



# Bergvesenet

Postboks 3021, 7002 Trondheim

## Rapportarkivet

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Kommer fra ..arkiv Sulitjelma Bergverk A/S	Ekstern rapport nr "522230013"	Oversendt fra	Fortrolig pga	Fortrolig fra dato:

### Tittel

Report on preliminary geological fieldwork in the region of Bolna, Stödi, Brøyte and Lønsdal.

Forfatter <b>BADKAR R. CUNNINGHAM J</b>	Dato 1970	Bedrift Sulitjelma Gruber A/S
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Commune	Fylke	Bergdistrikt	1: 50 000 kartblad	1: 250 000 kartblad
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Fagområde	Dokument type	Forekomster
Råstofftype	Emneord	

### Sammen drag

Kartlegging i området Bolna - Stödi - Brøyte - Lønsdal. Seks kyanitt -kvartsitt kropp er pavist. Disse opptrer i en sekvens finkorna gneis som strukturelt ligger over en meir grov- til middelskorna gneis. Selve kyanitt-bergarten er ved Bolna en kyanitt-ski fer, mens ved Semska består den av massiv bla kyanitt-kvartsitt. Kvarts.

REPORT ON PRELIMINARY GEOLOGICAL FIELDWORK IN THE REGIONS OF  
BOLNA, STODI, BROYTE AND LONSDAL  
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(28th July - 4th September 1970)

R. Badkar  
J.K. Cunningham

Summary

Reconnaissance mapping in the above region located five kyanite quartzite bodies in a zone running approx. E-W, 4 km west of Broyte stasjon. A sixth kyanite quartzite body was located 1 - 5 km west of the road, 1 km north of Semskfjell stasjon. Sketch maps of the outcrop distribution of these bodies are presented with related information regarding rock association and thickness. The kyanite quartzite bodies occur in a fine-grained group of gneisses which are structurally above a group of coarse-medium grained gneisses.

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042.001



### 1. Aim of work

Near Nasa and Bolna kyanite and quartz-bearing zones were located. (Platt 1969, Stoakes and Moorhouse 1969). The present work was aimed at extending this mapping with particular reference to tracing kyanite and quartz-bearing zones and to delineate areas for more detailed examination.

### 2. Location of area and physiography

The area is to the west of the road Lonsdal-Bolna and north of the valley containing Bolnabecken and Raufjelbecken. It is extended northwards to Lonsdal.

The region covered is represented in the AMS Series maps.

Sheet number	2028 II
" "	2128 III

and in aerial photograph.

The series of river valley running N-W drain high ground in the west running towards the broad N-S valley containing the road and the railway. The high ground has steep cliffs with extensive talus deposit. The high ground have extensive outcrop whereas in the valley exposure is scanty, especially north of Bolna.

### 3. General geology

In this area a coarse to medium grained gneiss complex referred to as "basement" is overlain by thick succession of rocks of varied composition dominated by fine-grained gneiss. The kyanite bearing zone in the Bolna region (ref. 1:10 000 map) appears to be confined between these two groups of gneisses, in the region of the contact, whereas the kyanite-bearing zones further north are found in the fine-grained group of gneisses, higher in a structural sense, than in the Bolna region.

The quartz body mapped by Platt at Bolna appears to be associated with graphite schist and banded quartzite (ref. "main quartz body" 1:10 000 map).

The association with the kyanite zone, of green mica gneiss (or schist) and pyritous biotite gneiss (often the green mica rock contains disseminated pyrite) is important as these pyritous rocks weather to a rusty brown colour and are used in tracing the zone.

### 4. Fieldwork

The Bolna region was mapped on aerial photomosaic of scale approx. 1:10 000, the remaining area being covered on AMS topographic sheets (scale 1:50 000). Therefore the mapping on the topographic sheets is approximate and the work was planned to cover large areas of ground, to delineate the important regions for further examination.



## 5. Lithological groups and rock types

The "Basement" gneiss (coarse-grained group of gneisses) is a coarse-medium grained crudely foliated biotite gneiss consisting of large grains of feldspar, with quartz and biotite in varying proportion. It is often granitic in appearance and sheets parallel to the hillside ~~but~~ in the Bolna region, nearer to the kyanite-bearing zone the rock is strongly foliated, biotite-rich bands appearing with distinct porphyroblasts of greenish feldspar. In the Stodi region the rock is medium-grained + crudely foliated. North of Stodi region rocks of this type are not found.

A graphite schist/quartzite/quartz lithology is infolded with these gneisses (ref. 1: 10 000 map). The rocks near to the contact with this lithology are strongly foliated and are often augen gneisses.

### The fine grained group of gneisses

In the region of Bolna - Stodi a thick succession of fine-grained quartzose biotite gneisses occur above the "basement" rock. Further north the rocks exposed compose only the group. The rocks are consistently varying proportions of quartz, flakes of biotite, and feldspar with accessory magnetite. In the higher part of the succession whitish quartzose gneisses predominate containing biotite-rich bands and some coarser-grained varieties containing porphyroblasts of feldspar. In these rocks small veins of quartz and simple pegmatites are frequent.

### The kyanite-bearing zone (of alumina zone of Platt, 1969)

As noted earlier in the Bolna region, the kyanite bearing zone appears to be confined to the region of the contact between the two groups of gneisses and is predominantly green mica gneiss, which frequently contains enough pyrite to weather as an orange crust or an otherwise pure white quartz-light mica rock.

In the region further north the zone is found higher in the fine-grained group of gneisses, as noted before, but the characteristic association of green mica gneiss and orange/rusty weathering varieties is maintained.

Specific outcrops of this zone are discussed later.

### In graphitic schist/quartzite/quartz association

In the Bolna region these rocks occur infolded with the "basement" gneiss and also with the more highly foliated varieties of this gneiss where they are in contact with the fine-grained group. The graphite schist weathers rusty brown, the quartzite is finely banded and the quartz often shows a remobilised aspect. The quartz body mapped by Platt has a localised mineralisation in the form of pyrrhotite-pyrite and in Semska where rocks of this association occurs structurally above the fine-grained gneisses, the rocks are stained red though no mineralisation was noted.



# 6. The kyanite zone (Alumina zone. Platt)

In the Bolna region the "kyanite schist" zone mapped on the 1:10 000 map is a fine white occasionally pyritous quartz-light mica rock which associates with kyanite north of Bolna-becken and grades into it. A biotite-rich porphyroblastic gneiss is the footfall rock with rusty weathering biotite gneiss commonly in the hanging wall. No massive bodies of kyanite were noted in the Bolna region north of Bolna-becken.

## In the Semska region

- a) Southern zone This extends for 3 km, being concealed by cover in the east as a quartz-light mica schist. At the strike and dip on the zone north of 1033 (73930/5145) the thickness of outcrop is 20 metres the rock being a pure quartz-muscovite schist. Orange-weathering biotite gneiss occurs in both footfall and hanging wall. Traced west the zone of schist thins to around 5 m in width of outcrop over 100 m and is lost in rockfall on Semskefjellet after it has thinned to around 1 m but locally it thickens up to 20 metres in places. In width of outcrop suggests where dip is measurable, an average thickness of 10 metres. Outcrop in the stream 73929/5158/ is of a very coarse-grained quartz muscovite schist, with quartz veins common thickness of outcrop averages 25 metres and here thickness may be in excess of 20 metres. No massive kyanite bodies occur in the southern Semska kyanite zone.

- b) Semska kyanite body Ref. Sketch map K1

The sketch map shows the outcrop distribution of this blue kyanite quartzite and if the dip in the green mica gneisses which occur below it is consistent with that of the body, a thickness of around 15 m is probable. Quartz muscovite schist, very similar to that seen in the southern zone, is associated with the kyanite quartzite, and a rusty-weathering biotite gneiss which occurs below it can be followed for some distance south before turning up the hill. Refer to descriptive list for description of kyanite quartzite. IVE

- c) The northern zone Ref. Sketch maps K2-K6

The extent of outcrop (5 km) of the five kyanite quartzite bodies is indicated in the sketch maps K2-K6. The footfall rock is a reddish weathering green mica schist of a pure quartz muscovite schist. The outcrop width indicated in the sketch maps gives a distorted estimate of the thickness of kyanite quartzite as no in situ exposure indicated a thickness in excess of 10 metres and repetition by folding (see diagram in sketch map K6), must be common. However scattered exposures between the five bodies suggests lateral continuity.

Refer the description list for description of kyanite quartzite.



7. A note on general structure

No detailed work to understand structure has been done but the outcrop pattern and attitude of the rocks suggest they may be disposed in a series of plunging open folds with axial planes running roughly parallel to NW along which most of the river valleys run. This, in connection with the characteristic association of kyanite quartzite with the green mica gneiss may be taken as general guidelines for locating kyanite.

8. Suggestions for further examination

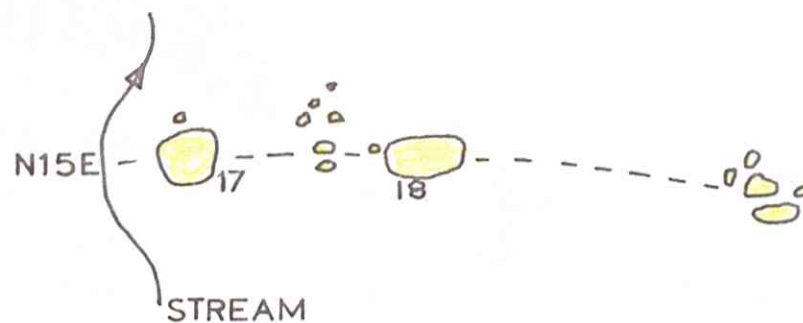
The important kyanite quartzite bodies are located at Semska and in the northern zone of the Semska region. In the southern zone of the Semska region no kyanite quartzite bodies occur though the fairly persistent pure quartz muscovite schist may be important. Hence the region covering these is recommended for full examination.

9. Descriptive list of specimens

<u>No.</u>	<u>Locality</u>	<u>Description</u>
JKC 11	On 1:10 000 map	Well foliated "basement" coarse-g. gneiss
" 12	" "	"Kyanite schist", a quartz-green mica rock
" 13	" "	Banded quartzite
" 14	" "	"Kyanite schist", a quartz-light mica pyrite rock, showing characteristic rusty crust
" 15	" "	Coarsely schistose "kyanite schist" with pyrite. From here to the road sees a thick development of this type of rock
JKC 17	{ Semska kyanite body	Slightly micaceous kyanite quartzite
JKC 18		"Kyanite schist", pure quartz muscovite-schist
JKC 19		Quartz muscovite schist (with magnetite), above kyanite quartzite
JKC 20		Quartz with kyanite (often the kyanite rich blue layers alternate with white quartzite layers)
JKC 21	{ " " " "	Muscovite-rich variety of kyanite quartzite
JKC 22		Kyanite quartzite showing streaking
JKC 23	{ On sketch map K3	Kyanite from quartzite
JKC 24		Specimen from kyanite rich band
JKC 25	{ On sketch map K4	Green mica schist in footfall
JKC 26		Kyanite quartzite rather whiter than the pinkish quartzite which is commoner here.
JKC 27	On sketch map K5	Rather typical kyanite quartzite from this exposure with pinkish quartz.
JKC 28	On Sketch map K6	Typical kyanite quartzite
JKC 29	{ Semska southern zone 73930/5145	Pure quartz-green mica schist
JKC 30		quartz-light mica schist } Both rather typical but much of the rocks of the zone here are quartz-muscovite schist, in the strict sense.

SCALE

0 \_\_\_\_\_ 100 m.



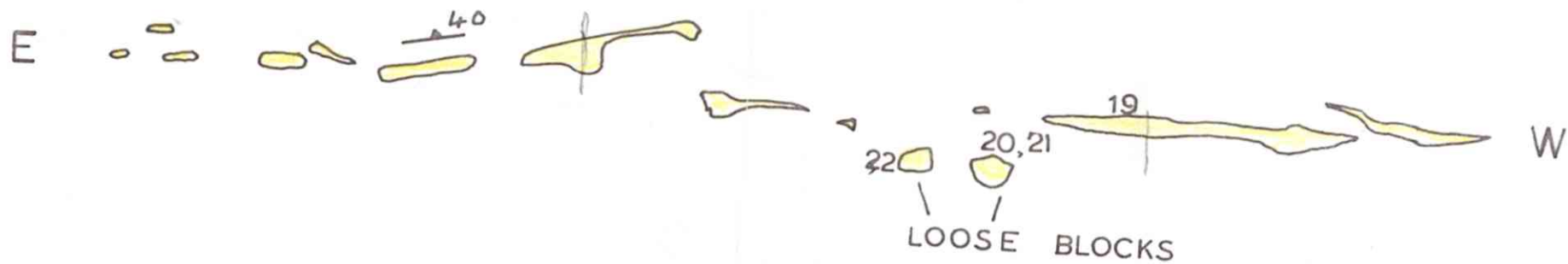
SKETCH MAP

K1 SEMSKA KYANITE

LOCATION. ABOUT 1.5 Km N60W OF SEMSKA STATION

SCALE

0 100m



SKETCH MAP

K 2

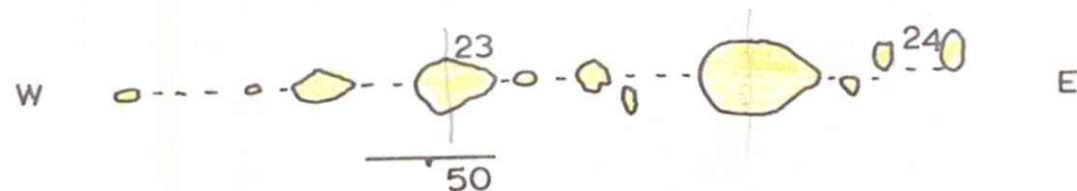
LOCATION

73985/ 5140



SCALE

0 40 M



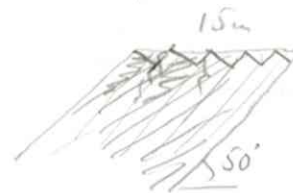
SKETCH MAP

K 3

LOCATION 73988/5134 , IN GULLY S. OF PROMINENT RIDGE.

SPECIMEN 23,24

A/S SULITJELMA GRUBER



SCALE

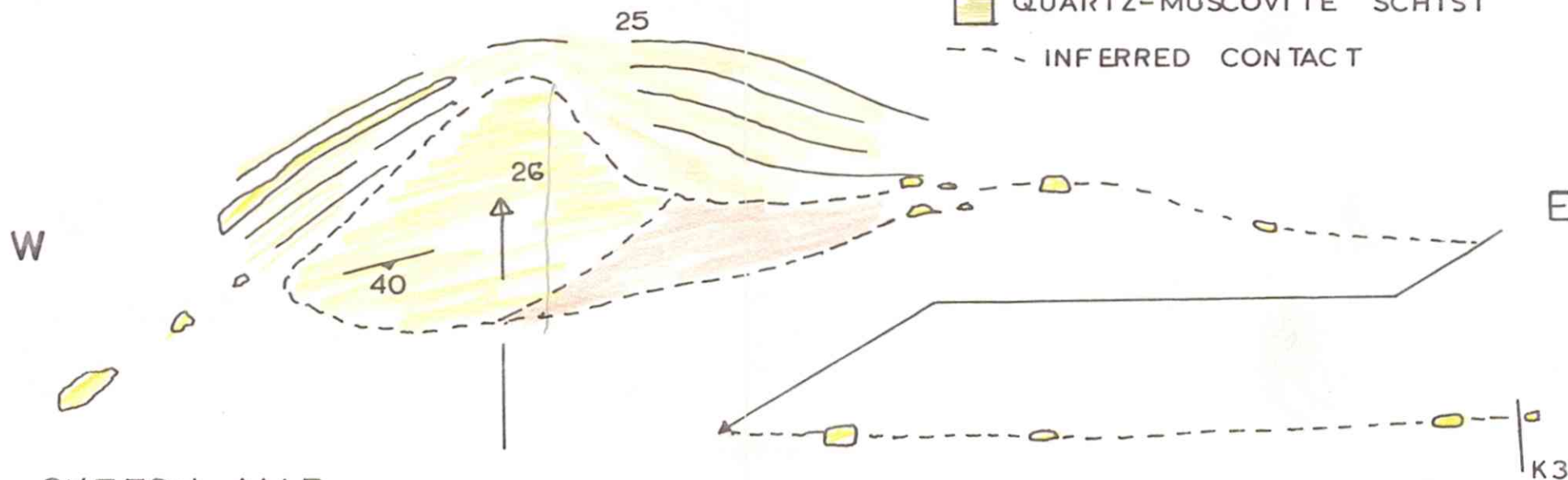
0 40 m

PINK KYANITE-BEARING QUARTZITE

QUARTZ

QUARTZ-MUSCOVITE SCHIST

INFERRED CONTACT



SKETCH MAP

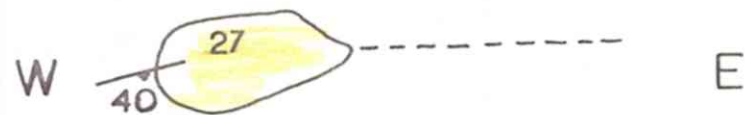
K 4

LOCATION 73989/5126



SCALE

0 40m



SKETCH MAP

K 5

LOCATION

73986/ 5117

A/S SULITIELMA GRUBER

SECTION



KYANITE QUARTZITE



QUARTZ-MUSCOVITE SCHIST



KYANITE QUARTZITE, Q-M SCHIST AND RUSTY WEATHERING FOOTFALL  
REPEATED BY FOLDING.

AVERAGE DIP  $40^{\circ}$

SCALE

0 50m

E

SKETCH MAP

K 6

LOCATION 73988/ 5106



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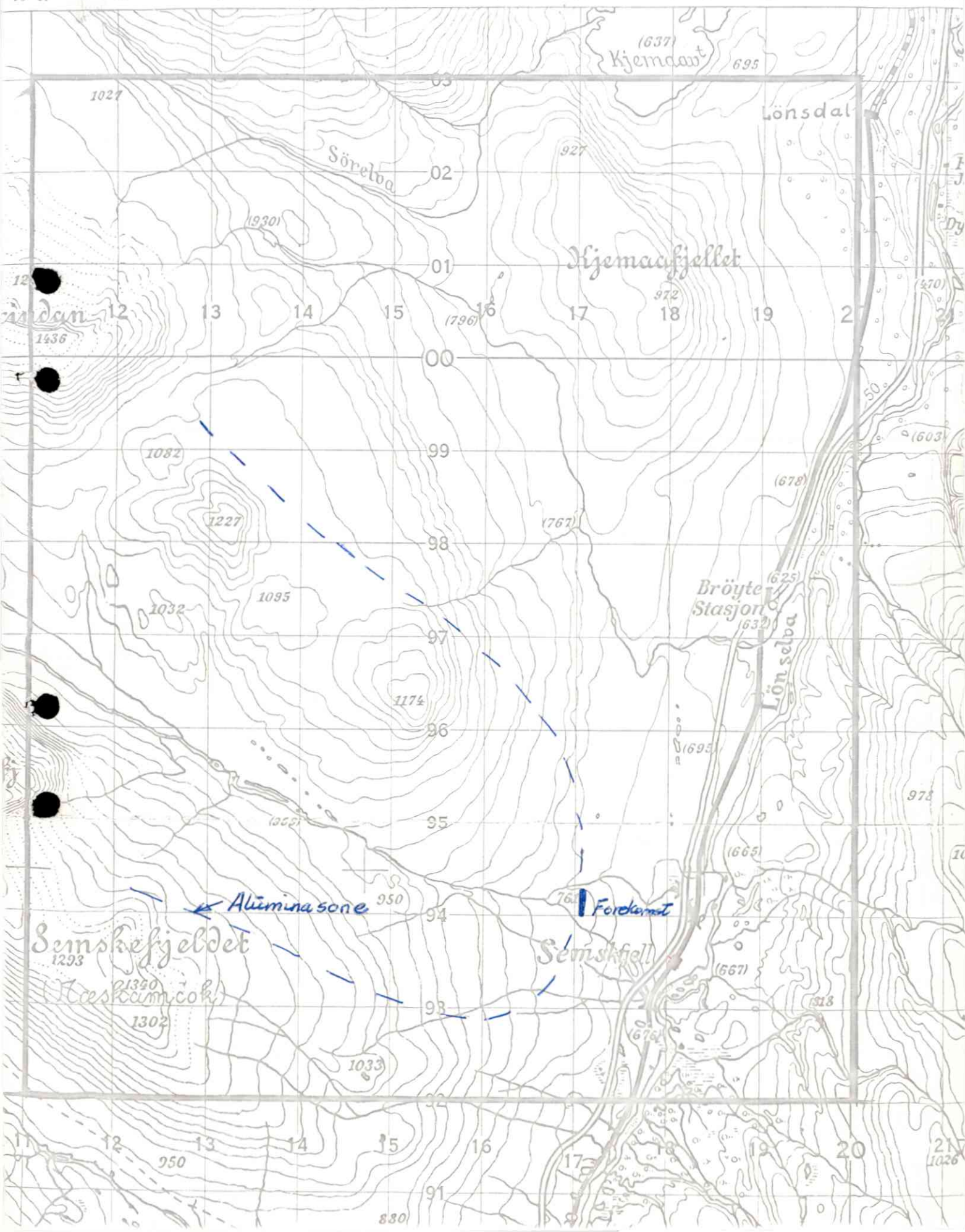
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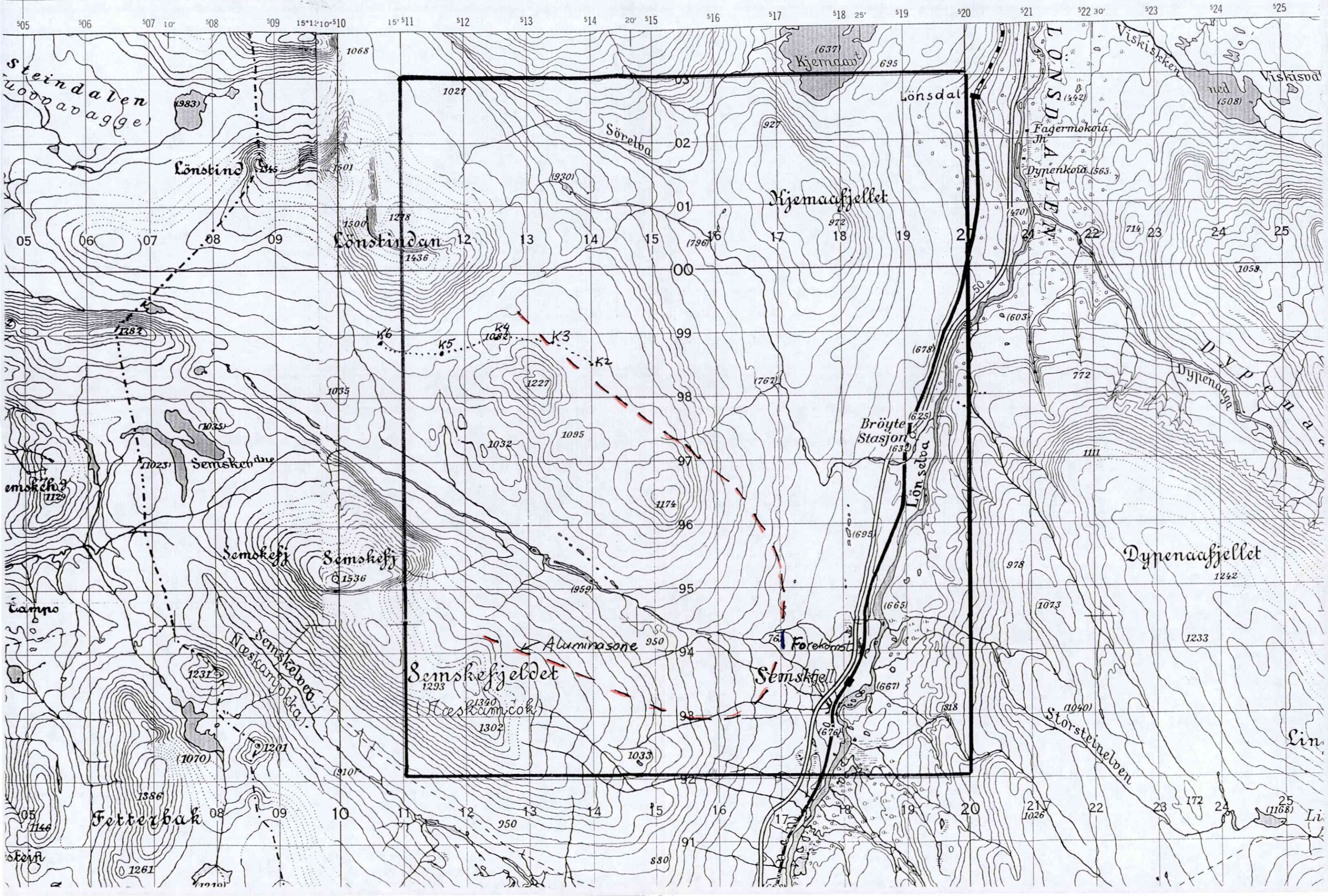
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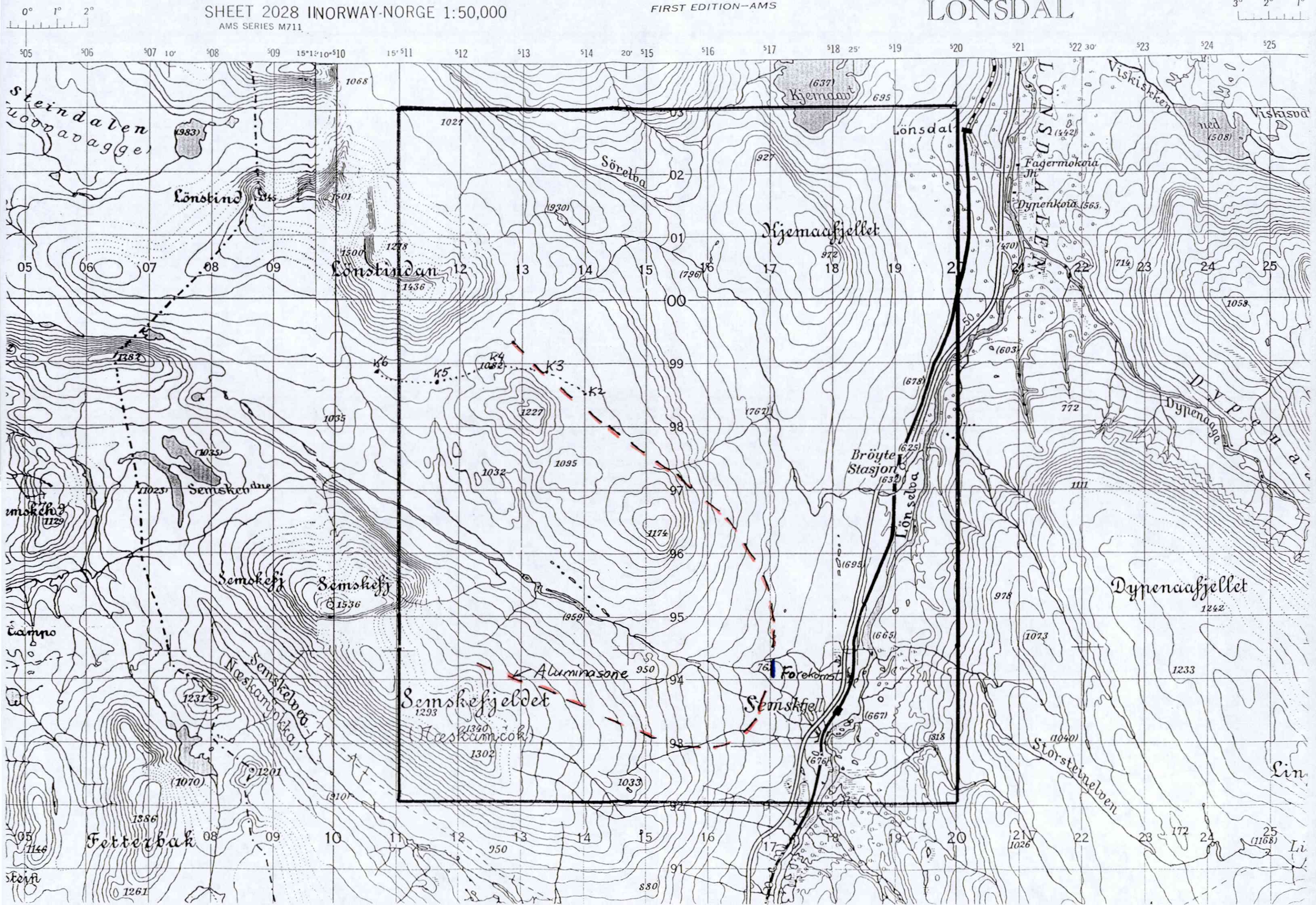
15° 11' 12' 13' 14' 15' 16' 17' 18' 25' 19' 20' 21'



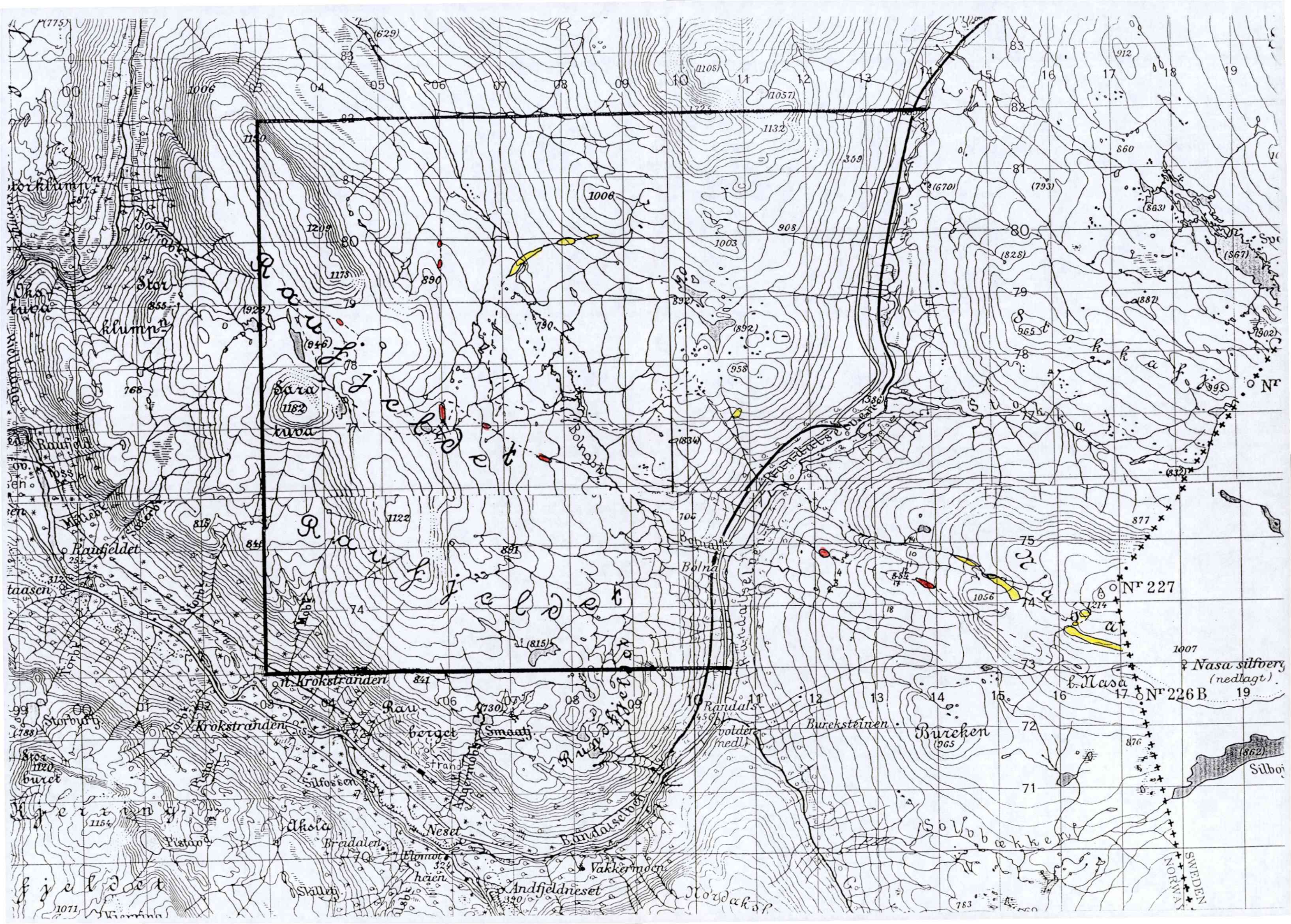




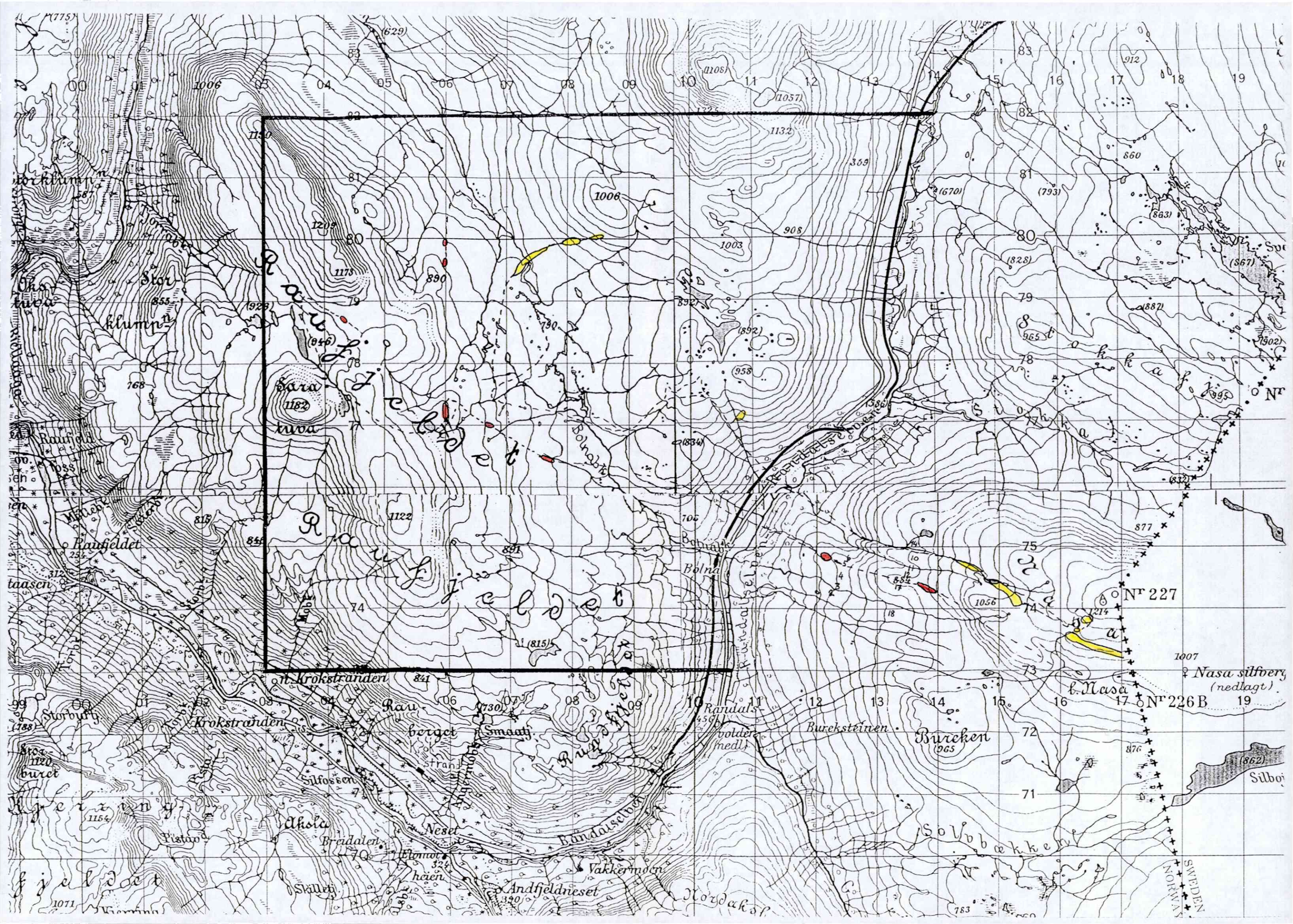








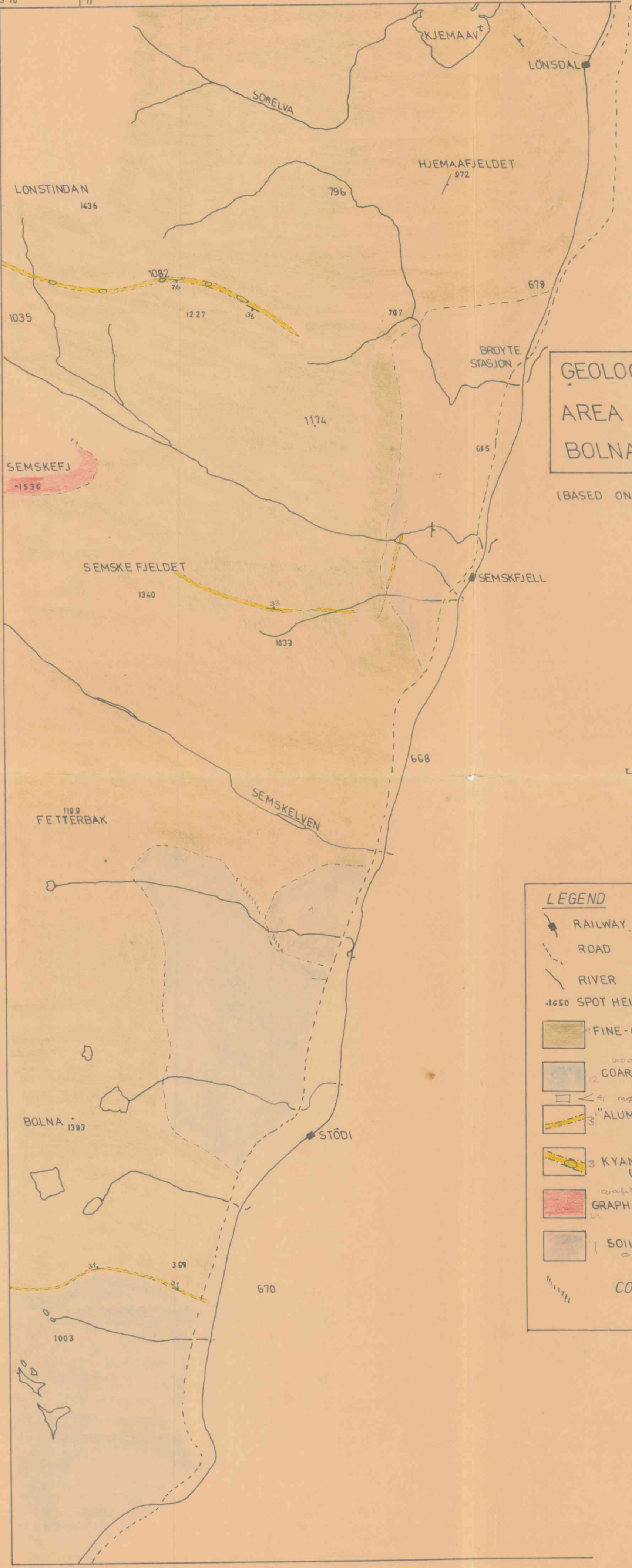






15°13'10"  
66°45'  
74°03'

1511

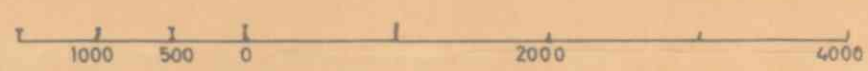


GEOLOGICAL MAP OF  
AREA WEST OF ROAD  
BOLNA — LONSDAL

(BASED ON AMS SERIES M711  
SHEET 2128 III)

GRID NORTH

SCALE 1:50,000



LEGEND

- RAILWAY
- ROAD
- RIVER
- 1650 SPOT HEIGHT (METRES)
- 1 FINE-GRAINED GROUP OF GNEISSES
- 12 COARSE-GRAINED GROUP OF GNEISSES
- 41 more gr. bthol. - gneiss
- 3 "ALUMINA ZONE" (NOT TO SCALE)  
aluminium zone
- 3 KYANITE BODY IN "ALUMINA ZONE" (DIMENSIONS NOT TO SCALE)  
T. leucosiderit
- 64 graphite schist banded kwartzite - kwartz group  
GRAPHITE SCHIST-BANDED QUARTZITE-QUARTZ GROUP
- 1 SOIL COVER  
overcool.
- CONTACT UNCERTAIN

	Målestokk	Tegn.	
		Trac.	
		Kfr.	
	Erstatning for:		
	Erstatet av:		

A/S SULITJELMA GRUBER  
FIELD SEASON SUMMER 1970  
R. BADKAR.  
J.K. CUNNINGHAM.



# GEOLOGICAL MAP OF AREA NORTH OF BOLNA STATION AND EAST OF BOLNABECKEN AND RAUFJELDELVEN.

REFERENCE AMS SERIES M711 SHEET 2028 11  
2128 111

NORTH

SCALE (APPROX) 1:10,000

500 400 300 200 100 0 500 1 KILOMETRE

**LEGEND**

- CONTACT
- CONTACT CONJECTURAL
- STREAM
- "KYANITE SCHIST" ZONE
- "ALUMINA ZONE"
- BIOTITE-RICH FINE-GRAINED PORPHYROBLASTIC GNEISS.
- "BASEMENT" GRANITE AND ASSOCIATED GNEISSES
- GRAPHITE-SCHIST—BANDED QUARTZITE—QUARTZ ZONE
- THE MAIN QUARTZ BODY WITH SOME PYRRHOTITE—PYRITE.
- AMPHIBOLITE
- \*1003. SPOT HEIGHT (METRES)
- 60° STRIKE + DIP
- HORIZONTAL