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Report on diamond drilling investigations at Klepptjern, winter 1971/1972.

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Råstofftype	Emneord
Malm/metall	Ni Cu CoFe S

Sammendrag

Borhull 1-5/71 og fortsettelsen som borhull 6-7/72 samt Winkie borhull W 1/72.

Mangler de opptegnede seksjonen for borhullene 1-7 + W1

Analyseskjemaer fra borkjernene

Vi har duplikat av tekst og borlogg

FOR FALCONBRIDGE NIKKELVERK A/S

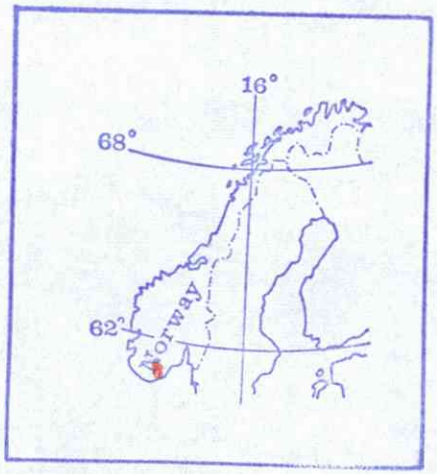
A/S SULFIDMALM

PROJECT 905-7

REPORT ON DIAMOND DRILLING INVESTIGATIONS AT KLEPPTJERN, WINTER 1971/1972.

by

F. NIXON



INTRODUCTION.

The Klepptjern area is centered around the small lake of Klepptjern in Iveland community S. Norway. The area lies approx. 1 km North east of Lake Kjettevann. Nickeliferous sulphides associated with ultrabasic rokks occur in the area, and an I.P. survey carried out in 1971 indicated several promising anomalies that occurred in association with known ultrabasic rocks.

Drilling of certain of these anomalies was recommended and the work was commenced in the autumn of 1971.

GEOLOGY.

The ultrabasic at Klepptjern lies surrounded by various types of gneissic and amphibolitic rocks that are all probably metamorphosed remnants of an older basic complex into which the ultrabasic rock has been intruded.

From surface observations it would seem that the ultrabasic occupies the core of a pastly overturned southeasterly plunging synline. On the small peninsula that occupies the northwesterly shore of Klepptjern gneisses overlying the ultrabasic can be seen to be folded synclinally with a south easterly plunge.

A fairly fresh surface sample of the ultrabasic rock has been examined in polished thin section and the following minerals were observed:

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

The rock showed textures that are typical of an altered peridotite. Olivine grains are partly pseudomorphed by serpentine. Orthopyroxene and colourless amphibole (after clinopyroxene) occur in coarse irregular plates and secondary magnetite occurs with serpentine in streaky development. Scattered irregular patches of sulphides consist mainly of pyrrhotite enclosing areas of heavily violaritized pentlandite and partly digested pyrite. Other areas of iron sulphides consist of secondary marcasite probably formed under supergene conditions from pyrrhotite.

WORK CARRIED OUT.

The main drilling contract was carried out by the Oslo Company A/S Grunnboring. They drilled 7 holes to a combined length of 549.17 m.

Sulfidmalm also drilled one hole on the property using a hired WINKIE machine. The hole was drilled to a depth of 30.5 m. The following table gives the location, dip and length of the holes. The position of the holes are shown in map no. 07.50.72.

Hole no.	co-ordinates	dip	length	drillers
1-71	500W/160S	45°N	67.95 m	Grunnboring
2-71	200W/125N	45°N	50.65 m	"
3-71	0/48S, deepened Feb. 72 to	45°N	74.65 m 127.40 m	"
4-71	0/22N	45°N	50.00 m	"
5-71	50E/41S	55°N	59.27 m	"
6-72	50W/25N	70°N	88.50 m	"
7-72	220E/40N	40°/238	105.40 m	"
W1-72	2W/20N	VERTICAL	30.5 m	Sulfidmalm

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All analyses have been carried out at the Falconbridge Nikkelverk laboratories in Kristiansand.

RESULTS.

All drill log data for the holes, together with drill sections are enclosed as appendixes to this report.

This section will include comments on the nature of the I.P. anomalies drilled, brief notes on the rock types and mineralization encountered in each hole, cause of anomaly and general remarks on the geology, structure and mineralization of the area as a whole.

Hole 1-71 was put down to investigate an anomaly that indicated a fairly broad source with stronger indications on the southern edge. The anomaly area has no outcrop, but is near to the contact of the ultrabasic with gneissic rocks. The best portion of the anomaly correlates with a magnetic low which in this area is generally indicative of basic rock. On the basis of this and the fact that the anomaly was not closed to the north it was considered an essential drill target.

The hole was drilled entirely in biotite gneiss rocks with varying amount of clioritic and quartz rich portions. Between 20 m and 40 m a zone of pyrite mineralization was intersected with 2 - 5% volume pyrite. This zone was considered to have caused the I.P. anomaly and the hole was stopped at 67.95 m.

Hole 2-71.

This hole was collared at the southern end of a fairly strong I.P. anomaly which seemed to indicate a shallow narrow source. Again this hole was drilled entirely in amphibolite gneissic rocks and between 25 and 40 m contained 0-2% of pyrite together with 0-5% magnetite. This zone was considered to have caused the I.P. anomaly and the hole was stopped at 50.65 m.

Hole 3-71.

This hole was put down to investigate the southern part of a complex I.P. anomaly that gave difficulty in interpretation. The line was detailed with close dipole seperation

and this seemed to indicate two definate concentrations of metallic content, the stronger being fairly shallow and to the south of the base line, hole 3 was put down to investigate this source.

At approximately 15 m this hole passed out of amphibolite into ultrabasic which between 15 and 30 was mineralized especially near the amphibolite contact, where coarse clumps and veins of pyrrhotite with minor chalcopyrite dominate. The sulphide content is very irregular varying from massive to minor specks over the zone. The best assay meter 17-18 m runs 1.00% Ni and .35% Cu, but other samples were much lower running around .2% Ni.

The rest of the hole intersected dominantly ultrabasic with bands of amphibolite.

Hole 4-71 was collared on the northern part of the complex anomaly mentioned above. Here the I.P. results indicate a greater depth to source, but the hole pulled sulphides in ultrabasics from surface down to 40 m. The sulphide content was erratic again with the best indications averaging around 0.3% Ni being from 0-20 m. The hole was stopped at 50.00 after technical complications.

Hole 5 was put down on an I.P. anomaly interpreted as indicating a shallow broad source with moderate metallic content.

The hole drilled 0-24 m qtz rich amphibolite, 24-29 m mineralized ultrabasic running approx. 0.28% Ni over 5 m, 29-39 m amphibolite and 39-59.27 m unmineralized ultrabasic.

The mineralized zone is regarded as causing the anomaly.

Hole 6 was put down to investigate a supposed westerly plunge of the mineralization picked up in hole 4. I.P. data seemed to indicate this.

The hole pulled mainly ultrabasic rock before passing into a contact zone of biotite gneiss/amphibolite at approx. 70 m.

Sporadic sulphides were present between 4 to 8 m and 40-69 m, but very erratic as isolated grains and small veins. Best intersections were between 4 and 8 m and 62-63 m where the Ni content runs around 0.15%. Minor pyrite was present in the contact zone. The anomaly is caused by sulphide and magnetite accumulation in the ultrabasic, biotite gneiss contact zone.

Hole 7-72 was put down to investigate an I.P. anomaly under the lake. Because of very poor ice conditions the drill had to be set up on a small island. On 50 m dipoles the I.P. anomaly was strong and typical of a narrow source of high metallic content. However on 25 m dipoles there was no definate increase in magnitude of the frequency effect or the metal factor values and the source material seemed to be possibly a rather broad zone of low and fairly uniform metallic content. Drilling substentiated the latter. The hole pulled 0-13 m amphibolite and 13 m - 105.40 ultrabasic, that contained very minor sulphide content (pyrrhotite dominantly) with minor zones running between 0.1-0.2% Ni.

Hole W 1

Was put down on the complex anomaly on line0, on a small open cut that had been worked in the past. The hole was drilled vertically down to 30.8 m in ultrabasic all the way and intersected mineralization (dominantly pyrrhotite) from surface down to 16 m, the sulphide content was fairly uniform over the entire zone averaging approx. ½% Ni.

The dominant sulphide in the ultrabasic is pyrrhotite, which is usually seen to occur as even med. gr. disseminations, but is also present as small veins, and large uneven blebs. Pyrite is very minor and chalcopyrite is also usually a minor constituent, but this varies and in some sections chalcopyrite outweighs pyrrhotite. Polished thin sections show the nickel sulphides to be violarite/pentlandite. In the section in question scattered irregular patches of sulphides were seen to consist mainly of pyrrhotite enclosing areas of heavily violaritized pentlandite and partly digested pyrite.

The assay results from the drilling program are shown in the following table.

Hole no.	Length	Ni	Co	Cu	Fe	S
3/71	15.5-16.00	0.28	0.020	0.13	13.8	4.1
"	16-17	0.39	0.028	0.25	15.1	4.5
"	17-18	1.00	0.050	0.36	24.9	13.4
	18-19	0.21	0.016	0.18	11.6	3.0
	19-20	0.15	0.011	0.07	9.4	1.6
	20-21	0.27	0.02	0.13	12.6	2.6
	21-22	0.24	0.021	0.11	12.3	2.9
	22-23	0.13	0.014	0.064	11.2	0.94
	23-24	0.21	0.016	0.077	11.4	1.7
	24-25	0.09	0.010	0.035	9.0	0.47
	25-26	0.09	0.010	0.034	9.0	0.60
	26-27	0.10	0.009	0.043	9.6	0.60
	27-28	0.07	0.008	0.024	8.9	0.33
	28-29	0.17	0.011	0.058	9.6	1.4
	29-30	0.14	0.009	0.059	9.1	0.78
	30-31	0.16	0.011	0.073	8.3	0.92
	31-32	0.12	0.008	0.048	7.8	0.44
	32-33	0.090	0.006	0.034	6.3	0.44
	33-34	0.12	0.006	0.048	7.4	0.39
	34-35	0.086	0.006	0.029	8.6	0.37
	35-36	0.054	0.005	0.030	7.5	0.19
	36-37	0.11	0.006	0.036	8.1	0.68
	37-38	0.083	0.006	0.026	8.3	0.37
	38-39	0.061	0.005	0.023	8.0	0.26
	40-41	0.061	0.005	0.018	8.1	0.18
	42-43	0.048	0.005	0.015	8.0	0.24
	44-45	0.048	0.005	0.014	8.1	0.13

From 15.5 - 24 m a length of 8.5 m the average Ni and Cu assays ~~wa~~n. 0.32 Ni and 0.15 Cu.

Hole no.	length	Ni	Co	Cu	Fe	S
4/71	1.6-2m	0.39	0.020	0.44	8.2	2.3
	2-3	0.35	0.019	0.23	8.3	2.2
	3-4	0.31	0.015	0.08	12.9	1.1
	4-5	0.26	0.014	0.06	11.0	1.1
	5-6	0.21	0.011	0.06	11.2	0.75
	6-7	0.29	0.019	0.09	11.4	1.4
	7-8	0.38	0.019	0.14	10.4	1.9
	8-9	0.27	0.014	0.10	7.3	1.4
	9-10	0.33	0.014	0.11	8.1	1.7
	10-11	0.33	0.015	0.11	7.5	1.8
	11-12	0.22	0.013	0.08	8.3	1.1
	12-13	0.44	0.024	0.17	8.8	2.2
	13-14	0.35	0.019	0.11	9.0	1.0
	14-15	0.31	0.015	0.094	9.3	1.4
	15-16	0.29	0.016	0.075	11.3	0.94
	16-17	0.16	0.014	0.036	8.9	0.41
	17-18	0.20	0.014	0.070	7.2	1.6
	18-19	0.28	0.019	0.13	8.0	1.2
	19-20	0.39	0.024	0.16	7.8	1.9
	20-21	0.29	0.019	0.088	7.6	1.4
	21-22	0.14	0.012	0.031	9.8	0.6
	22-23	0.13	0.012	0.024	9.8	0.3
	23-24	0.29	0.021	0.060	10.5	0.6
	24-25	0.25	0.019	0.051	10.5	0.9
	25-26	0.18	0.012	0.040	9.4	0.6
	26-27	0.30	0.019	0.090	9.7	1.0
	27-28	0.28	0.018	0.069	11.2	1.0
	28-29	0.22	0.015	0.060	9.7	0.7
	29-30	0.15	0.011	0.089	8.9	1.2
	30-31	0.08	0.009	0.035	7.2	0.51
	31-32	0.03	0.008	0.038	6.8	0.48
	32-33	0.03	0.006	0.029	7.0	0.48
	33-34	0.04	0.007	0.024	6.2	0.36

Hole no.	length	Ni	Co	Cu	Fe	S
4/71	34-35	0.06%	0.009	0.030	6.0	0.31
	35-36	0.02	0.004	0.014	2.5	0.18
	36-37	0.14	0.010	0.079	7.8	1.3
	37-38	0.24	0.013	0.15	8.3	1.6
	38-39	0.47	0.025	0.25	10.0	3.2
	39-40	0.28	0.016	0.14	8.5	1.6

From 1.6 m - 30 m a length of 28.4 m the core averages 0.3% Ni and 0.09% Cu.

From 36-40 m a length of 4 m the core averages 0.28% Ni, 0.15% Cu.

Hole no.	length	Ni	Co	Cu	Fe	S
W/1 72	0-1	0.32	0.017	0.13	13.8	1.5
	1-2	0.24	0.014	0.10	13.1	0.9
	2-3	0.32	0.016	0.12	13.8	1.4
	3-4	0.18	0.013	0.07	11.7	0.7
	4-5	0.24	0.015	0.09	11.7	1.0
	5-6	0.21	0.014	0.12	11.7	0.8
	6-7	0.17	0.014	0.05	11.6	0.5
	7-8	0.19	0.014	0.06	11.8	0.7
	8-9	0.25	0.015	0.12	11.7	0.8
	9-10	0.22	0.015	0.09	11.8	0.7
	10-11	0.26	0.015	0.09	11.9	1.0
	11-12	0.19	0.014	0.06	11.3	0.7
	12-13	0.15	0.014	0.03	11.1	0.3
	13-14	0.16	0.014	0.04	10.0	0.4
	14-15	0.20	0.014	0.05	11.2	0.4
	15-16	0.20	0.015	0.05	11.7	0.4

From 0-16 m a length of 16 m the core from this hole runs an average of 0.22% Ni and 0.08% Cu.

Hole no.	Length	Ni	Co	Cu	Fe	S
5/71	24-25	0.31	0.013	0.12	9.1	1.4
	25-26	0.32	0.015	0.12	9.9	1.3
	26-27	0.27	0.014	0.10	11.1	1.0
	27-28	0.28	0.011	0.15	9.3	1.3
	28-29	0.24	0.011	0.09	9.8	1.2
	40-41	0.07	0.006	0.05	8.2	0.30
	41-42	0.06	0.006	0.04	9.1	0.38
	42-43	0.12	0.008	0.05	8.0	0.48
	43-44	0.07	0.006	0.03	8.9	0.30
	44-45	0.06	0.006	0.02	8.1	0.22
	45-46	0.05	0.006	0.02	8.9	0.22
	46-47	0.04	0.006	0.01	8.1	0.30
	47-48	0.05	0.006	0.02	8.0	0.22
	48-49	0.03	0.005	0.02	8.3	0.22
	49-50	0.06	0.006	0.02	9.5	0.20
	50-51	0.06	0.005	0.02	8.0	0.22
	51-52	0.05	0.005	0.01	7.5	0.18
	52-53	0.05	0.006	0.01	9.4	0.18
	53-54	0.09	0.006	0.03	8.7	0.30
	54-55	0.06	0.006	0.02	8.0	0.22
	55-56	0.06	0.006	0.02	7.7	0.22
	56-57	0.04	0.005	0.01	7.8	0.18
	57-58	0.04	0.006	0.01	9.1	0.18
	58-59	0.03	0.004	0.01	7.6	0.18
	59-60	0.04	0.005	0.01	7.9	0.10

The 5 meters from 24 m - 29 m run an average of 0.28% Ni and .11% Cu.

Hole no.	Length	Ni	Co	Cu	Fe	S
6/72	3-4	0.06	0.006	0.018	9.2	0.13
	4-5	0.14	0.007	0.060	9.3	0.45
	5-6	0.15	0.006	0.059	8.7	0.54
	6-7	0.23	0.010	0.075	10.0	0.60
	7-8	0.17	0.01	0.063	10.7	0.54
	8-9	0.05	0.005	0.033	9.8	0.24
	9-10	0.07	0.004	0.023	9.2	0.30
	40-41	0.04	0.006	0.028	9.4	0.45
	41-42	0.04	0.008	0.025	9.0	0.45
	42-43	0.03	0.003	0.010	8.3	0.20
	43-44	0.04	0.005	0.014	9.0	0.57
	44-45	0.05	0.004	0.017	9.4	1.1
	45-46	0.07	0.008	0.030	8.7	0.54
	46-47	0.03	0.004	0.015	8.1	0.30
	47-48	0.04	0.005	0.016	8.4	0.45
	48-49	0.07	0.006	0.019	8.4	0.60
	49-50	0.06	0.006	0.021	9.6	0.45
	60-61	0.04	0.010	0.044	10.1	0.60
	61-62	0.05	0.015	0.075	11.5	1.9
	62-63	0.14	0.016	0.072	13.1	2.2
	63-64	0.11	0.010	0.043	11.0	0.7
	64-65	0.07	0.012	0.050	12.4	2.2
	65-66	0.04	0.010	0.075	11.5	1.5
	66-67	0.06	0.014	0.065	12.4	2.2
	67-68	0.09	0.021	0.051	14.8	2.8
	68-69	0.04	0.006	0.035	10.3	0.88
	69-70	0.03	0.005	0.042	10.0	0.45
	70-71	0.03	0.010	0.028	9.7	1.0
	71-72	0.12	0.046	0.28	16.6	5.3
	72-73	0.08	0.017	0.19	12.5	3.4
	73-74	0.06	0.009	0.047	11.5	1.4
	74-75	0.05	0.010	0.076	10.6	1.2
	75-76	0.04	0.009	0.081	10.0	1.9
	76-77	0.02	0.005	0.063	7.4	1.1
	77-78	0.01	0.001	0.044	8.0	1.1
	78-79	0.006	0.003	0.020	8.0	0.80
	79-80	0.01	0.004	0.029	9.9	0.80

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Hole no.	Length	Ni	Co	Cu	Fe	S
7/72	40-41	0.061	0.006	0.024	8.8	0.22
	41-42	0.059	0.006	0.024	8.8	0.21
	42-43	0.14	0.010	0.090	9.2	0.66
	43-44	0.070	0.008	0.032	9.0	0.30
	44-45	0.061	0.006	0.028	8.6	0.17
	45-46	0.079	0.009	0.135	8.2	0.48
	46-47	0.066	0.006	0.086	7.8	0.35
	47-48	0.045	0.006	0.020	7.9	0.24
	48-49	0.051	0.006	0.020	8.4	0.19
	49-50	0.18	0.009	0.081	8.2	0.66
	50-51	0.083	0.005	0.030	5.7	0.12
	51-52	0.070	0.005	0.036	5.3	0.13
	52-53	0.050	0.004	0.021	4.9	0.12
	53-54	0.12	0.004	0.060	4.0	0.29
	54-55	0.066	0.005	0.031	4.6	0.13
	55-56	0.071	0.005	0.026	5.5	0.12
	56-57	0.079	0.005	0.028	5.1	0.12
	57-58	0.071	0.005	0.029	5.1	0.12
	58-59	0.059	0.005	0.030	4.7	0.11
	59-60	0.048	0.006	0.019	5.3	0.13
	70-71	0.21	0.008	0.090	8.8	0.66
	71-72	0.095	0.005	0.036	7.4	0.35
	72-73	0.058	0.005	0.019	6.7	0.23
	73-74	0.13	0.008	0.047	8.6	0.35
	74-75	0.12	0.006	0.039	7.8	0.41
	75-76	0.10	0.008	0.032	8.0	0.35
	76-77	0.071	0.006	0.022	7.8	0.24
	77-78	0.061	0.005	0.014	7.8	0.17
	78-79	0.040	0.004	0.008	7.0	0.10
	79-80	0.040	0.006	0.029	7.7	1.8
	90-91	0.24	0.015	0.066	10.1	1.4
	91-92	0.24	0.016	0.064	9.7	0.98
	92-93	0.20	0.015	0.051	9.7	0.64

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Hole no.	Length	Ni	Co	Cu	Fe	S
93-94	93-94	0.096	0.010	0.023	8.9	0.57
7/72	94-95	0.13	0.011	0.026	9.1	0.70
	95-96	0.085	0.008	0.025	8.3	0.57
	96-97	0.071	0.008	0.024	8.5	0.35
	97-98	0.053	0.006	0.011	7.8	0.23
	98-99	0.041	0.005	0.008	7.1	0.23
	99-100	0.056	0.006	0.009	8.6	0.35

DISCUSSION.

Drilling has established the validity of the I.P. method in this area. All anomalies drilled intersected sulphides and/or magnetite and all I.P. anomalies can be explained by the mineralizations intersected.

The meta peridotite has been fairly well defined by surface mapping. Geophysics indicated possible extensions of the ultrabasic, but these were not substantiated by drilling of holes 1 and 2, as these indicated pyrite zones in the enclosing amphibolites and gneisses.

The mineralization in the ultrabasic after the best I.P. anomalies have been drilled seems to consist of a very weak distribution of sulphides that in places is concentrated into interesting amounts.

The best concentrations are seen in holes 3, 4, 5 and W 1, all of which are in the area around the old showing and where the best looking I.P. anomalies were obtained.

In hole 3 the sulphides are concentrated in the contact zone with overlying amphibolites and they are in places massive, but irregularly distributed and the best 8.5 m run 0.32 Ni and 0.15 Cu whereas the best meter in this zone which contained much massive and heavily disseminated sulphides runs 1.00% Ni and 0.35% Cu.

Holes 4 and W 1 which are located towards the northern flank of the ultrabasic show a fairly even concentration of med. gr. evenly distributed sulphides from surface down to 16-30 m. Hole 4 gives a 28.4 m intersection running 0.3% Ni and 0.09% Cu, whereas hole W 1 gives a 16 m intersection running 0.22% Ni and 0.08% Cu.

From the I.P. data it was thought that the zone intersected in hole 4 plunged towards the west and hole 6 wasset up 50 m to the west to test this possibility. This hole however intersected only very sporadic sulphide mineralization in the ultrabasic, together with pyrite concentration in the enclosing rocks in the contact zone.

From this evidence there does not seem to be any substantial westerly continuation of the mineralization intersected in 4.

Hole 7 intersected very sporadic and weak sulphide dissemination in isolated grains over a wide core length explaining the I.P. anomaly obtained.

It would thus seem that all interesting mineralization is concentrated in the area of line 0/0.

Hole 5, which was thought might intersect the easterly continuation of the zone in hole 3 picked up a 5 m sulphide zone running 0.28% Ni and .11% Cu and it would seem reasonable to assume that there is similar sulphide concentration along other parts of the contact.

The sulphur content in the assays is fairly high for such low nickel values and it is doubtful that one will get economic concentsate from this mineralizaiton, on the otherhand the mineralization around line 0/0 would be easy to open pit.

Due to the apparent limited extent of the mineralization, the low nickel content and to the poor nature of the ore no further work is recommended at the present.

LIST OF ENCLOSURES.

1) Log drill hole 1
" " " 2
" " " 3
" " " 4
" " " 5
" " " 6
" " " 7

2) Map no. 07.50.72. Summary map showing I.P. anomalies, and drill results.

3) Map no. 07.51.72. Geological map of the Klepptjern distrikt.

4) Map no. 07.52.72. Map showing relation of drill holes to contoured metal factor (n = 1, 50 m dipoles) values.

5) Map no. 07.53.72. Map showing relation of drill holes to contours of apparent resistivity for n = 1 on 50 m dipoles.

6) Map no. 07.54.72. Drill section D.D.H. 1.

7) Map no. 07.55.72. Drill section D.D.H. 2.

8) Map no. 07.56.72. Drill sections D.D.H. 3 and 4, D.D.H. W 1.

9) Map no. 07.57.72. Drill section D.D.H. 5.

10) Map no. 07.58.72. Drill section D.D.H. 6.

11) Map no. 07.59.72. Drill section D.D.H. 7.

N

DDH 6/72

0 - 3m	Overburden
3 - 8,2	Ultrabasic
8,2 - 9	Amphibolite
9 - 69,4	Ultrabasic

40-69 Mineralized zone.

69,4 - 71	Amphibolite
71 - 73,4	Biotite gneiss
73,4 - 75,5	Ultrabasic
75,5 - 78,4	Biotite gneiss
78,4 - 88,5	Amphibolite

	Ni %	Cu %	S %
3 - 4	0.06	0.02	0.13
4 - 5	.14	.06	.45
5 - 6	.15	.06	.54
6 - 7	.23	.07	.60
7 - 8	.17	.06	.54
8 - 9	.05	.03	.24
9 - 10	.07	.02	.30
40 - 41	.04	.03	.45
41 - 42	.04	.02	.45
42 - 43	.03	.01	.20
43 - 44	.04	.01	.57
44 - 45	.05	.02	1.1
45 - 46	.07	.03	.54
46 - 47	.03	.01	.30
47 - 48	.04	.02	.45
48 - 49	.07	.02	.60
49 - 50	.06	.02	.45
70 - 71	.03	.03	1.0
71 - 72	.12	.03	5.3
72 - 73	.08	.02	3.4
73 - 74	.06	.05	1.4
74 - 75	.05	.08	1.2
75 - 76	.04	.08	1.9
76 - 77	.02	.06	1.1
77 - 78	.01	.04	1.1
78 - 79	.01	.02	.80
79 - 80	.01	.03	.80

60 - 61	.04	.04	0.60
61 - 62	.05	.08	1.9
62 - 63	.14	.07	2.2
63 - 64	.11	.04	0.7
64 - 65	.07	.05	2.2
65 - 66	.04	.08	1.5
66 - 67	.06	.07	2.2
67 - 68	.09	.05	2.8
68 - 69	.04	.04	0.88
69 - 90	.03	.04	0.43

DDH 2/71

0-50.65 m amphibolite
25-40 m. 2-5% pyrite w. minor magnetite

DDH 4/71

0-50 m ultrabasic
mineralized zone
average 2-3 % sulfides.

	Ni %	Cu %	S %
1.6-2	0.39	0.44	2.3
-3	.35	.23	2.2
-4	.31	.08	1.1
-5	.26	.06	1.1
-6	.21	.06	0.75
-7	.29	.09	1.4
-8	.38	.14	1.9
-9	.27	.10	1.4
-10	.33	.10	1.7
-11	.33	.11	1.8
-12	.22	.08	1.1
-13	.44	.17	2.2
-14	.35	.11	1.0
-15	.31	.09	1.4
-16	.29	.07	0.44
-17	.16	.03	0.44
-18	.20	.07	1.6
-19	.28	.13	1.2
-20	.39	.16	1.9
21-22	.14	.03	.6
22-23	.13	.02	.3
23-24	.29	.06	.6
24-25	.25	.05	.9
25-26	.18	.04	.6
26-27	.30	.09	1.0
27-28	.28	.07	1.0
28-29	.22	.06	.7
29-30	.15	.09	1.2
30-31	.08	.01	.5
31-32	.03	.01	.5
32-33	.03	.01	.5
33-34	.04	.01	.4
34-35	.06	.01	.3
35-36	.02	-	.2
36-37	.14	.01	.3
37-38	.24	.01	.6
38-39	.47	.02	.2
39-40	.28	.02	.6

DDH 5/71

0-24m qtz - rich amphib.
24-28 m ultrabasic (mineralized zone)

28-39m amphib.
39-59.27 m ultrabasic

(chek assays)

	Ni %	Cu %	S %
24-25	.31	.12	1.4
25-26	.32	.12	1.3
26-27	.27	.10	1.0
27-28	.28	.15	1.3
28-29	.24	.04	1.2
40-41	.07	.05	.30
41-42	.07	.04	.38
42-43	.12	.05	.48
43-44	.07	.03	.30
44-45	.06	.02	.22
45-46	.05	.02	.22
46-47	.04	.02	.20
47-48	.05	.02	.22
48-49	.03	.03	.22
49-50	.06	.02	.20
50-51	.06	.02	.22
51-52	.05	.01	.18
52-53	.05	.01	.18
53-54	.09	.03	.30
54-55	.06	.02	.22
55-56	.06	.02	.22
56-57	.04	.01	.18
57-58	.04	.01	.18
58-59	.04	.01	.18
59-60	.04	.01	.10

DDH 1/71

0-67.95 m amphibolite
20-40 m. 2-5% pyrite

DDH 7/72

0-13 m	Amphibolite
13-105.4	Ultrabasic
52-55 m	Mineralized
55-74	Weakly mineralized

	Ni %	Cu %	S %
40-41	0.06	0.02	0.22
41-42	.06	.02	.21
42-43	.14	.09	.56
43-44	.07	.03	.30
44-45	.06	.03	.17
45-46	.08	.14	.48
46-47	.07	.04	.35
47-48	.05	.02	.24
48-49	.05	.02	.19
49-50	.18	.08	.66
70-71	.21	.09	.66
71-72	.1	.04	.35
72-73	.06	.02	.23
73-74	.13	.05	.35
74-75	.12	.04	.41
75-76	.10	.03	.35
76-77	.07	.02	.24
77-78	.06	.01	.17
78-79	.04	.01	.10
79-80	.04	.03	1.8
90-91	.24	.07	1.4
91-92	.24	.06	.98
92-93	.20	.05	.46
93-94	.1	.02	.57
94-95	.13	.03	.70
95-96	.09	.03	.57
96-97	.07	.02	.35
97-98	.05	.01	.23
98-99	.04	.01	.23
99-100	.06	.01	.35

DDH 3/71

0-15.5 m amphibolite w. mgt. rich zones.
15.5-41.88 ultrabasic
15.5-31.0 minld. zone.
dominantly pyrrhotite minor cpy and mgt. Irregular between 0-60% sulfides best concentrations near contacts. Average ca. 4% sulfides

	Ni %	Cu %
15.5-16.00	.28	.13
16.00-17.00	.39	.25
17.00-18.00	1.00	.35
18.00-19.00	.21	.18
19.00-20.00	.15	.07
20 - 21	.27	.13
21 - 22	.24	.11
22 - 23	.13	.06
23 - 24	.21	.08
24 - 25	.09	.03
25 - 26	.09	.04
26 - 27	.10	.04
27 - 28	.07	.02
28 - 29	.17	.06
29 - 30	.14	.06
30 - 31	.16	.07
31 - 32	.12	.05
32 - 33	.09	.03
33 - 34	.12	.05
34 - 35	.09	.03
35 - 36	.05	.03
36 - 37	.11	.04
37 - 38	.08	.03
38 - 39	.06	.02
40 - 40	.06	.02
42 - 43	.05	.01
44 - 45	.05	.01

41.88 - 47.62 amphib.
47.62 - 52.25 ub.
52.25 - 54.22 amphib.
54.22 - 58.40 ub.
58.40 - 62.00 amphib.
62.00 - 74.65 ub with minor amphib. bands.

(Deepened 2/72)

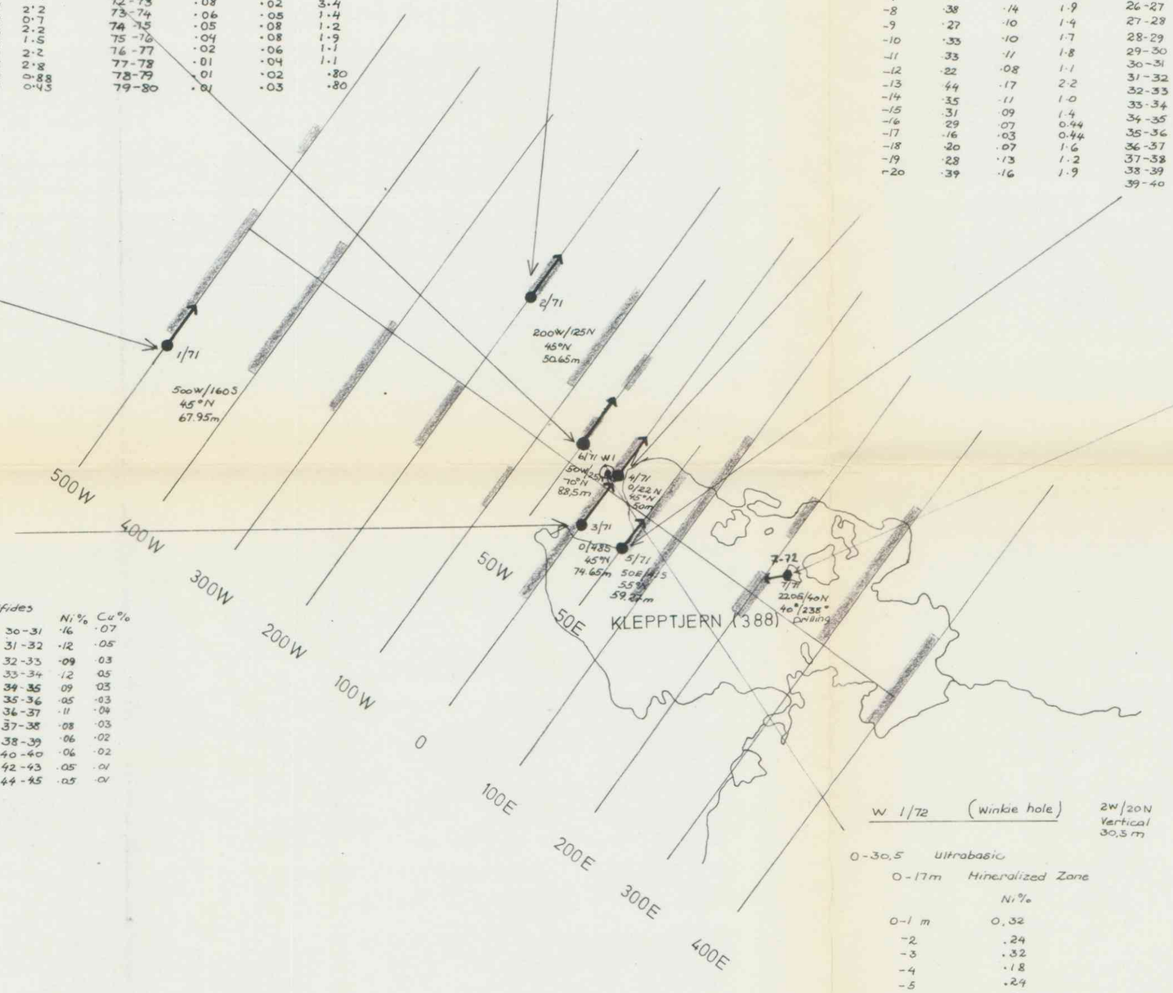
74,65 - 110 Ultrabasic, unmineralized
110 - 127,4 Alternating bands of ultrabasic with amphibolite and diorite

W 1/72 (Winkie hole)

2W/20N
Vertical
30,3 m

0-30,5 Ultrabasic
0-17m Mineralized Zone

	Ni %
0-1 m	0,32
-2	.24
-3	.32
-4	.18
-5	.24
-6	.21
-7	.17
-8	.19
-9	.25
-10	.22
-11	.26
-12	.19
-13	.15
-14	.16
-15	.20
-16	.20



LEGEND: J.P. anomaly

Diamond drill hole DDH

KLEPPTJERN GRID

SCALE 1:5000

OBS.
DRAW. FN/JBG.
TRAC. UT.
CHK.

⅛ SULFIDMALM

MAP NO. 07 50 72

MAP SHEET

A.s Tørrkopi. Sentrum Trykkeri.

A/S SULFIDMALM

INTER-OFFICE MEMORANDUM

Date: 14th December, 1972

To: Falconbridge Nikkelverk A/S

cc: A. M. Clarke, D. K. Lochhead, P. Nixon

From: J. B. Gammon

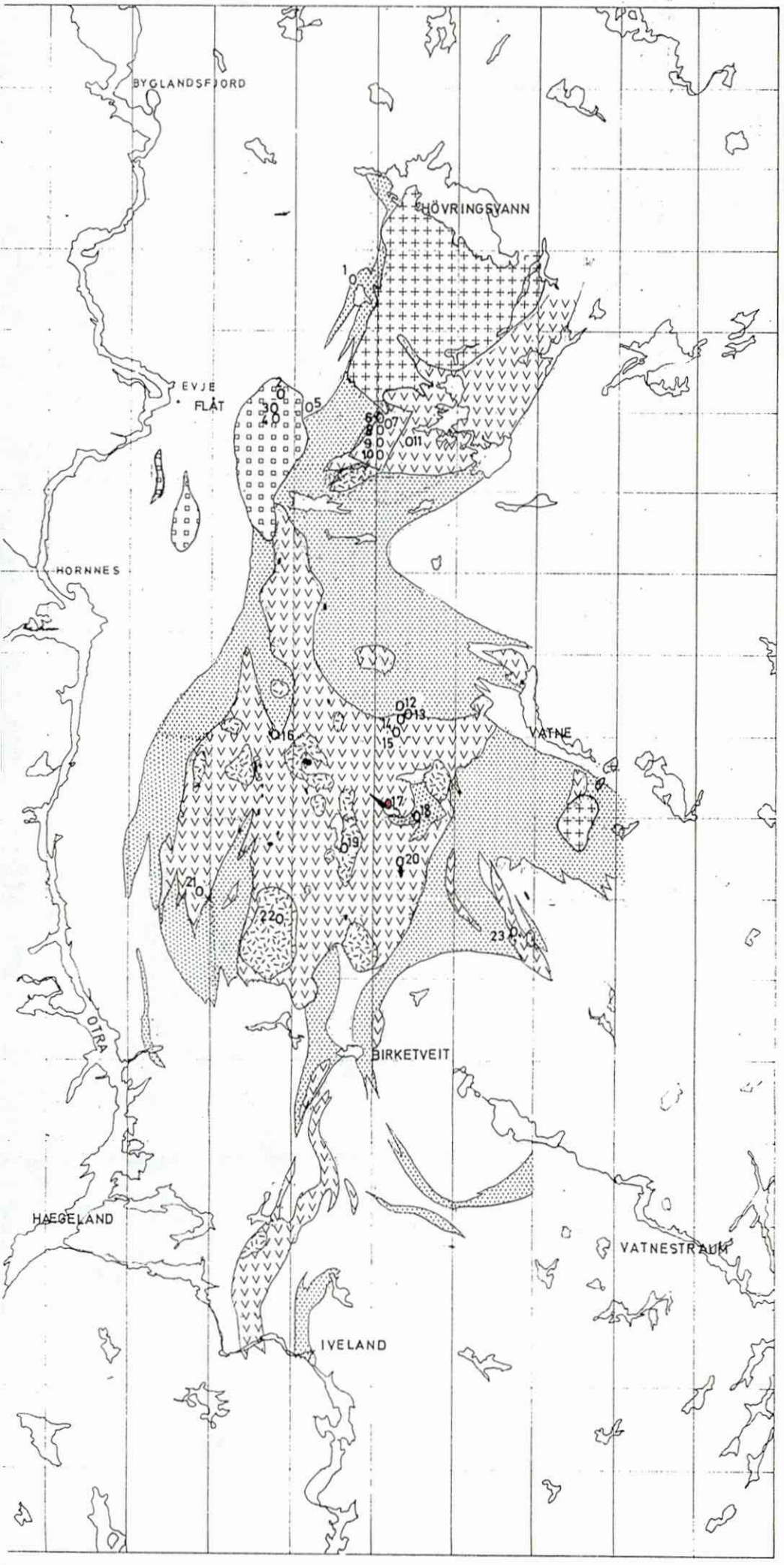
Subject:

808-7, Kløpptjørn drilling, Evjeg Iveland, (Rpt.No. 188/72/7).

Please find attached Nixon's report on a drill programme to follow-up IP anomalies in the Kløpptjørn district. The only interesting values were restricted to a small area around the old showing where the strongest IP anomalies were also obtained. No further work is recommended.

J. B. Gammon

EVJE-IVELAND AREA



GRANITIC AND DIORITIC GNEISS

AMPHIBOLITE FOLIATED AND MASSI

HORNBLENDE GNEISS

GABBRO

HORNBLENDE DIORITE

ULTRABASIC

GRANITE

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

AAVITSLANDSHEIA GRID AREA

0 1 2 3 4 5KM

11

(1)

A/S SULFIDMALM

DIAMOND DRILL RECORD

LOCATION: 500W/160S BEARING: N DIP: 45 HOLE No: 1 SHEET No: 1

LOGGED BY: Nixon STARTED: 28.9.71 PROPERTY: Klepptjern

CASING: FINISHED: 4.10.71 Iveland

CORE SIZE: 32 mm TESTS (CORRECTED):

FROM	TO		DESCRIPTION
0	0.20		Overburden soil.
0.20	20 m		Biotite gneiss in part more amphibolitic, well foliated and fairly rich in feldspar. Dioritic gneiss between 5 and 10 m. Between 10-15 m the rock has a well developed banded character. From 16 m this is less obvious and the rock is more dioritic in nature. 17.00 - 20.00. 2-5% pyrite mineralization as dissemination. Very minor chalcopyrite.
20 m	30 m		From 20-30 m the rock is essentially a biotite rich feldspar gneiss with irregular pyrite mineralization. Well foliated - some quartz present. 20-21. up to 5% pyrite as small grains and stringers, but from 21-26 odd specks and from 26-30 still irregular pyrite mineralization, but up to 5% in places.
30 m	40 m		Biotite gneiss - irregular pyrite mineralization from specks to 5% with very minor chalcopyrite. Magnetite is also present with the sulphides and may be up to 2% by volume.
			The rock is in part banded, but is essentially a biotite feldspar rich gneiss. Well foliated.
40 m	50 m		Minor sulphides from 40 - 41 m. Between 41 and 50 m 1-2% magnetite as small grains. The rock is slightly more massive than the previous 40 m, but is still classified as biotite gneiss.
50 m	67.95		Still fairly massive biotite gneiss and in parts more amphibolitic. From 50 - 62 magnetite is present, between 2-5%. No sulphides.
67.95			End of hole.

A/S SULFIDMALM

DIAMOND DRILL RECORD

LOCATION: 500W/160S BEARING: N DIP: 45 HOLE No: 1 SHEET No: 2
LOGGED BY: Nixon STARTED: 28.9.71 PROPERTY: Klepptjern
CASING: FINISHED: 4.10.71 Iveland
CORE SIZE: 32 mm TESTS (CORRECTED):

FROM	TO		DESCRIPTION
			Core angles.
			3.50. 70
			6.20. 58
			9.50. 60
			14.50. 62
			18.50. 75
			22.60. 55
			25.50. 65
			29.40. 68
			30.50. 60
			33.20. 56
			39.50. 72
			42.00. 70
			45.20. 70
			51.20. 72
			59.50. 75

A/S SULFIDMALM

DIAMOND DRILL RECORD

LOCATION: 200W/125N BEARING: N DIP: 45 HOLE No: 2 SHEET No: 1
LOGGED BY: Nixon STARTED: 11.10.71 PROPERTY: Klepptjern
CASING: FINISHED: 15.10.71 Iveland
CORE SIZE: 32 mm TESTS (CORRECTED): Norway

FROM	TO		DESCRIPTION
0.00	0.20		Overburden.
0.20	0.30		Medium grained foliated amphibolite.
0.30	10.00		The amphibolite passes into a feldspar, quartz rich banded gneiss - the dark bands being composed of amphibole & boitite. From 0.30 - 1.00 m and between 3 and 4 metres, almost pure feldspar quartz. 2-3 m up to 5% magnetite as specks. 3-9 m from specks to 2% magnetite.
10.00	20.00		Still essentially the same biotite banded gneiss. Between 18 and 18.50 m more amphibolitic as is the case between 19 and 19.60. Between 18 and 20 m minor specks of pyrite are visible.
19.80	30.00		Dominantly amphibolite which is fairly biotite rich and less well foliated than the biotite banded gneiss. Specks of pyrite are present at 28.10 and between 29,50 and 29.70.
			Between 26.70 and 29.00 the amphibolite is very basic and amphibolite rich - almost hornblendite. At 23.50 pyrite coatings on joint planes.
30	40		Dominantly amphibolite which contains from spechs to 2% of pyrite as irregular dissemination. Magnetite is also present in parts up to 5%.
40	43.00		The amphibolite continues down to 43 m and then passes
43.00	50.65		over into a banded gneiss which continues to the end of the hole at 50.65.
			Between 41 and 41.50 are odd specks of sulphides.

A/S SULFIDMALM

DIAMOND DRILL RECORD

LOCATION: 200W/125N BEARING: N DIP: 45 HOLE No: 2 SHEET No: 2
LOGGED BY: Nixon STARTED: 11.10.71 PROPERTY: Klepptjern
CASING: FINISHED: 15.10.71 Iveland
CORE SIZE: 32 mm TESTS (CORRECTED): Norway

FROM	TO		DESCRIPTION
			Core Angles.
			1.50. 78
			5.50. 90
			8.50. 80
			11.80. 78
			15.80. 75
			18.50. 76
			20.50. 78
			25.50. 75
			29.80. 62
			33.50. 82
			36.20. 85
			39.50. 83
			43.50. 69
			46.20. 74
			49.80. 70

A/S SULFIDMALM

DIAMOND DRILL RECORD

LOCATION: 0/48S BEARING: N DIP: 45° HOLE No: 3 SHEET No: 1

LOGGED BY: Nixon STARTED: 12.11.71/17.2.72 PROPERTY: Klepptjern

CASING: 0.50 m FINISHED: 19.11.71/22.2.72 Iveland

CORE SIZE: 32 mm TESTS (CORRECTED):

FROM	TO		DESCRIPTION
0	0.50		Overburden.
0.50	15.74		Amphibolite varying from fairly massive to gneissic.
			Containing in part much introduced quartz and feldspar,
			especially between 5 and 8 m.
			Between 1 and 9 m a good deal of magnetite is present:-
			in some places it can be seen to represent over 2-3%.
			The magnetite is most dominant in the quz/feldspar rich
			parts.
			Some of the more massive portions are very meta-gabbroic
			in nature and seem to contain small pyroxene remnants.
			One or two accessory sulphide grains are noted.
15.74	41.88		Ultrabasic. In the early meters is hornblende rich.
			Down to 20 m it is very well mineralized. Pyrrhotite
			being dominant, chalcopyrite approx. 10% of the
			sulphides. No pyrite was noted.
			15.74 - 17 m 20% sulphides.
			17 -18 m 40% sulphides.
			18 - 18.80 10-20% sulphides.
			18.80 - 19.15 small feldspar dyke.
			19.15 - 20 2-5% sulphides here, quite a lot of
			pyrite as fracture fillings. Small sections of
			amphibolite rock seem to be caught up in the ultrabasic
			and these are equally well mineralized as the ultrabasic.
			20.00 - 20.50. 2-5% sulphides as small isolated
			disseminated blebs. po. 70% cp. 30%, no pyrite.
			The ultrabasic here is very amphibole rich.
			From 20.50 - 21.00. The sulphide content increases -
			coarser lumps and veinlets ranging from 5-20% sulphides.
			80% po. 20% cp.

A/S SULFIDMALM

DIAMOND DRILL RECORD

LOCATION: 0/48S BEARING: N DIP: 45 HOLE No: 3 SHEET No: 2
LOGGED BY: Nixon STARTED: 12.11.71/17.2.72. PROPERTY: Klepptjern
CASING: 0.50 m FINISHED: 19.11.71/22.2.72. Iveland
CORE SIZE: 32 mm TESTS (CORRECTED):

FROM	TO		DESCRIPTION
			From 21 m the ultrabasic seems to be getting fresher.
			From 21.00-21.40 up to 15% sulphides, coarse, again
			po. is dominant. A ring of magnetite is present on the
			outside of the sulphide grains.
			21.40 - 22.00. 2-5% sulphides. Between 22.00 and 22.90
			the sulphide content drops markedly and is irregular
			ranging from spechs to 2%. Magnetite is also more
			abundant as large clumps up to 1 cm across. The
			ultrabasic is fresher and large brown hyperthenes can
			be seen.
			From 22.90 - 23.40 the sulphide content increases again
			with up to 20% sulphides as large grains and veinlets
			again with a rim of magnetite.
			Between 24 and 27 m sulphides are irregularly present
			as small disseminated grains which in a few places
			approach 2-5% over 10-20 cms, where this occurs the
			sulphides are associated with greener more altered parts
			of the ultrabasic. At 27.00 there is a sheared zone with
			associated qtz. The rock is quite altered and over a
			distance of 10 cms on each side has po. associated:-
			up to 5%.
			At 28.65 there is a strong shear zone, and between
			27.00 and this the rock becomes gradually more altered.
			Between 28.00 and 28.50 there is quite a large amount
			of pyrite as small fracture fillings which are more or
			less parallel to the shear.
			There is much development of phlogopite here. Magnetite
			is also present.
			Between 29 and 30 m getting better sulphide development
			with up to 5% po cp. Pyrite is present all through the
			ultrabasic as coatings on carbonate and talc lined joint
			and fracture planes. 30 - 30.25. coarse sulphide
			blebs po. cp.

A/S SULFIDMALM

DIAMOND DRILL RECORD

LOCATION: 0/48S BEARING: N DIP: 45 HOLE NO: 3 SHEET NO: 3
LOGGED BY: Nixon STARTED: 121171/17272 PROPERTY: Klepptjern Iveland
CASING: 0.50 m FINISHED: 191171/22272.
CORE SIZE: 32 mm TESTS (CORRECTED):

FROM	TO		DESCRIPTION
			Between 30 and 40 m the ultrabasic is very uniform and seems to be amphibole rich. Some magnetite grains and isolated odd sulphides pyrite on joint surfaces.
41.88	42.28		White feldspar dyke with a little mica contacts are altered and a little amphibole rich.
42.28	43.00		Medium grained fairly massive amphibolite.
43.00	43.26		Feldspar vein.
43.26	47.62		Amphibolite fairly massive, med gr. with some magnetite. At 44.35 a 1 cm band of sulphides po. cp. py.
			The amphibolite also contains irregular patches, of ultrabasic material which is converted entirely to hornblende or fibrous amphibole.
47.62	52.25		Ultrabasic consisting almost entirely of amphibole material.
52.25	54.22		Uneven contact with amphibolite which again is medium grained and fairly massive. (Looks like ultrabasic is intrusive into the amphibolite).
			52.90 - 53.75. Qtz feldspar biotite rock which has a nice foliation // to the contacts.
54.22	58.40		Into ultrabasic again, first couple of meters are extremely altered, hb rich with mica development and some feldspar inclusions.
58.40	61.80		Come over into amphibolite again, first few cms are coarse grained and feldspar rich, after this goes over into a more even grained fairly massive amphibolite.

A/S SULFIDMALM

DIAMOND DRILL RECORD

LOCATION: 0/48S BEARING: N DIP: 45 HOLE No: 3 SHEET No: 4
LOGGED BY: Nixon STARTED: 12\|17\|72 PROPERTY: Klepptiern
CASING: 0.50 m FINISHED: 19\|17\|72 Iveland
CORE SIZE: 32 mm TESTS (CORRECTED):

FROM	TO		DESCRIPTION
61.80	65.50		Fractured contact zone with ultrabasic. Again tremolite actinolite rich, only minor sulphide spechs. From 60 - 60.50 extremely fractured zone.
65.50	66.68		Amphibolite.
66.68	70.00		Ultrabasic, good mica development. Cut in two places by small qtz/feldspar rich dykes. Which tend to shear the ultrabasic. 68.90 - 69.10 qtz/feldspar dyke.
70.00	72.96		Amphibolite.
72.46	110.60		Ultrabasic, fairly fresh.
110.60	120.60		Amphibolite/hb. gneiss varying from massive to well foliated and qtz content varying considerably. 110.50 - 50° little sheared. 114.20 - 114.40 Qtz vein.
120.60	127.40		Contact 60° with green hornblendite contains no sulphides.
127.40			End of hole.

A/S SULFIDMALM

DIAMOND DRILL RECORD

LOCATION: 0/22N BEARING: N DIP: 45° HOLE No: 4 SHEET No: 1
LOGGED BY: Nixon STARTED: 19.11.71 PROPERTY: Klepptjern
CASING: 1.50 m FINISHED: 23.11.71 Iveland
CORE SIZE: 32 mm TESTS (CORRECTED):

FROM	TO		DESCRIPTION
0	1.60		Overburden.
1.60	30.70		Ultrabasic.
			Down to 8 m the rock is dark in colour, very massive and
			is slightly serpentinized. Mineralization consists of
			a medium grained dissemination of pyrrhotite with some
			minor chalcopyrite.
			Between 2.00 and 2.40 there is a feldspar concentration
			that is extremely rich in pyrrhotite up to 15% by
			volume. Otherwise sulphides are very evenly distributed
			throughout the rock varying from 2-5% by volume, increas-
			ing to more over limited distances.
			After 8 m the rock character changes and there is a
			more extensive development of fibrous amphibole minerals.
			Tremolite and actinolite. This type is dominant down
			to 15 m where the more serpentinized type is dominant
			over a couple of meters.
			Again sulphides evenly distributed over the entire
			meterage, between 15 and 17 m however slightly less
			than 2%.
			Between 20 and 30 m the ultrabasic is dominantly dark
			and serpentinitic. Sulphide distribution is not as
			even as in the previous meters and is strongest between
			26.70 and 28 m where it is up in 5%. Before this it
			is round 2%. Again pyrrhotite dominates with minor
			chalcopyrite.
30.70	33.64		Massive, med. gr. amphibolite. Contact 44.
33.64	34.95		Ultrabasic, tremolite rich no sulphides.
34.95	35.64		Pegmatite dyke - feldspar rich, no sulphides.

A/S SULFIDMALM

DIAMOND DRILL RECORD

LOCATION: 0/22 N BEARING: N DIP: 45 HOLE No: 4 SHEET No: 2
LOGGED BY: Nixon STARTED: 19.11.71 PROPERTY: Klepptjern
CASING: 1.50 m FINISHED: 23.11.71 Iveland
CORE SIZE: 32 mm TESTS (CORRECTED):

FROM	TO		DESCRIPTION
35.64	50.00		Ultrabasic.
			At 36.00 again sulphides which perrist down to 40 m.
			ca. 5% pyrrhotite. Between 36.60 and 37.30 there seems
			to have been some shearing. The mineralization here
			is dominantly in the form of stringers and veinlets
			instead of an even distribution.
			40.66 - 41.40 amphibolite inclusion.
			41.40 - 50.00 only odd spechs of sulphides.
50.00			End of hole.

A/S SULFIDMALM

DIAMOND DRILL RECORD

LOCATION: 50E/41S BEARING: N DIP: 55° HOLE No: 5 SHEET No: 1

LOGGED BY: Nixon STARTED: 26.11.71 PROPERTY: Klepptjern

CASING: 1.00 m FINISHED: 1.12.71 Iveland

CORE SIZE: 32 mm TESTS (CORRECTED):

FROM	TO		DESCRIPTION
0	1.00		Overburden.
1.00	23.85		Amphibolite/biotite gneiss, in places very quartz rich an
			with many samll veins and veinlets of quartz.
			1-2 m amphibolite is dominant.
			2-2.5 m quartz rich.
			2.5-4 m amphibolite is dominant, after 4 m becomes
			quartz rich.
			This gneiss like quartz rich amphibolite carries on
			down to 16.70. Magnetite is predominant in the quartz
			rich sections and especially from 10-13 m.
			From 16.70 to 23.85 passes into a more massive quartz
			rich amphibolite, less gneissic than the foregoing.
23.85	28.22		Contact with ultrabasic - (contact 54). 23.85 - 25.20
			tremolite-actinolite rich with up to 5% sulphides as
			an even dissemination of pyrrhotite and minor
			chalcopyrite.
			25.20 - 26.68 the rock is becoming more serpentinized,
			slight increase in sulphide content. 26.68- 28.22
			slightly less serpentinized sulphide content 2-5% volume.
28.22	36.76		Dominantly amphibolite. A medium grained fairly
			massive variety cut in places by small quartz veins.
			35.10 - 36.00 breccia/shear zone associated with
			feldspar inclusions. Joint faces in this section are
			coated with minor pyrite.
36.76	59.27		Ultrabasic. dominantly tremolite - actinolite rich..
			40.50 - 42.00 m contains introduced feldspar both as
			small veins and uneven lumps and inclusion.

A/S SULFIDMALM

DIAMOND DRILL RECORD

LOCATION: 50E/41S BEARING: N DIP: 55 HOLE No: 5 SHEET No: 2
LOGGED BY: Nixon STARTED: 26.11.71 PROPERTY: Klepptjern
CASING: 1.00 m FINISHED: 1.12.71 Iveland
CORE SIZE: 32 mm TESTS (CORRECTED):

FROM	TO		DESCRIPTION
36.76	59.27		42.70 - 43.20 slight sulphide content. Pyrrhotite and chalcopyrite as minor disseminations 1-2%.
			From 47-50 m begin to get a predominance of small amphibolite dykes and veins the most prominent of which are 47-47.20 m contact 81. and 48.03 - 48.65 contact 76.
			From 50-59.27 the ultrabasic is still tremolite-actinolite rich although hypersthene crystals can still be seen. Very minor sulphides.
59.27			End of hole.
			Core angles.
			2.20. 71
			4.30. 90
			9.50. 69
			13.30. 78
			15.50. 77
			31.78. 50 contact
			36.18. 54 contact.

A/S SULFIDMALM

DIAMOND DRILL RECORD

LOCATION: 50 W/ 25 N BEARING: N DIP: 70 HOLE No: 6 SHEET No: 1

LOGGED BY: Nixon STARTED: 7.2.72 PROPERTY: Klepptjern

CASING: 3.00 FINISHED: 12.2.72

CORE SIZE: Ax TESTS (CORRECTED):

FROM	TO		DESCRIPTION
0	3,00		Overburden - swamp
3.00	8,16		Ultrabasic, tremolite/actinolite rich with minor sulphides 2% over 20 cm around 5.00 m.
8,16	8,98		Minor amphibolite with fairly sharp contacts with ultrabasic. Contacts 50.
8,98	69,44		Ultrabasic
			17,50 - 17,60 Small amphibolite dyke
			21,65 - 22,10 " " "
			The contacts of this dyke are 68 and 70 (lower)
			From 40-50 m there are small quartz veins cutting through the ultrabasic which is still tremolite/ actinolite rich.
			45,00 - 45,20 There are minor sulphides
			At 49,50 there is a magnetite and po concentration over 2 cms.
			50-60 m sporadic mineralization less than 2% down to 57 m after which the content increases to over 2%.
			From 60-61 m the ultrabasic is slightly granular and contains an increased amount of plagioclase. Also contains finegrained pyrrhotite averaging 2-3%. Also abundant pyrite on fracture planes.
			61,10-61,20 heavy concentration of po + little py. Very little cp.
			Around 61,60 there is a concentration of medium gr. mineralization of po over 10 cm , 60% sulphides, otherwise rest of section from 61-62 is very weak in sulphides with mainly fracture fillings.
*) From 61-63 the ultrabsic is serpentinized.			*) 62-63 m average of over 5% sulphides mainly as med. gr. dissemination, but massive po between 62,10 -62,40 as vein.
			63,10 - 63,50 fracture zone
			63,50 - 64,50 heavily serpentinized
			63,50 - 64,50 odd sulphide stingers and disseminations
			At 64,50 there is a concentration of sulphides as fairly massive vein po over 15 cms.

A/S SULFIDMALM

DIAMOND DRILL RECORD

LOCATION: 50 W/ 25 N BEARING: _____ DIP: 70 HOLE No: 6 SHEET No: 2
LOGGED BY: Nixon STARTED: 7.2.72 PROPERTY: Klepptjern
CASING: 3.00 FINISHED: 12.2.72
CORE SIZE: A x TESTS (CORRECTED): _____

FROM	TO		DESCRIPTION
			64,65 - 65.00 2-5% disemination
			65,00 - 69,40 odd concentrations of sulphides. Average ca. 2%.
69,44	70,98		Contact with amphibolite, the contact is slightly sheared. Contact 58.
			The amphibolite is medium gr. with a slight suggestion of foliation. 5% magnetite and minor pyrite.
			Core angle 70,30 - 63°.
70,98	73,46		Passes into a biotite gneiss (contact 75 °) fine/med. gr. some quartz and felspar and fairly heavily mineralized in the form of massive veins and fine dissemination. Zone averages 5% sulphides po + py dominant. Over last half meter contains small veins of ultrabasic.
73,46	75,52		Green massive ultrabasic, actinolite/tremolite rich over first half meter is foliated to contact which at 73,46 is 60°. Free from sulphides.
75,52	78,40		Again the biotite gneiss richer in quartz here . Less sulphides and py is dominant. Contact at 75,52 is 65.
78,40	88,50		Gradual changeover into amphibolite.
			Core angels: 78,60 - 76
			81,80 - 70
			83,50 - 65
			85,60 - 62
			88,40 - 66.

A/S SULFIDMALM

DIAMOND DRILL RECORD

LOCATION: 220E/40N BEARING: 238 DIP: 40 HOLE No: 7 SHEET No: 1
LOGGED BY: Nixon STARTED: 25.2.72 PROPERTY: Klepptiern
CASING: 0.5 FINISHED: 6.3.72 Iveland
CORE SIZE: 32 mm TESTS (CORRECTED): Norway

FROM	TO		DESCRIPTION
0	0.20		Overburden.
0.20	3.20		Amphibolite, biotite rich with a well developed foliation. 62°.
3.20	6.10		Altered zone with much introduced feldspar. Occassional small blebs of pyrite.
6.10	7.80		Amphibolite, biotite rich with no obvious foliation.
7.80	10.00		Altered zone - bands of biotite rich amphibolite alternating with bands of plagioclase. Very minor amount of sulphides.
10.00	13.00		Foliated amphibolite. core angle at contact 50°.
13.00	20.00		Dominantly ultrabasic - fibrous amphiboles with a number of mineralized joint planes (pyrite).
20.00	30.00		Ultrabasic - fairly fresh with some small zones of more altered rock - fibrous with a little chlorite, biotite development.
			21.00 - 22.00 disseminated sulphides 5% pyrrhotite dominant.
			22.00 - 28.00. occassional spechs of sulphides. - sometimes up to 2%.
			28.00 - 30.00. 2% disseminated sulphides. pyrrhotite and chalcopyrite.
30.00	40.00		Ultrabasics with texture being fairly compact and massive
			Pyrite found as coatings on slip joints.
			32.50 - 32.80 Plag vein which has altered ultrabasic on either side - hp. rich.
			37.10 - 37.30. Feldspar vein with ultrabasic inclusions.
40.00	49.00		Ultrabasic, fairly massive with well defined, hyperathene crystals. Contains occasional disseminated sulphides. and also pyrite flakes along joint planes.

A/S SULFIDMALM

DIAMOND DRILL RECORD

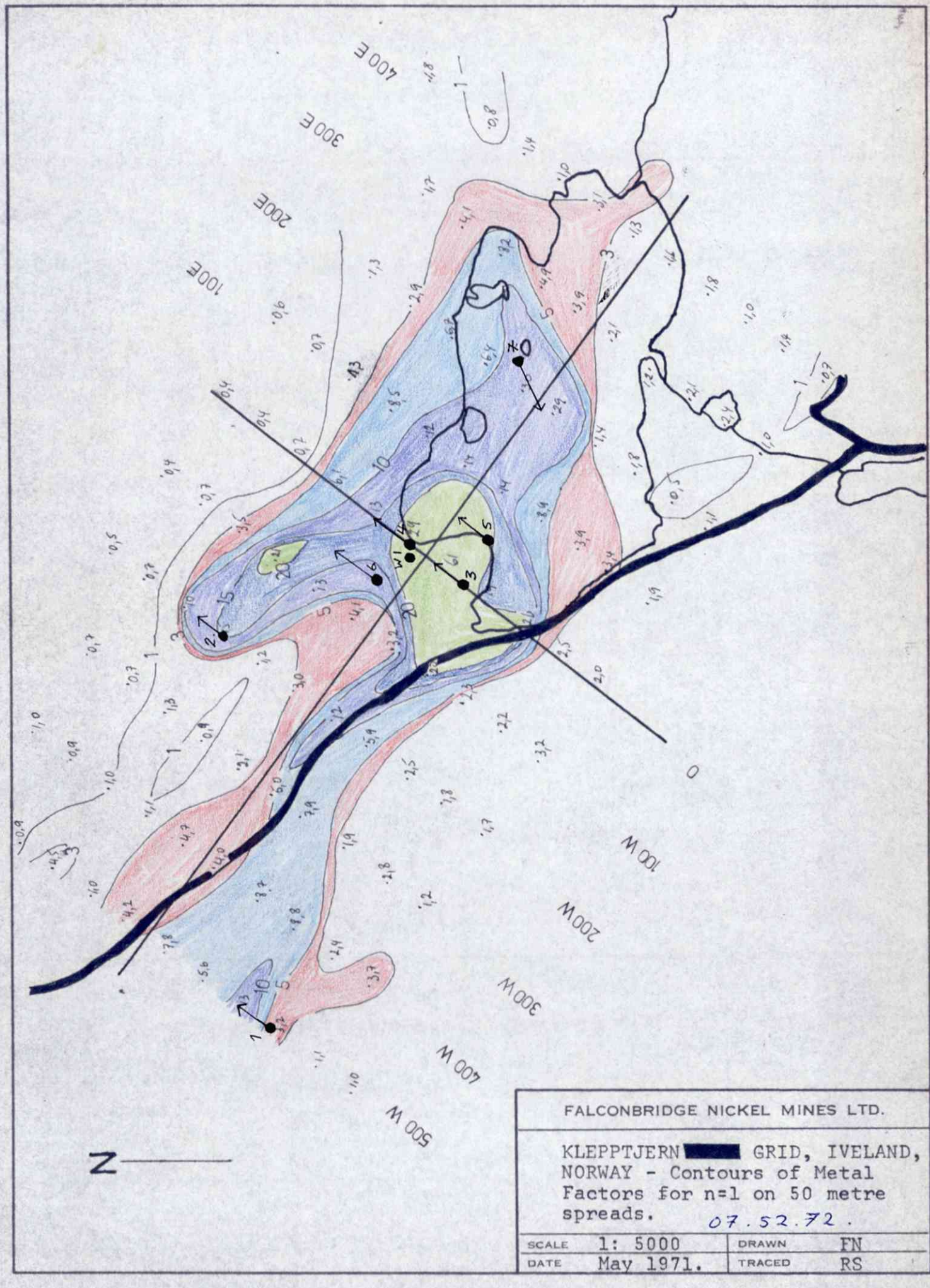
LOCATION: 220E/40N BEARING: 258 DIP: 40 HOLE No: 7 SHEET No: 2
LOGGED BY: Nixon STARTED: 25.2.72 PROPERTY: Klepptjern
CASING: 0.5 FINISHED: 6.3.72 Iveland
CORE SIZE: 32 mm TESTS (CORRECTED): Norway

FROM	TO		DESCRIPTION
49.0	49.05		Feldspar vein with disseminated pyrite and chalcopyrite.
49.05	49.40		Very fine grained basic dyke - no sulphides.
49.40	49.47		Feldspar vein with disseminated pyrite and chalcopyrite.
49.47	50.00		Ultrabasic with pyrite on joint planes.
50.00	60.00		Ultrabasic fairly massive only very occassional sulphide spechs.
60.00	70.00		Massive fresh ultrabasic non serpentinized olivine and orthopyroxene visible. No sulphides.
70.00	80.00		Fairly massive and fresh ultrabasic rock.
			71.80-72.00 fairly well sheared 65° shows occasional spechs of sulphides and some pyrite on joint planes.
			Especially between 70 and 72.
			79.25 - 79.80 small amphibolite vein that contains occasional spechs of pyrite.
80.00	90.00		Barren ultrabasic with very occassional spechs of sulphides.
			82.90 - 83.70 feldspar vein some pyrite on fracture planes.
90.00	105.40		90.00-95.10. Very heavily serpentinized with easily visible 1 cm long olivine or orthopyroxene crystals.
			90-95. 2-5% sulphides po. dominant.
			93.44 - 94.70 fractured zone.
			Well developed pyrite on fracture planes. Otherwise very little sulphide mineralization.
105.40			End of hole.

- ULTRABASIC
- BANDED GNEISS
- AMPHIBOLITE - GABBRO GNEISS.
- PEGMATITE

GEOLOGICAL MAP KLEPPTJERN IVELAND	SCALE 1:5000	OBS. FN. H.F.	
		DRAW. FN	OKT. 72
		TRAC. FN	" "
		CHK. FN	" "
⅛ SULFIDMALM	MAP NO. 07.51.72.		
	MAP SHEET		

A.s Terrtekpt. 1009. A 3. E 9 gl. 10-71. Senerum Trykkeri.


400 E
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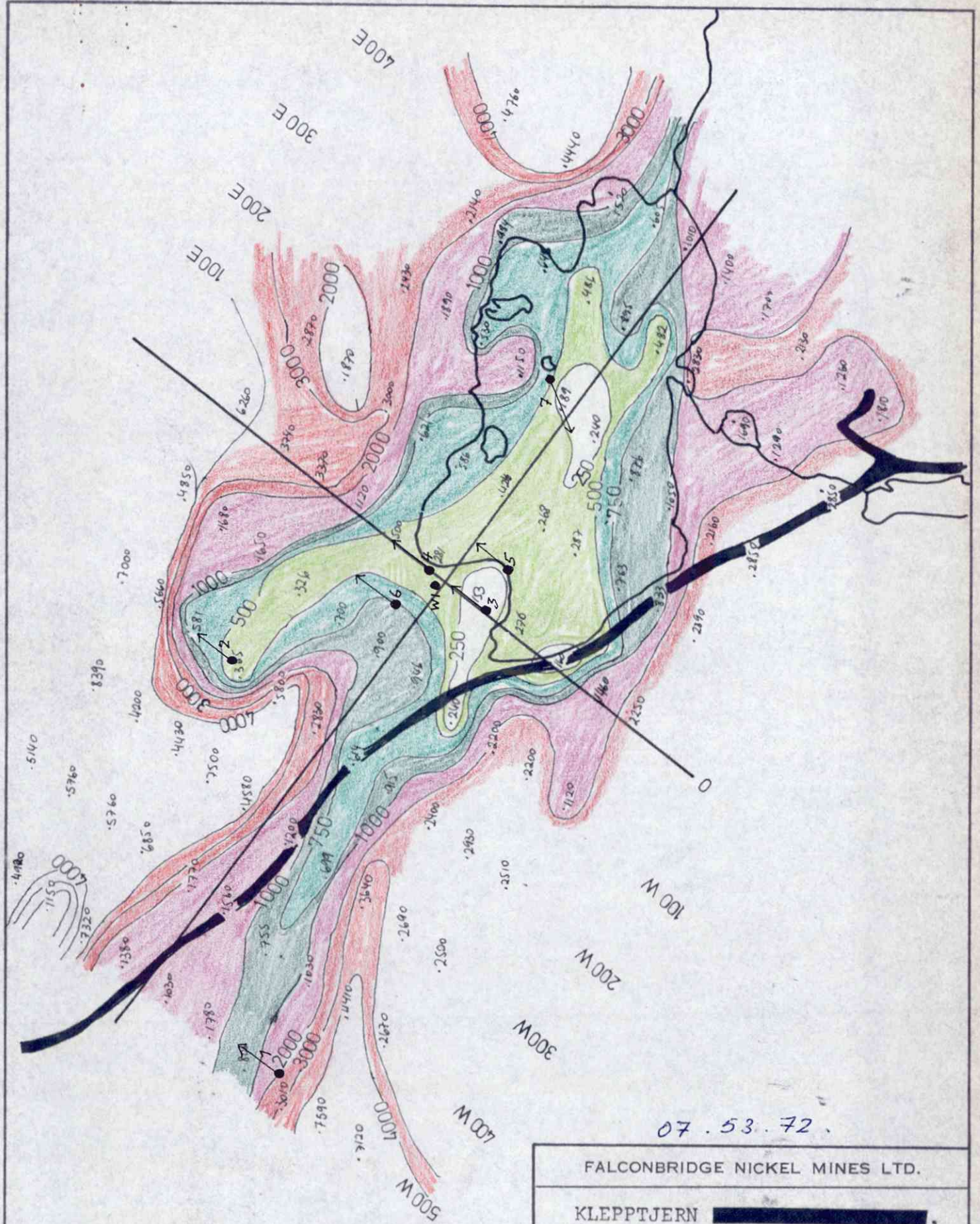
FALCONBRIDGE NICKEL MINES LTD.
KLEPPTJERN [redacted] GRID, IVELAND, NORWAY - Contours of Metal Factors for n=1 on 50 metre spreads.
07.52.72.
SCALE 1: 5000
DRAWN FN
DATE May 1971.
TRACED RS



FALCONBRIDGE NICKEL MINES LTD.

KLEPPTJERN [redacted], IVELAND, NORWAY. Contours of apparent resistivity ($\rho_a/2\pi$) for n=1 on 50 metre spread.

SCALE	1: 5000	DRAWN	FN
DATE	May 1971	TRACED	RS

FALCONBRIDGE
LABORATORIERAPPORT

Geo. avd. Prøver fra Klepptjern

Dato 19/1 - 72

Analyse-konto		Ni	Co	Cu	Fe	S			
	Borhull nr. 4, Prøve nr. 30, 30-31m	0,080	0.009	0,035	7,2	0.51			
	31 31-32	0,031	0,008	0,038	6.8	0,48			
	32 32-33	0,029	0,006	0.029	7,0	0,48			
	33 33-34	0,044	0,007	0,024	6.2	0,36			
	34 34-35	0.058	0,009	0.030	6,0	0,31			
	35 35-36	0,024	0,004	0,014	2,5	0,18			
	36 36-37	0.14	0.010	0,079	7,8	1,3			
	37 37-38	0,24	0,013	0,15	8,3	1.6			
	38 38-39	0,47	0.025	0,25	10,0	3,2			
	39 39-40	0,28	0.016	0.14	8,5	1,6			
	Borhull nr. 5 Prøve nr 1 24-25m	0,31	0,013	0,12	9,1	1,4			
	2 25-26	0,32	0,015	0,12	9,9	1,3			
	3 26-27	0,27	0,014	0,10	11,1	1,0			
	4 27-28	0,28	0.011	0,15	9,3	1,3			
	5 28-29	0,24	0,011	0.09	9,8	1,2			
	Borhull nr. 3 Prøve nr 16 30-31m	0,16	0.011	0,073	8,3	0.92			
	17 31-32	0,12	0,008	0,048	7,8	0,44			
	18 32-33	0,090	0,006	0,034	6,3	0,44			
	19 33-34	0,12	0.006	0,048	7,4	0,39			
	20 34-35	0,086	0,006	0,029	8,6	0,37			
	21 35-36	0,054	0,005	0,030	7,5	0,19			
	22 36-37	0,11	0,006	0,036	8,1	0,68			
	23 37-38	0,083	0,006	0,026	8,3	0,37			
	24 38-39	0,061	0,005	0,023	8,0	0,26			
	25 40-41	0,061	0,005	0,018	8,1	0,18			
	26 42-43	0,048	0,005	0,015	8,0	0,24			
	27 44-45	0,048	0,005	0,014	8,1	0,13			

Kog

EL. 21.03

FALCONBRIDGE
LABORATORIERAPPORT Nixon Geovid Prover 1m. kloppfiem. Hull 7 Dato 5/5-72

Analyse-konto		Ni	Co	Cu	Fe	S			
	50.0 - 51.0 m	0.083	0.005	0.030	5,7	0,12			
	51.0 - 52.0 "	0.070	0.005	0,036	5,3	0,13			
	52.0 - 53.0 "	0.050	0.004	0.021	4.9	0,12			
	53.0 - 54.0 "	0,12	0.004	0.060	4,0	0,29			
	54.0 - 55.0 "	0.066	0.005	0.031	4.6	0,13			
	55.0 - 56.0 "	0.071	0.005	0.026	5,5	0,12			
	56.0 - 57.0 "	0.079	0.005	0.028	5,1	0,12			
	57.0 - 58.0 "	0.071	0.005	0.027	5,1	0,12			
	58.0 - 59.0 "	0.059	0.005	0.030	4,7	0,11			
	59.0 - 60.0 "	0.048	0,006	0,019	5,3	0,13			

BL. 21.03

FALCONBRIDGE
LABORATORIERAPPORT

Geo. avd. Prover fra Klepptjern, Hall 7 Dato 5/5-72

Analyse-konto		Ni	Co	Cu	Fe	S			
	50.0 - 51.0 m	0.083	0.005	0.030	5.7	0,12			
	51.0 - 52.0 "	0.070	0.005	0.036	5,3	0,13			
	52.0 - 53.0 "	0.050	0.004	0.021	4.9	0,12			
	53.0 - 54.0 "	0,12	0,004	0,060	4,0	0,29			
	54.0 - 55.0 "	0.066	0,005	0.031	4,6	0,13			
	55.0 - 56.0 "	0.071	0,005	0.026	5,5	0,12			
	56.0 - 57.0 "	0.079	0,005	0.028	5,1	0,12			
	57.0 - 58.0 "	0.071	0,005	0.029	5,1	0,12			
	58.0 - 59.0 "	0,059	0,005	0.030	4,7	0,11			
	59.0 - 60.0 "	0.048	0,006	0,019	5,3	0,13			

BI. 21.03

FALCONBRIDGE
LABORATORIERAPPORT Nixon Geo-avd. Kleppfjern, Hull No 3. Dato 12/5-72

Analyse-Konto		Ni	Co	Cu	Fe	S			
	Prøve No 1 15,50 - 16.00 m	0,28	0.020	0,13	13,8	4,1			
	" " 2 16.00 - 17.00 "	0,39	0.028	0,25	15,1	4,5			
	" " 3 17.00 - 18.00 "	1.0	0.050	0,35	24,9	13,4			
	" " 4 18.00 - 19,00 "	0,21	0.016	0,18	11.6	3,0			
	" " 5 1900 - 2000 "	0,15	0.011	0,069	9.4	1,6			
		109							

BI. 21.03

FALCONBRIDGE
LABORATORIERAPPORT

Geo avd. Kluptjern. Hull No 3.

Dato 12/5

Analyse-konto		Ni	Co	Cu	Fe	S			
	Prøve No 1 15,50 - 16,00 m	0,28	0.020	0,13	13,8	4,1			
	" " 2 16.00 - 17,00 "	0,39	0.028	0,25	15.1	4,5			
	" " 3 17.00 - 18,00 "	1,0	0,050	0,35	24,9	13,4			
	" " 4 18,00 - 19,00 "	0,21	0.016	0,18	11.6	3,0			
	" " 5 19,00 - 20.00 "	0,15	0,011	0.069	9.4	1.6			

Kopi.

BI. 21.03

FALCONBRIDGE
LABORATORIERAPPORT Geolog Nixon Geo avd. Klemptiern. Hull no 3 Dato 6/12 - 71

Analyse-konto		Ni	Co	Cu	Fe	S
	Pr. 6 20 - 21 m.	0.27	0,018	0.13	12.6	2.6
	" 7 21 - 22 "	0,24	0,021	0.11	12,3	2.9
	" 8 22 - 23 "	0,13	0,014	0,064	11,2	0.94
	" 9 23 - 24 "	0,21	0,016	0,077	11.4	1,7
	" 10 24 - 25 "	0.09	0,010	0,035	9,0	0.47
	" 11 25 - 26 "	0,09	0,010	0,043	9.0	0,60
	" 12 26 - 27 "	0,10	0,009	0,043	9,6	0,60
	" 13 27 - 28 "	0,07	0,008	0,024	8,9	0,33
	" 14 28 - 29	0,17	0,011	0,058	9,6	1,4
	" 15 29 - 30 "	0,14	0,009	0,059	9,1	0,78

Kbg.

Bl. 21.03

FALCONBRIDGE
LABORATORIERAPPORT

(Geo avd. Klepptjern, Hull nr. 4)

Dato 15/12 - 71

Analyse-konto		Ni	Co	Cu	Fe	S		
	Prøve nr. 1 1,6 - 2 m	0.39	0,020	0.44	8.2	2.3		
	2 2 - 3 "	0.35	0,019	0.23	8.3	2.2		
	3 3 - 4 "	0,31	0,015	0,078	12.9	1,1		
	4 4 - 5 "	0.26	0,014	0,064	11.0	1.1		
	5 5 - 6 "	0.21	0,011	0,059	11.2	0,75		
	6 6 - 7 "	0,29	0,019	0.087	11.4	1.4		
	7 7 - 8 "	0.38	0,019	0,14	10.4	1,9		
	8 8 - 9 "	0,27	0,014	0,10	7,3	1,4		
	9 9 - 10 "	0,33	0,014	0.11	8,1	1,7		
	10 10 - 11 "	0,33	0,015	0,11	7,5	1,8		
	11 11 - 12 "	0,22	0,013	0,083	8,3	1,1		
	12 12 - 13 "	0,44	0,024	0,17	8,8	2,2		
	13 13 - 14 "	0,35	0,019	0,11	9,0	1,0		
	14 14 - 15 "	0,31	0,015	0,094	9,3	1,4		
	15 15 - 16 "	0,29	0,016	0,075	11,3	0,94		
	16 16 - 17 "	0,16	0,014	0,036	8,9	0,41		
	17 17 - 18 "	0,20	0,014	0,070	7,2	1,6		
	18 18 - 19 "	0,28	0,019	0,13	8,0	1,2		
	19 19 - 20 "	0,39	0,024	0,16	7,8	1,9		
	20 20 - 21 "	0,29	0,019	0,088	7,6	1,4		

Bl. 21.03

FALCONBRIDGE
LABORATORIERAPPORT

Geo-avd. Prøver fra Klenpatjern. Hull nr. 4 Dato 3/1-72

Analyse-konto		Ni	Co	Cu	Fe	S			
	Prøve nr 21 21-22 m	0,14	0.012	0,031	9.8	0.6			
	— " — " 22 22-23 "	0,13	0,012	0,024	9.8	0,3			
	— " — " 23 23-24 "	0,29	0,021	0,060	10,5	1,6			
	— " — " 24 24-25 "	0,25	1,019	0,051	10.5	0.9			
	— " — " 25 25-26 "	0,18	0,012	1.049	9,4	0,6			
	— " — " 26 26-27 "	0,30	0,019	0,090	9,7	1,0			
	— " — " 27 27-28 "	0,28	0,018	0,069	11,2	1,0			
	— " — " 28 28-29 "	0,22	0,015	0,060	9,7	0,7			
	— " — " 29 29-30 "	0,15	0,011	0,081	8,9	1,2			

Bl. 21.03