


Report no.: 2002.098		ISSN 0800-3416		Grading: Open	
Title: Data Acquisition and Processing - Helicopter Geophysical Survey at Valle, Setesdal					
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County: Vest-Agder, Aust-Agder			Commune:		
Map-sheet name (M=1:250.000) Sauda			Map-sheet no. and -name (M=1:50.000) 1413 I Urdenosi, 1413 II Valle, 1513 III Grøssæ		
Deposit name and grid-reference:			Number of pages: 8 Price (NOK): 40,- Map enclosures: 14 (Price: 30 NOK per map)		
Fieldwork carried out: June 2002	Date of report: 5.12.2002	Project no.: 2990.00	Person responsible: 		
Summary:					
<p>In June 2002, a helicopter geophysical survey was carried out over two areas at Valle, Setesdalen. The areas are named Rotemo and Rysstad-Straumsfjord. 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 526 line-km of magnetic and radiometric data were acquired using a nominal 200-m line spacing. The nominal flying height was 45 m above ground level (AGL), and lines were flown in alternating directions at headings of South and North at Rysstad-Straumsfjord, and northwest and southeast at Rotemo. Measurement noise levels were within survey specifications.</p> <p>Initial processing was carried out on a flight-by-flight basis. Total magnetic field measurements were collected using a cesium vapor magnetometer and corrected by removing diurnal variations as recorded at a magnetic base station at Valle. Radiometric data were reduced using three-channel processing according to procedures recommended by the International Atomic Energy Association. All final processed data were gridded using 50-m square cells. Geophysical maps were produced at a scale of 1:50 000 and are considered as standalone products.</p> <p>This report describes the aspects of data acquisition and processing of the survey.</p>					
Keywords: Geofysikk (Geophysics)		Radiometri (Radiometrics)		Magnetometri (Magnetometry)	
		Databehandling (Data processing)		Fagrapport (Technical report)	

CONTENTS

1	INTRODUCTION	4
2	SURVEY VARIABLES AND CONDITIONS	5
2.1	Magnetic data	5
2.2	Radiometric data	6
3	DATA ACQUISITION	6
3.1	Magnetic measurements	6
3.2	Radiometric measurements	6
3.3	Navigation, altimetry, and data logging	7
4	PROCESSING	7
5	MAPS PRODUCED	8
6	REFERENCES	8

Maps available for order from NGU

Scale: 1:50 000

Map 2002.098-01A:	Flight path, Rotemo
Map 2002.098-01B:	Flight path, Rysstad-Straumsfjord.
Map 2002.098-02A:	Magnetic total field, Rotemo.
Map 2002.098-02B:	Magnetic total field, Rysstad-Straumsfjord.
Map 2002.098-03A:	Magnetic vertical derivative, Rotemo.
Map 2002.098-03B:	Magnetic vertical derivative, Rysstad-Straumsfjord.
Map 2002.098-04A:	Radiometric total count, Rotemo.
Map 2002.098-04B:	Radiometric total count, Rysstad-Straumsfjord.
Map 2002.098-05A:	Radiometric potassium, ground conc., Rotemo
Map 2002.098-05B:	Radiometric potassium, ground conc., Rysstad-Str.fjord.
Map 2002.098-06A:	Radiometric uranium, ground conc., Rotemo
Map 2002.098-06B:	Radiometric uranium, ground conc., Rysstad-Str.fjord.
Map 2002.098-07A:	Radiometric thorium, ground conc., Rotemo
Map 2002.098-07B:	Radiometric thorium, ground conc., Rysstad-Str.fjord.

1 INTRODUCTION

In June, 2002, a helicopter geophysical survey was carried out over two areas at Valle, Setesdal, Vest-Agder and Aust-Agder counties (see figures 1 and 2). The contractor was Valley Metals Exploration AS. The total area covered is 198 km² (87 km² at Rotemo and 111 km² at Rysstad-Straumsfjord) and the total distance flown was 526 line-km (134 line-km at Rotemo and 392 line-km at Rysstad-Straumsfjord). Magnetic and radiometric data were collected. The primary objective of the survey was to provide geophysical information to be used in gold prospecting in the area.



Figure 1: Survey area, Rotemo. Scale 1:75000

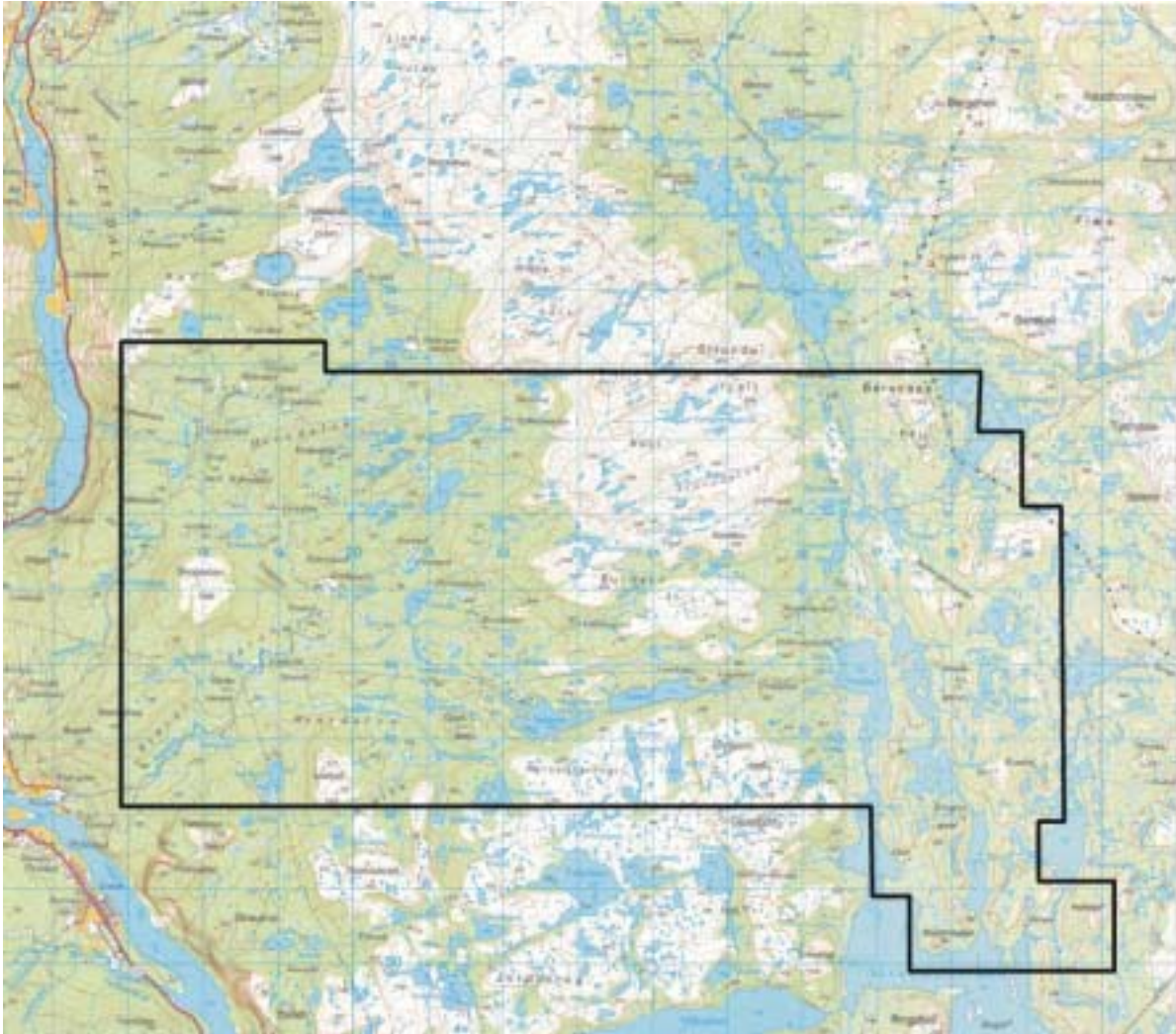


Figure 2: Survey area, Valle. Scale 1:100000

2 SURVEY PARAMETERS AND CONDITIONS

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

2.1 Magnetic data

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 is excellent on all lines.

2.2 Radiometric data

Radiometric data can be negatively affected by atmospheric radon. However, in this survey radon contamination did not appear to be significant. The quality of the radiometric data is good.

3 DATA ACQUISITION

The survey aircraft was an Areospace Ecureuil SA 350 B-2 helicopter. Flying speed was approximately 100 km per hour (28 meters per second). Flight lines over the survey areas were in directions North and South at Rysstad-Straumfjord and northwest-southeast (45°-315°) at Rotemo with a flight line spacing of 200 m.

Senior engineer John Olav Mogaard was responsible for data acquisition and parts of the processing. Additional processing and map production were done by Eirik Mauring. At Rotemo, data were collected 6/6-2002, while data were collected 5/6-2002 at Rysstad-Straumfjord.

3.1 Magnetic measurements

A Scintrex CS-2 cesium vapor magnetometer was used. The magnetometer resolution is 0.01 nT. Sampling rate was 10 measurements per second (approximately 3 meter spacing). The magnetic sensor was towed approximately 30 metres above the ground, 15 metres below the helicopter.

A Scintrex MP-3 proton precession magnetometer was located at Valle, and was used for base station measurements. The base station magnetometer was synchronized with the helicopter-borne magnetometer 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 at a rate of 15 measurements per minute.

3.2 Radiometric measurements

The radiometric system, purchased from Exploranium, Ltd. of Canada, consists of four sodium iodide (NaI) crystals (model GPX-1024-256) with a total volume of 1024 cubic inches (16.78 litres). The NaI crystals are coupled to a 256 channel Exploranium GR820 gamma ray spectrometer. Registration rate is one per second. An upward looking crystal was used in this survey, and can if desired be used to correct for airborne radon contamination. The crystal

package is mounted in a frame underneath the helicopter approximately 45 metres above the ground.

The spectrometer is an energy pulse height analyzer that sorts data into 256 channels according to energy magnitude. Every channel is 0.012 MeV wide. The full 256 channel spectrum was recorded. Windows constructed from selected groups of channels record the contributions of Potassium-40, Bismuth-214 (a daughter product of Uranium-238), and Thallium-208 (a daughter product of Thorium-232). These windows are labeled 'potassium', 'uranium', and 'thorium' respectively. A fourth window—the total count window—measures gamma ray energy between 0.4 MeV and 3 MeV.

3.3 Navigation, altimetry, and data logging

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

The navigation console was a PNAV 2001 manufactured by the Picodas Group, Ltd. of Canada. Profile line data are entered into the console and the helicopter pilot can view the traces. The pilot can see his position with respect to these predefined lines and adjust accordingly.

The helicopter was equipped with a King KRA-430 radar altimeter that measured height above ground level, and was recorded digitally and displayed in front of the pilot. The altimeter is accurate to 5 percent of the true flying height.

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

4 PROCESSING

The data were processed at the Geological Survey of Norway in Trondheim using Geosoft processing software (Geosoft, 1996) designed for NT operating systems. All maps were constructed from grids with a 50-m cell size. Obvious inaccuracies in navigation were manually removed from the data. The datum used for navigation was WGS84 and the projection was UTM zone 32.

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 Valle.

Radiometric data: The Geosoft radiometric processing package (Geosoft, 1995) follows the window stripping processing procedure outlined in International Atomic Energy Agency Technical Report No. 323 (IAEA, 1991). A narrow nonlinear filter was applied to the radiometric data to remove spikes and a low pass filter was applied to smooth the data slightly prior to further processing. Background radiation levels were estimated by flying background calibration lines over water, usually two per flight, and by analyzing flight lines passing over lakes. After background reduction, the data were corrected for spectral overlap using experimentally determined stripping ratios. Atmospheric radon does not appear to have been a major source of data contamination in any of the flights. The processed data are presented as ground concentrations of Uranium, Potassium, and Thorium, and as ground level total counts.

5 MAPS PRODUCED

Maps were produced at scale 1:50 000. The geophysical data are displayed in the form of colour contour maps with a shaded relief effect. The shading (shadowing) effect is based on a light source in the northeast. The grid cell size for all maps was 50 meters.

A list of the 14 maps produced is shown on page 3 of this report. These maps can be ordered from the NGU either in digital form or as hard-copies.

6 REFERENCES

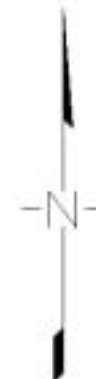
Geosoft Inc., 1995: OASIS Airborne Radiometric Processing System Version 1.0 User's Guide, *Geosoft Incorporated, Toronto*.

Geosoft Inc., 1996: OASIS montaj Version 4.0 User Guide, *Geosoft Incorporated, Toronto*.

IAEA, 1991: Airborne Gamma Ray Spectrometer Surveying, Technical Report 323, *International Atomic Energy Agency, Vienna*, 97 pp.



COORDINATE WITH
 CONFORM CYLINDRICAL SECTION
 Method: UTM, UTM coordinate, zone 32



NAVIGATION

The entire area was covered by GPS navigation.
 The nominal flying height above ground level in the area is 46 metres.

VALLEY METALS EXPLORATION AS

FLIGHT PATH

Rotemo, Setesdalen
 Aust-Agder

Drawing: Mogaard, J.O.	Date: JUN 2002	Obs: JOW
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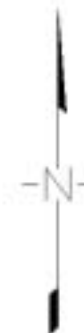
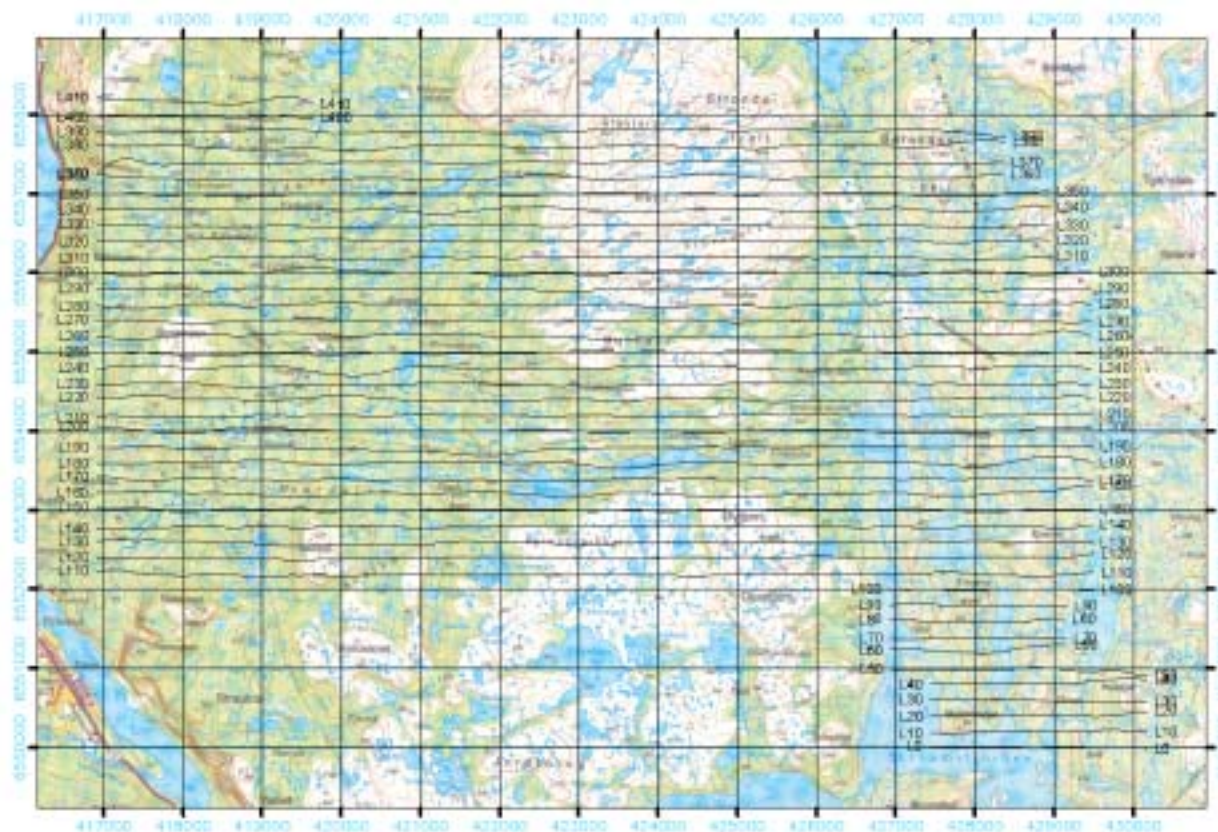


Mapsheet (1:50 000):
 5473 J Nord
 5473 J Unversal



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 http://www.ngu.no

Drawing no:
2002.098-01A



NAVIGATION

The air base was covered by GPS navigation.

The normal flight height above ground level in the area is 45 meters.


GEODETIC DATUM: WGS84
COORDINATE SYSTEM: UTM
Mapset: 4-101133-0150 (1:50 000) © NGU

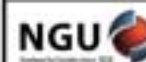
VALLEY METALS EXPLORATION AS

FLIGHT PATH

Straumsfjord, Setesdalen

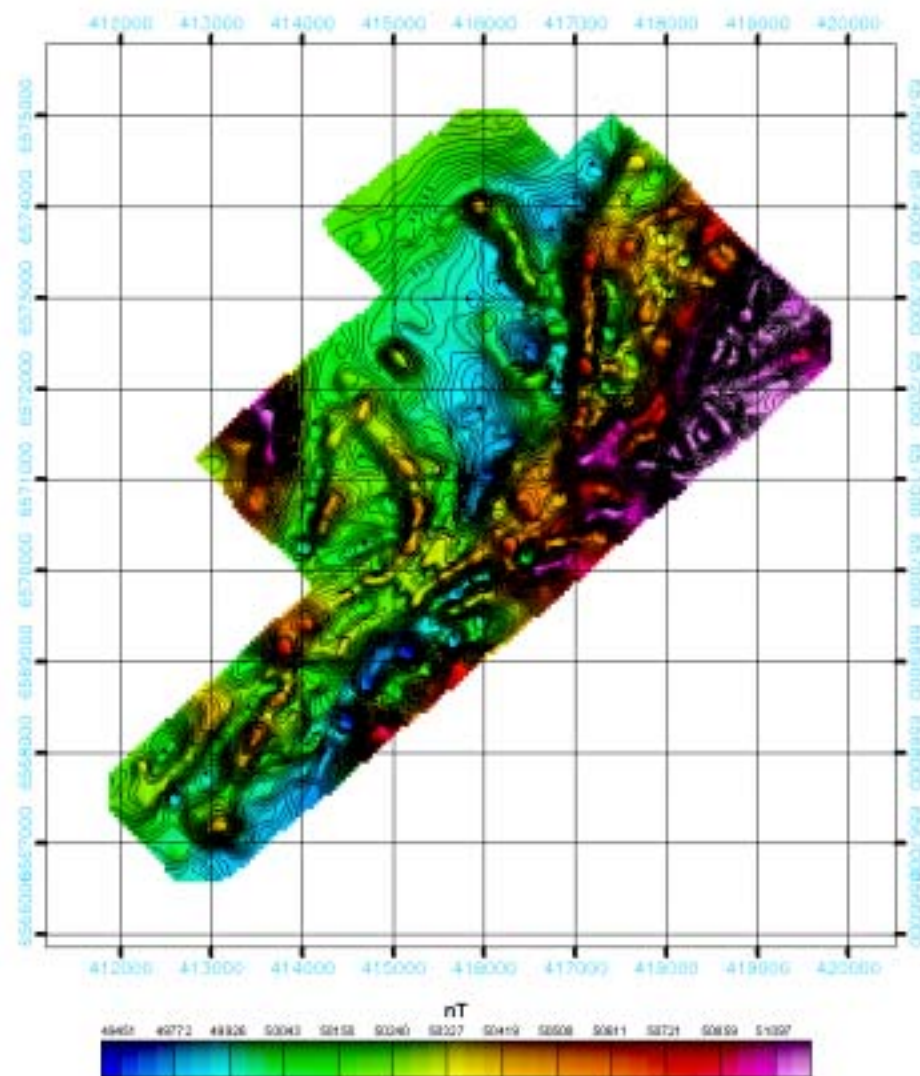
Aust-Agder

Drawing: Mogaard J.O.	Date: JUN 2002	Obs: JOM
Scale: 1:50 000		Mapsheet (1:50 000): 4-101133-0150
 (meter)		Sheet of Maps: 1571 of 1572



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Drawing no:
2002.098-01B



0000003 ATOM WITH
CONFORM CYLINDRICAL PROJECTION
Meters to UTM Zone 17M coordinate, zone 17

TOTAL MAGNETIC FIELD

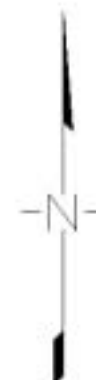
The intensity of the total magnetic field is in nano Tesla.

Contours given in following intervals:



Colors - interpolated after color scale.

A high conductivity zone (metals) indicates a zone with a vertical
current circulation of 30 mA/m.



NAVIGATION

The entire area was covered by GPS navigation.

The nominal flying height above ground level in the area is 45 metres.

VALLEY METALS EXPLORATION AS

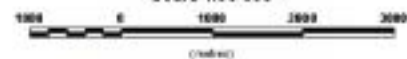
MAGNETIC TOTAL FIELD

Colours and contours

Rotemo, Setesdalen
Aust-Agder

Drawing: *Mogaard, J.O.* Date: JUN 2002 Obs: JOW

Scale 1:50 000



Mapsheet (1:50 000):
S473 K Male
S473 J Uncovered

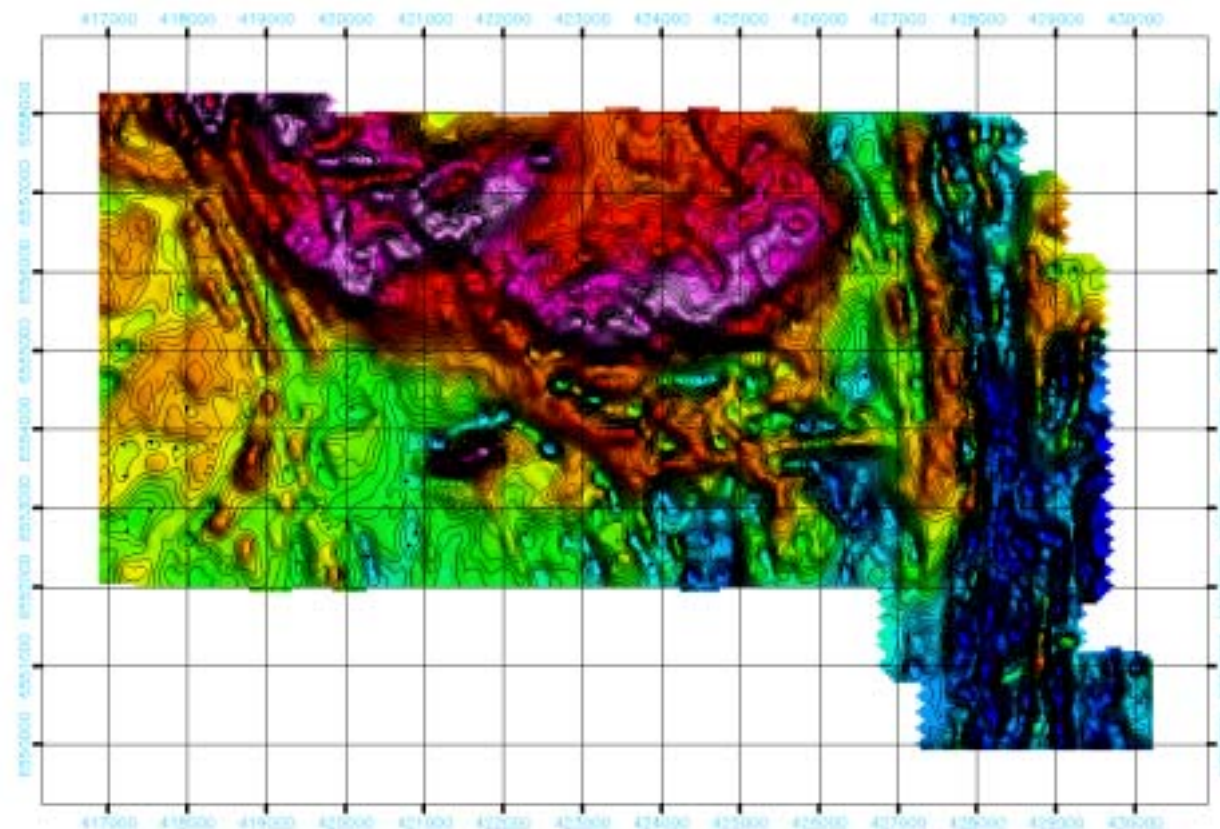
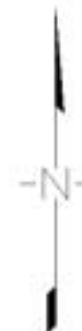
TOTAL MAGNETIC FIELD

The intensity of the total magnetic field is in nano Tesla.
Contours given in 5 nT intervals.



Colors - distributed after intervals.

A high conductivity (sulphide mineral) zone was found at a central part of the area of 30 km².



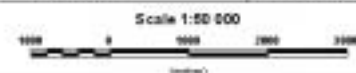
88030320 CH FINE WOOD
COPYFORM CILSIS/SDS/MS/2001
Revised to S1232 by ITM - 11/01/01, page 12.

VALLEY METALS EXPLORATION AS

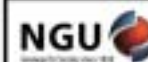
MAGNETIC TOTAL FIELD Colours and contours

Straumfjord, Selesdalen
Austhjørn

Drawing: **Mogaard, J.O.** Date: **JUN 2002** Obs: **JOM**

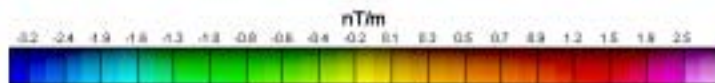
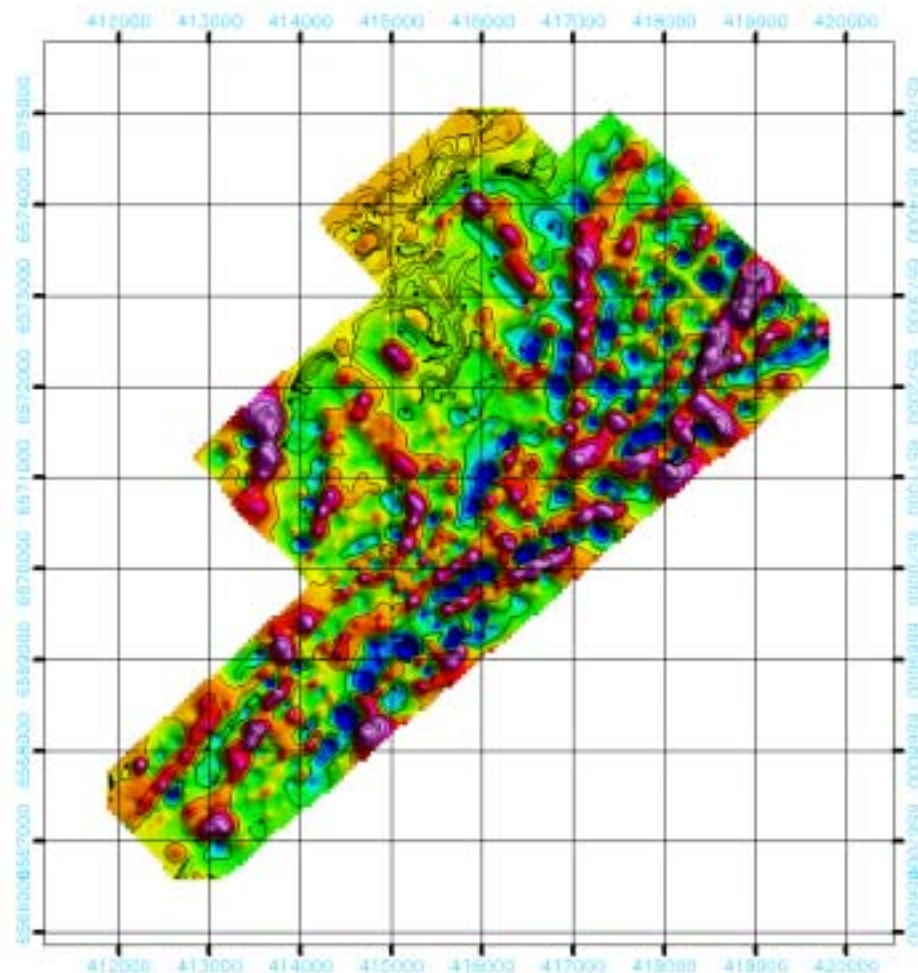


Mapsheet (1:50 000):
S123 of Scale:
S123 of Grid 11



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Drawing no:
2002.096-02B

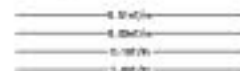


0000003 ATOM 8938
 COGNIFORM CYLINDRISSEKTOR
 Moduler i BL132a i TM coordinate, side 2



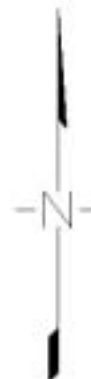
CALCULATED VERTICAL GRADIENT

Vertical magnetic gradient (in nanoTesla per metre)
 Calculated from the total field magnetic
 Contouring given following intervals:



Colours - distributed after colourcode.

Custom high sensitivity magnetic meter
 Sensor elevation - 35 metres.



NAVIGATION

The entire area was covered by GPS navigation.

The nominal flying height above ground level in the area is 45 metres.

VALLEY METALS EXPLORATION AS

MAGNETIC VERTICAL DERIVATIVE
 Colours and contours

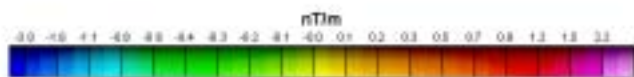
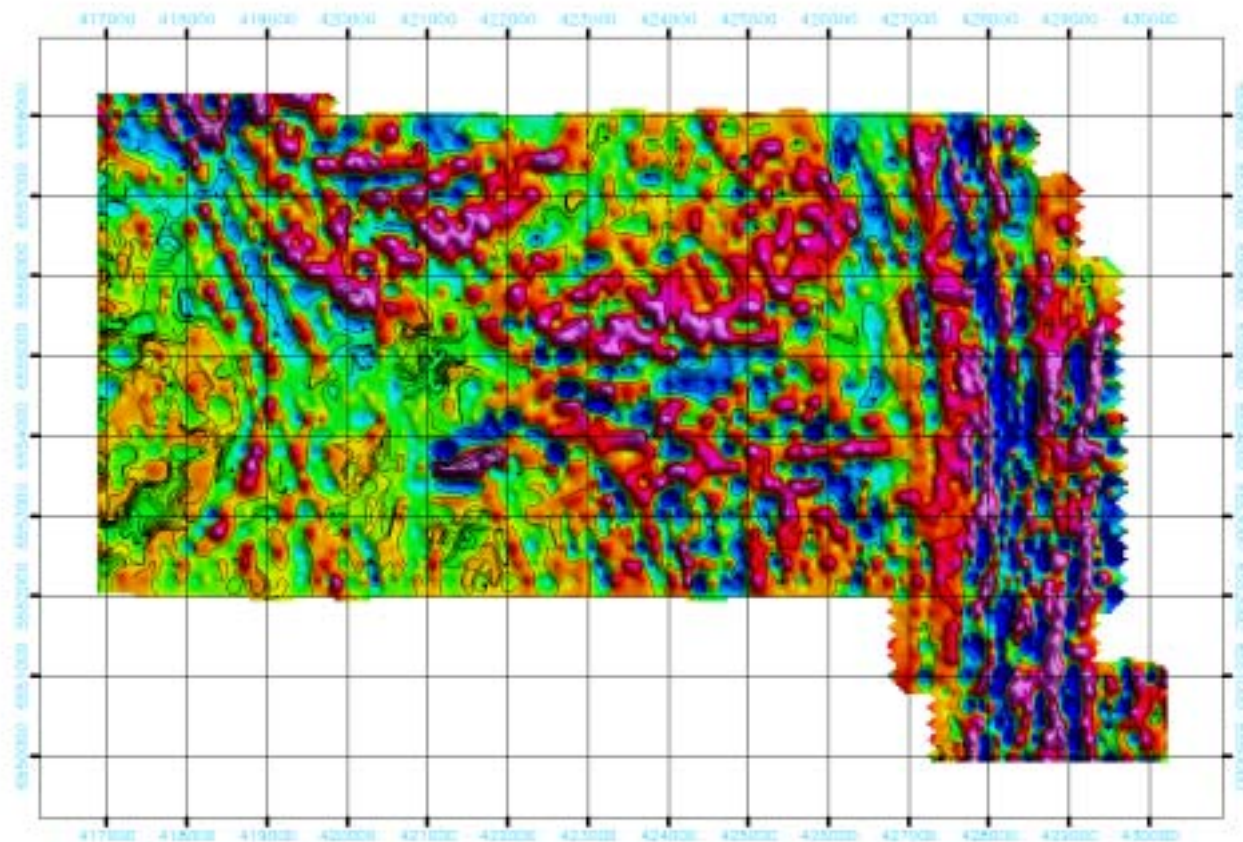
Rotemo, Setesdalen
 Aust-Agder

Drawing: Mogaard_1.0	Date: JUN 2002	Obs: JOW
Scale 1:50 000		Mapsheet (1:50 000): 5413.8 Male 5413.1 Uncovered



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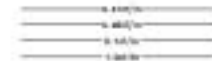
Drawing no:
2002.098-03A



ORGANISASJONEN
GEOLOGISKE TILFØRSLAG
Kart over Sletta (1:50 000) (1994)

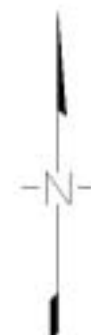
CALCULATED VERTICAL GRADIENT

Vertical Magnetic Gradient (in nanoTesla per metre)
Calculated from the total field magnetometry
Contours given in following intervals



Colours - distributed like contours

Colour high sensitivity magnetic field
Derivative interval - 30 nT/m



NAVIGATION

The entire area has been covered by GPS navigation.

The normal flying height above ground level in this area is 40 metres.


VALLEY METALS EXPLORATION AS

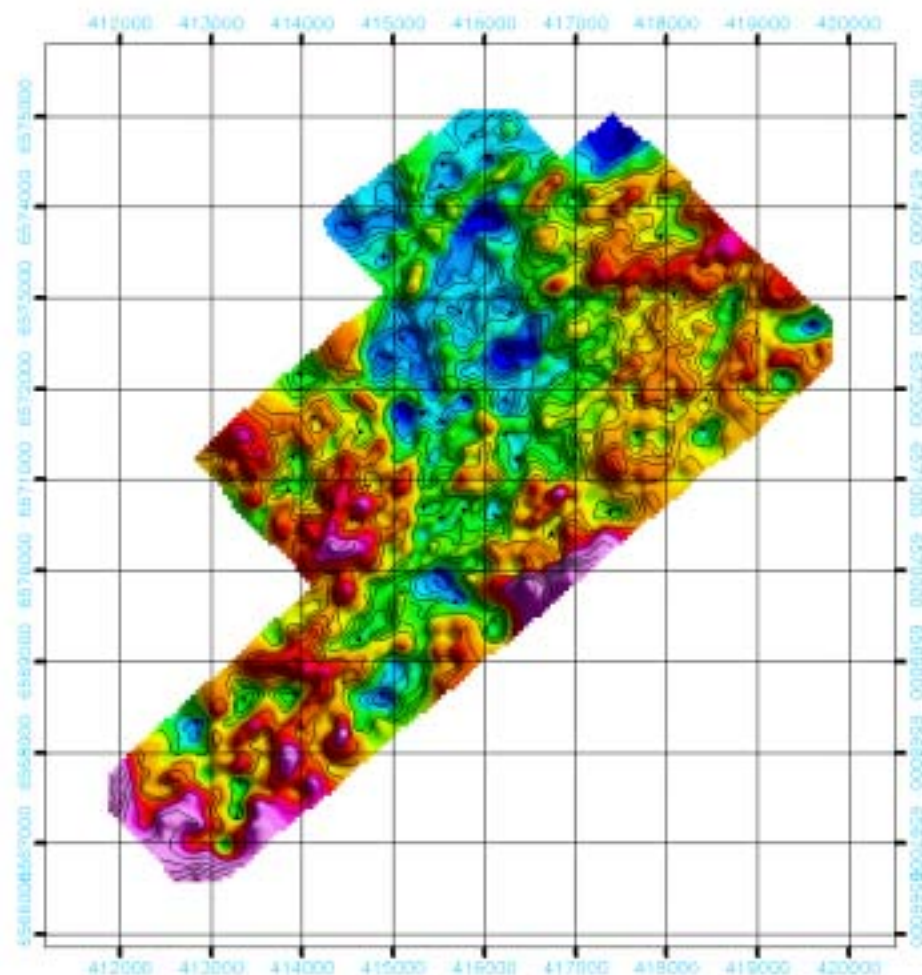
MAGNETIC VERTICAL DERIVATIVE

Colours and contours

Straumstjøfjord, Setesdalen

Arvid-Agder

Drawing: Mjgeord.J.O.	Date: JULY 2002	DBS: JOM
Scale 1:50 000		Mapsheet (1:50 000): 443 B Male 553 B Green
		



0000003-ATEM-87094
 COUNTY OF VALDRE DISTRICT
 Mapdata in MGRS or UTM coordinate, zone 32



RADIOMETRIC TOTAL COUNTS

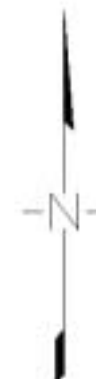
Radiometric Total Counts (in counts per second)

Contours given in following intervals:



Colours - distributed after contours

Data have been downward continued to ground level



NAVIGATION

The entire area has been covered by GPS navigation

The nominal flying height above ground level in the area is 45 metres

VALLEY METALS EXPLORATION AS

RADIOMETRIC TOTAL COUNT Colours and contours

Rotemo, Setesdalen

Aust-Agder

Drawing: *Mogaard, J.O.*

Date: *JUN 2002*

Obs: *JOW*

Scale 1:50 000



Mapsheet (1:50 000):
 5433 F Side
 5433 J Underside

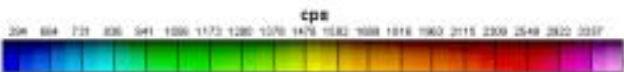
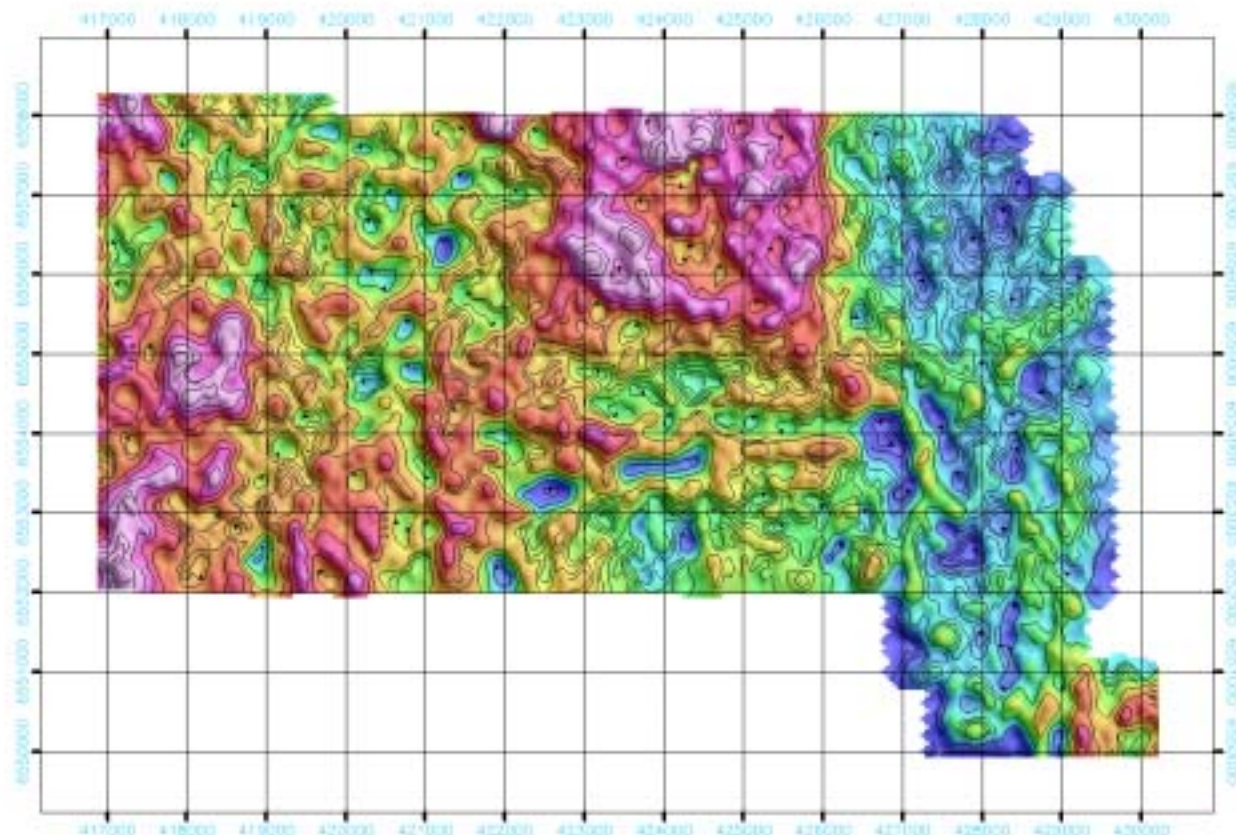


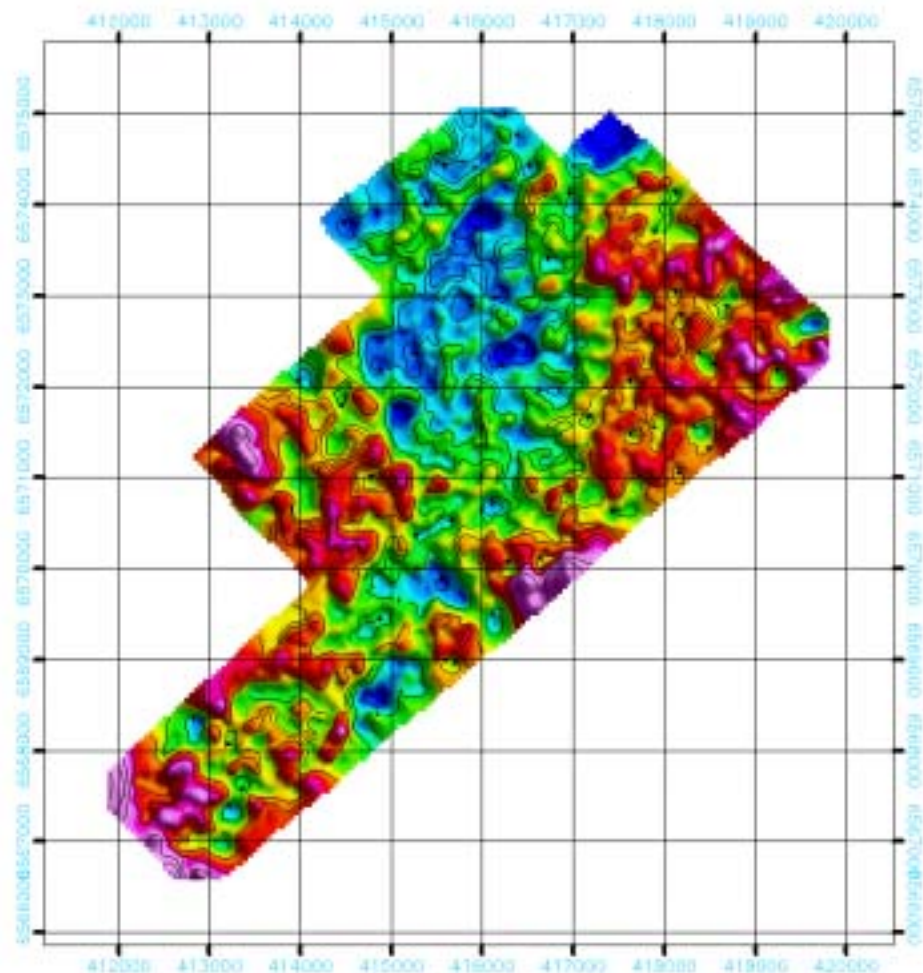
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Drawing no:

2002.098-04A





0000003 ATOM 8938
 COYFORM CYLINDRIS SECTION
 Modulen & BL122a IT TM cont/Sheet, side 2

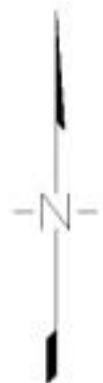


POTASSIUM

Potassium (in percent)
 Contours given in following intervals:

_____	0.64	_____
_____	1.15	_____
_____	1.68	_____
_____	1.99	_____

Colour – distributed after contours
 Data have been downward continued to ground level.



NAVIGATION

The entire area was covered by GPS navigation.
 The nominal flying height above ground level in the area is 45 metres.

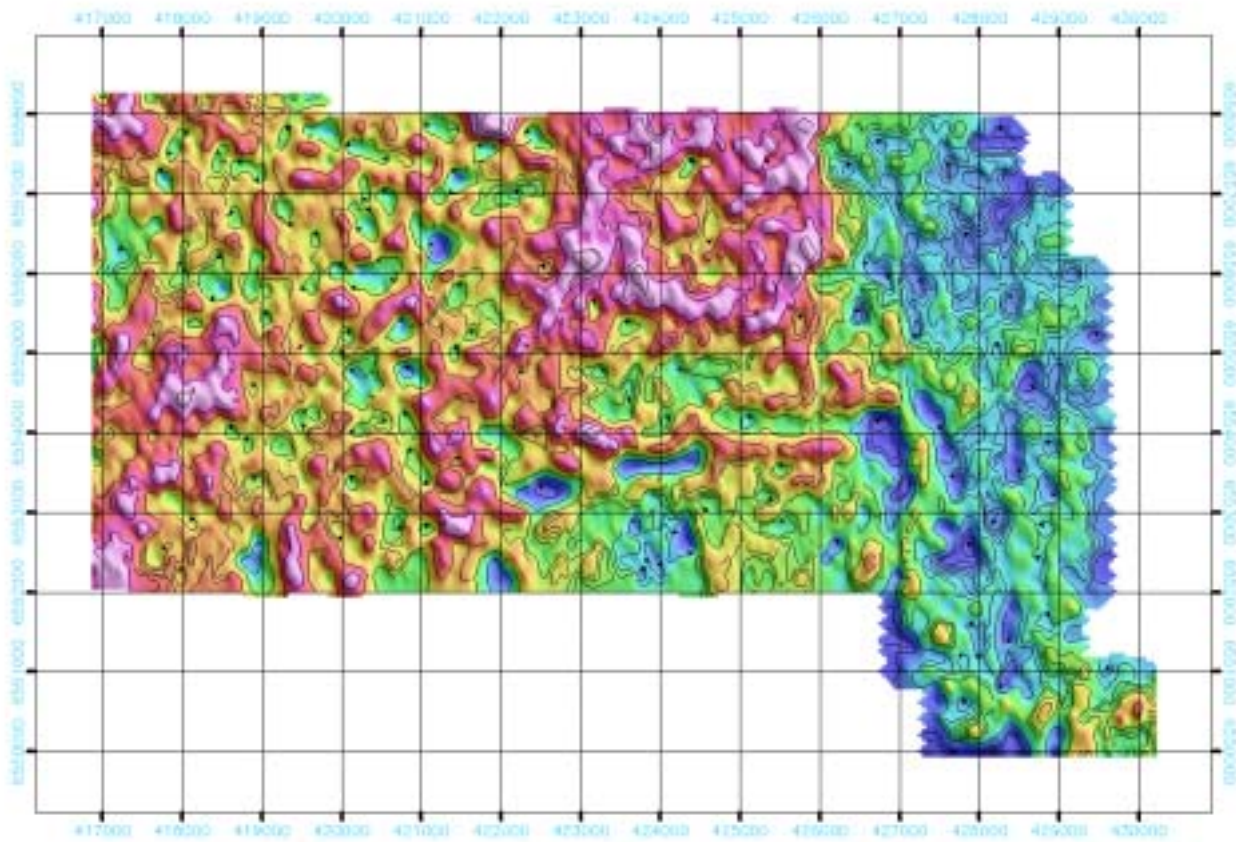
VALLEY METALS EXPLORATION AS

RADIOMETRIC POTASSIUM GROUND CONC.
Colours and contours

Rotemo, Setesdalen
 Aust-Agder

Drawing: Mogaard, J.O.	Date: JUN 2002	Obs: JOW
Scale 1:50 000		Mapsheet (1:50 000): 5413 I Male 5413 J Uncovered
<p>(metres)</p>		

	GEOLOGICAL SURVEY OF NORWAY Geologi og bergvesen P.O. Box 117, NO-2007 TRONDHEIM Tel: +47 73 30 40 11, Fax: +47 73 32 56 23 http://www.ngu.no	Drawing no: 2002.098-05A



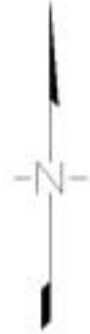
POTASSIUM

Potassium (ppm/weight)

Contour lines given in following intervals

0.5 B	_____
0.1 A	_____
0.5 A	_____
1 B	_____

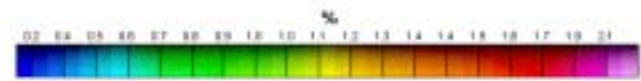
Colour - distributed after colouring
(data has been deviated continued to ground level)



NAVIGATION

The entire area has coverage of GPS navigation.
The normal flying height above ground level is the area of 100 m.


REGI KJØPT DATUM: 09/04
© COPYRIGHT BY: 02/04/05/06
Revised to: 01/07/07 by VTM (vorkhov, ans, jo)

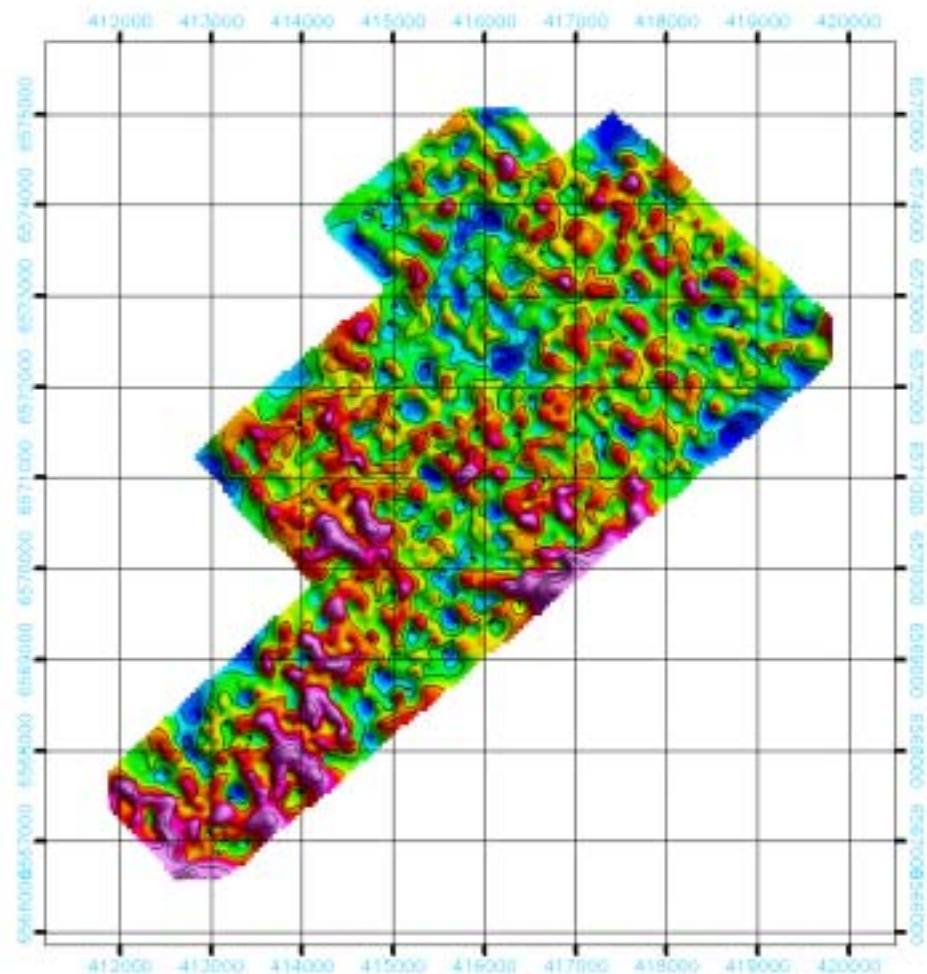


VALLEY METALS EXPLORATION AS

RADIOMETRIC POTASSIUM GROUND CONC.
Colours and contours

Straumsfjord, Setesdalen
Aust-Agder

Drawing: Mogren, J.O.	Date: JUN 2002	Obs: JOM
Scale: 1:50 000		Mapsheet (1:50 000): NY 13 14
		NY 13 14 NY 13 14



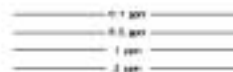
0000000000000000
 0000000000000000
 0000000000000000
 0000000000000000



URANIUM

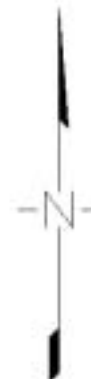
Equivalent Uranium (in ppm)

Contours given in following intervals:



Contours distributed after occurrence.

Data have been normalized corrected to ground level.



NAVIGATION

The entire area has been covered by GPS navigation.

The nominal flying height above ground level in the area is 45 metres.

VALLEY METALS EXPLORATION AS

RADIOMETRIC URANIUM GROUND CONC. Colours and contours

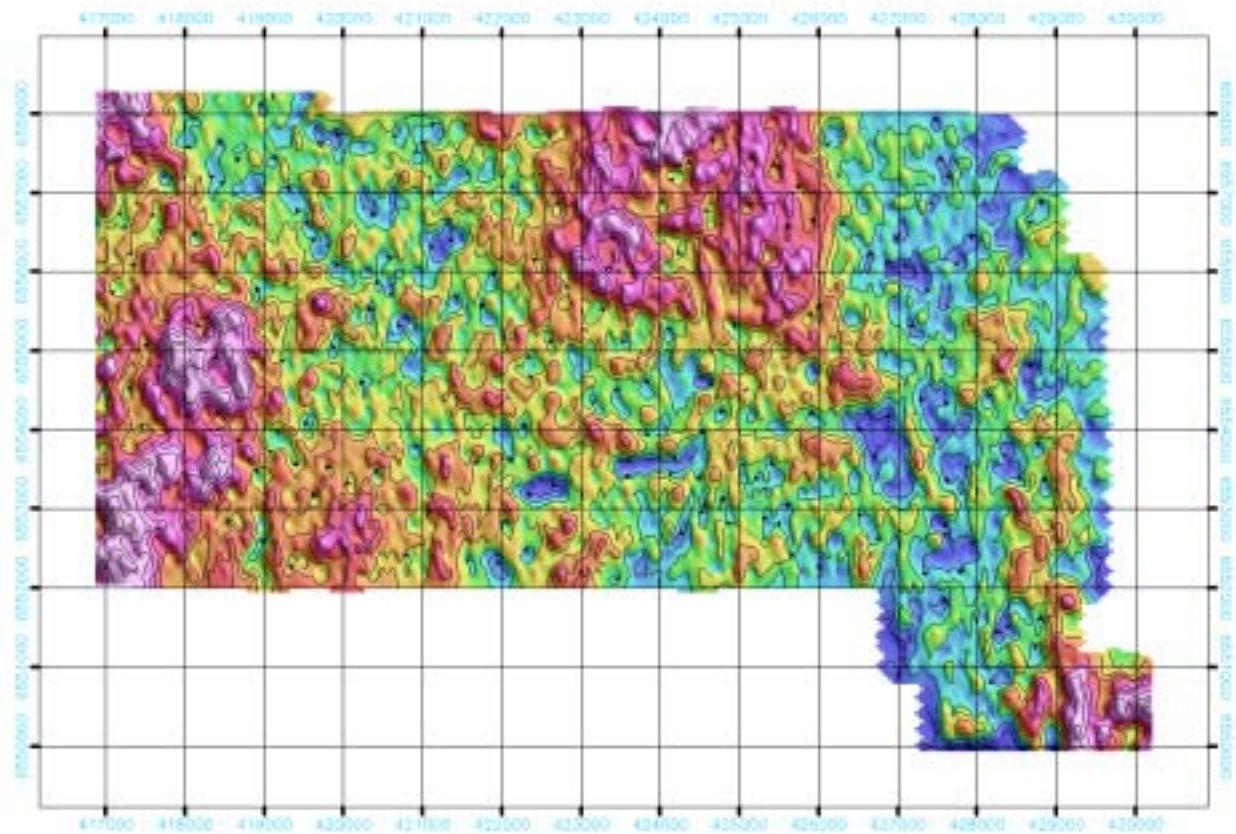
Rotemo, Setesdalen
 Aust-Agder

Drawing: Mogaard, J.O.	Date: JUN 2002	Obs: JOW
Scale 1:50 000		Mapsheet (1:50 000): 5403 F Utdrøst 5403 J Utdrøst



GEOLOGICAL SURVEY OF NORWAY
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Drawing no:
2002.098-06A



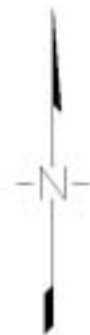
URANIUM

Equivalent thickness (ppm)

Contours given in following table:

0.1 ppm	_____
0.2 ppm	_____
1 ppm	_____
2 ppm	_____

Colors - distributed after observation
Data have been downward continued to ground level

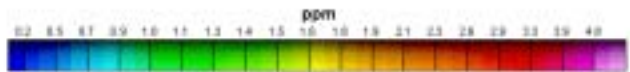


NAVIGATION

The entire area has accessibility of 0.0 navigation.

The contour height above ground level in the area is 0.0 meters.


GEOSIT SYSTEM V0.04
CONVERTITILAS BEKJÆFTNING
Metode 6. 01/01/98 7700-00000, rev 11

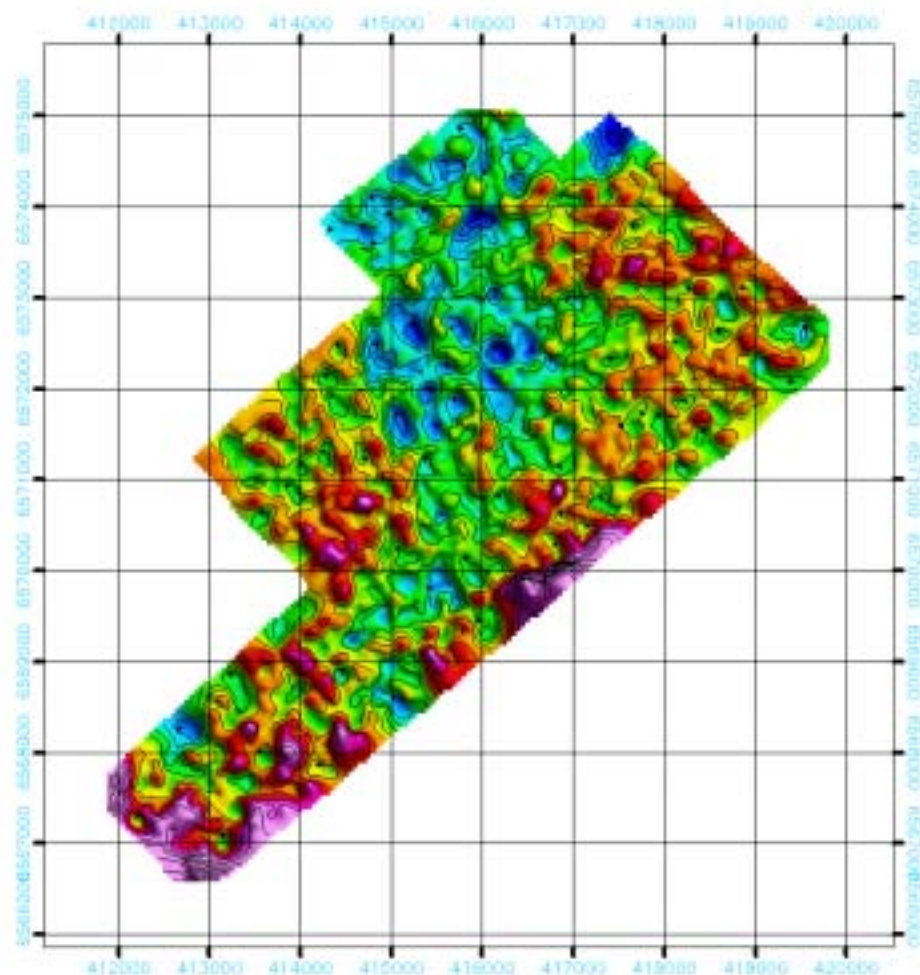


VALLEY METALS EXPLORATION AS

RADIOMETRIC URANIUM GROUND CONC.
Colours and contours

Straumfjord, Setesdalen
Aust-Agder

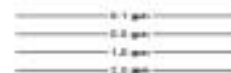
Drawing: Megner, J.D.	Date: JULY 2002	Clw: JDM
Scale 1:50 000		Mapsheet (1:50 000): 102.0 Udd 102.0 Udd
 (meters)		



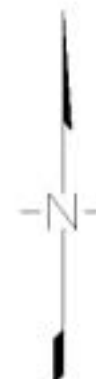
0000003 ATOM 8938
 COUNTY CYLINDRICAL PROJECTION
 Meters to UTM Zone 17 M coordinate, zone 17

THORIUM

Equivalent Thorium (in ppm)
 Contour given in following intervals:



Colours - distributed after colour scale.
 Data have been downward continued
 to ground level.



NAVIGATION

The entire area was covered by GPS navigation.
 The nominal flying height above ground level in the area is 45 metres.

VALLEY METALS EXPLORATION AS

RADIOMETRIC THORIUM GROUND CONC. Colours and contours

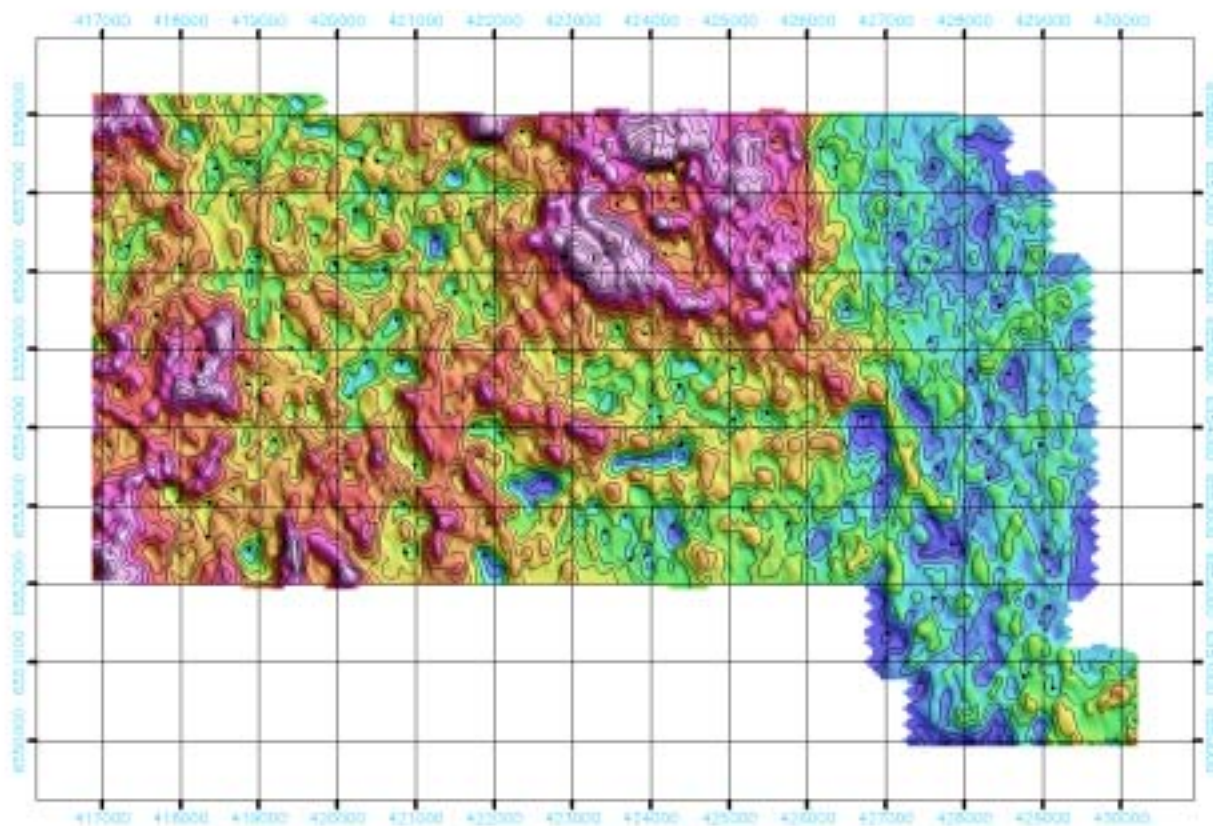
Rotemo, Setesdalen

Aust-Agder

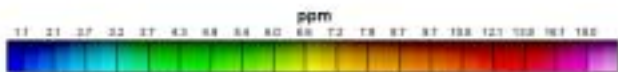
Drawing: Mogaard, J.O. Date: JUN 2002 Obs: JOW



Mapsheet (1:50 000):
 5413 I Male
 5413 J Uncovered



GEOTEKNIKTILGITT
 COFFRAM CYCLOSERVISJON
 (Se referanse til ESR for ESR-koordinater, side 1)



THORIUM

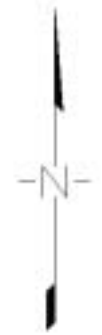
Skiltelet Thorium (ppm)

Contourer gitt i følgende intervaller:

- 0 - 1 ppm
- 1 - 2 ppm
- 2 - 4 ppm
- 4 - 8 ppm

Colour - skiltelet etter intervaller

OM å ha vært opplyst videre kontaktet
 til grunnlag



NAVIGATION

The entire area was covered by GPS navigation.

The nominal flying height above ground level in the area is 40 metres.

VALLEY METALS EXPLORATION AS
RADIOMETRIC THORIUM GROUND CONC.
Colours and contours

Straumstjor, Setesdalen
 Aust-Agder

Drawing: afgarev.J.O.	Date: JULY 2002	Drs: JOM
Scale: 1:50 000		Mapsheet (1:50 000): 472 6 Vulk 3173 47 Cirkul
<p>(metres)</p>		Drawing no: 2002.098-07B

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