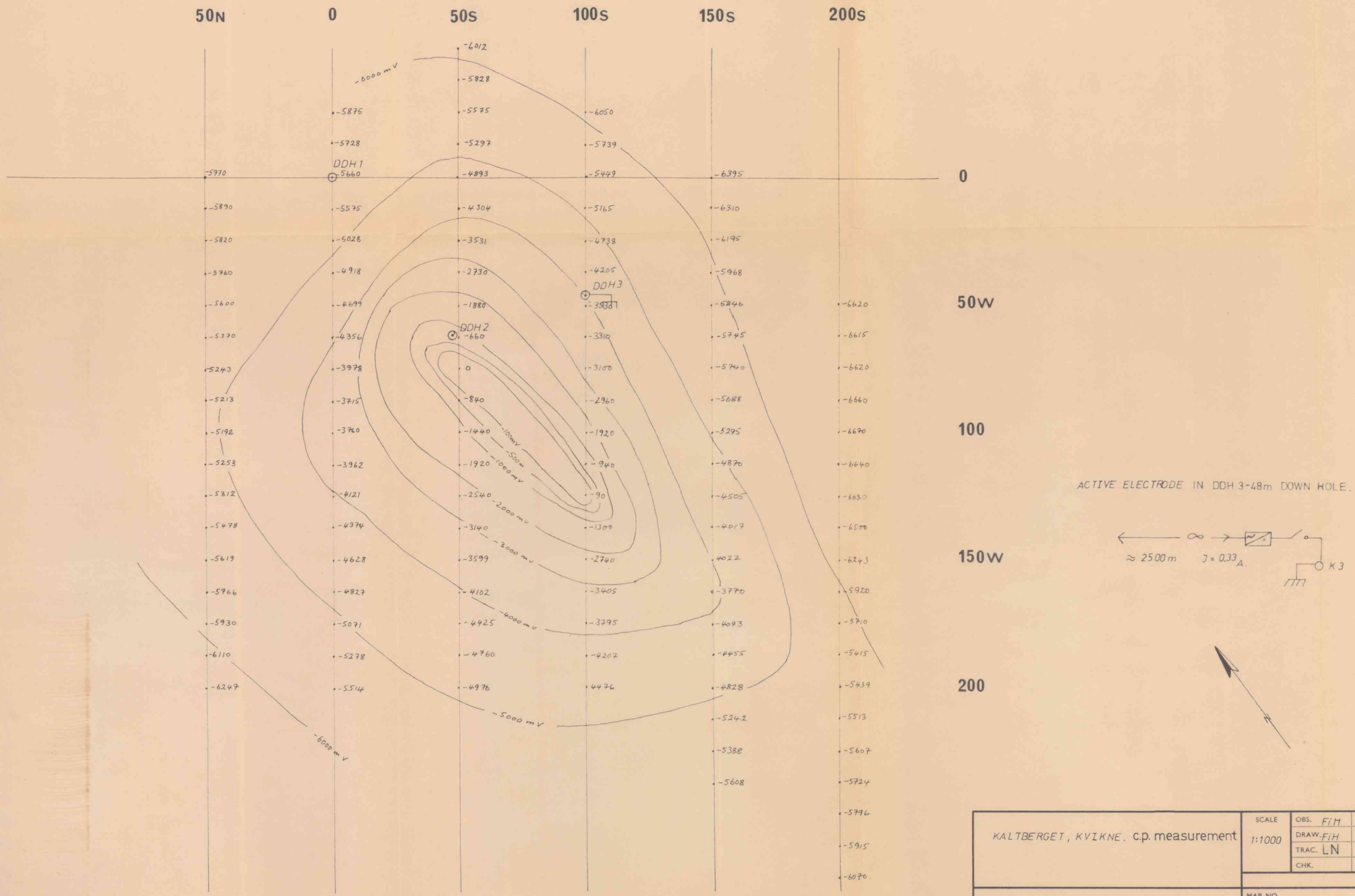
MAP NO.

MAP SHEET

⅓ SULFIDMALM

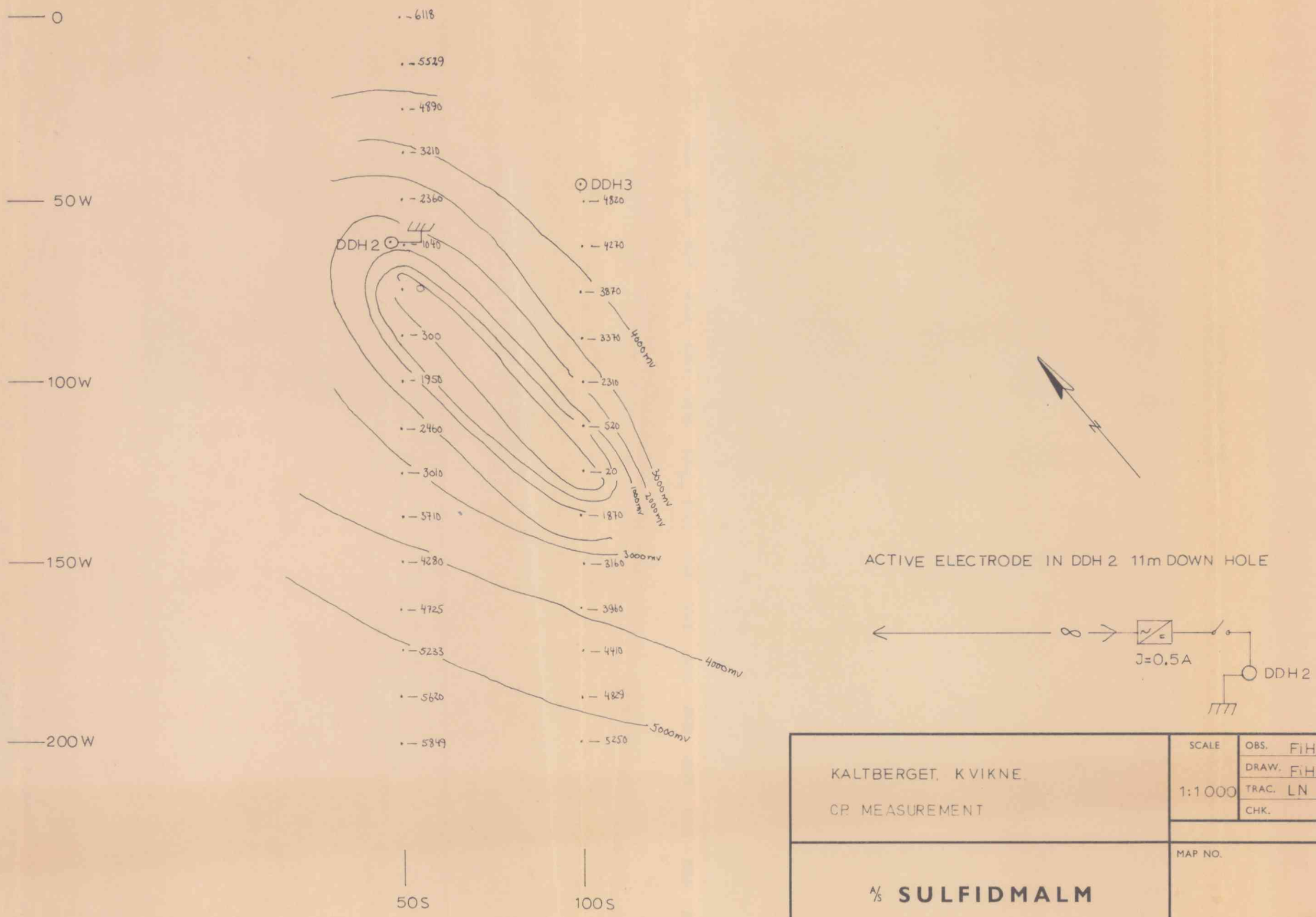


A.s Tørrkopi. 1000. A 3. E 9 gl. 10-71. Sentrum Trykkeri.



KALTBERGET, KVIKNE. c.p. measurement	SCALE 1:1000	OBS. FiH	7-76
		DRAW. FiH	7-76
		TRAC. LN	7-76
		CHK.	
A/S SULFIDMALM	MAP NO.		
	MAP SHEET		

A.s Tørrkopi. 2000. A 2. E 9 gl. 10-71. Sentrum Trykkeri.



KALTBERGET, KVIKNE

CP MEASUREMENT

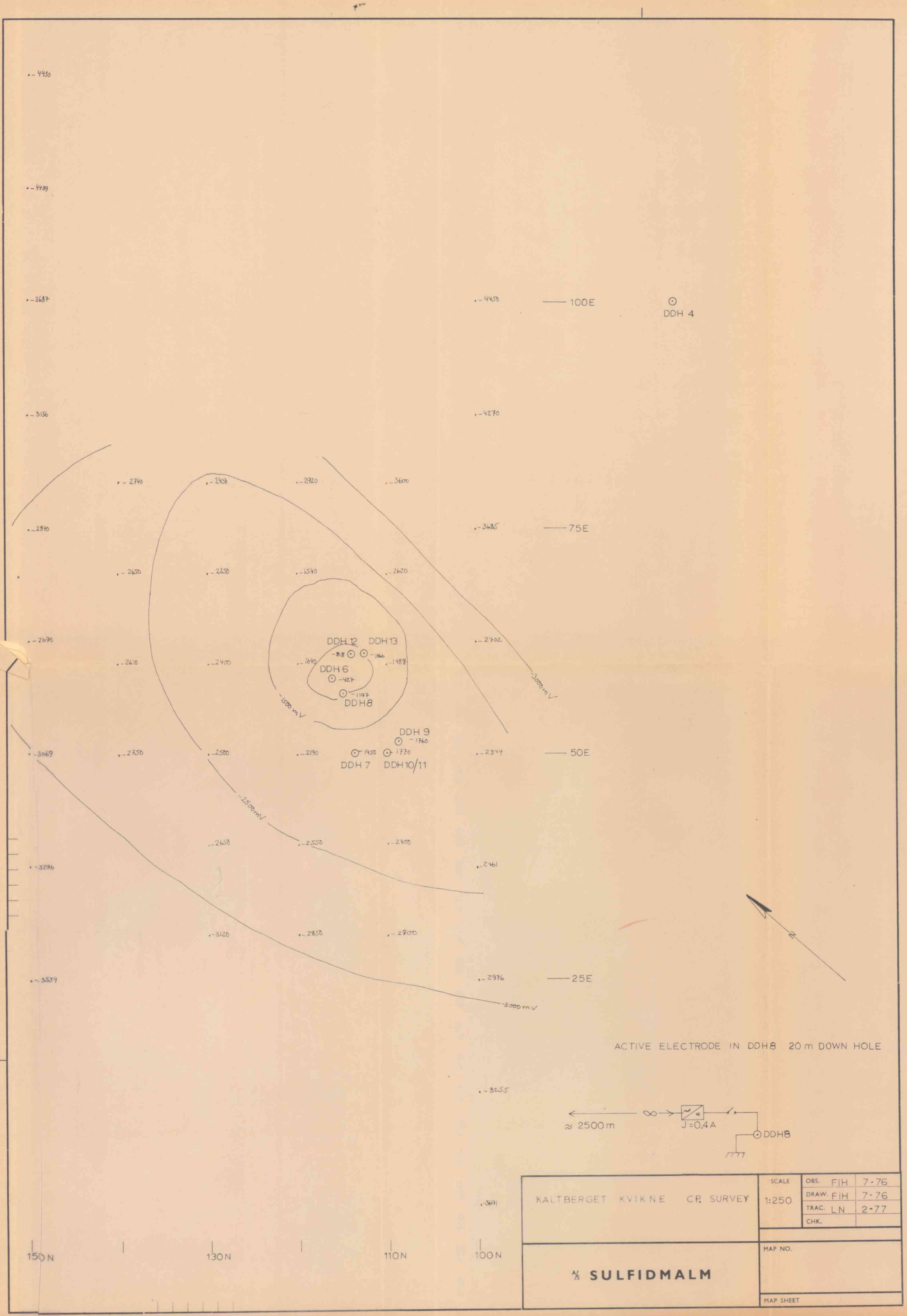
SCALE	OBS.	FiH	7-76
1:1 000	DRAW.	FiH	7-76
	TRAC.	LN	7-76
	CHK.		

MAP NO.

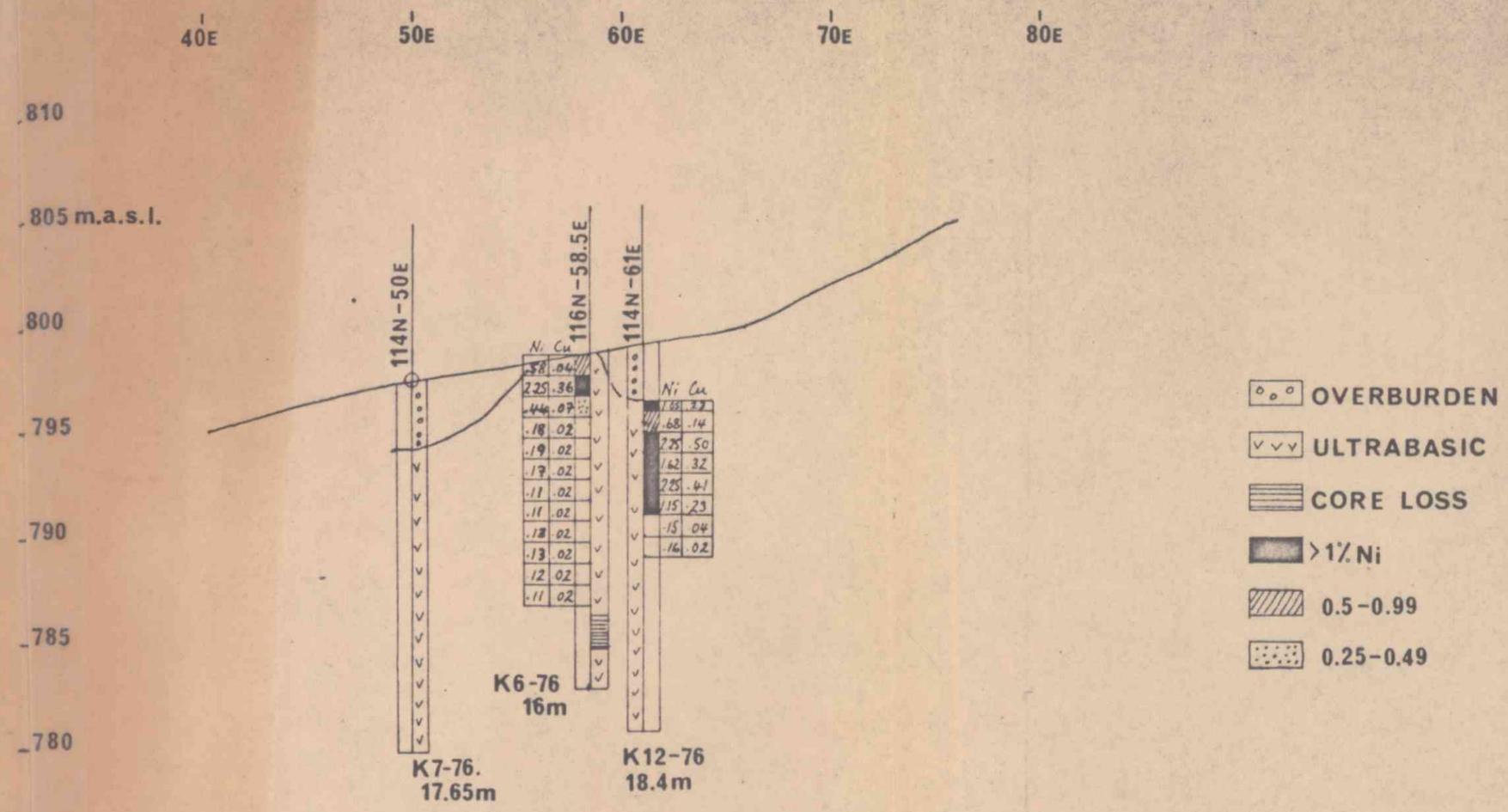
A/S **SULFIDMALM**

MAP SHEET

A.s Terrkopi. 2000. A 2. E 9 gl. 10-71. Sentrum Trykkeri.

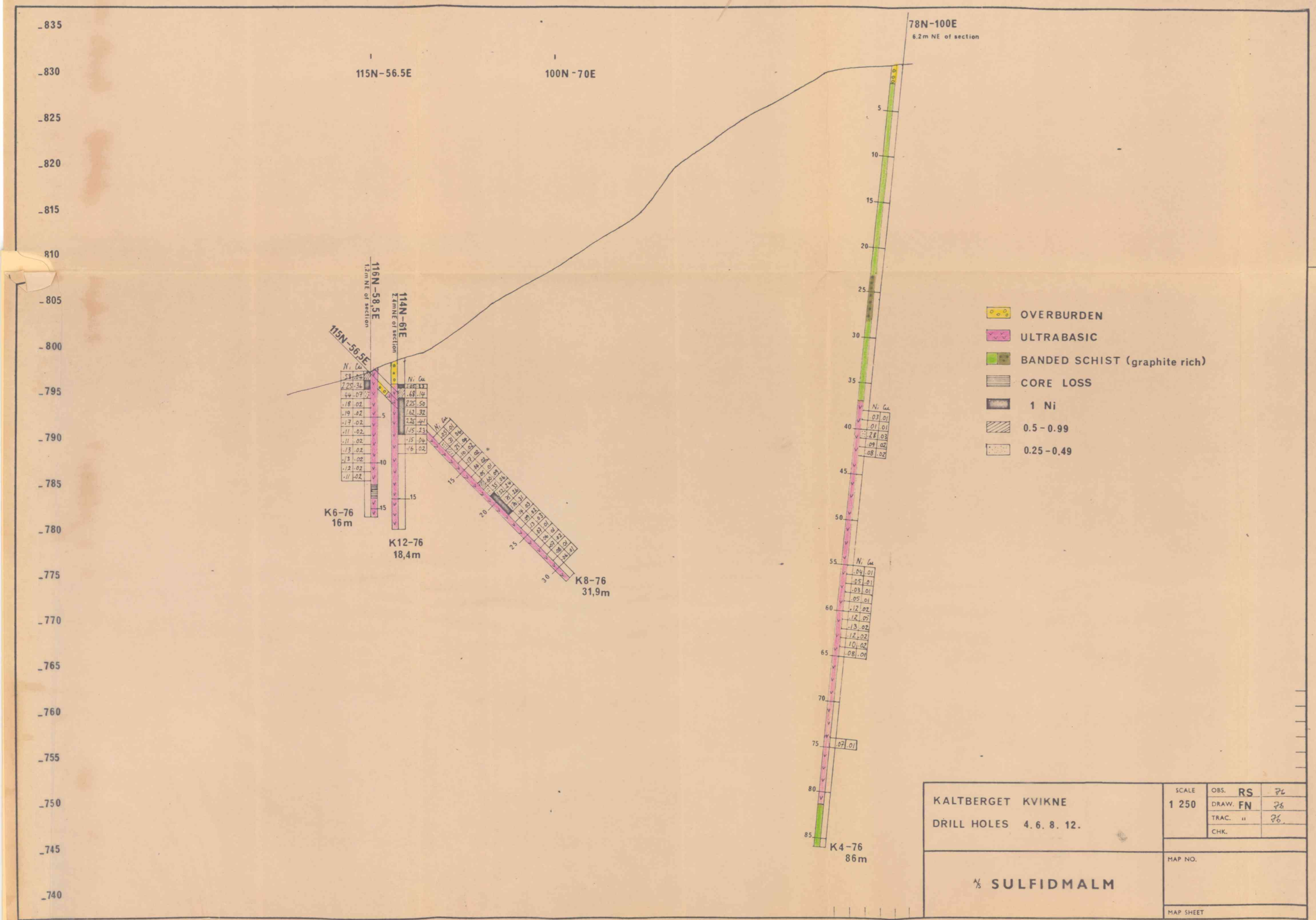


KALTBERGET KVIKNE CR SURVEY	SCALE 1:250	OBS. FiH	7-76
		DRAW. FiH	7-76
		TRAC. LN	2-77
		CHK.	
⅛ **SULFIDMALM**	MAP NO.		
	MAP SHEET		

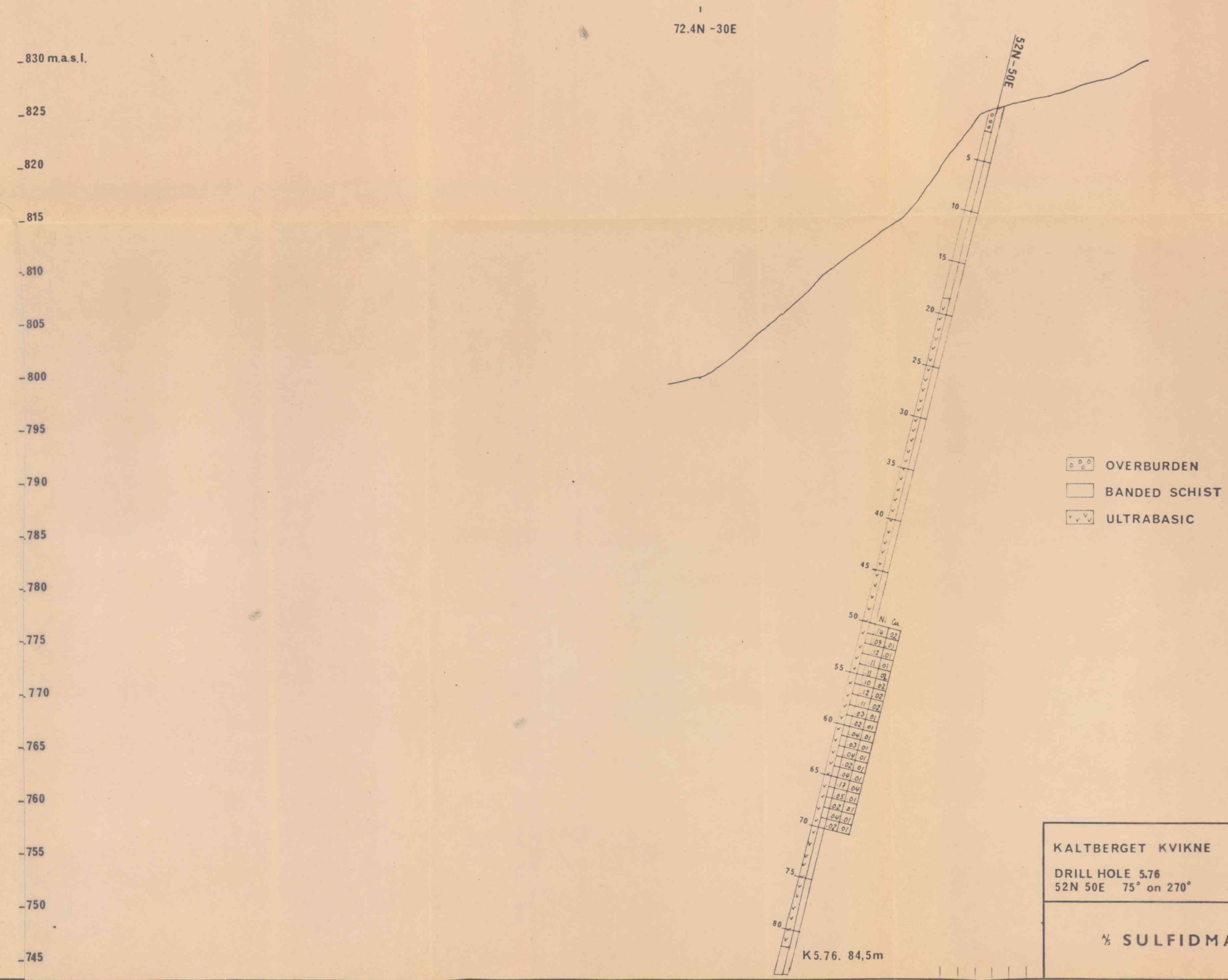


KALTBERGET KVIKNE DRILL HOLES 6.7.12.	SCALE 1·250	OBS. RS	76
		DRAW. FN	76
		TRAC. FN	76
		CHK.	
⅘ SULFIDMALM	MAP NO.		
	MAP SHEET		

A.s Tønsberg. 1008. A 3. E 9 gl. 10-71. Sentrum Trykkeri.

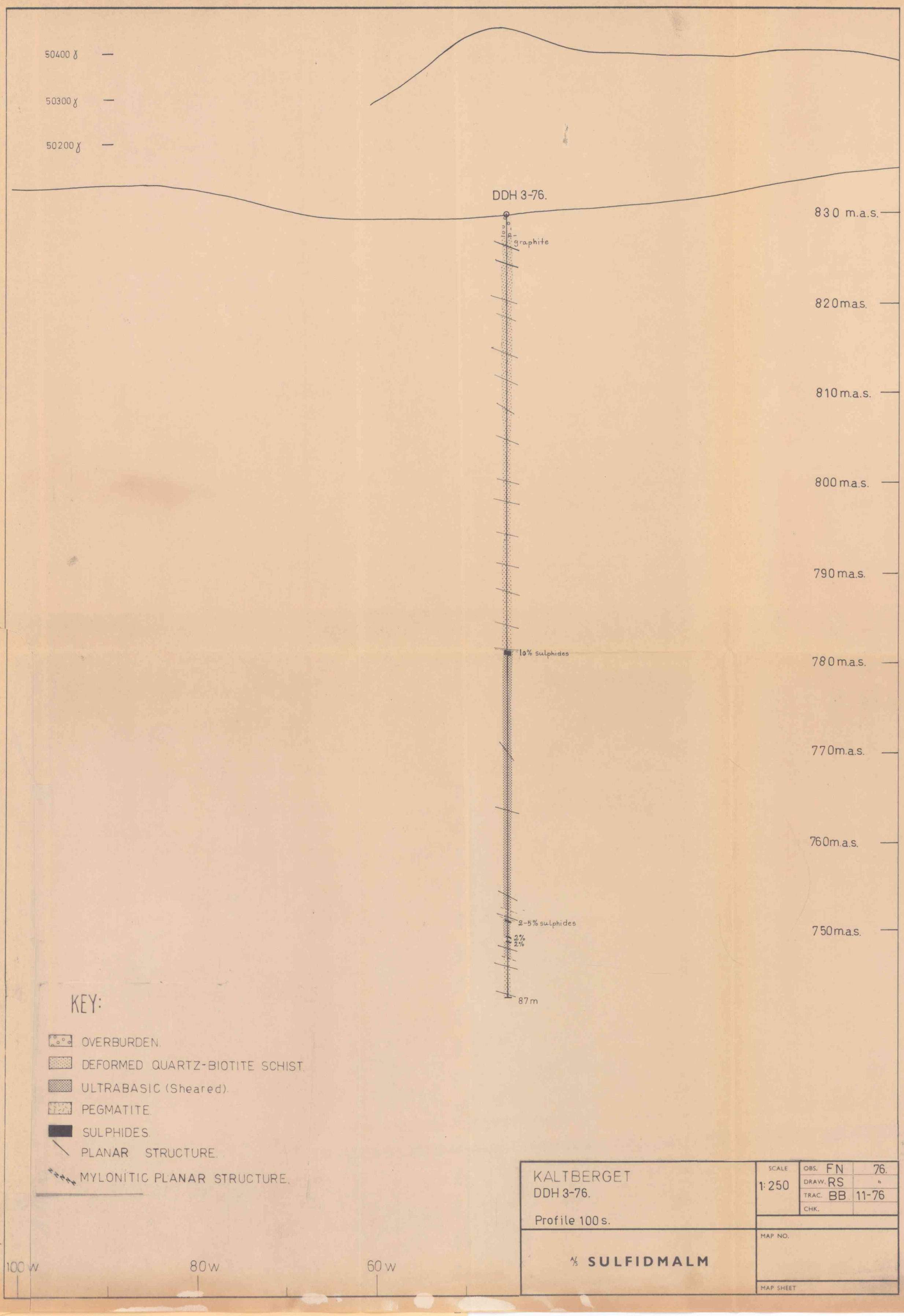


A.s Terrkopi. 2000 A 2. E 9 gl. 10-71. Sentrum Trykkeri.

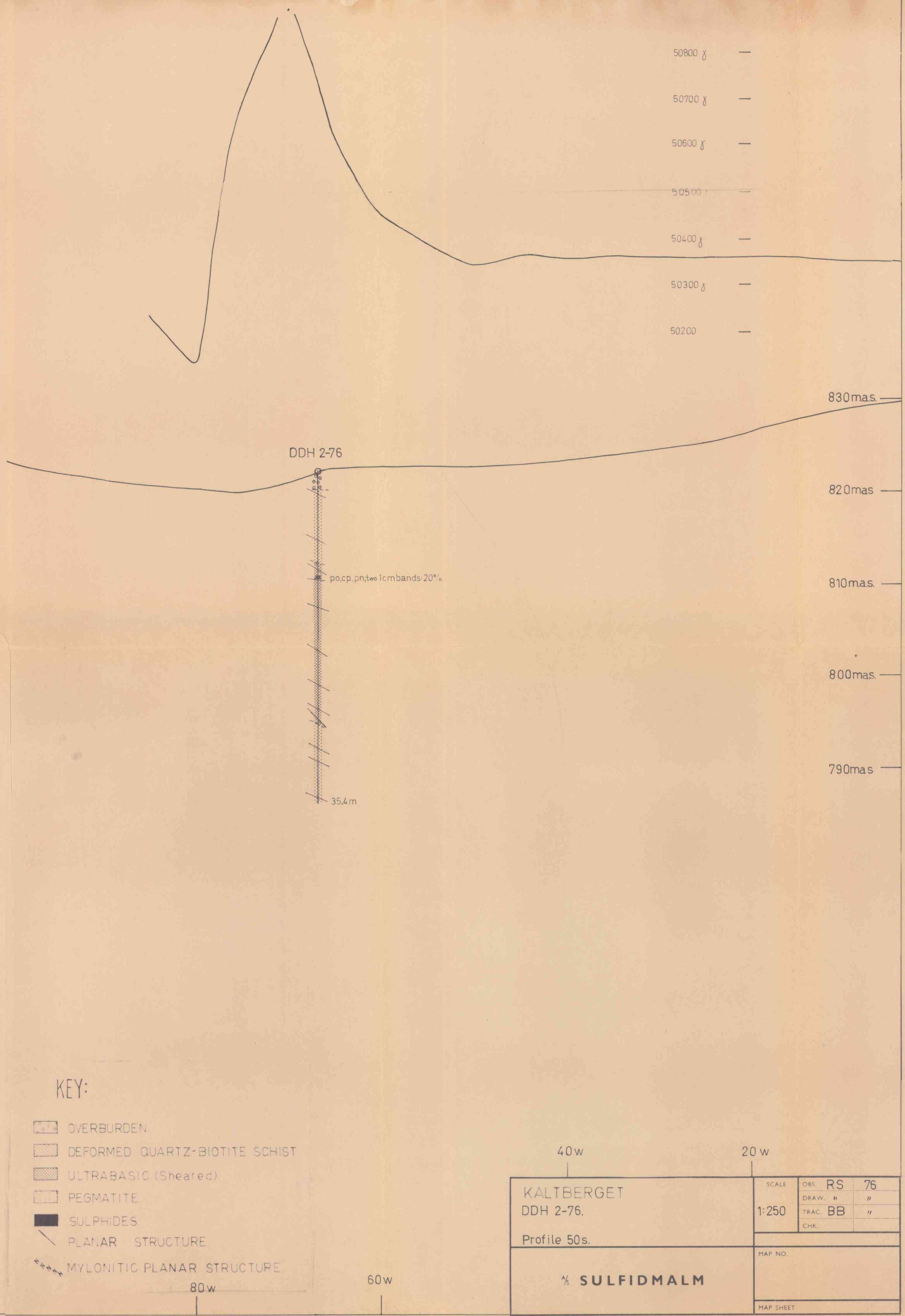


KALTBERGET KVIKNE DRILL HOLE 5.76 52N 50E 75° on 270°	SCALE 1·250	OBS. RS	76
		DRAW. FN	76
		TRAC. "	76
		CHK.	
⅓ SULFIDMALM	MAP NO.		
	MAP SHEET		

A.s Tørrkopi. 2000. A 2. E 9 gl. 10-71. Sentrum Trykkeri.


50400 γ
50300 γ
50200 γ
DDH 3-76.
830 m.a.s.
graphite
820m.a.s.
810 m.a.s.
800 m.a.s.
790 m.a.s.
10% sulphides
780 m.a.s.
770m.a.s.
760m.a.s.
2-5% sulphides
2%
2%
750m.a.s.
87m
KEY:
OVERBURDEN.
DEFORMED QUARTZ-BIOTITE SCHIST.
ULTRABASIC (Sheared).
PEGMATITE.
SULPHIDES.
PLANAR STRUCTURE.
MYLONITIC PLANAR STRUCTURE.
100 W
80 W
60 W
KALTBERGET
DDH 3-76.
Profile 100 s.
SCALE
1:250
OBS. FN 76.
DRAW. RS "
TRAC. BB 11-76
CHK.
MAP NO.
MAP SHEET
⅘ SULFIDMALM

A.s Tønsbergs 3000 A.T. E 9 gl. 10-71. Sentrum Trykkeri.



KEY:

- OVERBURDEN.
- DEFORMED QUARTZ-BIOTITE SCHIST.
- ULTRABASIC (Sheared).
- PEGMATITE.
- SULPHIDES.
- PLANAR STRUCTURE.
- MYLONITIC PLANAR STRUCTURE.

KALTBERGET

Section through old showing and drill holes WD-1, WD-2 /75, and K-1 -76.

SCALE	OBS. RS/FN	75-76.
1:250	DRAW. "	"
	TRAC. BB	76.
	CHK.	'

MAP NO.

MAP SHEET

A/S SULFIDMALM