Bergvesenet

Postboks 3021, 7002 Trondheim

Rapportarkivet

Bergvesenet rapport nr	Intern Journal nr	Internt arkiv nr	Rapport lokalisering	Gradering
BV 2271				**Fortrolig**
Kommer fra ..arkiv Sulitjelma Bergverk A/S	Ekstern rapport nr "522144002"	Oversendt fra	Fortrolig pga	Fortrolig fra dato:

Tittel

Rapport Evenesdal - Vassbotnfjell.

Forfatter	Dato	Bedrift
DOWNES M J.	1967	Sulitjelma Gruber A/S

Kommune	Fylke	Bergdistrikt	1: 50 000 kartblad	1: 250 000 kartblad

Fagområde	Dokument type	Forekomster
Råstofftype	**Emneord**	

Sammendrag

Generell bergrunnskartlegging i området mellom Evenesdal og Vassbotnfjell. Skildring av de forskjellige bergartene. I sørvest er området til dels sterkt intrudert av granittisk materiale, fra aplittiske til pegmatittiske ganger. To mineraliseringer er skildra kort, Siriheim og Ruaflaaget . Magnetkis, pyritt og kopperkis. Kort srtukturgeologisk beskrivelse og handstykkebeskrivelser.

M. J. Downes Evenesdal - Vassbotnfjell

Report and Appendix for 1:50 000 Geological Map
1:25 000 Sections
1:50 000 Tectonics maps

Introduction

The topography of the area is strongly controlled by the lithology and structure of the rocks in the north east and far west but covering the central and south eastern areas are extensive fluvioglacial deposits of sands and gravels. The major rock group divisions usedhave been according to pre-existing divisions of basement, Sjønstå, Furulund and calc.-mica schists.

The central and western areas are structurally complex, whereas in the extreme west and north east it is clear.

The report consists of a description of the rock types and a discussion of the structure, according to the general succession.

H) Amphibolites
G) Mica and graphitic Schists
F) Calc.-mica Schists
E) Furulund
D) Sjønstå
C) Pieske Marble Group
B) Sparagmite
A) Basement Granite

A) Basement Granite

This is structurally the lowest group and is brought up in the extreme east of the area. It consists of Quartz feldspar (crystals up to 0.5 cm) with blebs of biotite.

B) Sparagmite

This overlies the basement granite and is of considerable lateral variation in composition from finely banded pale quartzites to quartzoze mica schists and occassional calciferous bands. This grades upwards into a mica schist.

022.007

C) Pieske Marble Group

Marble (Pieske)

Intercalated with the marble are many mica schist bands of the type which underlie it. Indeed its overall appearance is a dirty pale brown and is impure throughout in this area.

Graphitic Schists

These vary lateralles in graphitic content espesially in the north and generally consist of large graphiterich lenses in mica schists.

Amphibolite

This is a rather friable amphibolite micaceous in parts and tends to be very thin.

D) Sjenstå group

This unit was distinguished from the overlying Furulund group by the latter consisting of biotite schists both calcic and quartzoze in the lower parts.

Garnetiferous Gneiss

This consists of a mixture of garnet mica schists and quartzoze garnet mica schists. There is also variation laterally due probably to tectonic thickening. In the area of Kraagelva and to the north and south, in Kleftelva and Grøndalen the sequence is thick showing a high degree of crumpling and distortish of quarts bands on a small scale. Here the rock weathers as a massive rock type (almost granitic type). On the southern side of Storfjell the sequences thins considerable being here less contacted and is a quartzoze garnet mica schist.

Amphibolite unit

This is a coarse grained amphibolite, in the east amphibole crystals about 0.5 cms and containing feldspar.

E) Furulund Group

The schist sequence in the Furulund has been divided on the basis of graphite content as follows

Upper Furulund	Mixture of graphitic schists and mica schists.
Lower Furulund	Calc. mica schists with hornblende.

Lower

This consists of biotite rich schists with hornblende in parts, with a variation from calcite rich to quartz rich.
The amphiboles generally only show up on weathered surfaces. Both the lower and upper Furulund are well laminated schists but not as slatey as the Sulitjelma sequence. In parts they are garnetiferous. Within this and the upper part are amphibolite bands often of no great thickness. There is a thick coarse grained amphibolite containing feldspar which forms the steep slope of Rauflaaget and which underlies the ore zone in those parts.

Upper

The lower junction of the upper Furulund was taken as the first appearence of graphite. This unit consists of a mixture of graphitic muscovite schists and calc. mica schists. Therefore at the upper limit of the upper Furulund where there is great complexity in the folds it is difficult to place a certain boundary with the calc. biotite sequence which lies above it.

F) Calciferous mica schists

The mica in this sequence is predominantly biotite and could therefore be called the calciferous biotite schists. I have however adopted the name used by Stoenken in the area to the south west. Often associated with these schists though not characteristic are small kyanite crystals about 1 cm long and a green calc. silicate mineral. Often the calcite content is high enough to give the overall rock a saccharoidal texture with poorly developed schistosity, though the latter is more probably due to the intense isoclinal folding.
In the east of this succession is a marble band which is uniform in its strike from north to south and is of almost vertical dip . In the north it is above 8 metres in width and thins southward. In parts it contains trenolite.

G) Mica and Graphitic Schists

The calc. mica schists to the east are garnet free whereas this group is commonly garnetiferous with garnets up to 1.5 cms diameter. Graphite rich bands often reach 4 to 5 meters. This succession is again steeply dipping within 10° of vertical and contains many isochially folded quartz and calcite bands, well crenulated schistosity, and tension gashes containing quartz muscovite and large kyanite crystals.

H) Amphibolites

These are mainly very hornblende rich mica schists grading to amphibolites in the most western parts.

Other rock units

In the west and south of the area are many injections of granitic material. The various types are discussed below.

Thin quartz-feldspar injections

These are thin veins of quartz and feldspar with a little mica in parts. They are commonly only of a few cms width and have an approximately north south strike and a steep dip. They are locally strongly folded in isoclinal folds and in parts fold hinges have been tectonically seperated as eye shaped blebs. They are often associated with kink bands especially in the mica and graphitic schist group.

Aplitic veins

These are fine grained with quartz feldspar and some biotite, and have a similar orientation and relationship to the general trend of schistosity as the quartz-feldspathic veins. They sometimes reach 5 metres in width as lens shaped bodies and may also become medium grained.

Pegmatitic veins

Again these have an approximately north south strike and steep dip to both the east and west. They contain large feldspars up to several cms across and sometimes consist almost entirely of feldspar. There is also tourmaline and muscovite. They vary in width but are generally about 1 metre. They are common in the calciferous mica schist sequence.

Granite Gneisses

These occur in the U. Furulund and one of which may be the Furulund gneiss as they are stratigraphically in the correct position. They are medium grained and contain quartz feldspar muscovite and biotite. They are concordant but lens out.

Ore Zones

No appreciable quantities of pyrite have been found in the Furulund which would correspond with the Sulitjelma level. There are however two main ore bodies in the area, but neither of great concentration.

1. Near Siriheim locality 1790/2780.
The width of the body exposed in old workings is about 2 metres and occurs in graphitic schists and kyanite schists of the mica schist sequence. These rocks contain pyrrhotite, pyrite and some chalcopyrite.

2. Rauflaaget locality in the region of 2120/2870.
The form and content of this ore body have previously been described. Laterally this becomes a rusty muscovite schist which has been marked on the map as a dashed thick 'ore zone' line.

There are two other localities where minor consentrations of ore were present.

3. In Kraggelva locality 2205/2915.
The position of this is at the top of the Sjønstå in the garnet mica schists. It contains mainly pyrrhotite but also a little chalcopyrite and pyrite.

4. In Sauelva locality 1710/2560.
This is in a graphitic schist in the mica and graphitic schists and contains pyrite with a little chalcopyrite.

Structure.

With reference to the sections and tectonics maps.
As previously stated the structure in the north east is clear.
There is a main antiform or gentle up-doming of the rock units exposing the basement granite gneiss.
To the north in the extreme north east in a second updoming with broad folds in the marble, the major fold axix being a south-west plunge. West of here a major antiform brings the steeply dipping Furulund from a north, south strike to a gently dipping east west strike. This most probably the same antiform seen on Satertind.

The major synform over Rauflaaget is a step like fold seen best on the cross-section. A major antiform to the north west brings steeply dipping rocks of north south strike north of Sørelva into a gently dipping NW-SE strike over Tverlia. To the west many minor folds bring the far Furulund round into a north-south strike concordant with the rocks in the extreme west which are vertical.

The area in the south is difficult to correlate with the adjoining area in central parts due to a combination of complicated tectonics and very

poor exposures.

The gravel slopes of Storfjell seems likely to be a dip slope from the attitude of rocks seen in the streams which would suggest that the Furulund is brought over to the south side of Kvenesdal by the antiform.

Samples.

Ore samples.

A 1. Locality - old workings near Siriheim. 1790/2780
3 samples taken across the ore body.
(x) Pyrite pyrrhotite mainly in the graphitic schist.
(y) Pyrite pyrrhotite and a little chalcopyrite in a graphitic schist.
(z) Pyrite and pyrrhotite in a kyanite schist with graphite.
Stratigraphical position calc. mica schists.

A 2. Locality Kraagdal 2205/2915
Pyrrhotite and a little chalcopyrite in a mica schist.
Stratigraphical position U. Sjenstå.

A 3. Locality Sauelva 1710/2560
Pyrite with a little chalcopyrite in a graphitic schist.

F 1. Gneiss locality 2070/2750 possibly the Furulund gneiss.

F 2. Mylorite or crush breccia associated with this gneiss.

F 3. Upper Furulund graphitic mica schist.
Locality 1950/2790

F 4. Upper Furulund graphitic mica schist, well laminated.
Locality 2180/2700

F 5. Lower Furulund non graphitic, hornblendic mica schist.
Locality northern slope of Storfjell.

C 1. Calc mica schist containing principally biotite and some kyanite.
Locality 1900/2470 Calc.mica schist group.

M 1. Quartz kyanite bearing mica schist.
Locality 1700/2560 Mica and graphitic schist group.

M 2. Coarse grained feldspathic amphibolite.
Locality 1950/2405 Evenesdal.

B 1. Basement granite gneiss.
Locality 2450/2820.

B 2. Micaceous quartzite from the sparagmite.
Locality 2450/2980.

G 1. Granitic injection vein medium grained with a contact with a biotite schist.
Calc. mica schist group. 1850/2650.

Key to Lithological Rock Units for 1:50 000 map.

Structurally highest beds at the top of the sequence.

Drift	- Sands and gravels		101/5
Amphibolites	- mixture of amphibolites (hornblendic) and hornblende schists		101/9
Mica and graphitic schists		Impure marble	101/2
	- mica schists with graphite rich bands	mica and graphitic schists	999/59
		Trenolite marble	101/2
Calciferous mica schists.			
	- mica is predominantly biotite; poorly laminated schists; kyanite also present		101/6
Furulund			
U. Furulund	- mixture of graphite bearing muscovite schists and calc.mica schists generally well laminated schists.		101/35
L. Furulund	- mica schists predominantly biotite calcic and quartz rich in parts hornblende is also characteristic		101/9 101/26 101/9
		ore zone	101/9
		amphibolite	101/26
Sjenstå			
	Garnet mica schists and garnet gneisses - massive and thick in the west thinning in the east.	amphibolite	101/9 999/59
Pieske Marble Group			
Amphibolite			
	Thin medium grained amphibolite micaceous in parts		999/180
Graphite schists			
	Graphitic and micaceous schists muscovite schists thinning southwards.		999/110 999/30
Pieske Marble			
	Pale and brown impure marble containing many muscovite schist bands		101/2
Sparagmite			
	In the upper parts a quartz mica schist In the lower parts a pure quartzite, banded		999/25

Basement

Granite gneiss	a quartz feldspar biotite granite	999/70

Other rock units

Gneisses of granitic composition occuring in the Furulund. Possibly the Furulund gneiss.	999/30

Rock units in south of doubtful correlation

Biotite schists	999/30
Muscovite schists and mica schists ± garnets	999/59
Garnet mica schists in the southcentral area	101/7

Key to lithological rock units for 1:50 000 map.

Structurally highest beds at the top of the sequence.

Drift - sand and gravels — 101/5

Amphibolites - mixture of amphibolites (hornblendic) and hornblende schists. — 101/9

Mica and graphitic shists

- mica schists with graphite rich bands

Impure marble - 101/2
Mica and graphitic schists - 999/59
Tremolite marble - 101/2

Calciferous mica schists

- mica is predominantly biotite; poorly laminated schists; kyanite also present — 101/6

Furulund

U. Furulund - mixture of graphite bearing muscovite schists and calc mica schists generally well laminated schists — 101/35

L. Furulund - mica schists predominantly biotite calcic and quartz rich in parts. Hornblende is also characteristic. — 101/9, 101/26, 101/9

Ore zone -
Amphibolite - 101/9, 101/26

Sjønstå - garnet mica schists and garnet gneisses - massive and thick in the west thinning in the east.

Amphibolite - 101/9, 999/59

Pieske marble group

Amphibolite - thin medium grained amphibolite, micaceous in parts — 999/180

Graphite schists

- Graphitic and micaceous schists - 999/110
- muscovite schists thinning southwards - 999/30

Pieske marble - pale brown impure marble containing many muscovite schist bands. — 101/2

Sparagmite — In the upper parts a quartz mica schist. In the lower parts a pure quartzite, banded — 999/25

Basement

Basement

Granite gneiss — a quartz feldspar biotite granite — 999/70

Other rock units — Gneisses of graphitic composition occuring in the Furulund. Possibly the Furulund gneiss. — 999/20

Rock units in south of doubtful correlation

Biotite schists — 999/30

Muscovite schists and mica schists + garnets — 999/59

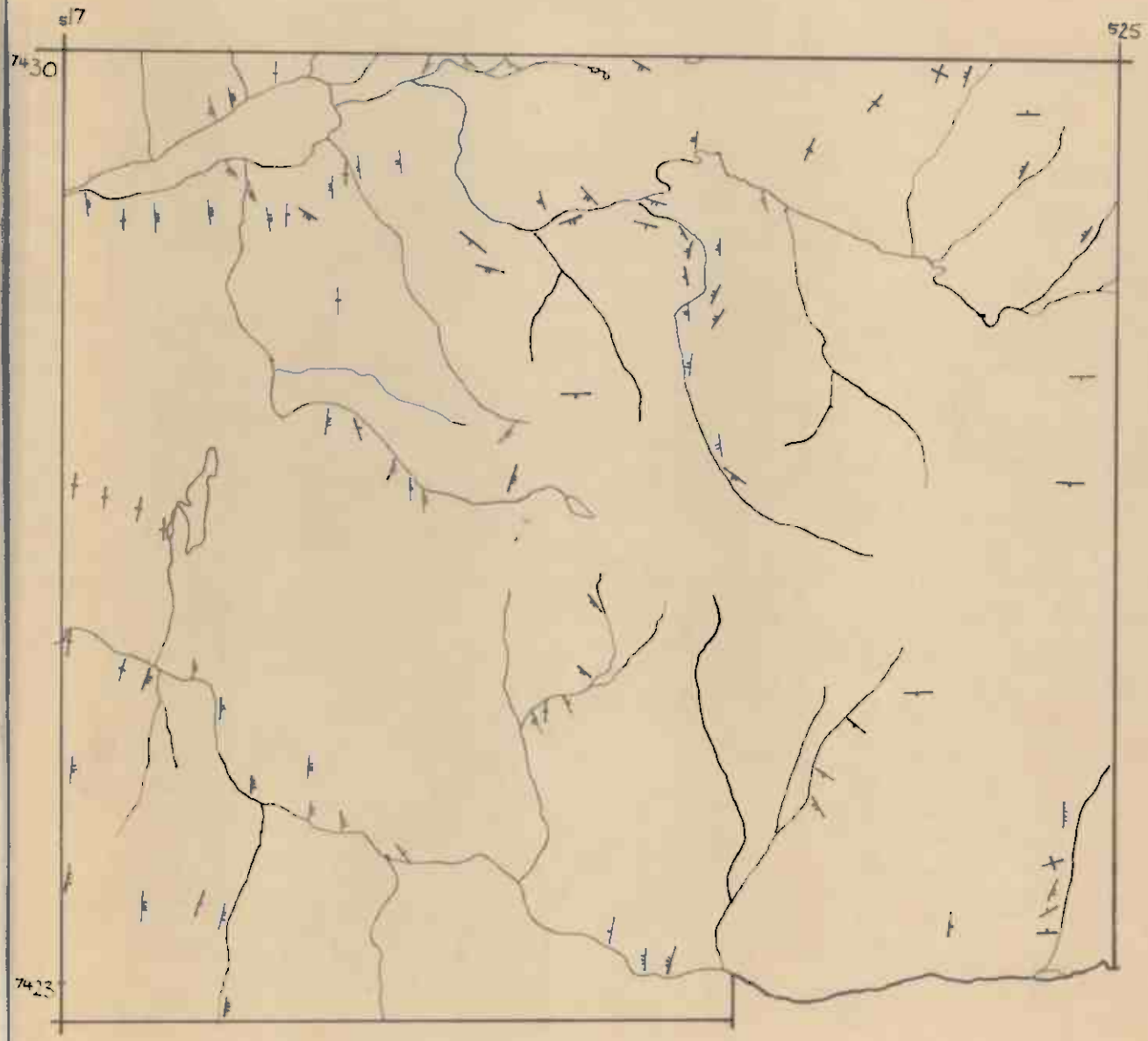
Garnet mica schists in the south central area. — 101/7

A/S SULITJELMA GRUBER

M. J. DOWNES

TECTONICS - SCHISTOCITY TRENDS

Scale 1 : 50,000



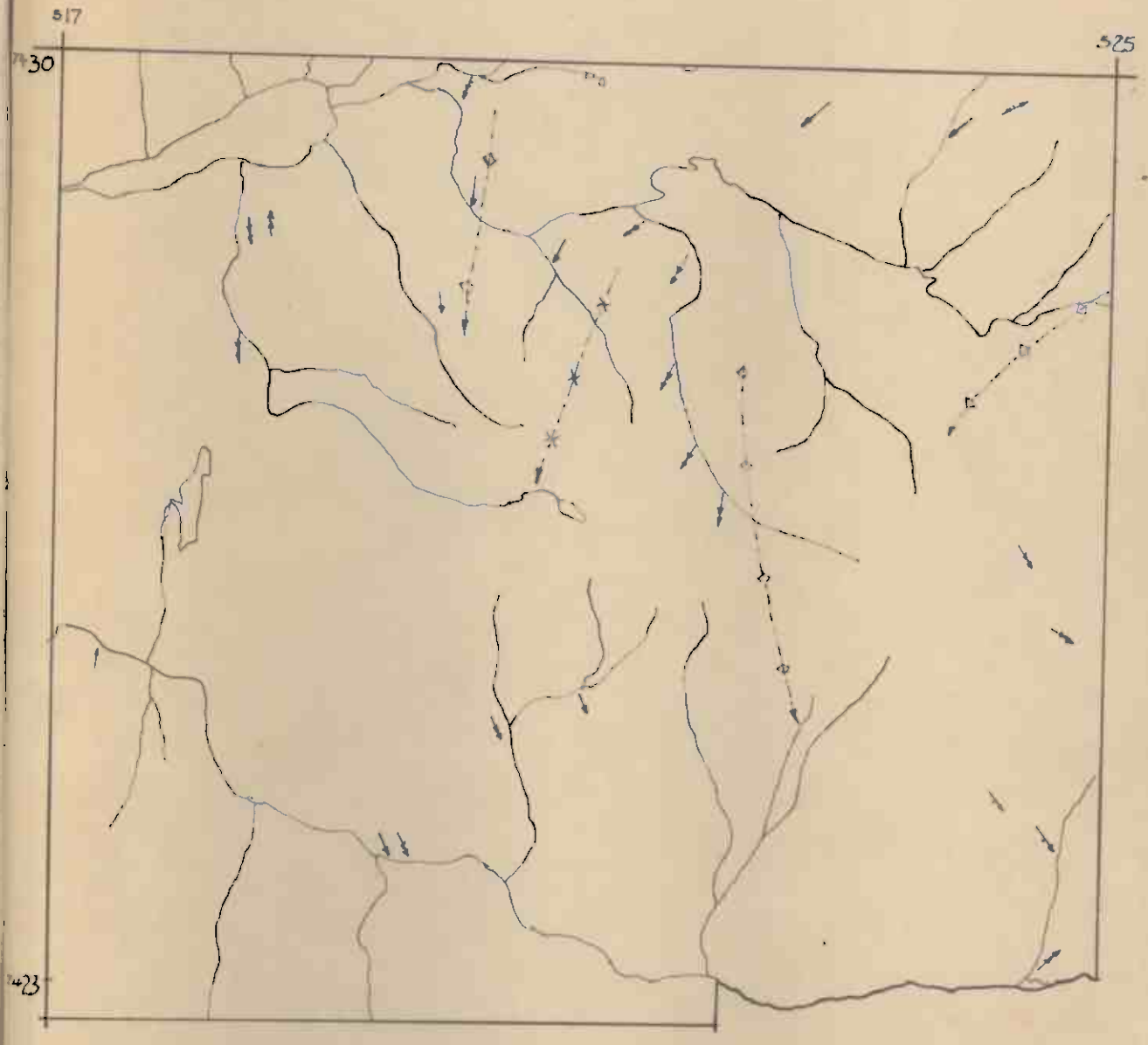
0°-4° 5°-29° 30°-59° 60°-84° 85°-90°

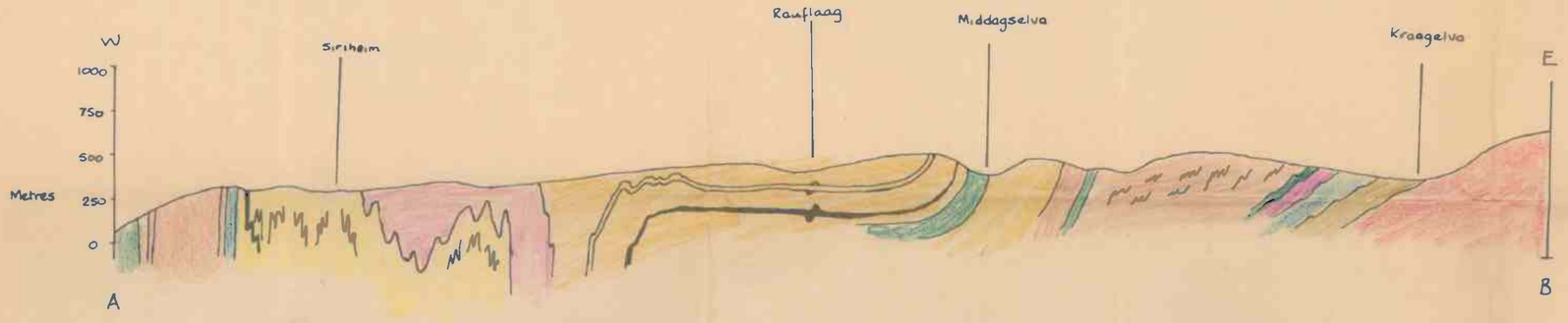
A/S SULITJELMA GRUBER

M. J. DOWNES

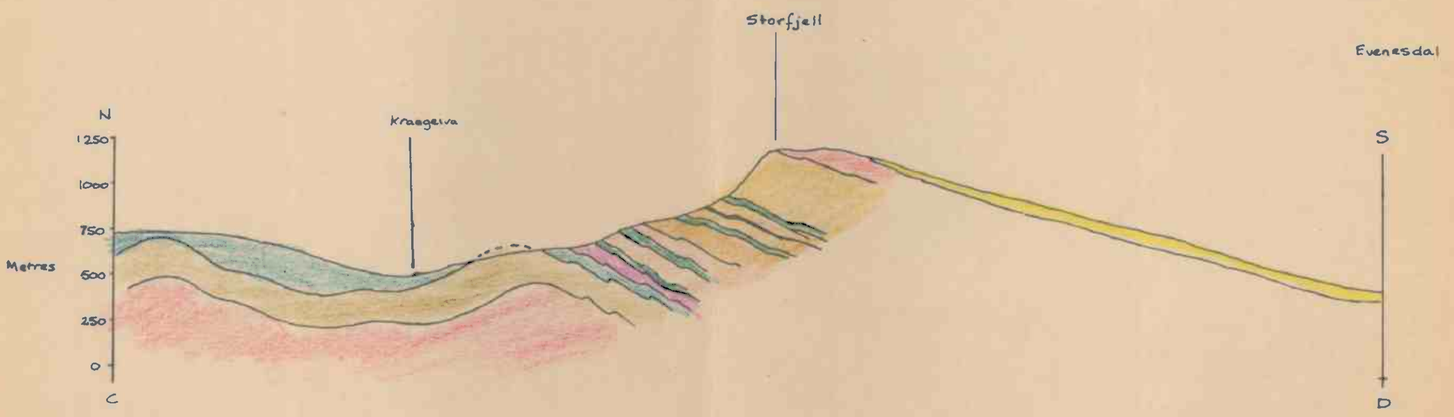
TECTONICS - FOLD AXES

Scale 1 : 50,000





East-West Section A-B along 7428



North-South section C-D along 524

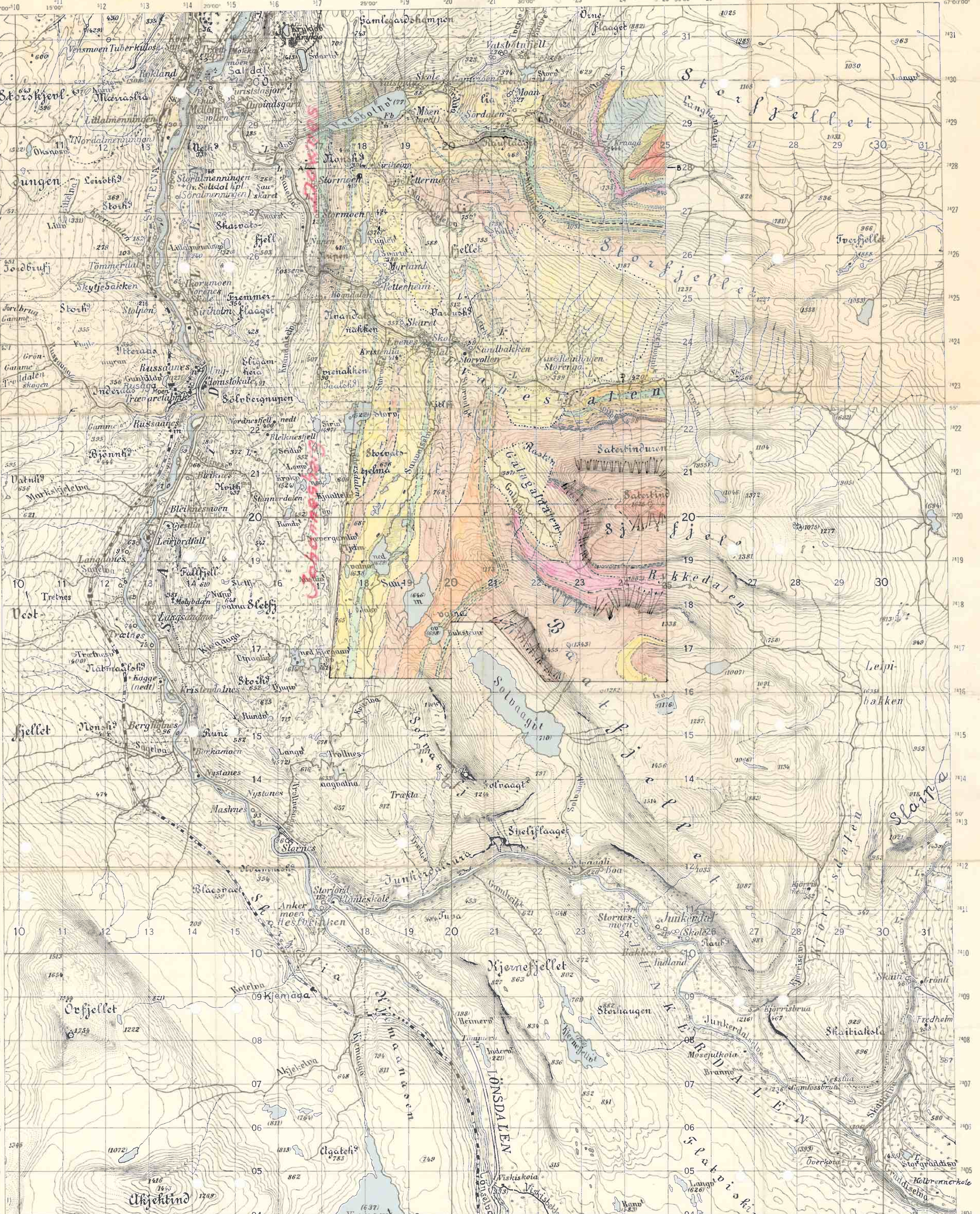
Scale Horizontal 1: 25,000 Vertical 1: 25,000		Målestokk	Tegn. Trac. Klr.
		Erstatning for:	
M. J. DOWNES			
		Erstattet av:	

NORWAY-NORGE 1:50,000

FIRST EDITION—AMS

JUNKERDAL

SHEET 2128 IV
AMS SERIES M711



TRYKT I NORGES GEOGRAFISKE OPPMÅLING 10-67

AMS M711
First Edition—AMS

Prepared by the Army Map Service (PV), Corps of Engineers, U. S. Army, Washington, D. C. Copied in 1952 from Norge 1:50,000, Norges Geografiske Oppmåling, Sheet L 14, 1943. Sheet size changed and planimetric detail partially revised.

Målestokk, Scale 1:50,000

1 ½ 0 1 2 3 Miles
1000 500 0 1000 2000 3000 4000 Meters
1000 500 0 1000 2000 3000 4000 Yards

EKVIDISTANSE. CONTOUR INTERVAL 30 METERS

TRANSVERSE MERCATOR PROJECTION
HORIZONTAL DATUM: E[illegible] DATUM

BLACK NUMBERED LINES INDICATE THE 1,000 METER UNIVERSAL TRANSVERSE MERCATOR GRID ZONE 33, INTERNATIONAL SPHEROID

RUTENETT UTM SONE 33. SORTE TALL

THE LAST THREE DIGITS OF THE GRID NUMBERS ARE OMITTED
TALLENE ANGIR KM

HEIGHTS IN METERS

LEGEND—TEIKNTYDING

- International boundary with marker — *Riksgrense, grenserøys, -merke*
- Province boundary — *Fylkesgrense*
- District, town boundary — *Herredsgrense, bygrense*
- Parish boundary — *Soknegrense*
- Crown lands boundary — *Statsalmenningsgrense*
- Main road; Route number—*Hovudveg, vegnummer*
- Secondary road—*Bygdeveg*
- Private road—*God privat køyreveg*
- Cart road—*Kjørreveg*
- Winter road; Track—*Vinterveg. Lite synleg stig (ferdaveg)*
- Path distinct—*Kløvveg, gangveg, tydeleg tråkka stig*
- Path with markers—*Vardesett stig og blåmerkt skogsveg*
- Telephone or telegraph line; Station — *Telefon-telegraflinje, stasjon*
- Power transmission line; Power station, transformer station — *Elektrisk leidning, kraft el. transformatorst.*
- Rocks: Awash; Sunken—*Båe i sjømålet. Båe under vatnet*
- Sandy foreshore flat—*Havstrand med fjøre og slaggrunnslinje*
- Marsh—*Myr*
- Coniferous woods—*Barskog*
- Deciduous woods—*Lauvskog*
- Railroad, double track; Station; Halt — *Jarnveg (tvisporal), stasjon, stoppestad*
- Railroad, single track; Caretakers house — *Jarnveg (einsporal), vaktarhus*
- Railroad, narrow gauge, electric tramway — *Tertiær jarnveg, elektrisk sporveg*
- Railroad under construction — *Jarnveg som er i bygging*
- Streetcar line — *Trallebane, hestejarnveg*
- Aerial cableway—*Togbane (taubane)*
- Church; Parish, chapel—*Hovudkyrkje, Soknekyrkje, Kapell*
- Cemeteries—*Kyrkjegard*
- Factory, power station, etc.; Mill — *Større fabrikk, drift, kraftverk, mylne o.l.*
- Brickworks; Small mill; Sawmill — *Teglverk, Mylne (mille), kvern, Sag*
- Mine, mining claim; Quarry—*Gruve, skjerp, Steinbrot*
- Wireless telegraph station—*Trådlaus stasjon*
- Airfield; Parade ground—*Flyplass. Eksismo*
- Horizontal control points—*Trigonometrisk punkt*
- Lighthouse, light; Beacon; Air navigation light — *Fyr, lykt, S[illegible]; Luftfyr*
- Fishers or hunters cabin, cattle camp, etc. — *Fiskarbu, skyttarbu, fe[illegible]ger o.l.*
- Farms; Farm, mountain pasture—*Gard, småbruk, plass, sæter*
- Cottage, school, hotel, meetinghouse, tourist shelter, inn, sports-hunters cabin, small farm, small power station, mill, etc. — *Villa, skole, hotell, bedehus, turisthytte, gjestgjevarhus, sports-jakthytte, mindre bruk, lite kraftverk, mølle o.f.*

RUTETILVISING (KARTREFERENSE). NAERMESTE 100 m.	SONEOMRÅDE GRID ZONE DESIGNATION: 33W	TO GIVE A STANDARD REFERENCE ON THIS SHEET TO NEAREST 100 METERS
Eksempel: TRIGONOMETRISK PUNKT 1625 km aust 246 km nord 283 TRIGONOMETRISK PUNKT 246283 Merk at komma strykes og at 100 km tallene- de små tallene 5 aust og 74 nord IKKE skal tas med. Ved meldinger utover 100 km eller hvis mere enn ett rutenett er merket på kartet, skal også 100 km ruten angis: TRIGONOMETRISK PUNKT WQ246283 Ved meldinger utover 9° nord, syd eller 18° aust, vest, skal også soneområde angis: TRIGONOMETRISK PUNKT 33WWQ246283	100 KM RUTE 100,000 M. SQUARE IDENTIFICATION WQ IGNORE the SMALLER figures of any grid number; these are for finding the full coordinates. Use ONLY the LARGER figures of the grid number. example: 7404000	SAMPLE POINT: HORIZONTAL CONTROL POINT 1625 1. Locate first VERTICAL grid line to LEFT of point and read LARGE figures labeling the line either in the top or bottom margin, or on the line itself: 24 Estimate tenths from grid line to point: 6 2. Locate first HORIZONTAL grid line BELOW point and read LARGE figures labeling the line either in the left or right margin, or on the line itself: 28 Estimate tenths from grid line to point: 3 SAMPLE REFERENCE: 246283 If reporting beyond 100,000 meters or if sheet bears an overlapping grid, prefix 100,000 Meter Square Identification, as: WQ246283 If reporting beyond 9°N-S or 18°E-W, prefix Grid Zone Designation, as: 33WWQ246283

INDEX TO ADJOINING SHEETS
ISOGONIC INFORMATION 1951

2029 II	2129 III	2129 II
2028 I	2128 IV	2128 I
2028 II	2128 III	2128 II

GN

5°00' OR 18 MILS

0°26' OR 8 MILS

APPROXIMATE MEAN DECLINATION 1952 FOR CENTER OF SHEET
ANNUAL MAGNETIC CHANGE 8' EASTERLY

Use diagram only to obtain numerical values. To determine magnetic north line, connect the pivot point "P" on the south edge of the map with the value of the angle between GRID NORTH and MAGNETIC NORTH, as plotted on the degree scale at the north edge of the map.

MISVISNING 1952 I GRADER OG MILS [illegible] OG I STREKER (MILS)
FORANDRING 8' ELLER 2,4'' AUST.

Diagrammet gir bare tallverdiene. Retningen for Magnetisk Nord bestemmes ved å forbinde pivotpunktet "P" i søndre rammekant, med det punkt på skalaen i nordre rammekant, som svarer til misvisningen regnet i forhold til RUTENETT NORD (GN).

GLOSSARY-FORKORTELSER

Bh	bedehus	meetinghouse	ned	nedre	lower
bg	berg	mountain, rock	n	nordre	northern
Bvs	brannvaktstasjon	fire station	n^t	nut	peak
bk	bekk	brook, creek	PÅ	poståpneri	post office
DS	dampskipsanløpssted	port	Pg^d	prestegard	vicarage
Elektr Vk	elektrisitetsverk	power station	RS	redningsstasjon	rescue station
ev	elv	river	San	sanatorium	sanatorium
Fbr	fabrikk	factory	Sph	sportshytte	sports cabin
Fb	fiskarbu	fishers cabin	skj	skjær	rock, skerry
fj	fjell	mountain	Sk	skole	schoolhouse
fd	fjord	fiord	Sb	skytterbu	hunters hut
fs	foss	waterfall	st	store	great
Fl	fe[illegible]ger	cattle camp	str	straum	stream, current
gd, g^d	gard	farm	s^d	sund	sound
hg	haug	hill, hillock	s^r	sæter	mountain pasture
h^d	høyde, høgd, houd	hill	s^l	støl	shieling
h^mr	hamar	crag	s	søndre	southern
hl	holme	islet	TS	telegrafstasjon	telegraph station
in, ind	indre	inner	t^d	tind	peak, pinnacle
jh	jakthytte	hunters cabin	tj	tjern, tjørn	lakelet, pool
k^p	kamp	hill, hilltop	Th	turisthytte	tourists shelter
Kpl	kapell	chapel	Tk	tømmerkoie	lumber shanty
Kn^p	knapp	peak	UH	Ungdomshus	meetinghouse
Kn^t	knatt	peak	v^n	vann, vatn	lake (lakelet)
Kl	kolle	knoll	v	vestre	western
L	lade, løe	barn	V^k	verk	factory, works
l^d	land	land	V^b	vokterbolig	caretakers house
Ldh	landhandleri	shop	V^l	voll	plain, meadow
l	lille, litle, lisle	little	Y^t	ytre	outer
LS	losstasjon	pilot station	ö	östre, austre	eastern
M	meieri	dairy	öv	övre	upper
m	mellem, midtre	middle			

JUNKERDAL
NORWAY

DOWNES

M. J. Downes Evenesdal - Vassbotnfjell

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Introduction

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G) Mica and graphitic Schists
F) Calc.-mica Schists
E) Furulund
D) Sjønstå
C) Pieske Marble Group
B) Sparagmite
A) Basement Granite

A) Basement Granite

This is structurally the lowest group and is brought up in the extreme east of the area. It consists of Quartz feldspar (crystals up to 0.5 cm) with blebs of biotite.

B) Sparagmite

This overlies the basement granite and is of considerable lateral variation in composition from finely banded pale quartzites to quartzoze mica schists and occassional calciferous bands. This grades upwards into a mica schist.

C) Pieske Marble Group

Marble (Pieske)

Intercalated with the marble are many mica schist bands of the type which underlie it. Indeed its overall appearance is a dirty pale brown and is impure throughout in this area.

Graphitic Schists

These vary lateralles in graphitic content espesially in the north and generally consist of large graphiterich lenses in mica schists.

Amphibolite

This is a rather friable amphibolite micaceous in parts and tends to be very thin.

D) Sjønstå group

This unit was distinguished from the overlying Furulund group by the latter consisting of biotite schists both calcic and quartzoze in the lower parts.

Garnetiferous Gneiss

This consists of a mixture of garnet mica schists and quartzoze garnet mica schists. There is also variation laterally due probably to tectonic thickening. In the area of Kraagelva and to the north and south, in Kløftelva and Grøndalen the sequence is thick showing a high degree of crumpling and distortish of quartz bands on a small scale. Here the rock weathers as a massive rock type (almost granitic type). On the southern side of Storfjell the sequences thins considerable being here less contacted and is a quartzoze garnet mica schist.

Amphibolite unit

This is a coarse grained amphibolite, in the east amphibole crystals about 0.5 cms and containing feldspar.

E) Furulund Group

The schist sequence in the Furulund has been divided on the basis of graphite content as follows

Upper Furulund	Mixture of graphitic schists and mica schists.
Lower Furulund	Calc. mica schists with hornblende.

Lower

This consists of biotite rich schists with hornblende in parts, with a variation from calcite rich to quartz rich.
The amphiboles generally only show up on weathered surfaces. Both the lower and upper Furulund are well laminated schists but not as slatey as the Sulitjelma sequence. In parts they are garnetiferous. Within this and the upper part are amphibolite bands often of no great thickness. There is a thick coarse grained amphibolite containing feldspar which forms the steep slope of Rauflaaget and which underlies the ore zone in those parts.

Upper

The lower junction of the upper Furulund was taken as the first appearence of graphite. This unit consists of a mixture of graphitic muscovite schists and calc. mica schists. Therefore at the upper limit of the upper Furulund where there is great complexity in the folds it is difficult to place a certain boundary with the calc. biotite sequence which lies above it.

F) Calciferous mica schists

The mica in this sequence is predominantly biotite and could therefore be called the calciferous biotite schists. I have however adopted the name used by Steenken in the area to the south west. Often associated with these schists though not characteristic are small kyanite crystals about 1 cm long and a green calc. silicate mineral. Often the calcite content is high enough to give the overall rock a saccharoidal texture with poorly developed schistosity, though the latter is more probably due to the intense isoclinal folding.
In the east of this succession is a marble band which is uniform in its strike from north to south and is of almost vertical dip . In the north it is above 8 metres in width and thins southward. In parts it contains trenolite.

G) Mica and Graphitic Schists

The calc. mica schists to the east are garnet free whereas this group is commonly garnetiferous with garnets up to 1.5 cms diameter. Graphite rich bands often reach 4 to 5 meters.This succession is again steeply dipping within 10^{o} of vertical and contains many isochially folded quartz and calcite bands, well crenulated schistosity, and tension gashes containing quartz muscovite and large kyanite crystals.

H) Amphibolites

These are mainly very hornblende rich mica schists grading to amphibolites in the most western parts.

Other rock units

In the west and south of the area are many injections of granitic material. The various types are discussed below.

Thin quartz-feldspar injections

These are thin veins of quartz and feldspar with a little mica in parts. They are commonly only of a few cms width and have an approximately north south strike and a steep dip. They are locally strongly folded in isoclinal folds and in parts fold hinges have been tectonically seperated as eye shaped blebs. They are often associated with kink bands especially in the mica and graphitic schist group.

Aplitic veins

These are fine grained with quartz feldspar and some biotite, and have a similar orientation and relationship to the general trend of schistosity as the quartz-feldspathic veins. They sometimes reach 5 metres in width as lens shaped bodies and may also become medium grained.

Pegmatitic veins

Again these have an approximately north south strike and steep dip to both the east and west. They contain large feldspars up to several cms across and sometimes consist almost entirely of feldspar. There is also tourmaline and muscovite. They vary in width but are generally about 1 metre. They are common in the calciferous mica schist. sequence.

Granite Gneisses

These occur in the U. Furulund and one of which may be the Furulund gneiss as they are stratigraphically in the correct position. They are medium grained and contain quartz feldspar muscovite and biotite. They are concordant but lens out.

Ore Zones

No appreciable quantities of pyrite have been found in the Furulund which would correspond with the Sulitjelma level. There are however two main ore bodies in the area, but neither of great concentration.

1. Near Siriheim locality 1790/2780.
The width of the body exposed in old workings is about 2 metres and occurs in graphitic schists and kyanite schists of the mica schist sequence. These rocks contain pyrrhotite, pyrite and some chalcopyrite.

2. Rauflaaget locality in the region of 2120/2870.
The form and content of this ore body have previously been described. Laterally this becomes a rusty muscovite schist which has been marked on the map as a dashed thick 'ore zone' line.

There are two other localities where minor consentrations of ore were present.

3. In Kragelva locality 2205/2915.
The position of this is at the top of the Sjønstå in the garnet mica schists. It contains mainly pyrrhotite but also a little chalcopyrite and pyrite.

4. In Sauelva locality 1710/2560.
This is in a graphitic schist in the mica and graphitic schists and contains pyrite with a little chalcopyrite.

Structure.

With reference to the sections and tectonics maps.
As previously stated the structure in the north east is clear.
There is a main antiform or gentle up-doming of the rock units exposing the basement granite gneiss.
To the north in the extreme north east in a second updoming with broad folds in the marble, the major fold axix being a south-west plunge. West of here a major antiform brings the steeply dipping Furulund from a north, south strike to a gently dipping east west strike. This most probably the same antiform seen on Satertind.

The major synform ovef Rauflaaget is a step like fold seen best on the cross-section. A major antiform to the north west brings steeply dipping rocks of north south strike north of Sørelva into a gently dipping NW-SE strike over Tverlia. To the west many minor folds bring the far Furulund round into a north-south strike concordant with the rocks in the extreme west which are vertical.

The area in the south is difficult to correlate with the adjoining area in central parts due to a combination of complicated tectonics and very

poor exposures.
The gravel slopes of Storfjell seems likely to be a dip slope from the attitude of rocks seen in the streams which would suggest that the Furulund is brought over to the south side of Evenesdal by the antiform.

Samples.

Ore samples.

A 1. Locality - old workings near Siriheim. 1790/2780
3 samples taken across the ore body.
(x) Pyrite pyrrhotite mainly in the graphitic schist.
(y) Pyrite pyrrhotite and a little chalcopyrite in a graphitic schist.
(z) Pyrite and pyrrhotite in a kyanite schist with graphite.
Stratigraphical position calc. mica schists.

A 2. Locality Kraagdal 2205/2915
Pyrrhotite and a little chalcopyrite in a mica schist.
Stratigraphical position U. Sjønstå.

A 3. Locality Sauelva 1710/2560
Pyrite with a little chalcopyrite in a graphitic schist.

F 1. Gneiss locality 2070/2750 possibly the Furulund gneiss.

F 2. Mylorite or crush breccia associated with this gneiss.

F 3. Upper Furulund graphitic mica schist.
Locality 1950/2790

F 4. Upper Furulund graphitic mica schist, well laminated.
Locality 2180/2700

F 5. Lower Furulund non graphitic, hornblendic mica schist.
Locality northern slope of Storfjell.

C 1. Calc mica schist containing principally biotite and some kyanite.
Locality 1900/2470 Calc.mica schist group.

M 1. Quartz kyanite bearing mica schist.
Locality 1700/2560 Mica and graphitic schist group.

M 2. Coarse grained feldspathic amphibolite.
Locality 1950/2405 Evenesdal.

B 1. Basement granite gneiss.
Locality 2450/2820.

B 2. Micaceous quartzite from the sparagmite.
Locality 2450/2980.

G 1. Granitic injection vein medium grained with a contact with a biotite schist.
Calc. mica schist group. 1850/2650.

Key to Lithological Rock Units for 1:50 000 map.

Structurally highest beds at the top of the sequence.

Drift - Sands and gravels — 101/5

Amphibolites - mixture of amphibolites (hornblendic) and hornblende schists — 101/9

Mica and graphitic schists

- mica schists with graphite rich bands

Impure marble — 101/2
mica and graphitic schists — 999/59
Trenolite marble — 101/2

Calciferous mica schists.

- mica is predominantly biotite; poorly laminated schists; kyanite also present — 101/6

Furulund

U. Furulund - mixture of graphite bearing muscovite schists and calc.mica schists generally well laminated schists. — 101/35

L. Furulund - mica schists predominantly biotite calcic and quartz rich in parts hornblende is also characteristic

101/9
101/26
101/9
ore zone — 101/9
amphibolite — 101/26

Sjønstå

Garnet mica schists and garnet gneisses - massive and thick in the west thinning in the east.

amphibolite — 101/9
999/59

Pieske Marble Group

Amphibolite

Thin medium grained amphibolite micaceous in parts — 999/180

Graphite schists

Graphitic and micaceous schists muscovite schists thinning southwards. — 999/110, 999/30

Pieske Marble

Pale and brown impure marble containing many muscovite schist bands — 101/2

Sparagmite

In the upper parts a quartz mica schist
In the lower parts a pure quartzite, banded — 999/25

Basement

Granite gneiss — a quartz feldspar biotite granite — 999/70

Other rock units

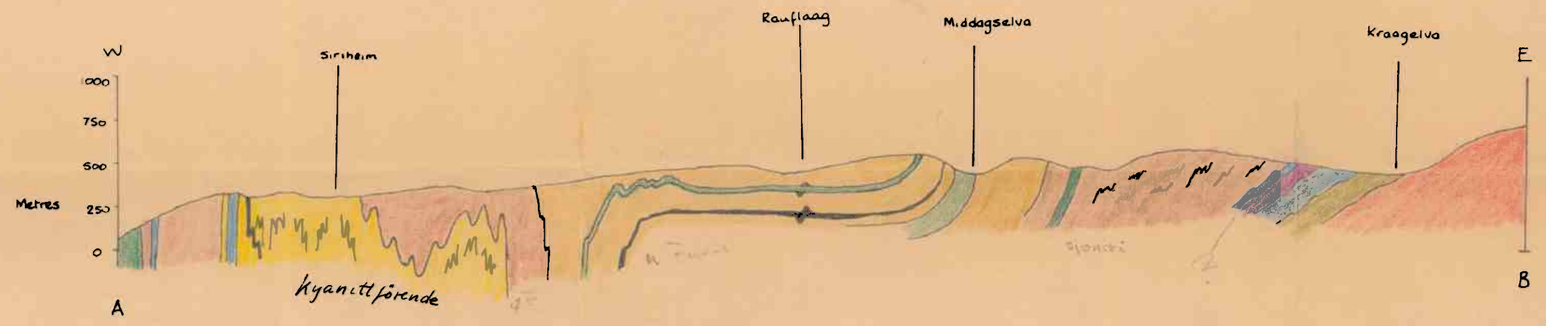
Gneisses of granitic composition occuring in the Furulund. Possibly the Furulund gneiss. — 999/~~30~~ 20

Rock units in south of doubtful correlation

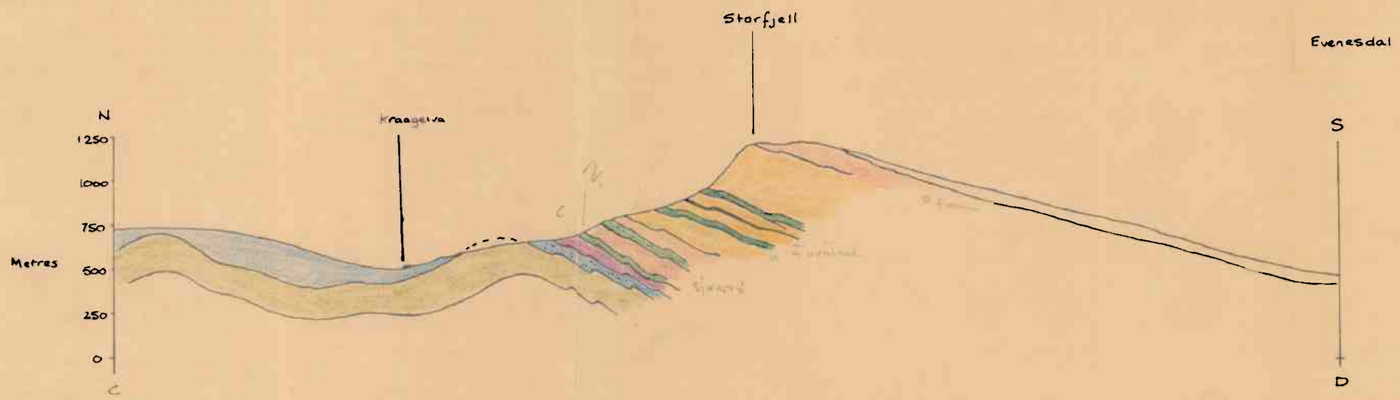
Biotite schists — 999/30

Muscovite schists and mica schists ± garnets — 999/59

Garnet mica schists in the southcentral area — 101/7



East-West Section A-B along 28



North-South Section C-D along 24

Scale Horizontal 1 : 25,000 Vertical 1 : 25,000		Målestokk	Tegn. Trac. Klr.
		Erstatning for:	
M. J. DOWNES		Erstattet av:	

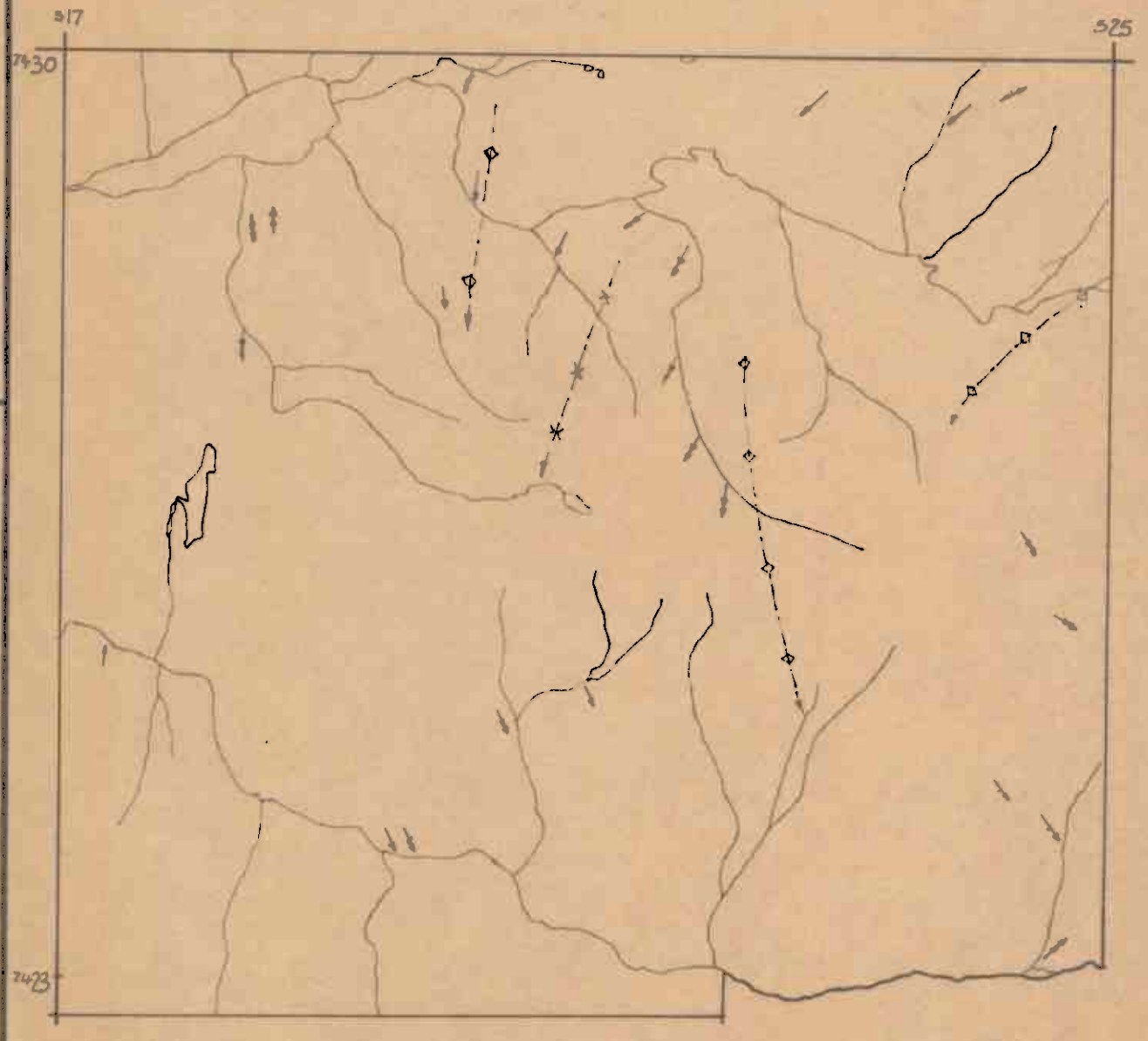
Format A 2

A/S SULITJELMA GRUBER

M. J. DOWNES

TECTONICS - FOLD AXES

Scale 1:50,000



0-4°

5-19°

20-40°

70°

ANTIFORM

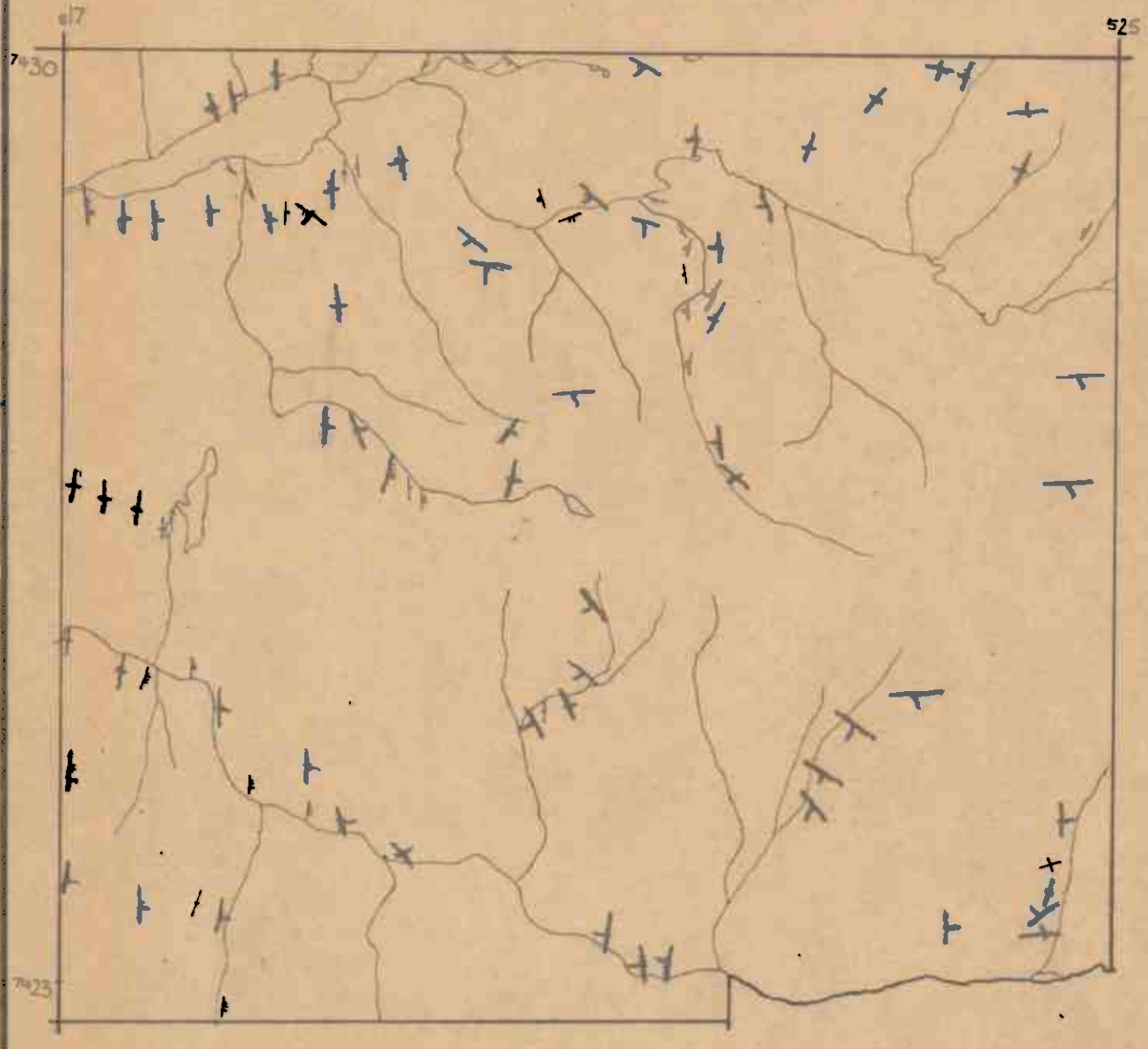
SYNFORM

A/S SULITJELMA GRUBER

M. J. DOWNES

TECTONICS - SCHISTOCITY TRENDS

Scale 1 : 50,000



0°-4° 5°-29° 30°-59° 60°-84° 85°-90°