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Kommer fra ..arkiv	Ekstern rapport nr NGU 2006.021	Oversendt fra Sulfidmalm a.s.	Fortrolig pga Muting	Fortrolig fra dato:

Tittel

Data Acquisition and Processing - Helicopter Geophysical Survey, Bamble Ertelien and Sigdal 2006

Forfatter	Dato År	Bedrift (Oppdragsgiver og/eller oppdragstaker)
Mogaard, Jon Olav	10.03 2006	Sulfidmalm A/S NGU

Kommune	Fylke	Bergdistrikt	1: 50 000 kartblad	1: 250 000 kartblad
Bamble Kragerø Ringerike Sigdal Flesberg	Telemark Buskerud		17124 17121 17132 17133 17141 17144 17153 17152 18154 18153	Hamar Skien Arendal

Fagområde	Dokument type	Forekomster (forekomst, gruvefelt, undersøkelsesfelt)
Geofysikk		Ertelien
Råstoffgruppe	**Råstofftype**	
Malm/metall	Ni	

Sammendrag, innholdsfortegnelse eller innholdsbeskrivelse

I alt fire forskjellige områder ble fløyet: Bamble i Telemark, Ertelien, Sigdal og Ramsdal i Buskerud. Totalt 3250 linjekm geofysikk ble fløyet med 100m linjeavstand

Bamble: 1450 linjekm
Ertelien: 1100 linjekm
Sigdal: 500 linjekm
Ramsdal: 2000 linjekm

EM-system som ble brukt var Hummingbird

CD ligger vedlagt med tekst og kart

NGU Report 2006.021
for
Sulfidmalm A/S

Data Acquisition and Processing – Helicopter Geophysical Survey, Bamble, Ertelien and Sigdal, 2005 Telemark and Buskerud counties, Norway

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GEOLOGY FOR SOCIETY

NGU Report 2006.021

Data Acquisition and Processing – Helicopter Geophysical Survey, Bamble, Ertelien and Sigdal, 2005
Telemark and Buskerud counties, Norway

NGU Report 2006.021

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Telemark and Buskerud counties, Norway

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REPORT

Report no.: 2006.021	ISSN 0800-3416	Grading: Confidential until 15.03.2008

Title:
Data Acquisition and Processing - Helicopter Geophysical Survey, Bamble, Ertelien and Sigdal, 2005, Telemark and Buskerud counties, Norway

Authors:
John Olav Mogaard

Client:
A/S Sulfidmalm

County:
Telemark and Buskerud

Commune:
Bamble, Kragerø, Ringerike, Sigdal, Flesberg

Map-sheet name (M=1:250.000)
Hamar, Skien, Arendal

Map-sheet no. and -name (M=1:50.000)
1712 IV Kragerø, 1712 I Langesund, 1713 II Porsgrunn, 1713 III Kilebygd, 1714 I Hokksund, 1714 IV Flesberg, 1715 III Eggedal, 1715 II Krøderen, 1815 IV Sperillen, 1815 III Hønefoss

Deposit name and grid-reference

Number of pages: 11 Price (NOK):
Map enclosures:

Fieldwork carried out:	Date of report:	Project no.:	Person responsible:
September/October 2005	10.03.2006	2990.06	

Summary:

In September/October 2005, a helicopter geophysical survey was carried out over four different areas in southern Norway. They were Bamble in Telemark county, and Ertelien, Sigdal and Ramsdal in Buskerud county. This report covers all areas. The purpose of the surveys was to provide geophysical information for mineral exploration. The data were collected and processed by the Geological Survey of Norway (NGU). A total of about 3250 line-km of electromagnetic (EM) and magnetic data were acquired using a nominal 100-m line spacing (app. 1450 line-km in Bamble, 1100 line-km in Ertelien, 500 line-km in Sigdal and app. 2000 line-km in Ramsdal. The nominal flying height was 60 m above ground level (AGL), and lines were flown in different alternating directions at headings of 066° and 246° in Bamble, 078° and 258° in Ertelien and 102° and 282° in Sigdal and Ramsdal. Noise levels were within survey specifications.

All initial processing was carried out on a flight-by-flight basis. Magnetic data, consisting of total field measurements collected by a cesium vapor magnetometer, were corrected by removing diurnal variations as recorded at a magnetic base station at Geiteryggen airfield, Skien for the Bamble area and at Eggemoen airfield, Honefoss for the other areas. EM data were leveled using data from frequent high altitude excursions 300-m AGL. All final processed data were gridded using 25-m cell size. Geophysical maps were produced at a scale of 1:50 000 and are considered as stand alone products.

This report covers aspects of data acquisition and processing.

Keywords: Geofysikk (Geophysics)		Magnetometri (Magnetometry)
Elektromagnetisk måling (Electromagnetic measurements)	Databehandling (Data processing)	Fagrapport (Technical report)

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Map 2006.021-03***n***:	First vertical derivative of magnetic total field.
Map 2006.021-04***n***:	EM stacked profiles 7001 Hz coaxial.
Map 2006.021-05***n***:	EM stacked profiles 6606 Hz coplanar.
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Map 2006.021-07***n***:	EM stacked profiles 880 Hz coplanar.
Map 2006.021-08***n***:	EM stacked profiles 34133 Hz coplanar.
Map 2006.021-09***n***:	EM apparent conductivity 6606 Hz coplanar.
Map 2006.021-10***n***:	EM apparent conductivity 7001 Hz coaxial.

Where:

n = **A** : Ertelien area

n = **B** : Bamble area

n = **C** : Sigdal (and Ramsdal) area

1 INTRODUCTION

As a contract work for AS Sulfidmalm, in September and October, 2005, a helicopter geophysical survey was carried out over four areas in Southern Central Norway. They were Bamble in Telemark county and Ertelien, Sigdal and Ramsdal in Buskerud county. The distances flown (with tie-lines) and areas covered are approx. 1450 line-km and 130 km² for Bamble; 1100 line-km and 98.8 km² for Ertelien; 500 line-km and 46.4 km² for Sigdal and 200 line-km and 18 km² for Ramsdal. See *fig.1*, *fig.2* and *fig.3* for the outline of the areas. Magnetic and electromagnetic (HEM) data were collected. The primary objective of the survey was to provide geophysical information for mineral prospecting in the area.

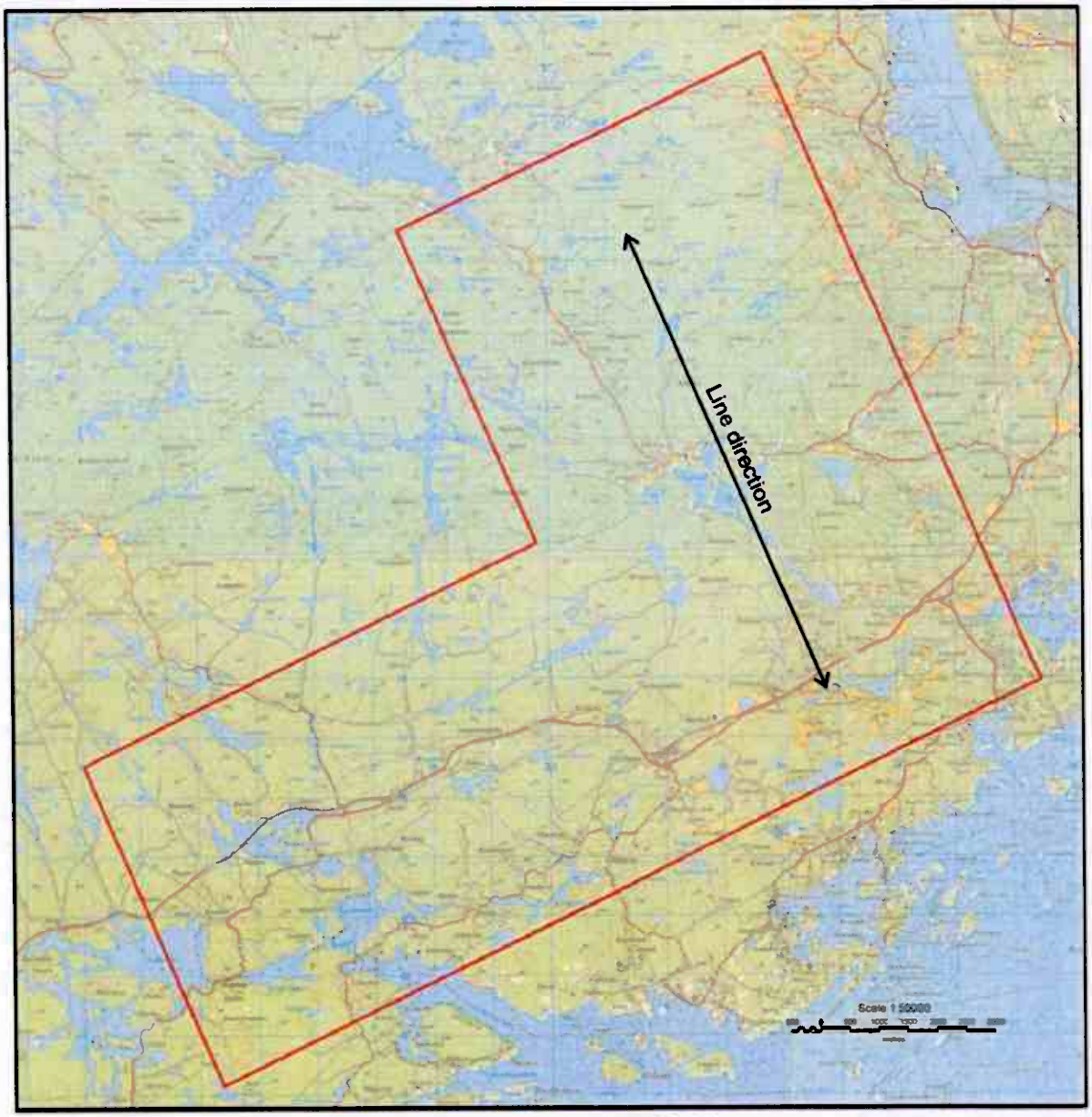

Fig. 1: Outline of the Bamble area (flight direction 066/246°).

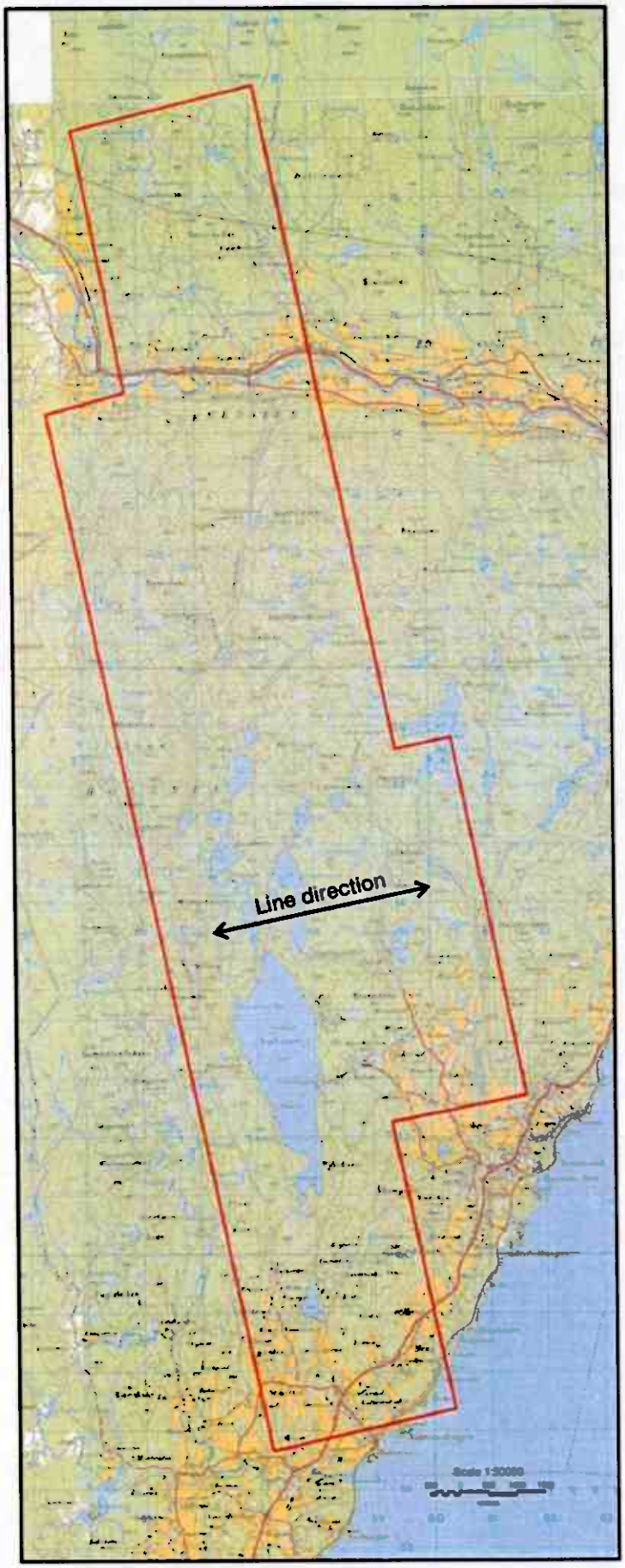

Fig. 2: Outline of the Ertelien area (flight direction 078/258°).

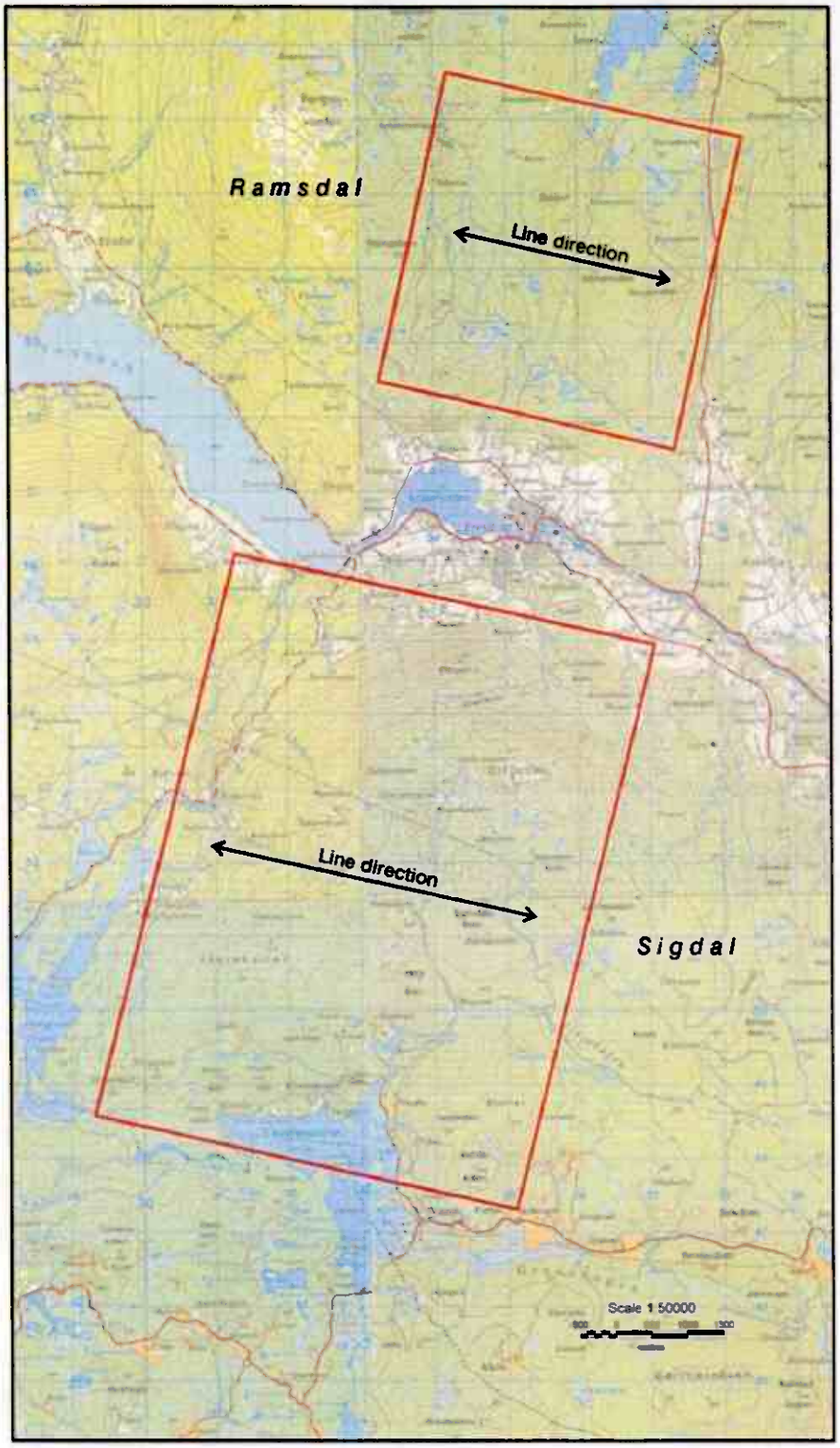

Fig. 3: Outline of the Sigdal and Ramsdal area (flight direction 102/282°).

2 SURVEY VARIABLES AND CONDITIONS

Several conditions may influence on the quality of the geophysical data.

2.1 Weather conditions

Strong wind can increase the noise level of airborne geophysical data. High winds were not frequent during the survey, but were encountered occasionally. Non of the flights were aborted because of wind.

2.2 Topographic conditions

The resolution of geophysical sensors decreases exponentially with flying height. To achieve the greatest possible resolution, the helicopter should be flown as low as is safely possible. The topography in the four areas are varying from fairly flat to quite steep and it is difficult to keep a constant terrain clearance during flying. The surveys were flown using a helicopter strong enough to climb the hills but in spite of this, data are strongly effected by altitude differences uphill and downhill. As a consequence of this it was impossible to drape the terrain with the bird 30 +/- 10 meters above ground as specified in the contract.

2.3 Magnetic conditions

Diurnal changes in the earth's magnetic field affect magnetic data. The base station magnetic field never indicated strong magnetic storm conditions during the surveys. Magnetic data quality on all lines used for production is very good.

2.4 EM data conditions

Strong vertical temperature gradients can affect EM leveling because the temperature at the 300-m nulling altitude is different from the temperature at survey altitude (30 m above ground level for the EM sensor). In addition to this, measuring at different altitudes may cause drift effects along profiles. Drift effects between nulling points are corrected using standard linear interpolation. EM drift is characterized as low.

The target flying height is 60 meters above ground level. Due to the severe terrain, flying height varied considerably in the present survey. This effected both the magnetic and the electromagnetic datasets.

In general EM signals are low in all the areas, and this created problems when producing conductivity maps. The quality of the EM data can be characterized as good.

3 DATA ACQUISITION

The survey aircraft was an Aerospatial Ecureuil AS 350 B-2. Flying speed was approximately 100 km per hour (28 meters per second). Flight lines were flown in directions 066°/246° in Bamble, 078°/258° in Ertelien and 102°/282° in Sigdal and Ramsdal with a flight line spacing of 100 m in all areas. In addition a few tie-lines were measured for all areas. The 5-frequency EM system and the magnetometer were enclosed in a 6-m long 'bird' suspended by cable 30m beneath the helicopter.

NGU personnel responsible for data acquisition were John Olav Mogaard and Janus Koziel. Pilots from AIRLIFT ASA were Leif Hus and Stian Follaug .

3.1 Magnetic measurements

A Scintrex CS-2 cesium vapor magnetometer was used. The magnetometer resolution is 0.01 nT. Sampling rate is 10 measurements per second (approximately 3 meter spacing).

A Scintrex ENVI-mag proton precession magnetometer was located at Geiteryggen airfield, Skien for the Bamble area and at Eggemoen airfield, Hønefoss for the other areas, and was used for base station measurements. The base station magnetometer was synchronized with the Scintrex magnetometer in the helicopter to ensure proper removal of diurnal magnetic changes from the helicopter magnetic measurements. The magnetic total field at the base station was digitally recorded during flights every third second.

3.2 Electromagnetic system

The EM system used was the 5-frequency Hummingbird system made in Canada by Geotech, Ltd. The Hummingbird records data at a sampling rate of 10 measurements per second. It has two coil orientations-vertical coaxial (VCA) and horizontal coplanar (HCP). The VCA coils operate at 980 Hz and 7001 Hz. The HCP coils operate at 880 Hz, 6606 Hz, and 34133 Hz. The transmitter-receiver separation is 6 m for lower frequencies and 4.2 m for 34133 Hz. The manufacturer specified noise level for each frequency is 1-2 ppm.

3.3 Navigation, altimetry, and data logging

The navigation system used is an Ashtech G12, 12 channel receiver. Position accuracy using this system is better than +/- 5 m.

The navigation console is a PNAV 2001 manufactured by the Picodas Group, Ltd. of Canada. Profile line data are entered into the console and are displayed on a left/right-display on the console. The pilot can see his position with respect to these predefined lines and adjust accordingly.

The helicopter is equipped with a King KRA-430 radar altimeter measuring height above ground level. The altimeter data is recorded digitally and altitude is displayed in front of the pilot. The altimeter is accurate to 5 percent of the true flying height. Unfortunately data are strongly affected when flying over dense forest.

The data logging system is an integral part of the Hummingbird electromagnetic system, manufactured by Geotech, Ltd. of Canada. Data is recorded both digitally and analog.

4 PROCESSING

The data were processed at the Geological Survey of Norway in Trondheim using Geosoft processing software (Geosoft Oasis Montaj 6.2, 2005).
Obvious inaccuracies in navigation were manually removed from the data. The datum used was WGS84 and the projection was UTM zone 32 for all areas.

4.1 Standard processing

Total field magnetic data: The data were inspected flight-by-flight and any cultural anomalies were identified and manually removed. A base station correction was applied to each flight using corrections based on the diurnal measurements from the base station magnetometer at Geiteryggen and Eggemoen airfields. Finally a time lag of 0.6 sec (6 points) were applied to the basemag-corrected (levelled) magnetic data.

EM data: EM data were processed on a flight-by-flight basis. Zero levels and drift control for each frequency were obtained by frequent excursions 300m AGL, usually at the end of every second flight line. A nonlinear filter was applied to all EM data to remove data spikes resulting from sferics. Before levelling, all data were mildly low passed using a 45 m filter. Noise levels for all frequencies were within an envelope of 2 ppm. Noise levels over 2 ppm

occurred near powerlines. All EM data (and especially in Bamble and Ertelien) were affected of huge powerlines crossing the survey areas. A manually levelling on a line by line basis were done for the two frequencies used for apparent resistivity calculation. Magnetic structures having high susceptibility may produce negatively oriented in-phase anomalies. A time lag of 0.5 sec (5 points) were applied to all channels before plotting of maps.

4.2 Map Production

Magnetic maps in scale 1: 50 000, total magnetic field and first vertical derivative, were produced using a grid cell size of 25 x 25 metres. The problems in keeping a correct flying height in parts of the area, created some leveling problems. These were significant on a first version of the contour maps, and were corrected for without ruining the information in the data using median micro-leveling procedures created at the NGU (Mauring & Kihle 2000). The contoured color maps are produced with a shaded relief of the high frequency content. In agreement with the clients representative, magnetic measurements outside the predefined area was kept in the magnetic maps. Flying height and profile separation may be out of specifications and as a result lower data quality.

As a standard, stacked profiles of all EM frequencies in scale 1: 50 000 were produced following standard procedures. Based on quadrature data, apparent resistivity was computed for 6606 Hz coplanar and 7001 Hz coaxial using least squares inversion and a homogeneous half space model (Geosoft 1997). In agreement with the clients representative, conductivity maps instead of resistivity maps were produced using 6606 Hz coplanar and 7001 Hz coaxial frequencies. Due to low EM signals (high resistivity), negative EM responses due to high susceptibility and problems to keep a constant flying altitude, it was a very difficult to create conductivity maps with a satisfactory layout. Because of this, a resistivity grid was created which was micro-leveled using median filtering (Mauring & Kihle 2000) before inverting data to conductivity. Grid cell size was 50 x 50 metres.

5 DATA DELIVERIES

In agreement with the clients representative, the following stand alone maps in scale 1: 50 000 are produced and delivered to the client as printed maps:

- **Map 2006.021-01*n***: Flight path.

- **Map 2006.021-02*n***: Total magnetic field.
- **Map 2006.021-03*n***: First vertical derivative of magnetic total field.
- **Map 2003.001-04*n***: EM stacked profiles 7001 Hz coaxial.
- **Map 2006.021-05*n***: EM stacked profiles 6606 Hz coplanar.
- **Map 2006.021-06*n***: EM stacked profiles 980 Hz coaxial.
- **Map 2006.021-07*n***: EM stacked profiles 880 Hz coplanar.
- **Map 2006.021-08*n***: EM stacked profiles 34133 Hz coplanar.
- **Map 2006.021-09*n***: EM apparent conductivity 6606 Hz coplanar.
- **Map 2006.021-10*n***: EM apparent conductivity 7001 Hz coaxial.

Where ***n* = A** : Ertelien area
***n* = B** : Bamble area
***n* = C** : Sigdal (and Ramsdal) area

These maps are also delivered on DVD in Geosoft packed maps format.

Digital magnetic an electromagnetic data in Geosoft XYZ file formats and grid files of these data are delivered on DVD as described in Appendix A.

6 REFERENCES

Geosoft Inc., 2005: OASIS montaj Version 6.2 User Guide, *Geosoft Incorporated, Toronto.*

Geosoft Inc.; 1997: HEM System (Windows®95 & NT™) User Guide, *Geosoft Incorporated*

Mauring, E. & Kihle, O. 2000: Micro-levelling of aeromagnetic data using a moving differential median filter. *NGU Report 2000.053.*

Appendix A: Data delivery formats.

Geosoft XYZ file formats.
Final Delivery on DVD

File: nMAG.XYZ (including tielines)

x_filt	meters	Final processed x (masked to the extended area polygon)
y_filt	meters	Final processed y (masked to the extended area polygon)
mag_final	nT	Levelled and time-lagged magnetic data (0.5 sec)
mag_final_1D	nT/m	Calculated vertical gradient

File: nEM.XYZ

x_filt	meters	Final processed x (masked to the area polygon)		
y_filt	meters	Final processed y (masked to the area polygon)		
recnum		Internal record number, ordinal, per flight, incremented at 0.1 per tenth of a second		
UTCtime		Universal time Hours: Minutes: Seconds. Decimal_seconds		
bird_height_m	meters	Processed radar altimeter data minus 30 meter		
IP1_f_L_lag	ppm	Filtered, leveled and lagged	inphase	7001 Hz Coaxial
Q1_f_L_lag	ppm		quadrature	7001 Hz Coaxial
IP2_f_L_lag	ppm		inphase	6606 Hz Coplanar
Q2_f_L_lag	ppm		quadrature	6606 Hz Coplanar
IP3_f_L_lag	ppm		inphase	980 Hz Coaxial
Q3_f_L_lag	ppm		quadrature	980 Hz Coaxial
IP4_f_L_lag	ppm		inphase	880 Hz Coplanar
Q4_f_L_lag	ppm		quadrature	880 Hz Coplanar
IP5_f_L_lag	ppm		inphase	33133 Hz Coplanar
Q5_f_L_lag	ppm		quadrature	33133 Hz Coplanar
cond6606_final	mS-m	Apparent conductivity (6606 Hz coplanar)		
cond7001_final	mS-m	Apparent conductivity (7001 Hz coaxial)		

Where ***n*** = **A** : Ertelien area
n = **B** : Bamble area
n = **C** : Sigdal (and Ramsdal) area

The following Geosoft grid files are copied to the DVD :

mag_finalm.grd	Micro levelled magnetic grid (circular median filter) used in map (25 m cell size)
mag_final_1Dm.grd	Calculated vertical gradient grid used in map based on the final magnetic grid file .
res6606_final.grd	Apparent resistivity grid from res6606 channel (50 m cell size)
res7001_final.grd	Apparent resistivity grid from res7001 channel (50 m cell size)
cond6606_final.grd	Final conductivity grid file used in map after micro levelling 6606 Hz coplanar freq. (50 m cell size)
cond7001_final.grd	Final conductivity grid file used in map after micro levelling 7001 Hz coaxial freq. (50 m cell size)

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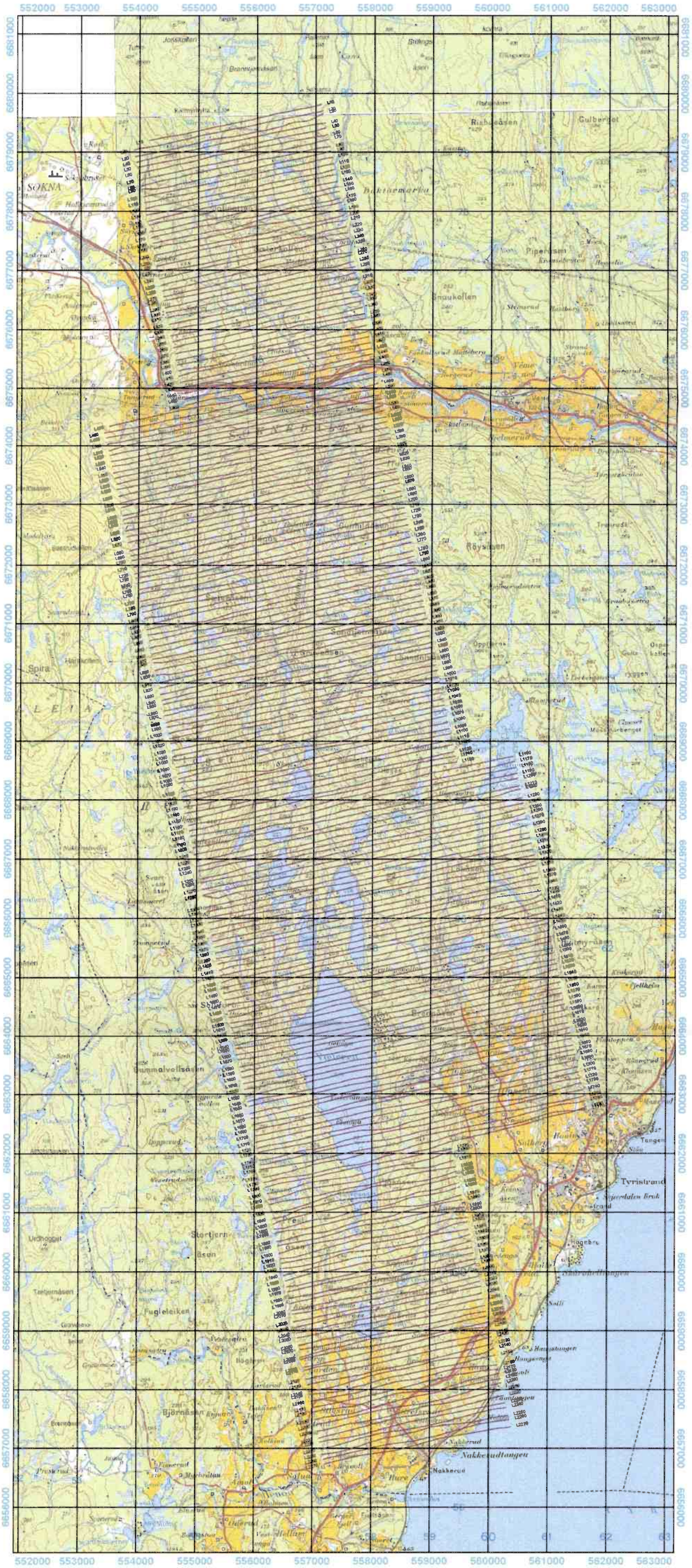

GEODETIC DATUM: WGS84
CONFORM CYLINDERPROJECTION
Numbers in BLUE for UTM coordinates, zone 32N

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NAVIGATION

The entire area was covered by GPS navigation.

The nominal flying height above ground level in the area is 60 metres.

A/S SULFIDMALM

FLIGHTPATH

Ertelien

Buskerud

Drawing: *Mogaard,J.O.*	Date: *FEB2006*	Obs: *JOM/JK*

Scale 1:50 000

1000 0 1000 2000 3000

(metres)

Mapsheet (1:50 000):
1815 IV Sperillen
1815 III Hønefoss
1715 II Krøderen

NGU Geology for Society since 1858

GEOLOGICAL SURVEY OF NORWAY
Leiv Eirikssons vei 39
N-7491 TRONDHEIM
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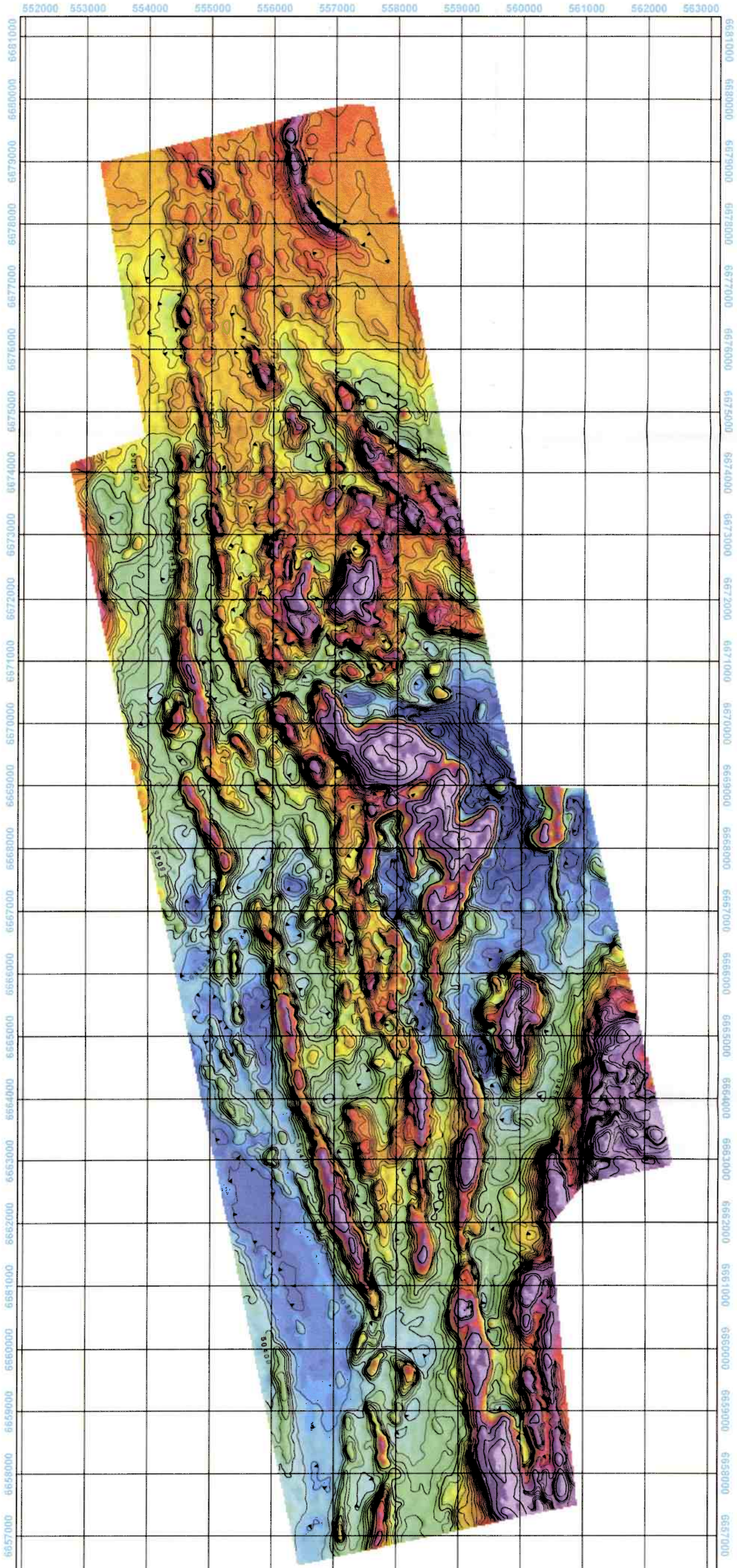
http://www.ngu.no

Drawing no:
2006.021-01A



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Geological Survey of Norway

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TOTAL MAGNETIC FIELD

The intensity of the total magnetic field is in nanoTesla.

Contours given in following intervalls:

25nT
50nT
100nT
500nT

Colours - distributed after colourscale.

Data are corrected for diurnal variations using a basemagnetometer located at Eggemoen airfield.

A high sensitivity cesiummagnetometer sensor is used and nominal sensor elevation is 30 metres.

NAVIGATION

The entire area was covered by GPS navigation.

The nominal flying height above ground level in the area is 60 metres.

A/S SULFIDMALM

TOTAL MAGNETIC FIELD

Colours and contours

Ertelien

Buskerud

Drawing: *Mogaard,J.O.*	**Date:** *FEB2006*	**Obs:** *JOM/JK*
Scale 1:50 000 1000 0 1000 2000 3000 (metres)		**Mapsheet (1:50 000):** *1815 IV Sperillen* *1815 III Hønefoss* *1715 II Krøderen*

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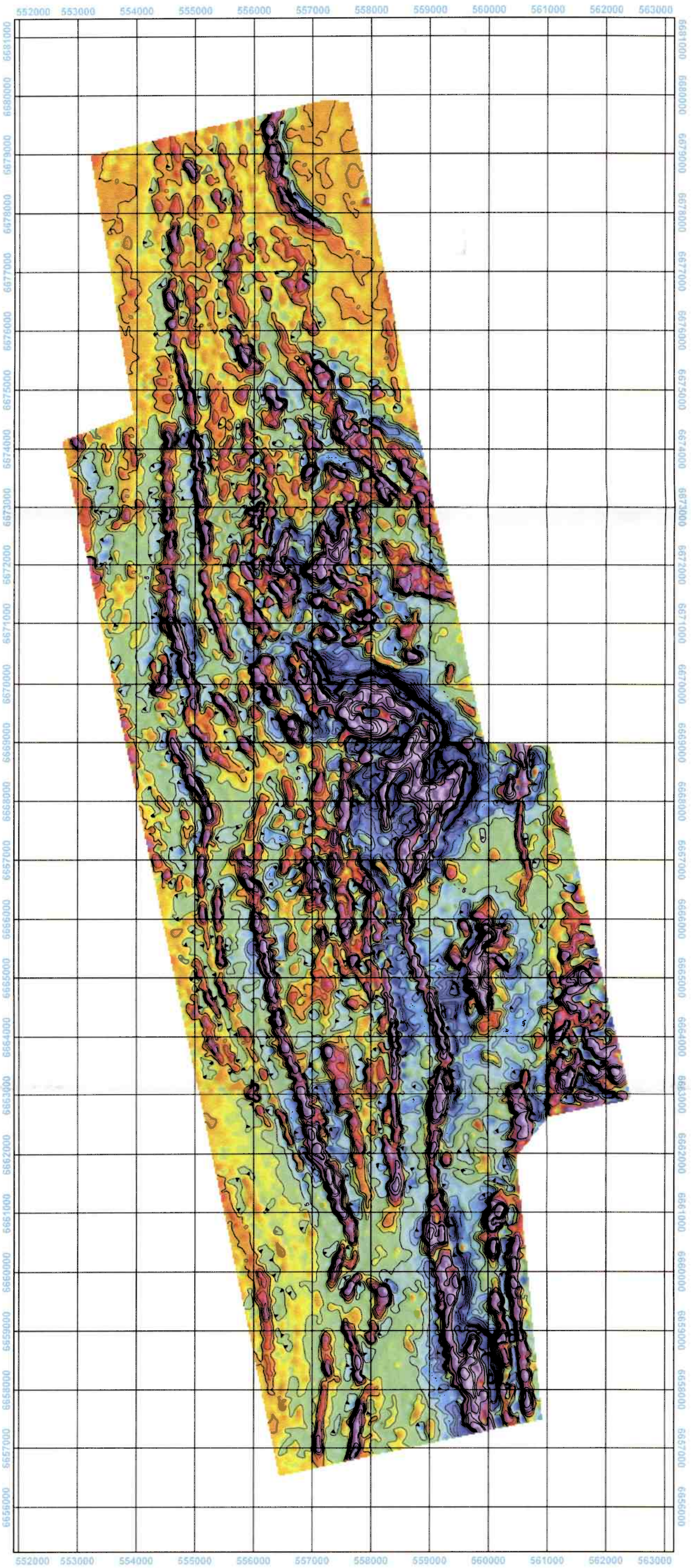
http://www.ngu.no

Drawing no:

2006.021-02A



GEODETIC DATUM: WGS84
CONFORM CYLINDERPROJECTION
Numbers in BLUE for UTM coordinates, zone 32N

nanoTesla/m

-1.6053 -0.7403 -0.5164 -0.3727 -0.2566 -0.1577 -0.0489 0.1130 0.3673 0.8906 3.1509

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CALCULATED VERTICAL GRADIENT

Vertical Magnetic Gradient (in NanoTeslas per meter).
Calculated from the total field magnetics.
Contours given in following intervalls:

0.25nT/m
0.5nT/m
1.0nT/m
2.0nT/m

Colours - distributed after colourscale.

Cesium high sensitivity magnetometer.
Sensor elevation - 30 metres.

NAVIGATION

The entire area was covered by GPS navigation.

The nominal flying height above ground level in the area is 60 metres.

A/S SULFIDMALM

CALCULATED VERTICAL MAGNETIC GRADIENT

Colours and contours

Ertelien

Buskerud

Drawing: *Mogaard,J.O.*	Date: *FEB2006*	Obs: *JOM/JK*
Scale 1:50 000 1000 0 1000 2000 3000 (metres)		Mapsheet (1:50 000): *1815 IV Sperillen* *1815 III Hønefoss* *1715 II Krøderen*

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Drawing no:
2006.021-03A

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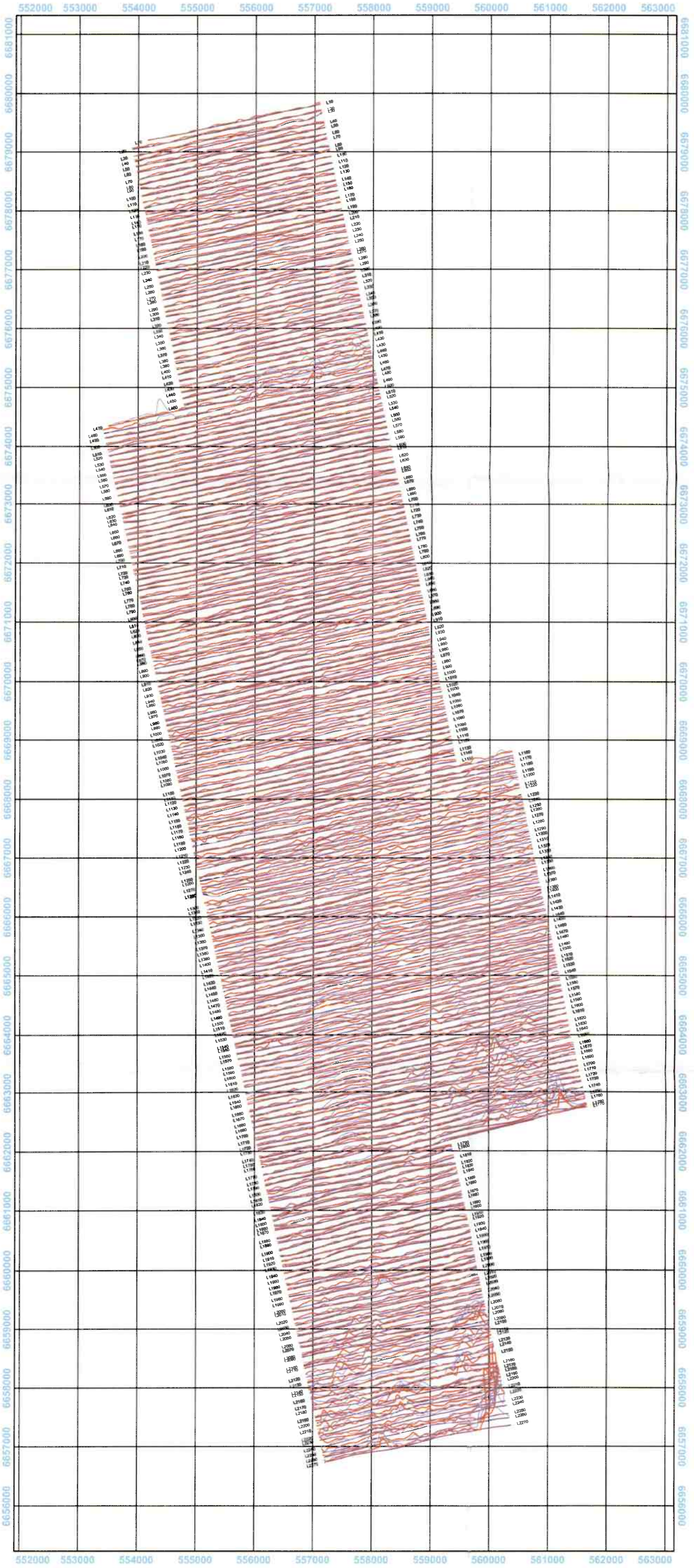
6681000 6680000 6679000 6678000 6677000 6676000 6675000 6674000 6673000 6672000 6671000 6670000 6669000 6668000 6667000 6666000 6665000 6664000 6663000 6662000 6661000 6660000 6659000 6658000 6657000 6656000 6655000



552000 553000 554000 555000 556000 557000 558000 559000 560000 561000 562000 563000

GEODETIC DATUM: WGS84
CONFORM CYLINDERPROJECTION
Numbers in BLUE for UTM coordinates, zone 32N

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HEM 7001 Hz COAXIAL

Frequency : 7001 Hz (coaxial orientation)
Coil spacing : 6 m

InPhase
Quad.

Inphase : 5 ppm/mm
Quadrature : 5 ppm/mm

NAVIGATION

The entire area was covered by GPS navigation.

The nominal flying height above ground level in the area is 60 metres.

A/S SULFIDMALM

HEM STACKED PROFILES 7001 Hz COAXIAL

Ertelien

Buskerud

Drawing: *Mogaard,J.O.*	Date: *FEB2006*	Obs: *JOM/JK*

Scale 1:50 000

1000 0 1000 2000 3000

(metres)

Mapsheet (1:50 000):
1815 IV Sperillen
1815 III Hønefoss
1715 II Krøderen

NGU Geology for Society since 1858

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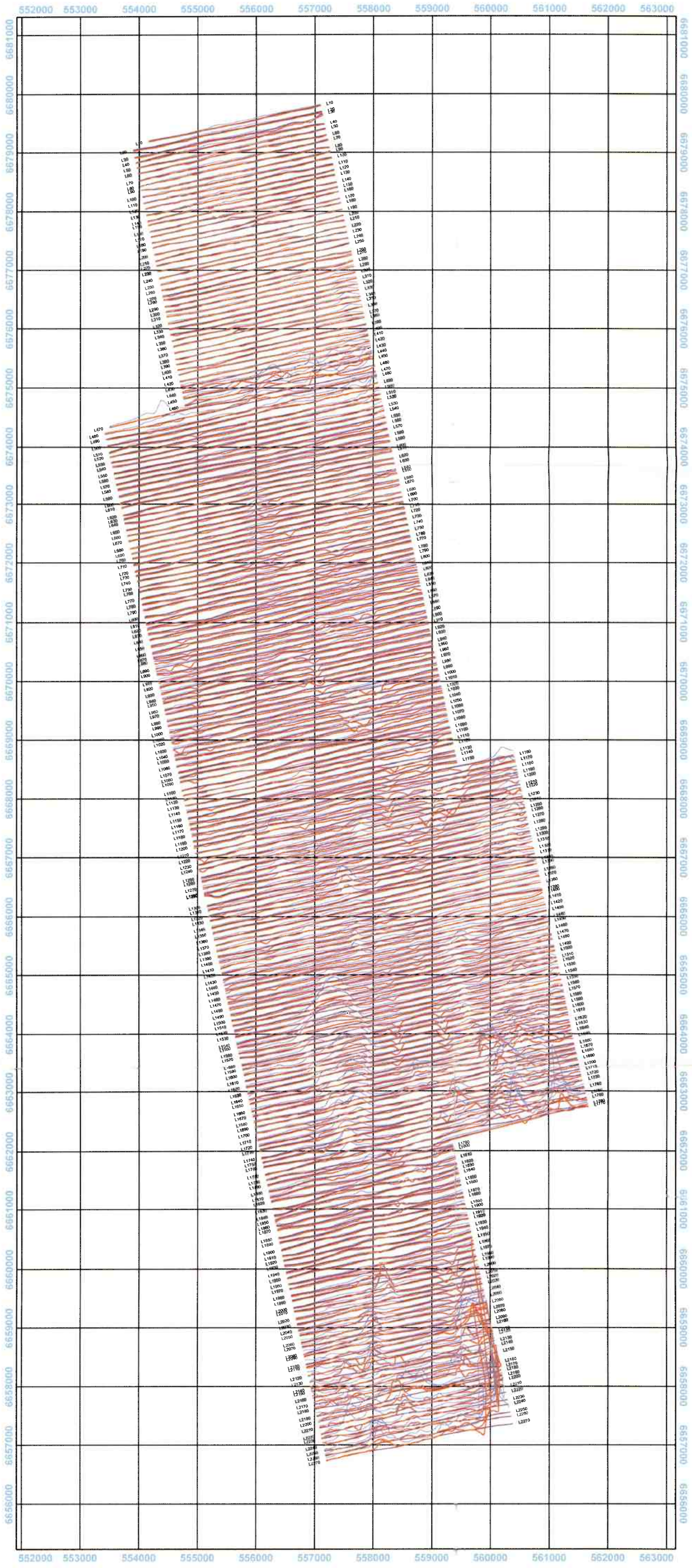
http://www.ngu.no

Drawing no:
2006.021-04A



GEODETIC DATUM: WGS84
CONFORM CYLINDERPROJECTION
Numbers in BLUE for UTM coordinates, zone 32N

NGU
Norges geologiske undersøkelse
Geological Survey of Norway

N

HEM 6606 Hz COPLANAR

Frequency : 6606 Hz (horizontal, coplanar orientation)
Coil spacing : 6 m

InPhase
Quad.

Inphase : 10 ppm/mm
Quadrature : 10 ppm/mm

NAVIGATION

The entire area was covered by GPS navigation.

The nominal flying height above ground level in the area is 60 metres.

A/S SULFIDMALM

HEM STACKED PROFILES 6606 Hz COPLANAR

Ertelien

Buskerud

Drawing: *Mogaard,J.O.*	**Date:** *FEB2006*	**Obs:** *JOM/JK*

Scale 1:50 000

1000 0 1000 2000 3000

(metres)

Mapsheet (1:50 000):
1815 IV Sperillen
1815 III Hønefoss
1715 II Krøderen

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GEOLOGICAL SURVEY OF NORWAY
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N-7491 TRONDHEIM
Tel +47-73 90 40 00, Fax +47-73 92 16 20
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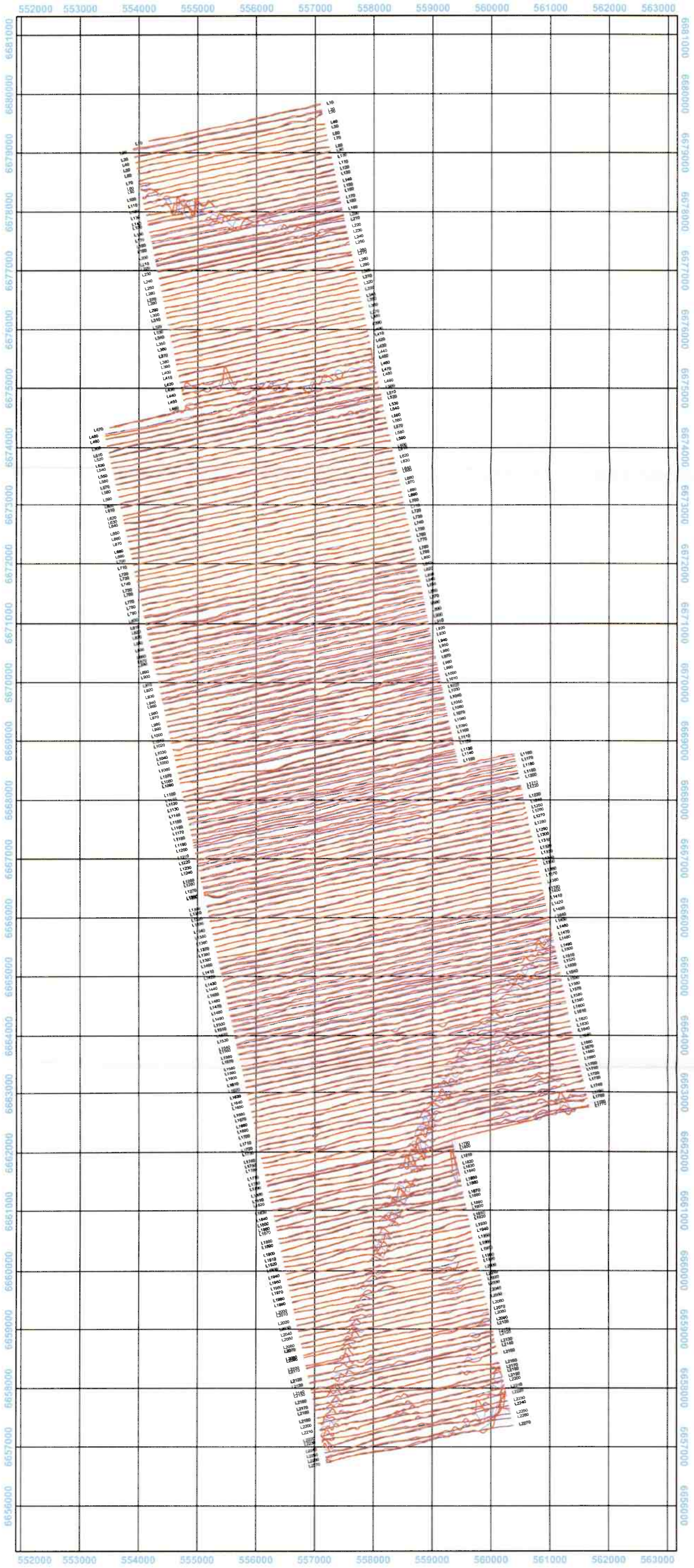
Drawing no:
2006.021-05A



GEODETIC DATUM: WGS84
CONFORM CYLINDERPROJECTION
Numbers in BLUE for UTM coordinates, zone 32N

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Geological Survey of Norway

N

HEM 980 Hz COAXIAL

Frequency : 980 Hz (coaxial orientation)
Coil spacing : 6 m

InPhase
Quad.

Inphase : 5 ppm/mm
Quadrature : 5 ppm/mm

NAVIGATION

The entire area was covered by GPS navigation.

The nominal flying height above ground level in the area is 60 metres.

A/S SULFIDMALM

HEM STACKED PROFILES 980 Hz COAXIAL

Ertelien

Buskerud

Drawing: *Mogaard,J.O.*	**Date:** *FEB2006*	**Obs:** *JOM/JK*

Scale 1:50 000

1000 0 1000 2000 3000

(metres)

Mapsheet (1:50 000):
1815 IV Sperillen
1815 III Hønefoss
1715 II Krøderen

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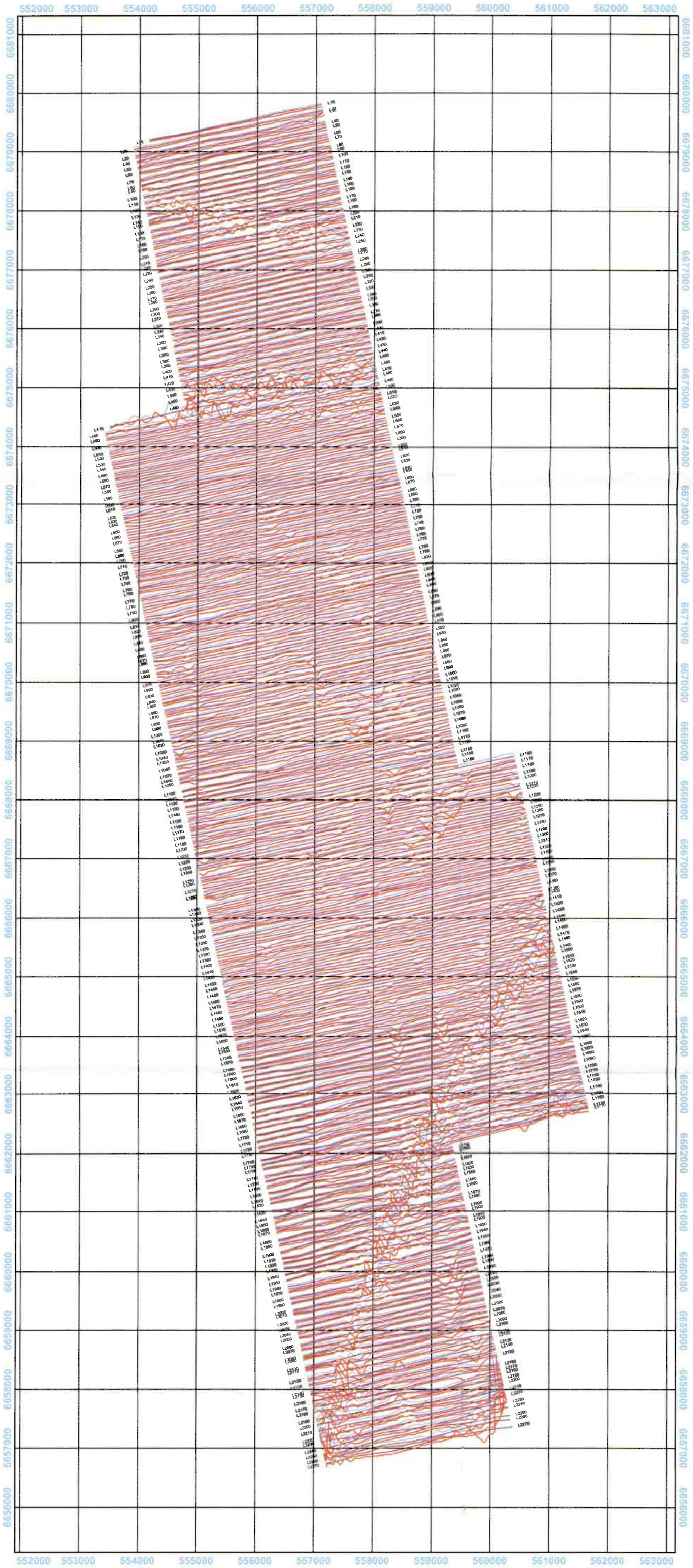
Drawing no:

2006.021-06A



GEODETIC DATUM: WGS84
CONFORM CYLINDERPROJECTION
Numbers in BLUE for UTM coordinates, zone 32N

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Norges geologiske undersøkelse
Geological Survey of Norway

HEM 880 Hz COPLANAR

Frequency : 880 Hz (horizontal, coplanar orientation)
Coil spacing : 6 m

InPhase
Quad.

Inphase : 10 ppm/mm
Quadrature : 10 ppm/mm

NAVIGATION

The entire area was covered by GPS navigation.

The nominal flying height above ground level in the area is 60 metres.

A/S SULFIDMALM

HEM STACKED PROFILES 880 Hz COPLANAR

Ertelien

Buskerud

Drawing: *Mogaard,J.O.*	**Date:** *FEB2006*	**Obs:** *JOM/JK*

Scale 1:50 000

1000 0 1000 2000 3000

(metres)

Mapsheet (1:50 000):
1815 IV Sperillen
1815 III Hønefoss
1715 II Krøderen

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GEOLOGICAL SURVEY OF NORWAY
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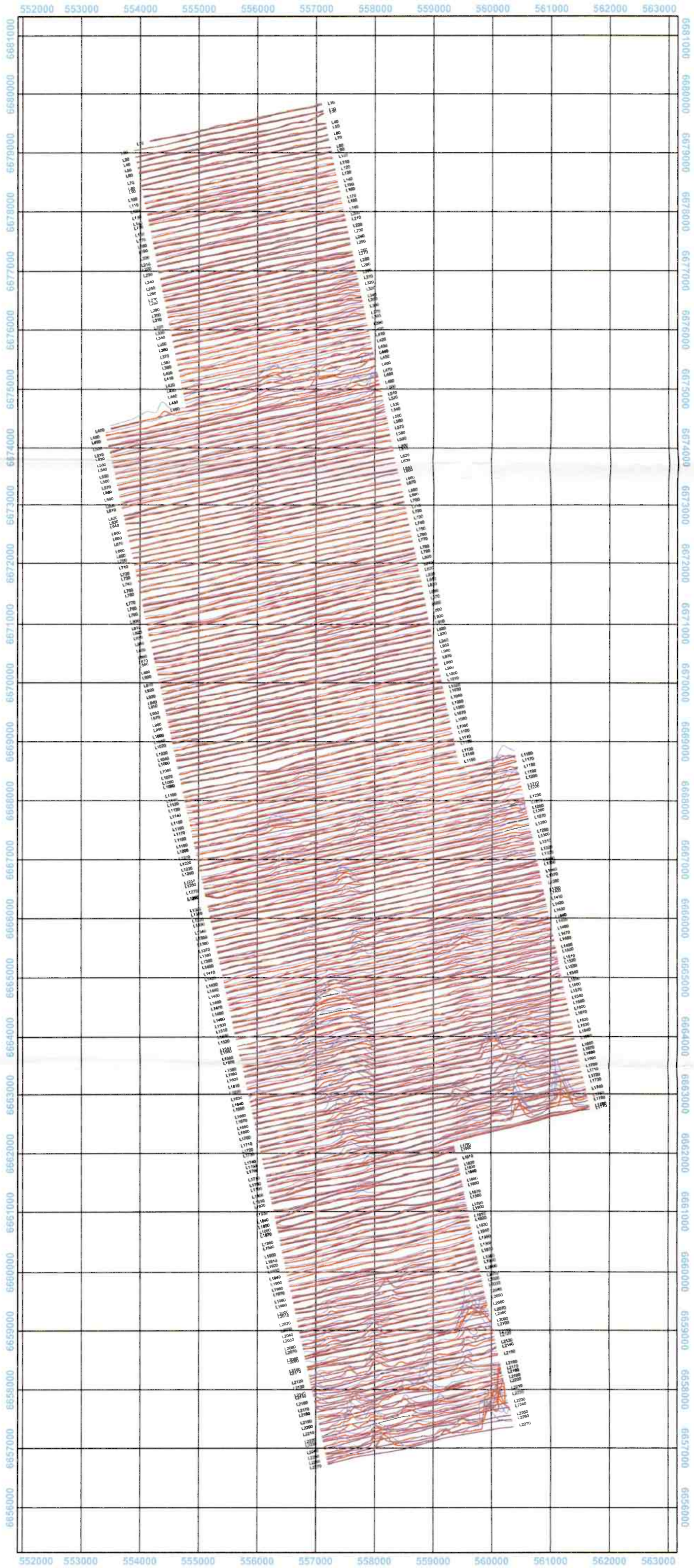
Drawing no:
2006.021-07A



GEODETIC DATUM: WGS84
CONFORM CYLINDERPROJECTION
Numbers in BLUE for UTM coordinates, zone 32N

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Geological Survey of Norway

HEM 34133 Hz COPLANAR

Frequency : 34133 Hz (horizontal, coplanar orientation)
Coil spacing : 4.2 m

InPhase
Quad

Inphase : 20 ppm/mm
Quadrature : 20 ppm/mm

NAVIGATION

The entire area was covered by GPS navigation.

The nominal flying height above ground level in the area is 60 metres.

A/S SULFIDMALM

HEM STACKED PROFILES 34133 Hz COPLANAR

Ertelien

Buskerud

Drawing: *Mogaard,J.O.*	**Date:** *FEB2006*	**Obs:** *JOM/JK*

Scale 1:50 000

1000 0 1000 2000 3000

(metres)

Mapsheet (1:50 000):
1815 IV Sperillen
1815 III Hønefoss
1715 II Krøderen

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Drawing no:
2006.021-08A

552000 553000 554000 555000 556000 557000 558000 559000 560000 561000 562000 563000

6681000 6680000 6679000 6678000 6677000 6676000 6675000 6674000 6673000 6672000 6671000 6670000 6669000 6668000 6667000 6666000 6665000 6664000 6663000 6662000 6661000 6660000 6659000 6658000 6657000 6656000

GEODETIC DATUM: WGS84
CONFORM CYLINDERPROJECTION
Numbers in BLUE for UTM coordinates, zone 32N

mS/m
0.01483 0.04049 0.05515 0.07031 0.08624 0.10718 0.13918 0.21182 0.42157 1.35429

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Geological Survey of Norway

APPARENT CONDUCTIVITY

Calculated from 6606 horizontal coplanar response.

Contours: given in following intervalls (mS/m)

0.1
1.0
2.0
5.0

Colours - distributed after colourscale.

Sensor elevation - 30 meters.

NAVIGATION

The entire area was covered by GPS navigation.

The nominal flying height above ground level in the area is 60 metres.

A/S SULFIDMALM

EM APPARENT CONDUCTIVITY 6606 Hz H.Coplanar

Colours and contours

Ertelien

Buskerud

Drawing: *Mogaard,J.O.*	Date: *FEB2006*	Obs: *JOM/JK*
Scale 1:50 000 1000 0 1000 2000 3000 (metres)		Mapsheet (1:50 000): *1815 IV Sperillen* *1815 III Hønefoss* *1715 II Krøderen*

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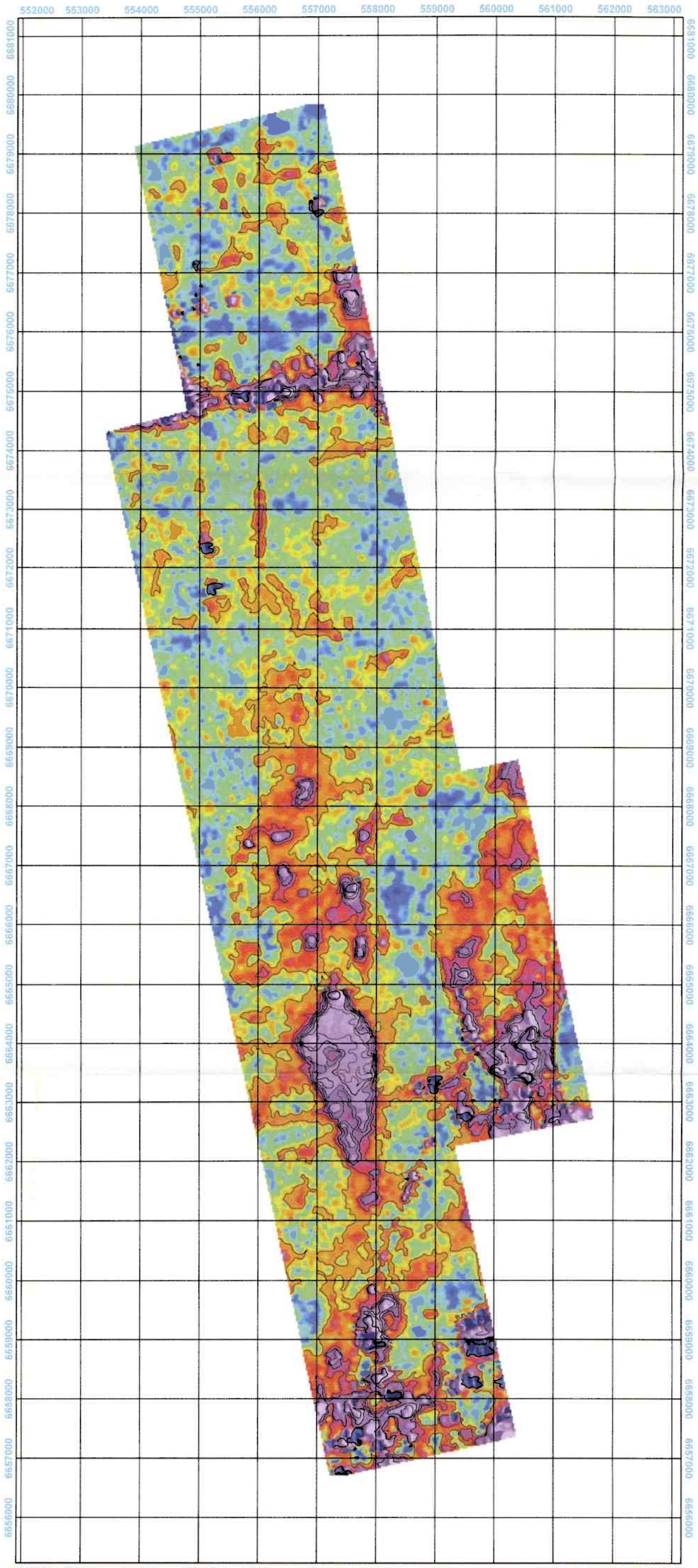
Drawing no:
2006.021-09A



GEODETIC DATUM: WGS84
CONFORM CYLINDERPROJECTION
Numbers in BLUE for UTM coordinates, zone 32N

mS/m

0.01895	0.06439	0.09151	0.11800	0.14757	0.18379	0.23395	0.32240	0.54361	1.64374

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Geological Survey of Norway

N

APPARENT CONDUCTIVITY

Calculated from 7001 Hz coaxial response.

Contours: given in following intervalls (mS/m)

0.1
1.0
2.0
5.0

Colours - distributed after colourscale.

Sensor elevation - 30 meters.

NAVIGATION

The entire area was covered by GPS navigation.

The nominal flying height above ground level in the area is 80 metres.

A/S SULFIDMALM

EM APPARENT CONDUCTIVITY 7001Hz Coaxial

Colours and contours

Ertelien

Buskerud

Drawing: *Mogaard,J.O.*	Date: *FEB2006*	Obs: *JOM/JK*

Scale 1:50 000

1000 0 1000 2000 3000

(metres)

Mapsheet (1:50 000):
1815 IV Sperillen
1815 III Hønefoss
1715 II Krøderen

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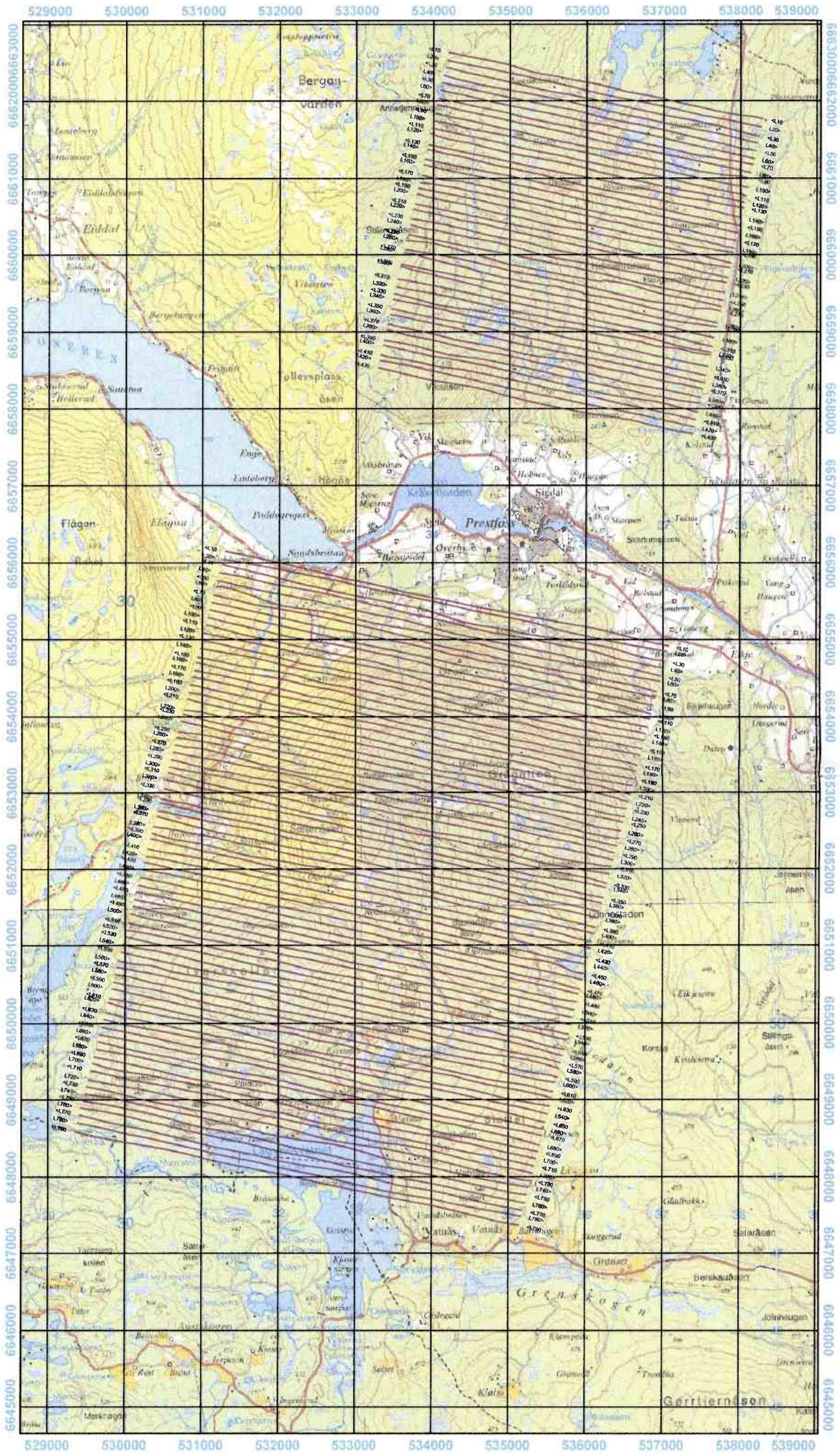
Drawing no:

2006.021-10A



GEODETIC DATUM: WGS84
CONFORM CYLINDERPROJECTION
Numbers in BLUE for UTM coordinates, zone 32N

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NAVIGATION

The entire area was covered by GPS navigation.

The nominal flying height above ground level in the area is 60 metres.

A/S SULFIDMALM

FLIGHTPATH

Sigdal

Buskerud

Drawing: *Mogaard,J.O.*	**Date:** *FEB2006*	**Obs:** *JOM/JK*

Scale 1:50 000

1000 0 1000 2000 3000

(metres)

Mapsheet (1:50 000):
1714 I Hokksund
1714 IV Flesberg
1715 III Eggedal
1715 II Krøderen

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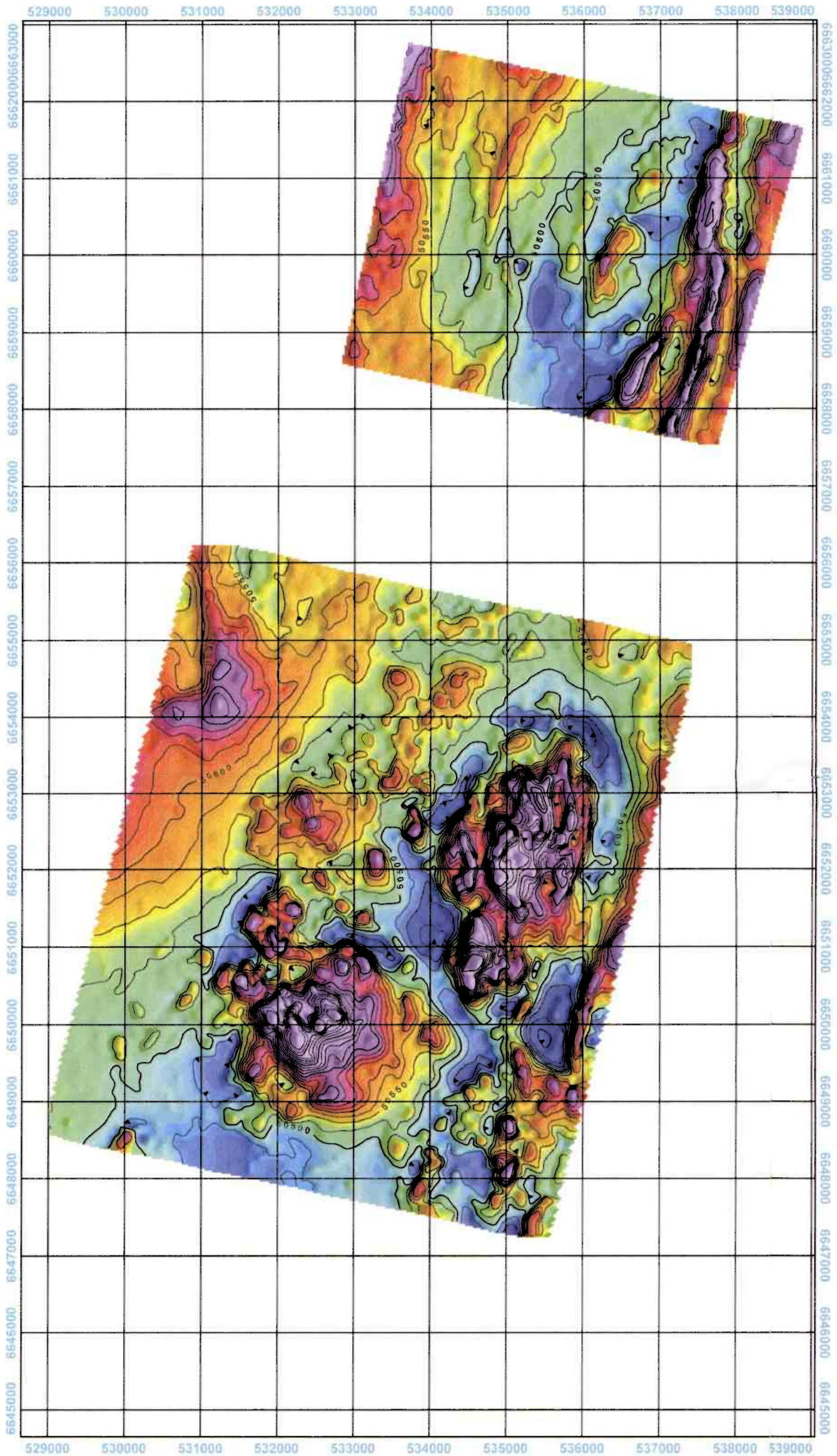
Drawing no:

2006.021-01C



GEODETIC DATUM: WGS84
CONFORM CYLINDERPROJECTION
Numbers in BLUE for UTM coordinates, zone 32N

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N

TOTAL MAGNETIC FIELD

The intensity of the total magnetic field is in nanoTesla.

Contours given in following intervalls:

25nT
50nT
100nT
500nT

Colours - distributed after colourscale.

Data are corrected for diurnal variations using a basemagnetometer located at Eggemoen airfield.

A high sensitivity cesiummagnetometer sensor is used and nominal sensor elevation is 30 metres.

NAVIGATION

The entire area was covered by GPS navigation.

The nominal flying height above ground level in the area is 60 metres.

A/S SULFIDMALM

TOTAL MAGNETIC FIELD

Colours and contours

Sigdal

Buskerud

Drawing: *Mogaard,J.O.*	Date: *FEB2006*	Obs: *JOM/JK*

Scale 1:50 000

1000 0 1000 2000 3000

(metres)

Mapsheet (1:50 000):
1714 I Hokksund
1714 IV Flesberg
1715 III Eggedal
1715 II Krøderen

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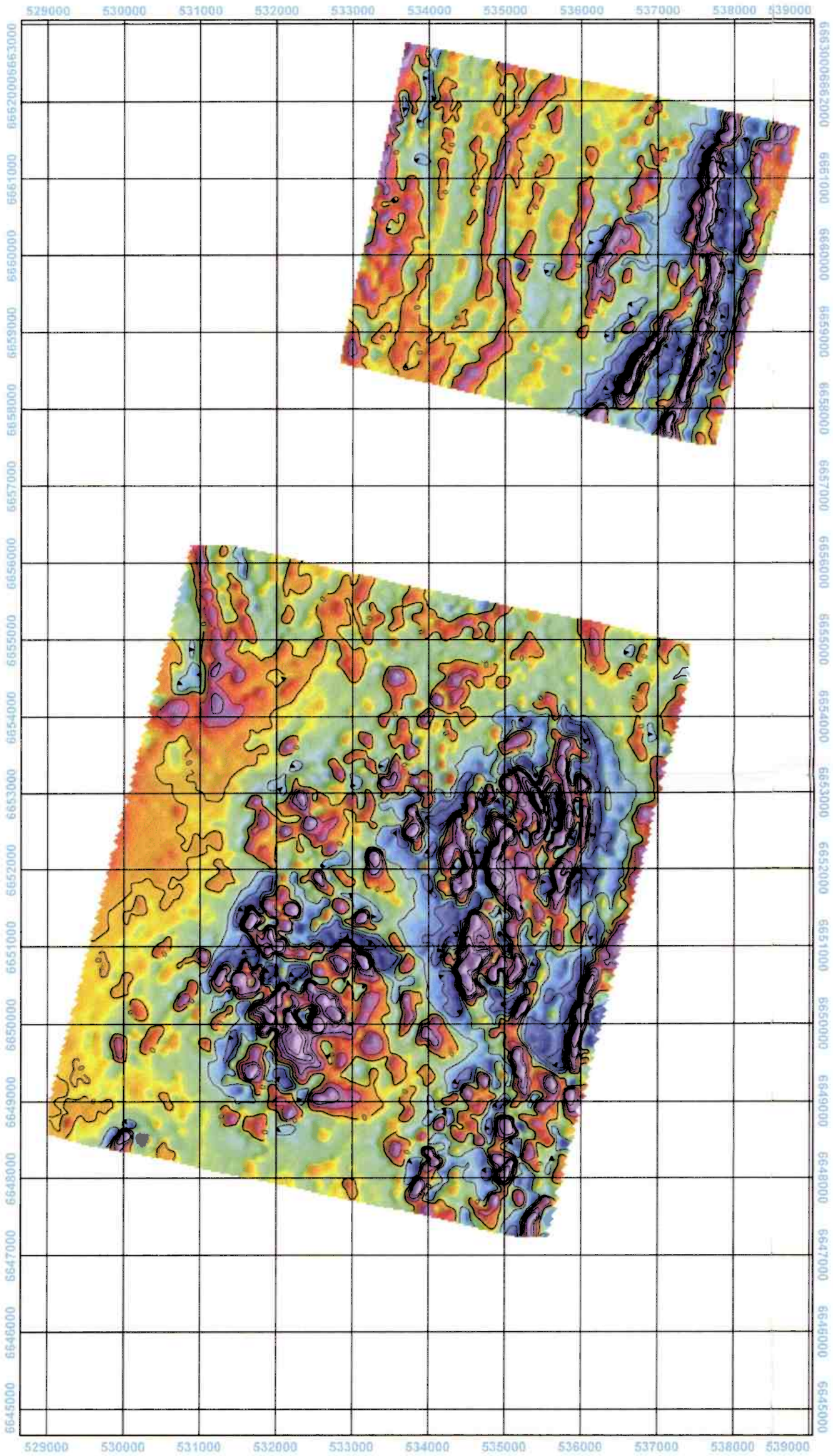
Drawing no:

2006.021-02C



GEODETIC DATUM: WGS84
CONFORM CYLINDERPROJECTION
Numbers in BLUE for UTM coordinates, zone 32N

nanoTesla/m

-0.6339 -0.3126 -0.1860 -0.1174 -0.0724 -0.0333 0.0066 0.0512 0.1298 0.2848 0.6708

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CALCULATED VERTICAL GRADIENT

Vertical Magnetic Gradient (in NanoTeslas per meter).
Calculated from the total field magnetics.
Contours given in following intervalls:

0.25nT/m
0.5nT/m
1.0nT/m
2.0nT/m

Colours - distributed after colourscale.

Cesium high sensitivity magnetometer.
Sensor elevation - 30 metres.

NAVIGATION

The entire area was covered by GPS navigation.

The nominal flying height above ground level in the area is 60 metres.

A/S SULFIDMALM

CALCULATED VERTICAL MAGNETIC GRADIENT

Colours and contours

Sigdal

Buskerud

Drawing: *Mogaard,J.O.*	Date: *FEB2006*	Obs: *JOM/JK*

Scale 1:50 000

1000 0 1000 2000 3000

(metres)

Mapsheet (1:50 000):
1714 I Hokksund
1714 IV Flesberg
1715 III Eggedal
1715 II Krøderen

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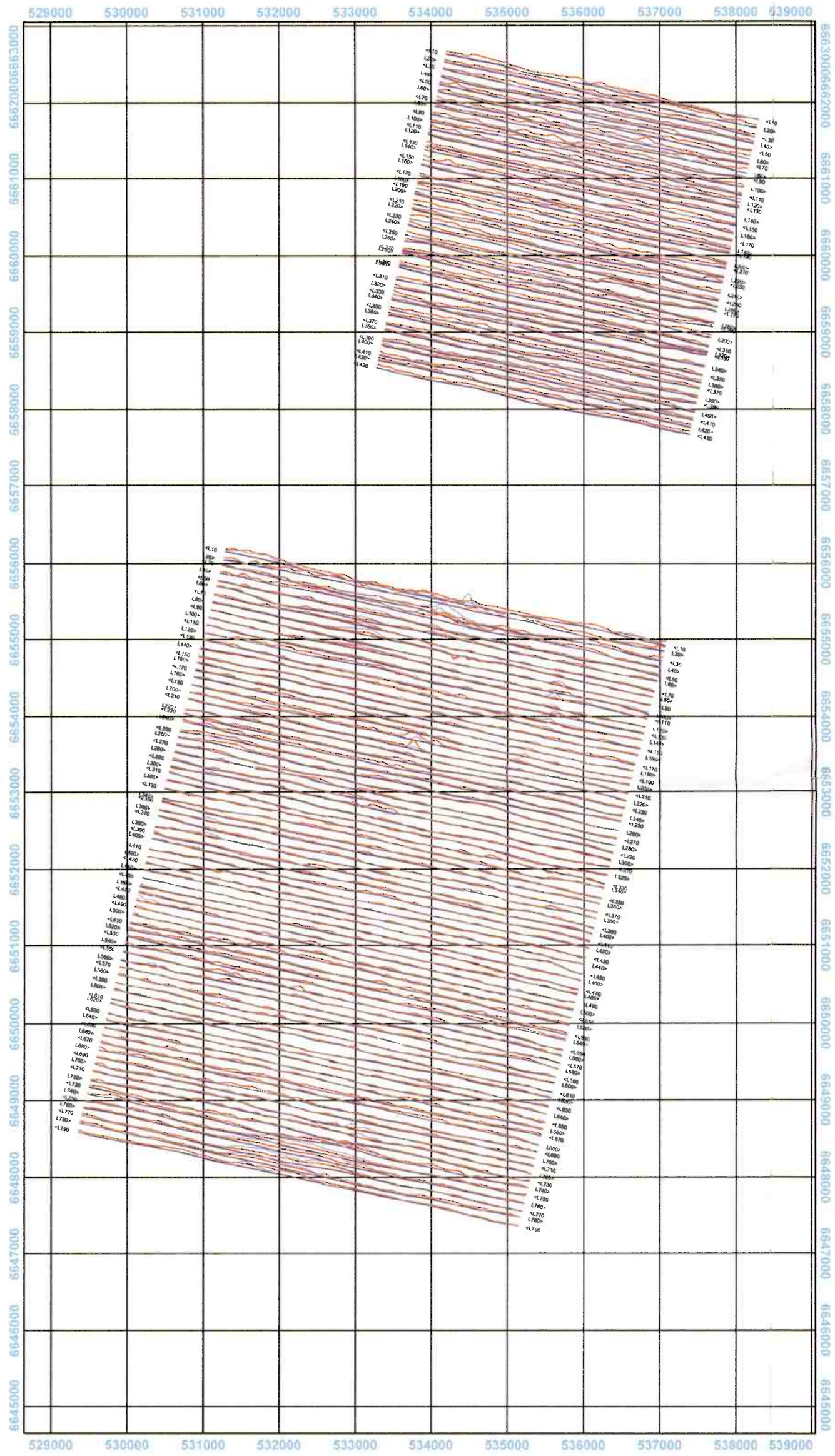
Drawing no:

2006.021-03C



GEODETIC DATUM: WGS84
CONFORM CYLINDERPROJECTION
Numbers in BLUE for UTM coordinates, zone 32N

NGU

Geology for Society since 1858

N

HEM 7001 Hz COAXIAL

Frequency : 7001 Hz (coaxial orientation)
Coil spacing : 6 m

InPhase
Quad.

Inphase : 5 ppm/mm
Quadrature : 5 ppm/mm

NAVIGATION

The entire area was covered by GPS navigation.

The nominal flying height above ground level in the area is 60 metres.

A/S SULFIDMALM

HEM STACKED PROFILES 7001 Hz COAXIAL

Sigdal

Buskerud

Drawing: *Mogaard,J.O.*	Date: *FEB2006*	Obs: *JOM/JK*

Scale 1:50 000

1000 0 1000 2000 3000

(metres)

Mapsheet (1:50 000):
1714 I Hokksund
1714 IV Flesberg
1715 III Eggedal
1715 II Krøderen

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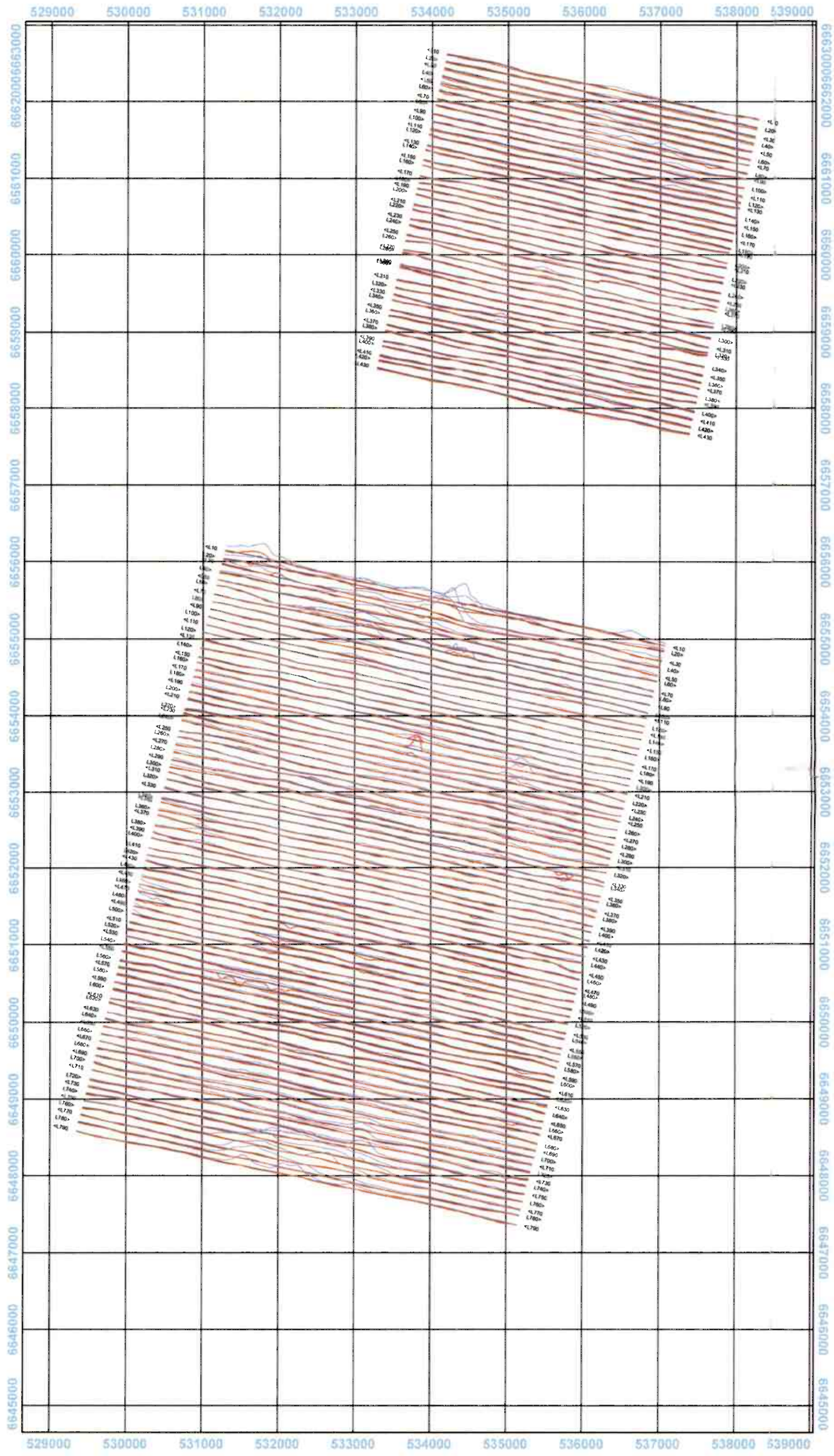
Drawing no:
2006.021-04C



GEODETIC DATUM: WGS84
CONFORM CYLINDERPROJECTION
Numbers in BLUE for UTM coordinates, zone 32N

NGU

Geology for Society since 1858

N

HEM 6606 Hz COPLANAR

Frequency : 6606 Hz (horizontal, coplanar orientation)
Coil spacing : 6 m

InPhase
Quad.

Inphase : 10 ppm/mm
Quadrature : 10 ppm/mm

NAVIGATION

The entire area was covered by GPS navigation.

The nominal flying height above ground level in the area is 60 metres.

A/S SULFIDMALM

HEM STACKED PROFILES 6606 Hz COPLANAR

Sigdal

Buskerud

Drawing: *Mogaard,J.O.*	Date: *FEB2006*	Obs: *JOM/JK*
Scale 1:50 000 1000 0 1000 2000 3000 (metres)		Mapsheet (1:50 000): *1714 I Hokksund* *1714 IV Flesberg* *1715 III Eggedal* *1715 II Krøderen*

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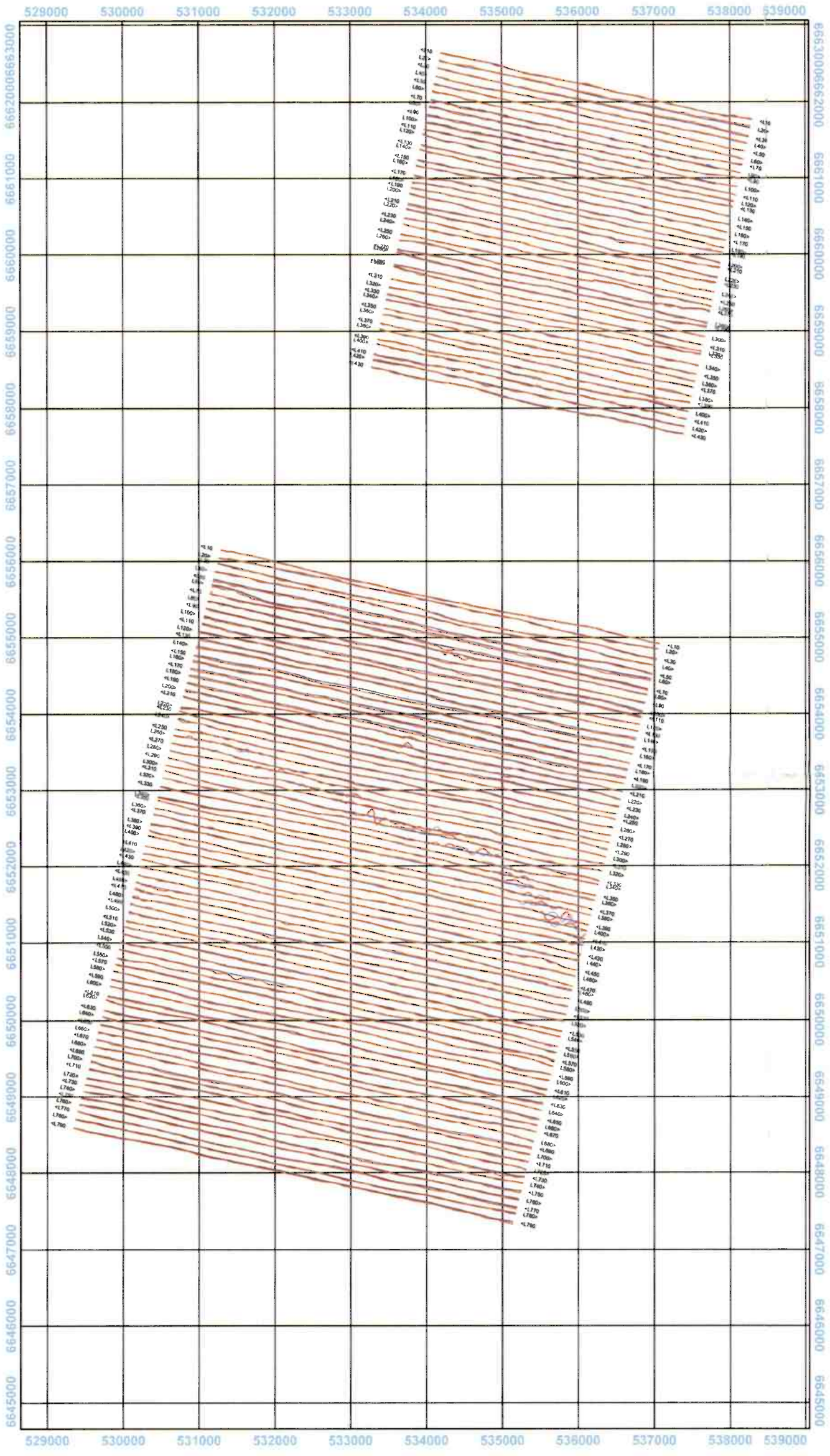
Drawing no:
2006.021-05C



GEODETIC DATUM: WGS84
CONFORM CYLINDERPROJECTION
Numbers in BLUE for UTM coordinates, zone 32N

NGU

Geology for Society since 1858

N

HEM 980 Hz COAXIAL

Frequency : 980 Hz (coaxial orientation)
Coil spacing : 6 m

InPhase
Quad.

Inphase : 5 ppm/mm
Quadrature : 5 ppm/mm

NAVIGATION

The entire area was covered by GPS navigation.

The nominal flying height above ground level in the area is 60 metres.

A/S SULFIDMALM

HEM STACKED PROFILES 980 Hz COAXIAL

Sigdal

Buskerud

Drawing: *Mogaard,J.O.*	**Date:** *FEB2006*	**Obs:** *JOM/JK*

Scale 1:50 000

1000 0 1000 2000 3000

(metres)

Mapsheet (1:50 000):
1714 I Hokksund
1714 IV Flesberg
1715 III Eggedal
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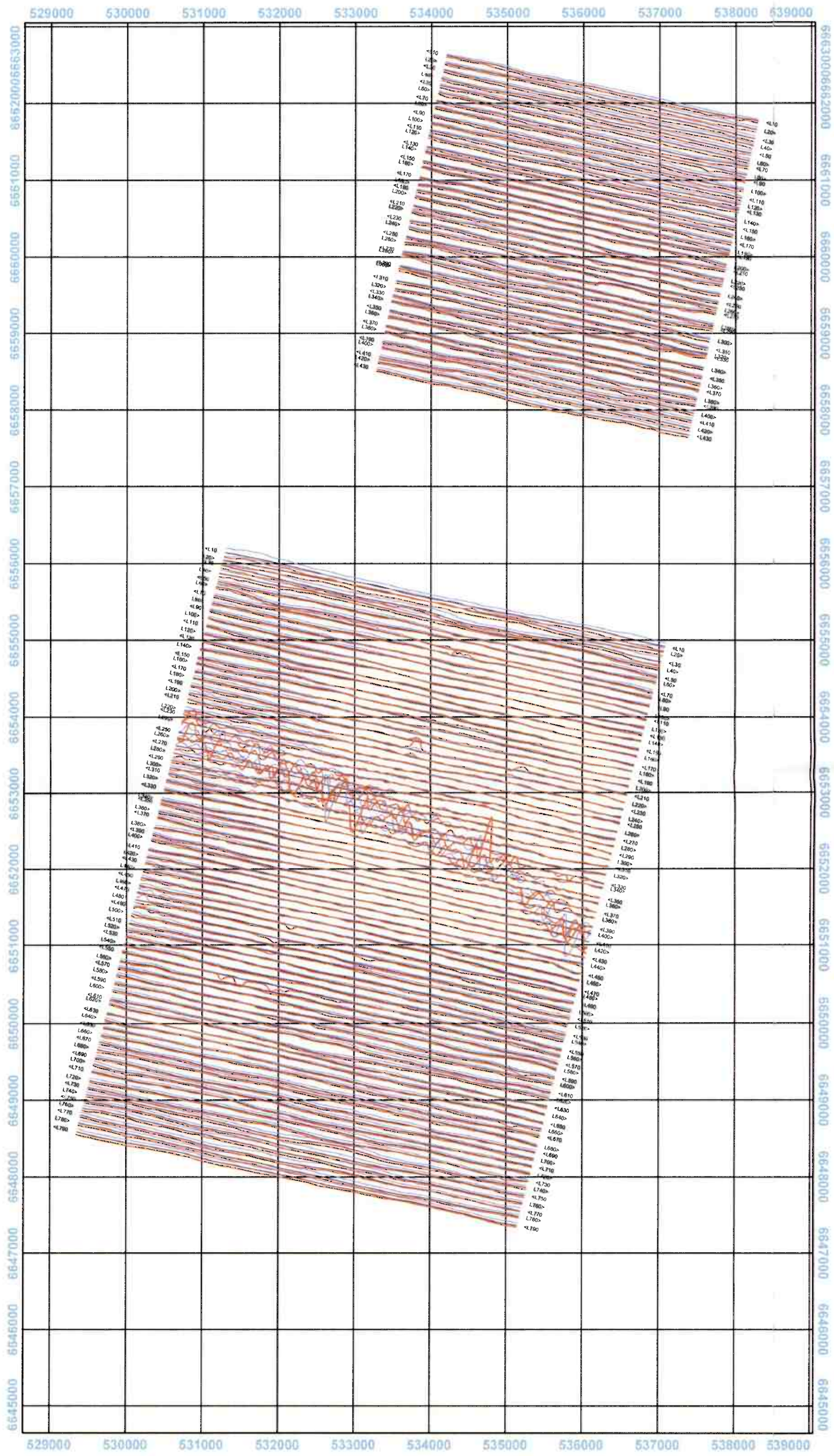
Drawing no:

2006.021-06C



GEODETIC DATUM: WGS84
CONFORM CYLINDERPROJECTION
Numbers in BLUE for UTM coordinates, zone 32N

NGU

Geology for Society since 1858

N

HEM 980 Hz COPLANAR

Frequency : 980 Hz (horizontal, coplanar orientation)
Coil spacing : 6 m

InPhase
Quad.

Inphase : 10 ppm/mm
Quadrature : 10 ppm/mm

NAVIGATION

The entire area was covered by GPS navigation.

The nominal flying height above ground level in the area is 60 metres.

A/S SULFIDMALM

HEM STACKED PROFILES 980 Hz COPLANAR

Sigdal

Buskerud

Drawing: *Mogaard,J.O.*	**Date:** *FEB2006*	**Obs:** *JOM/JK*

Scale 1:50 000

1000 0 1000 2000 3000

(metres)

Mapsheet (1:50 000):
1714 I Hokksund
1714 IV Flesberg
1715 III Eggedal
1715 II Krøderen

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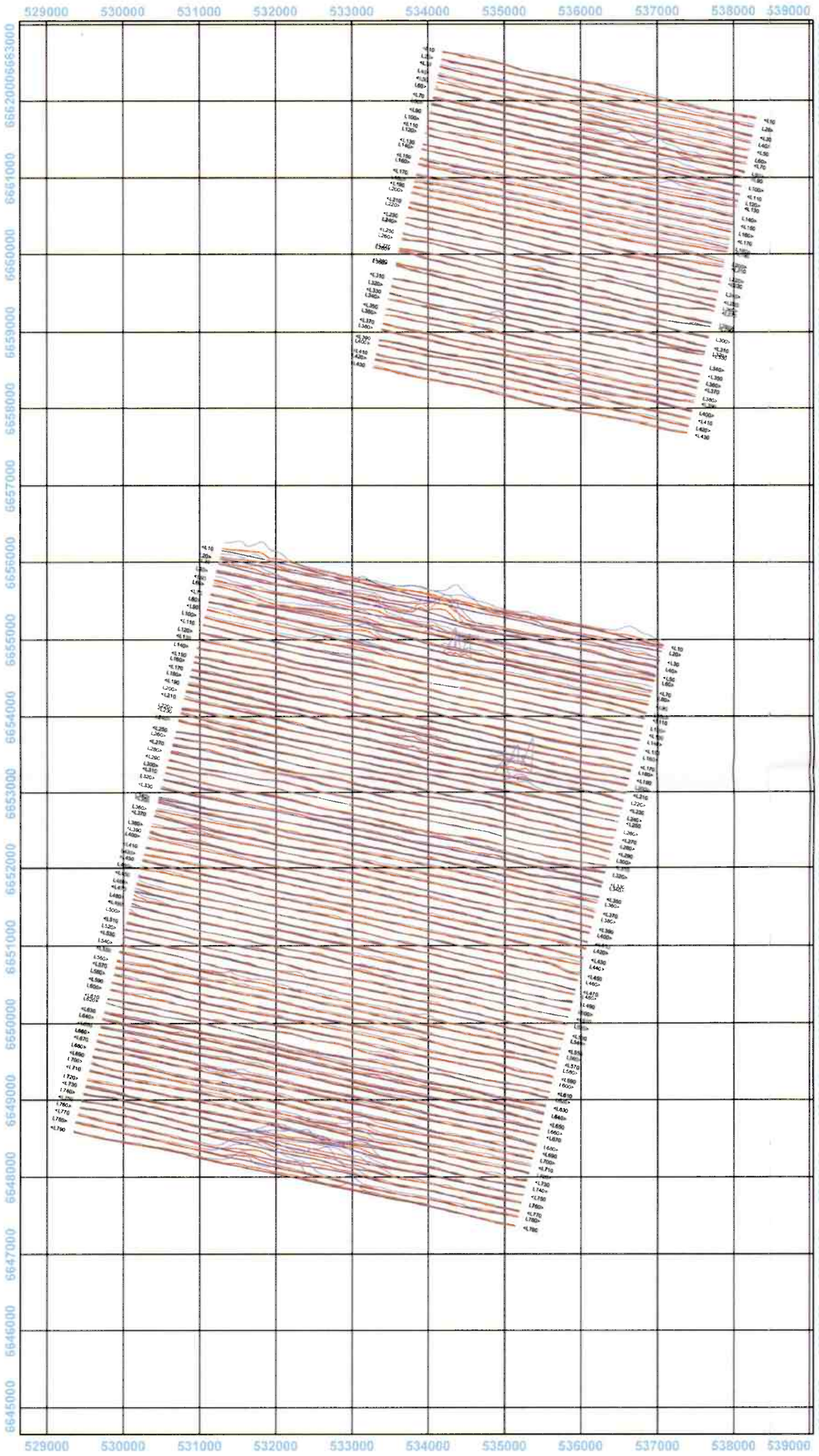
Drawing no:

2006.021-07C



GEODETIC DATUM: WGS84
CONFORM CYLINDERPROJECTION
Numbers in BLUE for UTM coordinates, zone 32N

NGU

Geology for Society since 1858

N

HEM 34133 Hz COPLANAR

Frequency : 34133 Hz (horizontal, coplanar orientation)
Coil spacing : 4.2 m

InPhase
Quad.

Inphase : 10 ppm/mm
Quadrature : 10 ppm/mm

NAVIGATION

The entire area was covered by GPS navigation.

The nominal flying height above ground level in the area is 60 metres.

A/S SULFIDMALM

HEM STACKED PROFILES 34133 Hz COPLANAR

Sigdal

Buskerud

Drawing: *Mogaard,J.O.*	Date: *FEB2006*	Obs: *JOM/JK*

Scale 1:50 000

1000 0 1000 2000 3000

(metres)

Mapsheet (1:50 000):
1714 I Hokksund
1714 IV Flesberg
1715 III Eggedal
1715 II Krøderen

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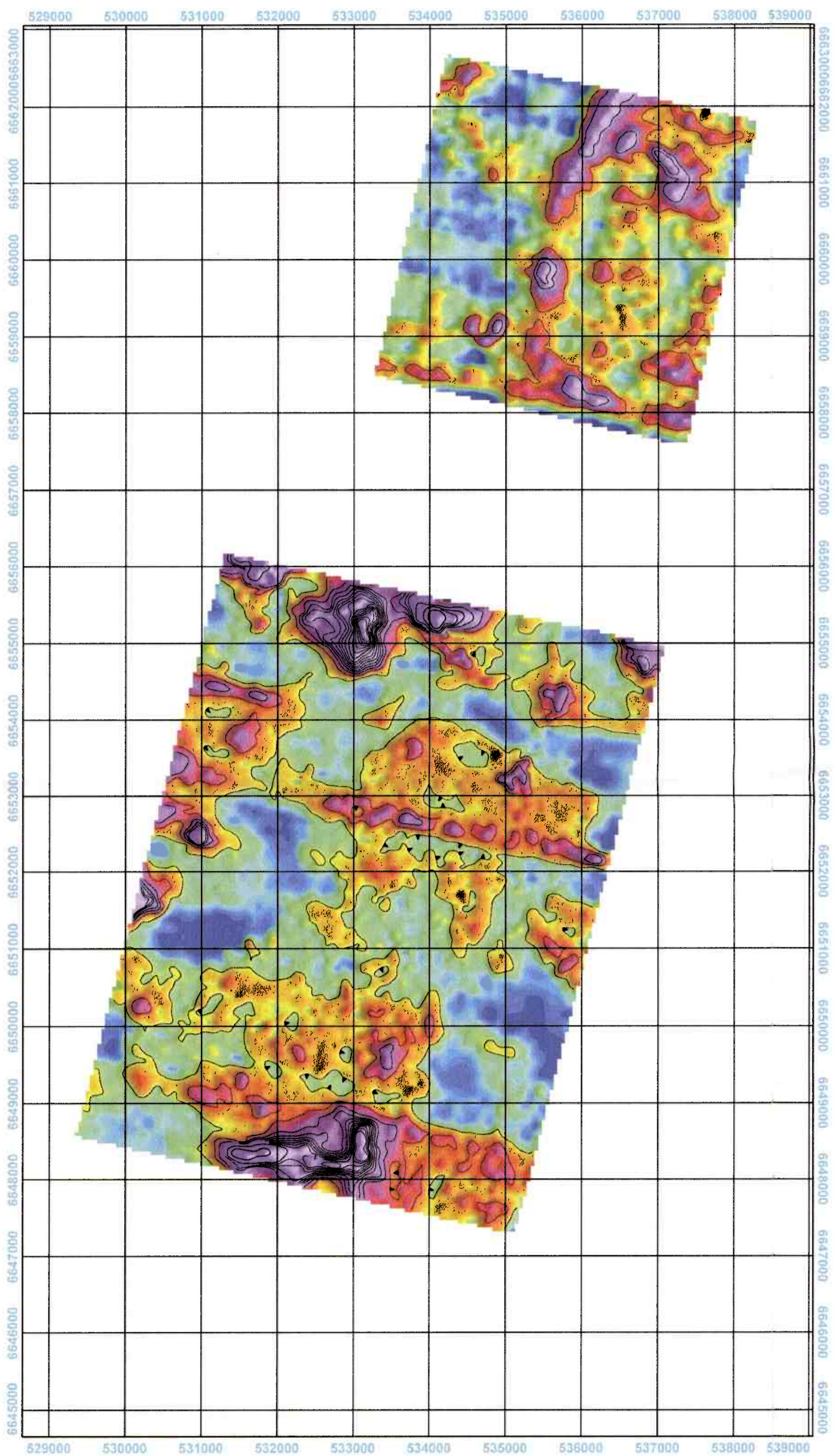
Drawing no:
2006.021-08C



GEODETIC DATUM WGS84
CONFORM CYLINDERPROJECTION
Numbers in BLUE for UTM coordinates, zone 32N

mS/m

0.02310 0.04814 0.06215 0.07666 0.09298 0.11052 0.13153 0.15981 0.20970 0.48203

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Geology for Society since 1858

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APPARENT CONDUCTIVITY

Calculated from 6606 horizontal coplanar response.

Contours: given in following intervalls (mS/m)

0.1
1.0
2.0
5.0

Colours - distributed after colourscale.

Sensor elevation - 30 meters.

NAVIGATION

The entire area was covered by GPS navigation.

The nominal flying height above ground level in the area is 60 metres.

A/S SULFIDMALM

EM APPARENT CONDUCTIVITY 6606 Hz H.Coplanar

Colours and contours

Sigdal

Buskerud

Drawing: *Mogaard,J.O.*	Date: *FEB2006*	Obs: *JOM/JK*

Scale 1:50 000

1000 0 1000 2000 3000

(metres)

Mapsheet (1:50 000):

1714 I Hokksund
1714 IV Flesberg
1715 III Eggedal
1715 II Krøderen

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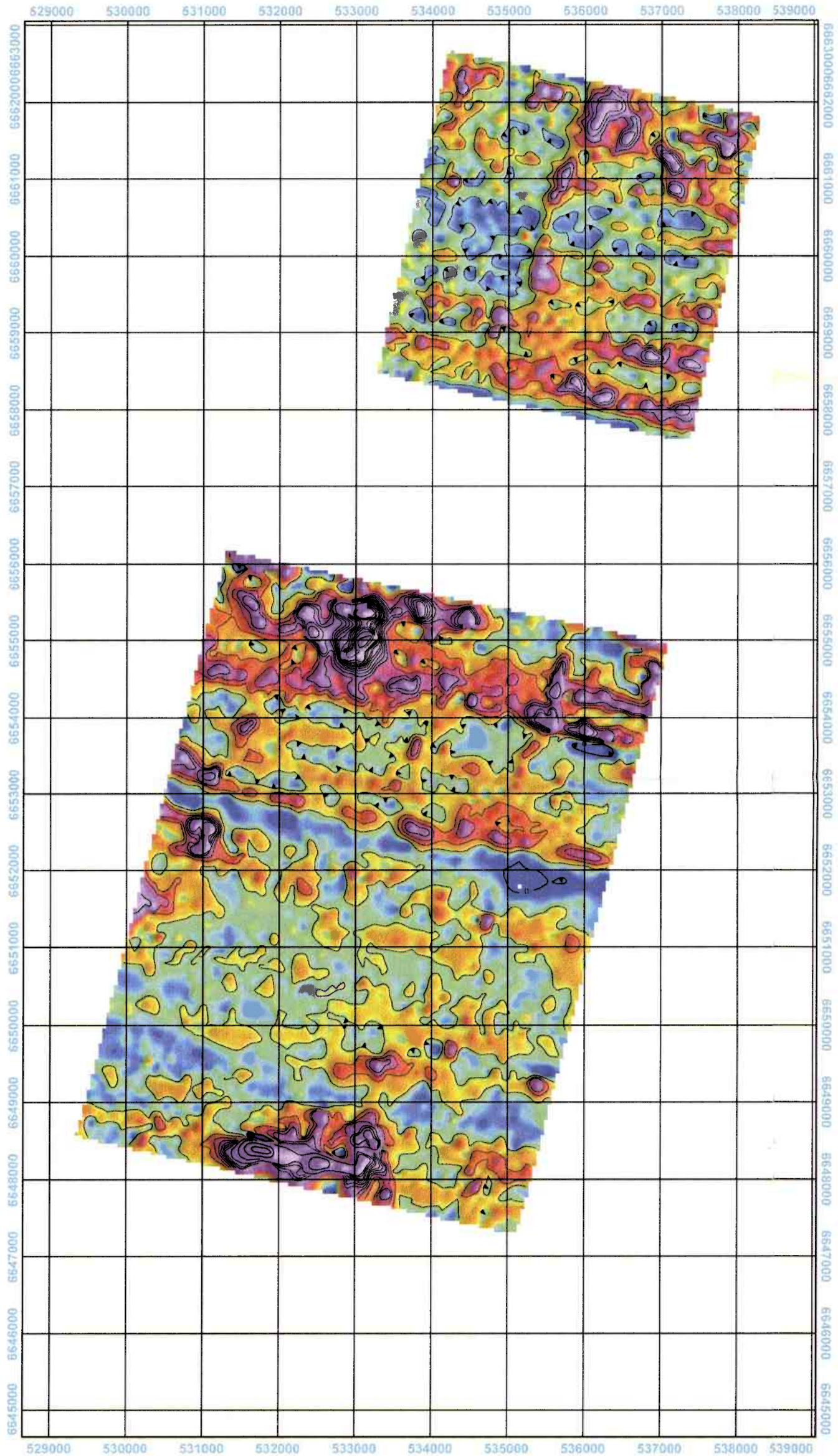
http://www.ngu.no

Drawing no:

2006.021-09C



GEODETIC DATUM: WGS84
CONFORM CYLINDERPROJECTION
Numbers in BLUE for UTM coordinates, zone 32N

mS/m

0.02605 0.05350 0.07080 0.08558 0.10086 0.11869 0.14454 0.18299 0.26849 0.58311

NGU

Geology for Society since 1858

N

APPARENT CONDUCTIVITY

Calculated from 7001 Hz coaxial response.

~~Contours: given in following intervalls (mS/m)~~

0.1
1.0
2.0
5.0

Colours - distributed after colourscale.

Sensor elevation - 30 meters.

NAVIGATION

The entire area was covered by GPS navigation.

The nominal flying height above ground level in the area is 60 metres.

A/S SULFIDMALM

EM APPARENT CONDUCTIVITY 7001 Hz COAXIAL

Colours and contours

Sigdal

Buskerud

Drawing: *Mogaard,J.O.*	**Date:** *FEB2006*	**Obs:** *JOM/JK*

Scale 1:50 000

1000 0 1000 2000 3000

(metres)

Mapsheet (1:50 000):
1714 I Hokksund
1714 IV Flesberg
1715 III Eggedal
1715 II Krøderen

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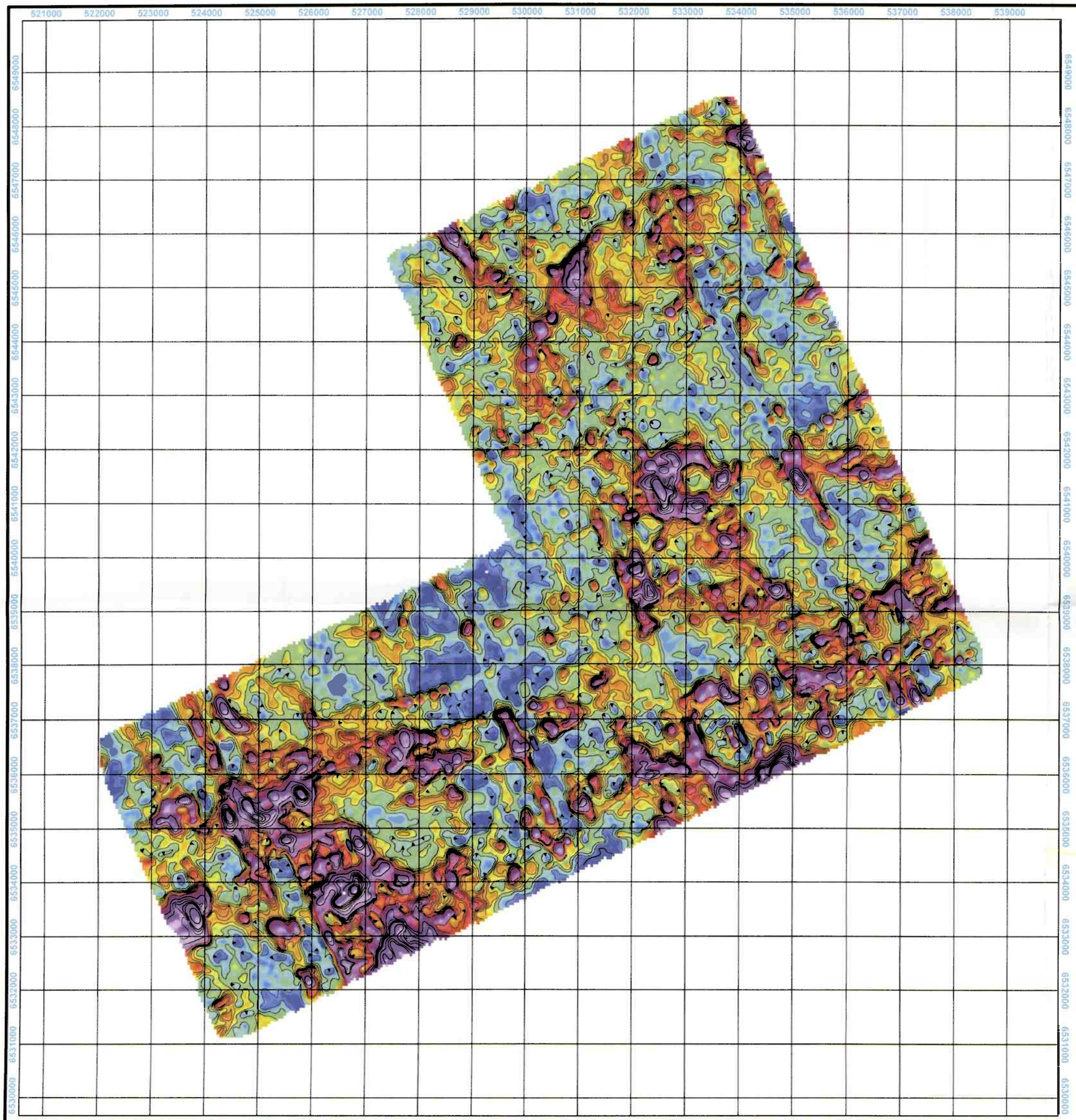
Drawing no:

2006.021-10C



GEODETIC DATUM: WGS84
CONFORM CYLINDERPROJECTION
Numbers in BLUE for UTM coordinates, zone 32N

NGU

Geology for Society since 1858

N

APPARENT CONDUCTIVITY

Calculated from 7001 Hz coaxial response.

Contours: given in following intervalls (mS/m)

0.1
1.0
2.0
5.0

Colours - distributed after colourscale.

Sensor elevation - 30 meters.

NAVIGATION

The entire area was covered by GPS navigation.

The nominal flying height above ground level in the area is 60 metres.

A/S SULFIDMALM

EM APPARENT CONDUCTIVITY 7001 Hz Coaxial

Colours and contours

Bamble

Telemark

Drawing: *Mogaard,J.O.*	Date: *FEB2006*	Obs: *JOM/JK*

Scale 1:50 000

1000 0 1000 2000 3000

(metres)

Mapsheet (1:50 000):
1712 IV Kragerø
1712 I Langesund
1713 II Porsgrunn
1713 III Kilebygd

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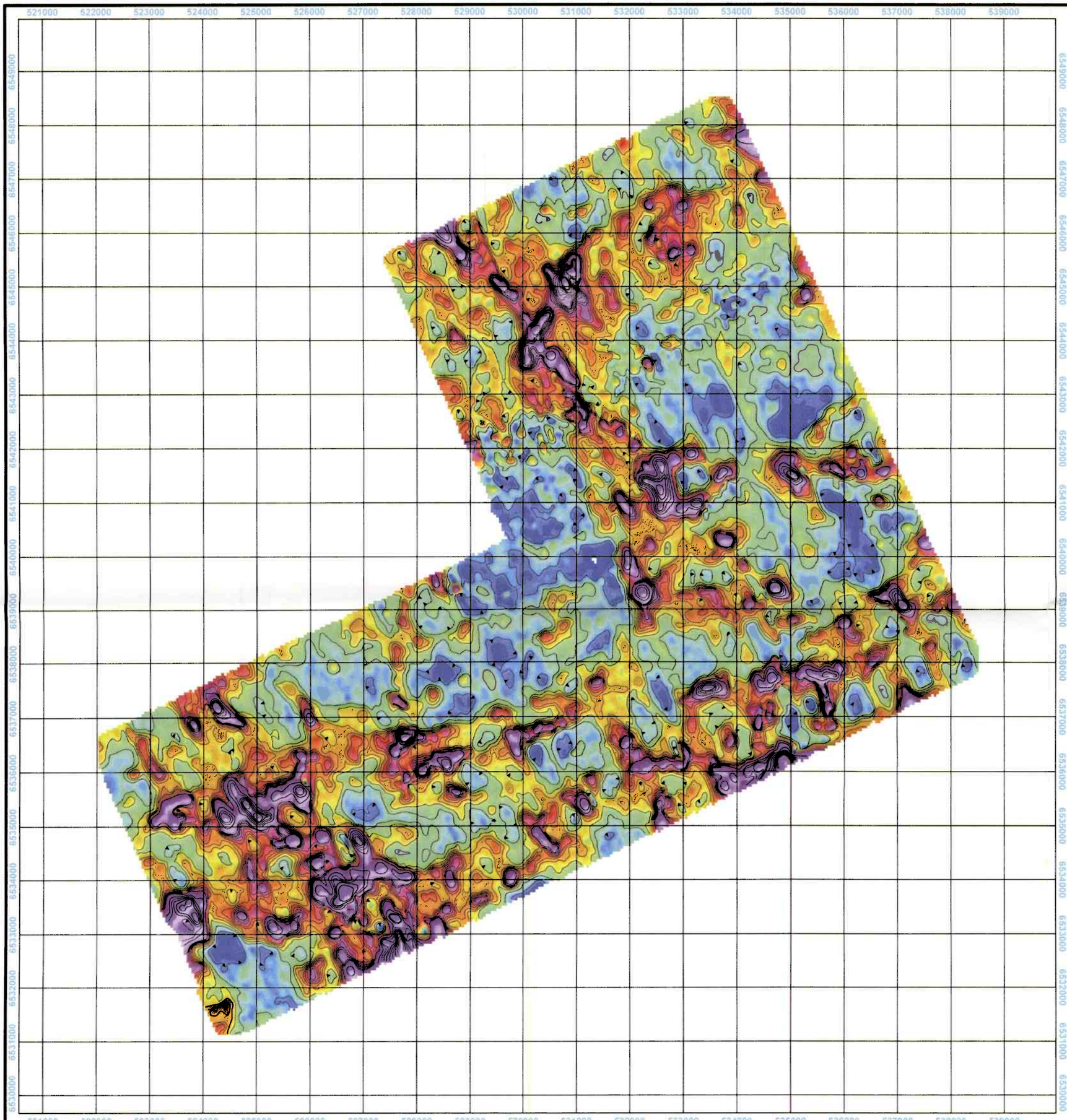
http://www.ngu.no

Drawing no:

2006.021-10B



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APPARENT CONDUCTIVITY

Calculated from 6606 horizontal coplanar response.

Contours: given in following intervalls (mS/m)

0.1
1.0
2.0
5.0

Colours - distributed after colourscale.

Sensor elevation - 30 meters.

NAVIGATION

The entire area was covered by GPS navigation.

The nominal flying height above ground level in the area is 60 metres.

A/S SULFIDMALM

EM APPARENT CONDUCTIVITY 6606 Hz H.Coplanar

Colours and contours

Bamble

Telemark

Drawing: *Mogaard,J.O.*	Date: *FEB2006*	Obs: *JOM/JK*

Scale 1:50 000

1000 0 1000 2000 3000

(metres)

Mapsheet (1:50 000):
1712 IV Kragerø
1712 I Langesund
1713 II Porsgrunn
1713 III Kilebygd

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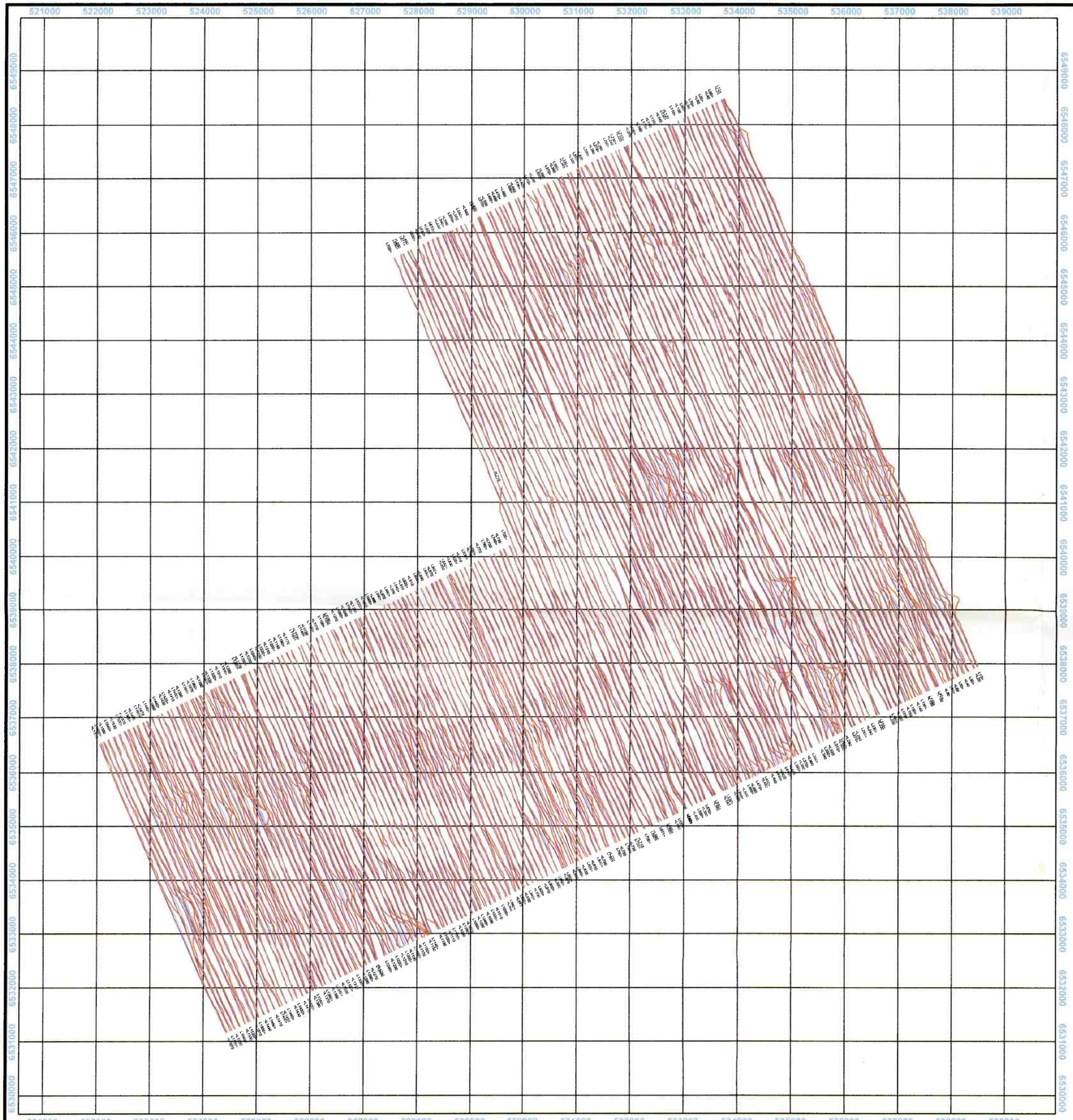
Drawing no:

2006.021-09B



GEODETIC DATUM: WGS84
CONFORM CYLINDERPROJECTION
Numbers in BLUE for UTM coordinates, zone 32N

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N

HEM 34133 Hz COPLANAR

Frequency : 34133 Hz (horizontal, coplanar orientation)
Coil spacing : 6 m

InPhase
Quad.

Inphase : 20 ppm/mm
Quadrature : 20 ppm/mm

NAVIGATION

The entire area was covered by GPS navigation.

The nominal flying height above ground level in the area is 60 metres.

A/S SULFIDMALM

HEM STACKED PROFILES 34133 Hz COPLANAR

Bamble

Telemark

Drawing: *Mogaard,J.O.*	Date: *FEB2006*	Obs: *JOM/JK*

Scale 1:50 000

1000 0 1000 2000 3000

(metres)

Mapsheet (1:50 000):
1712 IV Kragerø
1712 I Langesund
1713 II Porsgrunn
1713 III Kilebygd

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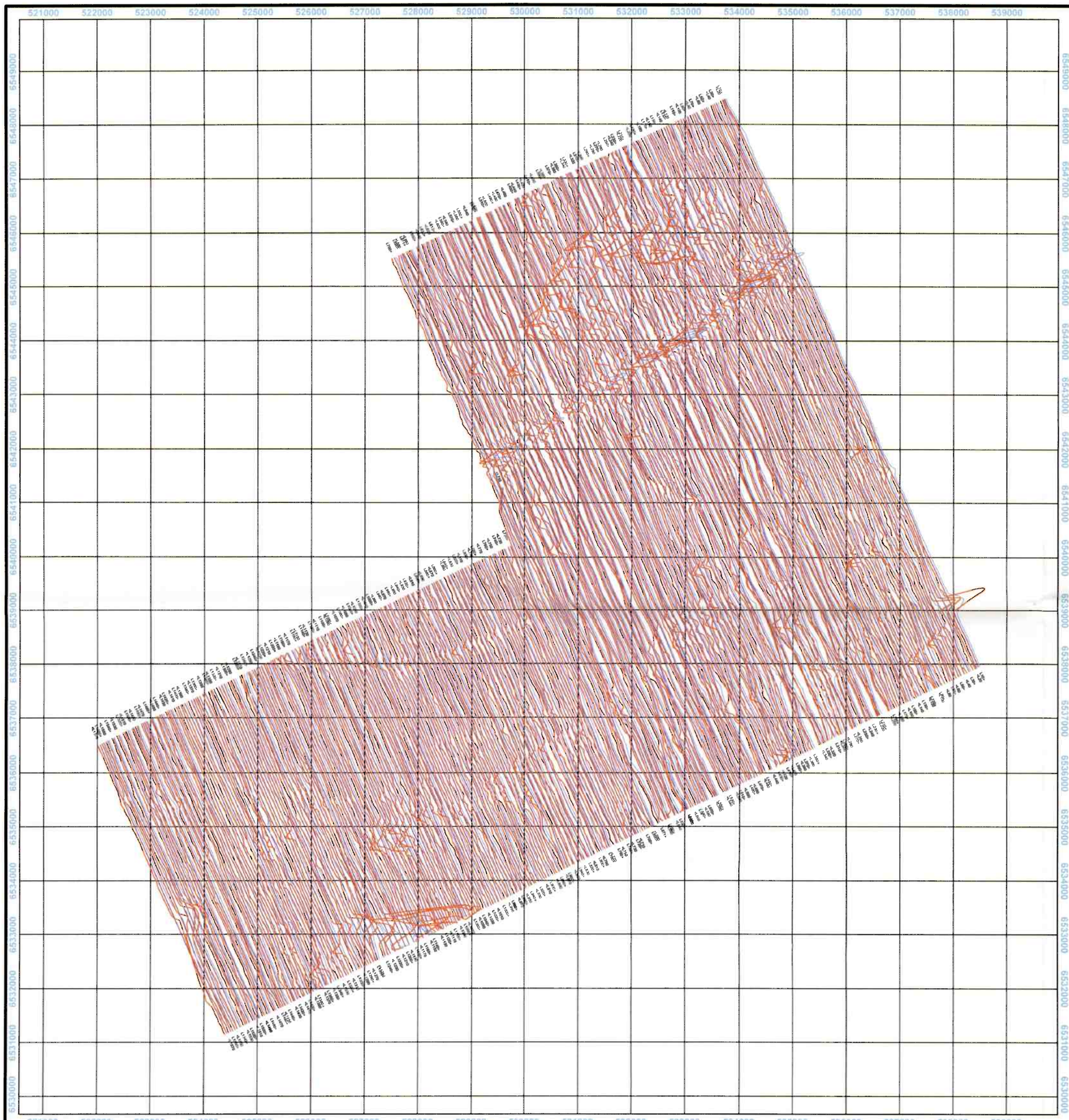
Drawing no:
2006.021-08B



GEODETIC DATUM: WGS84
CONFORM CYLINDERPROJECTION
Numbers in BLUE for UTM coordinates, zone 32N

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Geology for Society since 1858

N

HEM 880 Hz COPLANAR

Frequency : 880 Hz (horizontal, coplanar orientation)
Coil spacing : 6 m

InPhase
Quad.

Inphase : 10 ppm/mm
Quadrature : 10 ppm/mm

NAVIGATION

The entire area was covered by GPS navigation.

The nominal flying height above ground level in the area is 60 metres.

A/S SULFIDMALM

HEM STACKED PROFILES 880 Hz COPLANAR

Bamble

Telemark

Drawing: *Mogaard,J.O.*	Date: *FEB2006*	Obs: *JOM/JK*

Scale 1:50 000

1000 0 1000 2000 3000

(metres)

Mapsheet (1:50 000):
1712 IV Kragerø
1712 I Langesund
1713 II Porsgrunn
1713 III Kilebygd

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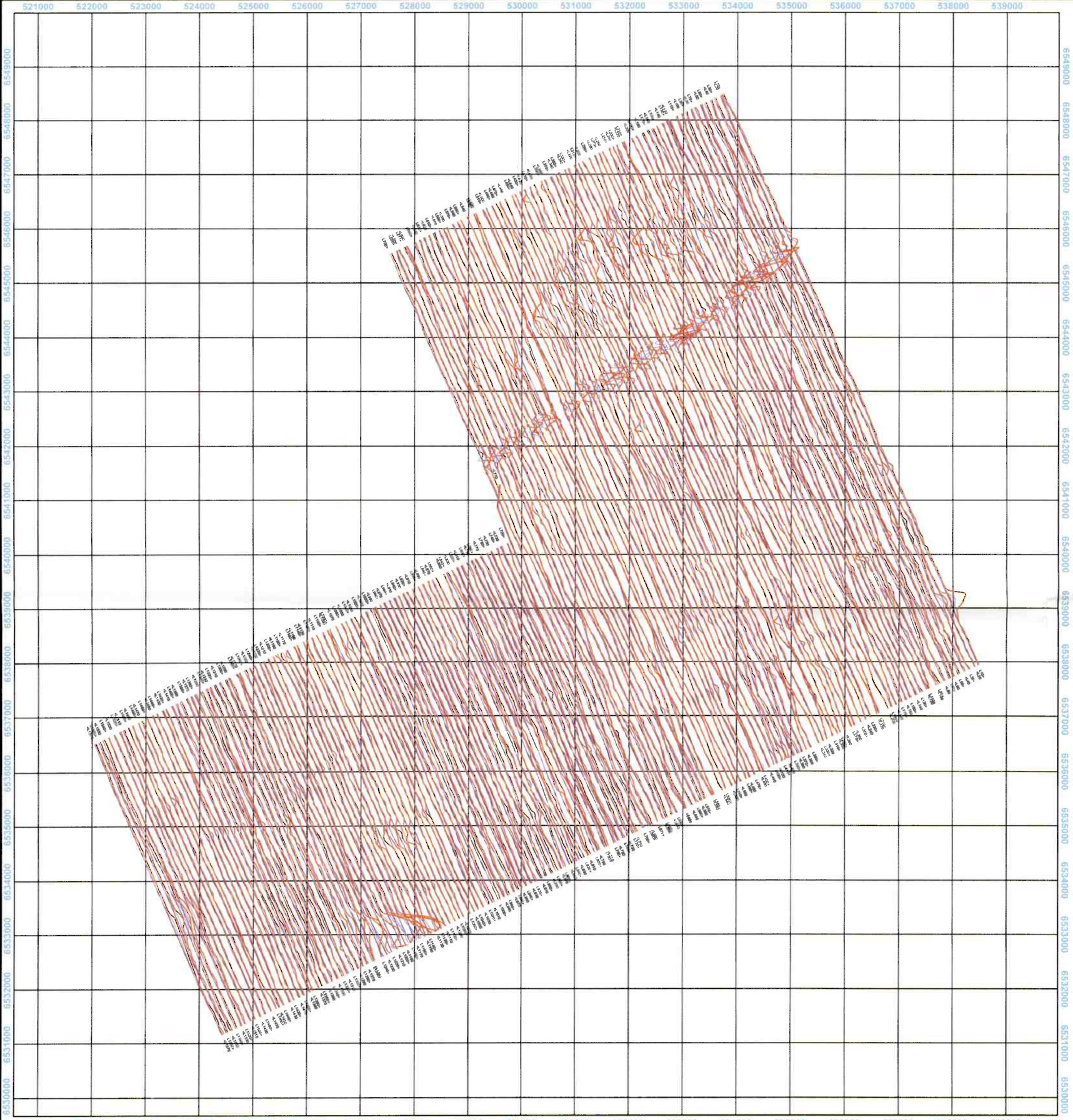
Drawing no:
2006.021-07B



GEODETIC DATUM: WGS84
CONFORM CYLINDERPROJECTION
Numbers in BLUE for UTM coordinates, zone 32N

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N

HEM 980 Hz COAXIAL

Frequency : 980 Hz (coaxial orientation)
Coil spacing : 6 m

InPhase
Quad.

Inphase : 5 ppm/mm
Quadrature : 5 ppm/mm

NAVIGATION

The entire area was covered by GPS navigation.

The nominal flying height above ground level in the area is 60 metres.

A/S SULFIDMALM

HEM STACKED PROFILES 980 Hz COAXIAL

Bamble

Telemark

Drawing: *Mogaard,J.O.*	Date: *FEB2006*	Obs: *JOM/JK*

Scale 1:50 000

1000 0 1000 2000 3000
(metres)

Mapsheet (1:50 000):
1712 IV Kragerø
1712 I Langesund
1713 II Porsgrunn
1713 III Kilebygd

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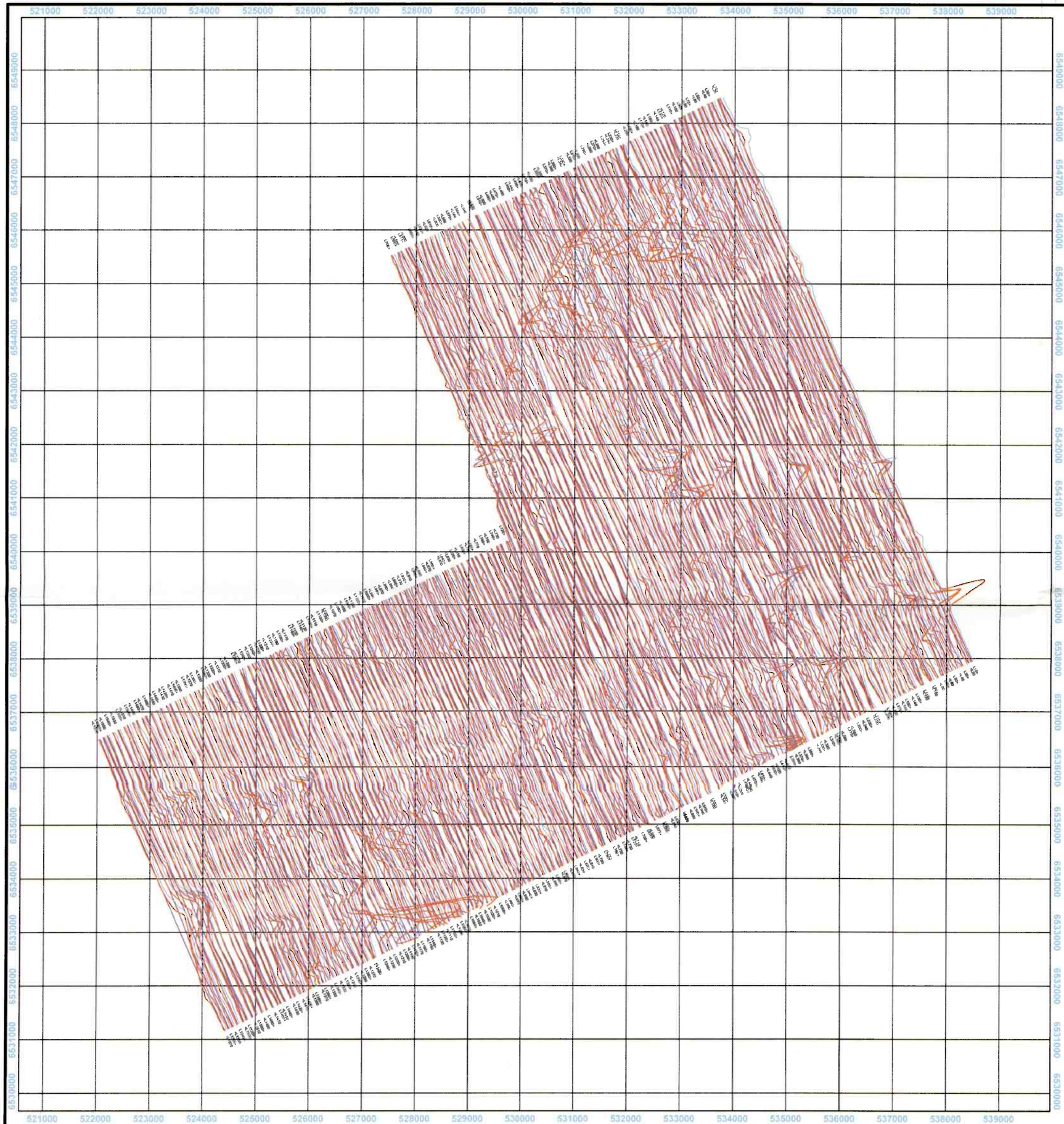
Drawing no:
2006.021-06B



GEODETIC DATUM: WGS84
CONFORM CYLINDERPROJECTION
Numbers in BLUE for UTM coordinates, zone 32N

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N

HEM 6606 Hz COPLANAR

Frequency : 6606 Hz (horizontal, coplanar orientation)
Coil spacing : 6 m

InPhase
Quad.

Inphase : 10 ppm/mm
Quadrature : 10 ppm/mm

NAVIGATION

The entire area was covered by GPS navigation.

The nominal flying height above ground level in the area is 60 metres.

A/S SULFIDMALM

HEM STACKED PROFILES 6606 Hz COPLANAR

Bamble

Telemark

Drawing: *Mogaard,J.O.*	Date: *FEB2006*	Obs: *JOM/JK*

Scale 1:50 000

1000 0 1000 2000 3000

(metres)

Mapsheet (1:50 000):
1712 IV Kragerø
1712 I Langesund
1713 II Porsgrunn
1713 III Kilebygd

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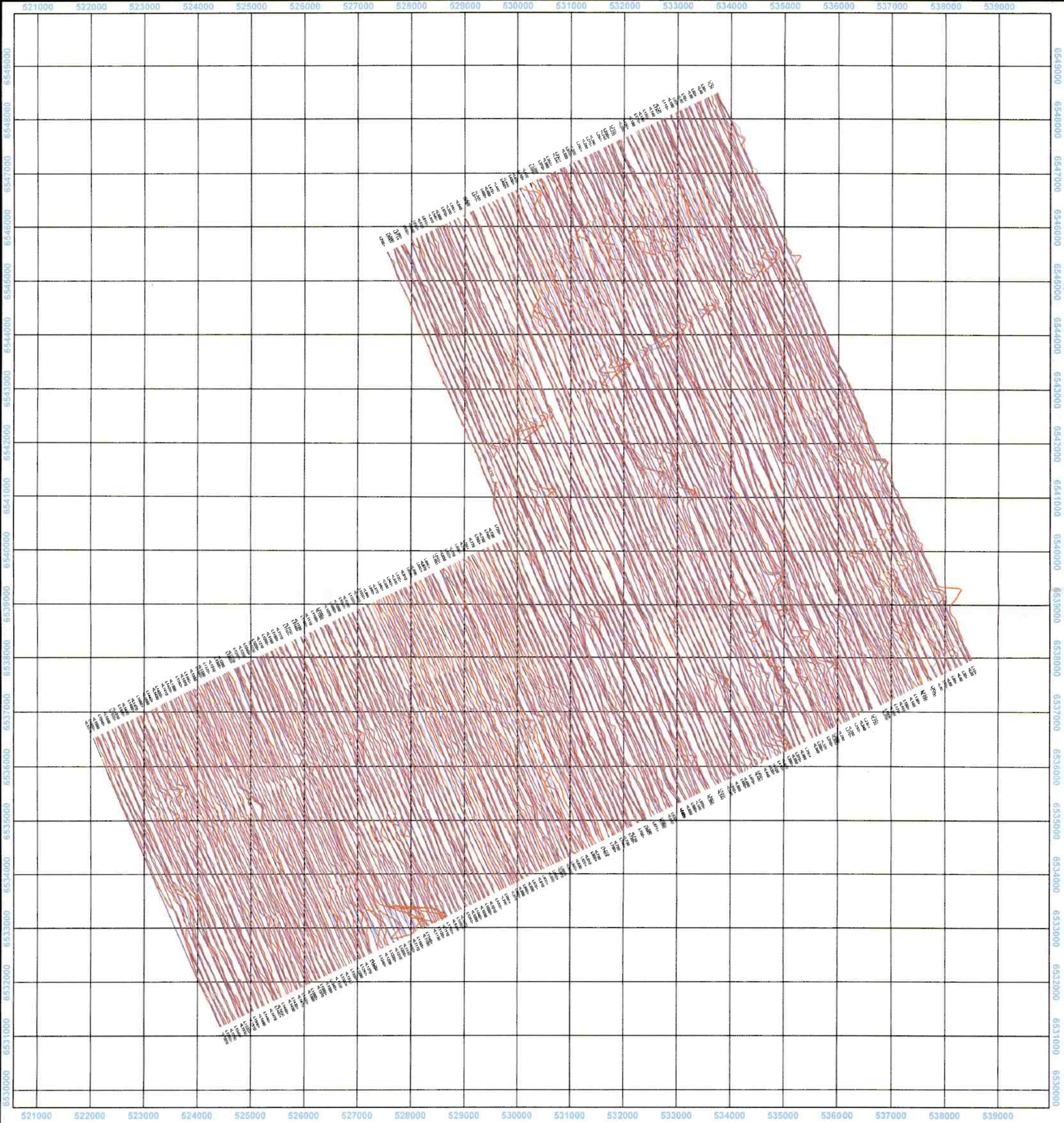
Drawing no:
2006.021-05B



GEODETIC DATUM: WGS84
CONFORM CYLINDERPROJECTION
Numbers in BLUE for UTM coordinates, zone 32N

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Geology for Society since 1858

N

HEM 7001 Hz COAXIAL

Frequency : 7001 Hz (coaxial orientation)
Coil spacing : 6 m

InPhase
Quad.

Inphase : 5 ppm/mm
Quadrature : 5 ppm/mm

NAVIGATION

The entire area was covered by GPS navigation.

The nominal flying height above ground level in the area is 60 metres.

A/S SULFIDMALM

HEM STACKED PROFILES 7001 Hz COAXIAL

Bamble

Telemark

Drawing: *Mogaard,J.O.*	Date: *FEB2006*	Obs: *JOM/JK*

Scale 1:50 000

1000 0 1000 2000 3000

(metres)

Mapsheet (1:50 000):
1712 IV Kragerø
1712 I Langesund
1713 II Porsgrunn
1713 III Kilebygd

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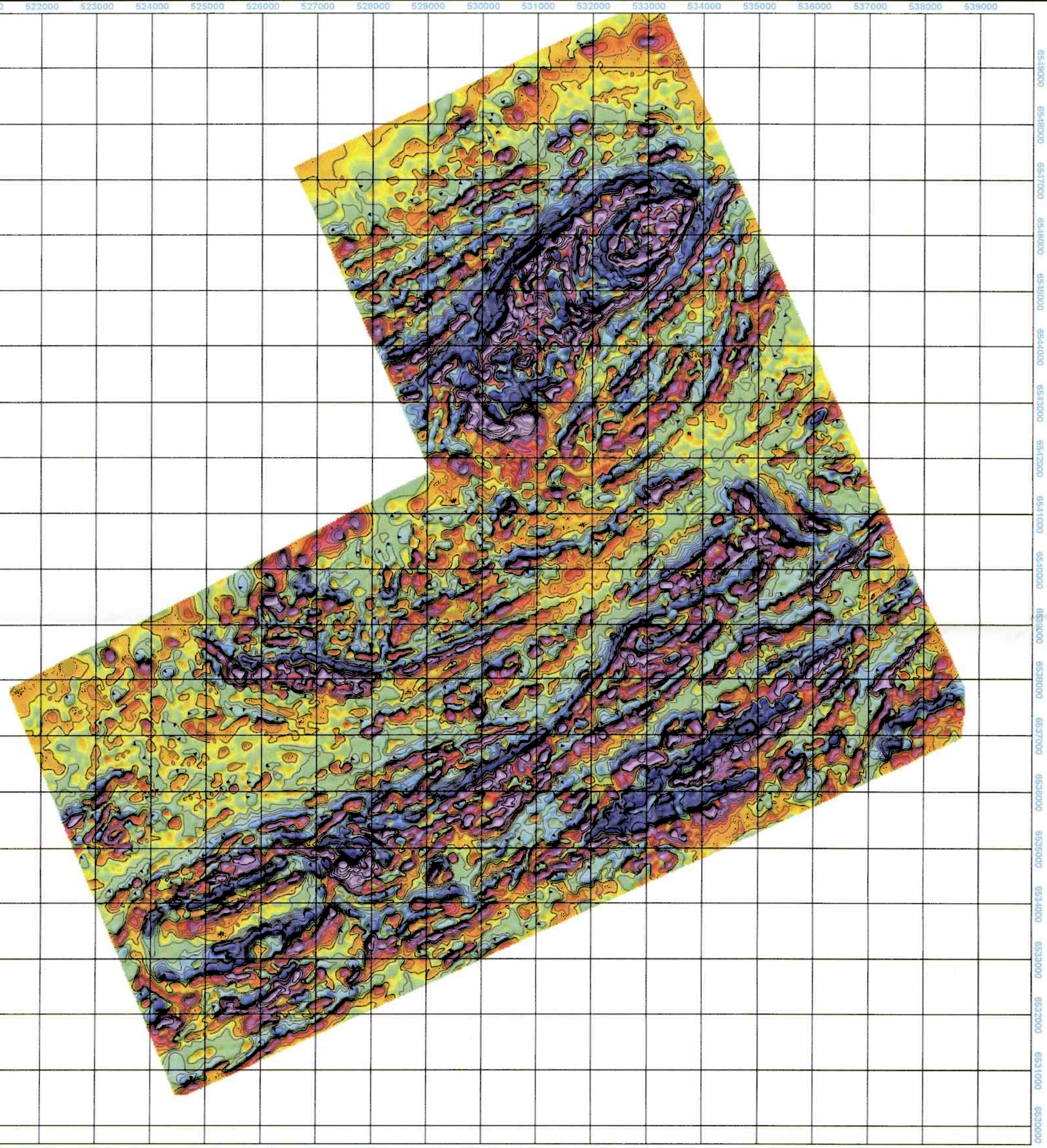
Drawing no:
2006.021-04B



GEODETIC DATUM: WGS84
CONFORM CYLINDERPROJECTION
Numbers in BLUE for UTM coordinates, zone 32N

nTesla/m

-22.1619 -1.1481 -0.6170 -0.3614 -0.2104 -0.0811 0.0570 0.2010 0.4163 0.7926 18.5455

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CALCULATED VERTICAL GRADIENT

Vertical Magnetic Gradient (in NanoTeslas per meter).
Calculated from the total field magnetics.
Contours given in following intervalls:

0.25nT/m
0.5nT/m
1.0nT/m
2.0nT/m

Colours - distributed after colourscale.

Cesium high sensitivity magnetometer.
Sensor elevation - 30 metres.

NAVIGATION

The entire area was covered by GPS navigation.

The nominal flying height above ground level in the area is 60 metres.

A/S SULFIDMALM

CALCULATED VERTICAL MAGNETIC GRADIENT

Colours and contours

Bamble

Telemark

Drawing: *Mogaard,J.O.*	Date: *FEB2006*	Obs: *JOM/JK*

Scale 1:50 000

1000 0 1000 2000 3000

(metres)

Mapsheet (1:50 000):
1712 IV Kragerø
1712 I Langesund
1713 II Porsgrunn
1713 III Kilebygd

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Drawing no:
2006.021-03B

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GEODETIC DATUM: WGS84
CONFORM CYLINDERPROJECTION
Numbers in BLUE for UTM coordinates, zone 32N

nTesla

48615 50199 50297 50360 50415 50473 50526 50569 50618 50673 50740 50843 51044 53557

TOTAL MAGNETIC FIELD

The intensity of the total magnetic field is in nanoTesla.

Contours given in following intervalls:

25nT
50nT
100nT
500nT

Colours - distributed after colourscale.

Data are corrected for diurnal variations using a basemagnetometer located at Geiteryggen airfield.

A high sensitivity cesiummagnetometer sensor is used and nominal sensor elevation is 30 metres.

NAVIGATION

The entire area was covered by GPS navigation.

The nominal flying height above ground level in the area is 60 metres.

A/S SULFIDMALM

TOTAL MAGNETIC FIELD

Colours and contours

Bamble

Telemark

Drawing: *Mogaard,J.O.*	Date: *FEB2006*	Obs: *JOM/JK*

Scale 1:50 000

1000 0 1000 2000 3000

(metres)

Mapsheet (1:50 000):
1712 IV Kragerø
1712 I Langesund
1713 II Porsgrunn
1713 III Kilebygd

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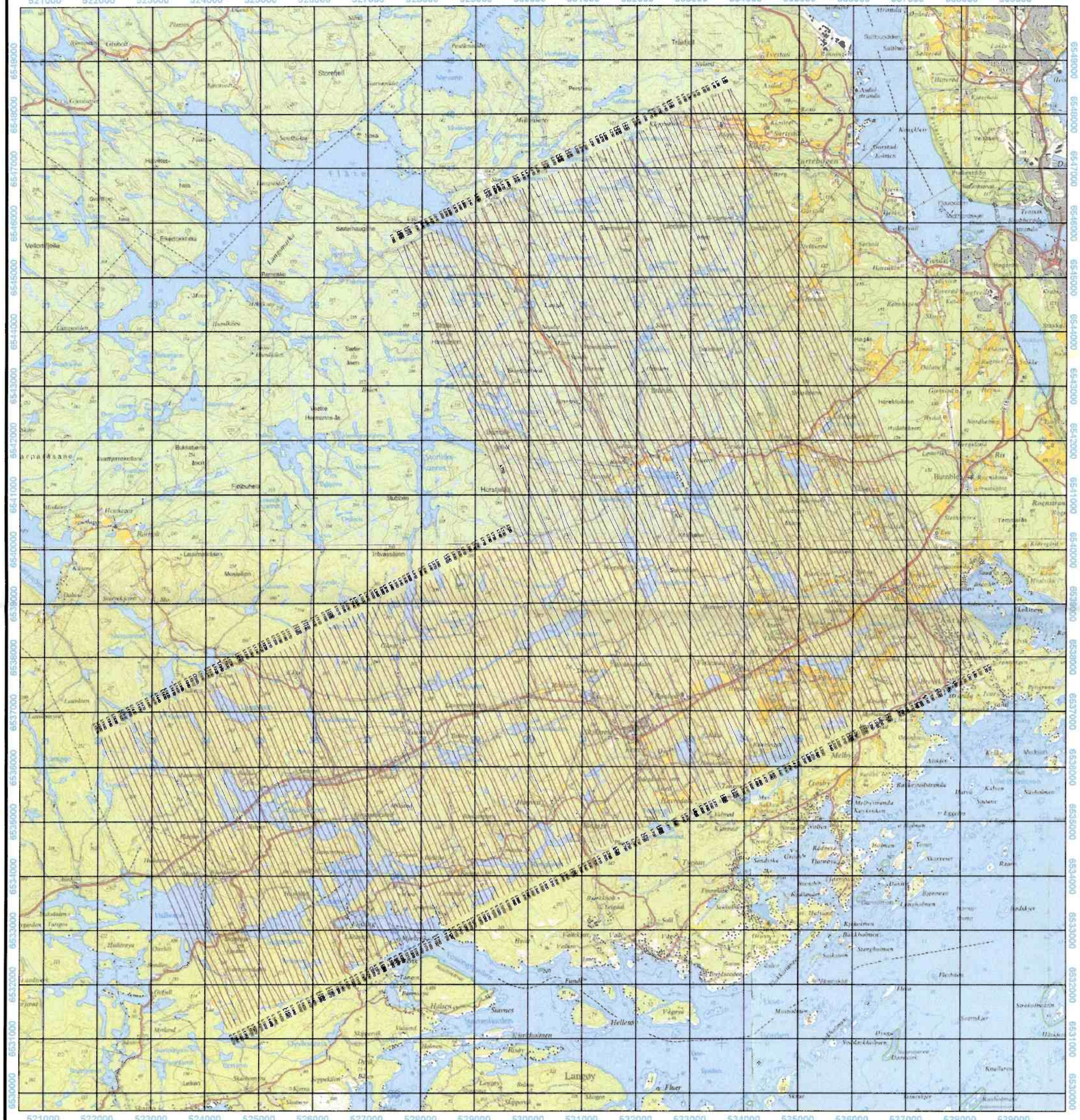
Drawing no:
2006.021-02B



GEODETIC DATUM: WGS84
CONFORM CYLINDERPROJECTION
Numbers in BLUE for UTM coordinates, zone 32N

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Geology for Society since 1858

N

NAVIGATION

The entire area was covered by GPS navigation.

The nominal flying height above ground level in the area is 60 metres.

A/S SULFIDMALM

FLIGHT PATH

Bamble

Telemark

Drawing: *Mogaard,J.O.*	Date: *FEB2006*	Obs: *JOM/JK*

Scale 1:50 000

1000 0 1000 2000 3000

(metres)

Mapsheet (1:50 000):
1712 IV Kragerø
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1713 III Kilebygd

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Drawing no:
2006.021-01B