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RAPPORT VEDRØRENDE:

Geophysics and diamond drilling of area no 68 in the Mobil - Sydvaranger joint venture, Kautokeino, Finnmark.

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RESYMÉ:

Follow-up area no 68 is situated 24 km south of Kautokeino. The area was given priority on the basis of regional geophysics. Two diamond drill holes, totalling 181 m were drilled to test three slingram-EM-conductors.

The conductors are caused by graphitic schists, containing iron sulphides and weak lead, zink, copper and arsenic mineralization. The economic potential of area 68 is small and no further work is recommended.

Area 68 may be correlated with the 1981-drilling target at Siccajavri, 10 km to the south-east and with several showings in the Masi-Suolovuobmi area.

KIRKENES:

- 1 Adm. dir.
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ANDRE:

- 1 Mobil
- 1 Sulfidmalm
- 1 Bergmester
- 2 Ind. dep.
- 1 A.Bjørlykke
-
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KOMMENTAR:

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Introduction

Area 68 is one of the targets that was selected for follow-up work on the basis of results of the geophysical helicopter surveys of the Kautokeino greenstone belt. The area 68 is located 24 km to the south of Kautokeino, just 2 km to east of the road to Finland (Fig. 1). The general area is very flat with numerous lakes and swamps. Bedrock is usually covered by thick deposits of till. The few outcrops that have been found consist of greenstones (Fig. 1). The rocks belong to the southern part of the Kautokeino greenstone belt, and are classified in the Avzi- and the Stuorajavri-formations by Karl Inge Olsen (geological mapsheet Siebe, 1985). The correlation between these formations and the Caskias-formation with mineralized units to the north of Kautokeino is not clear.

The location of the grid for ground geophysics is shown in Fig. 1. In the grid there are no bedrock outcrops.

Geophysics

The area is covered by helicopter geophysics (NGU-report no 1734). The survey was flown by NGU in 1979 and the quality of the data is very poor. This led to a reprocessing of the magnetics by Dighem Ltd. in 1983 (report no 1381). Unfortunately the EM-data were not digitized and could not be reprocessed. In Fig. 2, the reprocessed enhanced magnetic map is shown with EM-conductors transferred from the NGU EM-map.

Area 68 was selected for follow-up work by using a geophysical model developed mainly from results from the Bidjovagge ore deposit and the Suovrarappat mineralization. An irregular magnetic picture and an offset of the EM-conductor fits very well with the model (Fig. 2).

Area 68 was surveyed with the standard set-up of slingram and magnetics (report no 1520). The results are shown in Fig. 3.

Magnetics are shown as profile lines and slingram as an interpretation with a distinction between high and low conductance. The general ground geophysical picture is a broad conductive zone situated in a magnetic low. Four parallel conductors can be separated (conductors A to D in Fig. 3). Only conductors B and C can be found on all profiles. The B-conductor has got a positive correlation with the magnetics.

The ground surveys show that the irregularities of the EM and magnetics as shown by the helicopter survey (Fig. 2) are false. The explanation is a flight path recovery error on flight line 77. The pattern from the ground survey does not fit with the Bidjovagge geophysical model.

Conductor B was however considered interesting because of its positive correlation with the magnetics and it was decided to test this conductor.

Diamond drilling

Diamond drill hole 68-1 was drilled in 1984 to test the B-conductor. The hole was pulled back far enough to get an intersection also with the C-conductor (Figs. 3 and 4). The results from hole 68-1 led to the decision to drill hole 68-2 in 1985. Hole 68-2 intersects the eastern, D-conductor. Core log reports and chemical analysis are enclosed in Table 1.

The holes were drilled in the same profile and makes a more than 100 m wide geological section through the steeply dipping succession (Fig. 4). The rocks intersected are:

Tuffite. This term is used for a fine- to medium-grained, foliated rock with amphibole, feldspar and biotite as main minerals. Garnet-bearing zones are found in the tuffite. Carbonate veinlets with small amounts of pyrite occur sporadically.

Carbonate-micaschist. This is a heterogeneous unit with calcite, biotite, feldspar and amphibole as major constituents. The rock is usually medium-grained and a weak banding can be seen.

Graphitic schist is a black, finegrained, graphite-bearing mica schist. Calcite-rich zones also occur in the black schist. Graphite-rich parts of this unit represents a good conductor.

Carbonate rock is a light, medium- to fine-grained rock with calcite as the major mineral. Small amounts of dark silicates may form a weak banding.

Granitic vein. In diamond drill hole 68-2 the tuffite is cut by a 0,45 m thick granitic vein.

Mineralization of pyrrhotite and pyrite is common in the graphitic schist. The sulphides occur as disseminations and in veinlets. In sulphide-rich zones the veinlets may form a stockwork texture. Disseminated magnetite commonly occurs in the sulphide-mineralized zones. The zone in diamond drill hole 68-1 from 111,30 to 114,75 is a good conductor with an associated high magnetite contents which correlates with the B-conductor.

In diamond drill hole 68-1 a weak mineralization of base metal sulphides occurs. Carbonate veinlets with galena and sphalerite are found in the graphitic schist. Towards the bottom of the hole also chalcopryrite occurs. Assays of more than 0,1 % of these elements have been plotted on the drill hole section in Fig. 4.

All grades are sub-economic. Gold grades are usually less than 20 ppb and silver grades are 1,1 ppm or less (Table 1.a).

Samples from diamond drill hole 68-2 were analysed by a multi-element INAA analysis (Table 1.b). Base metal grades are very low in this hole. The most striking feature of the analysis is a high arsenic contents, up to 429 ppm. Nickel, cobalt, selenium, molybdenum, tungsten, gold and uranium values are also elevated compared to an unmineralized rock.

The area 68 mineralization may be correlated with the results from the 1980/1981 diamond drilling at Siccajavri, 10 km to the south-east (report no 1270). The iron sulphide mineralization with elevated values of a large number of elements in graphitic schists is also common in the Masi-Suolovuobmi area in the north-eastern part of the Kautokeino greenstone belt (several reports by A/S Sulfidmalm 1972-1974).

Conclusions

The diamond drilling of area 68 intersects only very weak mineralization. The economic potential of this type of mineralization in graphitic schists is considered very low. The A-conductor has not been tested by the drilling, but it is assumed to represent the same type as conductors B, C and D and no further work is recommended in area 68.

In the future exploration it should be kept in mind that mineralizations of the area 68 type can produce excellent geochemical anomalies.

The likeness between the mineralization in area 68 and mineralizations of the Siccajavri and Masi-Suolovuobmi areas opens interesting aspects regarding the correlation between these different parts of the Kautokeino greenstone belt.

Stabekk, 08.04.86.

Ragnar Hagen
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Kjerneobservasjoner.

Borhull nr. 68-1 Profil
 Koordinator: Y 200 S X 135 W
 Påsatt i høyde 376 m.
 • i retning 278^B
 • med helning 45°
 Borhullets lengde 121,35 m

Boret meter	Bergart	Kjerne- mangel	Skifrihet	Bergart prøve
0-15.00	Jordboring			
15.00-27.30	Glimmerskifer, middelskornig inhomogen. Lokalt båndet med biotitt og amfibol. Ba er oppknust og rusten, tildels grafittholdig (bånding med varierende grafittinnh.). Py finnes i tynne årer. Spredte årer med karb. og epidot. Karbonatholdig b.a. siste 2,5 m. Lavt mt-innhold.	16.60- 18.00	18.40: 45° 21.40: 35°	
27.30-40.40	Kalkglimmerskifer. Diffust båndet med mørke silikater. Middelsk.-fink. Grå farge. Tildels ren kalkstein. Etterhvert båndet med cm-brede bånd med mørke silikater.		37.70: 40°	
40.40-42.15	Overgangsba. Båndet fink.-middelsk. felsliknende fram til 41 m, så massiv, middelsk. amfibolholdig b.a., med biotitt og karb. Inneh. spredte tynne årer.			
42.15-59.05	Grafittholdig glimmerskifer. Fink., båndet. Varierende grafittinnh., stort sett lavt. Inneh. py disseminert og i slirer og årer. Inneh. også spor av cp. Ga, sl og py i karb. årer og på stikk. Lokalt er b.a. massiv og karb.rik. Delvis en middels god leder med grafitten og py i nettverk. Mt-rik. Fra omlag 44 m po istedet for py i årer.		42.25: 35° 54.80: 35°	
59.05-65.05	Karbonatba., middelsk., diffust lagret, lys, spredte po-korn og noe mørke silikater. Lavt mt-innhold.			
65.05-78.90	Grafittglimmerskifer som 42.15-59.05. Med py, po og litt gn i karb.årer. Mt-rik. Siste 4 m overgangs b.a. med karbonatrike soner.		72.10: 40° 78.70: 40°	
78.90-91.05	Karbonatb.a., fink.-middelsk. Lys, båndet med mørke min. Lavt mt-innh.		83.30: 40°	
91.05- 105.30	Grafittholdig skifer med karb.rike soner. Inneh. po i årer og slirer. Lokalt mt-rik.		96.70: 45°	

Boret meter	Bergart	Kjerne- mangel	Skifrihet	Bergart prøve
105.30-111.30	Glimmerskifer, fink.-middelsk. båndet med biotitt, flsp. og amf. Lite mt. Spredte py-korn.		109.50: 40°	
111.30-114.75	Grafittholdig gl.skifer. Tildels meget rik på py og po. Mt-rik. Spor cp, særlig på sene stikk. Meget god leder i massive partier.			
114.75-118.90	Karbonath. skifer, fink.-middelsk. diffust båndet, grå-grønn, mt-holdig. Noe sulfider første 1,5 m, særlig i årer.			
118.90-121.35	Glimmerskifer, middelsk.-fink. Biotitt-flsp-amf. b.a. Diffus lagning, lyse spetter.		121.20: 35°	
	Hullet avsluttet v/121.35			
	Stabekk, 08.08.84			
	Ragnar Hagen			

Kjerneobservasjoner.

Borhull nr. 68 - 2 Profil
 Koordinator: Y 200 S X 140 V
 Plsatt i høyde 376 m.
 • i retning 78°
 • med helning 45°
 Borhullets lengde 60,00 m

Boret meter	Bergart	Kjerne- mangel	Skiffrighet	Bergart prøve
0-12.50	Jordboring			
12.50-29.05	Tuffitt, fink.- middelsk., inhomogen grå-grønn. Foliasjon med amf. rike og flsp. rike bånd. Også soner med større amf. blaster. Mag. Sus. 1-2 Spredte karb. årer m. py. Tildels oppknu- st og forvitret. Skapolitt fra omlag 20 m.		18.30:65° 24.70:56°	
29.05-29.50	Granittisk gang. Lys grønnlig, grovk. massiv. Spredte amf. korn. MS = 0.			
29.50-41.65	Tuffitt som 12.50-29.05, mere biotitt og lokale soner m. granater. Py i årer og stikk. MS = 1.		38.50-59°	
41.65-49.75	Grafittskifer, finkornig, varierende Flsp. årer m. py. Def. og oppknu- st. MS = 0.1	46.25- 47.00	49.30:45°	
49.75-57.00	Kalkstein, massiv, middelsk. uren m. amf. og muskovitt. MS = 1-2			
57.00-60.00	Kalkglimmerskifer, gradvis overgang fra kalkstein, fink., foliert, inhomogen m. bio., karb., flsp. og amf. Py v. 59.20. MS = 1		58.40:56°	
	Hullet avsluttet v/60,00 m.			
	R. Hagen			

68 - 1

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meter	ppm Cu	ppm Pb	ppm Zn	ppm Ni	ppm Co	ppm Ag
42 - 43	325	43	68	266	70	-0.1
43 - 44	55	974	364	144	62	''
44 - 45	96	239	360	141	34	''
45 - 46	360	1269	3382	300	88	''
46 - 47	257	241	117	308	75	''
47 - 48	199	9320	27,440	165	82	''
48 - 49	156	1839	1849	179	133	''
49 - 50	105	44	25	100	25	''
50 - 51	54	34	20	111	36	''
51 - 52	120	50	26	202	58	''
52 - 53	144	47	13	200	60	''
53 - 54	66	24	20	82	127	0.6
54 - 55	80	55	56	122	44	0.6
55 - 56	116	42	24	166	91	-0.1
56 - 57	60	39	21	94	35	''
57 - 58	137	23	18	124	92	''
58 - 59	139	25	61	220	147	''
59 - 60	67	37	17	50	8	''
60 - 61	36	38	18	24	10	''
61 - 62	26	50	21	15	4	''
62 - 63	35	50	23	15	5	''
63 - 64	104	53	23	21	7	''
64 - 65	27	146	124	16	5	''
65 - 66	191	28	23	164	57	1.1
66 - 67	375	7104	1412	157	59	1.1
67 - 68	171	97	44	144	30	0.8
68 - 69	112	71	24	181	45	-0.1
69 - 70	91	36	18	137	31	''
70 - 71	345	1095	1249	148	45	''
71 - 72	226	89	41	174	85	''
72 - 73	199	35	23	226	81	''
73 - 74	123	32	15	160	31	''
74 - 75	94	22	13	139	47	''
75 - 76	168	23	28	124	36	''
76 - 77	91	25	18	65	34	''
94 - 95	131	32	47	117	68	''
95 - 96	153	24	23	115	56	''
100 - 101	278	119	33	116	52	''
101 - 102	474	820	2800	199	103	0.5
102 - 103	886	32	21	230	196	-0.1
103 - 104	535	29	18	144	86	''
104 - 105	649	22	19	155	77	''
105 - 106	464	16	20	125	54	''
111 - 112	3390	22	23	240	74	''
112 - 113	1698	128	61	364	479	''
113 - 114	1609	114	33	366	314	''
114 - 115	3357	21	53	111	22	''
115 - 116	267	24	95	55	108	''

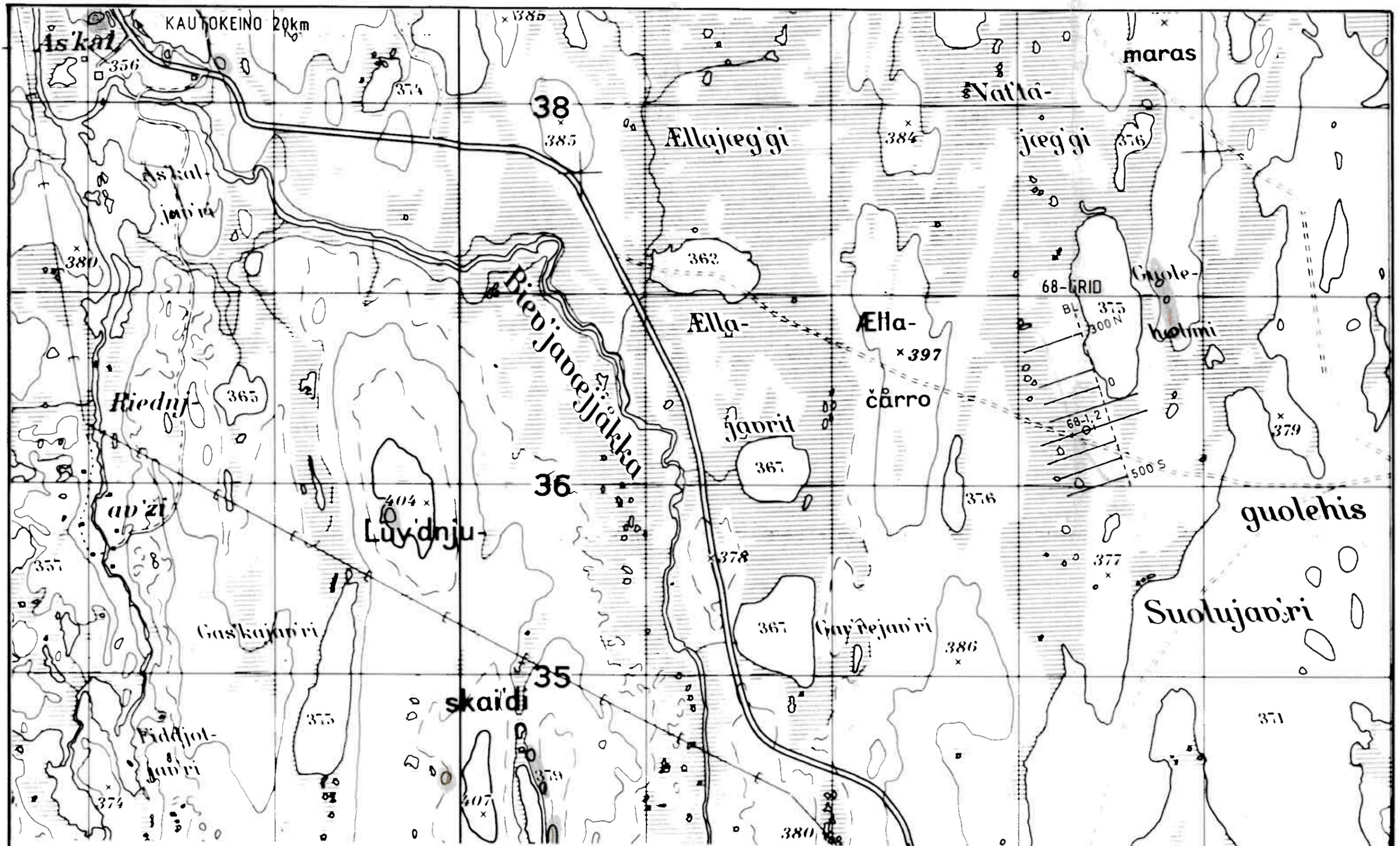
Table 1.a. Chemical analysis of diamond drill hole 68-1.
 Gold grades are less than 20 ppb except for sample 68-1, 75 - 76
 which contained 30 ppb Au.

SAMPLE NUMBER	ELEMENT UNITS	Na PCT	Cr PPM	Fe PCT	Co PPM	Ni PPM	Zn PPM	As PPM	Se PPM	Mo PPM	Ag PPM	Cd PPM	Sb PPM
68-2-48.00-49.00		0.06	110	16.0	120	540	<100	429.0	26	172	<2	<4	3.4
68-2-49.00-49.75		0.46	140	11.0	78	280	<100	228.0	22	74	<2	<4	1.3
68-2-49.75-50.00		0.14	<20	10.0	110	120	<100	143.0	11	<1	<2	<3	0.8

SAMPLE NUMBER	ELEMENT UNITS	Ba PPM	La PPM	Hf PPM	Ta PPM	W PPM	Ir PPB	Au PPB	Th PPM	U PPM	TestWt GMS	Cu PPM
68-2-48.00-49.00		89	22	1	0.6	10	<50	63	3.6	7.6	12.14	99
68-2-49.00-49.75		200	95	3	1.3	9	<50	12	7.7	8.5	13.32	71
68-2-49.75-50.00		<50	35	<1	<0.5	1	<50	6	2.0	1.2	12.35	204

Table 1.b. Multi-element analysis of diamond drill hole 68-2.

FIG. 1.

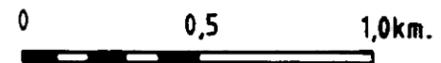


LEGEND

- Meta tuffite
- Meta tuff
- Meta basalt
- Outcrop



Drill hole

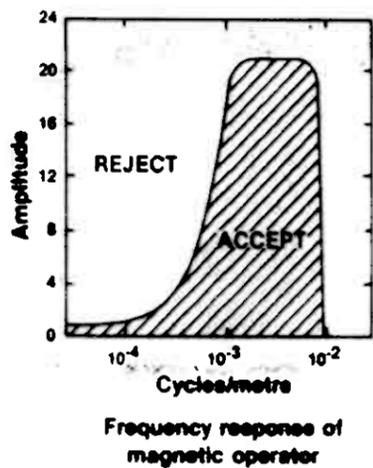
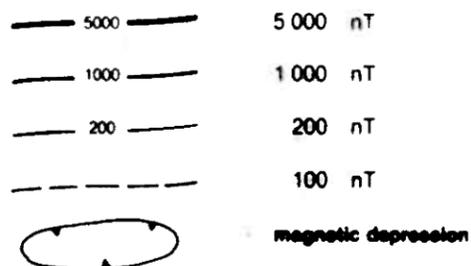


FINLAND

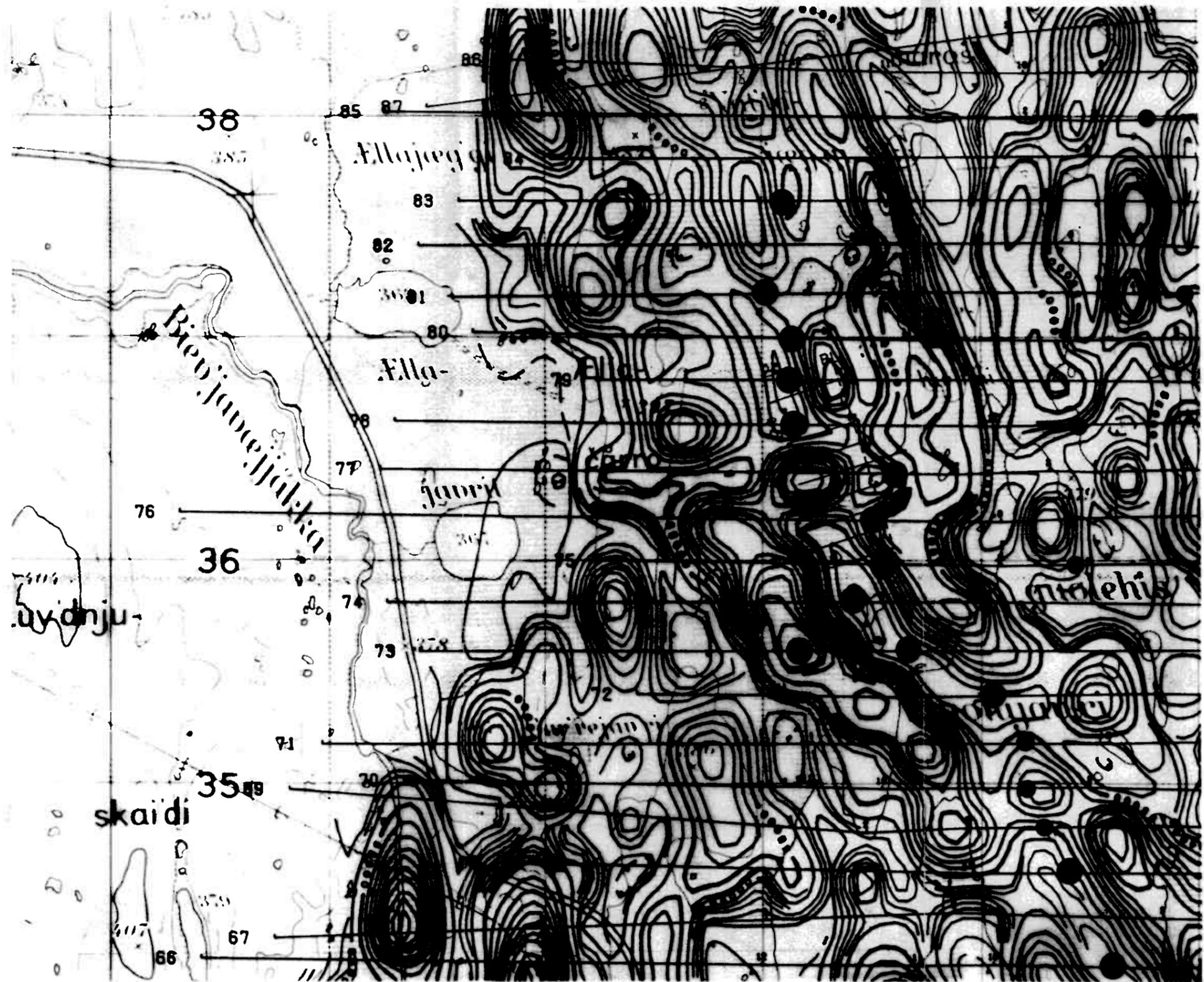
Area 68 Location map Bedrock outcrops	Scale 1:20 000
	KID, RH 84-85
	RH 3-86
	Trace: HB 3-86
PROSPEKTERING A/S	
Fig. 1	

F
I
G.
2.

ISOMAGNETIC LINES
(enhanced field)

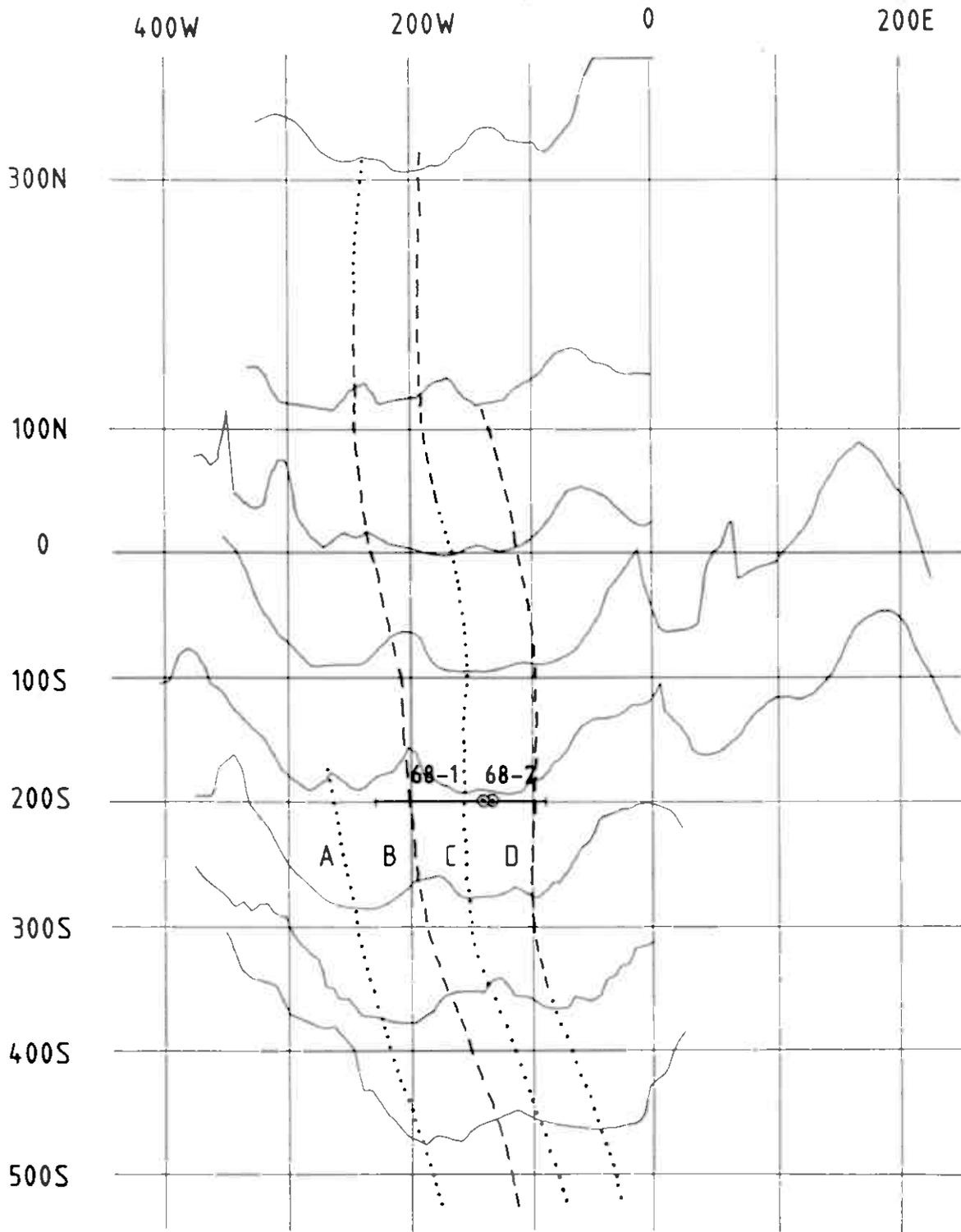


- EM-conductors
- $\sigma_{xt} > 5 \text{ mhos}$
 - $\sigma_{xt} \geq \text{mhos}$



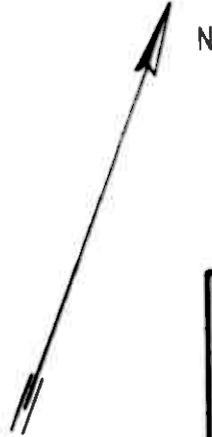
Area 68 Helicopter geophysics	Scale 1:20 000
	NGU 1979
	RH 4/86
	Trace: HB 4/86
PROSPEKTERING A/S	Fig. 2

FIG. 3.



LEGEND

- Slingram
- Good conductor
- Medium conductor
- Magnetics
- ~ Mag. vertical field (1cm=1000nT)
- 68-1
- Diamond drill hole



<p>Area 68 Geophysics Drill holes</p>	Scale: 1:5000
	Obs. FH 4-84
	Draw. RH 3-86
	Trace: MB 3-86
PROSPEKTERING A/S	
Fig. 3	

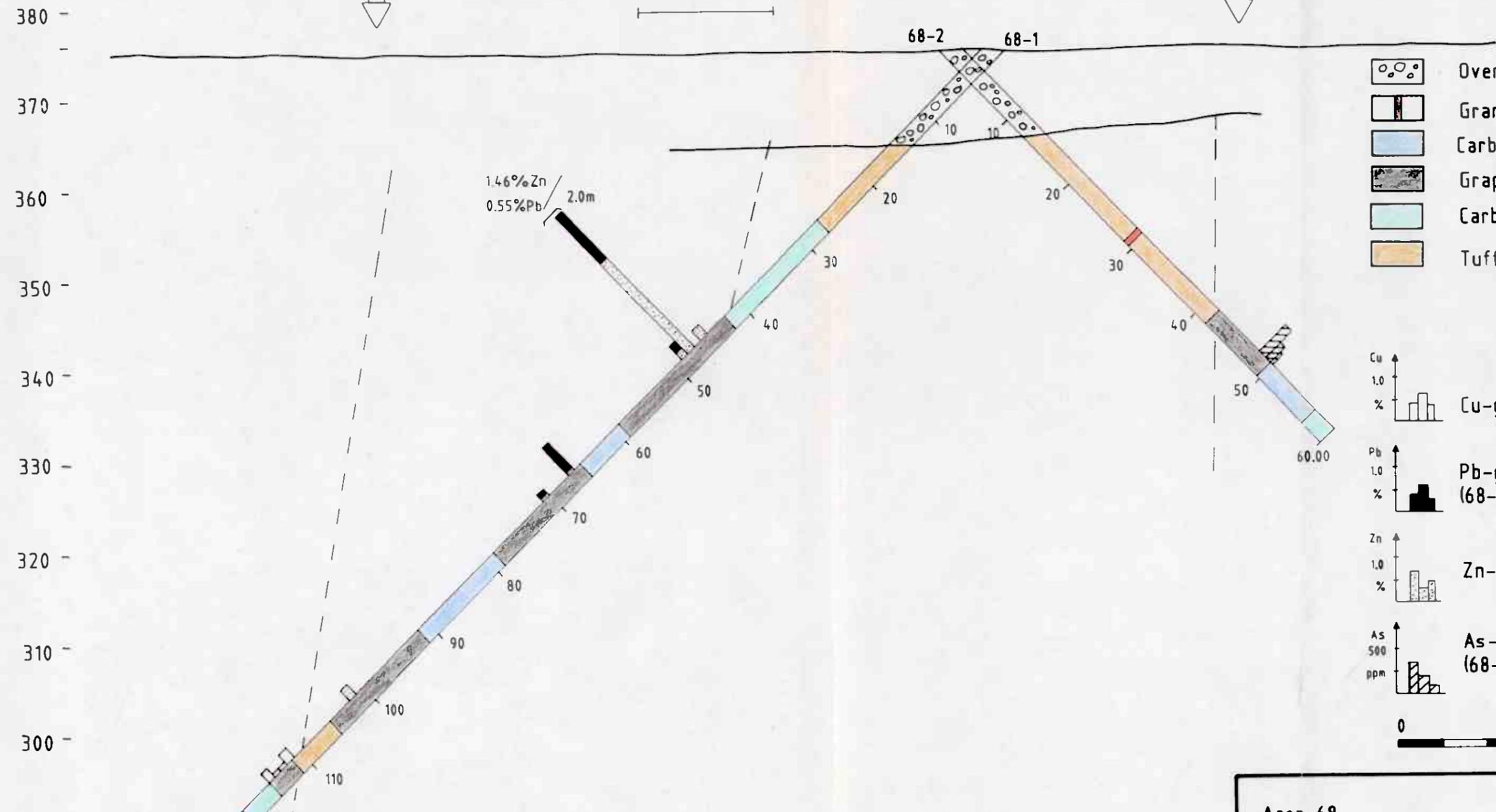
FIG.
4

240W 220W 200W 180W 160W 140W 120W 100W 80W

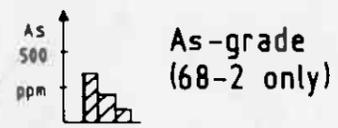
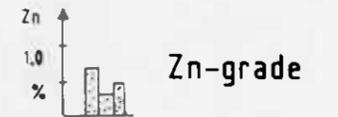
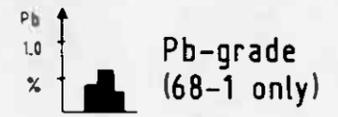
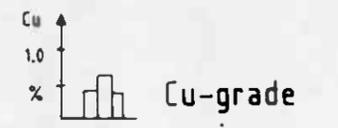
B
EM-conductor
↓

C
EM-conductor
—

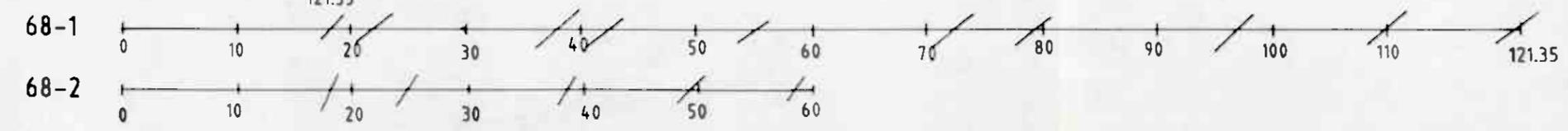
D
EM-conductor
↓



- Overburden
- Granitic vein
- Carbonate rock
- Graphitic schist
- Carbonate-micaschist
- Tuffite



CORE ANGLES:



Area 68 Drill hole section 200S	Scale 1:500
	RH 84-85
	RH 3-8
	Trace: HB 3-86
PROSPEKTERING A/S	Fig. 4