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Tittel Summary Report on Exploration Work Conducted on the Espedalen Property, Gausdal and Sør-Fron Kommunes, Oppland Norway				
Forfatter St-Jean, A Manojlovic, Pete		Dato År 23.09 2003	Bedrift (Oppdragsgiver og/eller oppdragstaker) Sulfidmalm A/S	
Kommune Sør-Fron Gausdal	Fylke Oppland	Bergdistrikt	1: 50 000 kartblad 17171 17172	1: 250 000 kartblad Lillehammer
Fagområde Geologi Geofysikk Geokjemi	Dokument type		Forekomster (forekomst, gruvefelt, undersøkelsesfelt) Evans gruve, Statsråd Stang gruve, Vesle gruve, Andreasberg gruve, Stylskampen, Megrund	
Råstoffgruppe Malm/metall	Råstofftype Cu Ni			
Sammendrag, innholdsfortegnelse eller innholdsbeskrivelse Kort oppsummering med nøkkelkart, knyttet til rapport BV 4822 fra Lamontagne				

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**Summary Report of Exploration Work Conducted on the
Espedalen Property, Gausdal and Sor-From Kommunes, Oppland, Norway
By AS SULFIDMALM
To September 2003.**

A. St-Jean, P. Manojlovic
September 23, 2003

1. Summary

The Espedalen Project area comprises a detached portion of the Precambrian Jotun Nappe Complex in the Norwegian Caledonides. This complex contains mafic/ultramafic rocks that host nickel sulphide deposits (up to 3.26 % Ni) that were mined in the 19th century. Previous exploration work in the area, including work by Sulfidmalm in the 1970's, has been shallow in nature and of limited extent and has used outdated methods. A total of 110 km of ground geophysics (UTEM and magnetics) is planned on two grids to test the Ni sulphide potential of the Espedalen complex. Surveying over the Southwest (SW) Grid was completed in 2003. Surveying over the Northeast (NE) Grid will be performed from January to April 2004.

Exploration work completed during 2003:

- 29.25 line km of UTEM and Magnetic surveying over the SW grid at Espedalen.
- Follow-up investigation of UTEM conductors on the SW grid
- Investigation and sampling of the known Ni occurrences in the complex.

Results of work to date:

- Detection of a strong UTEM conductor at Stylskampen (5200E, 1765N). The conductor is modeled at 2000 siemens with a strike length 200 m and a down-dip extent of 85m. This conductor has no surface expression.
- Detection of a weaker (175 siemens) conductor associated with the nickel mineralisation previously drilled by Sulfidmalm in the Megrund Area (3100E, 1950N).
- Confirmation of Ni grades (up to 3.26%) in samples from historic workings.

The northeastern part of the complex, which hosts the bulk of the historical nickel occurrences, remains to be surveyed. This work will be performed in early 2004.

2. Geological Setting and Historical Workings

The Espedalen area, located 180 km NNW of Oslo, is an historical copper and nickel mining area. The area has produced copper from 1666 to 1750 and nickel from 1848 to 1918. Mineralization at Espedalen occurs within a detached portion of the Jotun Nappe Complex. The Jotun Nappe Complex is a large (100 x 200 km) dominantly Precambrian thrust block that overlies non detached Precambrian Gneisses and Lower Paleozoic rocks. It is composed of metamorphosed syenites, norites, anorthosites, gabbros, pyroxenites and peridotites. Crosscutting relationships suggest multiple periods of intrusion from 1698 Ma for the oldest syenites to 1250 Ma for the youngest gabbros. The nappe was emplaced in its current position during the Caledonide Orogeny.

The Espedalen area is underlain by several basic to ultrabasic intrusive suites. Mineralization is related to differentiated intrusions consisting of peridotite, pyroxenite and norite. The intrusions are commonly

emplaced near the contact between anorthosite and gabbro in an older complex. Breccia-type mineralization occurs near the base of the intrusions though the overlying peridotites are generally barren. Above the peridotite, pyroxenite and norite contain disseminated sulphides.

Numerous small mining operations have exposed mineralization from which Sulfidmalm (Falconbridge's Norwegian exploration subsidiary) collected samples during the early 1960's. Results from these grab samples are presented below.

Deposit	Ore Type	Ni (%)	Cu (%)
Evans Mine	Sulphide-rich Ore	2.08	1.28
	Disseminated Ore	1.64	0.74
Statsraade Stang's Mine	Semi-massive Ore	1.30	0.28
Vesle Mine	Sulphide-rich Ore	1.92	0.56
	Strongly Disseminated Ore	1.58	1.02
	Poorly Disseminated Ore	1.36	1.08
Andreasberg Mine	Sulphide-rich Ore	2.34	0.19
	Disseminated Ore	0.69	0.18

Sulphides are dominated by pyrrhotite, chalcopyrite and pentlandite. Textures suggest primary magmatic sulphide segregation.

These historical workings are concentrated almost exclusively on the northern side of the Espedalen lake (Espedalsvatnet).

3. Previous modern work

From 1974 to 1978, Sulfidmalm (a Falconbridge subsidiary) completed ground magnetics and VLF surveys over grids covering portions of the complex. Follow-up work was largely confined to a small area on the southern side of the lake. From 1975 to 1977, 38 holes were drilled totalling 3,186 m testing VLF, Mise-a-la-Masse and down-hole I.P. anomalies. A zone of disseminated mineralization was outlined but did not correlate between sections. Significant intersections include 1.01% Ni, 0.32% Cu over 29 metres, including 3.18% Ni over 1m. Preliminary metallurgical testing of this material gave concentrate grades of 15.0% Ni and 5.27% Cu with recoveries of 70.3% for Ni and 76.8% for Cu.

Drill data from this program has been georeferenced and compiled into a digital database.

The entire Espedalen Complex was mapped in 1979-80 at the end of the Sulfidmalm program. The design of the previous exploration programs was not, therefore, able to benefit from this mapping. The design of the current exploration program including the geophysical surveys has been based on the information provided by this mapping.

None of the drill holes tested the complex below 100 m. The VLF surveys previously carried out were not well suited to the detection and discrimination of high-conductance nickel sulphide mineralization. The coverage of previous surveys was also incomplete and did not cover all of the prospective norite-peridotite portions of the Espedalen complex.

4. Geophysical Surveys, March-April 2003

Geophysical surveying consisting of 29.25 line km of UTEM and magnetics was completed over the SW grid at Espedalen.

Logistics

Field crews were based at the Strand Inn. The grid was accessed by snowmobile along a cross-country ski trail. Surveying was carried out on snowshoes. A local mountaineering guide was hired as an assistant and he was able to assess hazards in the area and advise us on how to avoid or mitigate them in order that exploration work could be carried out safely.

Grid Location Survey

Because of the "on-time" nature of UTEM surveying require precise (± 0.5 m vertical) location of measurement stations with respect to the loop front location. This is especially critical in areas of significant relief where geometric errors can create spurious conductors.

The grid was established using a Trimble GPS Pathfinder Pro XRS system. This is a differential Global Positioning System that uses a Satellite subscription service (OmniSTAR) for real-time correction of positions.

Grid locations were collected in local grid coordinates and UTM WGS84, Zone 32N coordinates. Difficulties were encountered in obtaining real-time satellite corrections in some areas in the forests on the northeastern slopes of the mountain. Where real-time positions were not determined, post-processing correction was carried out using the base station at Hame Polytechnic, Evo, Finland.

Common coordinates for Espedalen Grid and UTM WGS84, Zone 32 N:

	Easting	Northing
Espedalen Grid:	0	0
UTM:	525500	6808100

Espedalen grid line direction is 050 Az.

UTEM Survey and Results.

A UTEM and magnetics survey was conducted over the Southwest Grid on the Espedalen property during the months of March and April 2003. This grid covers the prospective rocks for Ni mineralization (peridotite-Norite suite) within the Espedalen Complex on the southwest side of Espedalen lake. The survey totaled 29.25 lineal km. Line spacing was 200m with 100m detailing in places. The survey detected a strong UTEM conductor on lines 5100, 5200, 5300 and 5400 on the southeast slope of Stylskampen. On line 5200E, 1765N, the conductor is modeled at 2000 siemens with a strike length 200 m and a down-dip extent of 85m. The anomaly coincides with a magnetic high that corresponds to mapped mafic/ultramafic lithologies. A second weaker, but larger, conductor was detected associated with the mineralisation at the Megrund area that was drilled by Sulfidmalm in the 1970s. This broad conductor extends from lines 2900E to 3300E along strike and from 1900N to 2100N. The conductor is modeled as two overlapping 175 siemens conductors with strike length of 500m and down-dip extent of ~90m. Conductor locations are shown in the accompanying figures and on the 1:20,000 scale map in the back pocket. Details of the survey are contained in the report entitled **Interpretation Report, 2003 UTEM Survey, Espedalen, Norway for A/S Sulfidmalm, Lamontagne Geophysics, June 2003 (see attached).**

Magnetics Survey

A magnetics survey was conducted over the grid at nominal 12.5m station spacing along 200m spaced lines. The survey was carried out by a Falconbridge crew using a Scintrex ENVI-MAG magnetometer / gradiometer for roving measurements and a Scintrex MP3 base magnetometer as the base station. This equipment was rented from the NGU. The base station was located at Strand Fjellstue (approximately 532,900m E, 6,805,700m N).

5. UTEM ground follow-up and sampling program, June 2003

A ground follow-up and sampling program was carried out at Espedalen from June 24 to 29, 2003 in order to ground-truth UTEM conductors, sample Ni showings and to make a preliminary survey of the structures in the NE grid area. See tables 1 and 2 for sample analyses.

Stylskampen Conductor

The locality of the Stylskampen conductor (5200E, 1765N) was investigated in the field. There is no obvious surface expression of this conductor. The rocks in the area consist of well foliated gneisses of mafic intrusive derivation. Unmineralised peridotite has been observed in outcrop at 5196E, 1837N. The attitude of the principal foliation in this vicinity is 312/42E at 5200E, 1780N (mineral lineation 08/328) and 316/72E at 5175E, 1650N.

These attitudes agree with the modeled attitude of the UTEM conductor (320/45E). This target could be drilled from a suitably flat site that exists to the north of the conductor axis on line 5200. This site could be accessed by a drill transported on a forest tractor along the ski/snowmobile trail from Nordgarseatra to the tree line and then along the contours to the drill site.

Megrund Area Conductor and Mineralisation

The Megrund area was the site of Sulfidmalm drilling in the 1970s. Some of these holes (MG-9, MG-32 and WD-2) have been located and provide good reference points for the georeferencing and plotting of the rest of the holes from the Sulfidmalm campaigns. The surface nickel showings have also been found and sampled (assay samples PG00958 and PG00959, see table). These samples consist of disseminated sulphide mineralisation in norite and peridotite. Assays of these samples (0.8% Ni range) confirm the Ni grades reported from previous work. This mineralisation is at the NW margin of the broad conductive zone.

The area underlain by the broad conductor forms a till covered depression. The northwestern portion of this conductor corresponds to the best mineralisation detected by previous Sulfidmalm drilling (holes MG-6 and MG-17). The conductivity detected by the UTEM survey in this area is consistent with the nature of mineralisation detected during the Sulfidmalm drilling and this conductor can probably be explained by the known uneconomic mineralisation. However, modeling of the UTEM results suggests that this mineralisation may be more extensive to the southeast (up to 200 additional metres) than previously recognized.

Andreasberg

A series of pits trending ca. 330 Az are flooded and surrounded by a wire fence with steel post anchored in cement. Mineralized assay sample (PG00961) from dumps exhibits net-textured sulphides. A weakly mineralised sample was collected for whole rock analysis (PG01764). Primary foliation trends 338/70NE.

Jorstadgruva

Series of small pits along a mineralised shear trending 085 Az. Sample **PG00962** consists of massive sulphide that was collected from the mine dumps.

Storgruva (Evans Mine)

Storgruva was the largest mine in the Espedalen camp. Open cast workings extend along the strike of the deposit. A tabular body was mined that dipped moderately to the northeast.

Some of the piles adjacent to the workings are very neatly piled and may represent ore that was left behind as much of the material is strongly mineralised. Sample **PG01757** is from one of these piles and consists of massive sulphides containing mafic and ultramafic fragments.

Stasrad Stang and Niccoline

These occurrences are grouped together at the NW end of the complex and occur in a line that trends approximately 045 Az (across regional foliation).

Stasrad Stang Mine

The attitude of the ore body that was mined at Stanggruva is 280/50 NE. Mafic intrusive rock from the immediate hanging wall of the deposit (within 3m of the mineralisation) contains no appreciable sulphides. **PG00963** is a sample of semi-massive sulphides that was collected from the mine dumps.

Niccoline Mine

The Stasrad mine consists of a series of pits that trend parallel to the mineralised planes (034/48E).

A small test pit occurs on the hill above the Niccoline mine. Foliation in this area trends 315/90.

6. Proposed Work

The following work is proposed to fully evaluate the potential of the Espedalen Complex to host an economic nickel sulphide deposit:

- Complete UTEM surveying over the Northeast Grid (Jan-April, 2004).
- Complete ground magnetics survey of Northeast Grid (Jan-April, 2004) or helicopter-borne magnetic survey of the entire Espedalen complex (as soon as possible). The choice between these options will depend on cost.
- Map lithology and structures at appropriate detail in the vicinity of any significant UTEM conductors that may be detected (June-July, 2004)
- Investigate significant UTEM conductors (including Stylskampen on SW Grid) using diamond drilling (summer, 2004).

List of Figures and Attachments

Figures in Report

- Sulfidmalm Pre-Claims in Norway- Location Map
- Espedalen Property – Location Map
- Nickel Occurrences and Previous Work on Geology background
- UTEM Grids and Nickel Occurrences on Topography background
- UTEM Grids and Nickel Occurrences on Geology background
- Geophysical Grids and Topography
- Geophysical Grids and Geology
- Southeast Grid with UTEM Conductors

Maps

- 1:20,000 Espedalen Compilation Map on Topography Base
- 1:20,000 Espedalen Compilation Map on Geology Base
- 1:10,000 Southwest Grid Magnetism and UTEM Profiles

Reports

- Interpretation Report, 2003 UTEM Survey, Espedalen, Norway for A/S Sulfidmalm, Lamontagne Geophysics, June 2003

Digital Data on CD

- Espedalen SW Grid UTEM Survey 2003 Data and Logistics Report
- Espedalen SW Grid Magnetism Survey data corrected for diurnal variations (.txt format)

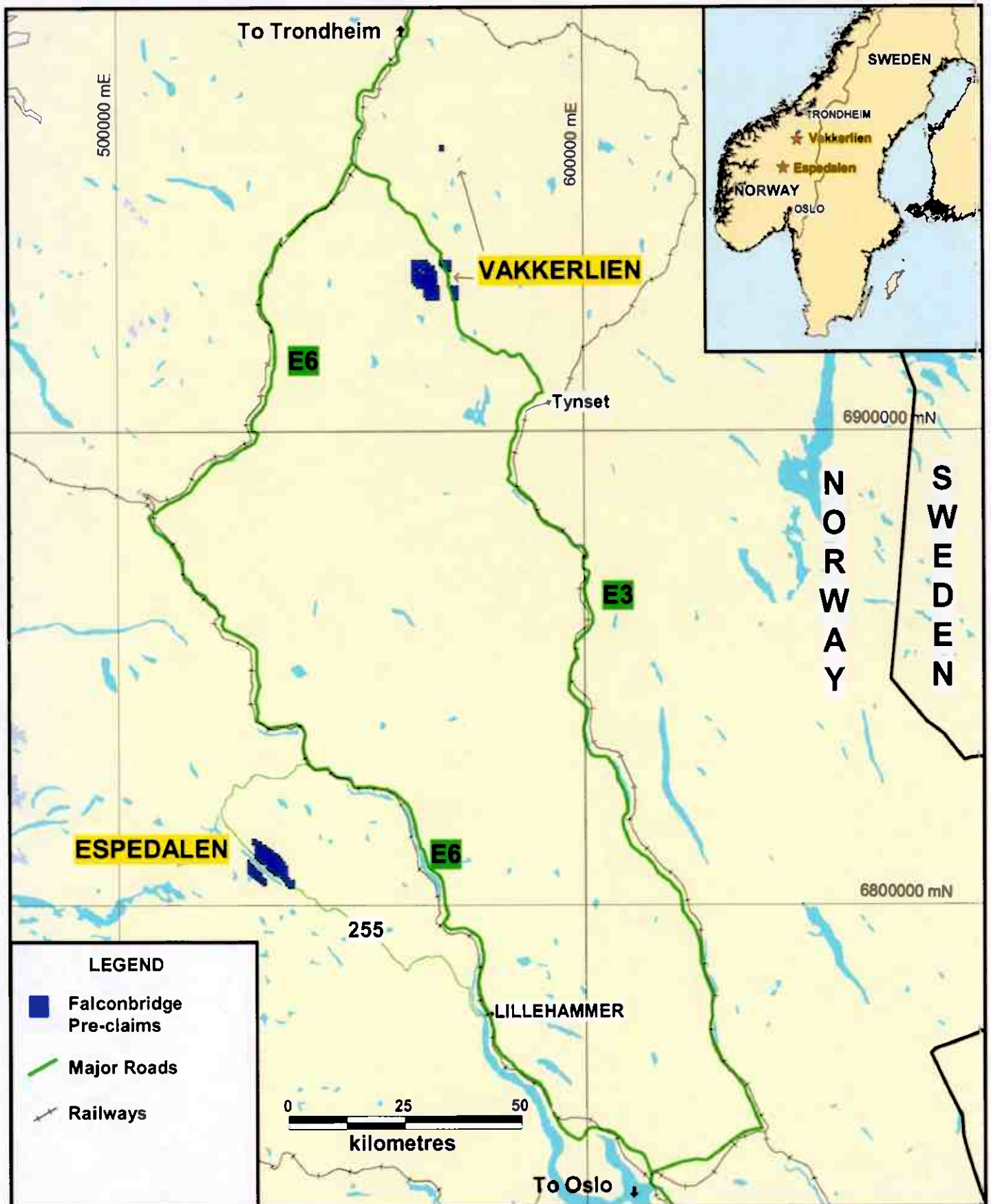
TABLE 1. ASSAY SAMPLES FROM ESPEDALEN AREA

SAMPLE NO	LOCALITY	DESCRIPTION	Au PPM	Pt PPM	Pd PPM	S%	CO%	CU%	NI%	Ni TENOR
PG00958	Megruud	Mineralised ultramafic	0.03	0.03	0.04	5.43	0.03	0.20	0.84	6.02
PG00959	Megruud	Mineralised norite	0.01	0.02	0.03	3.10	0.02	0.21	0.70	8.78
PG00960	Vesle Mine	Semi-massive sulphides in ultramafic	0.06	0.04	0.03	9.89	0.05	0.75	0.95	3.75
PG00961	Andreasburg Mine	Net-textured sulphides	0.01	0.00	0.11	15.20	0.13	0.31	3.26	8.36
PG00962	Jorstad Mine	Massive sulphides	0.03	0.02	0.00	18.00	0.13	0.08	0.84	1.81
PG00963	Stangruva Mine	Semi-massive sulphides	0.03	0.02	0.04	12.60	0.07	1.29	1.02	3.14
PG00964	Evans Mine	Semi-massive sulphides	0.00	0.00	0.02	5.55	0.03	0.06	0.57	4.00
PG01757	Storgruva	Massive sulphides	0.04	0.03	0.02	28.60	0.17	0.19	3.08	4.20

TABLE 2. WHOLE ROCK SAMPLES FROM ESPEDALEN AREA

SAMPLE NO	LOCALITY	DESCRIPTION	AG PPM	AL%	AS PPM	B PPM	BA PPM	BE PPM	BI PPM	CA%	CD PPM	CO PPM	CR PPM	CU PPM	FE%
PG01764	Andreasberg Mine	Andreasberg host rock - Ultramafic	0.20	0.32	1.00	5.00	5.00	0.25	1.00	0.27	0.25	106.00	410.00	121.00	7.14
PG01766	Megruud area	Ultramafic	0.20	2.58	1.00	10.00	30.00	0.25	1.00	0.45	0.25	100.00	1995.00	78.00	8.73
PG01764 (cont.)			GA PPM	HG PPM	K%	LA PPM	MG%	MN PPM	MO PPM	NA%	NI PPM	P PPM	PB PPM	S%	
PG01766 (cont.)			5.00	1.00	0.01	5.00	14.45	1090.00	0.50	0.02	1045.00	50.00	1.00	0.13	
			10.00	0.50	0.05	5.00	10.20	1070.00	0.50	0.04	773.00	640.00	1.00	0.16	
PG01764 (cont.)			SB PPM	SC PPM	SR PPM	TI%	TL PPM	U PPM	V PPM	W PPM	ZN PPM	SIO2%	AL2O3%	FE2O3%	CAO%
PG01766 (cont.)			1.00	5.00	4.00	0.01	5.00	5.00	19.00	5.00	28.00	38.73	1.95	13.57	5.44
			1.00	7.00	18.00	0.07	5.00	5.00	88.00	5.00	59.00	38.04	5.00	15.78	4.22
PG01764 (cont.)			MGO%	NA2O%	K2O%	CR2O3%	TIO2%	MNO%	P2O5%	SRO%	BAO%	LOI%	TOTAL%		
PG01766 (cont.)			35.66	0.26	0.04	0.59	0.14	0.23	0.02	0.01	0.01	2.91	99.52		
			27.02	0.25	0.11	0.47	0.36	0.25	0.13	0.01	0.01	7.54	99.19		

SULFIDMALM PRE-CLAIMS - LOCATION MAP

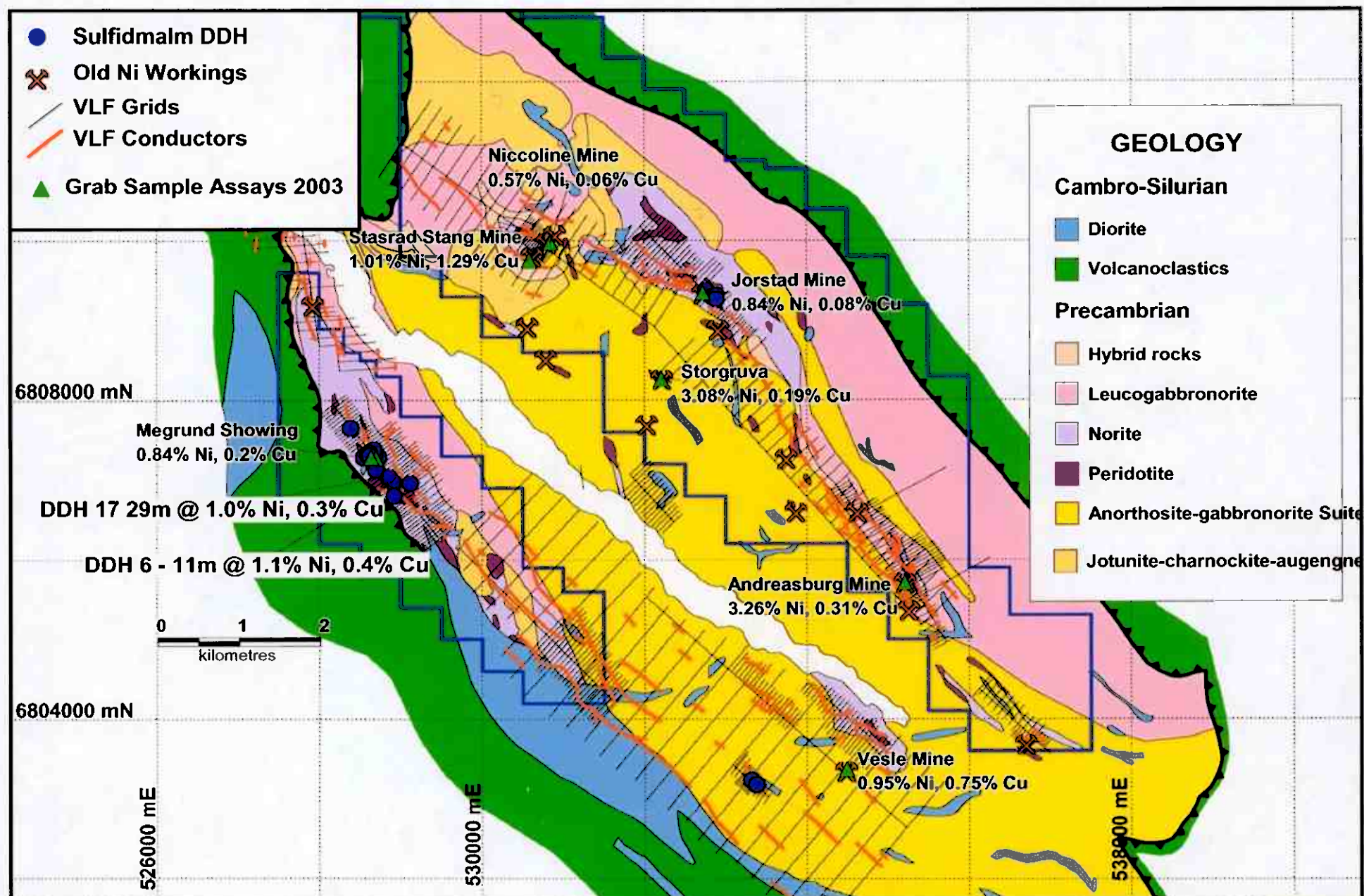


Coordinates: UTM WGS84

ESPEDALEN PROPERTY - LOCATION MAP



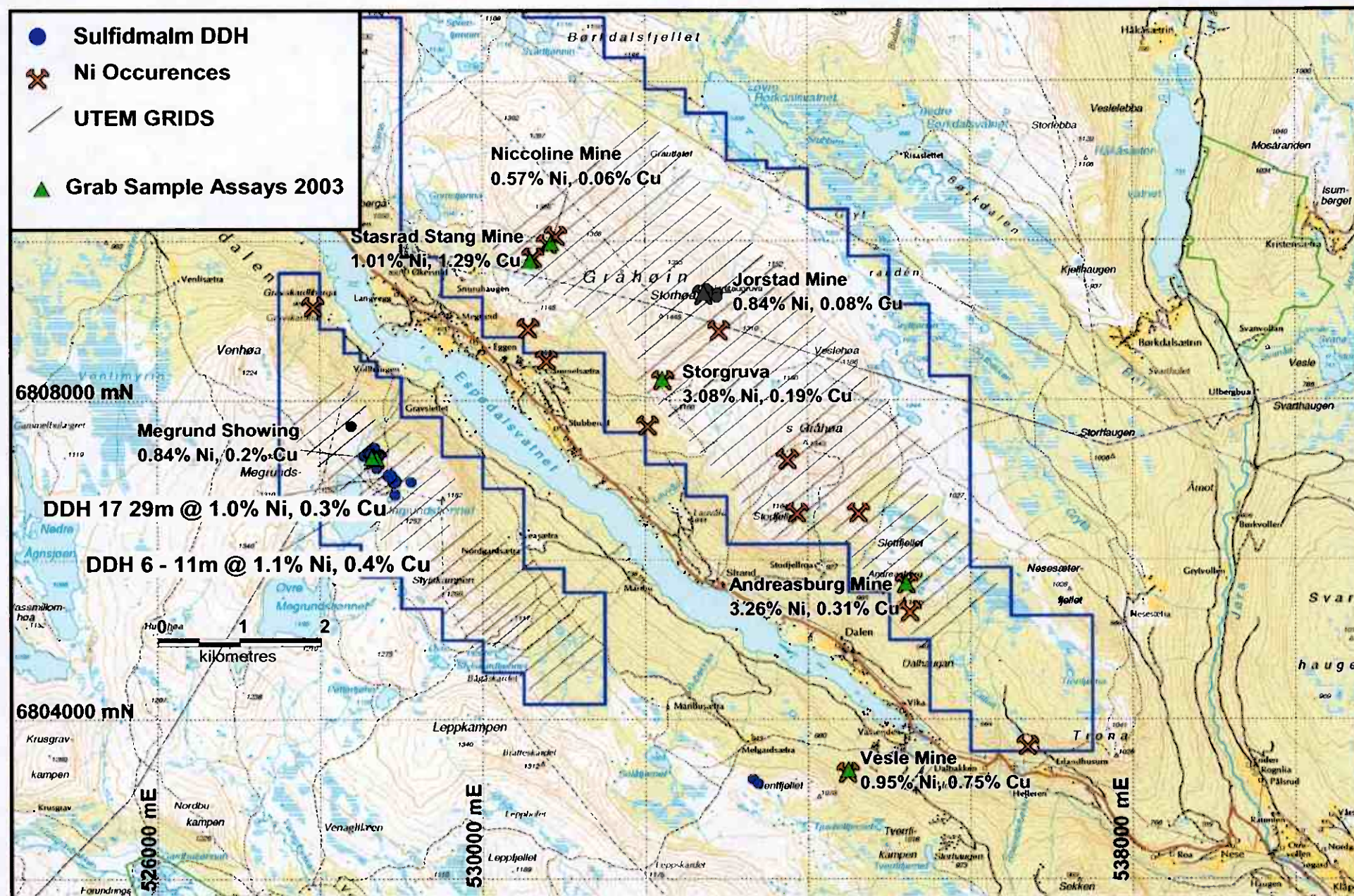
Espedalen, Norway - Ni Occurences and Previous Work



Previous work b WOR

Coordinates in UTM Zone 32N WGS 84 (Serie M711)

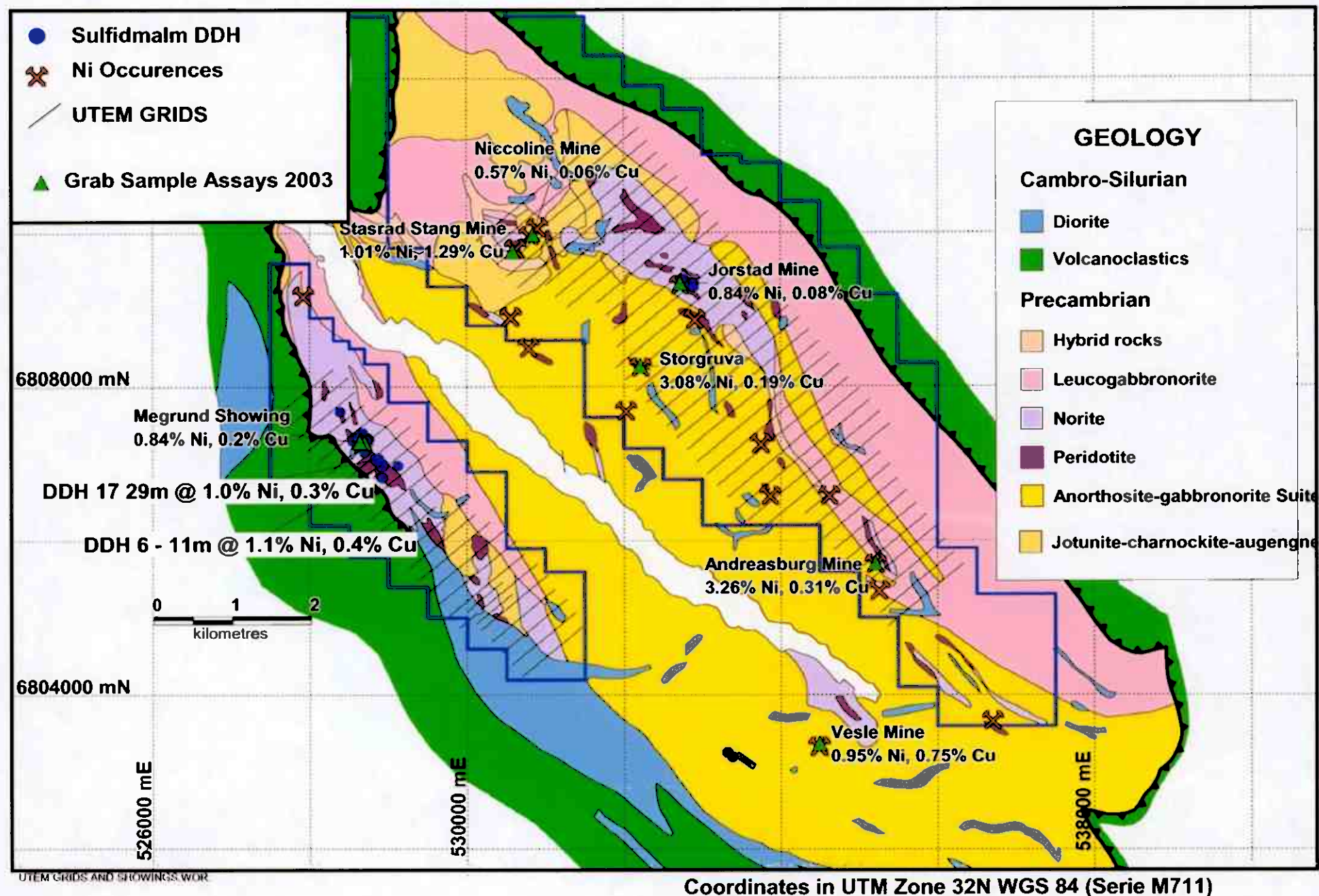
Espedalen, Norway - UTEM Grids and Ni Occurences



UTEM GRIDS AND SHOWINGS WORK

Coordinates in UTM Zone 32N WGS 84 (Serie M711)

Espedalen, Norway - UTEM Grids and Ni Occurences

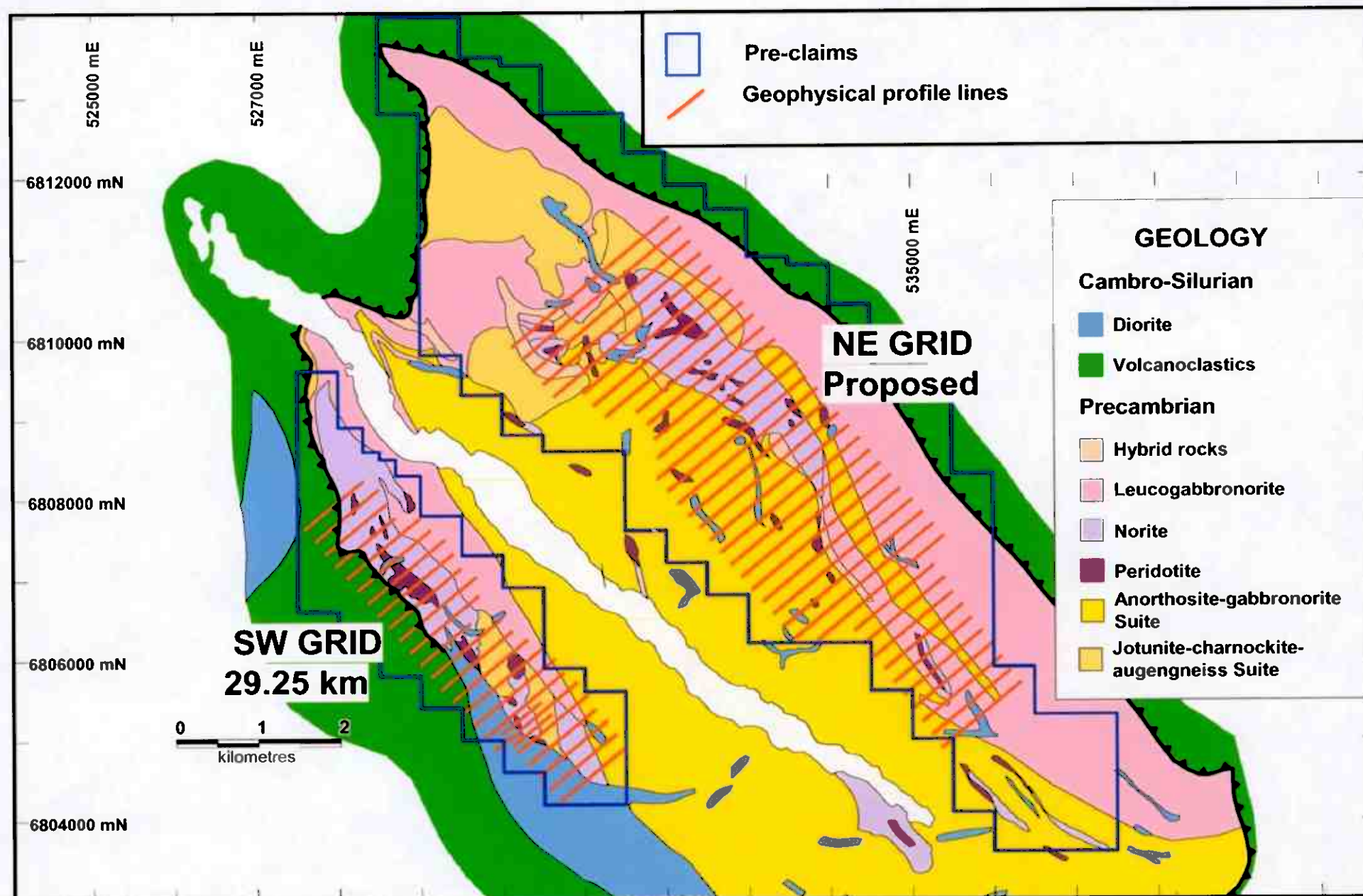




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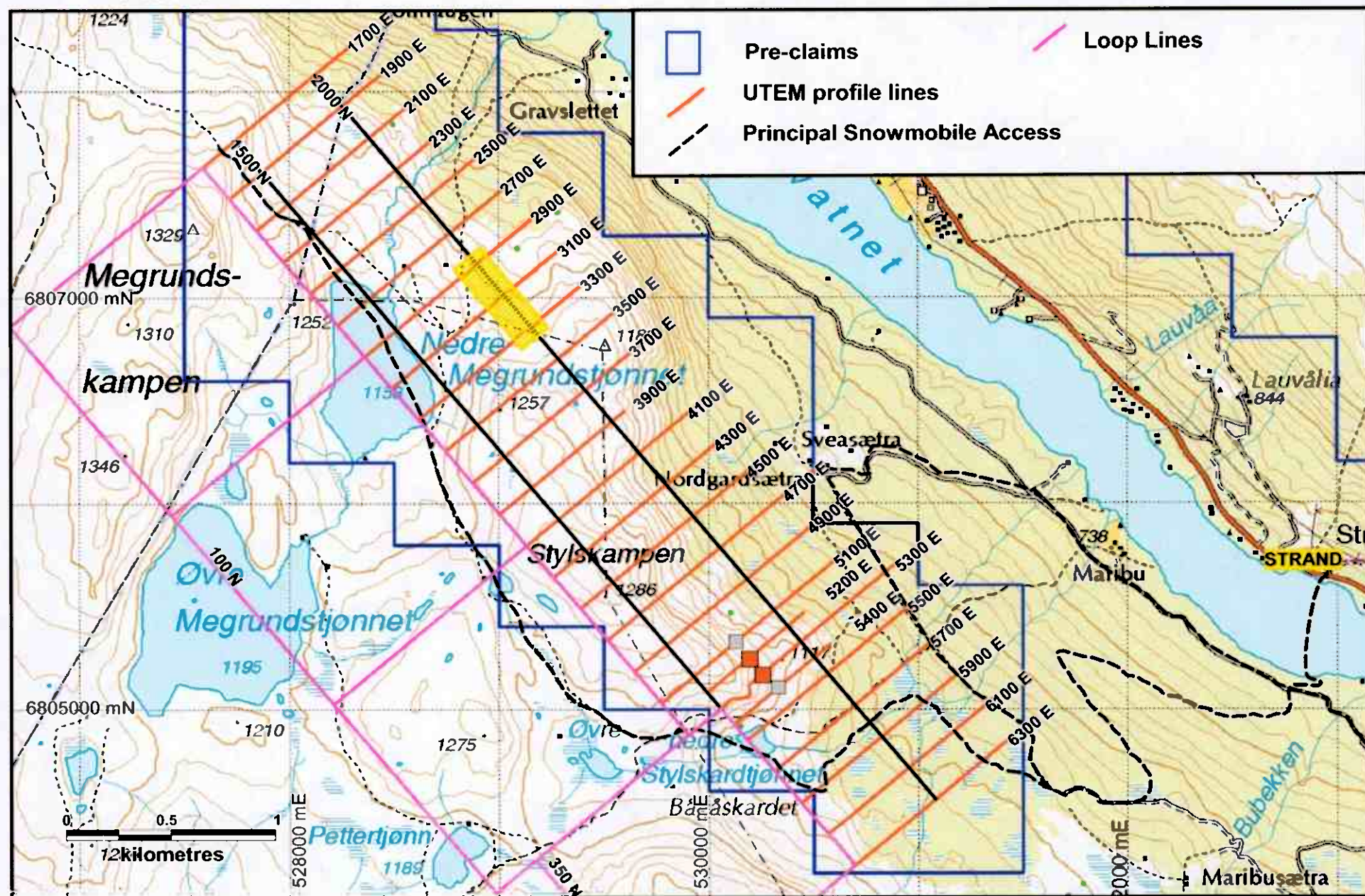
Espedalen, Norway

Geophysical Grids and Geology

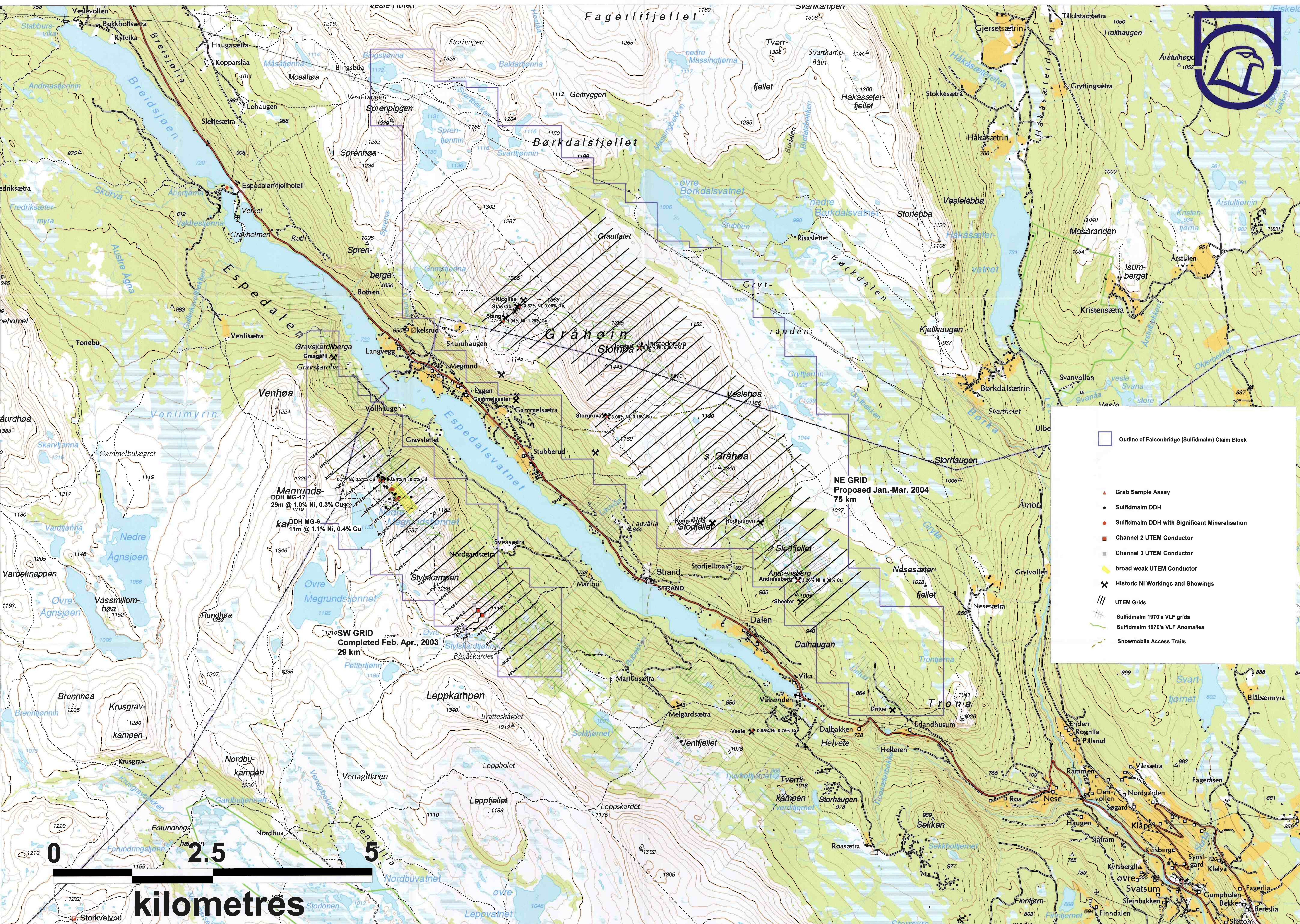


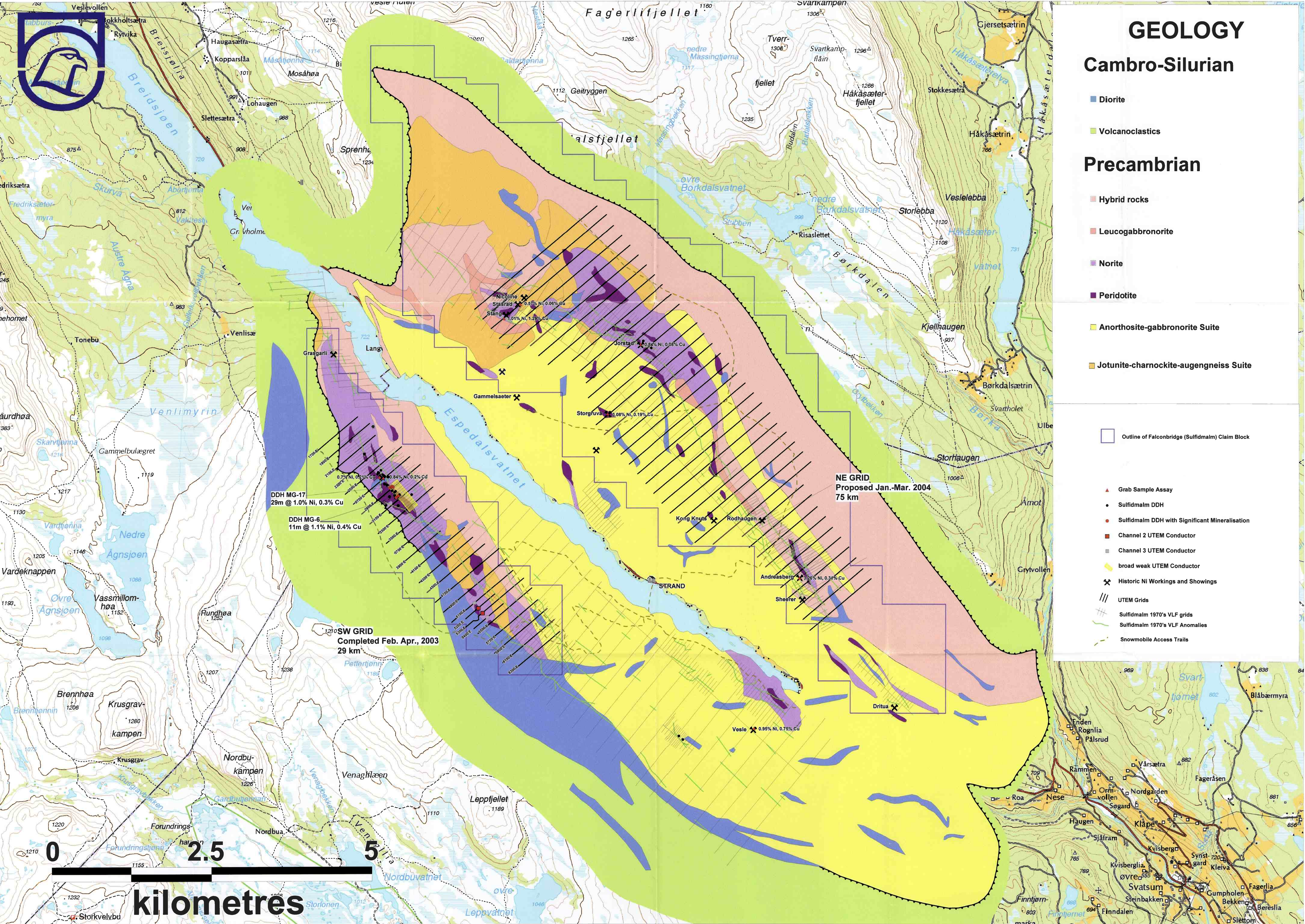
Espedalen, Norway

Southeast Grid with UTEM Conductors

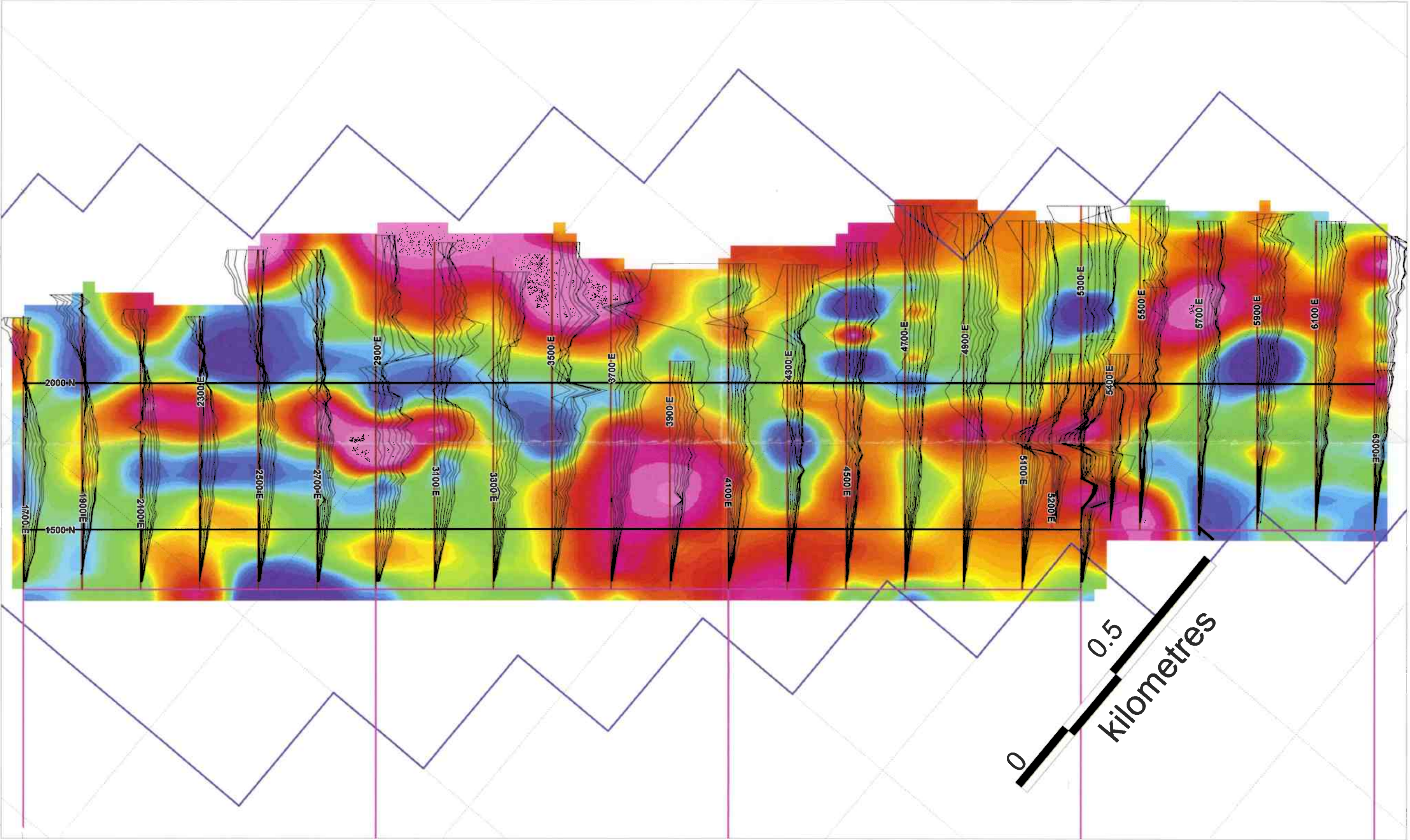


Coordinates in UTM Zone 32N WGS84. Contour Interval 20 m





SW GRID ESPEDALEN - UTEM PROFILES AND MAGNETICS



UTEM closeup WOR

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