

Folldal Project (N-81-1)

Folldal Verk A/S - Amoco Norway Oil Company

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Submitted by:

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Diamond Drill Logs 1982

Grid name abbreviations 1982 field season.

Maps

Includes all surveys performed on each grid for the 1982 field season. Surveys include VLF, CEM, Mag, Apex, Slingram, Geochemical sampling, geological mapping.

1) Box 1 of 3

Tynset/Savalen Area

2) Box 2 of 3

Rødalen, Folldal Areas

3) Box 3 of 3

Tolga/Os, Lesja, Alvdal Areas

SUMMARY AND CONCLUSION

Folldal Verk A/S and Amoco Norway Oil Company entered into a 50-50 joint venture agreement to explore for Cu-Zn massive sulphide deposits in the Folldal area of south central Norway. This agreement was signed in 1981 and field work in the Folldal area continued into 1982.

Field work included follow-up with ground geophysics and geochemistry on anomalous areas located by airborne surveys, and also included geochemical work on previously found anomalous gold stream sediment samples. Over forty individual geological grids were run, a majority of which included CEM, VLF, Mag, geochemical sampling, geological mapping, and selected amounts of Max-min and slingram surveys. Thirteen drill holes totalling approx. 2010 meters were drilled during the summer + early fall on selected anomalous areas from the 1981 survey. Unfortunately no economic zones were intersected.

Concentrating our work in volcanic and sedimentary belts of known past Cu-Zn producers (Sivilvangen, Vingelen, Rødalen) many interesting anomalies have still to be verified, some either by drilling or trenching and others by detailed geochemical and geophysical surveys.

Gold anomalies found at Lesja proved to be extensive and encouraging, and these areas should have detailed geochemistry and VLF-mag surveys performed. If results are positive the anomalies should be drill tested.

Late in the 1982 field season two airborne surveys were run, one located over the north-east portion of the Folldal project area and the other over and around the town of Folldal itself. Investigation of results from these surveys will continue into the 1983 field season and they have already outlined several priority areas.

RECOMMENDATIONS

Tynset-Savalen Area

The Sivilvangen area grid shows good VLF field strength along strike of known mineralization between L-5000N and L6200N at approximately B/L to 200E. The zone shows coincident and flanking zinc geochem with minor copper and lead highs. This zone should be drill tested along L-5200N at 70W, -45°E. It would be advisable to drill this hole during early spring when there is an abundant supply of water. The geochemical samples taken along L-4000N to 4400N from 800E to 800W should be re-done to varify anomalous Cu, Zn, Pb zones found during the 1981 field season. 1982 geochemical results were surprisingly low and showed no correlation with previous results. More work will be advisable once all geochemical results are received.

The Tunndalen area shows promise for Au mineralization along two zones. The first zone, a conglomerate unit, should be trenched and sampled along known geochemical peaks between L-200N to L-800N just west of the B/L. The second is the main volcanic pile found on the west section of the grid. This area has good outcrop and should have a rock chip survey between known geochemical highs along and between L-200N to L-800N, L-1600N to L-2000N, and L-3000N to L3400N. If insufficient rock outcrop exists, detailed soil geochemistry should be performed. All samples (rock and soil) should be run additionally for As as this element has shown anomalous results from rock analysis.

The Snausjovola II grid should have detailed geochemistry performed along both anomalous zones of Cu and Au. First, fill-in lines from L-900S, 300W to B/L north to L-300S, 200W to 150E will hopefully define a copper anomaly, and secondly, fill-in lines along L-500S, 300S and 100S from 150E to 450E will better define a gold anomaly. This area should be drilled if these new geochemical results are again coincident with the geophysical conductors.

The Fadalen II - Tonnvola grids should be joined and run with VLF and CEM surveys to better isolate the main conductor between the two grids. A geochemical survey should detail an interesting gold anomaly coming in on the north end of the Fadalen II grid. The survey should be run to the north.

Snausjovola I grid shows good gold geochem on L-1200N. Next years survey should include L-1100N, L-1300N, L-1400N east of the base line with geochemical and geophysical follow-up.

The Lomsjovola grid should have rock geochem run for gold as it already shows high copper results, and this may be an extension of the same Cu-Au anomaly found at Snausjovola II.

If Au geochemical results from Tunndalen prove encouraging, the Bondåsen grid should include a geochemical survey run for Cu, Au, Zn, Pb. Both grids have most probably the same conglomeratic unit and presently only a slingram survey has been conducted here.

Rødalen Area

A CEM conductor with good cut off on both ends of the Rødalen grid can be seen on the east side of the base line along profiles 10600N to 11300N. Half of the conductor is buried by lake and swamp. If mag and geochemical results prove conclusive this zone should be drill tested at L-10800N, 2000° -45°W, and the core split and assayed for Au, Cu, Zn, Pb, Ag.

Tolga-Os Area

Interesting results from the Bakkvollen grid makes this a potential drill location. Bedded massive pyrite has been found and continues north along strike into a good VLF cross over. There is no outcrop along this conductor, making it an excellent target. If geochemical results are coincident with this zone, it should be drill tested.

Other interesting areas exist such as Knausvola and Sæterasen and additional work should continue only if geochemical results prove conclusive.

Numerous airborne anomalies outlined by the 1982 survey remain to be followed up, several of which have Pb-Cu-Zn mineralization associated or in the immediate vicinity. These represent high priority targets.

Folldal Area

Numerous targets have been identified by the 1982 airborne survey for follow up in 1983 with geophysics, geochemistry and mapping.

Lesja Area

This is basically a gold area, with probable source rocks being

- 1) Amphibolites/Ultramafics
- 2) Qtz veins in quartzitic gneisses
- 3) Sulphide rich aplite dykes

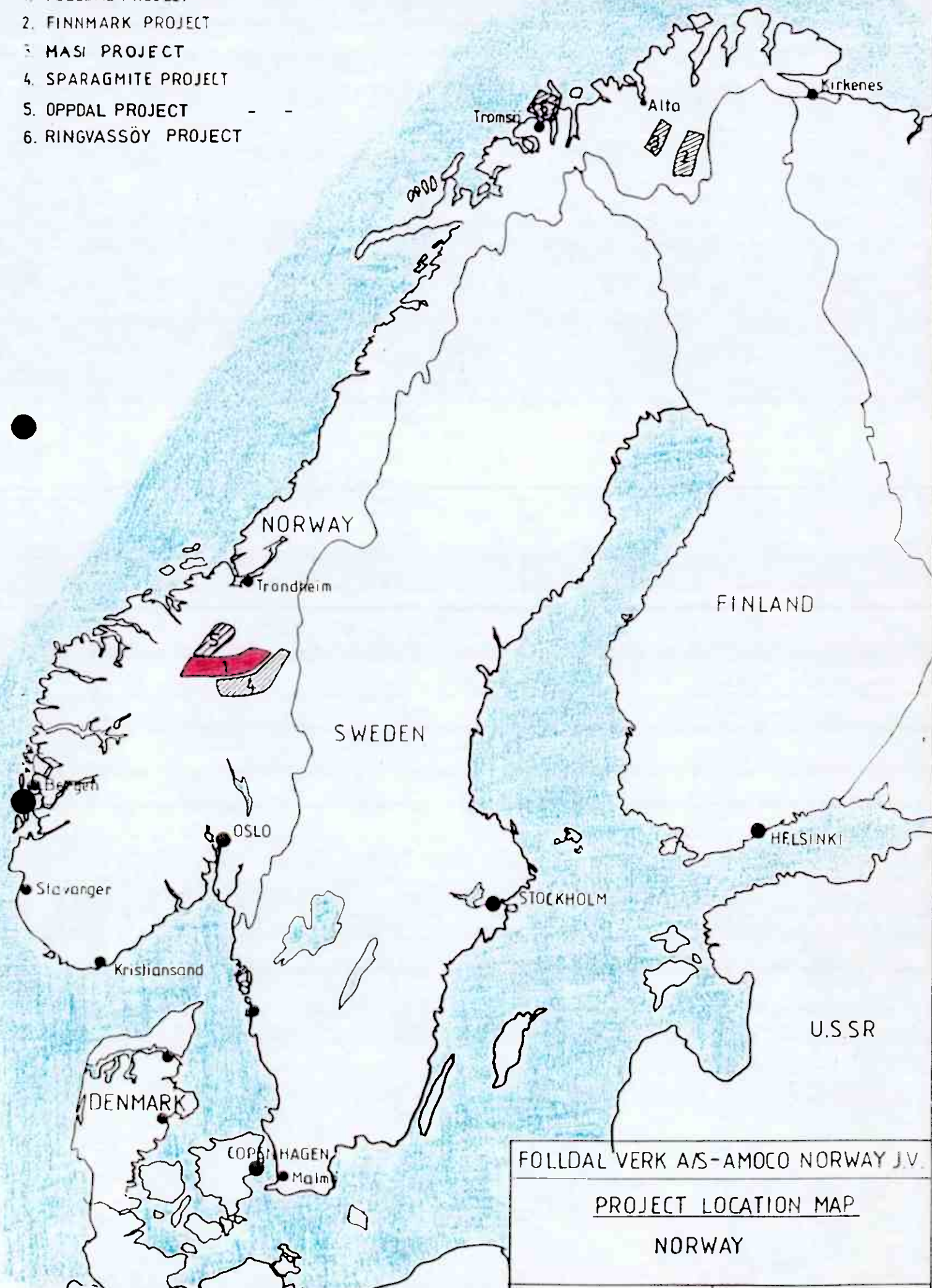
The Storhorrungen grid has isolated a gold anomaly along the south end of lines 60 and 61. We should establish a detailed grid with close station spacing (25M) over this zone. VLF field strength, mag and geochemical sampling should be performed.

The Rjuphoda grid has shown gold to be closely associated with aplite dykes. This zone already has a detailed grid established and VLF field strength and mag surveys should be run. If conductors over the dyke are found and a detailed geochemical survey proves anomalous, the zone should be drill tested.

The Holsberget grid area shows encouraging quartz veining with near-by sulphide and minor gold geochem. A small detailed grid should be set up covering L-8 with VLF field strength and mag surveys performed.

The Reindølsnabben area has shown small anomalous Au areas although no additional work has been done. Before setting up a new grid, this area should have VLF field strength and mag surveys run, on the old grid along with geological mapping. This will determine whether or not the area requires additional work.

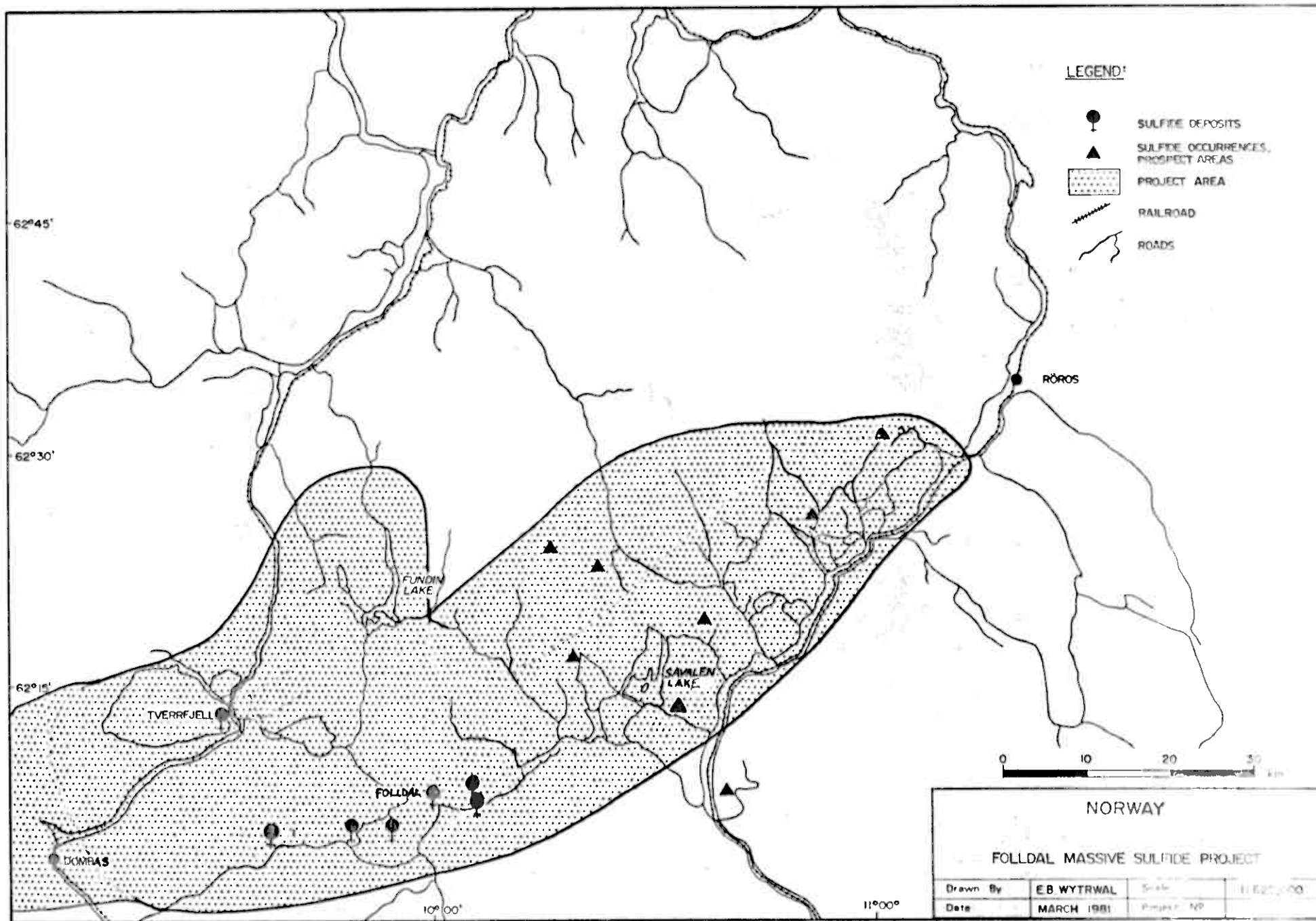
1. FOLLDAL PROJECT
2. FINNMARK PROJECT
3. MASI PROJECT
4. SPARGMITE PROJECT
5. OPPDAL PROJECT - -
6. RINGVASSÖY PROJECT



FOLLDAL VERK AS-AMOCO NORWAY JV.

PROJECT LOCATION MAP

NORWAY



INTRODUCTION

The Folldal project was first started in the summer of 1981 to explore, in a joint venture between Folldal Verk A/S and Amoco Norway Oil Company, for Cu, Zn massive sulphide deposits. Follow up work during 1982 included ground geophysics, geochemical sampling, geological mapping, and 2010 meters of diamond drilling. Anomalous areas were first located by airborne geophysics over the Savalen/Tynset area during 1981, and over the Tolga/Os and Folldal areas in 1982. Targets have been located for continued work in 1983 and presently priority drill targets have been outlined in close relation to known mineralization.

LOCATION AND ACCESS

The Folldal project is located between latitudes $60^{\circ}00'$ and $62^{\circ}35'$ and longitudes $8^{\circ}50'$ and $11^{\circ}15'$ east, trending generally in a north east - south west direction. The area is approximately 250 km north of Oslo and is serviced by major paved roads both in the eastern and western sections. Secondary roads can be found throughout. Two major rail lines, both of which connect Oslo and Trondheim, service the project area. The western line runs through the towns of Dombås and Hjerlinn, while the eastern line has stations at Alvdal, Tynset and Os. The major supply centers are Dombås, Folldal, Alvdal, Tynset and Os.

JOINT VENTURE AGREEMENT

Amoco Norway Oil Company and Folldal Verk A/S entered a 50/50 joint venture agreement dated June 1, 1981, which is to proceed over a period of six years (1981-1986). Either party may withdraw and cancel their agreement after September 1, 1983 by written notice to the other party before December 1 of any year. Withdrawal is effective

January 1 of the following year. The joint venture agreement between the two companies shows a financial breakdown as follows:

<u>Total Project</u>	<u>Amoco Funding Obligations</u>
1981 - 2,500.000 NOK	
1982 - 4,500.000 NOK	100% - 1 - 10,000.000 NOK
1983 - 5,000.000 NOK	80% - 10 - 15,000.000 NOK
1984 - 5,000.000 NOK	65% - 15 - 30,000.000 NOK
1985 - 6,000.000 NOK	50% - greater than 30,000.000 NOK
1986 - 6,500.000 NOK	
<u>30,000.000 NOK</u>	

LAND STATUS

Folldal Verk currently holds claims throughout the project area, at Grimsdalen, Tronfjell, Sivilvangen, Rodalen, Fadalen, Vingelen, and all the old producers around the Folldal area. Small claims are held privately by an individual from Oslo, that stretch intermittently from the Alvadal area northeasterly up to Os. These claim blocks, which have mining rights status only, were presumably staked on an N.G.U. magnetics survey and are valid for a seven year period.

PREVIOUS WORK HISTORY

The Folldal project area includes many various sized (up to 19 mm tonnes) massive and disseminated copper zinc-sulphide mines that can be dated back as early as 1748 with the first production from a copper mine in the town of Folldal (Hovedgruve). This mine was worked intermittently until 1940. During this time other mines were put into production in the vicinity of the Folldal camp, namely Nordgruve, Sondregrove and Nygruve. Other small showings had limited production in the Fadalen, Rodalen and Sivilvangen area from 1722 although these were small scale operations.

To the north of the project, Vingelen, Foss gruve and Oscar II were small but important massive sulphide copper zinc mines. These old showings are approx. 15 to 25 km south west of the Røros massive sulphide camp and are within the same volcanic belt. Many small diggings and adits can be found throughout the area, and most if not all surface exposures of sulphide have been found.

Presently, the only producing copper zinc mine in the area is Folldal Verk's Tverrfjellet mine in the western section of the project area. It is one of Norway's largest massive sulphide type deposits. (19 mm tonnes).

Previous work by Folldal Verk A/S in the project area has included ground geophysics, stream sediment surveys, and diamond drilling, basically in the vicinity of the old workings.

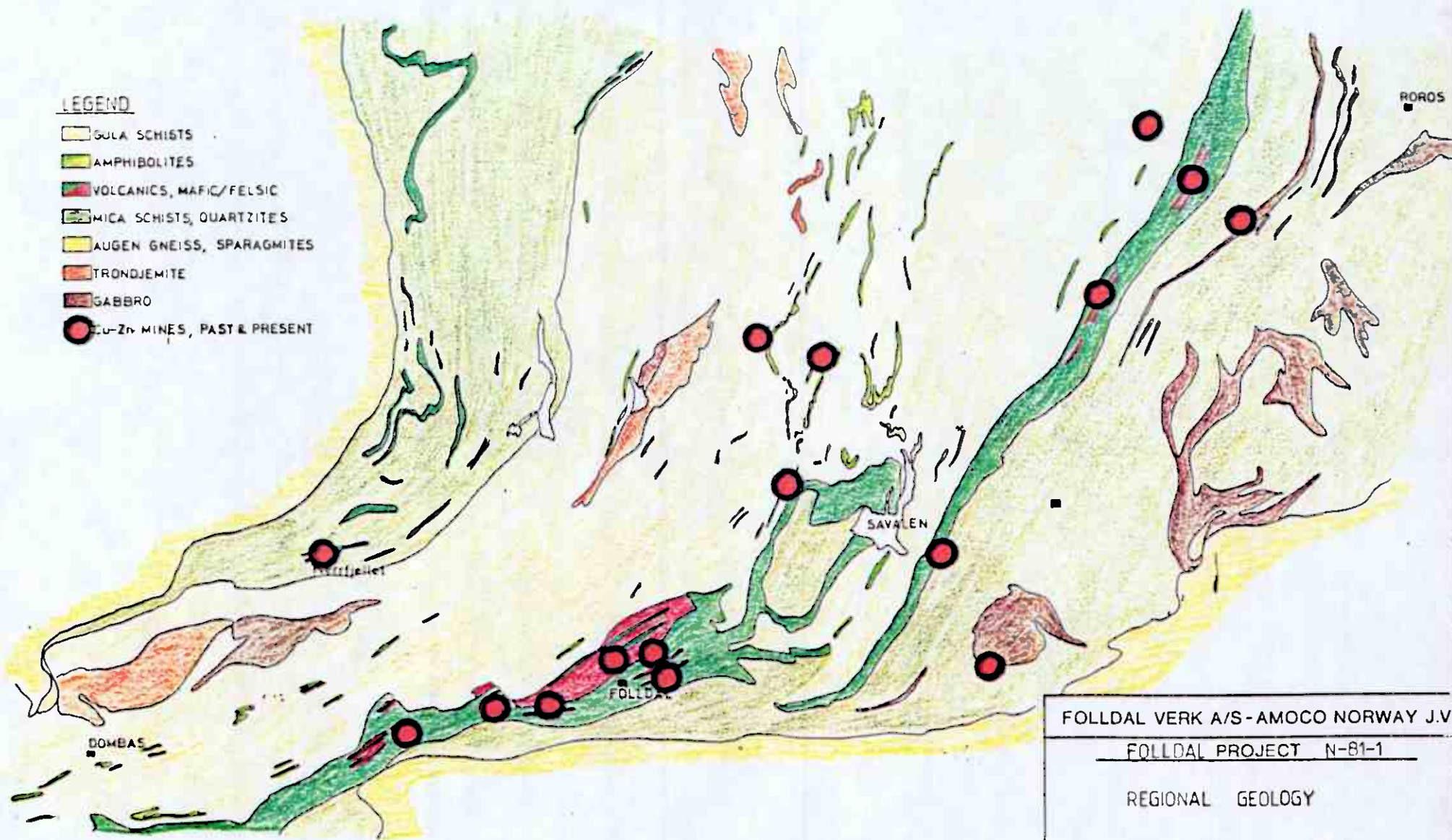
REGIONAL GEOLOGY

The Folldal project area lies within the southern section of the Trondheim greenstone belt and includes rock types of both sedimentary and volcanic origin. These rocks were deposited in the extensive Caledonian geosyncline during Cambro - Silurian times and can be seen to extend almost the total length of Norway's west coast. The east and west section of the Trondheim greenstone belt show definite rock type co-relation especially with the main volcanic units, although depositional environment was very different. The western section of the belt, which includes Folldal Verk's large Tverrfjellet mine, is generally thought to be closely associated with ocean floor volcanic activity, and includes rocks of more tholeiitic composition. The eastern limb of the geosyncline can be seen to include a much more differentiated rock type, perhaps indicating island arc deposition.

Name	Production	Tonnage (MM Tonnes)	Cu%	Zn%	Pb%	Ag (ppm)	Au (ppm)	S%
Fadalen	1722-28 1739-47 1738-88	0.1	?	?				
Hovre	Discontinuous 1738-1940	3	1.5	3.0	0.3	-	-	35
Rodalen	1751-1810 1911-1914	0.4	1-4	?	-	?	?	?
Røstvangen	1908-21	0.4	2.6	1.0	-	10-80	0.3-2.0	43
Sivilvangen	1915-17	1200 tons	1.5-2.5	>6.0	?			
Nordre	1936-70	2.5	1.3	3.2	0.2	31	0.2	34
Nygruve	1940-52	0.3						
Sondre	1950-65	0.5						
Grimsdal	No production	3.0	0.8	1.2	.008	-	-	32
Grimsdalen	" "	10.0	0.3	2.8	0.15	10-15	-	25-35
Tverrfjellet	1968-	19.0	1.0	1.2	.06	18	0.1	36

LEGEND

- GULA SCHISTS
- AMPHIBOLITES
- VOLCANICS, MAFIC/FELSIC
- MICA SCHISTS, QUARTZITES
- AUGEN GNEISS, SPARGMITES
- TRONDJEMITE
- GABBRO
- Cu-Zn MINES, PAST & PRESENT



FOLLFALD VERK A/S-AMOCO NORWAY J.V.

FOLLFALD PROJECT N-81-1

REGIONAL GEOLOGY

Date JULY 82

Scale 1:

1:100,000

1. Silurian	Limestones		
U. Ordovician	Amphibolites and greenstone	Gula greenstone)	
	Calcareous mica schists	Singsås Formation)	Gula
	Phyllites, Trondjemites	Asli Formation)	group
	Keratopyre, greenstone mafic tuffs	Hersjo Formation)	
		)	
		)	Fund-
		)	sjo
1. Ordovician	Layered gabbro trondjemite	)	Group

Cambrian	Graphite schists, qtz biotite schists, green- stone, serpentinites, dunites, & conglomerates	Røros Formation)	Sulåmo group)
Cambrian	Quartz mica schists quartzites, mafic tuffs, and graphite schists	Hummelfjell Formation	
Eocambrian	Augen gneiss Sparagmite		

General strike direction of the units is north easterly, dipping steeply to the north west. Highly folded areas exist throughout and can be found in close association with sulphide mineralization. Faulting is not readily apparent although low angle thrust zones have been mapped within almost every geological unit and consequently a great deal of imagination must be used for interpretation.

Most sulphide occurrences are in close association with one of four geological units as follows:

- 1) The Hummelfjell formation in close proximity to gabbroic intrusives.
- 2) The Hersjo formation volcanics.
- 3) The Singsås formation - Asli formation contacts.
- 4) The Gula greenstone. Typical sulphide association are pyrite, pyrrhotite, chalcopyrite and sphalerite. Magnetite is found in small concentrations throughout although it is more noticeable in somewhat banded form in the iron formations of the Gula greenstone.

SUMMARY OF PROPERTY AND FIELD WORK

A) Tynset - Savalen Area Map #'s 1619 III, 1619 IV

1) Sivilvangen

This grid was worked on during the 1981 field season with surveys including CEM, mag., VLF and geochem. Small amounts

of Max-Min was performed on selected areas. The 1982 field season included the continuation of these surveys from L-4000N up to L-7800N and from L-1400S to 2800S and also the testing of geochem highs and shootback conductors from 1981 by diamond drilling. Small old showings occur throughout these north and south sections and have small lenses of sphalerite with minor chalcopyrite. They all are within a bimodal volcanic environment.

The north section of the grid from L-4000N to L-7800N showed large continuous beds of graphite, usually found capping felsic-mafic volcanic zones. The CEM shootback survey picked these zones up very well. From profiles in old diggings, mineralization is closely associated with these zones and consequently should not be rejected from investigation. The most promising zone of this type stretches from L-5000N - B/L to 6200N-2000 and rock assays from an old digging in this zone assayed 2.43% Cu, 8.2% Zn. Geochemical results for this whole zone have yet to be received although L-5000N, 5200N and 5400N have picked out three zones of anomalous zinc with accompanying copper and lead. These geochem zones are coincident with felsic-mafic contacts and detailed geological mapping should be performed.

A VLF field strength survey was also performed over L-5000N to 6200N which shows good correlation to the geochem. This zone should be drill tested at L-5200N - 70W, -45°E.

The geochemical survey should be re-done along L-4000N, 4200N and 4400N from 800 W to 800E to see if the results can match previously contoured anomalies of the 1981 survey. Results from this year's geochemical survey were surprisingly low. Max-Min surveys show a very slight conductor zone coincident with the contoured geochem from 1981 from B/L to 100E on L-3800N, 4000N, and 4200N. Favorable rock type and extensive silicification and albitization can be seen throughout this area.

The southern section of the Sivilvangen grid (L-1400S to 2800S) shows extensive CEM shootback anomalies, most likely graphite and/or pyrrhotite related. One zone of particular interest although is L-2200S to 2600S, approximately 650W. Two small pyrrhotite diggings can be seen. Mag should be completed over this zone to delineate the conductor better only if geochemical results prove anomalous.

Two diamond drill holes were drilled in the early summer. The first along L-145N at 460W and the second along L-200N at 925W. Both indicated graphitic conductors with 5-7% Po and traces pyrite and chalcopryite.

2) Fadalen I

This area was chosen by good response from the 1981 airborne survey plus known mineralization from being a past small producer. The base line was originally put in from 220S to 2000N but later extended to 3600N to include additional airborne E.M. anomalies along the Singsås Asli formation contacts to the north. The old diggings and small adits are generally found along the base line at lines 1075S-100E, L-35S - B/L, L-220N - B/L, L-630N -25W, and 950N-100W. Massive pyrrhotite was the main sulphide found in the waste piles although grab samples assayed up to 0.89% Cu and 1.29% Zn.

CEM, VLF, mag and small amounts of Max-Min (L-800N, 1000N, 1200N) and slingram (2200N-3600N) were performed to cover the long but narrow airborne conductor. Strong results were obtained by all surveys especially noticeable along strike of the old diggings. No geochem was taken over this zone for fear that contamination might be too high. The only geochem taken was over a small zone on lines 200S to 600S, between 100W and 300W, mainly for the fact that the geology was favorable. Results are still to come. Sections of lines 2000N, and 2800N were also surveyed by geochemical means and were restricted to small CEM conductors.

Line 1000N was drill tested at 150W, -45°E in response to a large CEM shootback anomaly. The zone was later better defined by a Max-Min survey. An old adit can be seen at L-950N - 100W. Diamond drilling showed basically a sequence of quartz plagioclase biotite schists with intermixed graphite and pyrrhotite zones with minor pyrite and chalcopyrite. Our conductor was the banded pyrrhotite found between 73.50 meters and 84.75 meters.

No further work is recommended unless results from the geochem are high and can be further separated from potentially contaminated zones.

3) Fadalen II

This grid is following up conductors along strike of the Sivilvangen grid, although it is located just about seven hundred meters north east from the north end of the Sivilvangen grid.

CEM, Mag, VLF, geochem, and geological mapping were all done to cover a base line from ONS to 1200N. One main conductor was found 100 to 200 meters east of the base line, and mapping showed this to be the result of a thick graphite horizon separating two volcanic periods. Flanking VLF and shootback anomalies should require closer attention especially noticeable on L-800N and 1000N at 50E and 75E. This anomaly is cut off sharply on both ends and is located just west of the large graphite zone.

Geochemical results have yet to be received although if they are found coincident with sulphide bearing keratophyre from L-580N to L-650N between 150E and 200E, and also coincident with the occurrence of galena on L-1000N, 160E, additional work should be performed.

4) Tonnvola

This area is the continuation of conductors found along the Sivilvangen and Fadalen II grids. CEM, VLF, Mag, geo-chem geological mapping and small amounts of Max-Min (0N-200N) were run this summer, isolating a main conductor running from 0N to 1400N along 500W to 75W respectively. Geochemical results were generally very low, except for a few zinc highs on line 800N, 50W to 250W.

The base line should be extended southwards to join the north east section of the Fadalen II grid, and completion of a CEM survey should be done to delineate the conductive body. Geochemical sampling should then be performed to join the two grids.

5) Tunndalen

Interest in the area was two fold 1) A variety of airborne conductors. 2) Anomalous gold located by silts from the re-analyses of old stream sediment samples. These conductors were generally coincident with the lower contacts of the Hersjo volcanics and the schists and conglomerates of the Røros formation. Geochemistry, geological mapping, slingram, and minor amounts of Max-Min (0NS-200N, 800N-1000N, 3400N-3600N) were performed that isolated a main graphite unit running the length of the grid. The small conductors from slingram along side of the main graphite horizon(s) should be of particular interest. These have associated gold values ranging from 12 ppb to 120 ppb and follow generally a conglomerate unit just east of the base line. Trenching along geo-chem highs in this unit would be adviseable. To the west of the base line gold geochem highs with associated arsenic in rock samples have been isolated in a volcanic environment. Outcrop is visible enough to carry out a rock chip survey especially between lines 200N, 400N, 600N, 800N and 1600N, 1800N, 2000N, and 3000N, 3200N, 3400N.

6) Snausjøvola II

Follow-up on this area was the result of airborne EM and mag along strike of the old Fadalen mines at Gruvkletten. Located about eleven kilometers south west of the old mines this area showed one major shootback conductor with coincident and flanking mag, and a gold-copper geochem halo basically following these geophysical highs. Geological mapping located very few outcrops although the mag and shootback conductors were in close association to a greenstone/phyllite contact, running approximately 30° east of north from L-800S, 150W.

Geochemical samplings should cover this anomalous and conductive zone as fill in lines from 900S, 300W to B/L, along strike to 300S, 200W to 150E. This is basically a copper zone with isolated highs of gold. A second geochem anomaly (gold) shows up on the east side of lines 400S and 200S. Fill in lines should include L-500S, 300S, 100S from 150 east to 450 east. If results are positive the area should be drill tested.

7) The following areas hold only limited potential for mineralization and are listed in decreasing order of priority.

A) Snausjøvola I

One main conductor was located here, possibly the same unit as Smausjøvola II, although no copper geochem was coincident with the conductor. The unit is an ultramafic garnet-cummingtonite magnetite rich body. Cross sections at L-1000N, B/L show heavy concentrations of graphite. Soil profiles up to 80 cm deep have been taken across the conductor zone on L-570N where a massive sulphide (Cu, Zn, Py) boulder has been found. We await results.

Follow-up geochem on lines 1100N, 1300N, and 1400N east from the base line should define a gold anomaly (26 to 1100ppb) on L-1200N.

B) Svarthue

This anomalous zone, most probably graphite related, has its main conductor basically along the base line and disappears southwards into Savalen lake. Winter geophysics has picked up the same extensive conductor under the lake.

Encouraging albitization in felsic kerotophyre and rock samples of 2596 ppm Zn in the same zone near L-840N, 500 brighten the outlook of this prospect. We await geochemical results.

C) Lomsjøvola

The conductor here is very similar to the Snausjøvola I and II garnet cummingtonite ultramafic, although it shows sections of massive pyrrhotite. It may be closely related to Snausjøvola II, and additional rock samples along this zone should be analysed for gold. Rock samples along this zone have copper geochem values of up to 965 ppm with an average of near 650 ppm, definitely well above background of the similar rock types of the area.

8) These next four areas in the Tynset/Savalen area hold very little promise for mineralization. All are either entirely graphite related and show extensive CEM and VLF conductors, or they are closely related to ultramafic garnet-cummingtonite pyrrhotite assemblages.

8a) Lomsjøvola/Solve

A main conductor located an ultramafic garnet cummingtonite pyrrhotite assemblage. Geochemical soil samples were taken over parts of the grid that appeared to be the best targets, although nothing was coincident with the main conductive zone. The remainder of the survey was discouraging.

8b) Stralsjøen

The grid showed a very strong and lengthy CEM conductor which was later defined as graphite. Work was subsequently stopped.

8c) Rødhammaren

Again this grid was located on an ultramafic garnet-cumming-tonite rich body that showed good airborne EM and mag response. A ground slingram survey was performed and the area later dropped.

8d) Bondåsen

A weak conductor was located on this grid corresponding to a schist conglomerate contact, probably graphite rich, and the area was later dropped.

B) RØDALEN AREA Map # 1619 IV

1) Rødalen

This was a very large grid extending over a group of EM airborne conductors found along strike of the old Rødalen mines. The area is characterized by amphibolites, greenstone, iron formation (Po, Mt rich), calcareous mica schists, and minor limestones, all of the Gula group. Three drill holes were drilled during this summer, two of which were spotted from data of last years survey and the third spotted as a result of this year's work. The survey was generally a continuation, along strike, of last years work concentrating along lines 7200N up to 12200N. CEM, VLF, Mag geological mapping, and Max-Min were performed. Geochemical sampling covered basically the east side of the baseline and results are still to come.

Drilling indicated geophysical conductors to be mainly pyrrhotite-rich iron formation. Magnetite was present in

massive and disseminated form. No copper or zinc was seen although sections are being analysed and results are expected shortly.

Targets for next year are still incomplete although if soil geochemistry is coincident with the good shootback anomalies found on the east side of the base line, from profiles 10600N to 11400N, drilling this zone should be considered, especially along profile 10800N at 2000. This anomalous zone has a sharp cut off to the north and is covered by lake and swamp to the south, making it a much better target than the one found to the east of it. Mag should be run on these profiles since pyrrhotite and magnetite are found in large concentrations with the iron formations.

2.) Other areas of minor interest in the Rødalen area have been generally graphite related. They are listed in decreasing order of preference.

a) Storgiokletten - An area with one main CEM and VLF conductor running from L-400N to L-800N showing good cut off on both ends. From geological mapping this conductor is very closely related to a contact between amphibolite and micaschist, and from field observation most if not all graphite related. We await results from soil samples.

b) Fisktjorna CEM, VLF, Mag, soil sampling and geological mapping have all been done. Geophysics has isolated a small continuous conductor that has been verified to be graphite related. Soil over this zone show no anomalous areas and it is recommended this grid be dropped.

c) Veslehoi - Very discouraging soil results over known small CEM and VLF conductors give this area poor potential for mineralization. We await rock geochemical results from the small sulphide rich graphitic zones found throughout.

d) Fjelltorna - A small grid survey with CEM and Mag indicated very weak shootback conductors throughout, although correlation between lines is difficult. The magnetic survey indicated amphibolite layers but all conductors were void of mineralization. The area should be dropped.

e) Veslevangen I, II - Both grids show poor geophysical conductors that can be best followed by VLF. Geological mapping located only a few outcrops of mica schist and greenschist, along with abundant graphitic schist float. No soils were taken and the areas should be dropped.

C) TOLGA/OS AREA Map #'s 1619 I, 1620 II

1) Bakkvollen

This grid is located within the lower part of the main volcanic group called the Hersjo formation and includes good airborne EM and mag conductors. The grid stretches from 400S up to 1600N and has been surveyed by CEM, VLF, Mag, geochemical soil sampling and geological mapping.

Favorable rock type (albitization) and the location of a massive pyrite bed (10 cm) make this area an interesting prospect. This zone is located on L-1000N, just west of the base line and strikes north six hundred meters. VLF is the only survey able to pick this zone up, perhaps because the massive sulphide has a fine siliceous matrix. The conductor is covered going to the north. If results from soils prove anomalous around this zone, it should be drill tested at either, known mineralization at L-1000N, 50W, or preferably along strike of this showing to line 1600N at 125W. The VLF and mag surveys should be extended to include the western sections of L-1700N to 2000N from B/L to 250W. Our target will then be better defined.

Interest in the main CEM conductor that runs through from L-600N to 1100N and disappears under water should be moderated due to the fact that it is coincident with a graphite horizon running along the schist volcanic contact found just north of the grid.

2) Limited potential prospects

a) Knausvola - This grid lies along strike of the old Vingelen mines and three main conductors show up on the CEM and VLF surveys. One of these conductors can be eliminated as being a buried cable, although a small conductor to the west (shows well on VLF) and more importantly a large one to the east of the base line at approximately 2000 to 3000 should be looked at closely. We have yet to receive results from soil samples taken over the entire grid from L-0N to L-1500N.

b) The rest of the grids in this area (Vangroftdalen, Skogli, Vangsåsen and Sæteråsen) have yet to receive results from soil samples. They all include large CEM and VLF conductors, some most certainly graphite related, and once geochem results are in we will know better the potential of these areas.

D) FOLLDAL AREA Map #'s 1519 II, 1519 III

The following areas or grids are all within the vicinity of old mines and have been followed up as a continuation of work from previous years or have been the result of anomalies from the 1982 airborne survey.

1) Sondre

This grid lies between two old mines, namely Nordre and Sondre, that have themselves produced approximately 3.0 mm tonnes of copper-zinc ore. This years investigation

involved Max-Min surveys, geological mapping, minor soil sampling, and just over one hundred meters of diamond drilling. The drilling tested a Max-Min anomaly with coincident encouraging rock types, although the conductor turned out to be a graphite horizon. Minor zinc was found at the top of the bore hole, and when geochemical results are received, this zone can better be isolated.

2.) Grimsdalen

Max-Min surveys over previous Turam anomalies turned up, in a little more detail, the same conductors as were known last year, and previous years. Three holes, totalling approximately 450 meters, were drilled, each intersecting graphite horizons with intermixed pyrrhotite and minor pyrite. Work in the past years by Folldal Verk has included extensive diamond drilling to the east of these drill holes, that has intersected mineralized copper-zinc zones with accompanying lead. The hope was to test the extension of these mineralized zones to the west.

It is recommended this area be given low priority for the 1983 field season. Virtually all conductive bodies and favorable horizons of interest have been drill tested.

3) Nordre Bekkensætra

This area was first located by airborne EM, and later followed-up by ground geophysics. The anomalous zone is along strike of the old Nordre mine and consequently became of interest as a possible continuation of the Nordre deposit.

Mag, VLF, CEM were all performed and basically isolated a small conductor to the west of the base line. Mag is coincident with selected zones of the shootback anomalies. Detailing with Max-Min has now defined these zones better.

We still await geochemical results and perhaps this will give us a better target to deal with in the future.

4) Hovedgruva

This is the old Folldal mine area and the majority of work included Max-Min and mag surveys. One small conductor with mag overlap, can be seen running parallel to the base line at approximately 1100N-1200N from lines 3600E to 5600E. Being a long and continuous conductor as it is, graphite with intermixed pyrrhotite is highly likely. The rest of the grid shows very quiet response with Max-Min and mag. The area should be looked at closely with reference to the new airborne flown during the late 1982 field season, and perhaps this will isolate better anomalies.

E) LESJA Map #/ 1419 II

The Lesja area is located on the western edge of the southern most tip of the Trondheim greenstone belt, and is similar in many respects, in rock type, to that found along the base on the eastern side of the geosyncline. A general succession of rocks is as follows:

Stratigraphic Succession (Lesja gold area)

	Mafic and felsic volcanics,	) Bottheim)
	quartzitic gneiss	) Group)
	(from keratophyre)	))
	Feldspathic mica schists	)) Andbergshoi
	Amphibolites and ultramafics (?)	) Complex
	Augen gneiss, orthogneiss,	) Vestfjell)
	dioritic gneiss, quartzites	) Group)
Eocambrian	K-feldspar rich quartzites	Sparagmite
	(Sparagmites)	cover
Precambrian	Granitic gneiss, augen gneiss)	Liafjell
	basic and aplitic dykes	) Group

This area was originally investigated for gold potential derived from ultramafic rock. Three possible rock sources were defined:

- 1) Amphibolites and ultramafics
- 2) Qtz veins in quartzitic gneisses
- 3) Aplite dykes of the Liafjell group

Several good soil anomalies were isolated by regional soil geochemistry and follow-up is warranted on Storhorrungen, Rjuphoda, Reindølsnabben and Holsberget.

1) Storhorrungen

The area is characterized by a majority of mica schists, quartz mica gneiss, ultramafics, with minor amphibolite and quartzite. The source here for gold is closely related to the ultramafics, amphibolites, and possibly qtz veining in the gneisses.

Geochemical sampling and geological mapping have been completed. Anomalous gold from 12 ppb up to 210 ppb has been located along the south ends of lines 60 and 61. These anomalous results have associated copper from 50 ppm to 110 ppm within a fairly low copper background. The anomaly is approximately 150 meters wide along strike and up to 450 meters long, and is in close association to ultramafics in the west. A precise grid should be layed out to include the anomalous zone, and VLF field strength and mag surveys should be run. A small geochemical program may also be run to better isolate the gold source. If results are positive the zone should be drill tested.

If time warrants a large grid may be established (2000 meters) from the west end of the large ultramafic body in the middle of L-52, trending northeast to the ultramafic body on the north end of lines 62 and 61. Profile lengths should be 400 m to the north east and 700 m to the south west. This area includes spotty occurrences of gold from 12 ppb to 200 ppb and VLF, mag and geochemical surveys should be completed.

2) Rjuphoda

This area is dominated by gneiss, with closely associated amphibolites and aplite dykes. Gold concentrations here seem related to biotite rich aplite dykes, and anomalous values range from 12 ppb up to 320 ppb.

A base line of 800 meters has been put in and VLF and mag surveys are presently being completed. We await results.

3) Reindølsnabben

This area has had only a geochemical survey done over it. Anomalous values range from 12 ppb to 220 ppb and are basically restricted to lines 75 and 76. Length of the anomaly is roughly 500 meters on line 75 and shows only spotty occurrences on line 76.

The area should be mapped and rock samples should be taken around anomalous zones. If the rock type is favorable and rock analyses good, a geophysical survey should be initiated.

4) Holsberget

Characterized basically by gneiss with minor quartzite and greenstone.

Gold values range from 12 ppb to 120 ppb and are surprisingly restricted to one profile (L-8). Geological mapping has indicated quartz veining and sulphide towards the top of this line. Rock geochem from areas close by were surprisingly low in all elements (Au, Cu, As, Pb, Zn, Ag). A small grid should be set up here, with VLF and mag surveys run.

5) All other areas which had follow-up performed showed very discouraging results. These include Svaningsbotten, Djupdalsbekken I, Djupdalsbekken II and Kvitmyrin. One

encouraging fact is a small amount of copper found in a quartz vein at Kvitmyrin which is coincident with a single gold soil anomaly. We await assays from rocks of this area. No further work should be performed on these areas.

F) Alvdal Area Map #'s 1619 III, 1619 IV

This small program was run to help follow-up on anomalous gold stream sediments from the 1981 field season. A total of six small grids were layed out and were covered by soil sampling. The gold from the stream sediments was generally coincident with the ultramafic belt just north west of Alvdal, although gold in other areas (Bratthø, Tverrvola) may also be closely associated with a major tectonic "break" between the Gula group and the underlying Hersjø formation volcanics.

We presently await geochemical results.

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The 1982 field season included many abbreviations each of which described different grid names for the purpose of quick, identification of selected areas. They are as follows.

Tynset-Savalen Area.

Sivilvangen	S
Fadalen I	FI
Fadalen II	FII
Tonnvola	T
Tunndalen	Tu
Snausjøvola II	SNII
Snausjøvola I	SNI
Svarthue	Sv
Lomsjøvola	Lo
Lomsjøvola/Solve	Ls (No Au)
Stralsjøen	Str
Rødhammaren	Rh
Bondåsen	Bd

Rødalen Area

Rødalen	R, Rø
Storgiokletten	St
Fisktjørna	Fs
Veslehoi	V
FjellTorna	Fj
Veslivangen I	Vev I
Veslivangen II	Vev II

Tolga/Os Area

Bakkvollen	B
Knausvola	K
Vangroftdalen	La
Skogli	Sk
Vangsåsen	Va
Sæteråsen	Sæ

Folldal Area

Søndre	Sø
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Grimsdalen.....G
Nordre Bekkensætra.....N

Lesja Area.....Ls (with Au)
Alvdal Area HA

Rock samples all include 'R*' in their code. All core samples include the hole #, "C", and the number of core sample.

FOLLDAL VERK A/S

D.D.H. No.		Azimuth	E	Started	23.10.84	Directional surveys					
Property	Sivildalen	Angle	50°	Finished	4.11.84	Depth	Azim.	Dip.	Depth	Azim.	Dip.
Co-ord.	800N-100W	Depth	173.80 m	Logged by	Krause						
From	To	Description	Interval	Assays (%)							
		a = angle of foliation to axis of core	From To	Cu Mo Pb Zn Au Ag S							
0	14.15	glacial drift									
14.15	18.70	greenschists, dark green coloured rocks with quartz-feldspar material parallel to schistosity. a=80°									
18.70	30.80	massive greenstones, dark green coloured rocks a=75°									
30.80	34.90	keratophyre, light coloured rock with amphibole-needles and impregnation with pyrite. a=75°	31 32	< 0.1 < 0.1							
			32 33	< 0.1 < 0.1							
34.90	40.30	greenschists, dark green coloured rock with some quartz schlieren. a=75°	33 34	< 0.1 < 0.1							
			34 35	< 0.1 < 0.1							
40.30	40.65	keratophyre, light grey coloured rock with small amphibole needles. a=70-75°									
40.65	42.15	greenschists, a=70°									
42.15	42.35	keratophyre, as 40.30-40.65 a=70°									
42.35	44.65	greenschists, a=75°									
44.65	45.10	massive greenstones, dark green coloured rocks.									
45.10	46.20	greenschists, a=75°									
46.20	48.20	keratophyre, as 40.30-40.65 a=75°									
48.20	51.15	greenschists, with high content of quartz-feldspar material parallel to schistosity and numerous quartz schlieren. a=75°									

DIAMOND DRILL LOG

FOLLDAL VERK A/S

Sivil #1

PAGE 2

From	To	Description	DDH No. 1	Interval		Assays(%)						
				From	To	Cu	Mo	Pb	Zn	Au	Ag	S
51.15	52.95	keratophyre, containing some chlorite, numerous amphibolitic layers. $\alpha=80^{\circ}$										
52.95	55.50	keratophyre, light grey coloured rocks with many amphibole needles, containing a little chlorite.										
55.50	57.20	keratophyre, with numerous amphibolitic layers.										
57.20	60.75	greenschists, with high content of felsic material parallel schistosity and many quartzschlieren $\alpha=75^{\circ}$										
60.75	62.80	keratophyre, with many layers of amphibolitic material $\alpha=70^{\circ}$										
62.80	63.50	grey phyllites, impregnation with sulphides. $\alpha=70^{\circ}$		63	64	< 0.1			< 0.1			6.25
63.50	67.60	graphite schists, strong impregnation with sulphides, large pyrite-grains $\alpha=70^{\circ}$		64	65	< 0.1			0.1			7.30
				65	66	< 0.1			0.1			5.00
67.60	69.85	shists, with alternating layers of amphibolitic, felsic and grey coloured material. $\alpha=75^{\circ}$		66	67	< 0.1			< 0.1			2.35
				67	67.60	< 0.1			< 0.1			3.75
69.85	70.65	keratophyre, white-light grey coloured rock $\alpha=75^{\circ}$										
70.65	71.30	grey phyllites, $\alpha=75^{\circ}$										
71.30	71.65	keratophyre, light grey coloured rock. $\alpha=75^{\circ}$										
71.65	76.95	grey phyllites, $\alpha=75^{\circ}$										
76.95	77.30	keratophyre, as 71.30-71.65										
77.30	77.95	grey phyllites, $\alpha=80^{\circ}$										
77.95	82.40	keratophyre, white-light grey coloured rock with weak impregnation of pyrite. $\alpha=70^{\circ}$										

DIAMOND DRILL LOG

FOLLODAL VERK A/S

Sivil 41

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From	To	Description	DDH No. 1	Interval		Assays (%)						
				From	To	Cu	Mo	Pb	Zn	Au	Ag	S
82.40	82.90	<u>keratophyre</u> , containig some chlorite and amphiboles.										
82.90	83.20	<u>keratophyre</u> , white coloured rock. $\alpha=70^\circ$										
83.20	84.25	<u>keratophyre</u> , contain ⁱⁿ some chlorite and numerous layers of amphibolitic material. $\alpha=70^\circ$										
84.25	88.20	<u>keratophyre</u> , light grey coloured rock with impregnation of pyrite. $\alpha=70-75^\circ$										
88.20	91.50	<u>greenschists</u> , with quartz-feldspar material parallel to schistosity. $\alpha=75^\circ$										
91.50	91.90	<u>phyllites</u> , grey coloured rocks with some <u>graphitic</u> layers and some amphibolitic material. $\alpha=70^\circ$										
91.90	94.40	<u>impure graphite schists</u> ,										
94.40	100.00	<u>phyllites</u> , greyish-brownish coloured rocks with a few stripes of <u>graphite</u> $\alpha=65-70^\circ$										
100.00	102.80	<u>grey phyllites</u> , $\alpha=70^\circ$										
102.80	116.20	<u>schists</u> , grey, brown, green coloured mica-rich schists with amphibolitic material, $\alpha=75^\circ$										
116.20	118.80	<u>dark phyllites</u> , dark grey rocks with content of some <u>graphite</u> . $\alpha=75^\circ$		116.30	117	<0.1			<0.1			0.90
				117	118	<0.1			<0.1			1.60
118.80	120.00	<u>micashists</u> , grey-brown coloured rocks. $\alpha=75^\circ$		118	118.60	<0.1			<0.1			3.20
120.00	120.05	<u>grey phyllites</u> ,										
120.05	120.35	<u>graphite schists</u> , impregnation with sulphides										

DIAMOND DRILL LOG

FOLLDAL VERK A/S

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From	To	Description	DDH No. 1	Interval		Assays (%)						
				From	To	Cu	Mo	Pb	Zn	Au	Ag	S
120.35	123.25	grey phyllites, with some narrow layers of graphite										
123.25	123.40	graphite schists, impregnation with sulphides. $\alpha=75^{\circ}$										
123.40	124.50	grey phyllites, $\alpha=75^{\circ}$										
124.50	128.35	graphite schists, partly with high content of quartz and carbonate, partly impregnated with sulphides.		124.40	125	<0.1			<0.1			4.50
				125	126	<0.1			<0.1			4.45
128.35	130.20	grey phyllites, with many narrow graphite layers, partly strong impregnation with sulphides. $\alpha=80^{\circ}$		126	127	<0.1			<0.1			2.90
				127	128	<0.1			<0.1			6.60
130.20	133.65	grey phyllites, $\alpha=75^{\circ}$		128	129	<0.1			<0.1			2.15
133.65	133.85	graphite schists, with impregnation of sulphides		129	130	<0.1			<0.1			3.20
133.85	134.40	grey phyllites,		130	130.7	<0.1			<0.1			5.55
134.40	135.55	light grey mica schists, $\alpha=70^{\circ}$										
135.55	136.95	dark phyllites, dark grey coloured rocks.										
136.95	138.50	light grey mica schists, $\alpha=70^{\circ}$										
138.50	139.25	grey phyllites,										
139.25	142.50	impure graphite schists, graphite-rich layers are alternating with grey phyllites, graphite-rich zones are impregnated with sulphides. $\alpha=75^{\circ}$		141.75	142.45	<0.1			<0.1			4.50
142.50	150.00	grey mica schists, with quartz-feldspar material parallel to schistosity. $\alpha=75-80^{\circ}$										
150.00	153.15	grey phyllites, with numerous layers of graphite, weak impregnation with sulphides. $\alpha=65^{\circ}$										

Sivil #1

PAGE 5

Hammat Lebb A/S

DIAMOND DRILL LOG

FOLLDAL VERK A/S

PAGE 1

D.D.H. No.		Azimuth		Started		Directional surveys					
2		E		5.11.81		Depth	Azim.	Dip.	Depth	Azim.	Dip.
Property		Angle		Finished							
Givildalen		50°		21.11.81							
Co-ord.		Depth		Logged by							
500N-300		100 m		Krause							

From	To	Description a=angel of foliation to axis of core	Interval		Assays(%)						
			From	To	Cu	Mo	Pb	Zn	Au	Ag	S
0	5.60	glacial drift,									
5.60	34.35	massive greenstones, dark green coloured rocks, with weak impregnation of pyrite, with a few schlieren of hydrothermal quartz up to 40 cm thick a at 8m:75°, at 15m:65°, at 22m:85°, at 28m:65°, at 34:50°	5.50	6.70	<0.1				<0.1		0.45
			10	10.60	<0.1				<0.1		0.45
34.35	35.75	hydrothermal quartz	25.3	25.90	<0.1				<0.1		0.30
35.75	40.00	massive greenstones, dark green coloured rocks, with weak impregnation of pyrite, a=65°	33.4	34.35	<0.1				<0.1		0.60
			35.50	35.75	<0.1				<0.1		0.40
40.00	56.70	greenschists, with numerous intercalations of quartz- carbonatic and quartz-feldspar material parallel to schistosity, larger schlieren of hydrothermal quartz at 40.85-40.95, 41.40-41.65, 43.15-43.65. a=65-75°	38.25	39.25	<0.1				<0.1		0.45
56.70	57.70	keratophyre, light grey coloured rock with some amphiboles and impregnation of pyrite. a=75°	56.80	57.85	<0.1				<0.1		3.50
57.70	63.30	graphite schists, strongly impregnated with sul- phides, mostly pyrite. a=75°	57.85	58.85	<0.1				0.1		13.25
			58.85	60.0	<0.1				<0.1		9.60
63.30	77.30	dark phyllites, dark grey coloured rocks with rela- tively high content of graphite, weak impregnation with sulphides, some quartz schlieren up to 30 cm.	62	63.25	<0.1				<0.1		9.30
			63.25	64.25	<0.1				<0.1		2.60
77.30	78.55	graphite schists, strong impregnation with sulphides, mostly pyrite. a=75°	77.80	78.40	<0.1				<0.1		7.30

Civil #2

PAGE 2

Hammar, Frank A. 55

DIAMOND DRILL LOG

FOLLDAL VERK A/S

Sivil 43

PAGE 2

From	To	Description	DDH No. 3	Interval		Assays						
				From	To	Cu	Mo	Pb	Zn	Au	Ag	
28.70	40.00	greenschists, dark green coloured rocks with quartz-feldspar material parallel to schistosity. $\alpha=70-75^\circ$										
40.00	41.50	massive greenstones, with a lot of schlieren of hydrothermal quartz. $\alpha=75^\circ$										
41.50	48.25	greenschists, as 28.70-40.00 and with weak impregnation of sulphides. $\alpha=70^\circ$										
48.25	52.80	quartz-keratophyre, with some layers of dark grey coloured phyllites up to 10 cm thick. $\alpha=70-75^\circ$										
52.80	55.55	phyllites, dark grey coloured rocks with very low content of amphiboles and chlorite, is containing off and on 5 cm thick layers of keratophyre $\alpha=75-80^\circ$										
55.55	57.00	greenschists, $\alpha=75-80^\circ$										
57.00	57.10	keratophyre, with some amphiboles $\alpha=75^\circ$										
57.10	78.50	greenschists, with a few layers of quartz-feldspar material parallel to schistosity, off and on with some thick quartz-schlieren, weak impregnation with sulphides 70.50-77.90. α = at 58m: 75° , 60-78m: $60-70^\circ$										
78.50	79.15	keratophyre, with amphibole needles. $\alpha=70^\circ$										
79.15	87.30	greenschists, felsic layers parallel to schistosity, weak impregnated with sulphides. α = at 82m: 60° at 82m: 80°										
87.30	87.50	keratophyre, white-lightgreen coloured rock with some chlorite and weak impregnation of pyrite.										

Sivil ★ 3

PAGE 3

Hammes Truck & Auto

FOLLDAL VERK A/S

D.D.H. No.	no. 4	Azimuth	East	Started	Directional surveys							
Property	Sivilvanger	Angle	60°	Finished	Depth	Azim.	Dip.	Depth	Azim.	Dip.		
Co-ord.	1100S-475W	Depth	220.0m	Logged by	Jim Cuttle							
From	To	Description			Interval		Assays					
					From	To	Cu	Mo	Pb	Zn	Au	Ag
0.00	31.50	<u>Overburden</u>										
31.50	49.21	<u>Greenstone</u>										
		Unit is light greenish-grey to dark green in places and is commonly characterized by layers qtz carbonate sections (0.1-2.0 cm wide) at 050° to CA. Carbonate predominates over qtz, sometimes 100% but generally 70/30 ratio. Qtz carbonate layers increase greatly with depth until end of section.										
		Tuffaceous sections predominate in upper sections of the unit and are especially noticeable at 31.5-38.84, but seem to disappear with depth. Tuffaceous fragments are 0.1-0.5 cm in diameter and have epidotized to a light green colour.										
		Pyrite found in small concentrations along bedding planes disseminated throughout 42.10-42.76 → Silicified unit (?) with biotite banding (050° to CA). No visible sulphides.			< 1.0%	Py						

Swire #4

PAGE 2

Harvey Tyeck & S.

Siviti #4

PAGE 3

Hammat Grylls A/S

DIAMOND DRILL LOG

FOLLDAL VERK A/S

Sivil #4

PAGE 4

From	To	Description	DCH-No.	Interval		Assays						
				From	To	Cu	Mo	Pb	Zn	Au	Ag	
70.30	87.67	<u>Micaceous schists</u> (phyllitic sections) Typical dark grey banded schists with bedding 060 to CA. Chlorite is concentrated along planes throughout. No visible sulphides or graphitic zones.										
		-78.73 → 79.09, 82.49 - 84.53 keratophyre is massive and has typical light grey to white colour. Barren of visible sulphide 79.09 → 80.05 - typical green- stone slightly banded at 050 to CA with tuffaceous units at 79.35 - 79.90. Barren of visible mineralization.										
87.67	105.00	<u>Greenstone</u> (minor greenschist) Typical as previous units with banding generally at 0.63 to CA. Sections have been heavily layered with qtz carbonate beds (0.1-0.8 cm) at 89.40 → 89.73, 90.74 → 90.89 and 97.37 → 98.90 - 92.08 → 95.73 keratophyre unit includes up to 2% Py at 95.34.	2% Py									
		-96.60 - 99.72 includes tuffaceous sections with trace Py throughout.	Tr Py									
105.00	108.64	<u>Keratophyre</u> Similar to previous units. Abundant sericite along planes at 048 to CA. Tr Py throughout section especially noticeable along planes or beds at 105.00 - 105.48, ≈ 1-2% Py.	Tr Py									
108.64	122.20	<u>Micaceous schists</u> Similar to previous units. Bedding at 060 to CA. Sections are rich in mica and have been highly silicified. (Resembles keratophyre somewhat?). -119.58 → 119.86 → 2% Po and 1% Cpy bedded along qtz rich sections of schists. Qtz beds are ≈ 0.1 → 0.5 cm. - 119.86 → 120.00 massive graphitic horizon under- lies mineralized zone.	1% Cpy 2% Po									

Sivil #4.

PAGE 5

Harmer Fresh Air

Siv. 5

PAGE 2

Homer Iyck A.S.

FOLLDAL VERK A/S

D.D.H. No.	S-82-6	Azimuth	Grid E	Started	01.06.82.	Directional surveys					
Property	Sivilvängen	Angle	45°	Finished	08.06.82.	Depth	Azim.	Dip.	Depth	Azim.	Dip.
Co-ord.	460V L-145 N	Depth	116.10m	Logged by	J.Cuttle						
From	To	Description	Interval		Assays						
			From	To	Cu	Mo	Pb	Zn	Au	Ag	
0.00	5.30	OVERBURDEN									
5.30	35.00	<u>QUARTZ CHLORITE SCHIST</u> Light green to whitish green, greasy texture along chistose planes (chlorite). Most of unit is heavily banded with creamy white quartz and in places bands have been slightly folded. Qtz bands include small amounts of carbonate layers intermixed. No visible sulphides through unit.									
35.00	43.74	<u>GREENSCHIST TO GREENSTONE</u> Similar in colour to 5.30-35.00, but more massive in texture and exhibits a somewhat spotted appearance. Qtz carbonate layers are almost absent. Hydrothermal quartz sections up to 50cm in length occur at 36.44, 37.00-37.30. No visible sulphide in these sections. Possible fault zone at 41.22 to 41.40. -43.10-43.74 unit becomes more siliceous, approaching keratophyre in appearance. Section includes unknown, greenish white micaceous mineral. Traces of pyrrhotite throughout.									
43.74	58.83	<u>GRAPHITE SCHIST</u> Dark grey black to black with intermittent quartz layers. Minor carbonate exists with quartz. Contact with upper unit is sharp and at 45° to CA. 49.25-51.85, unit becomes more similar to quartz chlorite schist, almost void of graphite.									

DIAMOND DRILL LOG

FOLLDAL VERK A/S

S-12-6

PAGE 2

From	To	Description	Interval		Assays						
			From	To	Cu	Mo	Pb	Zn	Au	Ag	
		No sulphides are found on this section. Hydrothermal qtz seen at 49.70 approx. 40cm long.									
		All sulphide is restricted to graphite sections. Pyrrhotite is seen throughout, up to 5% and 1% or less pyrite. Traces of chalcopyrite are few but are seen at 43.78, and 47.95.									
58.83	82.70	<u>QTZ CHLORITE SCHIST</u> Similar to 5.30 to 35.00 although somewhat lighter in colour. Chlorite is more evident along fracture and schistose planes. Small black graphitic zones found at 62.60, 68.65, 69.23 and 71.18. Contact with upper unit is sharp at 050° to CA. No visible sulphides seen in section.									
82.70	94.30	<u>GRAPHITE SCHIST</u> Similar to 43.74-58.83 with quartz sections not as abundant. Sulphide throughout unit Po up to 4%, pyrite approx. 1% and minor traces of chalcopyrite. Pyrrhotite is characteristically found in stringers parallel to schistosity. Pyrite is seen in crystal form disseminated throughout.									
94.30	109.50	<u>DARK GREY PHYLLITE</u> Unit is fine grained, somewhat massive and void of quartz carbonate layers as in the chlorite schist zones. Hydrothermal quartz is seen but only limited amounts.									

4% PO
1% Py
Tr Cpy

FOLLDAL VERK A/S

PAGE 3

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FOLLDAL VERK A/S

1

D.D.H. No.		Azimuth	Grid E	Started	Directional surveys					
S-82-7				<i>June 11/82</i>	Depth	Azim.	Dip.	Depth	Azim.	Dip.
Property	Sivilvanqen	Angle	045°	<i>June 16/82</i>						
Co-ord.	925V L-200N	Depth	90.30 m.	Legged by <i>J.Cuttle</i>						
From	To	Description								
0.00	48.85	<u>QTZ CHLORITE SCHIST</u> Dark greenish grey schistose rock, with alternating band (0.1cm-1.0cm wide) of quartz at 070 to CA. Unit is at times somewhat massive resembling greenstone. Very minor traces of pyrite throughout unit usually located along fracture zones. Minor sections of quartz bandings are seen but are void of sulphide. -10.30-11.75, 14.60-16.35, 38.65-41.88. Tuffaceous mafic volcanics with visible fragments approx. 0.5cm-2.0cm in size, intermixed with small garnets and chlorite rich layers. Fragments are generally felsic in composition. No visible sulphides in these sections. -20.35-22.40 and 28.80-29.25. Greenstone sections of minor volcanic flows. No visible sulphide was seen.								
48.85	66.17	<u>PHYLLITE</u> Light greenish grey in colour, easily fractured with minor amounts of Qtz layers at 75° to CA. Some zones appear to be somewhat more siliceous but still phyllitic in nature. Qtz bandings are minor and are void of sulphide. -52.72-53.00 Keratophyre. Siliceous, light grey white and void of sulphide. -61.45-61.73 Small graphitic lenses on phyllite with accompanying 2% PO.								

FOLLDAL VERK A/S

PAGE 2

[illegible]

GRIMSDALEN

FOLLODAL VERK A/S

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FOLLDAL VERK A/S

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FOLLDAL VERK A/S

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DIAMOND DRILL LOG

FOLLDAL VERK A/S

GRIMS 760

PAGE 2

From	To	Description	Interval		Assays						
			From	To	Cu	Mo	Pb	Zn	Au	Ag	
		-Banding (bedding of unit at 082 to CA.)									
		- 68.05-68.32, 72.17-72.18 show small sedimentary sections of muscovite schists.									
86.37	90.13	<u>GREENSTONE (Minor Greenschist)</u>									
		Unit is more massive than previous one at 6.70-62.90 and is slightly darker in colour. Qtz-plagioclase banding is minor and is generally at 083 to CA.									
		- 86.50-86.92. Keratophyre similar to 62.90-86.37.									
		-The greenstone is void of garnets and of hornblende tails that were previously found in the keratophyre, and no visible sulphides could be seen.									
90.13	97.68	<u>BIOTITE MUSCOVITE SCHIST</u>									
		Unit is light to dark grey, fine grained and shows banding at 078 to CA. Light brownish red garnets still appear but are small (<0.3cm), shapeless, and are restricted to more siliceous sections of the unit (?). Found in large quantities at 90.20-90.85.									
		-No visible sulphides except trace of Py along planes (<0.5cm).									
97.68	105.08	<u>KERATOPHYRE</u>									
		Similar to previous unit, (62.90-86-37) shows more homogeneous texture. Minor garnet throughout with banding at 085 to CA. Unit seems to grade slowly into upper and lower units and is hard to determinate actual rock type change. Hornblende tails are distinctive at 100.55, and 102.05-102.55 and range in size from 0.2-0.8cm.									
		-No visible sulphides were seen.									

Hømsdal Verk A/S

Tr Py

DIAMOND DRILL LOG

FOLLDAL VERK A/S

GRINS 760

PAGE 3

From	To	Description		Interval		Assays						
				From	To	Cu	Mo	Pb	Zn	Au	Ag	
105.08	196.56	<u>GREENSCHIST</u> (Minor mafic tuffs and flows)										
		Unit is generally light grey green to light grey, shows banding with biotite throughout and has been highly folded in most places. The unit in some places becomes somewhat gneissic with bands of greenstone and qtz-feldspar mixture. These bands are lightly folded. Biotite zones in schists carry associated pyrrhotite (up to 1%) towards unit at 108.00-108.43, 125.30-126.08, 126.71-127.55, 129.74, 130-52 and 131.23-131.34. Minor trace of chalcopyrite at 131.25.	< 1% PO									
		-120.73-121.42, 180-85-190.92 mafic tuff, heavily banded and folded. Tuffaceous fragments (0.2-0.8cm) have been stretched. Pyrite is found in this section in trace amounts at 189.20-189.80.	Tr Cpy									
		-108-43-115.92, 168.30-169.22, 176.94-177.10. Mafic tuffs with fine and folded banding throughout. Section is very fine grained and almost massive. No visible sulphides.	Tr Py									
		-174.05-174.35 Keratophyre(?) Lightly siliceous, sharp contacts at 070 to CA and 1% Pyrrhotite with trace chalcopyrite.	1% PO Tr Cpy									
196.56	202.40	<u>COARSE GRAINED DACITE</u> --> <u>TO DIORITE</u>										
		Unit is light grey to creamy white, shows small hornblende tails (<0.2cm) throughout. Contact is sharp with upper and lower units at 070 to CA. Reddish brown garnets appear in small quantities up to 0.2cm in size.										
		-Hydrothermal qtz sections at 199.91-199.98, 200.25, 201.65-202.05 associated with Tr pyrite and unknown light white green mineral. Mineral is characteristically along qtz borders.	Tr Py									
202.40	239.45	<u>GREENSCHIST</u> (Minor Greenstone)										
		Unit is characteristically greyish green colour, fine grained with heavily folded qtz feldspar layers. No visible sulphides.										

FOLLDAL VERK A/S

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BORHULL NR. 760 D - 40° (24.06.81) Grimsdalshytta.

0,00 - 64,85 m

Stort sett klorittisk biotitt førende grønn glimmerskifer (grunnskiferfasie' ette Goldschmitt) med mange uregelmessige innfelte parallelle striper av kvartsitt og marmor. Bergarten er på stedet rik på CaCO_3 . På stedet finnes det soner med mobilisert biotitt, ofte akkumulerte i innfelte striper f.eks. mellom 40,20 - 40,80 m, 50,50 - 55,00 m og mellom 56,20 - 61,60 m. Mellom 50,90 - 51,60 m finnes det en tektonisk kvartsbreksje med uregelmessige slirer, linser og reder av remobilisert biotitt. Mellom 9,25 - 9,50 m, 13,96 - 14,05 m og mellom 15,20 - 17,80 m er bergarten sterkt oppsprukket, delvis sterkt forvitret med limonitt belegg på sprekke. Kjerneutvinning er her 70 - 80 %. Det samme finnes mellom 29,60 - 29,45 m og mellom 35,20 - 35,75 m og mellom 36,90 - 37,95 m hvor fjellet ikke er forvitret men det finnes limonittbelegg på sprekke, stort sett tversgående, spesielt mellom 35,20 - 35,70 m er sprekke parallelt med hullets akse.

Gjennomsnittsfall av foliasjonen mot hullets akse er 70 - 75° på enkelte steder 80 - 85°. Mellom 12,25 - 15,00 m er fallet 50° - 0° - 20° - 10° - 0° - 45° - 75°. Mellom 15,00 - 17,50 m 40° - 45°, mellom 23,60 - 24,60 m 45° - 0° - 60° - 0° - 75° - 45°, mellom 30,00 - 46,00 m varierer mellom 40° - 45° - 50° - 60° - 40° og 45° - 60°, på stedetptygmatiske og disharmoniske foldet. Slik folding og variasjon av fall finnes også mellom 52,00 - 60,00 m.

Mellom 62,95 - 63,30 m finnes det massiv, lett båndet kvarts-metakeratofyr, albittrik, lett hornblende, serisitt og granatholdig. Fall av foliasjon mot hullets akse er 85°.

64,85 - 82,00 m

Båndet finkornig albittrik, kvartsmetamofyr, serisitt-kloritt og hornblende (nåler 0,2 - 0,5 cm lange) og granatholdig. Gjennomsnittsfall av foliasjon er 85 - 80°, på steder 90° mot hullets akse. På steder finnes det mellomlag rik på kloritt og serisitt og hornblende førende (nåler 1 - 2 mm lange) og granatholdig som tilsvarer båndet metakeratofyrisk båndgneis.

82,00 - 100,00

Kvartsrik og albittrik metakeratofyrisk båndgneis, kloritt, serisitt og delvis biotittførende hornblende og granat-holdig, stort sett middelskornig, på steder finkornig. Gjennomsnittsfall av foliasjonen mot hullets akse varierer fra 80° - 85° - 75° - 70° - 85° - 90° - 85° .

Mellom 84,20 - 84,95 m finnes det finkornig lett båndet kvarts og albittrik metakeratofyr. Mellom 96,90 - 97,05 m finnes hvit metahydrothermal kvarts (diskordant). Mellom 92,40 - 92,76 m er bergarten ptygmatiske foldet.

100,00 - 103,25

Kvarts og albittrik finkornig, på enkelte steder massiv, på enkelte steder lett båndet metakeratofyr delvis serisitt og klorittholdig hornblende og granatførende. Nåleporfyroblaster av hornblende, 2-3 mm lange og stort sett uorienterte og akkumulerte i enkelte parallelle soner 2 - 5 cm tykke. Gjennomsnittsfall av foliasjonen er 80° - 85° mot hullets akse.

103,25 - 107,80

Kvartsrik, albittrik, kloritt og serisitt førende hornblende og granat-holdig på stedet biotittførende metakeratofyr - båndgneisskifer. Mellom 106,60 - 107,00 m dominerer biotitt - serisitt sliregneis, stort sett ptygmatiske sterkt foldet. Gjennomsnittsfall av foliasjonen mot hullets akse er varierende mellom 80° - 85° - 75° - 80° - 70° mot hullets akse.

107,80 - 116,25

Klorittrik, biotittførende sliregrønnskifer med overganger til sliregrønn-glimmerskifer. Det fins enkelte soner med store akkumulasjoner av mobilisert biotitt i innfelte striper. Det fins mange uregelmessige innfelte striper av kvartsitt. Bergarten er stort sett disharmonisk og ptygmatiske foldet. Gjennomsnittsfall av foliasjonen sterkt varierer mellom 50° - 40° - 70° - 80° - 50° - 75° .

116,25 - 117,25

Meget klorittrik, biotittførende grønnskifer finkornig med 1 - 3 mm store flater av biotitt på foliasjonsflater. Gjennomsnittsfall av foliasjonen er 75° - 80° - 85° - 80° mot hullets akse.

117,25 - 124,20

Klorittrik kvarts, albitt og hornblende førende delvis biotitt-holdig gneisrik grønnskifer, båndet og stort sett middelskornig med enkelte tynne innfelte parallelle uregelmessige striper av kvartsitt. Bergarten er også karbonat-holdig (CaCO_3 , delvis også $\text{CaMg(Fe)(CO}_3)_2$). Gjennomsnittsfall av foliasjon

varierer mellom 80° - 75° - 85° - 80° men mellom 121,60 - 123,00 m varierer det mellom 50° - 45° - 40° - 60° .

124,20 - 183,80

Klorittrik, biotittførende grønnslireskifer med overganger til grønnglimmerskifer med mange uregelmessige innfelte parallelle striper og tynne bånd (maks 0,5 cm) av kvartsitt. På steder finnes det soner rikere på mobilisert biotitt som er akkumulert i innfelte parallelle striper. Spesielt rik på biotitt er disse soner mellom 142,40 - 145,90 m og 167,60 - 172,00 m og 176,00 - 179,00 m. Mellom 130,75 - 130,90 m, 167,00 - 167,20 m finnes det diskordant hvit metahydrothermal kvart Mellom 174,05 - 174,35 m finnes det også diskordant metahydrothermal hvit kvarts, delvis kvartsbreksie, diskordant som inneholder enkelte ujevnt spredte hypidioblaster og også idio-blaster av kubisk utviklet FeS_2 maks. 1 - 2 mm i diameter og mindre. Gjennomsnittsfall av foliasjonen er sterkt varierende mellom 60° - 50° - 40° - 45° - 70° - 50° - 80° - 50° og 45° . På stedet er bergarten sterkt disharmonisk og ptygmatisk foldet. Mellom 153,00 - 155,00 m er fall av foliasjon stort sett 30° - 35° mot hullets akse. Mellom 142,85 - 143,00 m finnes det sprekker, parallelt liggende med hullets akse som har fylling bestående av finkornig FeS_2 i kloritt metatekt.

183,80 - 184,30

Båndet uren marmor med klorittrik, biotittførende slireskifer, striper, på stedet med uregelmessig pigment av soisitt-epidott.

184,30 - 195,10

Klorittrik, biotittførende grønnslireskifer med enkelte overganger til grønnglimmerskifer med mange uregelmessige innfelte, stort sett parallelle striper av kvartsitt. Stort sett det samme som mellom 124,20 - 183,80. Gjennomsnittsfall av foliasjon varierer mellom 70° - 75° - 70° - 65° mot hullets akse. På steder disharmonisk foldet.

195,10 - 195,60

Klorittrik, amfibolittisk, biotittførende bandskifer med enektel tynne innfelte parallelle kvartsrike striper og/eller tynne uregelmessige bånd (maks. 3 mm tykke). Det finnes bare små mengder av ujevnt spredte små fliser og/eller flate hypidioblaster (deformerte - kataklastiske) av bare FeS_2 . Disse korn/fliser følger - eller er orientert ved foliasjonsflater. Gjennomsnittsfall av foliasjon varierer mellom 60° - 45° - 70° . På steder disharmonisk foldet. Ved 195,45 m finnes det ca. 20 mm tykke bånd av CaCO_3 (marmor)

195,60 - 196,55

Kvartsrik, klorittførende, serisitt og biotittholdig, middelskornig aglomeratisk glimmerskifer. Pressede korn av stort sett kvarts og/eller kvarts/plagioklas er orienterte ved foliasjon. Meget sjelden finnes det små korn av almandin/porypgranat og også små hypidioblaster av FeS_2 . Gjennomsnittsfall av foliasjonen mot hullsets akse varierer mellom ca. 60° - 40° - 75° på stedet flatt foldet og med 196,00 m synklinal eller antiklinal kneet.

196,55 - 202,40

Kvartsrik og albittrik metakeratofyr båndgneis, kloritt-serisittholdig og hornblendeførende. Det fins mange små nåleporfyroblaster av hornblende (maks. 1 - 2 mm lange). På enkelte steder finnes det tynne innfelte striper og sjelden mellomlag av klorittrik, biotittførende grønn-glimmerskifer også delvis hornblendeholdig. Gjennomsnittsfall av foliasjon varierer fra 70° til 45° og 70° mot hullets akse. På stedet flatt foldet. Mellom 200,00 - 200,10 m, 201,00 - 201,05 m og mellom 201,75 - 202,05 m finnes det kvartsbreksie/diskordant.

202,40 - 203,40

Kloritt meget rik, hornblendeførende båndskifer, delvis også biotittholdig som inneholder enkelte stort sett ujevnt spredte små fliser og også preddede hypidioblaster av FeS_2 . Disse ble stort sett orientert etter foliasjon. Gjennomsnittsfall av foliasjon mot hullets akse er på 50° - 45° - 50° .

203,40 - 205,30

Klorittrik, hornblende og biotittførende, soisitt og spidottholdig, delvis alterert gneisisk grønnslireskifer og/eller båndskifer. Gjennomsnittsfall av foliasjon varierer mellom 50° - 45° - 50° mot hullets akse.

205,30 - 209,50

Kvartsrik og albittrik metakeratofyr båndgneis, hornblendenåler førende (maks. 2-5 mm lange), kloritt og serisittholdig. Sjelden og bare på enkelte steder finnes det små idioblaster og/eller hypidioblaster av pyrop/almandin granat. På steder finnes det enkelte mellomlag av kvarts og albittrik, hornblende førende båndet metakeratofyr. Gjennomsnittsfal av foliasjon mot hullets akse er på 50° - 45° - 50° . Mellom 207,20 - 208,30 m finnes det mellomlag av klorittrik, biotittførende og hornblendeholdig slireskifer. Gjennomsnittsfall av foliasjon varierer mellom 60° - 45° - 70° , på steder er ptygmatiske, disharmoniske foldet.

209,50 - 214,60

Klorittrik og delvis også biotittrik slireglimmerskifer, delvis også kvartsrik og serisittholdig. Det finnes mange innfelte parallelle

men uregelmessige striper og/eller tynne bånd av kvartsitt. Gjennomsnittsfall av foliasjon varierer sterkt mellom 60 - 80 - 70 og 75° mot hullets akse. På steder er bergarten sterkt disharmonisk foldet.

214,60 - 219,45

Klorittrik, finkornig båndskifer, biotittførende og hornblendenåler holdige. Det finnes enkelte små fliser, ujevnt spredte av FeS₂ og/eller pressede flate hypidioblaster av FeS₂ som ble orienterte etter foliasjon. På stedet finnes det store akkumulasjoner av remobilisert biotitt, konsentrerte i innfelte uregelmessige striper og/eller årer, stort sett i sone mellom 216,40 - 216,60 m og mellom 218,60 - 219,00 m. Gjennomsnittsfall av foliasjon varierer mellom 60 - 50 - 65 og 60°. På steder flatfoldet, mere sjelden pygmatisk foldet og/eller isiklonal foldet. Mellom 217,50 - 217,55 m, 219,00 - 219,10 m og mellom 219,45 - 219,70 m finnes det diskordant hvit SiO₂ og/eller kvartsbreksie (metahydrothermal).

219,70 - 238,40

Delvis finkornig, delvis middelskornig kloritt og delvis også biotittførende båndet amfibolitt. Det finnes på steder enkelte soner rik på slirer og uregelmessige bånd av soisitt-epidott. På steder finnes det enkelte parallelle striper og/eller mellomlag av kloritt-biotittrik grønn glimmerskifer med uregelmessige parallelle innfelte striper av kvartsitt. Mellom 235,20 - 235,30 m finnes det delvis, uren, massiv, finkornig metakvartsitt med fall av foliasjon på 70° mot hullets akse. Mellom 225,50 - 227,10 m er bergarten finkornig (metadiabaskarakter). Gjennomsnittsfall av foliasjon varierer mellom 45 - 50 og 40°, men mellom 234,00 - 236,00 m er fall på 30° mot hullets akse og bergart er her sterkt foldet. Mellom 219,80 - 219,90 m og mellom 220,50 - 220,60 m finnes det hvis SiO₂, diskordant liggende delvis med overganger til kvartsbreksie.

238,40 - 247,70

Kloritt - biotittrik og også serisittrik slireglimmerskifer. Sjelder finnes det enkelte små ujevnt spredte korn av pyrop/alamndin granat. Bergarten er stort sett diskordant og isoklinal foldet. Gjennomsnittsfall av foliasjon mot hullets akse varierer sterkt mellom 60 - 80° og på stedet 45 - 50°.

247,70 - 251,10

Flekket, kloritt-biotittførende båndet amfibolitt middelskornig. På stedet finnes soner rikere på kloritt og biotitt. På stedet finnes det soner rik på avrundede kvarts-albitt-obigklas korn (flekker) og det finnes også enkelte soner rik

på bånd og/eller uregelmessige slirer av soisitt (klinosoisitt-spidot) som f.eks. mellom 251,10 - 251,60 m. Gjennomsnittsfall av foliasjon mot hullets akse varierer mellom 45 - 60° stort sett flatt foldet, bare på enkelte steder ptygmatiske foldet. Det finnes bare enkelte små ujevnt spredte korn av FeS₂.

251,10 - 255,10

Klorittrik og biotittrik middelskornig, kvarts albitt-obigoklasførende slire- og/eller båndet gneisisk glimmerskifer - grønnskifer. Enkelte soner har middelskornig aglomeratisk (orientert) karakter. Gjennomsnittsfall av foliasjon varierer mellom 70 - 80°, på stedet disharmonisk foldet og også isoklinalfoldet.

255,10 - 259,00

Mørk finkornig, båndet, klorittførende amfibolitt. Det finnes bare enkelte små fliser (hypodiolblaster) av FeS₂ stort sett orienterte ved foliasjon. Gjennomsnittsfall av foliasjon varierer mellom 70 - 80 - 90 - 80 - 85 og 70°.

259,00 - 265,50

Kvartsrik, kloritt, muskovitt (serisitt) og og biotittførende slireglimmerskifer på stedet med overganger til biotittrik paragneisisk glimmerskifer. Bergarten er stort sett disharmonisk foldet, på stedet ptygmatiske foldet, på stedet også isoklinal foldet. Gjennomsnittsfall av foliasjon sterkt varierende mellom 70 - 80 - 60 og 70°.

Mellom 261,15 - 264,50 m finnes det konkordant liggende sone av båndet kvartsmetakeratofyr rik på 1 - 2 mm lange nåler av hornblende og også kloritt-serisittholdig. Sjelden finnes det små hypidioblaster av almandin, ujevnt spredt. Gjennomsnittsfall av foliasjon mot hullets akse er på 70°.

Diamantborhull nr. 760 D vest for Grimsdals-
hytta ble stoppet 01.07.81, kl. 13.30 på 265,50 m.



(Milosh Motys).

DIAMANTBORHULL NR. 761 D

2750 X

GRIMSDALSHYTTA

440 Y

-40°

Kort petrografisk beskrivelse av borkjerner.

0,00 - 42,85

Stort sett finkorning, delvis middelskornig klorittrik, stort sett også kvartsrik, biotittholdig, plagioklas (albitt - oligoklas) holdig slire grønnskifer med enkelte overganger til gneisslireskifer. På steder finnes soner av mere middelskornig, båndet klorittskifer. Gjennomsnittsfall av foliasjon varierer sterkt mellom 40 - 70°. På steder finnes sonerptygmatiske og disharmoniske foldet men også isoklinalfoldet. Det finnes mangel uregelmessige tynne innfelte striper av kvartsitt.

Mellom 32,50 - 35,20 m finnes det sterkt tektonisert sone også soner av blastomylomitt-kvartsbreksie mellom 33,60 - 33,90 m, på steder finnes slire og reder av remobilisert biotitt (Mellom 33,90 - 34,20 m ? finnes det sterkt oppknust sone med kjernetap (20 %)). Fall av foliasjon i tektonisk sone er 20 - 15 - 30° mot hullets akse.

Mellom 13,00 - 13,10 m, 13,80 - 13,85 m, 15,15 - 15,25 m og 24,00 - 24,30 m finnes det hvit diskordant SiO₂.

42,85 - 43,25

Kvarts- og albitt-oligoklasrik metakeratofyr til metakeratofyrgneis, delvis kloritt, serisitt og hornblendeholdig, mindre soisitt - epidotholdig. Gjennomsnittsfall av foliasjon mot hullets akse er 70 - 75°.

Mellom 43,10 - 43,15 m finnes det diskordant hvit SiO₂.

43,25 - 49,40

Kvartsrik, delvis også albitt og albitt-oligoklasrik, klorittførende og biotittholdig, mindre serisitt og soisitt-epidotholdig og hornblendeholdig gneisrik-slireskifer. Gjennomsnittsfall av foliasjon er sterkt varierende mellom 60 - 70 - 80 - 70°, på steder disharmonisk og ptygmatiske foldet. Det finnes mange uregelmessige innfelte parallelle striper og tynne bånd og linser av kvartsitt.

49,50 - 54,30

Hornblendeførende kvarts- og albitt-oligoklasrik, kloritt, soisitt - epidotførende, sjelden serisitt og biotittholdig, injisert - alterert gneisskifer (migmatittisert med kvartsmetakeratofyrkiler) også hornblende nåler. Hornblendenåler er opp til 1 cm. lange, stort sett uorienterte. Gjennomsnittsfall av foliasjon varierer sterkt mellom 60 - 80° på steder 40° mot hullets akse. På enkelte steder er bergarten disharmonisk foldet.

54,30 - 91,00

Klorittrik, også kvartsrik, biotittførende og plagioklas (albitt - oligoklas) holdig, mere sjelden serisitt og soisitt - epidotholdig gneisrik sliregrønnskifer med mange uregelmessige parallelle striper og sjelden tynne bånd av kvartsitt. Gjennomsnittsfall av foliasjon varierer sterkt mellom 75 - 70 - 60 - 50 - 60 - 40 - 70°. I enkelte soner er bergarten sterkt disharmonisk foldet, ptygmatiske foldet og også isoklinalfoldet.

Mellom 60,60 - 61,40 m finnes det kvartsrik, hornblende og kloritt - serisitt-holdig metakeratofyr (båndet) stort sett massiv. Fall av konkordante grenser er på 45° mot hullets akse.

Mellom 68,60 - 68,80 m og ved 80,60 m, 80,70 m, 81,00 m, 81,10 m og 81,15 m finnes det 5 - 3 cm tykke soner av diskordant hvit SiO_2 .

91,00 - 114,50

Klorittrik grønskiifer, sterkt middelskornig med mange innfelte parallelle striper av kvartstitt med soner av små kantete fragmenter av kvarts - albitt og kvarts (maks. 2 mm i diameter). Fra ca. 112,10 m finnes det soner og overganger til gneisisk grønskiifer hornblende og biotittholdig og albitt-oligoklasførende. Gjennomsnittsfall av foliasjon varierer sterkt mellom $40 - 70^{\circ}$ på steder finnes soner sterkt disharmonisk og ptygmatisk foldet. Mellom 113,00 - 116,00 m er fall av foliasjon 35° mot hullets akse.

Ved 93,00 m, 93,40 m, 94,30 m, 95,40 m og 96,70 m finnes det diskordante soner av hvit kvarts 3 - 6 cm tykke.

114,50 - 117,90

Kvartsrik, albitt og albitt oligoklasførende kloritt - biotitt og delvis serisittførende hornblendeholdig gneisisk båndskiifer med overganger til gneisisk glimmerskiifer. På stedet finnes soner injiserte med parallelle striper av kvartsmetakeratofyrgneis, kloritt-serisitt og hornblende holdig. Gjennomsnittsfall av foliasjon mot hullets akser varierer sterkt mellom $70 - 75 - 60^{\circ}$ men også 50° . Bergarten er mere sjelden disharmonisk foldet.

117,90 - 126,70

Kloritt - serisittrik, kvartsrik biotittførende slireglimmerskiifer.

Mellom 119,20 - 120,70 m finnes soner av kvartsrik plagioklasførende gneisisk glimmerskiifer med fluidial struktur.

Mellom 119,55 - 119,80 m finnes det ptygmatisk foldet tektonisert sone, kvartsrik med remobilisert biotitt som inneholder ujevne spredte hypidioblaster og idioblaster av FeS_2 (0,1 - 2 mm i diameter) på steder akkumulerte i reder og uregelmessige delvis parallelle årer.

Mellom 120,90 - 121,00 m og mellom 124,20 - 124,30 m finnes det soner av hvit SiO_2 (diskordant).

Fra ca. 124,30 - 126,00 m finnes det bare enkelte ujevne spredte idioblaster (kubiske) også deformerte - flate av FeS_2 , 2 - 5 mm opp til 10 - 15 mm i diameter.

Gjennomsnittsfall av foliasjon stort varierer stort sett mellom $70 - 75^{\circ}$ til $60 - 50^{\circ}$. På steder er bergarten disharmonisk foldet også ptygmatisk foldet, sjelden isoklinal-foldet.

126,70 - 143,45

Kvartsrik, albitt - oligoklasførende delvis kloritt - serisittholdig (på foliasjonsflater) båndet metakeratofyr.

Mellom 132,80 - 133,20 m og mellom 136,50 - 139,70 m finnes det hornblendeførende metakeratofyr, delvis massiv, delvis båndet med mange små uorienterte nåle porfyroblaster av hornblende opp til 1 - 3 mm lange.

Mellom 143,45 - 143,55 m finnes det diskordant hvit SiO_2 .

Gjennomsnittsfall av foliasjon varierer omkring 70° mot hullets akse men fra ca. 139,50 m er $45^\circ - 30^\circ - 20^\circ - 10^\circ - 50^\circ$ til 144,00 m.

143,55 - 152,20

Det finnes kvartsrik kloritt - serisittrik båndet, alterert glimmerskifer, biotittholdig. Fall av foliasjon er på 60° mot hullets akse.

Mellom 143,45 - 143,55 m og mellom 143,60 - 143,70 m finnes det diskordant hvis SiO_2 . Det finnes mange innfelte parallelle uregelmessige striper og bånd av kvartsitt.

152,20 - 156,60

Kvartsrik og albitt og/eller labitt-oligoklasrik metakeratofyrisk båndgneisskifer med serisitt og lettere kloritt og mere sjelden biotitt på foliasjonsflater. Det finnes bare sjelden enkelte porfyroblaster av hornblende. Bare på enkelte steder finnes det enkelte uregelmessige innfelte striper og/eller tynne bånd av kvartsitt. Det finnes enkelte nok så regelmessige spredte små korn ($0,1 - 0,3$ mm i diameter, hypidioblaster og ksenoblaster og sjelden idioblaster) av FeS_2 . Disse er ofte samlet ved foliasjonsflater. Mellom 155,25 - 155,45 m finnes det litt større konsentrasjon av FeS_2 -korn stort sett samlet i parallelle slirer. Bare på enkelte steder er bergarten pygmatisk gjennomfoldet. Gjennomsnittsfall av foliasjon varierer fra 80° til $50^\circ - 60^\circ - 75^\circ$ mot hullets akse.

156,60 - 157,60

Båndet kvartsrik og albitt - oligoklasrik metakeratofyr som har enkelte tynne parallelle mellomlag og striper av serisittrik og klorittførende slireskifer - glimmerskifer. Gjennomsnittsfall av foliasjon er på $70^\circ - 80^\circ$ mot hullets akse.

157,60 - 163,35

Kvartsrik, kloritt - serisittrik, albitt delvis biotitt førende, sjelden hornblendeholdig gneisisk (metakeratofyrisk) slireglimmerskifer. Det finnes bare på enkelte steder, sjelden uregelmessig spredte små korn av FeS_2 . Ved 159,40 m finnes det korn av FeS_2 og fliser av masseformet FeS i ca. 1 cm tykt parallelt bånd.

Gjennomsnittsfall av foliasjon mot hullets akse varierer mellom $70^\circ - 80^\circ$ på steder 60° og bergarten er bare på enkelte steder pygmatisk foldet.

163,35 - 178,50

Kvartsrik og også albitt og albitt-oligoklasrik, serisittførende og delvis klorittholdig, sjelden biotittholdig båndet metakeratofyr med overganger til metakeratofyr - båndet gneis som dominerer fra 169,40 m og som inneholder tynne mellomlag av kloritt - serisitt - biotittførende, kvartsrik slireglimmerskifer på steder.

Gjennomsnittsfall av foliasjon mot hullets akse varierer mellom 70° - 80° og 60° - 70° , bare sjelden på enkelte steder er bergarten uregelmessig og ptygmatisk foldet. Det finnes bare sjelden uregelmessige spredte korn FeS_2 f.eks. ved 168,05 m finnes det deformert idioblast FeS_2 ca. 5 mm i diameter.

178,50 - 186,90

Klorittrik, serisitt og biotittførende, på steder også kvartsrik slireglimmerskifer med overganger til klorittrik, biotittførende grønnskifer. Det finnes enkelte soner med mange uregelmessige innfelte striper av kvartsitt, ofte ptygmatisk foldet. I soner mellom 182,30 - 182,70 m og 184,70 - 186,50 m finnes det remobilisert biotitt stort sett konsentrert i parallelle innfelte striper. Det finnes bare sjelden enkelte uregelmessige spredte små korn FeS_2 spredt mellom 178,50 - 178,70 m.

Gjennomsnittsfall av foliasjon varierer sterkt fra 70° - 80° til 60° - 45° . På enkelte steder er bergarten sterkt disharmonisk og ptygmatisk foldet.

186,90 - 188,85

Kvartsrik, albitt og albitt - oligoklasrik, hornblendeførende og serisittførende og litt kloritt og sjelden biotittholdig båndet metakeratofyr, delvis med overganger til metakeratofyrgneis.

Nåleporfyroblaster av hornblende er 1 - 3 mm lange, sjelden 5 mm lange, er jevnt spredte, (uorienterte, ofte med hvite aureoller rundt seg selv. Gjennomsnittsfall av foliasjon varierer mellom 70° - 50° - 60° - 70° .

188,85 - 208,15

Kvartsrik, serisittførende og klorittholdig, bare på stedet biotittholdig kvartsittiskglimmerskifer til 193,50 m med injiseringer av metakeratofyrisk gneisskifer. Mellom 189,50 - 191,30 m er bergarten sterkt ptygmatisk foldet og uregelmessig foldet.

Mellom 189,80 - 192,80 m, 193,35 - 193,90 m og 194,15 - 194,40 m og mellom 208,05 - 208,15 finnes det nok så regelmessig spredte små korn av FeS_2 (ksenoblaster - idioblaster) ofte konsentrert i parallelle striper. I bergarten finnes det ellers enkelte spredte korn av FeS_2 og også små amorfe fliser FeS .

Mellom 198,25 - 199,40 m finnes det kvartstektonisk breksie med uregelmessige bånd og reder av remobilisert biotitt mellom 198,50 - 199,00 m.

Gjennomsnittsfall av foliasjon mot hullets akse varierer mellom 70° - 80° på steder 50° - 40° - 60° (hvor bergarten er sterkt disharmonisk foldet).

208,15 - 211,40

Kvartsrik båndet metakeratofyr, albittførende og serisittholdig med enkelte overganger og mellomlag av kvartsrik, serisittførende, delvis klorittholdig metakeratofyrisk glimmerskifer. Gjennomsnittsfall av foliasjon varierer mellom 80° - 90° - 80° - 70° - 80° .

211,40 - 215,60

Kvartsrik, serisittførende og almandinholdig båndet kvartsittisk glimmerskifer. På steder finnes det uregelmessige spredte uorienterte nåleporfyroblaster av hornblende. Gjennomsnittsfall av foliasjonen er stort sett på 80° - 90° - 80° , sjelden 70° mot hullets akse.

Mellom 214,20 - 214,65 m og mellom 215,00 - 215,30 m er bergarten sterkt oppsprukket (kjernetap på 20 %). Parallellsprekker med hullets akse har belegg av fin-kornig FeS_2 .

215,60 - 219,60

Båndet kvartsrik og albitt og albitt-oligoklasrik serisitt klorittførende og hornblende og granat (almandin)holdig metakeratofyr og metakeratofyrgneis. Nåleporfyroblaster av hornblende er delvis orientert, delvis uorientert, 1 - 3 mm, sjelden 5 mm lange på steder med hvite aureoler. Granaten er mindre 1 - 3 mm i diameter. Gjennomsnittsfall av foliasjon mot hullets akse er ca. 70° - 80° - 70° .

219,00 - 240,40

Klorittrik, delvis også kvartsrik, biotitt og hornblende førende og også albitt og serisittholdig delvis svakere karbonatholdig hornblende/amfibolittisk slire/båndet gneisisk skifer, med enkelte overganger til store amfibolittiskgrønnskifer. Det finnes mange innfelte parallelle striper og også enkelte tynne bånd av kvartsitt og også injisert kvartsrik metakeratofyr og/eller metakeratofyrisk gneisskifer.

Mellom 221,00 - 224,60 m og mellom 231,60 - 234,00 m finnes det mange jevnt spredte delvis orienterte, delvis uorienterte nåleporfyroblaster av hornblende 2 - 3 mm, maks. 5 - 10 mm lange. Gjennomsnittsfall av foliasjon varierer fra 80° - 90° - 80° til 227,90 m, senere fra 60° - 50° - 40° - 60° - 70° - 50° og 40° . I området mellom 234,00 - 240,40 m er bergarten stort sett disharmonisk og på stederptygmatiske foldet.

Borhull nr. 761 D har stoppet på 240,40 m den 23.07.81 kl. 10.00.



(Milosh Motys)
gruvegeolog

RØDALEN

FOLLDAL VERK A/S

PAGE 1

D.D.H. No.		Azimuth		Grid		Started		Directional surveys											
R-82-1				West		Aug 19/82		Depth		Azim.		Dip.		Depth		Azim.		Dip.	
Property		Angle				Finished													
Rødalen		45°				Aug. 24/82													
Co-ord.		Depth				Logged by													
8600 N - 350E		121.70 m				J. Cuttle													
From		To		Description		Interval		Assays											
						From To		Cu		Mo		Pb		Zn		Au		Ag	
0.0	6.11			Overburden		no. 1 91.85 92.85													
6.11	28.35			Greenstone		no. 2 28.50 30.10													
				Massive dark green unit with minor qtz feltspar veins intermittent throughout.		no. 3 40.50 43.00													
				8.35 - 8.75, 12.30 - 12.45, 12.85 - 13.00, 23.10 - 23.25 > small garnet zones of up to 20% garnet. These sections have associated Po and Mt as massive sections interstitial with garnet + greenstone. Po up to 30%. Mt up to 7% in most sections.															
28.35	30.25			Pyrrhotite, magnetite garnet assemblage (minor greenstone). (minor cummingtonite).															
				Unit is dark green to silvery gold and includes a majority of Po + Mt, up to 70% combined. Garnets are small (0.1CM - 0.3CM) and found speckled through are + greenstone. Small areas include minor cummingtonite.															
30.25	40.38			Qtz biotite schist															
				Dark grey to black, includes sections very rich in biotite. Banding generally at 85° to C.A. No visible sulphide.															
40.38	42.85			Pyrrhotite magnetite garnet assemblage intermixed minor greenstone															
				Similar to previous unit 28.35 - 30.25 except noticeable increase of magnetite con- tent. Somewhat banded appearance + contains 30% Mt, 35% Po. Small garnets found through- out sulphide + greenstone zones.		30%Mt 35%Po													

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FOLLDAL VERK A/S

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FOLLODAL VERK A/S

D.D.H. No.		Azimuth		Started		Directional surveys					
R-82-3		Grid. West		Sep. 1/82		Depth	Azim.	Dip.	Depth	Azim.	Dip.
Property		Angle		Finished							
Rydalen		45°		Sep 6/82							
Co-ord.		Depth		Logged by	J. Cuttle						
5000 N - 225 E		III. 20 m									
From	To	Description	Interval	Assays							
			From To	Cu Mo Pb Zn Au Ag							
0.0	5.30	Overburden									
5.30	58.80	Qtz plagioclase biotite schist									
		Unit is dark grey to black and includes, in places, high % of biotite with minor plagioclase and quartz. The unit is characterized in small zones by qtz rich layers (almost quartzite) with small amounts of micaceous minerals associated.	no. 1 79.75	82.15							
		Small whitish red garnets speckled throughout (0.5MM - 2.0MM) and seems to increase towards bottom of section.	no. 2 86.85	88.85							
		Unit becomes generally more qtz rich with depth.									
		Banding at 80° to C.A. No visible sulphides seen.									
58.80	77.90	Biotite garnet qtz chlorite schist									
		Unit is similar to previous although biotite and garnet are found throughout. Generally dark grey to reddish grey (in places) and somewhat coarser grained. Garnets are up to 5.0MM.									
		Schist includes some hornblend with biotite usually in absence of qtz.									
77.90	92.13	Garnetiferous greenstone with massive sulphide association									
		Greenstone shows massive sections of dark green with small qtz plagioclase veins cross cutting generally at 70° - 80° to C.A.									

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FADALEN

FOLLDAL VERK A/S

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SONDR

DIAMOND DRILL LOG

FOLLODAL VERK A/S

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From	To	Description	Interval		Assays					
			From	To	Cu	Mo	Pb	Zn	Au	Ag
		at bottom of section (52.00 - 54.00) No visible sulphides.								
56.80	78.30	<u>Qtz plagioclase sericite schist</u> Light coloured unit, greenish grey, fine grained and includes minor qtz boudins towards middle of section (65.0 - 68.50). Small dark grey to black banded zones may indicate graphite (?) Banding at 65° to C.A. although folding is heavy + minor down dip drilling is seen. No visible sulphide.								
78.30	98.10	<u>Dacite tuff (minor graphite horizons)</u> Light green, shows banding of qtz plagioclase at approx 65° to C.A. Minor qtz boudins located towards top of unit (2.0 - 6.0CM). 81.00 - 81.60, 82.45 - 82.60, 88.25 - 88.75 and possibly from 94.00 - 94.40. Graphite zones with up to 15% Po and traces Py. Pyrrhotite always found as fine stringers.								
98.40	100.25	<u>Graphite schist</u> Dark black, with minor associated dacitic tuff zones. Stringers of Po throughout with Py usually found along fractures especially noticeable at 98.80 (up to 3% Py).								
100.25	105.30	<u>Dacitic tuff</u> Similar to previous unit in colour and texture with minor graphite zones noticeable. Banding at 75° to C.A. No visible sulphide.								
	105.30	E.O.H.								

DIAMOND DRILL LOG

FOLLDAL VERK A/S

PAGE 1

D.D.H. No.		Azimuth		Started		Directional surveys					
VS-82-1		Grid North		July 1/82		Depth		Azim.		Dip.	
Property		Angle		Finished		Depth		Azim.		Dip.	
Vesli Knatten		65°		Sept. 7/82							
Co-ord.		Depth		Logged by		Depth		Azim.		Dip.	
L-6200 W - 1550 N		47457m.		J. Cuttle							

From	To	Description	Interval		Assays						
			From	To	Cu	Mo	Pb	Zn	Au	Ag	
0.0	8.00	Overburden									
8.00	95.0	Dacitic tuff (?)									
		Dark grey green, slightly chloritic with good quantities of biotite. Local garnet accumulation. Well bedded 40° -> 45° to C.A. Slight carbonate/feldspar mixed with quartz veins. Qtz boudins are local. Minor banded sections of amphibolite rich layers.									
		30. -> 51., occasional flow type rocks dacitic in composition including minor heavy amphibole laths (1MM -> 5MM).									
		39. -> 41. Qtz boudins (up to 8.0CM) with minor carbonate/feldspar. Becoming more massive down section until 51, then prominent lineation of biotite at 40° - 45° to C.A.									
		Pyrrhotite found in more sed rich sections only as traces + at 51.0 in more massive dacite.									
95.0	135.0	Flow type Dacite									
		Similar to previous unit, perhaps lighter grey. Includes much more massive flows with increase of biotite and garnet down section.									
		108.0 - 135.0 Increase in qtz carbonate/feldspar veins (5MM - 7MM). Intense from 118.0 -> 135.0. Majority at 50° to 70° to C.A., some oblique to C.A.									
135.0	190.50	Dacite tuff									
		Appears much more heavily banded (approx 60° to C.A.) Decrease in garnet quantity down section.									

Tr-Po

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FOLLODAL VERK A/S

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