



Bergvesenet

Postboks 3021, 7002 Trondheim

Rapportarkivet

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Kommer fra ..arkiv Falconbridge	Ekstern rapport nr Sul 467-77-15	Oversendt fra Sulfidmalm A/S	Fortrolig pga	Fortrolig fra dato:
Tittel Espedalen Status 1977.				
Forfatter D Ellen		Dato 1977	Bedrift Sulfidmalm A/S	
Kommune Sør-Fron Gausdal	Fylke Oppland	Bergdistrikt Østlandske	1: 50 000 kartblad 17171 17174	1: 250 000 kartblad Lillehammer
Fagområde Boring geokjemi	Dokument type Rapport	Forekomster Megrunnstjern Vesle gruve		
Råstofftype Malm/metall	Emneord Cu Ni			
Sammendrag Det ble boret 1612 meter i Megrunnstjernfeltet fordelt på 15 hull og tre hull ble i tillegg forlenget. Det ble i tillegg boret med Winkie maskin i Vesle gruve grid.				

FOR FALCONBRIDGE NIKKELVERK A/S
A/S SULFIDMALM
PROJECT 905-15
Espedalen Status Report 1977

By
D. Ellen

A/S SULFIDMALM
INTER-OFFICE MEMORANDUM

Date: 14th February, 1978 ✓
To: Falconbridge Nikkelverk A/S ✓
cc: W. D. Harrison, H. T. Berry, D. Ellen
From: F. Nixon ✓
Subject:

Please find enclosed a status report on our Espedalen investigations. The report gives a summary of activities to date. No investigations are planned for 1978.

Frank Nixon

MOTTATT		05. 04. 78		DESV.	ARK.
ADM. DIR.			PEO. DIR.		
ASS. DIR.			LL. DIR.		
ADM. SJEF			M. A. A. A. V. D.		
SKIPN. A. V. D.			E. C. C. A. V. D.		
INR. A. V. D.			LL. Y. A. V. D.		
REGNSK. A. V. D.			INT. A. V. D.		
PERSONAL DIR.			E. A. A. V. D.		
FORSKN. DIR.			PROJ. A. V. D.		
3	SAKSBEARD.				Syst. data

Summary

Over the past few years the work done in the Espedalen basic complex has been concentrated on a full ground V.L.F. and magnetometer coverage of the complex with detailed investigations being carried out in the Megrundstjern area.

During 1975-1977 a total of 38 holes with 3143,30 meters have been drilled. From the completed drilling the mineralization in the Megrundstjern area seems to be of two types.

- 1) A disseminated type running up to 0.5% Ni, surrounding limited areas of
- 2) a massive type probably remobilized and controlled by shears in the 1-3% Ni range.

Charge potential data has outlined interesting anomalous areas for both types, but drilling during 1977 has shown that the mineralization has a very irregular shape, form and grade, with small rich sections of very limited extent being surrounded by a wide area of weakly to very weakly disseminated mineralization.

No potential economic deposit has been outlined. Investigations near the old Vesle mine show some mineralization is an ultra-mafic rock in a Winkie drill hole.

Legal

Sulfidmalm have a joint venture agreement with Norsk Hydro A/S. Espedalen is one of the areas included within this agreement. Hydro have now announced their intention of withdrawing from the joint venture. Sulfidmalm hold 64 claim blocks. Hydro hold 18 claim blocks. Hydro did not partake in the 1976/77 programmes.

Geology

The area is part of a thrust mass - the Espedalen thrust sheet. The rocks of the sheet can be divided into two large groups: ie. Precambrian crystalline rocks, essentially of the anorthosite kindred, and Eocambrian sediments. Both groups are allochthonous, resting on autochthonous Cambro-ordovician schists. The dominant crystalline rock type is anorthosite, but in the Megrundstjern area noritic and ultrabasic rocks are much more dominant and distinct multiple lithological units can be recognized here. These are:-

- 1) Ultramafic - feldspathic ultramafic - mafic norite-norite-anorthosite suite.
- 2) Leucogabbro intrusive sill.
- 3) Tectonites derived from the above units.
- 4) Chlorite - actinolite grey schist/conglomerate.
- 5) Quartz bearing schists and gneisses (metasedimentary rafts).

The mineralization of interest seems to be confined to the rocks of group 1. Mineralization occurs mainly as disseminations of up to 15% sulphides, with some limited zones from 15-80% sulphides in more sheared parts.

Status

Although many interesting anomalies occur in the Espedalen area, work over the past three years has been concentrated on the Megrundstjern area where one saw the possibility for a large tonnage - low grade type of deposit.

Investigations 1975

In 1975 a total of 704.4 m were drilled in 11 holes on a series of V.L.F. and Slingram anomalies with some coincident magnetic anomalies. Disseminated mineralization was found in most of the holes, and the main anomaly between 40S-240S seems to indicate a zone of disseminated mineralization in the 0.4% Ni range. The zone was closed at depth by an intrusive sill.

One hole (MG 6/75) located on 520S gave a better more massive sulphide intersection.

Preliminary flotation tests gave poor results. The rougher concentrates assayed 2.24% Cu and 5.45% Ni with 80.7% and 71.4% recovery.

Investigations 1976

The grid was re-established and topographically surveyed, and a charge potential survey carried out. The active electrode was grounded first in the mineralization intersected in MG 6/75. Grid and down-hole measurements outlined a 700 m long anomaly, which appeared to lie below the disseminated mineralization intersected in the area 40S-240S. A survey carried out with the active electrode in Mg 3/75 confirmed this and outlined a limited area previously drilled during 1975, and showed no connection with the MG 6 zone.

12 holes were drilled, totalling 825 metres on the MG 6 anomaly zone on four profiles. This drilling indicated that the anomaly zone seemed to consist of a discontinuous shear zone/shear zones with massive sulphide mineralization surrounded by more disseminated sulphides.

There were too few holes to have any picture of the geometry of the mineralization.

The mineralization encountered contained visible pentlandite usually as free grains. Two representative samples from this area were taken for flotation tests. Results were a great improvement on the previous tests.

	Head Assay		Concentrate assay		Recovery	
	Cu %	Ni %	Cu %	Ni %	Cu %	Ni %
Sample A	0.29	0.91	5.27	15.0	76.8	70.3
Sample B	0.24	0.58	4.96	9.73	70.9	62.3

Investigations 1977

Work was again concentrated on the Megrundstjern area to complete the detailed investigations started during 1976. A total of 1612 meters were drilled in 15 main holes and in extension of 3 previously drilled holes. The results confirmed that the more massive type of mineralization was of limited extent around the two holes (Mg 6, MG 17) where it was previously intersected. The rock around and between the two holes contained disseminations of trace - 5% sulphides on average with some sections up to 15% sulphides. Charge potential data carried out on surface and down holes indicated that electrical connection between the two richer zones was weak and confirmed the idea of two richer sections surrounded by weakly mineralized rock. Results of locked cycle flotation tests gave the following result:-

	Head Assay		Concentrate assay		Recovery	
	Cu %	Ni %	Cu %	Ni %	Cu %	Ni %
Sample A	0.29	0.91	4.22	13.6	87.3	85.7

A summary of drilling results for all holes drilled on the Megrundstjern grid area is included in table form. It was concluded that the Megrundstjern area no longer has potential for an economic deposit at this time.

Another work carried out included drilling two Winkie drill holes on the old Vesle mine at the southern end of the valley. These holes proved that this has limited depth. A further Winkie hole drilled on a VLF anomaly nearby showed mineralized ultramafic with assays in 0.60 - 0.80% Ni range, increasing with depth, before the hole was stopped by jammed rocks.

Planned work 1978

No major work is planned for 1978. It is possible that some geological work will be carried out, and the claims will be maintained.

Summary list of reports on the Espedal area

The reader is referred to the following reports:

- 32.64.15 Reports from a geological survey in Espedalen, Oppland.
- 127.71.15 Mise-à-la-masse potential measurements, Espedalen August 1971 A. Sindre
- 128.71.15 A geochemical orientation study in the Espedalen area R. B. Band

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|-----------|---|--------------------------|
| 129.71.15 | Photogeology of the Espedalen area | L. Lucarelli |
| 187.72.15 | Summary of fieldwork in the Espedalen area,
August 1972 | B. H. Wilson |
| 191.72.15 | Andreasberg Mine, Espedalen | B. H. Wilson |
| 192.72.15 | The Nicoline Mine, Espedalen | B. H. Wilson |
| 193.72.15 | The Statråd Stang Mine, Espedalen | B. H. Wilson |
| 229.72.15 | Fieldwork in Espedalen 1973 | M. J. Ryan |
| 236.72.15 | Geochemical till sampling in Espedalen | T. H. Tan / J. B. Gammon |
| 238.72.15 | Ground geophysical surveys over the Andreasberg
and Megrund areas, Espedalen | Norsk Hydro A/S |
| 264.73.15 | Soil geochemistry in Megrundstjern area,
Espedalen | R. Hovland |
| 265.73.15 | Prospecting work in the Grasgardli area,
Espedalen | R. Hovland |
| 269.73.15 | A summary of the geology, nickel potential and
exploration in the Espedalen area | F. Nixon |

- 344.74.15 Geological, Geophysical and diamond drilling
investigations in the Espedalen basic complex 1974
F. Nixon et all
- 374.75.15 Report on diamond drilling, mineralogy of core
and metallurgy of nickel, copper mineralization,
Megrundstjern Espedalen 1975
D. Ellen et all
- 405.76.15 Report on geophysical surveys, Espedalen
D. Ellen et all
- 425.76.15 Investigations in the Megrundstjern area,
Espedalen 1976 D. Ellen et all
- 426.76.15 Lakefield Research Progress Report on Espedalen
samples F. G. T. Pickard

MEGRUNDSTJERN

SUMMARY OF DIAMOND DRILLING RESULTS

SECTION	HOLE	E/W	BEAR	DIP	LENGTH	SUMMARY LOG	SIGNIFICANT MINERALIZATION					REMARKS
							FROM	TO	LENGTH	%Ni	%Cu	
640S	7	120E	-	90	48.5	0 - 5 Overburden 5 - 26.15 Norite 26.15 - 32.25 Anorthosite 32.25 - 34.60 Norite 34.60 - 46.50 Leucogabbro 46.50 - 48.50 Norite						
"	8	87.5W	-	90	73.0	0 - 8 Overburden 8 - 13.20 Norite 13.20 - 73.0 Ultramafic						No significant min. drilled on VLF anomaly still unexplained
560S	37	380E	-	90	106.25	0 - 3 Overburden 3 - 10.40 Quartz/feldspar gneiss 10.40 - 12.05 Chlorite schist 12.05 - 59.40 Norite & Gabbro 59.40 - 61.60 Leucogabbro 61.60 - 74.75 Norite 74.75 - 106.25 Ultramafic						Assays awaiting No significant Ni or Cu
533S	16	36W	N51°E	50	73.50	0 - 5.40 Overburden 5.40 - 25.70 Ultramafic 25.70 - 66.60 Norite 66.60 - 73.50 Quartz/feldspar gneiss						At 55 m has 20% go that is barren and has no electrical connection with hole 6.
520S	6	12.5W	-	90	70.0	0 - 3.0 Overburden 3.0 - 14.0 Ultramafic 14.0 - 70.0 Norite	25	27	2	0.55	0.20	
							27	34	7	0.27	0.09	
							34	35	1	0.45	0.17	
							35	37	2	0.25	0.12	
							37	48	11	1.11	0.41	
							48	51	3	0.29	0.10	
							51	54	3	0.51	0.40	
							54	57	3	0.25	0.10	
							57	59	2	0.14	0.09	
							59	61	2	0.64	0.26	
							25	61	36	0.57	0.24	

ESPEDALEN NORWAY

MEGRUNDSTJERN

SUMMARY OF DIAMOND DRILLING RESULTS

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MEGRUNDSTJERN

SUMMARY OF DIAMOND DRILLING RESULTS

						SIGNIFICANT MINERALIZATION						
SECTION	HOLE	E/W	BEAR	DIP	LENGTH	SUMMARY LOG	FROM	TO	LENGTH	%Ni	%Cu	REMARKS
440S	29	0	-	90	119.80	0 - 2.50 Overburden	7	9	2	0.25	0.10	
						2.50- 7.20 Ultramafic	10	11	1	0.29	0.18	
						7.20- 61.45 Norite	26	28	2	0.27	0.14	
						61.45- 76.40 Leucogabbro						
						76.40-106 Ultramafic						
397S	30	35W	N51°E	60	71.10	106 -112 Schist/greenstone?						
						112 -119.80 Norite						
						0 - 2.50 Overburden	36	39	3	0.35	0.28	
						2.50- 24.45 Leucogabbro	39	40	1	0.60	1.58	
						24.45- 71.10 Norite	40	42	2	0.27	0.11	
360S	27	15E	W	65	69.10		42	43	1	0.43	0.10	
							43	45	2	0.27	0.12	
							36	45	9	0.35	0.33	
						0 - 2.00 Overburden	45	60	15	0.71	0.24	
						2.00- 6.65 Leucogabbro						
340S	23	33W	-	90	70.70	6.65- 67.50 Norite						
						67.50- 69.10 Ultramafic						
						0 - 4.0 Overburden	11	17	6	0.41	0.16	
						4.0 - 10.0 Leucogabbro	17	22	5	0.31	0.12	
						10.0 - 70.70 Norite						
340S	25	32.5W	N51°E	70	78.30	0 - 5.0 Overburden	20	28	8	0.27	0.13	
						5.0 - 11.33 Leucogabbro	28	29	1	0.52	0.17	
						11.33- 75.36 Norite	29	41	12	0.24	0.09	
						75.36- 78.30 Ultrabasic	41	44	3	0.43	0.19	
							44	62	18	0.34	0.14	
340S	24	32.5W	N51°E	55	75.0		62	74	12	0.56	0.19	
						0 - 6.0 Overburden	30	45	15	0.32	0.12	
						6.0 - 11.85 Leucogabbro	45	63	18	0.83	0.28	
						11.85- 75.0 Norite	63	64	1	0.29	0.11	
							64	67	3	0.43	0.17	
							67	75	8	0.32	0.14	

MEGRUNGSTJERN

SUMMARY OF DIAMOND DRILLING RESULTS

							SIGNIFICANT MINERALIZATION					REMARKS
SECTION	HOLE	E/W	BEAR	DIP	LENGTH	SUMMARY LOG	FROM	TO	LENGTH	%Ni	%Cu	
340S	22	17W	-	90	70.1	0 - 3.0 Overburden	10	20	10	0.33	0.12	
						3.0 - 9.15 Leucogabbro	25	56	31	0.26	0.09	
						9.15- 70.10 Norite	62	65	3	0.31	0.13	
							65	67	2	0.15	0.21	
341S	17	7W	-	90	71.6	0 - 2.0 Overburden	12	17	5	0.47	0.15	
						2.0 - 9.0 Leucogabbro	17	33	16	0.30	0.11	
						9.0 - 70.0 Norite	33	68	35	0.95	0.28	
						70.0 - 71.60 Ultramafic						
340S	26	5E	-	90	63.15	0 - 2.0 Overburden	12	16	4	0.63	0.18	
						2.0 - 6.50 Leucogabbro	16	18	2	0.30	0.14	
						6.50- 12.40 Sheared norite	18	35	17	0.61	0.21	
						12.40- 63.15 Norite	35	39	4	0.29	0.12	
							39	41	2	0.65	0.16	
							41	42	1	0.31	0.12	
							42	49	7	0.57	0.24	
							49	54	5	0.33	0.15	
							54	57	3	0.62	0.21	
340S	28	5E	N51°E	60	44.4	0 - 2.20 Overburden	57	60	3	0.40	0.17	
						2.20- 14.30 Leucogabbro	21	30	9	0.30	0.13	
						14.30- 18.10 Sheared norite						
						18.10- 44.40 Norite						
280S	32	40W	N51°E	60	137.0	0 - 4.50 Overburden	77	82	5	0.45	0.15	
						4.50- 9.80 Leucogabbro	82	85	3	0.25	0.12	
						9.80- 76.40 Ultramafic	85	87	2	0.47	0.15	
						76.40-137 Norite	87	90	3	0.28	0.12	
							96	97	1	0.20	0.09	
							100	101	1	0.20	0.09	
							102	103	1	0.23	0.08	
							104	105	1	0.20	0.13	
							105	106	1	0.85	0.25	

MEGRUNDSTJERN

SUMMARY OF DIAMOND DRILLING RESULTS

							SIGNIFICANT MINERALIZATION					
SECTION	HOLE	E/W	BEAR	DIP	LENGTH	SUMMARY LOG	FROM	TO	LENGTH	%Ni	%Cu	REMARKS
240S	5	58W	-	90	49.8	0 - 2.3 Overburden 2.3 - 28.9 Norite 28.9 - 35.1 Leucogabbro 35.1 - 49.8 Ultramafic	2.3 24	5.0 26.75	2.7 2.75	0.69 0.42	0.30 0.15	
196S	19	63.5E	-	90	57.7	0 - 3.0 Overburden 3 - 19.0 Ultramafic 10.0 - 25.10 Leucogabbro 25.10- 50.25 Norite 50.25- 57.7 Ultramafic						No significant min.
189S	18	51E	-	90	90.7	0 - 2.50 Overburden 2.50- 9.00 Norite 9.0 - 20.0 Ultramafic 20.0 - 26.18 Norite 26.18- 31.0 Leucogabbro 31.0 - 79.50 Norite 79.50- 90.70 Ultramafic						No significant min.
189S	34	51E	W	65	71.5	0 - 2.0 Overburden 2.0 - 28.4 Norite 28.4 - 34.15 Leucogabbro 34.95- 50.50 Norite 50.50- 57.70 Ultramafic 57.70- 71.50 Norite	46.6 49 50 56 64 65 66	49 50 55 63 65 66 67	2.4 1 5 7 1 1 1	0.28 0.42 0.29 0.29 0.33 0.41 0.34	0.09 0.09 0.10 0.10 0.08 0.17 0.13	
189S	33	51E	W	45	81.15	0 - 2.0 Overburden 2 - 18.30 Norite 18.30- 38.85 Leucogabbro 38.85- 81.15 Ultramafic	39.75 42 52 55 56 63 66 68 73 75	42 52 55 56 58 66 68 71 74 81.15	2.25 10 3 1 2 3 2 3 1 6.15	0.45 0.38 0.28 0.40 0.31 0.29 0.42 0.30 0.23 0.32	0.19 0.17 0.15 0.20 0.08 0.09 0.10 0.09 0.07 0.07	

MEGRUNDTJERN

SUMMARY OF DIAMOND DRILLING RESULTS

							SIGNIFICANT MINERALIZATION					
SECTION	HOLE	E/W	BEAR	DIP	LENGTH	SUMMARY LOG	FROM	TO	LENGTH	%Ni	%Cu	REMARKS
150S	2	20E	270	45	75.0	0 - 2.6 Overburden 0 - 31.0 Norite 31.0 - 54.0 Leucogabbro 54 - 55 Schist contact 55 - 75 Ultramafic	37	30	3	0.47	0.21	
07.5S	1	12.5E	270	45	104.1	0 - 2.8 Overburden 2.8 - 30.2 Ultramafic 30.2 - 42.4 Leucogabbro 42.4 - 104.1 Ultramafic	2.8	30.2	27.4	0.49	0.15	
50S	4	14W	-	90	145.5	0 - 2.0 Overburden 2.0 - 18.50 Norite 18.50 - 45.50 Ultramafic 45.50 - 52.0 Leucogabbro 52.0 - 128.0 Ultramafic 128.0 - 134.0 Leucogabbro 134.0 - 145.5 Ultramafic	91 93	92 94	1 1	0.20 0.20	0.08 0.05	hole deepened in 1977. Assays awaiting
45S	10	106W	-	90	67.7	0 - 3.0 Overburden 3.0 - 8.0 Ultramafic 8.0 - 20.8 Norite 20.80 - 38.0 Leucogabbro 38.0 - 64.5 Norite 64.5 - 67.7 Ultramafic	3 6	6 8	3 2	0.21 0.38	0.07 0.11	
40S	3	36E	270	80	103.6	0 - 2.0 Overburden 2 - 8.80 Norite 8.80 - 18.1 Ultramafic 18.1 - 19.2 Schist contact zone 19.2 - 36.4 Leucogabbro 36.4 - 76.50 Ultramafic 76.50 - 86.45 Norite 86.45 - 91.55 Ultramafic 91.55 - 93.90 Norite 93.90 - 97.50 Leucogabbro 97.50 - 99.50 Norite 99.50 - 103.80 Leucogabbro	2 6 10 12	6 10 18.1 18.1	4 4 8.1 16.1	0.38 0.52 0.38 0.40	0.21 0.14 0.16 0.13	hole deepened in 1977. Assays awaiting from lower part of hole.

MEGRUNDSTJERN

SUMMARY OF DIAMOND DRILLING RESULTS

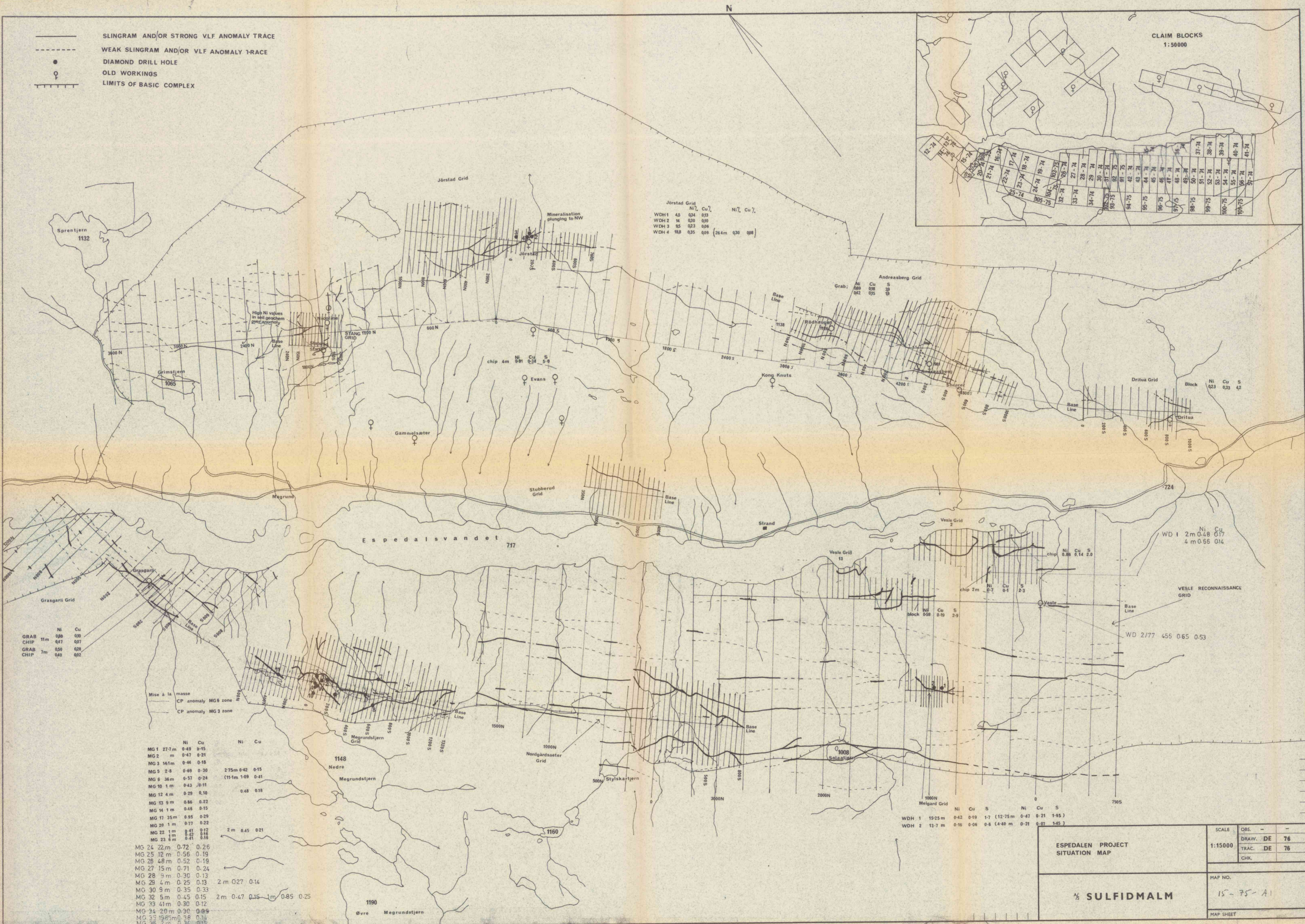
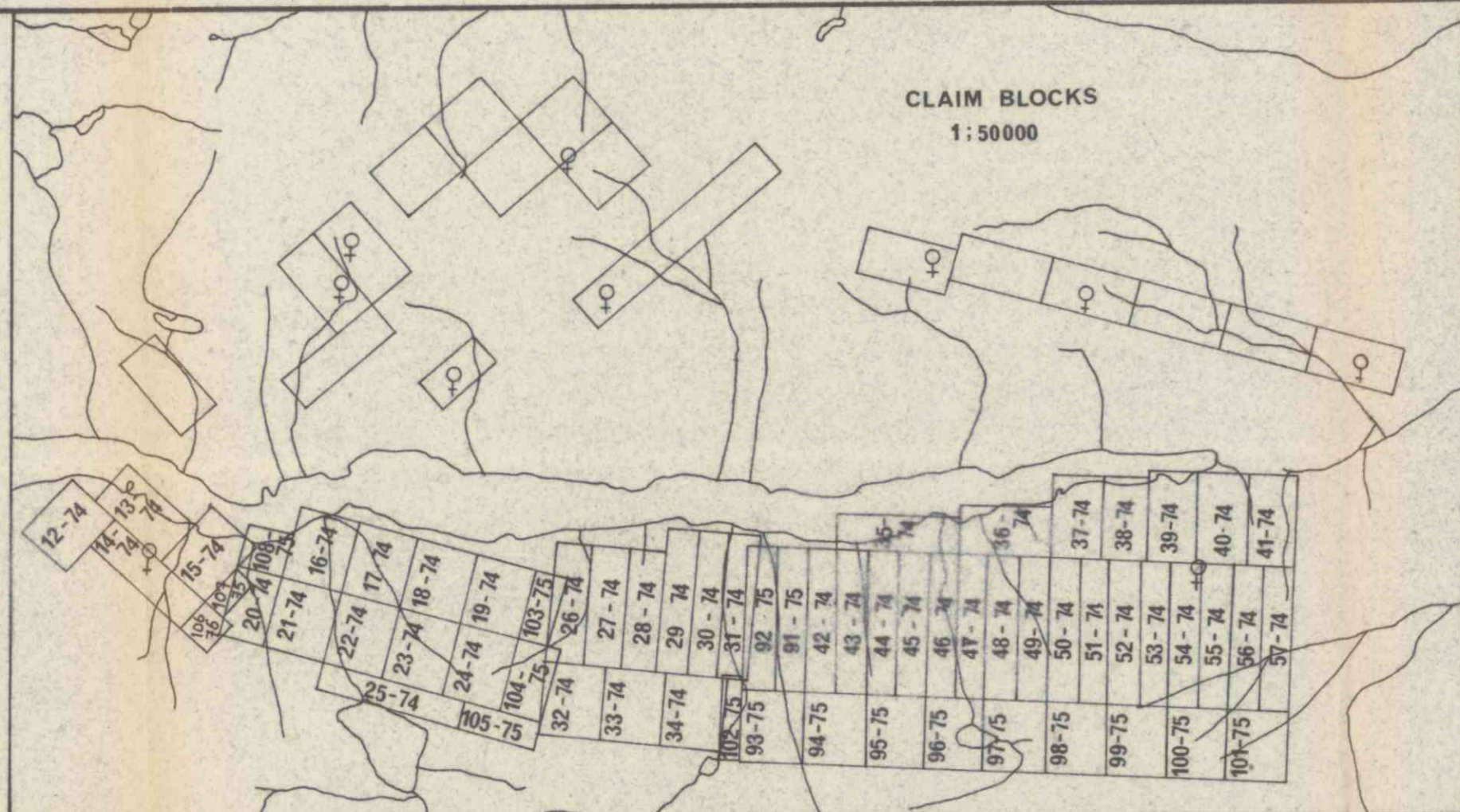
						SIGNIFICANT MINERALIZATION						
SECTION	HOLE	E/W	BEAR	DIP	LENGTH	SUMMARY LOG	FROM	TO	LENGTH	%Ni	%Cu	REMARKS
40S	36	36E	N50E	80	105.2	0 - 2.50 Overburden 2.50- 3.25 Norite 3.25- 4.50 Ultramafic 4.50- 4.69 Norite 4.69- 19.15 Ultramafic 19.15- 32.60 Leucogabbro 32.60- 51.85 Ultramafic 51.85- 80.55 Norite 80.55-102.68 Ultramafic 102.68-105.20 Norite	91	102.7	11.7	0.32	0.11	
40S	35	36E	N50E	60	120	0 - 2.40 Overburden 2.40- 4.0 Norite 4.0 - 9.0 Ultramafic 9.0 - 10.30 Norite 10.30- 22.70 Ultramafic 22.70- 39.40 Leucogabbro 39.40- 45.2 Ultramafic 45.20- 52.40 Norite 52.40- 56.30 Ultramafic 56.30-106.50 Norite 106.50-112.20 Ultramafic 112.20-114.60 Leucogabbro 114.60-117.30 Norite 117.30-120 Ultramafic	3 6	5 22.85	2 16.85	0.31 0.40	0.10 0.14	
36S	9	17W	N50E	75	152.9	0 - 38.95 Norite 38.95- 48.50 Ultramafic 48.50- 61.40 Leucogabbro 61.40-107.60 Ultramafic 107.60-125.0 Norite 125.0 -127.75 Leucogabbro 127.75-132.95 Norite 132.95-145.30 Leucogabbro 145.30-146.35 Schistose contact 146.35-156.90 Ultramafic	146	148	2	0.34	0.15	

MEGRUNDSTJERN

SUMMARY OF DIAMOND DRILLING RESULTS

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- SLINGRAM AND/OR STRONG VLF ANOMALY TRACE
- WEAK SLINGRAM AND/OR VLF ANOMALY TRACE
- DIAMOND DRILL HOLE
- OLD WORKINGS
- LIMITS OF BASIC COMPLEX



ESPEDALEN PROJECT SITUATION MAP	SCALE		OBS.	-
	1:15000		DRAW.	DE 76
			TRAC.	DE 76
			CHK.	
1/2 SULFIDMALM	MAP NO.		15-75-A1	
			MAP SHEET	