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Olav Limyr	17.02 1983	Folldal Verk A/S Norske Fina A/S

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Råstofftype	**Emneord**	
Malm/metall	W Mo	

Sammendrag

Exploration activities have continued from the mining period and until today. In the forties and fifthies exploration-drifting at the valley bottom (stoll I and II) resulted in the finding of low grade tungsten mineralzation, as diamond drilling on the mountain plateau (DB 1-5, Map 2) not gave any positive result. Urban (1971) gave a mineralogical description of the deposit. In the seventhies Folldal Verk A/S undertook detail mapping on the mountain plateau (Nyegaard, 1976), bulksampling from Schånningsgruben (Pedersen et al., 1974) and diamond drilling of four holes on the mountain plateau (DDH 227-230, Map 2) (Nyegaard, 1975). The claims were returned to the government, which undertook a compilation of all relevant data and did an evaluation of the prospect (Olerud, 1980). In 1980 the joint venture Folldal Verk A/S - Norske Fina A/S took over the claims and continued with diamond drilling of three holes (DDH 231-233, Map 2) (Nyegaard, 1981).

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Stabekk, 17. februar 1983
Deres ref.
Vår ref.: Mining - OL/Lo

Vedr.: Håndgivelsesavtale Ørsdalen og Knaben Gruvor

Vedlagt oversendes i 2 eksemplarer:

Ørsdalen, Exploration Works 1982.

Knaben Gruvor, Exploration Works 1982.

Med hilsen
for NORSKE FINA A/S

Olav Limyr

Vedlegg

JOINT VENTURE

FOLLDAL VERK A/S - NORSKE FINA A/S

ØRSDALEN

EKSPLORATION WORKS 1982

ØRSDALEN

Previous work.

The old molybdenum-tungsten mine in Ørsdalen (Map 1) is situated on the mountain plateau just south of the valley. Mining took place for shorter periods from 1904 to 1953 and was concentrated around three small mines (Map 2). Strossekrateret was the first to be worked. It produced 55 tons of MoS_2 from an estimated 5000 to 7000 tons of ore. Wolframsynken and Wolframstrossen produced 18 tons of WO_3 from 3000 to 5000 tons of ore, and Schånningsgruben produced 32 tons of WO_3 from 5000 to 7000 tons of ore. These values indicate a grade of c. 1 % MoS_2 and c. 0,5 % WO_3.

Exploration activities have continued from the mining period and until today. In the forties and fifthies exploration-drifting at the valley bottom (Stoll I and II) resulted in the finding of low grade tungsten mineralization, as diamond drilling on the mountain plateau (DB 1-5, Map 2) not gave any positive result. Urban (1971) gave a mineralogical description of the deposit. In the seventhies Folldal Verk A/S undertook detail mapping on the mountain plateau (Nyegaard, 1976), bulksampling from Schånningsgruben (Pedersen et al., 1974) and diamond drilling of four holes on the mountain plateau (DDH 227-230, Map 2) (Nyegaard, 1975). The claims were returned to the government, which undertook a compilation of all relevant data and did an evaluation of the prospect (Olerud, 1980). In 1980 the joint venture Folldal Verk A/S - Norske Fina A/S took over the claims and continued with diamond drilling of three holes (DDH 231-233, Map 2) (Nyegaard, 1981).

Activities.

None of the above mentioned exploration activities had succeeded in finding continous and high grade mineralization. The expectation to the area still being based on the high grade ore from the three old mines. Therefore, instead of continued diamond drilling it was decided this year to do a detailed structural/

lithological mapping with the intension of obtaining a geological/mineralization model, which could form basis for continued investigations.

The main mineralized zone on the mountain plateau - including the three old mines - and the continuation of this zone down the valley wall were mapped in scale 1:1ooo (Map 2). Stoll 1 and 2 were mapped in scale 1:2oo (Map 3 to Map 6) and an interpretation of the geology of the Stoll 1 - Stoll 2 level was done in scale 1:1ooo (Map 7). Mapping was also done of the 12o m long adit to Strossekrateret (Map 8) and of the old adit Norges Bank 3o m above Schånningsgruben (Map 9).

The mapping of the valley wall was done by Sven Dahlgren, Jan Inge Tollefsrud and Per Erik Øverli, and the map of the area around Wolframsynken is taken from Nyegaard (1981).

The following description on geological setting and mineralization includes information from Urban (1971) and Nyegaard (1976).

Geological setting

The area around the Ørsdalen Mo-W mines comprises high grade metamorphic, mainly leucocratic gneisses. It is possible to discriminate between:

Quartz-feldspar gneiss or granulite which contains 1 to 2 % mafic minerals, mainly biotite. The rock is coarse grained and characteristically has developed platy quartz.

Biotite gneiss with 5-1o % mafic minerals, mainly biotite. It is a fine to medium grained, light grey rock with a vague foliation.

Biotite-hypersthene gneiss with or without garnet. The rock contains 2o-5o % mafic minerals and is characterized by the abundance of often isoclinally folded leucocratic veins.

Amphibolite. Most often it is a massive hornblende-plagioclase rock, but occasionally it is rich in cm-thick leucocratic bands.

Hornblende-biotite gneiss with 1o-2o % mafic minerals. The rock is characterized by large kalifeldspar grains and a vague biotite foliation.

Quartz veins and pegmatites.

The mapped area (Map 2) is part of the eastern overturned flank of a large synclinal structure in the Ørsdalen area (Nyegaard, 1976). The transition zone from the the flank to the foldclosure of the synclinal structure occurs just south of Strossekrateret on the mountain plateau (Map 2) and in the bottom of Stoll 1 at the level of the valley floor (Map 7). The trend of this foldaxis is shown in the lengthprofile of the Ørsdalen deposit (Map 1o).

Within the flank biotite gneiss and hornblende gneiss are the predominating rocktypes. The abundance of all other rocktypes is less than 1o %. From Map 2 it is seen that the two rocktypes form drawn-out refolded isoclinal foldstructures, which obviously are structurally independent of the later synclinal structure. Such a complex deformational history explains why a minor but characteristic rocktype as garnet-biotite-hypersthene gneiss only is found as discrete lenses. It has not been possible to propose a structural model which could explain the distribution of these lenses. However, a certain macroscopic pattern can be recognized in the general distribution of the minor rocktypes. Amphibolite occurs near the foldclosure of the syncline, namely south of Strossekrateret (Nyegaard, 1976) and in Stoll 1 and 2 (Map 7), as garnet-biotite-hypersthene is found in the area above a line from Strossekrateret to the Outcrop at 6oo m (Map 2 and Map 1o).

Mineralization

The ore-minerals in the Ørsdalen area are pyrrhotite, wolframite,

scheelite, molybdenite, chalcopyrite and titanomagnetite plus a few rare minerals.

The main mineralized zone which approximately corresponds to the area mapped this year (Map 2) hosts all the major occurrences plus many showings (Nyegaard, 1981). Several types of mineralization can be recognized:

Disseminated pyrrhotite, molybdenite and chalcopyrite in the garnet-biotite-hypersthene gneiss. The grade is always very low.

Aggregates of wolframite rimmed by scheelite and/or molybdenite in subconcordant quartz veins enclosed in or close to garnet-biotite-hypersthene gneiss. Individual veins can be up to 2 m wide and 10 m long but often several veins follows after each other. The mineralized lens comprising quartz veins and garnet-biotite-hypersthene gneiss is 30 to 60 m long. The grade seems to be 0.5 to 1.0 % MoS_2/WO_3 over a width of 1 to 5 m. Mineralized lenses of this type are known from Strossekrateret (Mo > W), Wolframsynken/strossen (W >> Mo), Schånningsgruben (W >> Mo), the outcrop at 600 m (Mo ~ W) and the "cover" zone in DDH 228 and DDH 229 (Mo ~ W).

Flakes of molybdenite concentrated at the contact of often small subconcordant quartz veins in the various rocktypes. The overall grade is very low.

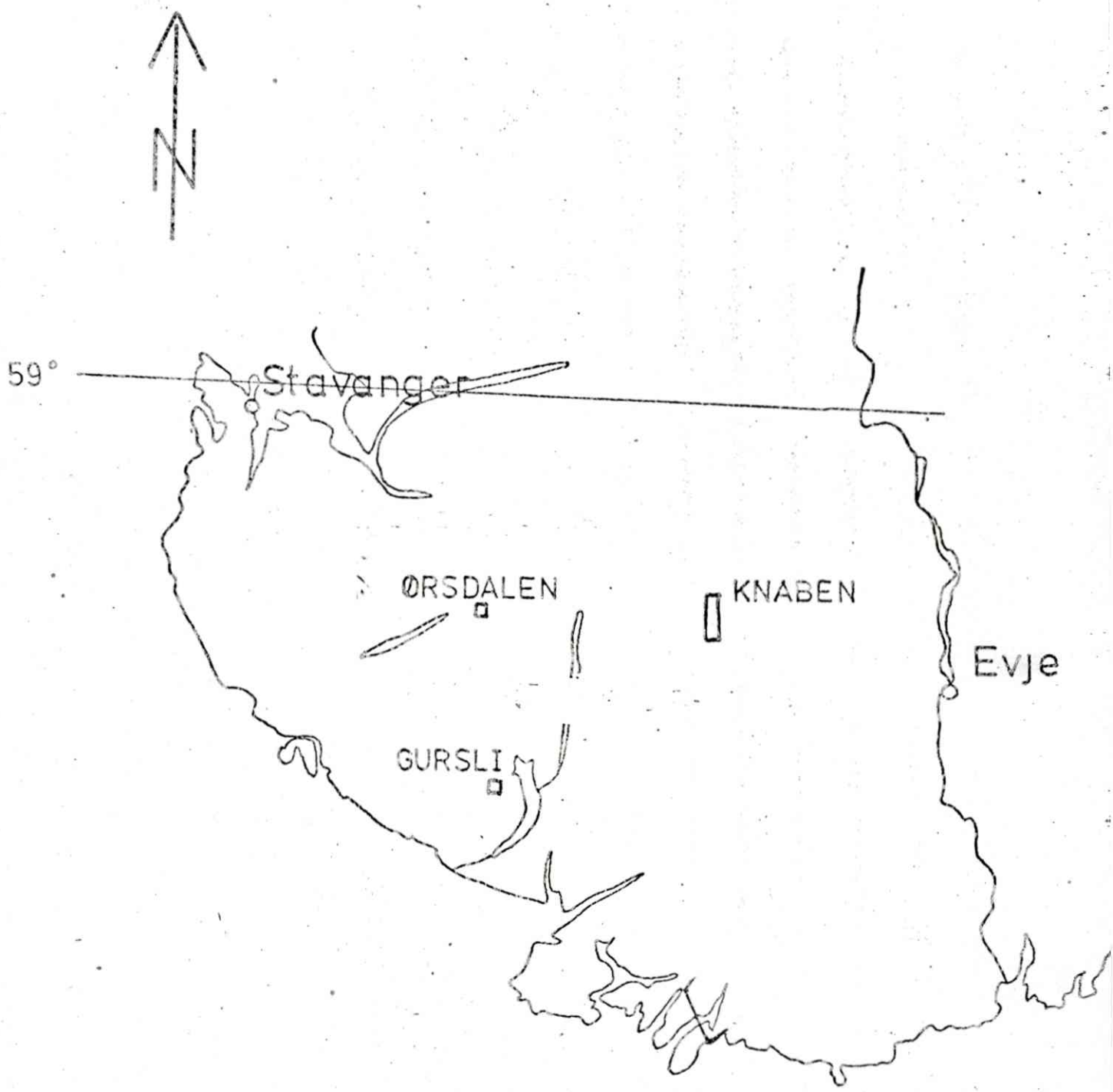
Scheelite mineralization in amphibolite. Scheelite is found as blebs in the amphibolite or is concentrated in mm-thick, leucocratic veins in the amphibolite. The overall grade is less than 1000 ppm W. The type is found in Stoll 1 and Stoll 2 and within the foldclosure on the mountain plateau.

Scheelite in late jointzones. The type is found in the bottom of Stoll 1 (Map 5). The overall grade is very low.

Discussion/conclusion

The only mineralization type which holds a potential for an economic orebody is the large quartz veins associated with garnet-biotite-hypersthene gneiss. From the mapping it is known that this type forms discrete lenses. The actual size and geometry of the lenses are not known. From map lo it is seen that there is a geometric possibility, that the lens at Schånningsgruben can plunge 4o-9o° S, and that the lens at Strossekrateret can continue in all directions, as these possibilities never have been tested by diamond drilling. However, it must be remarked that the most likely long-axis of a possible high-grade lens will be parallel with the foldaxis of the synclinal structure. The possibility that Wolframsynken/strossen continues at depth has been excluded by diamond drilling.

It is proposed to determine the size and geometry of the lenses at Schånningsgruben and Strossekrateret. If none of the high-grade lenses known today have a size comparable with say one half or one third of an economic orebody, it is very unlikely that hidden lenses should have such dimensions and the overall potential for finding sufficient ore is considerable lowered. It must be noted that the structural pattern previously described has diminished the rock volume of potential for high grade lenses.



MAP 1

NORSKE FINA A/S
Locality map SW - NORWAY 1:1000000 JLP oct 82


LEGEND
Quartz vein
Hornblende gneiss
Amphibolite
Quartz-feldspar gneiss (granulite)
Biotite gneiss
Garnet-hypersthene gneis
W Mo Fe
Major and minor occurrences of scheelite/wolframite, molybdenite and ironsulphides (minor occurrences on the mountain plateau is not shown, see Nyegaard, 1981)
Strike/dip of foliation/contact
DB 1
MAP 2
NORSKE FINA A/S
Geological/Mineralization map
VALLEY WALL AND MOUNTAIN PLATEAU
MINING AREA
ØRSDALEN
1:1000
JLP oct 82

LEGEND
QUARTZ - FELDSPAR GNEISS
BIOTITE GNEISS
HORNBLENDE GNEISS
(GARNET-) HYPERSTHENE GNEISS
AMPHIBOLITE
PEGMATITE / QUARTZ VEIN
MAJOR AND MINOR OCCURRENCE OF SCHEELITE AND MOLYBDENITE
STRIKE/DIP OF FOLIATION
STRIKE/DIP OF FAULT
FAULT/JOINT ZONE
A little scheelite in leucocratic veins in amphibolite
Aggregates of scheelite and molybdenite along the contact of small quartz veins. Overall content a 20 cm wide zone with ~0,1% W
172,6 M
75680
75640
75600
75560
22040
22080
22120
22160
MAP 3
NORSKE FINA A/S
Geological map
STOLL 1, PLATE 1
ØRSDALEN
1:200
JLP sep 82

MAP 4

NORSKE FINA A/S

Geological map
STOLL 1, PLATE 2
ØRSDALEN
1:200

JLP sep 82

Aggregates of scheelite enclosed in amphibolites and along the contact of small quartz lenses
App. 0,5 % W over 1 m²

A little scheelite in leucocratic veins in amphibolite

A little scheelite in leucocratic veins in the amphibolite

Aggregates and grains of scheelite in leucocratic veins and at the contact of quartz lenses within the amphibolite

Overall content in the crosscut ≤ 100 ppm W. It is the most rich mineralization in STOLL!

Within the shearzone 1 m² with 0,1-0,5 % W

LEGEND: see map STOLL 1, PLATE 1

75440

75400

22240

75360

22360

75320

22280

22320

MAP 5

NORSKE FINA A/S

Geological map
STOLL 1, PLATE 3
ØRSDALEN
1:200

JLP sep 82

75550

75500

75450

21900

21950

22000

196,2 M

N

W

W

W

W

W

Mo

RAISE

RAISE

M

85

20

Large quartz - feldspar pegmatites

Fragments of aplite occur at the contact of quartz veins and in fracture zones within the amphibolite. The overall content is ~ 500 ppm W over a length of 30 m

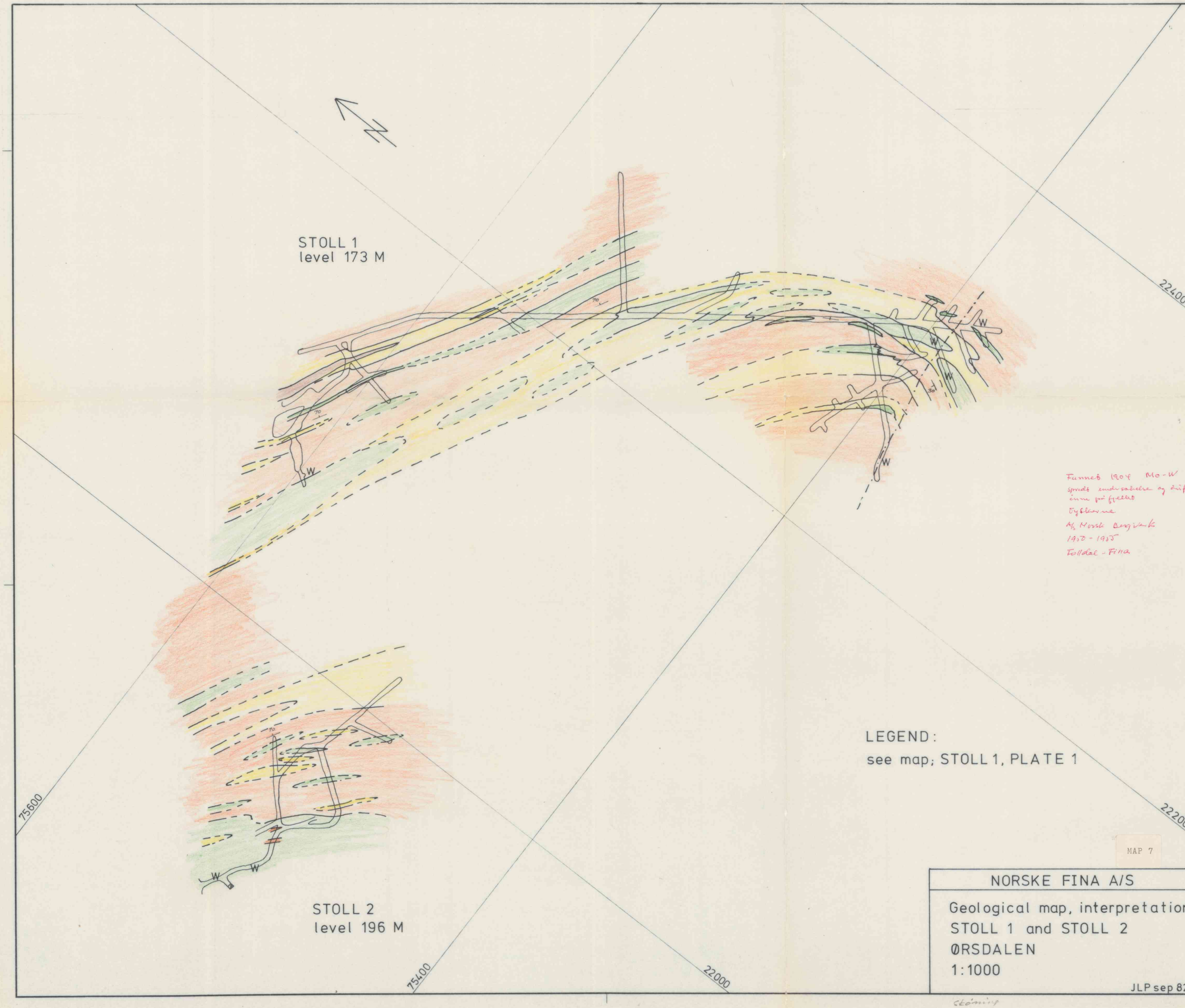
LEGEND: see map; STOLL 1, plate 1

MAP 6

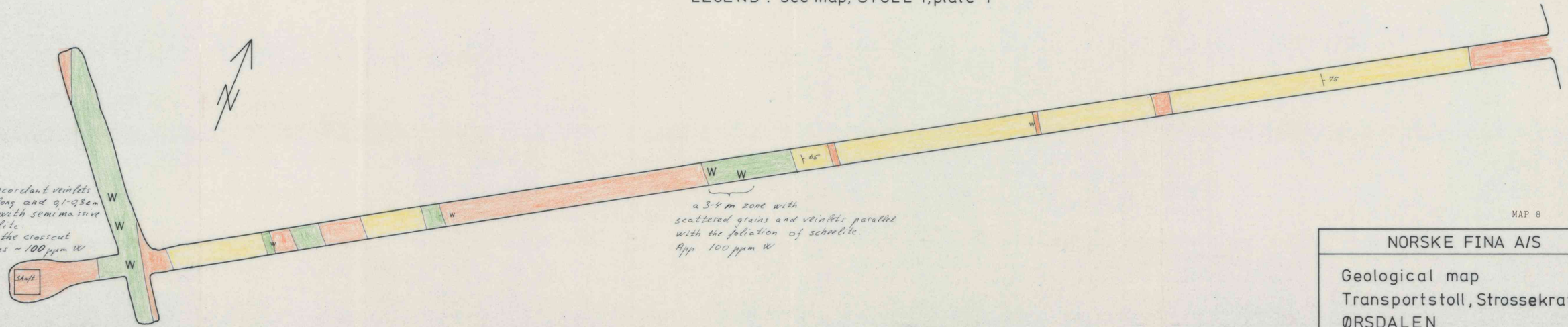
NORSKE FINA A/S

Geological map
STOLL 2
ØRSDALEN
1:200

JLP sep 82


STOLL 1
level 173 M
STOLL 2
level 196 M
22400
22200
22000
75600
75400
LEGEND:
see map; STOLL 1, PLATE 1
Funnet 1904 Mo-W
Spredt undersøkelse og drift
inne på fjellet
Tyskerne
A/S Norsk Bergverk
1950 - 1955
Folldal - Fina
MAP 7
NORSKE FINA A/S
Geological map, interpretation
STOLL 1 and STOLL 2
ØRSDALEN
1:1000
JLP sep 82

LEGEND : see map; STOLL 1, plate 1

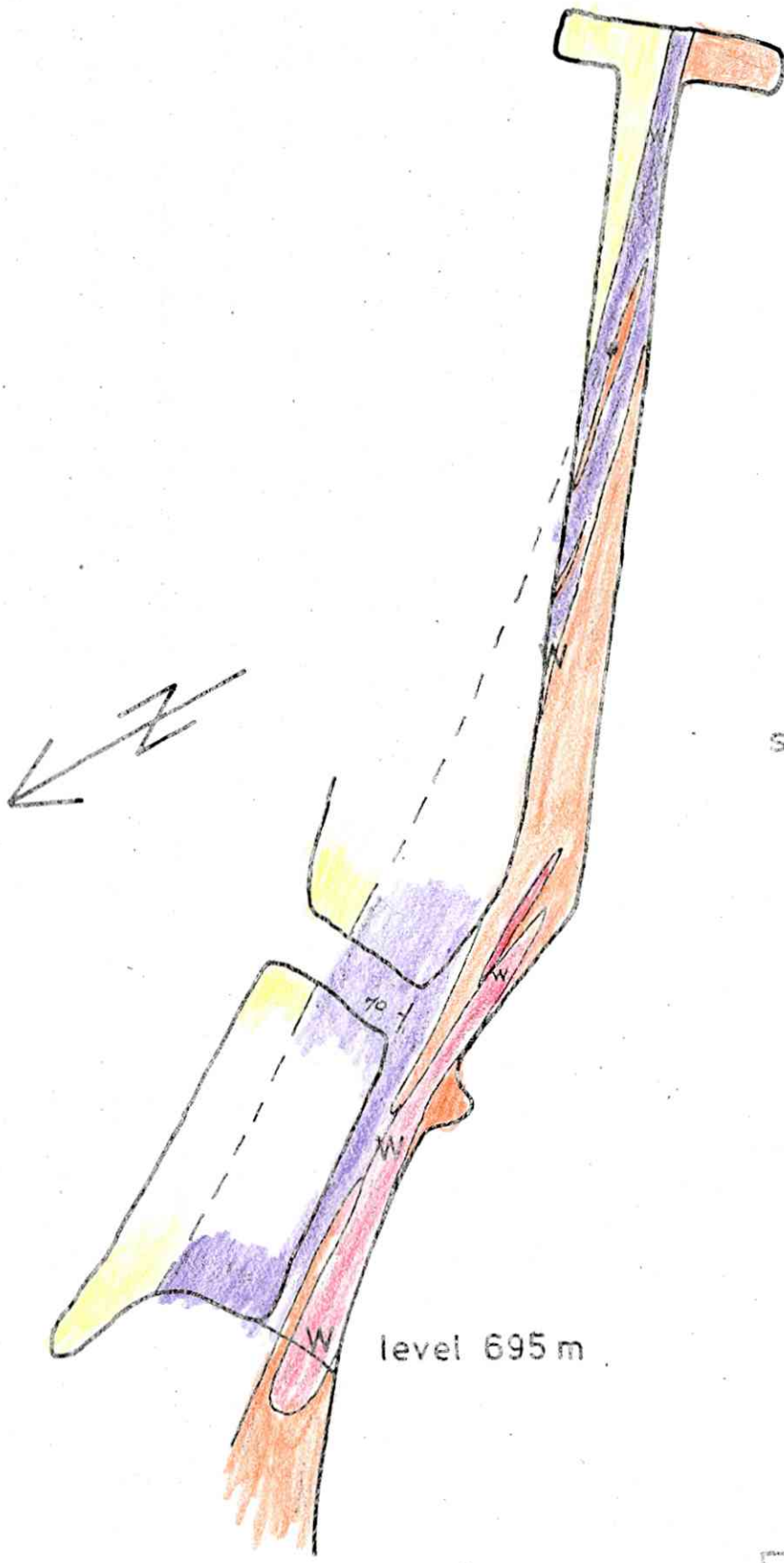


MAP 8

NORSKE FINA A/S

Geological map
Transportstoll, Strossekrater
ØRSDALEN
1:200

JLP sep 82



Legend :

see map : STOLL 1, plate 1

MAP 9

NORSKE FINA A/S
Geological map
Norges Bank, ØRSDALEN
1 : 200 JLP sep 82

Illustration of the size of a 0,5 mill. tons orebody

AREA 33000 m^2
THICKNESS 5 m
DENSITY 3

NW

SE

800
700
600
500
400
300
200
100

WOLFRAM –
SYNKEN / STROSSEN

STROSSEKRATER

DDH 5 4 3 2

B C D

SCHÅNNINGS

DDH 1
DDH 227
DDH 230
DDH 232
DDH 228
DDH 232
A
DDH 231
600 M
OUTCROP
DDH 229
DDH 233

Trend of foldaxis

STOLL 1

PREVIOUS DRILLING

⊞ Intersection with supposed oreplane (142°/75° NE) of Wolframsynken

⊕ Intersection with the supposed oreplane (137°/70° NE) of Schånningsgruven

DRILLING PROGRAM - PROPOSAL

▣ Planned intersection with oreplane of Strossekrateret

◎ Planned intersection with oreplane of Schånningsgruven

KAP 10

NORSKE FINA A/S

Length profile
Mineralized horizon
ØRSDALEN
1:2000

JLP oct 82