Bergvesenet

Postboks 3021, N-7441 Trondheim

Rapportarkivet

Bergvesenet rapport nr	Intern Journal nr	Internt arkiv nr	Rapport lokalisering	Gradering
4651	0371/99			Fortrolig

Kommer fra ..arkiv	Ekstern rapport nr	Oversendt fra	Fortrolig pga	Fortrolig fra dato:
		Mindex ASA		

Tittel

Røros Zinc Project: Geological Investigations of Stratiform Sulphide Deposit in the Røros - Meråker area. Part 1: Text

Forfatter

Wilberg, Rune
Røsholt, Bernt

Dato År: 1998

Bedrift (Oppdragsgiver og/eller oppdragstaker): Mindex ASA

Kommune	Fylke	Bergdistrikt	1: 50 000 kartblad	1: 250 000 kartblad
Røros Tydal Meråker Os	Sør-Trøndelag Hedmark Nord-Trøndelag		16202 17201 17202 17203 17204 17211 17212 17213	Trondheim Røros

Fagområde	Dokument type	Forekomster (forekomst, gruvefelt, undersøkelsesfelt)
Geologi		Røros Nordgruvefelt, Røros Østgruvefelt, Holtålen, Kjøli, Tydal Meråker Østfelt, Guldalen, Tolga

Råstoffgruppe	Rastofftype
Malm/metall	Zn Cu

Sammendrag, innholdsfortegnelse eller innholdsbeskrivelse

The selected areas encompassing more than 3000 sq.km of prosperous ground

The objective for the investigations was to evaluate and delineate targets with a potential for economic stratiform zinc-deposits in the Røros and Røsjø formations, an environment regarded as having a strong affinity for sedex-type zinc deposit of Besshi-type as well as in adjacent of the Hersjø formation.

Røros Zinc-Project

Geological Investigations of Stratiform
Sulfide Deposits in the Røros – Meråker area.

1998

Mindex ASA

Part I

by
Rune Wilberg and Bernt Røsholt,
October 1998.

Røros Zinc-Project

Geological Investigations of Stratiform
Sulfide Deposits in the Røros – Meråker area.

1998

Mindex ASA

Part I

by
Rune Wilberg and Bernt Røsholt,
October 1998.

Contents:

Exhibit Maps: (Enclosed)

1 Røros-Meråker Geological map with sulphide deposits 1:250 000
2 Plot of sulphide deposits; mapsheet Røros 1:50 000
3 Plot of sulphide deposits; mapsheet Ålen 1:50 000
4 Plot of sulphide deposits; mapsheet Stugusjø 1:50 000
5 Plot of sulphide deposits; mapsheet Tydal og Essandsjøen 1:50 000
6 Plot of sulphide deposits; mapsheet Meråker 1:50 000
7 Storwartz mining field; 1:5000

Sketch maps: (Enclosed)

8. Lomtjønna
9. Fruhaugen
10. Rognåsen
12. Littlefjell
17. Frysihjel
20. Gamle Storwartz
21. Nye Storwartz
22. Hestkletten
23. Myrgruva
24. Quintus
25. Nyberget/Olavsgruva
26. Nye Solskinn
27. Gamle Solskinn
29. Klasberget
30. Klasberglia
31. Abraham
32. Klinkenberg
40a. Bønskneppen
46. Vattåsen I
49. Storhøgdgruben
50. Fromgruben
51. Rogngruben
52. Litlrena
54. Hultrå
56. Heina
59. Gamle Folldalsgrube
61. Øvre Børklepptjørna
62. Svenskmenna
63. Rørosmenna
64. Guldal
71. Grønskar
72. Allergodt
75. Gressli
76. Våråviken

78. Langdalsvollen
80. Ramsjø
81. Stadåsen
85. Hammerskallen
86. Skomakermoen
88. Sagskjerpet
89. Brenthaugvollen
90. Langsundgruva
91. Nordre Knoll
92. Søndre Knoll
93. Anna
95. Duddu
96. Ebba
101. Gilså
102. Dronningen
104. Fløttum
106. Taraldsbakken

Enclosures

Røros Data base

1. Introduction:

MINDEX ASA initiated the Røros Project in 1998 through claiming all known and potentially favorable sulfide occurrences in an area from Vingelen in the south to Meråker in the north. The selected areas comprise parts of Hedmark, Sør- and Nord-Trøndelag counties encompassing more than 3.000 sq. km of prosperous ground.

The objective for the investigations was to evaluate and delineate targets with a potential for economic stratiform zinc-deposits in the Røros and Røsjø formations, an environment regarded as having a strong affinity for sedex-type zinc deposits of Besshi-type as well as in adjacent volcanics of the Hersjø formation.

Fieldwork included a geological examination and representative sampling of all claimed prospects, detailed and regional structural studies and geophysical orientation studies in selected areas. The work was conducted in the period 21/7-4/9 1998 and the examined occurrences are all treated individually in this report.

Historic copper mining in the district dates back to 1644 when a massive sulfide deposit was discovered at Storwartz. Additional deposits were found subsequently in abundance all over the Røros-Meråker district, but copper remained the single commodity until about 1880 when interest started focusing on pyrite. During the entire 333-year long mining period, zinc was regarded an unwanted waste product, except the final 10-15 years where zinc was admitted. Up to now zinc has never attracted any attention in terms of exploration.

A huge amount of reports from earlier works on mining and exploration in the Røros-Meråker district are available (mostly in Norwegian language), but this material was not included in the initial exploration phase (or incorporated/referred to in this report).

It should also be pointed out that comparatively little emphasis was attached to the larger, inaccessible mines, as the Storwartz field, with only a brief search of the remaining ore at the dumps.

Concerning the Røsjø and Røros formations, the goal was to include all the known mineralizations in the investigation, while in the Hersjø formation only a few were picked out.

It has often been applied different names of the same claim or mine. The main reason for 2this is that claim registration made at the office of the mining inspector asks to make reference to names on the official maps for the staking of claim areas. The name in parentenses in the head of each individual description is the registered claim area name.

2. Regional Geology:

The Cambro-Silurian rocks of the Røros-Meråker district make up the southeastern limb of a large and complexly folded synformal structure composing the Trondheim Region. The rocks belong to the Upper Allochton of the Scandinavian Caledonides.

The geology is characterized by a series of low-angle thrusts, or nappes, which dip gently towards the west. Lithologically, the rocks represent a lateral transition from epiclastic rocks along the former margin of the Baltic Shield to the east, through calcareous-pelitic

shelf sediments to predominantly volcanogenic rocks of the Iapetus Ocean in the West. During the Caledonian Orogen in Silurian times, this lateral facies-transition piled up into a series of major nappe sheets, which roughly placed the various lithofacies on top of each other.

The Røros district is bordered to the West by a major thrust, the Tydal Thrust, which separates rocks of predominantly volcanogenic origin in the West from the primarily sedimentary rocks in the East.

The Lowermost nappe sequence consists of a thick succession of epiclastic sediments (sparagmites) and augen gneisses. Overlying these Eocambrian rocks is the *Hummelfjell Formation*, which includes a generally sedimentary sequence of quartzites, quartz mica schists, and graphite schists, with minor associated mafic tuffs. Wolff (1978) correlated the Hummelfjell Formation with the *Slågan Group* in the northerly Meråker district.

The Hummelfjell formation is overlain by the *Røros Formation*, correlated with the Kjølhaug group in the Meråker area, and subsequently with the *Røsjø Formation*, consisting of a thick sequence of calcareous, grey to greenish phyllite and greywacke. The more westerly Røsjø formation appears a little less calcareous than the Røros formation and has a more pronounced banding, with a few interbedded layers of volcanogenic rocks, although the two do not differ much in composition or appearance (Rui & Bakke 1975). These Røros and Røsjø metasediments are locally heavily invaded by pre-metamorphic gabbro sills.

Overlying the Røros and Røsjø formations is the *Dalsbygd Group* in the Røros area and the *Sulåmo Group* in the Meråker area which consist of phyllites, metasandstone, marble, conglomerate, and thin beds of greenstones and quartz keratophyre.

The Hersjø formation is the next in succession, and consists mainly of basic volcanogenic rocks (greenstones and greenschists) with minor horizons of acidic volcanic tuffs and flows.

The Gula group (Gula nappe), which caps the whole greenstone belt, includes a large succession of sediments, with minor thin beds of mafic volcanics (amphibolites). The Gula group has been considered to represent the oldest, assumed Late Precambrian/ Cambrian member of the partly inverted stratigraphical succession, pre-dating the volcanogene Hersjø formation of probable Lower Ordovician age.

It is possible, although not proven, that the rocks of the Gula Group have been overturned, and belongs to a large recumbent nappe with roots far to the west; and thus the Slågan group and the Hummelfjell formation represent the youngest members of the supposed inverted succession.

The interpretation of the area has been challenged by work recently started in the Otta area. Papers by Sturt et al. (1991 and 1995) and Bjerkgård & Bjørlykke (1994) suggest a major reinterpretation of the stratigraphy of the whole area. Rather than forming part of an isolated nappe, the Hummelfjell unit is now correlated with the Heidal series of the Otta area, and both are regarded as equivalents of the lower part of the Gula group. The rocks outcropping between the Gula and the Hummelfjell are considered metasediments of Ordovician age. The Dalsbygda, Fundsjø/Hersjø and Aursund groups plus the upper Åsli formation are now grouped together into the Sel group. This is a single package of

Ordovician sediments and volcanics, lying in the core of a major fold structure, of Scandian age. The three thrust planes lying between the Gula and the Hummelfjell units are not recognized. The tectono-stratigraphy of the area thereby is greatly simplified.

Most of the rocks in the area are metamorphosed in greenschist facies. Contact metamorphic rocks surrounding gabbro intrusives include hornfelses as well as cordierite- and andalucite-bearing rocks.

The structural geology and deformation history is treated separately in the report by P. Witt-Nilsson

3. Sulphide-hosting lithologies:

Known sulfide occurrences in the license area are hosted in several geological units:

- the Hummelfjell formation, in close proximity to gabbroic intrusives.
- the Røros and Røsjø formations, often in vicinity to gabbroic intrusives.
- the Sulåmo group, in the Turifoss greenstones.
- the Hersjø formation, both in mafic volcanics and at the contacts of mafic/felsic volcanics.
- the Gula group, at the contact Singsås-/Åsli formation.
- the Gula group greenstones.

Except for a few occurrences in the Sulåmo group (Turifoss greenstone), in the Hummelfjell formation and in the Gula group (Fløttum), the main focus for the present work is the sediment-hosted, Zn-rich sulfide deposits in the Røros- and Røsjø formations, and the volcanic-hosted deposits in the Hersjø formation as lower priority targets.

The Røros formation:

Extensive areas east of the Røsjø formation are underlain by a series of calcareous, argillaceous to subarenaceous mica schists, earlier named "Røros skifer" (Rui & Bakke 1975). More rarely, the beds pass into more massive arenaceous types.

The Røros formation often exhibits a weak to distinct compositional banding related to variations essentially in the quartz and carbonate contents. The individual beds usually range from about 0.5-10cm in thickness, though several dm-thick, quite massive layers may occur. The colors of the rocks usually vary from gray to light gray, or grayish green.

In addition to quartz and biotite, the ordinary Røros schists usually carry abundant, though variable, amounts of muscovite, chlorite, and carbonate, and lesser amounts of sodic plagioclase and epidote minerals. Biotite, hornblende and garnet are frequently developed as larger porphyroblasts, e.g. in the typical biotite porphyroblast-bearing "Stuedals-skifer" and the hornblende garben schists.

Conformable sheets and lenses of fine- to coarse grained saussuritic gabbros are frequently intruded into the Røros formation, and bodies of serpentinite and other ultramafic rocks occur along its base.

The Kjølhaug group of the Meråker area is correlated with the Røros formation, and comprise a thick sequence of gray-green phyllites, phyllitic greywackes and greywackes (often banded), partly conglomeratic, and less calcareous than the Røros formation to the south. The less calcareous nature might mean that the Kjølhaug group should be correlated with the Røsjø formation.

The Kjølhaug group is frequently intruded by gabbro sills.

The Røsjø formation:

The Røros formation is transitionally grading into the overlying Røsjø formation, which can be followed from Tolga to the Kjøli area. The formation is composed of two members (Rui & Bakke 1975). In the lower part finely banded and laminated gray to grayish brown metaargillites predominate. Characteristic are thin, but distinct, green interlayerings, which are usually less than one cm thick.

The metaargillites are chiefly composed of quartz and biotite with subordinate amounts of sodic plagioclase, clinozoisite, and chlorite. The thin green beds consist of hornblende, sodic plagioclase, and quartz in varying proportions. It remains uncertain whether these bands represent volcanoclastic sediments or contemporaneous pyroclastic volcanics (Rui & Bakke 1975).

In the higher parts of the Røsjø formation the beds usually become increasingly massive, and consist mainly of metagreywackes. The chief constituent is quartz, but sodic plagioclase may be present in substantial amounts. The variable distribution of the dark coloured minerals, i.e. notably hornblende, epidote minerals, and chlorite, are responsible for the variable gray to greenish colour of the rocks. Hornblende is commonly developed as tiny, needle-shaped porphyroblasts, often about one cm long.

Green beds of hornblende-rich schists, from a few cm to a few dm in thickness, are also found within this part of the succession. Petrographically they are similar to the greenstones from the Hersjø formation (Rui & Bakke 1975).

The Hersjø formation, which is located west and above the Tydal thrust, consists of volcanics with subordinate sediments (graphitic phyllites and siliceous, banded sediments). The volcanics include a differentiated sequence of mafic flows (hornblende schists and greenstone), mafic and felsic tuffs, and subordinate rhyolite flows. The greenstone-belt also contains sills and dykes of diorite, porphyrite and trondhjemite, representing shallow intrusions.

Grouping of the deposits in the various geological units:

Hersjø formation:

105.	Vingelen	(1619 I)
45.	Killingdal	(1720 IV)
107.	Killingdal north	(1720 IV)
49.	Storhøgdgruben	(1720 IV)
50.	Fromgruben	(1720 IV)
51.	Rogngruben	(1720 IV)
52.	Litlrena	(1720 IV)
53.	Kårslått	(1720 IV)

54. Hultrå (1720 IV)
55. Skjellåfjellet (1720 IV)
57. Blåhenbekken (1720 IV)
58. Holdsjøhøgda (1720 IV)
59. Gamle Folldalsgrube (1720 IV)
60. Menntjønna (1720 IV)
61. Øvre Børklepptjønna (1720 IV)
107. Taraldsbakken (1720 IV)
73. Sæterå (1721 III)
74. Nea (1721 III)
75. Gressli (1721 III)

Røsjø formation:

1. Kongens gruve (1720 III)
2. Lergruvbakken (1720 III)
3. Christianus Sextus (1720 III)
4. Fjellsjø gruve (1720 III)
5. Muggruva (1720 III)
6. Lille Mugg and Nye Mugg (1720 III)
7. Rødalen gruve (1720 III)
8. Lomtjønna (1720 III)
10. Rognåsen (1720 III)
11. Skittlia (1720 III)
14. Røa (1720 III)
15. Fjellsjølia (1720 III)
16. Lobekken (1720 III)
17. Frysihjel (1720 III)
46. Skargruben (1720 IV)
62. Svenskmenna (1720 IV)
63. Rørosmenna (1720 IV)
64. Guldal (1720 IV)
65. Godthåb (1720 IV)
66. Godthåb north (1720 IV)
67. Jensåsbekken west (1720 IV)
68. Jensåsbekken (1720 IV)
69. Kjøli grube (1720 IV)
70. Midtgruben (1720 IV)
71. Grønskar (1720 IV)
72. Allergodt (1720 IV)

Røros formation (S) and Kjølhaug group (N):

9. Fruhaugen (1720 III)
12. Littlefjell (1720 III)
13. Kvernenglia (1720 III)
18. Slettmoen (1720 III)
19. Pustbakken (1720 III)

20.	Gamle Storwartz	(1720 III)
21.	Nye Storwartz	(1720 III)
22.	Hestkletten	(1720 III)
23.	Myrgruva	(1720 III)
24.	Quintus	(1720 III)
25.	Nyberget/Olavsgruva	(1720 III)
26.	Nye Solskinn	(1720 III)
27.	Gamle Solskinn	(1720 III)
28.	Isakgruva	(1720 III)
29.	Klasberget	(1720 III)
30.	Klasberglia	(1720 III)
31.	Abraham	(1720 III)
32.	Klinkenberg	(1720 III)
33.	Matz	(1720 III)
34.	Fjellgjelt	(1720 III)
35.	Sødalsgruben	(1720 III)
36.	Storhøgda	(1720 I)
37.	Tjørnvollmyran	(1720 IV)
38.	Stømnbekken	(1720 IV)
39.	Gulhåvola	(1720 IV)
40.	Bønskneppen a and b	(1720 IV)
41.	Syaosen I	(1720 IV)
42.	Syaosen II	(1720 IV)
43.	Syaosen III	(1720 IV)
44.	Skarvbekken	(1720 IV)
47.	Molingdalsskarven	(1720 IV)
48.	Litlskarven	(1720 IV)
76.	Våråviken	(1721 III)
80.	Ramsjø	(1721 II)
98.	Peder Bentzens skjerp	(1721 II)
99.	Peder Bentzen nord	(1721 II)
100.	Litlfjellet south	(1721 II)
101.	Gilså	(1721 II)
102.	Dronningen	(1721 II)
103.	Svartåtjern	(1721 II)
83.	Statsåsgrubba	(1721 I)
84.	Skarbekken	(1721 I)
85.	Hammerskallen	(1721 I)
86.	Skomakermoen	(1721 I)
87.	Øyan	(1721 I)
89.	Brenthaugvollen	(1721 I)
90.	Langsundgruva	(1721 I)
91.	Nordre Knoll	(1721 I)
92.	Søndre Knoll	(1721 I)
93.	Anna	(1721 I)
94.	Gøsta	(1721 I)

95. Duddu (1721 I)
96. Ebba (1721 I)
97. Lillefjell (1721 I)

Sulåmo group:

81. Stadåsen (1721 I)
82. Geitberget (1721 I)
88. Sagskjerpet (1721 I)

Hummelfjell formation:

77. Øifjellet (1721 II)
78. Langdalsvollen (1721 II)
79. Storvollvola (1720 I)

Gula group:

56. Heina (1720 IV)
104. Fløttum (1620 I)

Chemical analysis.

In all 415 samples (nos. 399651-400071 except nos. 399976-399981) have been collected for analysis and shipped to Severn Trent Laboratories Ltd. in Merseyside (Liverpool) UK. All samples have been analyzed for the Multi Element Package "Au + 34". The gold was assayed in a 30g fire-assay. A complete list of analysis is enclosed to the report listing sample number, name of area, location number, UTM coordinates, Au30 and the 34 elements Ag, Cu, Pb, Zn, Mo, Ni, Co, Ca, Bi, As, Sb, Fe, Mn, Te, Ba, Cr, V, Sn, W, La, Al, Mg, Ca, Na, K, Sr, Y, Ga, Li, Nb, Sc, Ta, Ti, Zr as "Røros data base". Enclosed. Under the description of each mine or claim the analytical results for Au, Ag, Cu, Zn, Pb, As and Fe of the respective samples are presented.

4. Description of the mines and prospects:

Heading name in parenthesis refers to claim name.

Røros Nordgruvefelt: (Orvsjøen)

1. Kongens Gruve from UTM 0618669 6950956 to UTM 0616871 6950865

Location:

Kongens gruve consists of Arvedals gruve, Kongen and Oskar shaft. The ore zone at Kongens gruve is approx. 2.5km long, stretching from UTM 618669 6950956 (GPS23T), which is the easternmost part of Arvedals gruve, and past Oskar shaft at UTM 616871 6950865 (GPS25T). Accessible by car to Arvedals gruve, and the tractor road (accessible by 4WD) to Rødalen mine passes close by Oskar shaft.

Core drilling:

A number of 8 drillholes totaling 1320m are stored at The Geological Survey's storage.

Mineralization:

The ruler shaped ore body is, in addition to underground mining, followed with an almost 900m long trench from GPS23T and westwards. The samples are collected from the eastern end of this trench, from the large dumps at GPS24T (UTM 617724 6950896), and at the dump at Oskar shaft (GPS25T).

The dump material exhibit a great variety of ore types, but generally they can be puzzled into two groups/ore types, which seem to occur in more or less separate layers. These are 1) pyrrhotitic, brecciated ore with wallrock fragments and quartz nodules, dominated by Po, with minor amounts of Cpy, Sl and Py, and 2) pyritic, occasionally banded ore, dominated by Py, with subordinate Sl, Cpy and Po.

At the east end of the extensive trench, at the entrance of two SW-directed adits (GPS23T), are outcropping two ore horizons in massive, hard, fine grained, greenish, hornblende(?)-containing rock with sulphide dusting: An upper, 5-25cm thick, (splitting up to three layers) consisting of massive, fine grained, banded Py-Sl(-Cpy) ore (with quartz lenses along the hangingwall); and 65cm below, a lower, 10-30cm thick massive, medium grained Py-Po(-Cpy-Sl) ore. Almost no chloritization, except thin chlorite-rich schist between up-splitted upper ore layers. At the hangingwall contact of the upper ore zone appears a local segregation of massive, fine grained Po-Cpy.

30-40m to the west, folding has thickened the ore zone (massive Py-Po ore below massive Cpy-Po(-Sl) ore) considerably. Here, chlorite schist, with quartz lenses, surrounds the ore both above and below.

Further to the west a large boulder shows 1m thick massive, fine grained Py with no visible Sl. Observation of 0.3-1.5m thick clay-rich crush zone with direction 195°/80°.

Further westwards it is mainly the Py-Sl ore type that is outcropping, but frequent boulders derived from the underlying Po-Cpy ore are observed. The Py-Sl ore consists

here of 1-3mm sized, rounded Py grains in Sl(-Cpy) matrix with chlorite schist fragments and quartz nodules.

The trench ceases before the large dumps at GPS24T, which show:
- Massive, fine to medium grained Py-Sl-Cpy ore with schist fragments, quartz eyes and occasional schist lamellae.
- Massive Po(±Cpy) and Po-Cpy-Sl(±Py) with chlorite schist fragments.
- Chlorite schist with disseminated to semimassive Po-Cpy-Sl-Py mineralization.

The ore zone is not outcropping further westwards, but the dump at Oskar shaft, which is covered with a cemented lid, show large variation in ore types at local scale, being subtypes of the above mentioned pyritic and pyrrhotitic ores:

- Massive, fine grained Py, and Sl-matrix with phenocrysts of coarse Py – representing local variation of the Py-Sl-Cpy ore type.
- Varieties of the massive, brecciated (chlorite schist "rugs") Po-Cpy-Sl-Py ore type; from Cpy-dominated, to massive Po with minor amounts of the other sulphides (in places large phenocrysts of Py cubes), and locally small Mt-enrichments.
- Chlorite- and chlorite-sericite schist with sulphide bands.

Susceptibility:
Noted in parenthesis below (min.-max.; typical value).
Additional comments:
Local bands of massive Po: 10 000-20 000.
Wallrock: 20-40.

Samples for analysis:
399728 (GPS23T): Massive Py-Po(-Sl-Cpy) ore; loc. E-most adit, lower ore zone; RCS of 30cm thickness (500-2 000; 1 200).
399729 (GPS23T): Massive, fine grained Py(-Cpy) ore with few-mm thick Sl-bands; loc. E-most adit, upper ore zone; RCS of 25cm thickness (600-900).
399730 (40m west of GPS23T): Semimassive Py (coarse grained)-Po-Sl-Gn ore with quartz nodules (10-20).
399731 (GPS24T): Chlorite schist with massive Py-Sl-Cpy bands (10 -350; 100).
399732 (GPS24T): Massive, medium grained Py-Sl(-Cpy) ore with quartz nodules and schist fragments (5-80; 30).
399733 (GPS24T): Massive Po-Cpy-Sl(-Py) ore with chlorite schist fragments (500-2 000; 1500).
399734 (GPS24T): Chlorite schist with semimassive Py-Po-Cpy-Sl ore (300-1100; 600).
399735 (GPS24T): Massive, fine grained Cpy-Sl-rich ore (5-80; 40).
399736 (GPS25T): Massive, fine to coarse grained Cpy-Py-Po-Sl ore with chlorite schist fragments (200-1 000; 800).
399737 (GPS25T): Massive, medium grained Py-Sl-Cpy ore (20-200; 40).
399738 (GPS25T): Massive Cpy-Po-Py ore at wallrock contact (200-1 000; 400).

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399728	127	9	9431	536	19000	74	> 10.00
399729	118	24,9	6055	6331	118000	167	27,1
399730	250	16,1	7284	5080	70000	101	> 10.00
399731	92	7,1	6276	1195	44000	56	21,2
399732	205	33	6530	6490	133000	80	26,8
399733	102	10,9	17000	1753	44000	< 5	> 10.00
399734	109	10,8	13000	1591	38000	23	27,5
399735	155	27	82000	1283	68000	108	> 10.00
399736	1278	37,6	82000	1709	64000	65	> 10.00
399737	1054	27,8	29000	2924	41000	37	28,6
399738	137	29,5	75000	1433	40000	40	> 10.00

2. Lergruvbakken (Orvsjøen) UTM 0619682 6948740

Location:

The mine is located at 860m a.s.l. at UTM 0619682 6948740 (GPS26T).
Accessible by car.

Core drilling:

A number of 48 drillholes totaling 2731m are stored at The Geological Survey's storage.

Mineralization:

The mine itself was not accessible, and observations are limited to the remaining dump material. The ore prove to be massive, fine grained, brecciated groundmass of Sl, Po, Cpy and traces of Gn, with Py phenocrysts (eu- to anhedral, up to 1-2mm size), with chlorite schist fragments and small quartz eyes. The ore is occasionally banded, with alternating bands rich in Po, Sl and Cpy respectively. The dump material also shows quartz-sericite schist with impregnation and mm-cm thick, concordant bands of Py, Sl and Cpy.
Wallrock at the dump are chlorite schist and greywacke, occasionally developed as garbenschist.

Susceptibility:

Massive ore: 100-500, typically 200.
Wallrock: 60-80.

Samples for analysis:

399739: Massive, fine grained Sl-Po-Cpy groundmass with Py crystals, quartz lenses and schist fragments.

399740: Same as 399739.

399741: Same as 399739, but more Cpy-rich.

399742: Same as 399739, but banded.
399743: Semimassive Sl-Po-Cpy-Py ore with chlorite schist fragments.
399744: Quartz-sericite schist with impregnation and thin bands of Py, Sl and Cpy.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399739	132	19,4	12000	4431	246500	8	22,2
399740	150	22,9	16000	5239	198100	49	27,5
399741	133	21,4	12000	4617	207800	36	29,8
399742	137	23	13000	5485	198700	52	> 10.00
399743	77	15	16000	2944	178800	8	18,8
399744	31	2,7	2905	329	36000	41	8,98

3. Christianus Sextus Gruve (Orvsjøen) UTM 0619641 6952854

Location:

Christianus Sextus mine is situated at the SW slope of Storkletta Mountain, about 860m a.s.l. The central part of the outcropping ore (the upper ore zone) runs through UTM 0619641 6952854 (GPS19T). UTM 0619484 6953146 (GPS20T) is a long adit in the NW part, while the SE'ernmost part of the upper ore zone is a digging at UTM 0619707 6952756 (GPS21T). Accessible by car along gravel road all the way up to the "spooky" remains of the old ropeway station at the mine site.

Mineralization:

The underground mine is accessible, and the ore is exposed several places along the outcropping extension. The ore deposit consists of two ore horizons with 4-6m separation, that are outcropping over approx. 400m NW-SE extension. The upper pyritic ore consists of massive Py-Sl-Cpy(±Mt) ore, while the lower is pyrrhotitic, containing massive Po-Cpy-Py(-Sl) with breccia fragments of the wallrock.
Samples are collected at three localities; the central part (GPS19T), the NW'ern (GPS20T) and the SE'ern (GPS21T).
Central part (GPS19T):

Outcrop of 60cm thick upper ore horizon, consisting of repeated bands (mm-cm; up to 15cm thick) of massive, fine grained, partly banded Py-Sl-Cpy ore in quartz-sericite schist with thin chlorite bands. The massive ore is mainly embedded concordant in the schist, but local discordances occur. Hangingwall is 0.5m thick chlorite schist with overlying calcareous (carbonate in spots and mm-bands), gray-green schist. Exposed 20cm of the footwall, consisting of chlorite schist. Boudinated quartz bands of few cm thickness occur both in the mineralization and in the wallrocks. 40m to the SE the ore zone is 2m thick, including low-grade schist bands and a 30cm thick layer of greenish,

quartzitic rock with no sulphides. 10m NW of GPS19T, and lower down (approx. 5m below upper ore zone), the lower ore zone is partly exposed, consisting of quartz-mica schist with concordant and irregular bands (up to few cm thick) of Po, Cpy, Py (euhedral, up to 10mm size) and Sl.

At the NW-ernmost dump (GPS20T) appears only Po-Cpy ore derived from the lower ore zone, showing massive, fine grained, brecciated Po-Cpy ore with wallrock fragments/nodules/"rugs" of chloritic- and sericitic schist, and quartz nodules (up to few cm sized). Also appearing at the dump, in addition to the greywacke, is rusty-yellow quartzitic(±sericite) schist with mm-thick Po(-Cpy) bands.

In the SE-ernmost digging (GPS21T) is outcropping 20-40cm thick massive, fine grained, banded Py-Sl ore with chloritized schist above and below. 20-30cm thickness of the footwall schist carry Po-Cpy bands. 30m to the NW the massive Sl-Py ore are fold thickened to 0.7m thickness. Here the ore contains large (up to 10cm size), rounded inclusions of wallrock and quartz.

A ventilation shaft (with large dump) is located at UTM 0619965 6953191.
Susceptibility:
GPS19T:
Po-Cpy-Py(-Sl)-banded quartz-mica schist (lower ore horizon): 200-400.
Upper ore horizon: Massive Py ore: 20-40, and massive Py-Sl(-Mt) ore: up to 6 000.

GPS20T:

500-2 000 at massive Po-Cpy ore from lower ore horizon.
GPS21T:
10-20 at massive Py-Sl ore.
20-30 at hangingwall.
200-400 at 0.5m thickness of the footwall (Cpy-Po-impregnated chlorite schist); below: low values, with thin bands showing up to 800.

Samples for analysis:
399718 (GPS19T): Massive, fine grained, banded Py-Sl ore.
399719 (GPS19T): Massive Py with minor Sl and Cpy; at the contact to 399718.
399720 (GPS19T): Quartz-sericite schist and chlorite schist with massive Py-Sl-Cpy bands; RCS of 60cm thickness.
399721 (GPS19T): Quartz-sericite-chlorite schist with impregnation and mm-bands of Py(-Cpy-Sl).
399722 (GPS19T): Quartz-mica schist with cm-bands of Po-Cpy-Py(-Sl).
399723 (GPS20T): Massive, fine grained, brecciated Po-Cpy ore with chlorite schist fragments and quartz eyes.
399724 (GPS20T): Massive, fine grained Cpy-rich Cpy(-Po) ore.
399725 (GPS21T): Massive, fine grained Sl-Py ore; loc. SE-most digging.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399718	197	7,8	6028	3901	160400	88	29,7
399719	57	2,6	6730	541	7547	109	> 10.00
399720	66	6	12000	1069	55000	97	22,8
399721	106	2,9	9807	65	2780	114	16,1
399722	125	6,2	31000	70	2228	160	12,1
399723	49	2,1	2719	25	15000	< 5	> 10.00
399724	330	44,6	97000	1430	111000	12	23,7
399725	153	5,7	1783	1130	181000	49	24,1

4. Fjellsjø Gruve (Orvsjøen) UTM 0616307 6953250

Location:
0616307 6953250, 890m a.s.l. (GPS-location no 28 BR). Location at presumed filled pit. Good access by tractor about 2km from gravel road.
Two remaining small houses at the mine. A vertical drillhole is located about 25m direction SE from the filled pit. A number of 55 drillholes at together 3309m from Fjellsjø are located at The Geological Survey's storage.

Outcrops:
Outcrops may be found about 150m towards the S and W and 100 to 300m towards the E and N. Main rock, greywacke with garben schist development.

Wall rocks:
Wall rocks on the mine dumps are dominated by a gray-greenish greywacke with bands and staining of ankerite and pyrite. Pyrite mostly as cubes. The greywacke is medium grained with quartz and feldspar (?), biotite, muscovite and amphibole often as garben-porphyroblasts.

Alteration rocks:
Coarse grained muscovite in contact zone.

Dumps:
The volume of the mine dumps is estimated at 5000m3.

Dump samples:
Most of the ore samples on the dumps are rich in both Zn and Cu. Several samples with higher metal content than the samples shipped for analysis may easily be found on the dumps. Only little Po. A sample with 10cm of Py-cube xenoblasts in a matrix of Sl in Si-altered greywacke was found at the dump and sampled for cutting.

Samples collected for analysis:
399657: Zone with quartz and ankerite with a little Cpy, Sl and trace of Gn(?).The presence of sulphides in this type is low.
399658: Poor ore. Massive finegrained Py. In greywacke. About 50/50% greywacke/Py with trace Cpy and Sl. Rusty surface; Po?

399659: Massive, rich ore with Py, Cpy and a little Sl in a quartz-rich matrix. Not rusty.

399660: "Medium-rich ore". Massive type with finegrained Py cube xenoblasts with Cpy, Sl and quartz in matrix. Not rusty.

399661: Medium-grained massive rich ore with parallel bands of Sl. Cpy and xenoblasts of Py-cubes.

399662: Fine-grained massive Po, Sl, Cpy and Py-cube xenoblasts. Schlieren of coarse-grained muscovite. Rusty.

399663: Rich, massive Zn-ore with Py-cube xenoblasts, Cpy, quartz and a little Po.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399657	5	0,5	2196	90	2187	< 5	3,9
399658	84	8,3	13000	948	40000	104	> 10.00
399659	519	14,2	33000	1371	35000	105	29,7
399660	390	13,4	38000	816	47000	52	> 10.00
399661	243	9	14000	2224	79000	45	> 10.00
399662	191	4,8	5850	679	111000	40	> 10.00
399663	107	8,4	16000	548	135000	30	21,6

5. Muggruva (Orvsjøen) UTM 0617048 6956440

Location:

The northernmost deposit in Nordgruvefeltet is located 880m a.s.l. at UTM 0617048 6956440 (GPS04T) (SE'ern outcrop).
Access along tractor and 4WD road from Rugldalen (2km) or alternatively along tractor road from Vardvollen (2km).

Core drilling:
One drillhole at 100m is stored at The Geological Survey's storage.

Mineralization and wall rocks:
The orebody is almost flatlying like a large sheet, dipping genteelly towards the NW. It may be followed along axes for 1700m and is about 150m broad with an average thickness at 0,4m.
The underground mine is hardly accessible, and sampling and observations are done at the dumps.
The dominant ore type is massive to semimassive, fine grained, brecciated Po with minor Cpy, Py and Sl, containing a large amount of fragments/nodules/"rugs" of schist (chlorite, biotite, sericite) and phyllite, and quartz nodules (up to few-cm size). The content of Cpy and Py seem to vary considerably; Py seem to occur only locally.
Other types appearing at the dumps are 1) finely laminated chloritic schist with stringers of Po, Py and Cpy, and 2) finely laminated semimassive to massive Mt-Cpy (and amphibole?) mineralization.
Finely laminated layers up to 0,5cm of thickness with octahedral magnetite crystals may be found in the waste dumps.
Wallrock samples show greywacke, chlorite(±garnet) schist, phyllite and biotitite.
The pyrrhotitic ore is low-grade in Zn, and Zn-pyritic ore, which is commonly associated with the pyrrhotitic ore in other deposits, is not encountered at the dumps at Mugg.

At location UTM 0617180 6956104 about 400m S of the main Mugg mine by the trail, a narrow ore zone 0,1-0,3m of thickness occurs. It is subhorizontal with a dip direction almost parallel to the Mugg mine (304^0). Dominating ore minerals are Po and Cpy.

Dump volume: 300 000 m3.

Susceptibility:
200-400 at massive Po-Cpy ore.
40 000-50 000 at massive Mt-Cpy-Po ore.
20-70 at wallrock.

Samples for analysis:
399678: Semimassive, brecciated Po-Py-Cpy ore with chlorite schist fragments and quartz nodules.
399679: Massive, brecciated Po-Cpy-Py ore with chlorite schist fragments, quartz nodules and garnet.
399680: Semimassive, finely laminated Po-Cpy mineralization in chlorite schist.
399681: Massive to semimassive, banded and laminated Mt-Cpy-Po mineralization.
399682: Same as 399681, but less Cpy.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399678	505	6,1	6636	111	3464	< 5	25,8
399679	330	16,2	76000	300	2448	< 5	> 10.00
399680	229	6,6	18000	59	1120	< 5	> 10.00
399681	123	7,8	31000	73	1322	< 5	> 10.00
399682	51	1,2	34000	36	427	< 5	27,5

6. Lille Mugg and Nye Mugg (Orvsjøen) UTM 0616129 6955901

Location:
The mineralization is located 1.2km WSW of Muggruva, 950m a.s.l., at UTM 0616129 6955901 (GPS05T). A footpath from Muggruva passes 10m north of the diggings.

Mineralization:
The mineralization is tested with two diggings. At GPS05T is the waterfilled entrance of a NW-inclined adit. At the waterfront on the eastside is a small exposure of a 20-30cm thick (may be more) quartz-rich ore zone, which is also seen in the wall on the West Side. The hangingwall greywacke is chloritized.
Strike and dip of schistosity and the conformable ore zone is 230°/10°.
The dump material shows massive, fine grained, brecciated Po-Cpy(-Sl) ore with chlorite schist fragments and quartz nodules. Occasional Cpy(-Sl)-rich irregular bands. Cpy and Sl enriched at the quartz contacts.
A small, waterfilled pit with no outcrop is found 70m to the WSW (GPS06T). The same type of ore, in places Cpy-rich, is seen at the small dump.
The ground is covered, and it is not possible to trace the extension of the ore horizon(s), but EM ground measurements (1942 and 1960; GM rep. No. 274B) have indicated a weak conductor from the adit and 1400m NNW-wards.
Another parallel, weak conductor extends 4km NNW-wards from Lille Mugg. This was drilltested in 1944, two holes at UTM 0614400 6958750 and 0614650 6958450, and according to Lieungh (1973) thin sulphide mineralization was intersected. This was named Nye Mugg.

Dump volume:
300 m3.

Susceptibility:
800-3 000 at mineralization.

Samples for analysis:
399683 (GPS05T): Semimassive Po-Cpy-Sl ore in metagreywacke.

399684 (GPS05T): Massive, brecciated Po-Cpy ore with chlorite schist fragments and quartz nodules.
399685 (GPS05T): Semimassive, brecciated, Cpy-rich Cpy -Po ore with schist fragments and quartz eyes.
399686 (GPS06T): Semimassive Cpy with traces of Po and quartz lenses in greenish greywacke.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399683	804	9,2	85000	97	21000	< 5	17
399684	257	8,6	3204	28	50000	< 5	> 10.00
399685	244	21,5	85000	117	29000	< 5	20,3
399686	138	22,3	67000	124	13000	< 5	12,7

7. Rødalen Gruve (Orvsjøen) UTM 0615724 6951000

Location:
800m.a.s.l. (GPS-location no 27 BR). Location at mine shaft. Access good with 4WD 3.5km from Kongens gruve.

Core drilling:
A number of 3 drillholes totaling 473m are stored at The Geological Survey's storage.

Three remaining houses at mine.

Outcrops:
The area is well covered by glacial till. One outcrop could be located at the western side of the Røa River about 250m from the outlet from Røsjøen. UTM 0615630E 6950700N. The outcropping rock is a light-colored garbenschist (Greywacke), with small, up to 5mm hornblende phenocrysts muscovite and quartz. The schistosity of the rock is 171°/12°W. One open anticlinal fold with strike 233° and a flat-lying dip towards the SW. The same rock type may outcrop in the southern part of the mine camp.

Wall rocks:
Wall rocks on the mine dumps are dominated by a light-colored greywacke-muscovite-schist with some pyrite phenochryst cubes. A rusty weathered schist consisting of coarse muscovite, may be a contact altered rock.

Dumps:
The volume of the mine dumps are estimated at 30,000m^3

Dump ore:
In general, the dump ore is dominated by pyrite, pyrrhotite, chalcopyrite and some sphalerite.

Samples collected for analyses:
399652: Rich ore. Finegrained Cpy with Po and rotated quartz crystals. Schlieren of muscovite.
399653: Rich ore. Finegrained matrix of Po, Cpy and Sl? With schlieren of muscovite, Py cube xenoblasts and quartz.
399654: Poor ore. A 0.5m or more thick zone with Py-cube xenoblasts with biotite-muscovite schlieren.
399655: As no 654 above, with possible Sl.
399656: Rich ore. Cpy in mica-schlieren with Po and cube-xenoblasts of Py.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399652	128	12,2	7723	3146	75000	61	27
399653	101	13,3	12000	1595	37000	33	> 10.00
399654	254	10,5	25000	995	34000	24	> 10.00
399655	56	23,6	98000	1129	28000	9	25
399656	353	14	34000	2058	52000	48	> 10.00

8. Lomtjønna (Lomtjørna) UTM 0616230 6938080

Location:
The mineralization is exposed in four diggings on the east side of a small hill, ENE of Lomtjørna, and midway between Lomtjørna and the river Galåa, 740m a.s.l., 400m NW of main road. The SW'ernmost and largest digging has location UTM 0616230 6938080.

Description of mineralization and wall rocks:
The mineralized horizon is investigated with four diggings along a strike length of 90 m (see sketch map).
The SW'ernmost digging (1) is a 7x4 m2 and 3m deep trench with a waterfilled shaft (about 100 m3 dump).
Hangingwall rock is a medium grained gabbro with occasional small carbonate wugs.
The lower 0.5m of the gabbro is Po-impregnated, with traces of Cpy.
Below the gabbro contact is a 2m thick chlorite-hornblende (±gnt.) schist with thin intercalations of gray mica schist and bands of chlorite mass with small unoriented hornblende needles.
The lower 0.7m of this section is more or less rusty and contain thin (few mm) bands and dissemination of Cpy and Po. The lower 5cm is Cpy rich, with Cpy and Po in mm-bands

and segregation's. Traces of Sl are observed. The mineralized schist contains some quartz-schlieren.
The footwall constitutes of calcareous, silver grey, phyllitic muscovite-sericite schist. Both footwall and the mineralized horizon contain small spots and mm-thick bands of carbonate – in one place a carbonate band is 2cm thick.
0.5m of the footwall of the mineralization is chloritized.
Strike and dip of schistosity varies from 224°/60° in the hangingwall contact to 224°/45° in the footwall schist.
Digging 2 is situated 50m to the NE, and is a 4x3 m2 waterfilled shaft (25 m3 dump). It exposes a gray to weakly green, calcareous mica schist (weakly chloritic) with boudinated quartz-layer up to 1m thick. 30-40cm below this quartz layer is a 30cm thick rusty horizon of more mafic, hornblende-chlorite schist with poor Po and Cpy dissemination.
Digging 3 is located 22m north (10°) of digging 2. It is a small pit (<1 m3 dump) exposing the same greygreen schist. Only traces of Cpy in the lower 10cm of the pit.
Digging 4, 6m further north, is a small pit with no exposure.

Dump :
125m3

Sample for analysis:
399706: Chloritic mica schist with Cpy-Po bands.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399706	283	1,2	11000	23	919	117	12,1

9. Fruhaugen (Fruhaugen) UTM 0617801 6939435
Location:
Four small diggings are situated in a narrow NW-SE running bog, (GPS16T), 300m N of Fruhaugen.
400m footpath from the road.

Description of diggings (see sketch map):
1: 6x2 m2, shallow, waterfilled pit. Possible outcrop to be seen if water dries out.
2: 10x4 m2 waterfilled pit with deeper shaft in the center. Probable outcropping mineralization on the eastside of the pit, which strikes 214°/42°, with lineation 22°/20°. Outcrop, which strikes about 208°/8°, can be seen under water on the West Side of the pit.
3: 10x2 m2, shallow, waterfilled pit. No outcrop.
4: 15m long, shallow trench. Possible outcrop of calcareous mica schist at one point under the moss.

Outcrops:
Apart from the difficult accessible outcrops in the pits, no nearby outcrops are found, except of two small exposures of calcareous, medium grained gabbro to the south – one at 85 S, 85 E in the grid, and one further SW towards Fruhaugen.

Mineralization:
Dump samples show white to dark gray quartz-sericite schist, which is the host to the mineralization. Content of quartz vs. sericite varies considerably. A few samples of the dark gray sericite schist show possible graphite. Garnet (up to 1 mm) occurs in thin bands, commonly associated with the sulphide bands.
The finegrained sulphides, Py, Sl and Cpy, are enriched in mm-few-cm thick concordant bands. Some samples contain Py as the only visible sulphide, as small scattered grains, partly enriched in thin, up to 3-4cm thick bands of massive Py. Some of the Py bands are Cpy rich. Other dump samples show Zn-rich bands, up to 3-4cm thick, with Sl as dominant sulphide, together with Py and minor Cpy. Typically, Py cubes occur in a groundmass of Sl.
Mt is observed in some of the sulphide bands, and also as tiny grains scattered in the most quartz-rich portion.

Dump volume: 10 m3.

Susceptibility:
Quartz-sericite schist with Sl-Py-Mt bands: 1000-3000
Quartz-sericite schist with Py-Sl bands: 10-20

Samples for analysis:
399711: Quartz-sericite schist with Sl-Py-Cpy-Mt bands
399712: Semimassive Sl-Cpy-Py in quartz-sericite schist
399713: Massive to semimassive, finegrained Py in quartz-sericite schist.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399711	47	1,4	1633	139	46000	289	5,17
399712	347	5,7	12000	121	71000	449	9,6
399713	107	2,3	1824	89	8266	163	20,5

10. Rognåsen or Skittlitjørna (Rognåsen) UTM 0616225 6940479

Location:
The diggings are located 1100m SE of Skittlitjørna, 810m a.s.l., at (GPS17T).

Mineralization:
4 diggings appear along 60m N-S extension (see sketch map):
1) Southernmost (GPS17T): 2x2 m2 shallow pit (2 m3 dump).
2) Small digging (2 m3 dump).
3) 4x3 m2 waterfilled shaft, 2-3m deep? (8 m3 dump).
4) 5x3 m2 waterfilled pit, approx. 2m deep? (8 m3 dump).

Outcrops are limited to the diggings and a few adjacent exposures: surrounding terrain is covered.
Bedrock is calcareous, greenish to light gray schist/greywacke (more or less laminated with mica) to more massive quartzite in the northern part.
The sulphide mineralization is remobilized, occurring in subparallel bands (mm-2cm thick) rich in Sl, Cpy and minor Po; one band, however, stands out: 3-4cm thick massive Po-Cpy-Sl. Also frequent discordant, mm-thick Cpy-Sl veins. Often, Cpy and Sl are bound to cm-thick (one is up to 20cm) quartz(±minor carbonate) veins, both approximately parallel to the schistosity and discordant. If so, the sulphides tend to be coarser grained and appear partly incorporated in the quartz and partly along the contacts.
Occasional, few-cm thick brecciated quartzitic layers in the schist, containing semimassive Cpy-Po-Sl mineralization.
Also subordinate, weak sulphide impregnation in the greywacke outside the enriched bands.
Schistosity: 180°/29°.

Dump volume: 20 m3.

Susceptibility:
20-40 at mineralization and wallrock.
100-300 at Po-rich Po-Cpy-Sl band.

Samples for analysis:
399714 (UTM 0616225 6940479): Cpy-Sl impregnation in quartz vein and in bands and impregnation in the hosting light greygreen schist.
399715 (UTM 0616225 6940519): 3-7cm thick semimassive, rel. coarse grained Cpy-Po-Sl mineralization bound to brecciated quartzitic layer in the light greygreen schist.
399716 (UTM 0616225 6940539): White quartzite schist with poor dissemination and mm-bands of Cpy and Sl.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399714	30	1,2	5697	21	18000	130	4,8
399715	579	12,4	23000	48	13000	167	15,3
399716	19	0,4	3446	35	2392	103	2,72

11. Skittlilia (Fjellsjøen) UTM 0615700 6942700

Location:
1km east of Fjellsjøen, at a ridge 855m a.s.l.

Mineralization:
A tiny excavation (<1 m3 dump) at the surface of a 2-3m thick fine grained amphibolite lens with a small rusty area with traces of Py as dissemination and along joints.
Surrounding rock is dark gray, fine grained schist. Schistosity: 212°/40°.
Insignificant mineralization.

12. Littlefjell (Litlfjell) UTM 0618121 6941899

Location:
The mineralization outcrops in the hillside between and above Nørdre and Syndre Prestvollen, 780m a.s.l., (GPS18T).
About 500m walk NW from Nørdre Prestvollen.

Mineralization:
The mineralized zone outcrops in a 4x3 m2 waterfilled pit with a west-inclining shaft. Host rock is quartz-mica schist (muscovite, sericite, minor biotite) rich in quartz-augen and lenses (≤1mm). Finegrained sulphides, Po, Cpy and minor Sl, as impregnation and a few 5-10mm thick, semimassive, concordant bands are bound to this approx. 0.5m thick mica schist. The sulphides fill in between the quartz grains.
Footwall is chloritic schist. Hangingwall is fine bladed sericitic schist with small hornblende xenoblasts (garben).
The mineralization is exposed in a small outcrop 15m NNW of the shaft.
Schistosity: 185°/32°.

Dump volume: 35 m3.
Susceptibility:
Mineralization: approx. 200
Wall rocks: approx. 40

Sample for analysis:
399717: Quartz-mica schist with impregnation of Po, Cpy and minor Sl

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399717	20	0,7	7406	32	153	92	15

13. Kvernenglia (Orvsjøen) UTM 0619750 6945900

Location:
The deposit is located 1.5km NNW of Kvernengan, 760m a.s.l., at (approx.).

Core drilling:
A number of 13 drillholes totaling 979m are stored at The Geological Survey's storage.

Mineralization:
The ore deposit is located in heavily covered ground, and no outcrop or sign of drill holes was found, only a metal pole.
According to Liungh (1973) the deposit was found by airborne EM in 1959, and ground measurements were conducted the same year (Sakshaug 1961), followed by excavation and drilling of 10 holes.
The massive ore consisted of Py, Sl, Cpy, Po and Gn.
The average thickness of massive and impregnation ore is 0.7m containing 6.0% Zn, 0.9% Cu and 21.9% S.

Ref.:
Sakshaug, G.F. 1961: Elektromagnetisk undersøkelse Kvernenglia.
GM rep. No. 274A.

14. Røa (Rørosgård) UTM 0618720 6943430.

Location:
A vertical drillhole is situated about 100m from the Rødals road, 700m a.s.l., at

Core drilling:
A number of 2 drillholes totaling 290m are stored at The Geological Survey's storage.

Outcrops:
No outcrops of the mineralization or the wall rocks. Thick overburden.

Mineralization:
The mineralization was proved by drill testing of a 480m long, weak EM anomaly in 1959. According to Lieungh (1973) it showed good impregnation (of what?) in several cm-thick bands at a depth of 25-27m.

Dumps:
No dumps

15. Fjellsjølia (Tverrøa)

Location:
The mineralization is supposed to be located just east of the road, approx. 500m north of Fjellsjøbekken. No outcrop was found in this area. According to Lieungh (1973) a weak geophysical indication lead to proposed trenching at this place, but that the follow up was not conducted.
Lieungh also mentions some small diggings further south along strike direction, on the other side of Fjellsjøbekken. A brief search south of Fjellsjøbekken did not lead to detection of any of these.

16. Lobekken (Lomyra) 0614549 6947892.

Location: 0614549 6947892.
The deposit is located at the eastslope of Røsjøhøgda, approx. 850m a.s.l. Accessible by 1km walk westwards from the Rødals road.

Core drilling:
A number of 7 drillholes totaling 770m are stored at The Geological Survey's storage.

Outcrops:
The ore zone is not outcropping.

Mineralization:
The conductor was found by EM air- and ground geophysics (Singsaas 1965), and drilltested in the 1960's. According to Lieungh (1973) the deposit consists of four slightly westward dipping plates, with E-W direction of the longer axes. The A-ore is the most extensive, with a width of 250-300m, and length of minimum 800m. Thickness do not exceed 60cm.
The ore consists of up to 3mm sized idiomorphic Py crystals in a groundmass of Cpy ore Cpy/Sl. Minor content of Po and Gn.
Ref.:
Singsaas, P. 1965: Geofysisk undersøkelse Lobekken. NGU rep. No. 647.

17. Frysihjel (Orvsjøen) UTM 0618435 6950515

Location:
This mineralization runs E-W, more or less parallel to the Kongens Gruve ore zone, 500-600m south of the same.
Easily accessible from the road to Rødalen Gruve, along tractor road to the easternmost digging at (GPS22T).

Description of the diggings and mineralization:
The mineralization is followed with 11 diggings, shafts and adits over a strike length of 460m (see sketch map).
From east to west:
1: 7x5 m2 water filled shaft with SW inclination. The north wall shows Py-Cpy impregnation bound to a steep tectonic zone of chlorite schist dominated by quartz lenses. Surrounding rocks are mixture of fine grained amphibolite and irregular layers of calcareous, greenish hornblende-mica schist (±chlorite). The dump shows chloritic quartz-mica schist with impregnation and narrow lenses of massive Po and Cpy.
2: Working in steep slope. In calcareous, light greygreen schist with small hornblende needles occur a 1.5m wide chlorite schist with relatively large quartz boudins and boudins of semimassive Po and Cpy of few cm2 size.
3: 25m long and 2m deep, WNW-ESE running trench with 5m long adit with inclined shaft to the SW. Dump volume of diggings 1, 2, and 3 is approx. 250 m3. A tectonized, more or less flatlying, rusty chlorite-hornblende schist with quartz bands contains lenses and bands of few dm thickness rich in Po and Cpy stringers, and some 2-4cm thick massive Po-Cpy bands.
4: Small pit (no dump) exposes a rusty chlorite schist with Po-Cpy stringers outcropping in an antiformal structure (direction of flatlying axes 90°).
5: Small digging (<1 m3 dump) in an approx., nearly flatlying, quartz-chlorite-mica schist with Po-Cpy stringers.
6: 4x4 m2 water filled shaft (50 m3 dump). It is a small outcrop of chloritic schist at the waterfront. Dump samples show semimassive Po-Cpy with cm-sized quartz augens in chloritic schist.
7: Water filled adit with inclined shaft to the SW in the opening (150 m3 dump). Approx. 0.5m thick fine grained garnet (up to 1mm size)-chlorite-hornblende schist with stringers and impregnation of Po-Cpy in the entrance, and weaker impregnation of 1-1.5m thickness above. The mineralized zone is folded and contains quartz boudins. No massive ore in the dump pile.
8: 10m long, E-W running, shallow trench (20 m3 dump). Only poor sulphide impregnation is seen in the exposed, flatlying, rusty chlorite-hornblende schist. Dump show some samples of semimassive Po-Cpy with cm-sized quartz nodules. Small dump pile of sorted quartz.
9: 3x1 m2 shallow pit (2 m3 dump). Weak Po-Cpy impregnation of at least 0.5m thickness in chlorite-hornblende schist.
10: Waterfilled adit towards WNW (600 m3 dump). Approx. 2m thick chlorite-hornblende schist with stringers, thin bands and impregnation of Po and Cpy. Two, 2-

7cm thick bands of massive Cpy and Po occur close to the hanging wall. There are some horizons in the mineralized zone with very weak impregnation. Quartz lenses are common, and sorted quartz occurs in the dump.
Hanging wall consists of fine grained garnet amphibolite, while the foot wall is biotite-dominated schist with garnet.
11: 4x2 m2 waterfilled shaft (100 m3 dump). The strike has turned to NE-SW with steeper dip towards the NW. Rusty schist is seen in the wall. Amphibolite follows the hanging wall of the mineralization.

The folded, undulating, relatively flatlying, pinch and swell mineralized horizon with chlorite alteration appear close to, or at the contact to overlying amphibolite. Folding is probably the explanation to the apparent jumps in level of the exposed mineralization. The host rock change character along strike, from chlorite schist and chloritic quartz-mica schist in the western part to chlorite-hornblende schist in the east.

Susceptibility:
Po-Cpy stringer mineralization: approx. 200.
In the semimassive parts up to 600.

Dump volume: 1170 m3
Samples for analyses:
399726: Chlorite-hornblende schist with Po-Cpy stringers
399727: Chloritic schist with semimassive Po-Cpy with cm-sized qtz. eyes.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399726	20	3,8	13000	35	2503	< 5	21,5
399727	14	3,3	7533	53	5281	< 5	> 10.00

18. Slettmoen (Slettmoen) UTM 623445 6949990

Location:
Approx. 50m west of main road 30 at Slettmoen, UTM 0623445 6949990 (GPS27T).

Core drilling:
One drillhole at 150m are stored at The Geological Survey's storage.

History and description of the mine:
The deposit was found about 1900. Mining was initiated in 1901, and lasted until 1906. The mine consists of two adits with a couple of short branches. According to Lieungh (1973) the ore is followed along dip to a length of 85m.

The northernmost adit (GPS27T) is inclined and directed to the west. Only 5m are accessible (waterfilled). Associated dump pile (overgrown) is approx. 45x35 m2, and is estimated at 500 m3.
Second adit is located 40m to the SSE, and approx. 50m west of a house. It is inaccessible because of water. Approx. 50 m3 remaining dump, the rest is removed. Drilling of two holes was conducted in 1905.

Mineralization:
The ore zone outcrops in the entrance to the northernmost adit, and is here 60cm wide. It consists of 4-5 bands/lenses of massive fine grained Po-Cpy dominated ore with minor Sl and traces of Gn, with small quartz eyes (sample 399746 from the lower ore band). Thickness varies between few cm and 15cm. Portions of the massive ore bands are extremely Cpy-rich (sample 399747).
The massive-bands are separated by quartz lenses, sericite schist, and quartz-sericite schist with concordant, mm-thick sulphide bands and -dissemination. These thin sulphide bands in the sericite- and quartz-sericite schist are dominated by Sl and Py with less amount of Cpy, Po and Gn.
Along the hanging wall contact occur a 5-15cm thick layer of brecciated, quartz hosted ore with infillings of Sl and Cpy around the quartz fragments, and intercalated thin sericite schist bands. Similar, brecciated, quartz hosted, sulphide veined (here Cpy dominated) boudins, up to 15cm thick, occur lower in the ore zone.
A 10-15cm thick layer of quartz-lenses borders the hanging wall contact with interlayers of thin sericite schist lamellae. Some of the lenses contain coarse feldspar and minor sulphide impregnation.
The hanging wall consists of calcareous, light greygreen, weakly chloritic micascheous schist, which is sericitic in the lower 10-20cm. The schist contains quartz lenses with some yellow carbonate, and thin carbonate bands.
The limited exposed footwall shows sericite schist.
Schistosity: 175°/28°.

Exposure at the opening of the inaccessible SSE adit show a silver grey, soft phyllitic schist with quartz (±carbonate) lenses. This is the footwall, and the adit supposedly intersects the ore zone further inwards.

Susceptibility:
Noted in parenthesis below.
Wallrock: 20-40.

Dump volume: 550 m3

Samples for analysis:
399745: Chip sample of 60cm ore zone (100-700).
399746: Massive fine grained Po-Cpy(-Sl) ore with small (<1mm), up to 10mm sized quartz eyes. From footwall layer (1 000-4 000).
399747: Same as 399746, but Cpy-dominated. From middle layer (400 -2 000).
399748: Brecciated quartz with Sl-Cpy(-Po) infill (200-1 000).

399749: Grab sample from dump of different ore types (200-2 000).

References:
GM report no 24, NGU report no 769

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399745	160	12,5	13000	2849	25000	5	10,1
399746	49	15,8	8656	4969	48000	< 5	> 10.00
399747	363	40	95000	3891	41000	311	19,3
399748	87	17	12000	6654	55000	146	8,83
399749	513	30,3	41000	3745	29000	149	19,4

19. Pustbakken (Pustbakken) UTM 0623403 6949077

Location:
UTM 0623403 6949077 (GPS12T).
The mineralization appears 70m east of the main road, at a small rise in an otherwise boggy terrain. Two pits, 15m apart, are worked to investigate the mineralization.

Core drilling:
A number of 2 drillholes totaling 150m are stored at The Geological Survey's storage.

Mineralization:
No mineralized outcrop are found, but dump samples show stratabound, impregnation type sulfide mineralization. Host rock is dominated by quartz-sericite- and sericite schist, with minor mica schist (biotite, sericite, chlorite, muscovite, ±graphite, ±garnet). The sulphides occur as semiconcordant to concordant bands and impregnation in the schist. Thickness of the sulphide bands is mainly in the order of a few mm – occasionally up to 1-2cm massive bands.
Generally Po is slightly more dominant than the other sulphide minerals, Cpy, Py, Sl, and Gn, but minor schist layers of a few cm thickness are dominated by either Cpy, Sl or Gn. Native Cu, also as nice dendrites, is found in quartz boudins and immediate biotitite layers. A small amount of graphite is contained locally in the mica schist, and occasionally in the quartz boudins.

A drill hole (year 1966) intersected impregnation of Po, Cpy, Sl between 46-49.5m averaging 0.7 % Cu and 0.5 % Zn.
Geophysical measurements conducted in 1941 (Sakshaug 1941) and 1967 (Eidsvik 1968).

Dump volume:
90 m3.

Samples for analysis:
399699: Quartz-sericite schist with bands of Po, and minor Cpy, Py, and Sl
399700: Graphitic garnet-mica schist with impregnation and bands of Cpy, Po, and Sl
399785: Sericite schist with Gn, Cpy, (Sl) bands
399786: Biotite schist with Sl, Cpy, Po, and (Gn) impregnation.

References:
Sakshaug, G.F. 1941: GM rep. no. 24.
Eidsvik, P. 1968: Geofysiske målinger Pustbakken-Sletmo. NGU rep. no. 769.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399699	362	4	4774	1317	21000	204	17
399700	211	2,9	11000	218	1407	231	8,79
399785	91	6,6	1768	17100	28000	198	3,56
399786	359	15,3	12000	2712	14000	36	11,4

Røros Østgruvefelt (Klasberget):

Investigation of the mines along the 3km long east-west extension between Gamle Storwartz and Gamle Solskinn is limited to observations and sampling of the dumps (see exhibit map no7).

20. Gamle Storwartz (Klasberget) UTM 0629126 6946382

Location:
Gamle Storwartz, the first mine to be opened in 1645, is located at the high, 880m a.s.l. at UTM 0629126 6946382 (GPS124T), which is the location of Cornelia shaft. Car road leads up to the mine site, where it is some old restored buildings.

Core drilling:
A number of 26 drillholes from the Storwartz area totaling 1406m are stored at The Geological Survey's storage.

Mineralization:
Two ore types appear at the dumps:

- Massive, fine grained, banded Py-Sl-Cpy ore. The cm-thick Sl-rich bands, up to almost pure Sl, consist of Sl-matrix with 1-3mm sized Py-phenocrysts. Occasionally containing breccia fragments of wallrock and carbonate lenses and –segregation's.
- Massive, medium to fine grained, brecciated Po-Cpy ore with chlorite schist fragments and quartz eyes.

Susceptibility:
Noted in parenthesis below.

Samples for analysis:
400057: Massive, fine grained Py-Sl-Cpy ore (10).
400058: Massive, fine grained Sl-Po(?)-Py-Cpy ore (1 000).
400059: Massive, medium grained, brecciated Po-Cpy ore with chlorite schist fragments and quartz eyes (2 500).
400060: Semimassive-massive, brecciated Po-Cpy ore with chlorite schist fragments and quartz eyes (1 000).
400061: Massive, fine grained, banded Py-Sl-Cpy ore with carbonate (10).
400062: Massive, banded Cpy-rich Cpy-Po ore (400-800).

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
400057	127	32	476	31100	185700	488	> 10.00
400058	106	8,5	9680	7274	193900	82	> 10.00
400059	12	4,8	18100	675	4282	142	> 10.00
400060	55	3,4	6383	1811	15600	27	> 10.00
400061	78	34	4018	25900	155400	372	> 10.00
400062	262	11,1	32700	7997	72700	85	> 10.00

21. Nye Storwartz (Klasberget) UTM 0629775 6946645

Location:
Nye Storwartz extends approx. 1300m eastwards from the buildings on the high where Gamle Storwartz is situated.

Mineralization:
Samples are collected at the dump of an adjacent, covered shaft at UTM 0629775 6946645 (GPS01T), and at dumps adjacent to Gammelsjakta (UTM 0629554 6946583 (GPS02T) and UTM 0629545 6946650 (GPS125T))
Two types of massive ore are encountered at the dumps:
- Massive, fine grained, banded Py-Sl-Cpy(±Mt) ore; traces of Gn.
- Massive, fine grained, brecciated Po-Cpy ore with more or less Sl, traces of Gn, and wallrock fragments and quartz eyes.

Susceptibility:
Noted in parenthesis below.
Samples for analysis:
399664 (GPS01T): Massive, fine grained Po-Cpy-Sl ore.
399665 (GPS01T): Gn-Sl-impregnated mica schist.
399666 (GPS01T): Massive, fine grained, brecciated Po(-Cpy) ore.
399667 (GPS01T): Semimassive-massive Po-Cpy(-Sl?) in garnet-biotite schist.
399668 (GPS01T): Massive, fine grained Sl-Po-Cpy ore.
399669 (GPS01T): Quartz-rich mica schist with sulphide dissemination and a 2cm thick massive Sl band.
399670 (GPS01T): Massive Py-Sl ore.
399671 (GPS02T): Massive, fine grained (up to 1mm sized Py), banded Py-Sl ore.
399672 (GPS02T): Gn(-Cpy) impregnation in carbonate (ankerite) layers (lenses) in schist.
399673 (GPS02T): Massive Cpy-rich Cpy-Po ore.
399674 (GPS02T): Massive Py-Sl-Mt ore (15 000-20 000).
400063 (GPS125T): Garnet-chlorite schist with Cpy-Po stringers (400 -500).
400064 (GPS125T): Carbonate lens (15cm thick, consisting of coarse calcite and ankerite) with Po-Cpy-Sl-Gn impregnation (10-20).
400065 (GPS125T): Massive, fine grained Po-Cpy-Sl ore (15 000).
400066 (GPS125T): Massive, fine grained Py-Po(?)-Sl-Mt-Cpy ore (20 000).
400067 (GPS125T): Massive, fine grained, brecciated Sl-Po-Cpy-Gn ore with wallrock fragments; Gn enriched at the contact to fragments of quartzitic greywacke (2 000).
Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399664	267	5,6	9344	4681	265000	19	24
399665	11	5,5	1817	9243	54000	9	6,67
399666	67	9,8	13000	2007	77000	13	> 10.00
399667	197	7,4	24000	708	28000	5	> 10.00
399668	90	59,1	23000	106200	203600	20	23,1
399669	10	0,8	2820	497	84000	11	9,63
399670	325	21,8	30000	5803	108000	432	> 10.00
399671	385	28,5	21000	13700	163400	178	29,3
399672	255	25,4	1123	18200	19000	24	6,82
399673	35	15,9	97000	1396	8457	37	> 10.00
399674	68	3,5	5568	391	133000	84	> 10.00
400063	124	2,3	12800	1703	6203	13	> 10.00
400064	197	3,1	6754	2009	4586	30	9,24
400065	144	4,2	21800	674	64300	17	> 10.00
400066	67	7,2	13900	794	145600	89	> 10.00
400067	763	13,3	3785	29200	179200	7	> 10.00

22. Hestkletten (Klasberget) UTM 0630278 6946979

Location:
Hestkletten mine is located approx. 400m ENE of Storwartz leirskole, with Hillesjakta at UTM 0630278 6946979 (GPS126T).

Core drilling:
A number of 2 drillholes totaling 120m are stored at The Geological Survey's storage.

Mineralization:
Samples are collected from a dump adjacent to Hillesjakta (GPS126T), and from a dump at UTM 0630303 6946874 (GPS03T).
Both the pyrrhotitic and the pyritic ore types, as described from Storwartz above, appear at the dumps.

Susceptibility:
Noted in parenthesis below.

Samples for analysis:
399675 (GPS03T): Quartzitic greywacke with Cpy-Po impregnation.
399676 (GPS03T): Gneissic quartz-mica rock with Cpy-Sl impregnation.
399677 (GPS03T): Greywacke with Sl-Gn-Cpy bands.
400068 (GPS126T): Massive, fine grained, brecciated Po-Cpy ore with schist fragments and quartz eyes (200-500).
400069 (GPS126T): Sericite schist with Cpy-stringers (20-100).
400070 (GPS126T): Quartzitic rock with irregular bands of Sl, and scattered impregnation of Cpy (100).
400071 (GPS126T): Massive, fine grained, brecciated Sl-rich ore (300 -400).

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399675	17	3	14000	208	1873	< 5	9,2
399676	1630	8,5	23000	428	39000	8	8,76
399677	48	19,8	4670	16900	40000	6	8,87
400068	276	5,3	22400	263	33300	12	> 10.00
400069	129	4,6	21300	342	29400	7	8,3
400070	69	2,2	16800	115	64400	95	6,37
400071	173	0,6	1448	872	257400	6	> 10.00

23. Myrgruva (Klasberget) UTM 0630858 6946792

Location:
UTM 0630858 6946792 (GPS120T) is the entrance to Myrgruva, which is connected to the Quintus mine. Car road up to the mine.

Mineralization:
Samples are collected from dumps adjacent to the entrance at GPS120T. Both massive, brecciated Po-Cpy ore and massive Sl-rich (±Cpy) ore are encountered at the dumps.

Susceptibility:
Noted in parenthesis below.

Samples for analysis:
400044: Massive, brecciated Sl-rich ore with chlorite schist fragments and quartz eyes (300).
400045: Same (200-300).
400046: Same, containing Cpy (150).
400049: Massive, fine grained, brecciated Po-Cpy ore (150-400).

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
400044	264	2,8	1126	1719	169800	< 5	> 10.00
400045	274	4,6	3008	886	78700	< 5	> 10.00
400046	32	4,4	22900	120	24100	5	> 10.00
400049	388	17,9	28000	19400	84000	< 5	5,45

24. Quintus (Klasberget) UTM 0630967 6946905.

Location:
UTM 0630967 6946905 (GPS121T) is the adit entrance to the mine.

Core drilling:
A number of 2 drillholes totaling 120m are stored at The Geological Survey's storage.

Mineralization:
Samples are collected from a dump close to the adit.
Only the Po-Cpy(-Sl) ore type where found at the dump.

Susceptibility:
Noted in parenthesis below.

Samples for analysis:
400047: Massive, fine grained, brecciated Po-Cpy ore (150-250).
400048: Massive, fine grained, brecciated Po-Cpy-Sl ore (150).

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
400047	26	2	17500	567	55800	< 5	> 10.00
400048	24	3,2	13900	65	24900	< 5	> 10.00

25. Nyberget / Olavsgruva (Klasberget) UTM 0631406 6947102

Location:
UTM 0631406 6947102 (GPS119T) is a shaft to Nyberget, 70m north of the ropeway station. Olavsgruva is situated below Nyberget, the two being separated by a fault.

Core drilling:
A number of 19 drillholes totaling 1174m are stored at The Geological Survey's storage.

Mineralization:
The samples are collected from the dump adjacent to the mentioned shaft, where only the massive, fine grained, brecciated Po-Cpy(-Sl) ore where found.

Susceptibility:
Noted in parenthesis below.

Samples for analysis:
400042: Massive, fine grained, brecciated Po-Cpy ore (100).
400043: Massive, fine grained, brecciated Po-Cpy-Sl ore (500-700).

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
400042	211	14,6	55900	22	3245	25	> 10.00
400043	49	15,9	71200	86	7494	62	> 10.00

26. Nye Solskinn (Klasberget) UTM 0631588 6947000

Location:
Nye Solskinn is located east of Nyberget, and UTM 0631588 6947000 (GPS118T) is the entrance of an adit, situated 10m south of the road.

Mineralization:
The samples are collected from the dump adjacent to the adit (GPS118T), where only the pyrrhotitic ore type are found; massive, fine grained, brecciated Po-Cpy ore with wallrock fragments.

Susceptibility:

Noted in parenthesis below.

Samples for analysis:
400040: Massive, fine grained, brecciated Po-Cpy ore with wallrock fragments (200-600).
400041: Massive, fine grained, brecciated Po(-Cpy) ore with wallrock fragments (400-1200).

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
400040	451	8	36800	19	39700	66	> 10.00
400041	83	3,9	15800	88	27700	74	> 10.00

27. Gamle Solskinn (Klasberget) UTM 0631804 6947415

Location:
Gamle Solskinn is located east of Olavsgruva, and UTM 0631804 6947415 (GPS117T) is one entrance. Another adit is just east of the road.

Core drilling:
A number of 12 drillholes totaling 500m are stored at The Geological Survey's storage.

Mineralization:
The samples are collected from the dump adjacent to the entrance at GPS117T. Massive, fine grained, brecciated Po-Cpy ore with wallrock fragments is the dominating ore type seen at the dumps. Some samples show brecciated Sl-Po-Py-Cpy ore with wallrock fragments.

Susceptibility:
Noted in parenthesis below.

Samples for analysis:
400038: Massive, fine grained, brecciated Po(-Cpy) ore, in places with thin, intercalated sericite schist layers (1 000).
400039: Semimassive, brecciated Sl-Po-Py-Cpy ore with fragments of quartzitic rock (100-250).

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	Ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
400038	16	3,8	24400	14	7672	32	> 10.00
400039	81	2,2	4583	60	65000	65	> 10.00

28. Isakgruva UTM 0622802 6942706

Location:
The digging is located on a small hill, 765m a.s.l. at Bersvensåsen, UTM 0622802 6942706 (GPS116T).

Mineralization.
5x3 m2 and 1.5m deep pit at an insignificant mineralization, consisting of very weak Cpy impregnation (and a few small clusters) bound to a 10-20cm thick horizon containing up to 10cm thick quartz (±subordinate calcite) lenses and bands. Cpy is disseminated in the quartz and adjacent mica schist close to the quartz. In places the quartz contact is rimmed with thin, weakly chloritized biotite with weak Cpy impregnation. Schistosity: 205°/50°. Approx. 250m to the NNW, NGU has registered similar mineralization.

Dump volume: 8 m3.

Susceptibility:
10-20 at the Cpy-impregnation.

Sample for analysis:
400037: Mica schist with quartz lenses; Cpy impregnation in both.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
400037	100	0,8	4527	178	427	7	5,4

29. Klasberget (Klasberget) UTM 0631831 6950000

Location:
The ESE'ernmost digging is located 10m NW of the trig.point 900m a.s.l., at UTM 0631831 6950000 (GPS13T), 700m walk from Svensvollen.

Description of workings and mineralization:
Massive, fine grained, brecciated Po-Cpy(-Sl) ore with chlorite schist fragments and small quartz eyes appears in one or more, fold repeated, horizons of few dm thickness over an extension of at least 100m, accompanied by chlorite alteration in greywacke. The WNW extension is impregnation of Cpy-Po-Sl in quartzite. The mineralization is

followed with workings along 200m ESE-WNW extension (sketch map of the workings is based in the geophysical grid; baseline 300°):

Digging 1 is 8x4 m2 and approx. 2m deep (waterfilled). SE in the digging is outcropping a 20cm thick (could be more) mineralization, consisting of garnet-chlorite schist with thin bands and aggregates of Cpy, Po and minor redbrown, rel. coarse Sl – and boudins (up to 5-10cm thick) of massive, fine grained Po-Cpy(-Sl) ore. The undulating ore horizon show pinch and swell, and has a gentle dip towards SW, though strike and dip is variable due to folding. Along the hangingwall appear quartz (in places with coarse ankerite) boudins (up to 0.5m thick). The mineralization emerges in the NW-end of the digging as almost massive, fine grained Cpy-Po in chloritic phyllite with quartz lenses.

2 is a pit with adits (a-c) in each corner:

A: 5m long and 8m wide adit towards east. In the north and east walls appears a folded pinch and swell ore horizon, 3-20cm thick with a local, 60cm thick boudin, with an underlying branch (3-15cm thick). Fold axis and plunge of the boudins: 318°/10°. The ore consists of massive, fine grained, brecciated Po-Cpy(-Sl) ore with chlorite schist fragments and quartz eyes.

B: 8m long south-directed adit with continuing, waterfilled, west-inclined shaft, following the approx. 35° dipping ore horizon, the same that was rel. flatlying in a. The upper pinch and swell ore horizon has average thickness 20cm. Two thinner ore bands up to 1.5m below.

C: Waterfilled shaft(s) inclined NW and SW. A 10cm thick ore band is seen in the shaft wall.

3: A 1x0.5 m2 entrance hole 2m down to the tunnel, coming from 5.From the entrancehole it runs 5m to the north, and then approx. 50m WNW-wards to 5. 10-15m inwards are inclining shafts on either side. From this point and WNW-wards the tunnel is inaccessible (waterfilled). Three ore horizons are seen in the tunnel; average thickness is 20cm, locally up to 50cm. It is probably the same, repeated by folding. A synform, axis 288°/10°, is seen in the wallrock close to the entrance hole, with a nearby overturned fold, axis 285°/10°. Strike and dip of schistosity is generally 110°/40-50° in the SSW wall, and relatively flatlying in the NNE wall. The wallrock is greenish greywacke (±garnet) with garbenschist layers and quartz boudins. Garnet-chlorite schist surround the ore bands.

4: are a 3x2 m2 and 2m deep waterfilled hole, probably a collapse of the tunnel roof.

5: is a waterfilled pit with two inaccessible entrances to the SE (the tunnel) and east. A fold structure with axis 180°/5° appear at the entrance. No ore is outcropping.

6: Small digging. Weak Po impregnation and gossan.

7: 12x3 m2 and 1.5m deep pit. Outcrop of 1m thick, folded (axis 276°/20°) quartzite (±garnet), partly laminated with sericite, with Cpy-Po(-Sl) impregnation and –bands.

8: Small, 1.5m deep digging, showing a 10-15cm thick layer of garnet-mica schist (appearing in chlorite schist) with Cpy in impregnation bands and at joints.

Dump volume: 3000 m3.

Susceptibility:
300-1 000 at the ore.

Samples for analysis:
399701: Massive, fine grained Po-Cpy-Sl ore.
399702: Quartzitic rock with mm-bands and irregular aggregates of Cpy, Po and Sl.
399703: Massive, fine grained Po-Cpy(-Sl) ore.
399704: Same as 399703, but Cpy-rich.
399705: Same as 399703; loc. adit 2a; RCS of 20cm thick ore.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399701	14	5,8	48000	181	59000	175	> 10.00
399702	107	4,2	44000	119	3147	148	15,5
399703	15	3,3	23000	121	35000	150	> 10.00
399704	16	3,6	28000	95	16000	76	> 10.00
399705	232	5,6	34000	181	24000	123	> 10.00

30. Klasberglia (Klasberget) UTM 0631671 6949805

Location:
4 rows of workings (diggings, shafts and adits) occur at different levels in the hillside between Svensvollen and the Klasberget deposit, at (GPS31T), UTM 0631571 6949760 (GPS14T), and UTM 0631587 6949706 (GPS32T).

Description of workings and mineralization:
The workings are numbered at the sketch map.

1-5 (GPS31T) are waterfilled pits and shafts (200 m3 dump) along the upper ore horizon. Little mineralization is exposed, and at the dumps only some sulphide impregnation appear.
The mineralization is bound to a flatlying, undulating, pinch and swell horizon of quartz-mica schist with thin (up to at least 10cm) bands and lenses of chlorite schist rich in garnet (≈5mm, up to 10mm size).
Thin mm-bands (both concordant and discordant) of Cpy and Po occur in the quartz-mica schist, but the richer stringer-mineralization, up to semimassive, is emplaced in the garnet-chlorite schist bands/lenses.
Quartz boudins are common, with Cpy and Po as impregnation and enriched at the contacts, as up to 2-3cm thick massive bands.
This mineralization is followed along strike for 80m with the workings, and is further covered in both directions. Thickness is unknown, probably not more than a couple of dm.

6-9 (GPS14T) are waterfilled shafts and pits (100 m3 dump) along 50m strike length. A few mineralized samples at the dump show the same ore type as described above. The wall of the NW'ernmost digging show a folded, rel. flatlying, 1m thick rustzone, consisting of garnet-chlorite schist with occasional Cpy-Po stringers, limited to lenses or boudins. Large (up to 1m thick) quartz boudins.

10-13 (GPS32T) are two connected adits (25m inwards) and two small diggings (1200 m3 dump).
The dump material shows:

- Massive, slightly brecciated Po(-Cpy) with schist fragments and quartz nodules
- Massive Cpy(-Po-Mt)
- Massive Cpy(-Po-Sl) with garnet (up to 10mm size); Sl mostly along contact zone
- Quartz-mica schist with up to 1cm thick bands of massive Cpy-Sl(-Mt)
- Garnet-chlorite schist with Cpy and Po as stringers and cm-thick massive bands

At the entrance to the NW'ernmost adit is exposed 0.5m thick coarse grained garnet-chlorite schist with Cpy-Po stringers, and a similar 10-20cm thick horizon 1m below. Wallrock is chloritic mica schist.
In the adits the mineralized horizon is rel. flatlying, undulating, with pinch and swell from 0.5m thickness to nearly nil. The mineralization is stringer-dominated (impregnation), with minor lenses up to 20cm thickness of semi-massive to massive Po-Cpy(-Sl) ore. Also small, local mineralized lenses below.
In digging 13 the stringer-mineralization is 30cm thick. Schistosity is here 325°/30°.
Associated to the mineralized horizon are quartz lenses up to a few dm thicknesses.
The footwall consists of approx. 1m thick chlorite schist, while the hangingwall is only slightly chloritized mica schist with sulphide dust.

14-17 are three waterfilled shafts and one 15m long adit (800 m3 dump).
The ore horizon is rel. flatlying, undulating and approx. 0.5m thick (up to 1m). It is dominated by mm-thick stringerbands of Cpy-Po(-Sl) in chloritic schist, with some lenses of few-cm thicknesses consisting of massive Cpy-Po(-Sl), and dm-thick quartz boudins.

The mineralizations at the apparently 4 different levels might represent the same folded horizon, including the Klasberget deposit.

Dump volume: 2300 m3.

Susceptibility:
60-100 at Cpy-Po-disseminated mineralization; 800-1 000 at massive Cpy-Po(-Mt) ore; 50 at wallrock.

Samples for analysis:
399757 (GPS31T): Garnet-chlorite schist with Cpy-Po stringers (semimassive).
399758 (GPS32T): Massive Cpy-Sl(-Po) ore with large garnet.
399759 (GPS32T): Quartz-mica schist with cm-thick bands of massive Cpy, Sl and Mt.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399757	197	3,3	8021	268	832	192	> 10.00
399758	116	31,2	180500	288	31000	109	29,1
399759	252	10,2	33000	130	9980	227	11

31. Abraham (Abrahamshøgda) UTM 0629678 6955870

Location:
The diggings are located 500m NNW of nedre Stenbutjørna, 875m a.s.l. at UTM 0629678 6955870 (GPS15T). Accessible by car 1km north of Engesvollen, then 45 min. walk WNW'wards.

Mineralization:
Two separate, adjacent mineralizations are tested with 5 workings at Abrahamshøgda (see sketch map).
The mineralization tested by working 1, 2 and 5 is dominated by Py-Sl-Cpy-banded quartz-sericite schist, with subordinate remobilized, brecciated, semimassive Po-Cpy(-Sl) ore in quartzitic rock, which at least locally show discordant relationship to schistosity and primary bedding.
Working 3 and 4 test a horizon of chloritic schist with Po-Cpy-stringers and –bands.

Shaft 1 is 4x3 m2, waterfilled and inclined towards SW, located 105m SE of a small lake. Cross-section exposed in the SE wall show, from bottom and up (fig. at sketch map):

- Footwall is at least 0.7m thick fine grained hornblende schist.
- Ore zone: 1.2m thick quartz-sericite schist with stratabound, banded Py-Sl(-Cpy) mineralization. The sulphide bands are ≈concordant and mm-10cm thick. Feldspar- and sericite content is variable, with alternating layers of almost pure quartzite, sericite schist and white, feldspatic bands. Generally, increasingly quartzitic and less sericite upwards.
- Hangingwall: 1m thick phyllitic chlorite-sericite-biotite (±hornblende) schist; the upper 0.5m of this section being little altered quartz-biotite schist.
- Discordantly emplaced between this and the above medium grained hornblende schist (at least 2m thick) with quartz-feldspar bands, is 10-20cm thick remobilized, partly brecciated and slightly banded, semimassive to massive Po-Cpy(-Sl) ore with quartz-sericite schist fragments, in quartzitic rock.
  Schistosity and banding is 298°/40° in the footwall, and 298°/70° in the hangingwall.

Shaft 2 is 6x2 m2 and waterfilled (400 m3 dump from the two shafts). The entire 5m wide cross-section exposed in the NW wall (fig. at sketch map) show the above mentioned Py-Sl(-Cpy-Po)- banded quartz-sericite schist. The massive sulphide bands are mm-10cm thick and internally banded, with alternating Py-rich (subordinate Sl in matrix) and Sl-rich (scattered phenocrysts of up to 2-3mm sized Py crystals) bands, and minor Cpy-rich and Po-rich bands. 1.5m thickness is tectonized and crumpled. The assumed

remobilized Po-Cpy ore, which in shaft 1 appeared separately above the Py-Sl ore, is in shaft 2 intercalated in the Py-Sl ore as a 10cm thick, folded band (also containing Sl), above the tectonized section. Lineation and fold axis: 298°/14°. The apparent "step-over" of the ore zones in the two shafts is most likely due to folding. The ground around the shafts is covered.

Digging 5 is a small, waterfilled pit (2 m3 dump) with no outcrop. The dump material shows semimassive Py-Sl ore in quartz-sericite schist with occasional hornblende and biotite. This is most likely the prolongation of the ore zone from the shafts, making up an elongation of the Py-Sl ore zone of at least 130m. meta-gabbro is outcropping 10m SE of the digging, that means the mineralization is emplaced at or close above the gabbro contact.

Digging 3 (1 m3) in a steep slope: Small-folded (axis 5°/20°) quartz-sericite-chlorite schist with weak Cpy-Po-Py impregnation.

Digging 4 is a 10m long adit (waterfilled, 30 m3 dump) towards west into the same steep slope.
The mineralization from digging 3 is here 80cm thick, consisting of chloritic quartz-biotite schist (upper 20cm is quartzitic) with dissemination, stringers and a few massive-bands (1-2cm thick) of Cpy and Po. The dip is gently westwards at the entrance, but due to folding it varies considerably. The footwall is at least 2m thick silver-gray, calcareous mica schist. Hangingwall is silver-gray to greenish, calcareous chloritic phyllite with occasional quartz lenses, carbonate lenses/bands and dm-thick bands rich in hornblende needles. 4m above the mineralization appear a 1-1.5m thick calcareous hornblende schist with cm-thick carbonate veins and –bands. Above this unit, medium grained gabbro is outcropping along the NW-SE-running ridge.

Another small digging (2x2 m2, 2 m3 dump) is located 370m SW of shaft 1 and 2, approx. 150m north of Blanktjern, at UTM 0629430 6955580. Outcrop of Po-Cpy-Py-banded garnet-chlorite schist with quartz lenses; also sulphide impregnation in the quartz, and typically concentrated along the contacts. Enrichment of semimassive sulphides in about 10cm thickness.

Geophysical ground measurements (EM) were conducted in 1949 (Singsaas & Brækken 1950), which indicated a conducting zone from shaft 1 and 2 150m NW'wards, but no extension SE'wards to digging 5.

Ref.:
Singsaas, P. & Brækken, H. 1950: Rapport over elektromagnetisk kartlegging over og omkring Klinkenberg grube og Abrahams grube. NGU rep. No. 72.

Dump volume: 430 m3.

Susceptibility:
10-20 at Py-Sl-banded quartz-sericite schist; 200-700(-1100) at remobilized Po-Cpy ore in quartzitic rock; 20-80 at footwall hornblende schist; 5 at hangingwall phyllite and 50-150 at hangingwall hornblende schist.

Samples for analysis:
399707 (GPS15T): Massive Py-Sl ore.

399708 (GPS15T): Quartz-sericite schist with mm-bands of Sl-Py-Cpy.
399709 (GPS15T): Semimassive Po-Cpy(-Sl) ore in quartzitic rock.
399710 (GPS15T): Brecciated Sl-Cpy-Po ore with quartz-sericite schist fragments.
399842 (UTM 629430 6955580): Garnet-chlorite schist with Po-Cpy impregnation.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399707	96	3,4	1126	376	138000	186	> 10.00
399708	43	1,5	2747	115	60000	143	7,06
399709	426	3,4	13000	391	7262	121	18,1
399710	287	7,5	19000	2237	24000	146	14
399842	39	1,4	6073	26	236	16	12,5

32. Klinkenberg (Klinkenhåmmåren) UTM 0635821 6958721

Location:
Klinkenberg mine is located south of Klinkenhåmmåren, 955m a.s.l. at UTM 0635821 6958721 (GPS08T). The road to Bendikssetra is accessible by car; from here it is a 3km walk, preferentially along the fault zone passing through Snøfonntjørnan.

History of the mine:
The ore deposit was found in 1668, and was initially operated by Det Øresundske Kobberverk. Production of copper ore took place during several shorter periods. Approx. 1790 a new ore horizon was detected, encouraging reinforced mining activity by Røros Kobberverk. In 1796 27 workers were employed at the mine (and totally 470 at Røros Kobberverk). Mining ceased in 1831.
The mine was reopened in 1880 by a farmer from Glåmos, now as a pyrite mine. The ore was transported to Jensvoll (Glåmos) station by horse. This mining period ceased in 1892. Annual production of pyrite ore was in 1892 476 tons.
It is claimed that mining activity at Klinkenberg took place until the beginning of Worldwar I, but no production statistics exist.

Description of the mine and mineralization:
The Klinkenberg ore deposit is followed with underground mining and pitting along a NW-SE extension of approx. 480m (see sketch map).
The initial mining activity was limited to the NW end, called Gammelgruben (GPS08T is at the dump outside the mine entrance), which holds the Cu-containing pyrrhotitic ore type.
Later exploitation was concentrated at Nygruben, following the strike extension SE'wards from Gammelgruben. UTM 0635941 6958551 is the NW'ernmost adit (19) in Nygruben (which is rock chip sampled), and UTM 0635861 6958691 is tailings of Zn-rich Py-Sl-Cpy ore, adjacent to three shafts (4).

SE'wards from Nygruben the outcropping, extremely Zn-rich ore is tested with shafts and excavations. The extension further SE is neither delineated by workings (covered ground) nor drilling, which is not conducted at any part of the deposit.

In the NW'ern part, Gammelgruben, only the pyrrhotitic ore type is found, as isoclinally, repeated layers of massive, brecciated Po-Py-Cpy(±Mt) ore of up to 0.8m thickness.
SE of Gammelgruben only the pyritic ore type is found to occur, that is the Zn-rich, banded Py-Sl-Cpy(±Mt) ore, which Nygruben is entirely based on.
The reason for this apparently sudden(?) change in ore type is not yet understood. It is a possibility that it is a lateral change from Cu-pyrrhotitic- to Zn-pyritic ore, to the abnormally Zn-rich, almost massive Sl ore in the distal SE-extension.
The alteration signature is also different. Chloritization accompany the pyrrhotitic ore, while sericitization accompany the pyritic ore.

The workings from NW to SE; numbers refer to the sketch map:
Nos. 1 and 2 (Gammelgruben) are adits connected to a larger room, 25m inwards, most of what is accessible. Layers of massive, brecciated, Po-dominated Po-Py-Cpy (±Mt ±Graphite) ore are repeated by isoclinal folding. In the pillar inwards from 2 can be seen 8 dm-thick (up to 30cm) ore bands in an overall thickness of 3m.
At the entrance of 1 the uppermost ore layer is 0.7m thick, with 4-5 dm-thick layers below in the adit.
In the fine grained, durchbewegt ore, Py is irregularly distributed in 1-3mm, up to 15mm sized crystals, and Mt is occasionally abundant in irregular bands.
Intercalated in the ore is in places lenses and bands (few-cm thick) of coarse grained, massive, unoriented hornblende surrounded by few cm of ankerite. At the dump, samples of ankerite-tremolite rock with coarse grained Py are observed.
The remobilized ore layers are embedded more or less concordant with the bedding in the schist, relatively flatlying and undulating, but more local discordant relationships occur frequently.
Wallrock is fine grained, gray-green schist with lamellae of biotite and hornblende (garben texture). Especially in the adit roof well-developed kinkfolding (flatlying axis at 162°) occur. Chlorite schist (in places with large, up to 2-3cm, hornblende needles) commonly accompany the ore layers, specially along their footwall.

No. 3 is a waterfilled, inaccessible adit with side branches inclining westwards, most likely following the here west-dipping pyrrhotitic ore, outcropping at the entrance, from 1 and 2.

No. 4 is three waterfilled shafts. In the inaccessible wall of the middle shaft is seen from distance what appear to be Py-Sl ore, the NW'ernmost outcrop of the pyritic ore type. This means that the pyritic ore here appears at a higher level than the pyrrhotitic that is exploited below, from adit 3. A large dump of Zn-rich pyritic ore close by show massive, fine grained, banded (mm-cm scale) Py-Sl(-Cpy) ore with minor Mt, and in places, bound to local chlorite layers, abundant Gn.

No. 5 is a shaft. No accessible ore outcrop, but at the surrounding dump appear only the pyrrhotitic ore type. A small dump 25m to the SE, containing Py-Sl ore, might however be derived from this shaft.

No. 6 is a small digging with a tiny outcrop of Sl-Py ore; the small dump showing Zn-rich ore.

No. 7: Outcropping Py-Sl ore. No digging.

No. 8: The dump from this digging shows pyrrhotitic ore.

No. 9: Small (2x2 m2) digging. Sl-Py ore.

No. 10: Cpy impregnation in outcrop.

No. 11: Small digging showing 10-20cm thick fine grained Py-Sl ore with mm-band of Cpy at quartz lens contact. SW-erly dip.

No. 12: Small digging shows a rustzone; Py-Sl in quartzite and sericite schist.

No. 13: Zn-rich Sl-Py ore at the dump derived from the digging.

No. 14: Trench in the creek showing upfolded (axis 185°/5°) antiform with Py-Sl ore at the crest.

No. 15: Waterfilled pit. Adjacent outcropping Zn-rich Sl-Py ore.

No. 16: UTM 0636216 6958442 (GPS123T). The wall of a waterfilled pit exposes two (or the same that is folded) Sl-Py layers, 10 and at least 20cm thick, in quartz-sericite schist and greywacke. 90m east of 16: Rusty overburden and weak gossan, and some small boulders of Sl-Py ore (carried from other places or upweathered?).

No. 17: Excavation exposing Sl-Py-banded, 60-70cm thick sericite schist with thin quartz bands. The 5 massive sulphide bands are 2-6cm thick, and they are banded, with alternating Py and Sl bands of 3-5mm thickness. They are repeated by isoclinal folding, axis 185°/5°.

No. 18 and 19 are interconnected adits, 40m inwards to the NE, and 50m to the NW from 19. Parts of the mine are waterfilled, but considerable areas are accessible.
At the entrance of adit 18 is outcropping a 50-60cm thick layer of massive Py-Sl ore with minor Cpy, Mt (tend to be concentrated close to the footwall contact most places, where Mt-enrichment is observed) and Po in occasional bands, thinning out (splitting up?) to 30cm a few meters inwards. The footwall consists of white sericite schist, and hangingwall of gray chlorite-sericite schist. A similar sulphide layer occurs 1m above.
At the SE-wall of the entrance of adit 19 is outcropping several massive Py-Sl bands of up to 15-20cm thickness, repeated by isoclinal folding, over a width of 2m. Additional Py-Sl bands can be seen above the roof of the entrance, making up an overall mineralized thickness of 3.5m.
At the NW-wall of the entrance of adit 19 is outcropping a 0.5m thick massive Py-Sl ore, and a few meters inwards it is 6-7 massive layers, averaging 10-15cm thickness each, in 1.7m overall thickness.
The ore bands are intensely isoclinal folded, and are locally cut by the schistosity, e.g. in kinkfolded areas, but the overall picture is a flatlying ore unit followed inwards with the horizontal adits. In the east part and west part of this mine, however, the ore unit (and waterfilled adits) dips to the east and west respectively. At the inner end of adit 19 a 0.5m thickness contain only mm-4cm thick Py-Sl bands, but it appears like the adit should have been lower down. The other adit, following the ore zone 30m to the SE, is in the

inner part inclined to the NE.
Generally, in the mine, the main massive Py-Sl ore layer average approx. 0.5m thickness, increasing to 1-1.5m in places. In addition, several massive layers of dm-thickness occur above and below, making up an overall mineralized thickness of 1.5-3.5m, and massive Sl-Py ore is even outcropping above the adits (digging 11).

Geophysical ground measurements (EM) were conducted in 1949 (Singsaas & Brækken 1950). Referring to their report on the results from the mine area. It is however worth calling attention to an interesting anomaly approx. 200m north of Klinkenberg Gammelgrube.
This extensive conductor could be the extension of the Klinkenberg ore zone, displaced 100m to the NE. In fact, a distinct fault zone, running NE'wards from the westernmost Snøfjelltjørnan is directed towards the NW end of the Klinkenberg deposit, where the two (previously connected?) geophysical anomalies ceases out. In any case this anomaly should be followed up.

Dump volume: 23 000 m3.

Susceptibility:
4 000-20 000 at the pyrrhotitic ore (Po-Py-Cpy-Mt) at Gammelgruben, and 20-40 at its wallrocks.
Other measurements, e.g. the Py-Sl ore, are lacking/not yet conducted.

Samples for analysis:
399688 (UTM 0635821 6958751): Semimassive to massive Po-Py-Cpy-Mt ore; loc. NW'ernmost adit (Gammelgruben), upper ore horizon, RCS of 0.7m thick ore.
399689 (UTM 0635861 6958691): Massive, fine grained, banded Sl-Py (-Cpy) ore.
399690 (UTM 0635821 6958751): Chlorite schist with Cpy-Po stringers and quartz boudins.
399691 (UTM 0635861 6958691): Massive, Sl-rich Sl-Py-Cpy ore.
399692 (UTM 0635861 6958691): Massive, banded Sl-Py-Cpy ore.
399693 (UTM 0635861 6958691): Same as 399692, but more Cpy.
399694 (UTM 0635861 6958691): Same as 399692, with chlorite layers with associated Gn(-Po-Cpy) impregnation.
399784 (UTM 0635941 6958551): Sericite schist with frequent, mm-cm thick bands of massive Py-Sl(-Cpy).
400053 (UTM 0635941 6958551): Massive Py-Sl(-Mt) ore; loc. adit (13) entrance, RCS of 0.9m thickness.
400054 (UTM 0635941 6958551): Massive Py-Sl ore; loc. adit (13), RCS of 0.45m thickness.
400055 (UTM 0635941 6958551): Massive Py-Sl ore with occasional schist bands; loc. adit (13), RCS of 0.75m thickness.
400056 (UTM 0635941 6958551): Massive Py-Sl ore; loc. adit (13), RCS of 0.95m thickness.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399688	41	1,4	14000	54	856	27	> 10.00
399689	122	11,9	16000	3752	128000	95	> 10.00
399690	144	1,1	30000	64	1593	9	20,4
399691	438	12,4	3883	5317	245000	99	27,3
399692	137	8,6	2914	2647	163300	190	< 10.00
399693	128	7,3	15000	1915	104000	140	> 10.00
399694	350	51,8	15000	27700	48000	64	> 10.00
399784	419	12,3	9141	3024	34000	196	11
400053	778	10,7	50000	797	26800	187	> 10.00
400054	756	7	31600	2110	43000	136	> 10.00
400055	644	7,7	21600	1889	73200	112	> 10.00
400056	737	8,7	26000	2877	107300	191	> 10.00

33. Matz (Klinkenhåmmåren) UTM 0635318 6959057

Location:
Matzgruben is located south of Klinkenhåmmåren, 980m a.s.l., 600m NW of Klinkenberg Gammelgrube, at UTM 0635318 6959057 (GPS11T).

Mineralization:
This impregnation-mineralization is tested with 4 workings along a NW-SE (135°) strike length of 170m.
The two small (5 and 2 m3 dump) SE-erly diggings (50m apart) show greenish schist with concordant Py bands (mm-few-cm scale).
150m further to the NW is a waterfilled shaft, and 15m further NW a small digging (2 m3 dump).
In the NW'ernmost digging the mineralization, chlorite schist with up to 10mm sized Py crystals, Mt octahedron, Cpy aggregates and quartz lenses, constitutes the crest of an antiform plunging 162°/12°.
The mineralization can be seen in the inaccessible shaft wall, with phyllite as hangingwall. At the adjacent dump ore samples are scarce, just a few sorted rocks of massive, fine grained Py with minor Cpy and Sl, most likely occurring in thin bands. Chlorite schist with 1) Cpy(-Py-Po) stringers, 2) thin bands of massive, fine grained Py-Cpy, and 3) intergrowth of Mt and Cpy also appear at the dump.

Geophysical ground measurements (EM) were conducted in 1949 (Singsaas & Brækken 1950), which indicated only insignificant extension of the weak conductor SE of the SE'ernmost digging.

Dump volume: 100 m3.

Susceptibility:

2 000 at the Py-Cpy-Mt impregnated chlorite schist from the NW'ermost digging, and 20 000 at chlorite schist with Mt-Cpy intergrowth.
Wallrock: 20-40.

Sample for analysis:
399698: Grab sample from the dump, of massive, fine grained Py(-Cpy -Sl) ore, and chlorite schist with Py-Cpy bands.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399698	534	3,9	30000	149	1000	92	> 10.00

34. Fjellgjelt (Klinkenhåmmåren) UTM about 0634650 6960500 to 0634850 6960150

Location:
The diggings are located 100-500m south of the lake Fjellgjelten, 960-990m a.s.l. 4km walk NNE'wards from Bendikssetra.

Mineralization:
In this area occur three diggings at three different mineralization types with different mineral paragenesis:

1) Garnet-chlorite schist with Cpy-Po-Mt impregnation. (GPS 28T) 0634625 6960424.
2) Remobilized, vein type Cpy-Sl (-Mt) mineralization in chlorite rock. (GPS 29T) 0634905 6960305.
3) Massive Py-Mt mineralization ("vasskis"). (GPS 30T) 0634865 6960194.

1) is a 4x2 m2 waterfilled shaft (30 m3 dump) inclined to the west, 10m east of a small lake. Of what is shown in the upper part of the shaft, the relatively flat lying mineralization is 0.5-1m thick (more, lower down?). It consists of kinkfolded garnet (up to 2mm size, concentrated in thin bands)-chlorite schist with quartz bands and Cpy-stringers and –dusting. Often Cpy impregnation in the quartz and enriched at the contact. Occasional massive Po bands up to 1cm thickness and massive Po-Cpy bands (≈5mm thick) with mm-bands of biotite as large, unoriented flakes. Occasional chlorite schist bands contain impregnation of Mt as <0.5mm sized crystals. Mt also occurs as inclusions in Cpy. In places the garnet-chlorite schist contain unoriented flakes of biotite and muscovite (few-mm size), small amphibole needles, and layers of hornblende schist.

   Wallrock west of the shaft, between the shaft and the lake, is quartz-banded greywacke – alternating (few-cm scale) quartz-rich bands and greenish, chlorite containing bands. East of the shaft the wallrocks are dominated by light gray, massive greywacke (rich in carbonate spots and occasionally biotite porphyroblasts), exhibiting graded sediments, with thin, fine grained interlayers of greenish, chlorite containing sediment and mm-thin dark bands.

The mineralization can be followed 12m south of the shaft (then covered), and 75m to the NNW. The chlorite schist horizon is found in small exposures further NNW'wards. Weakly Cpy-impregnated chlorite schist is also found exposed at another level, 10m from the lake Fjellgjelten (UTM 0634660 6960600).

2) is a 6x4 m2 waterfilled shaft (50 m3 dump) 300m ESE of shaft 1).

Outcrop of the relatively flatlying mineralization is partly exposed at the edge of the shaft, in addition to small exposures along strike 10m to the north and 15m to the south, then as approx. 30cm(?) thick weaker impregnations.

The dump material shows that the mineralization is hosted in a massive, fine-grained chlorite rock with abundant impregnation of Mt (<0,5mm) octahedron, and more or less hornblende as unoriented needles up to 8-10mm. The richer parts are pervasively chloritized to a soft rock.

Medium to coarse grained Cpy and Sl (±Mt) appear in veins (mm-2cm thickness) surrounding pillow-like lenses (typically ≈5cm sized) of the chloritic rock. Accompaning gangue minerals are carbonate and minor quartz and biotite.

Another subordinate hostrock seen at the dump, is a quartzitic rock with up to 1-2cm thick coarse grained carbonate bands/lenses, and Cpy and Sl in impregnation bands and as 5mm thick fracture filling. Wallrock to the mineralization is fine grained, light gray greywacke with carbonate spots and weak garben texture.

3) is a 5x2 m2 digging (35 m3 dump) located 115m SSW of 2), at UTM 0634865 6960194 (GPS30T).

A 10-20cm thick massive Py-Mt mineralization, more or less concordant to schistosity, is outcropping in the digging. It has a banded appearance, due to grain size variation; dominantly fine grained, but banded variation from microcrystalin to medium grained (euhedral and anhedral), in places rounded grains up to 5-6mm size. The mineralization is strongly magnetic, with Mt as thin lamellae and up to 8-10cm thick lenses/bands.

The dump material also show chlorite schist with Cpy stringers (similar to the mineralization in shaft 1), and layers of chlorite schist with large, unoriented biotite flakes, and quartz lenses with Cpy-enriched contacts.

Wallrock is chlorite schist, 1m thick above and 20-30cm below. 10cm above the mineralization appears a band of quartz boudins (up to 15cm thick). Adjacent to the digging is exposed greywacke with phyllitic layers. The massive Py-Mt mineralization dips 8° towards east in the digging, but close by it is intensely folded (axis 172°/≈horizontal). The extension of the mineralization is not known. Approx. 150m to the south is a tiny digging at Cpy-stringered chlorite schist.

Geophysical ground measurements (EM) were conducted in 1949 (Singsaas & Brækken 1950). Only the mineralization at shaft 1) responded.

Dump volume: 115 m3.

Susceptibility:
Noted in parenthesis below.

Samples for analysis:
399750 (GPS28T UTM 0634625 6960424): Garnet-chlorite schist with Cpy bands (600-1 100).
399751 (GPS28T UTM 0634625 6960424): Garnet-chlorite schist with Cpy-Po bands (600-1 000)
399752 (GPS29T UTM 0634905 6960305): Chlorite rock with Mt impregnation and Cpy-Sl-carbonate veins (1 000-2 000).
399753 (GPS29T): Same as 399752, but richer in sulphides (1 000-2 000).
399754 (GPS29T): Greywacke with Cpy-Sl veining (400-700).
399755 (GPS29T): Quartzitic rock with Cpy and Sl as vein- and fracturefilling (50-100).
399756 (GPS30T UTM 0634865 6960194): Massive, fine grained Py-Mt ore (50 000).

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399750	115	4,1	53000	129	782	118	19,2
399751	44	1,9	22000	72	385	133	18
399752	86	2,5	18000	96	87000	126	11,9
399753	125	3,8	26000	51	108000	116	12,6
399754	779	2,7	23000	48	31000	143	9,01
399755	79	0,2	4414	24	5209	90	4,15
399756	201	12,1	75000	219	5726	127	22,5

35. Sødalsgruben (Klinkenhåmmåren) UTM 0638058 6959153

Location:
Sødalsgruben is located 2.2km ENE of Klinkenberg, 860m a.s.l., at UTM 0638058 6959153 (GPS09T). Accessible by foot from either Bendikssetra, or probably more favourable, NW'wards from Rålia/Sødalen (4km).

Mineralization:
This remobilized sulphide dissemination is tested with three diggings on either side of a NNE-SSW running fault zone. It is probably the same horizon that is displaced by the fault.
At UTM 0638058 6959153 (GPS09T) is a 4x2 m2 waterfilled shaft. The disseminated mineralization is 2-3m thick, consisting of greenish schist (greywacke) with thin bands and mm-stringers of Cpy, Sl, Py and Po; Sl and Py being partly rel. coarse grained. Locally Sl-rich (semimassive), with Sl as remobilized, mm-thick, irregular bands in light green feldspatic schist with biotite porphyroblasts. Also up to 5cm thick bands rich in Cpy, Po and quartz, and up to 2-3cm thick bands of massive, durchbewegt Po. The mineralization contains occasional carbonate bands/lenses up to 10cm thick, with mm-thick enrichments of Sl at the contacts.
Foliation: 155°/38°. Fold axis: 214°/20°.

120m to the NW (325°) is a small (3x2 m2) waterfilled pit (2 m3 dump). Traces of Cpy, Py and Sl in greywacke with quartz lenses. It is occasional rust-stained outcrops between the pit and the shaft. Strike/dip of mineralized zone (Layer): 176/36W.

Approx. 450m ESE of the shaft, at UTM 0638485 6958979 (GPS10T), is a small, waterfilled digging (20 m3 dump). Outcrop of light gray greywacke with Cpy-Po-Gn-Sl impregnation, commonly associated with quartz lenses. Also appearing in the greywacke are coarse grained calcite lenses/bands, and thin Cpy-rich bands, usually along the calcite contacts. This sulphide-disseminated horizon is not exposed outside the digging.

Geophysical ground measurements (EM) were conducted in 1949 (Singsaas & Brækken 1950). A 350m long, weak conductor can be followed from the fault, through the shaft and NNW'wards. The digging at GPS10T is outside the measured area.

Dump volume: 700 m3.

Susceptibility:
50-200 at the disseminated mineralization, and 40-50 at the wallrock from the shaft.
10-20 at the disseminated mineralization, and 20-40 at the wallrock from the ESE'ernmost digging.

Samples for analysis:
399695 (GPS09T): Greenish schist with bands and stringers of Sl, Cpy, Po and Py.
399696 (GPS09T): Same, but semimassive and more Sl-rich.
399697 (GPS10T): Light gray, fine grained greywacke with Cpy-Gn-Sl-Po impregnation.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399695	90	7,1	13000	1121	57000	20	9,84
399696	87	12,1	29000	1163	88000	9	11
399697	408	24,3	38000	17100	15000	< 5	8,48

36. Storhøgda (Storhøgda) UTM 0641871 6961606

Location:
The digging is located at the eastslope of Storhøgda, 150m west of a small lake, 935m a.s.l. at (GPS122T). 2.5km walk westwards from the main road.

Mineralization:
The mineralization is not exposed in the 7x4 m2 waterfilled pit. The dump material shows disseminated Cpy and Sl in an assumed thickness of 10-20cm in white quartz(-sericite) schist with biotite porphyroblasts (up to 1mm size), with minor, thinner (6-7cm) semimassive parts. The sulphides also occur, in less degree, in remobilized veins. Quartz lenses (containing weak Cpy impregnation) up to 10-15cm thickness are associated with the mineralization.

The dump material shows the wallrock to be light gray schist with biotite porphyroblasts, differing from the mineralized hostrock by decrease in quartz. Also cm-thick bands of carbonate are seen.
Strike and dip of schistosity is 155°/20°.

An outcrop in the creek, 20m south of the digging, exposes the mineralization. In a thickness of approx. 0.5m in greywacke, at the footwall of a 1m thick quartz lens, appear three quartz-enriched lenses or bands of few-cm thicknesses with Sl-Cpy impregnation. No other mineralized outcrops are found in the area.

Dump volume: 20 m3.

Susceptibility:
10-15 at the mineralization.

Samples for analysis:
400050: Quartz-rich semimassive Sl-Cpy mineralization.
400051: Same.
400052: Bands and veins of Cpy and Sl in light gray-green schist with biotite porphyroblasts.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
400050	231	47,7	57300	18700	116900	5	8,49
400051	412	13,6	13700	8555	168400	< 5	> 10.00
400052	103	2,3	8755	1281	18800	15	4,81

Holtålen district:

37. Tjønnvollmyran or Lille Gula (Tjønnvollmyran) UTM 0636853 6973037

Location:
The mineralization crops out at the bank of river Lillegula (Litlgaula), 875m a.s.l., at UTM 0636853 6973037 (GPS51T).

Mineralization:
The workings are:
1) 2x2 m2 waterfilled shaft 5m west of the river,
2) 30m to the east, a small digging with no mineralization, and
3) 35m south of the shaft, 10m west of the river, a shaft inclined to the north, towards shaft 1) (remaining rails).

The mineralization is not exposed, except weak sulphide dissemination at the riverbed, where the outcropping bedrock consists of light, rusty mica schist (quartz, muscovite, sericite, chlorite, little biotite, and hornblende needles (garben)). The schist is affected by folding, both open folds and kink folds, with axis 343°/10°. Schistosity: 163°/15°.

Dump samples show both chlorite schist and sericite-muscovite schist with concordant and folded, irregular bands (mm-2cm thick) of Cpy, Po and Sl. The sulphides appear to be enriched in separate bands, Cpy being the more widespread, with abundant Po and Sl restricted to a few samples.

Dump volume: 80 m3.

Susceptibility:
200-400 at the mineralization.

Samples for analysis:
399818: Sericite-muscovite schist with Cpy-Po-Sl bands.
399819: Chlorite schist with Cpy-Po-Sl bands.
399820: Same as 399819, but more Cpy-dominated.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399818	267	29,5	80000	2181	7741	12	18,2
399819	131	18,3	57000	1052	6640	177	16,9
399820	395	18,8	54000	1277	5329	144	15,3

38. Stømnbekken (Strømnbekken) UTM 0637950 6968550

Location:
The small digging is located 20m north of a bog, 30m east of a creek (running through the bog), which is a branch of Stømnbekken, 960m a.s.l., at UTM 0637950 6968550 (GPS55T).

Mineralization:
The digging exposes a 2.5m high north-facing wall of a gabbro lens. The gabbro is coarse to medium grained and contain veins and wugs of carbonate (ankerite and white, coarse grained calcite), and weak Po-impregnation. The surface of the gabbro is altered, containing talc, abundant carbonate and coarse biotite flakes.
Hosted in the gabbro is an up to 40cm thick massive-sulphide lens, exposed over 2m length, with direction 165°/40°, which wedges out and disappears upwards in the exposed wall. The ore consists of fine grained Sl, Po(?), Cpy and Gn and rugs and bands of yellow-brown schist. It is carbonate-rich; the dump samples having diluted hollows. Incorporated in the massive ore is an up to 15cm thick quartz lens, hosting minor dissemination and veins of Cpy, Gn, and Po.
Another sulphide layer, assumably 10-20cm thick, is partly exposed (partly covered by gossan) at the bottom of the wall, along the footwall of the gabbro lens. This occurs 1-2m below the previous mentioned mineralization, and has another direction, parallel to the schistosity in the footwall grey mica schist: 125°/60°. This mineralization is richer in Cpy and Gn, and contains abundant graphite. Between this sulphide layer and the gabbro

appears an approx. 20cm thick layer of cordierite (andalucite?) schist; grey schist with biotite-coated cordierite crystals.
No mineralization can be traced outside the digging (overburden), but the gabbro lens continues at least a few meters to the south.

Dump volume: 3 m3.

Susceptibility:
80-300 at the upper mineralization.
70-150 at the lower mineralization.

Samples for analysis:
399829: Massive, fine grained Sl-Po(?)-Cpy-Gn ore (upper mineralization).
399830: Massive, fine grained, graphitic Sl-Cpy-Gn ore (lower mineralization).
399831: Same as 399829 (dump sample).
399832: Same as 399831.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399829	95	52,8	8591	35800	86000	10	> 10.00
399830	138	49,5	26000	34900	108000	223	> 10.00
399831	105	37,6	7539	24000	79000	500	> 10.00
399832	216	2,3	496	38	220	54	> 10.00

39. Gulhåvola (Gjårdvola) UTM 0638630 6965600

Location:
UTM 0638630 6965600. The claim is located 750m direction 144° from the N tip of small lake about 1025m a. s. l. and about 2,2km SSE of the Gjårdvola summit.
A small 5X1m waterfilled pit is located along the strike of the mineralization.

Mineralization:
A sulphide mineralized zone up to 30cm of thickness may be seen in the claim area that is well exposed. It is striking in a NW-SE direction with a flatlying dip towards the NE. Fold axis in the ore is measured with a flatlying dip towards the SE. Total length of the mineralized zone is less than 10m, and the sulphides are concentrated in lens-shaped bodies with hydrothermal quartz. About 25 to 35 m direction108° from the claim two similar lens-shaped mineralizations with quartz and sulphides may be seen. Dimensions: 10x2m, strike 144° and 7x3m, strike 126° respectively.
No alteration minerals are seen.
The wall rock is a garnet-mica-schist, and the mineralization seems to be concordant to the foliation of the schist connected to sub parallel tectonic zones.

The ore itself is a poor sulpide mineralization with pyrite and pyrrhotite with traces of chalcopyrite.
About 10m3 material is in total extracted from the claim.

Sample collected from the dump for analysis (magnetic susceptibility in parentenses):

399853: Poor ore with Py, Po and traces of Cpy. (Up to 60).

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399853	23	3,2	9275	43	577	< 5	12,4

40. Bønskneppen a, b (Bønskneppen) UTM a: 0633709 6967387, b: 0634980 6967682.

Location:
The two claims are located 500m and 1,7km NE of the summit Bønskneppen.

Mineralization a:
Bønskneppen location **a** at UTM 0633709 6967387 is a small claim where the sulphide mineralization is related to a felsic sill about 0,5m of thickness and subhorizontal to the greywacke wall rock with quartz, feldspar, biotite, amphibole needles and small garnets (garbenschist). See sketch map. Only a little mineralization may be seen since the felsic sill with the sulphides is partly submerged in the small pit of the claim. The mineralization seems to be concentrated in flatlying lens. On the dumps (15m3) quite copper rich samples may be found.

Mineralization b:
Bønskneppen location **b** at UTM 0634980 6967682 is found 1,3km –ENE of the Bønskneppen **a** location.
The wall rock of this location is a garnet-mica-schist with a flatlying dip towards the SW. A sub parallel mineralized zone to the foliation of the schist can be followed for 15metres. The thickness of the ore zone is up to one metre, and copper rich sections are up to 0,3m. It is believed that the mineralization is related to a tectonic zone. The sulphides pyrite, pyrrhotite and chalcopyrite occur as "schlieren" in garnet-rich sections. About 10m3 of ore/schist is extracted from the claim.

Samples collected from the dumps for analysis (magnetic susceptibility in parentenses):
a. 399851: Copper rich sample from felsic sill with Cpy, Py and Po. (Up to 50).
b. 399852: Copper rich sample from garnet rich zone in mica-schist with Cpy, Py and Po. (Up to 100).

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399851	970	0,7	42000	110	864	< 5	8,68
399852	538	4	36000	82	613	7	13

41. Syaosen I (Nersjøen) UTM 0631529 6966442

Location:
The digging is located east of a waterfall in the river, 840m a.s.l., at UTM 0631529 6966442 (GPS112T).

Mineralization:
The digging is blasted 3m into a 4m high steep slope.
Approx. 30-cm thick impregnation ore consists of conformable stringers and apparently irregular veins of Po, Cpy and Sl in reworked, strongly kinkfolded and crumpled chlorite schist. In places, local semimassive parts. Py occur as few, scattered crystals. Dump samples also show up to 1cm thick Cpy-rich bands in very weakly chlorite altered mica schist.
Approx. 0.5m of the hangingwall is pervasively chlorite altered, with coarse-flaky chlorite, coarse grained biotite porphyroblasts and garnet. Above this 0.5m, the chlorite content decreases in the mica schist. The same scenario is apparent in the footwall, but here slightly less chlorite alteration.
Quartz lenses occur in the mineralization and in the wallrocks. A minor fault is seen to displace the mineralization with 0.5m. Schistosity: 125°/30°.
The mineralization is covered east of the digging, but westwards, the rustzone reappears at the riverbank at the waterfall, here consisting of only weak sulphide impregnation.

Dump volume: 50 m3.

Susceptibility:
70-200 at the mineralization.

Samples for analysis:
400030: Chlorite schist with Po-Cpy-Sl stringers.
400031: Same.
400032: Same.
400033: Same.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
400030	56	2,8	11200	13	15700	16	> 10.00
400031	40	3,6	14700	11	7708	29	> 10.00
400032	37	3,2	14200	13	8131	10	> 10.00
400033	164	8	35500	16	9239	10	> 10.00

42. Syaosen II UTM 0630840 6966765

Location:
800m WNW of Syaosen I, at (GPS113T).

Mineralization:
The workings consist of an 8x3 m2 waterfilled pit with a south-inclined shaft, from where rails pass through a cottage on their way to the dump; a 2x2 m2 waterfilled. (anyway, everything seems to be waterfilled this "summer"!) pit (no outcrop) 10m to the WNW, and yet 3 small diggings up to 50m further WNW. (only very weak sulphide dissemination in these).
The mineralization proves to be similar to Syaosen I, and is possibly the same horizon. The ore is folded and crumpled garnet (up to 2mm)-chlorite schist with stringers of Cpy, Po (and Sl?). The mineralization is incompletely exposed in the pit, and proves to be at least 40cm thick, containing small quartz lenses. Chlorite altered both above and below the ore zone.
Strike and dip of schistosity and mineralization: 110°/15°.

Dump volume: 130 m3.

Susceptibility:
60 at the mineralization.

Samples for analysis:
400034: Garnet-chlorite schist with Cpy-Po stringers.
400035: Same.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
400034	19	7,1	36900	14	592	9	> 10.00
400035	18	6,7	33300	14	421	13	> 10.00

43. Syaosen III UTM 0630531 6966841

Location:
300m WNW of Syaosen II, at UTM 0630531 6966841 (GPS114T).

Mineralization:
5x2 m2 waterfilled pit.
This mineralization is similar to, but more low-grade than Syaosen I and II, and they all possibly belong to the same horizon with lens shaped mineralizations.
The mineralization appears only in one incomplete exposure in the pit, and seems to be about 20cm thick. It consists of stringers of Cpy and minor Po in kinkfolded (axis 145°/50°) garnet-chlorite schist.

Dump volume: 15 m3.

Susceptibility:
50 at the mineralization.

Sample for analysis:
400036: Garnet-chlorite schist with Cpy(-Po) stringers.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
400036	28	5,5	22600	14	568	8	> 10.00

44. Skarvbekken (Skarvbekken) UTM 0628346 6965430

Location:
The mineralization crops out in a gorge in Skarvbekken, 775m a.s.l., at UTM 0628346 6965430 (GPS36T).

Mineralization:
In the river gorge is outcropping undulating, silvery grey mica schist. Axis of small folds: 138°/12°. Scistosity: 30°/12°.
In a thickness of 1m appear two conformable, pinch and swell ore bands of up to 5cm thickness. They consist of infill of Po, Cpy and Sl around quartz eyes and –lenses (in places brecciated), and the semimassive to massive ore contains some chlorite schist fragments, and subordinate garnet bound to the quartz/sulphide contact. The quartz lenses contain occasionally octahedral, mm-sized crystals, possibly gahnite.
The mica schist is slightly chloritized close to the ore bands.
One of the ore bands changes laterally to an up to 10cm thick rustband with dispersed sulphides in chloritic mica schist, and associated 10-15cm thick quartz lenses.
The ore bands are accessible along approx. 5m length in the steep gorge. It is signs of excavation on the opposite (west) side of the river. Approx. 50m northwards and 8-10m lower in the stratigraphy is outcropping a bench of rusty, finegrained amphibolite.

Dump volume: 0

Susceptibility:
100-200 at rich ore.
40 at wallrock.

Samples for analysis:
399766: Massive, fine grained Po-Cpy-Sl matrix with quartz lenses.
399767: Same.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	Ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399766	196	1,6	5030	20	74000	88	29,7
399767	270	1,8	3144	17	79000	146	> 10.00

45. Killingdal (Killingdal) UTM 0626075 6965180

Location:
The Easternmost location of Killingdal mine (The original Killingdal Old Mine) is at UTM 0626075 6965180.
The main entrance to the mine was at Bjørgåsen at UTM 0622960 6965460 and the distance between the Old Killingdal Mine and the last main entrance is 3,2 km. The access to the sites is good on gravel roads.

Core drilling:
A number of 70 drillholes totaling 3448m are stored at The Geological Survey's storage.

Mine history:
The Killingdal mine was discovered in 1674 and was exploited in periods by Røros Kobberverk until the "Killingdalen Grubeselskap A/S" took over in 1891. In the period 1895 through 1946 the mine was rented by an English company, The Bede Metal and Chemical Co. Ltd. A total at about 2,8million tonnes of ore had been extracted from the mine in March 1986 when the operation ceased.
The produced ore averaged 1,7%Cu and 4-5%Zn.

Geological setting:
Killingdal mine occurs in metamorphosed, eugeosynclinal rocks of probable Ordovician age belonging to the Hersjø Formation of the Caledonides of Central Norway. The present pyritic, chalcopyrite- and sphalerite-bearing type of ores belong to the stratiform class of sulphide deposits.
The close relationship between major and minor tectonic structures and the extremely elongated ore bodies strongly suggests a structural control. Formation of successive quartz-muscovite and chlorite alteration envelopes in the immediate wall rocks, accompanied by extensive redistribution, leaching, and introduction of elements from

outside, suggests a hydrothermal metasomatic origin of the ores. The ultimate source of the ore-forming solutions is ascribed to metamorphic palingenic processes.
(Abstract from Ingolf J. Rui "Structural Control and Wall Rock Alteration at Killingdal Mine, Central Norwegian Caledonides". Econ. Geol. Vol. 68, 1973, pp. 859-883).

Dumps:
There are three different dumps at Killingdal:

1. Dumps at the location of Old Killingdalen Mine at UTM 0626075 6965180. This dump is sealed by a plastic cover and covered by a gneissic rock to minimize the environmental impact of acidic mine water. Its volume is about 120,000m3. Very few ore samples may be found here.
2. Dumps at Bjørgåsen, the main mine entrance at UTM 0622960 6965460. Most of the dumps here, are from the works at the Bjørgåsen inclined shaft 1500m long which was completed 1956 making a good access to the deeper levels of the mine.
3. Some small dumps, about 2,000m3, are left by the ore storage bin by the rail to Trondheim 1,5km West of the main mine entrance where the ore was shipped for processing. Representative ore samples from the mine may be found here.

Samples (399862-866) collected for analysis from the ore storage bin area: (Magnetic susceptibility in parentenses).

399862: A typical rich ore. Medium to fine grained, banded with Py, Sl and Cpy. (Up to 60)
399863: Rich copper ore with Cpy as bands and schlieren in strongly folded chloritic schist. (Up to 150).
399864: poor massive fine- to medium-grained pyritic ore with traces of Sl and very finely disseminated Cpy. (Up to 80).
399865: A relatively rich banded ore type with quartz, Cpy, Sl and Py. (Up to 60).
399866: A poor lateral banded type of ore. Bands of quartz and sericite with Py, Sl and Gn. (Up to 60).
Samples (399868-869) collected from the dumps of Old Killingdal Mine:
399868: A rich type of massive, finegrained, partly banded ore with Po, Py, Sl and Cpy. (Up to 1000).
399869: Massive Po ore type with very finegrained disseminated Sl and a little Cpy. (Up to 3000).

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399862	67	21,9	12000	4405	78000	149	> 10.00
399863	68	19,7	77000	1074	19000	146	19,5
399864	50	12,7	22000	397	4048	378	> 10.00
399865	107	16,8	6380	2101	69000	156	14,9
399866	20	12,8	1917	8633	15000	139	14,6
399868	273	41,4	8315	5503	67000	184	> 10.00
399869	93	64,7	6827	7436	102000	222	> 10.00

Sphalerite rich boulders South of Bjørgåsen.

Location:
Sphalerite rich boulders are located about 2-4km S of Bjørgåsen (Killingdalen Maine Mine Entrance). Pers. Comm. Kjell Stenmark, Ternaby, Sweden. Mr. Stenmark located the Zn-rich boulders during an exploration campaign in the late seventies/early eighties.

108. Killingdal North (Killingdal) UTM 0626093 6965692

Location:
Killingdal North is located about 450m NNW of The Old Killingdalen Mine at UTM 0626093 6965692. Access is good by car to The Old Killingdalen Mine. A foot parth towards the north leads to The Killingdal North site. Killingdal North is located in Kjurudal formation – chiefly phyllites like the Killingdalen North ore body, which overlies the Killingdal Main ore body.

Mineralization:
A waterfilled inclined shaft dips towards the South-West. A very weak Py, Po and graphite mineralization occurs concordant to a fine grained sedimentary dark colored phyllite with foliation 200°/25-60°W.

Dumps:
Dump volume is estimated at 400m3.

Sample collected for analyses:
399867: Massive Po-ore sample from the dumps with traces of disseminated Cpy.
Magnetic susceptibility: Up to 2000.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399867	15	0,4	573	76	903	9	24,3

46. Skargruben or Rundhøgda (Vattåsen I and II) UTM 0622550 6961910 and 0621620 6962693.

Location:
Two claim areas Vattåsen I and II, UTM 0622550 6961910 and 0621620 6962693 respectively, are located in the Rundhøgda – Vattåsen area 3,5 to 4 km SW of Killingdalen Mine. Access by foot from Vondgrova, Skårdalen 2,2 and 1,1km to Vattåsen I and II respectively.

Vattåsen I (Rundhøgda claim) UTM 0622550 6961910.
The claim is located at 895m.a.s.l. in a well exposed area with a fine grained quartzitic rock, (greywacke). See sketch map.
An inclined waterfilled shaft is worked in a NW-ern direction at a dip around 30°. The ore horizon is up to one metre thick and can be followed for about 12m. Its strike direction is concordant to the foliation of the wall rock dipping to the NW. (207/34NW). No alterations are seen.

Dumps: The volume of the dumps is calculated at 120m3.

Samples collected for analysis (Susceptibility in parenthesis):
399855: rich coarse grained massive to stringers and stockwork ore type comprising of Cpy, Sl and Po. The same type with abundant Sl may also be found. Po-content is low. (Up to 600).
399856: Banded ore type in greenish (chloritic) greywacke with Cpy, Sl and Po. (Up to 600).

Vattåsen II (=Skargruben claim?). UTM 0621620 6962693.
The presumed claim is located in a NE- facing cliff about 50metres long and 1-5metres high. No signs of any human activity may be seen. The cliff is partly covered by rust due to finely disseminated Po in fine grained dark colored schist rich in quartz with foliation: 178/27W.

Sample for analysis:
399857: Finegrained dark colored schist with finely disseminated Po. Susceptibility up to 150.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399855	195	6,4	62000	146	46000	7	14,8
399856	34	0,7	16000	54	16000	< 5	8,24
399857	6	< 0.2	387	7	594	8	4,46

47. Molingdalsskarven (Molingdalsskarven) UTM 0628675 6961427

Location:
Three diggings are located at the SW slope of Molingdalsskarven, 1000m a.s.l., at GPS35T (UTM 0628675-6961427), which is the easternmost digging.

Mineralization:
In the easternmost, 5x4 m2 shallow, waterfilled pit (5 m3 dump), the rock sequence from bottom and up is: 1) Fine grained, calcareous (some calcite wugs) amphibolite which become increasingly schistose and chlorite-rich towards the mineralization. 2) Approx. 0.5m thick lens (?) of garnet-chlorite-hornblende schist with few-cm thick quartz lenses/bands. Cpy is impregnated both in the quartz and in thin bands in the schist as partly coarse-grained infill around 1-5mm sized garnet. 3) Green, dense, altered amphibolite. 4) Weakly chloritic mica schist with dm-thick garnet-chlorite-hornblende schist above and below, the latter containing bands and infill of Cpy around garnet grains. These mineralized layers are undulating, schistosity is generally 350°/40°. 5) Medium grained, partly massive gabbro.
The mineralization, as a dm-thick Cpy-impregnated horizon at the footwall contact to gabbro, is followed NW-wards with tiny blasts 10 and 25m NW of the pit. The mineralization then probably (covered) turns westwards, and emerges in a 5x4 m2 waterfilled shaft (10 m3 dump) 65m west of the pit. Here appear two horizons of Cpy-impregnated garnet-chlorite-hornblende schist (the lowermost also contain abundant biotite) of 10 and 40-50cm thickness and different directions; one is vertical and the other is relatively flatlying. They are smeared around foliated gabbro lenses.
75m further west is a 10m long, east-west running trench with an east-inclined shaft (100 m3 dump). Outcrop shows: in a 0.5m thick section of quartz-banded (mm-cm thick) garnet-hornblende schist appear two pinch and swell layers (approx. 10cm thick) of garnet-chlorite-hornblende schist with thin Cpy-Po bands. Hangingwall is grey, calcareous schisty greywacke with undulating strike and dip, approx. 330°/15°. Footwall is amphibolite. The dump material shows massive Po(-Cpy) ore with garnet, schist fragments and quartz eyes. Coarse grained hornblende and Cpy often rim the quartz lenses; Cpy is also impregnated in the quartz. At the dump appears also medium to coarse grained, Cpy-impregnated amphibolite. (The direction between the three diggings is not exactly east-west, but 285°). The sulphide-impregnated chloritic horizons probably represent shearzones with remobilized Cpy and Po at or close to gabbro lenses, over an extension of at least 140m.

Dump volume: 115 m3.

Susceptibility:
Wallrock: 60-100; Sulphide-impregnation from easternmost digging: 40-100;
Massive Po from westernmost digging: 400-700.

Samples for analysis:
399764: Garnet-chlorite-hornblende schist with Cpy bands.
399765: Garnet-chlorite-hornblende schist with quartz bands; Cpy-impregnation in both.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399764	357	5,4	22000	42	259	103	11,2
399765	441	4,3	15000	31	195	104	8,59

48. Litlskarven UTM 0628724 6963917

Location:
In the valley north of Litlskarven, at UTM 0628724 6963917.

Mineralization:
A small exposure of a few-dm thick rustzone, consisting of garnet-chlorite-hornblende schist with Cpy-impregnation and quartz lenses. Fine grained amphibolite/hornblende schist crops out above and below.

49. Storhøgdgruben (Storhøgdgruva) UTM 0616520 6964600

Location:
Storhøgdgruben, UTM 0616520 6964600, is located 2,5 km SW of Sjursvollen and may be reached by foot along a trail from Sjursvollen.
The area is covered by glacial till and exposures may only be seen above the waterlevel of the water filled vertical shaft, which is closed by a high fence. See sketch map.

Wall rocks:
The wall rock found at the dumps is coarse grained light colored garben schist with sericite-muscovite-chlorite-matrix with needles of actinolite.

Mineralization:
The mineralization seems to be concordant to the primary structures of the wall rock: 176°/steepW. One fold axis in ore is measured at 311°/77°NW.
Pyrite is by far the most dominating sulphide found at the dumps. Other ore minerals are magnetite, sphalerite and chalcopyrite. The mineralizations are frequently occurring as parallel bands from mm to several cm of thickness.

Dumps:
The dump volume at the mine site is calculated at 900m3.

Samples collected from the dumps for analysis (magnetic susceptibility in parentenses):
399860: Banded ore with pyrite, quartz, Cpy? And Sl? (Up to 1000).
399861: Massive ore with pyrite, quartz and sphalerite. (Up to 100).

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399860	37	2,1	5362	36	7408	42	> 10.00
399861	36	1,7	4449	36	59000	43	> 10.00

50. Fromgruben (Fromgruva) UTM 0615052 6965960

Location:
Fromgruben may be reached by a footpath about 1,5km SSE of Rogngrubene or by foot about 2,0km NW of Storhøgdgruben (no trail). The area is well exposed uphill towards the NW, but downhill, towards the SE, it becomes more covered. The sketch map shows the old, almost vertical shaft dipping steeply to the West, ruins of two buildings and a dump with estimated volume at 500m3.

Mineralization:
The mineralization seems as Storhøgdgruben to be concordant to the primary structures of the wall rock. The strike of the mineralization is NE-SW with a steep dip towards the NW. Fold axis in the ore at the top of the water filled almost vertical shaft is measured to an almost vertical dip towards the WSW.
The wall rock is a dark colored hornblende rich schist, most likely derived from a basic lava flow in the Hersjø formation. Rusty patches, up to several square metres in extension may be seen in a pattern indicating a NE-SW strike. Limited alteration of chlorite enveloping the ore may be seen at the top of the shaft. The thickness of the ore is up to 0,7m in the folded part.
The ore is dominated by the presence of pyrite and some pyrrhotite. The amount of chalcopyrite and sphalerite is limited.

Samples collected from the dumps for analysis (magnetic susceptibility in parentenses):
399858: Some pyrite as cubic crystals and a little Cpy. (Up to 200).
399859: Massive Py-ore as cubic crystals and a little Cpy and Sl. (Up to 350).

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399858	33	3,5	9793	51	3311	12	> 10.00
399859	63	4,2	6896	33	40000	29	> 10.00

51. Rogngruben (Rogngruva) UTM 0614179 6967602

Location:
Workings appear at three sites 810-830m a.s.l. between Rogne and Katrenahøgda. Accessible by tractor road and footpath from roadturn south of Rognli, 2.5km SE-wards to the mine.

Mineralization:
The northernmost mineralization, at GPS52T (UTM 0614179-6967602), is tested with a small digging (<1 m3 dump) 30m east of a small lake. Calcareous mica schist (±hornblende) with 1-3m thick layers of rusty, black phyllite/blackschist, in places containing graphite, surrounds amphibolite lenses of some meter thickness.
The digging is located at a 1m thick blackschist-layer with few-mm thick Po-bands and minor Py-Cpy-Mt bands. Interlayered, 1-2cm thick bands and lenses of dark quartzite with dusty Mt impregnation, which resembles bluequartz-Mt exhalites.
The western Rogn mine is a 3x3 m2 waterfilled shaft inclined to the west (150 m3 dump) at GPS53T (UTM 0614212 6967278). The dump material shows: 1) massive, brecciated Po-Cpy ore with minor Sl and Py and schist fragments, 2) massive, slightly banded, brecciated Py(-Sl) ore with schist fragments and folded, mm-cm-thick schist layers, 3) chlorite schist (±hornblende) with mm-bands of Py(±Po and Sl) and Cpy(-Sl) and lenses of dark quartzite with weak, fine grained Mt-impregnation. Both the pyrrhotitic and the pyritic ore types are locally relatively Sl-rich. Especially Sl is enriched distal to the pyritic ore, in thin pyritic bands in chlorite-hornblende schist, and minor as Sl-enriched bands in the massive Py ore. In the shaft walls can be seen several ore bands in hornblende schist (with quartz and biotite), and more massive amphibolite parts, which is chloritized towards the ore bands. A 0.5m thick pyrrhotitic ore, steeply dipping to the SW overly a 0.3m thick pyritic ore. Below, 1-1.5m thick hornblende schist with underlying 0.2-0.3m thick massive, pyritic ore and cm-thick Py-banding in a 0.5m thick schist sequence below. Additional ore bands are seen in the inaccessible west wall.
Two fold axis are observed: 197°/40° and 135°/?. 55m east of the shaft is a tiny excavation at a rustlense of fine grained hornblende schist with weak sulphide impregnation.
Eastern Rogn mine is located at UTM 0614527 6967274 (GPS54T). The workings consist of two trenches and three shafts (see sketch map) (3000 m3 dump). The outcrop shows mainly fine grained amphibolite, consisting of chloritized, sulphide-containing hornblende schist surrounding dm-m sized massive amphibolite lenses, and larger masses of amphibolite, which are commonly feldspar-porphyritic (diabase porphyrite), the phenocrysts being variably deformed to streaks and lenses. A few dump samples show diabase porphyrite, with 1-2cm sized, undeformed phenocrysts, that contain clusters and veins of Cpy and Po, and contact enrichment of Py, Po and Cpy in surrounding chlorite-hornblende schist. The dump material also shows massive, medium grained Py ore (at least 30cm thick) with only traces of Sl, massive Po-Cpy ore, and hornblende schist with Py impregnation and Mt-impregnated bands.

Dump volume: 3150 m3.

Susceptibility:
Noted in parenthesis below

Samples for analysis:

399821 (GPS52T): Blackschist with Po-Mt-Py-Cpy bands (200-500; up to 5 000 in local bands).

399822 (GPS53T): Massive Py(-Sl) ore with folded chlorite-hornblende layers (200-2 000).

399823 (GPS53T): Massive, brecciated Py-Sl ore with schist fragments and bands (100-6 000).

399824 (GPS53T): Same (30-5 000).

399825 (GPS53T): Massive, brecciated Po-Cpy-Sl ore with schist fragments (1 000-2 000).

399826 (GPS53T): Semimassive, brecciated Po-Sl-Cpy ore with schist fragments (100-400).

399827 (GPS54T): Hornblende schist with Py impregnation and Mt -impregnated bands (1 000-15 000).

399828 (GPS54T): Diabasporphyrite with Cpy-Po impregnation, and enrichment of Cpy and Po in hornblende schist along contact zone (60-400).

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399821	6	< 0.2	718	19	123	160	11,5
399822	19	1	761	9	53000	54	> 10.00
399823	16	1,2	705	7	74000	88	> 10.00
399824	20	1,5	1606	16	101000	62	27,8
399825	47	4,9	16000	42	68000	42	> 10.00
399826	42	4,2	9670	33	97000	15	> 10.00
399827	9	0,5	3062	16	205	30	24,9
399828	13	0,6	2841	98	389	14	5,16

52. Litlrena (Kårslåtthøgda) UTM 0618956 6971489

Location:

The mineralization is located between farmland and the river Litlrena, at (GPS111T). Access by road 200m south of the deposit.

Description of the workings:

ENE of two regrown excavation trenches is a 4x3 m2 waterfilled shaft, with a 15m long refilled excavation trench to the north, and a west-inclined, waterfilled shaft to the east (see sketch map).

Mineralization:

The ore is not exposed in the diggings, only at the NE riverbank, NE of the diggings. The 10m wide exposure shows fine grained, schisty amphibolite with fine grained, massive amphibolite above and below. The ore zone, which appears in the schistose amphibolite, is incompletely exposed, and seems to be approx. 1.5m thick, consisting of semimassive

to massive Po-Mt-Cpy ore in amphibole schist. The ore appears mm-banded in the amphibole schist, dominated by Po-Mt bands and minor Cpy-rich bands. The amphibole schist is, however, rusty, containing Po-Mt-Cpy impregnation, in a thickness of 5m surrounding the massive ore. The dump material shows fine grained, semimassive to massive Mt-dominated ore in amphibole schist, with frequent, cm-thick bands of Po and Cpy, varying in amount from almost massive Cpy to massive Po. Other samples show massive Po-dominated Po-Cpy(-Mt) ore, and also disseminated mineralization of Po-Cpy stringers in amphibolite is encountered.

Dump volume: 600 m3.

Susceptibility:
From 200 at semimassive Po-Cpy, to 400-800 at massive Po-Cpy, and >100 000 at massive Mt-dominated ore.

Samples for analysis:
400024: Semimassive to massive, fine grained Po-Mt-Cpy mineralization in amphibole schist; loc. riverbank.
400025: Semimassive, fine grained Mt-Cpy-Po in amphibole schist (isoclinalfold).
400026: Fine grained amphibole schist with semimassive Po-Cpy as concordant mm-stringers and veins.
400027: Massive, fine grained Po-Mt-Cpy ore.
400028: Semimassive, fine grained Mt(-Po-Cpy) in amphibole schist.
400029: Massive Po-dominated Po-Cpy ore.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
400024	75	1,3	6893	18	626	30	> 10.00
400025	359	1	4640	< 2	89	29	> 10.00
400026	548	6	29900	13	236	18	> 10.00
400027	98	1,2	3716	< 2	84	26	> 10.00
400028	34	0,3	1024	< 2	69	14	> 10.00
400029	37	2,5	19600	< 2	99	17	> 10.00

53. Kårslått (Kårslåtthøgda) UTM 0619821 6972757 (GPS33T), 0619659 6972685 (GPS34T)

Location:
The diggings are located at Kårslåtthøgda, 840m a.s.l. There are three groups of diggings over 500m NW-SE extension.

Mineralization:
The SE-most working is a 3x3 m2 waterfilled shaft (70 m3 dump). The mineralization is outcropping in the shaft as approx. 1m thick rusty chlorite schist with cm-sized garnets and unoriented hornblende needles (up to 1-2cm in size), containing thin (mm-cm thick),

concordant bands of Cpy (±Mt and Po). Up to 3-4cm thick bands of relatively massive, Cpy-rich mineralization, up to 2-3cm thick massive Po, and schist bands with Mt-impregnation are seen at the dump. The hangingwall is dominated by chlorite-hornblende schist (both fine and medium grained) with dm-thick horizons containing abundant carbonate spots, and thin horizons of quartzo-feldspatic schist. The hangingwall contact of the mineralization consists of coarse grained hornblende rock. Strike and dip of schistosity in the mineralization varies due to folding, but is generally 120°/60°. Lineation varies between 228°/40° and 245°/45°.
250m to the NW, at UTM 0619659 6972685 (GPS34T), occurs another group of diggings (300 m3 dump). A 20m long and 3-4m deep NNE-SSW running trench, with a NW-inclined shaft, and another shaft few meters to the SSW in the trench, as well as several water filled excavations in the bog up to 50m north of the trench. 20m SW of the trench are 3 adjacent waterfilled pits. In the trench is outcropping 2m thick fine grained chlorite-hornblende schist with garnet-rich bands and dm-thick bands and boudins of quartz, and stringers, concordant and discordant bands and impregnation of Cpy and Po. Enrichment of sulphides along quartz contacts as well as within the quartz. In the dump material is seen up to 7cm thick massive sulphide bands, both totally Cpy-dominated and totally Po-dominated. At the footwall appears a 40cm thick silicified, dens, hard chlorite-hornblende schist with disseminated, euhedral Mt (up to 0.5mm size) and weak sulphide dissemination. Above and below the ore zone appears carbonate-rich (spots and veins), feldspatic hornblende schist. At the dump is observed light, carbonate-rich quartz-feldspar schist with unoriented hornblende needles and sulphide dusting. Foliation varies because of folding, generally 185°/50°. Fold axis and lineation: 235°/35°. 35m south of the last mentioned 3 adjacent diggings is a waterfilled shaft with a tiny outcrop of chlorite-hornblende schist with Cpy-Po stringers. The hangingwall consists of 1m thick chlorite schist with large garnet (1-2cm size). Schistosity: 145°/45°.
(250-300m to the WSW is another group of diggings, which are not included in this review – heavy rainfall prohibited more paperwork.). The generally covered sulphide impregnation, outcropping in the diggings, possibly represents the same horizon, with changing dip from 120°/60° (SE-end) to 185°/50°, bending around SW-plunging fold axis.

Dump volume: 370 m3 at the two SE-ermmost mining sites.

Susceptibility:
Approx. 4 000 at Cpy-Po ore.
7 000-20 000 at Mt-impregnated hornblende schist.

Samples for analysis:
399760 (GPS33T): Garnet-chlorite-hornblende schist with Cpy-Po-Mt banding and impregnation.
399761 (GPS34T): Light carbonaceous quartz-feldspar schist with Py-dusting.
399762 (GPS34T): Chlorite-hornblende schist with Cpy-Po bands.
399763 (GPS34T): Massive Cpy(-Po) ore.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399760	486	10	39000	63	550	149	> 10.00
399761	10	< 0.2	1357	12	271	132	7,93
399762	293	7,6	37000	67	210	131	19,1
399763	244	43,3	204800	288	644	80	> 10.00

54. Hultrå (Råen) UTM 0620831 6979882

Location:
The stratiform Zn-Cu pyritic ore is showing up in an excellent exposure at the riverbank of Holda, south of Høgvollen, at GPS110T (UTM 0620831 6979882), and is exploited with adits (altogether 120m long (Aasgaard 1927)) on either side of the river. The road to Holddalsvollan is accessible by car.

Mineralization:
The outcrop at the northern riverbank exposes the ore zone over 5-6m strike length (fig. at sketch map). The massive, fine grained, banded Py-Sl-Cpy ore is 1.5-2m thick. Py is the dominant sulphide, with subordinate Sl-rich bands, generally 0.5-1cm thick, and minor Cpy-enriched bands. The ore contains occasional carbonate lenses (up to 1cm thick and few cm long), and large (10-70cm thick) inclusions (rounded nodules and lenses) of silicified amphibolite, diabasporphyrite (up to 5mm sized feldspar phenocrysts), and minor banded hornblende schist (banding almost parallel to ore banding, which bend around the inclusions). Locally the inclusions carry mm-thin Py veins, and occasionally they are weakly brecciated, with sulphide infilling around the rounded fragments. Cpy tends to be enriched at the inclusion contacts.

The ore banding is parallel to the sharp wallrock contacts. The footwall is unaltered, fine grained hornblende schist. The hangingwall is rimmed by 10cm thick slightly chloritized, fine grained hornblende schist with bands and dissemination of Py, capped by a 3m thick quartz-eye (<0.5mm) rhyolite with some Po-Py dusting. Above the rhyolite is an up to 40cm thick wedging lens of fine grained diabaseporphyrite, containing hornblende porphyroblasts and cm-sized feldspar phenocrysts, overlain by 3m thick rusty chlorite- and chlorite-hornblende schist with bands and impregnation of Py and minor Cpy. In this mineralized schist appear up to 1m thick lenses of fine grained amphibole schist and up to 0.5m thick quartz lenses. Above this is fine grained hornblende schist with weak Po-Py impregnation.

The same scenario appears at the entrance of the north-directed adit (200 m3 dump) 40m north of the river: The massive Py-Sl-Cpy ore is here 20-30cm thick. 10-20cm of the footwall is quartz-rich (silicified?) hornblende schist with occasional, thin chloritic bands and lenses. Further down the amphibolite is porphyritic. Hangingwall is 1m thick slightly chloritized and tectonized hornblende schist, overlain by the 1-1.5m thick rhyolite (with Po dust). Above this is 2-2.5m thick variably chloritized hornblende schist with impregnation, mm-cm thick bands, and up to 20cm thick lenses of massive Py, often

bound to quartz (±sericite) schist-lenses and -layers. In one of the Py bands is observed graphite. Subordinate in this zone occurs Po-Cpy rich bands and lenses. At the dump appear also bands of massive, brecciated Po-Cpy ore with chlorite schist fragments in the chloritic hornblende schist. Fold axis (200°/30°) of observed small folds in this upper mineralized horizon coincides with the plunge of the mineralized lenses. Strike and dip of schistosity is 185°/70°.
The adit 10m south of the river is directed to the south (300 m3 dump). It was not investigated – too much water prevented rivercrossing. For the same reason Skomse occurrence, plotted by Nilsen (1971) approx. 200m ESE of the Hultrå deposit, and registered by NGU as a Py-Po-Sl-Cpy deposit, was not visited.

Dump volume: 500 m3.

Susceptibility:
1 000-4 000 at massive Py-Sl-Cpy ore.
2 000 at massive Po-Cpy ore.

Samples for analysis:
400019: Massive, fine grained, banded Py-Sl-Cpy ore; RCS of 1.5m thickness at the riverbank.
400020: Massive, fine grained Py-Cpy-Sl ore.
400021: Massive, fine grained, banded Py-Sl(-Cpy) ore.
400022: Same as 400021.
400023: Massive, brecciated Po(-Cpy) ore with chlorite schist fragments.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	Ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
400019	64	10,1	6057	689	81100	47	> 10.00
400020	312	22,8	30200	108	135600	56	> 10.00
400021	126	11,1	5480	417	85500	128	> 10.00
400022	74	20,3	5950	1271	60400	44	> 10.00
400023	41	2,5	3099	10	688	54	> 10.00

55. Skjellåfjellet (Skjellåfjell) UTM 0624213 6981590

Location:
The shaft is located at the SW slope of Skjellåfjellet, 1095m a.s.l., at GPS56T (UTM 0624213 6981590). Accessible by footpath ca 1 hour from Holddalsvollan.

Mineralization:
The massive Po-Sl-Cpy ore appears in the Hyllingen gabbro. The orebody is tested with a shaft (waterfilled) inclined towards WNW. It is exposed only in the northern shaft wall, and seems to be stock-formed; alternatively, it could be more lens-shaped, with displacement along observed fracture direction at 108°/90° as reason for the missing extension into the SE shaft wall, which consists of Po-Cpy-impregnated, coarse grained

gabbro. The orebody has sharp, undulating contacts (approximate direction 25°/70°) to a hornfelsic wallrock with Po-Cpy dusting. The hornfels surrounds the ore and extends 4-5m on either side, and can be followed 60-70m NNE-wards. Surrounding rock is alternating coarse and fine grained gabbro. The Zn-rich ore (which is abundantly appearing at the tailing) is massive Po-Sl-Cpy-Py, dominantly fine grained, with locally more medium grained Sl, Cpy and clusters of Py. The ore is slightly banded, with alternating bands of Po, Sl and Cpy. Po is dominant, with banded Sl-enrichment along the western contact and minor interbanded centrally in the ore. These bands consist of almost pure Sl, frequently interbanded with mm-cm thick Cpy-rich bands.
A separate ore lens (1m x 0.2m) can be seen in the inaccessible north wall of the shaft. Among the dump material is also found a soft, coarsegrained alteration rock consisting of unoriented muscovite flakes (and talc?). 50m south of the shaft are foundation walls of two huts. In the surrounding area rusty gabbro appears locally several places. At UTM 0624330 6981540 is a small excavation (1 m3 dump) in gabbro with Po-Cpy (-pentlandite?) impregnation.

Dump volume: 200 m3.

Susceptibility:
Massive ore shows 2 000-15 000, typically 4 000-5 000.
Wallrock-hornfels: 100.

Samples for analysis:
399833: Massive, fine grained Sl(-Cpy-Po) ore, Sl-rich; loc. shaft wall.
399834: Semimassive, banded Po-Cpy-Sl ore.
399835: Hornfels with Po-Cpy impregnation.
399836: Massive, fine grained Po-Sl-Cpy ore.
399837: Same as 399836, more Sl-rich.
399838: Coarse grained gabbro with Po-Cpy impregnation.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399833	83	6,5	8018	104	195000	27	18,7
399834	79	11,1	22000	320	77000	31	25,5
399835	21	1,8	2977	55	1490	8	7,18
399836	15	5,2	6570	58	66000	6	> 10.00
399837	69	15,7	27000	96	106000	12	> 10.00
399838	21	0,8	1252	72	3160	13	3,42

56. Heina or Veunda UTM 0627819 6981294

Location:
The mineralization is located 400m SW of the river Veunda, 930m a.s.l., at GPS57T (UTM 0627819 6981294). A 7-8km walk from Holddalsvollan.

Mineralization:
The mineralization is hosted in metasediments approx. 300m east of the contact to the Hyllingen gabbro complex. The workings consist of a 2x2 m2 waterfilled shaft (5 m3 dump) 20m SW of a creek, with a 15m long excavation trench (no outcrop) 10m to the west, and a small pit (1 m3 dump) 12m to the ESE (see sketch map).
The dump material shows:

- Massive, coarse grained Po ore with traces of Cpy and occasional, cm-sized quartzite nodules.
- Massive, medium grained Py ore (≈1mm crystals) with occasional, cm-sized quartzite nodules.
- Coarse grained Py (up to 10mm sized) in groundmass of Po.
- White quartzite (±minor muscovite) with impregnation and semimassive to massive bands of Py.
- Quartzite with impregnation and irregular veins of Po.

The shaft exposes a 3m thick (may be more) ore zone, dominated by Po as impregnation and semimassive to massive bands up to 1m in thickness. Py occurs subordinate, mainly as impregnation. Wallrock is grey to grey-greenish schist, in places containing small garnet. The mineralization can be followed in one direction, as gossan northwards to the creek, where it wedges out towards a fault zone. A 4-5m thick lens of coarse grained granite crops out 10m north of the shaft, from where it continues northwards towards the creek, and in the other direction it bends of to the SE. Between this granite lens and the shaft appears covered, massive Mt-mineralization (strong magnetic influence at the compass) which appears to be very local. At the dump of the SE-pit, massive to semimassive Py show up. It seems like it is a single, at least 30m long, folded ore horizon consisting of variable proportions of Po and Py with traces of Cpy, capped by iron formation at the footwall of a granite lens.

Dump volume: 6 m3.

Susceptibility:
Massive Po ore: 700-1 000.
Massive Py ore: 5-10.

Samples for analysis:
399839: Massive Py ore.
399840: Massive Po ore.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399839	312	2,2	332	19	1016	477	> 10.00
399840	42	3,4	227	17	85	110	> 10.00

57. Blåhenbekken (Blåhenbekken) UTM 0626017 6977695

Location:
The digging is located 920m a.s.l. at GPS58T (UTM 0626017 6977695).

Mineralization:
In the small digging is outcropping a 1.5m thick rustzone consisting of grey quartzite with Po-dust, to slightly richer impregnation, with a 10-20cm thick layer of massive Po-Cpy mineralization. Can not be followed along strike due to overburden. Gabbro crops out few meters to the east. 60m east of the digging is an exposure of dark grey, quartzitic schist with weak Po-Cpy impregnation, with gabbro outcropping above and below.

The dark, rusty, Po-Cpy-impregnated quartzite is also exposed at other localities, at or close to the contact to the Hyllingen gabbro:
- UTM 0626740 6979550
- UTM 0626070 6977980
- UTM 0624850 6977450

Dump volume: 1 m3.

Susceptibility:
800 at the massive Po-Cpy ore in the digging.
100-200 at the quartzite with Po-dust in the digging.

Sample for analysis:
399841: Massive, fine grained Po-Cpy mineralization.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399841	17	36,3	4718	36	81000	1100	> 10.00

58. Holdsjøhøgda (Stillbankan) UTM 0624895 6974335

Location:
The digging is located 1km SW of Holdsjøen, 845m a.s.l. at GPS46T (UTM 0624895 6974335).

Mineralization:
The digging exposes an at least 1m thick fine grained, epidotized amphibolite (epidote rock) with Cpy-impregnation and <1mm sized hematite plates, and overlying, weakly chloritized hornblende schist - both jointed and fractured, and containing up to 5-10cm thick calcite lenses. The epidote rock is strongly rust-weathered and crumbled, with occasional coating of malachite and chrysocolla. A few dump samples show semimassive to massive Po-Cpy(-Sl) mineralization in epidote-amphibolite. It is a small outcrop of immediately overlying calcite marble with mm-bands of chlorite-amphibole schist.
The mineralization is more likely a small skarn-like sulphide enrichment, even though overburden hide the possible SW-extension. 100m to the SW is exposed a 0.5m thick

marble horizon in a karst-fracture in fine grained hornblende schist. Schistosity: 195°/50°.

Dump volume: 2 m3.

Susceptibility:
200-1 500 at semimassive Po-Cpy mineralization, and 100 at epidotized amphibolite with Cpy impregnation.
Samples for analysis:
399806: Semimassive Po-Cpy(-Sl) in epidote-amphibolite.
399807: Epidotized amphibolite with Cpy-impregnation.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399806	46	2,2	6538	31	1944	10	25,5
399807	21	1,6	7350	48	9742	< 5	2,04

59. Gamle Folldalsgrube (Kongetjønnan) UTM 0626027 6972448

Location:
The deposit is located SW of Kongetjønnan, 905m a.s.l. at GPS47T (UTM 0626027 6972448).

Mineralization:
The mineralization is followed with 7 diggings along a 160m long SE-NW extension, to test separate ore rods (plunging 270°/35°) consisting of massive to impregnation-type Po(-Cpy) ore and massive Mt horizons (see sketch map):

1) The SE-ernmost and largest trench is 20m long and 5m deep in the NE end. It is following an up to 2.5m thick ore rod, which plunges 270°/35°. The ore rod resembles a rose branch, with flattened barbs extending into the wallrock, which is massive (locally schistose), dens, fine grained amphibolite, with Po stringers close to the ore. Below the ore rod, 10cm thickness of the immediate wallrock contains mm-thick bands rich in Mt in addition to the Po stringers. The ore consists of massive, fine grained Po, with minor Cpy (typically as mm-sized spots); judged from the remaining material the ore is low-grade in Cu. Parts of the ore is semimassive Po(-Cpy) in amphibolite. Faults (155°/75°) have occasionally displaced the ore up to a few dm. Short NE of the trench appear two adjacent, few-dm thick ore rods which plunges 265°/30°. Close by occur a few-m thick lens of leucocratic rock (trondhjemite?) and an adjacent exposure of few-m thick grey gneiss to the NE, in the elsewhere dominating amphibolite, which close to the leucocratic lens is porphyritic (mm-sized feldspar phenocrysts).
2) Tiny excavation at rusty, jointed (small blocks), fine grained amphibolite with Mt- and minor Cpy-Po-impregnation over at least 3-4m thickness. In parts epidotized.

3) Small digging in a steep slope showing a 20cm thick massive, fine grained Mt layer at the contact to a 3-4m thick lens or rod of Mt-Po(-Cpy)-impregnated, and subordinate semimassive-massive Po(-Cpy) in amphibolite, plunging 270°/35°.
4) Same as 2).
5) Same as 2).
6) Small digging. Approx. 3m thick rod of semimassive to massive Po-Cpy-Mt in fine grained amphibolite. Bands rich in Mt.
7) Small excavation. Impregnation of Mt, Po and Cpy in amphibole schist.

Dump volume: 250 m3.

Susceptibility:
2 000 at massive Po(-Cpy) ore.

Samples for analysis:
399808: Massive, fine grained Po(-Cpy) ore.
399809: Fine grained amphibolite with Po-Cpy impregnation; footwall contact to massive ore.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399808	81	1,6	6055	25	62	< 5	> 10.00
399809	11	< 0.2	1491	8	117	6	16,6

60. Menntjønna UTM 0627484 6972639

Location:
The mineralization is outcropping at a ridge, 1020m a.s.l., 800m SW of Menntjønna at UTM 0627484 6972639 (GPS48T).

Mineralization:
Outcrop of 30-40cm thick massive, fine grained, schisty Mt mineralization in amphibole schist. Can be followed as compass influence, mostly covered by local, upweathered boulders of rusty, block-jointed amphibolite with weak sulphide impregnation, which is associated to the iron formation.

Dump volume: 0

Sample for analysis:
399810: Massive, fine grained, schisty Mt mineralization.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399810	101	0,5	67	10	144	< 5	> 10.00

61. Øvre Børklepptjønna (Øvre Børklepptjern) UTM 0627225 6971768

Location:
The diggings are located 250m north of Øvre Børklepptjønna, 945m a.s.l., at UTM 0627225 6971768 (GPS49T).

Mineralization:
Over 100m NW-SE extension are 4 small diggings at up to 1m thick rods of massive Po-Cpy-Mt mineralization plunging 270°/15° (see sketch map). Parts of the mineralization are semimassive in fine grained amphibolite, and parts of more coarse grained, massive Mt. Wallrock is fine grained amphibolite (some meters away porphyritic), which in places is seen to be epidotized at the ore contact and few dm outwards, where a few-dm thick hornfelsic rock appears. At the SE-ernmost digging is outcropping a 1-1.5m thick layer of calcite marble, which occur 1-2m below the ore rod. This layer is folded with same axis as the plunge of the rods, 270°/15°. If this layer continues NW-wards below the other ore rods is not evident due to overburden, and for the same reason a potential connection between the ore rods can not be ruled out.

Dump volume: 3 m3.

Susceptibility:
80 000-100 000 at massive Po-Mt-Cpy mineralization.
>100 000 at massive Mt mineralization.

Sample for analysis:
399811: Massive Po-Mt-Cpy mineralization.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399811	1429	1,4	4669	19	50	< 5	> 10.00

106. Taraldsbakken UTM 0620185 6962253

Location:
Taraldsbakken claim UTM 0620185 6962253 is located by the SE roadside of the local road between Nesvollmon and Engan in Holtålen.

Geology, outcrops:

The mineralization is located in Fundsjø group/Hersjø formation close to the Dalsbygd group. It occurs as a layer parallel to the footwall schist 214°/45°NW, which also is dip slope to the road side. See enclosed sketch section.

1. Footwall rock of Røros garben schist.
2. Silicified footwall about 0,5m thick with disseminations of Cpy and Po. The silicified zone is regarded as an alteration zone.
3. Mineralized zone up to 0,1m thick with stockwork mineralization of Cpy, Po, Sl and Gn.
4. Hanging wall schist rich in carbonate.

Mineralization:
The mineralized zone is concordant to the contact rocks, Røros garben schist in the footwall and lime schist in the hangingwall. Chalcopyrite, pyrrhotite, sphalerite and galena are identified in the up to 0,1m thick mineralized zone. The sulphides occur in a stockwork pattern in the mineralized zone. Chalcopyrite and pyrrhotite occur as disseminations in the 0,5m altered (silicified) footwall zone to the mineralized zone.

Sample collected for analysis:
399854: One sample with Cpy, Po, Sl and Gn was collected for analysis. Susceptibility: 200.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399854	23	1,3	9947	2420	24000	8	11

Kjøli district:
In the Kjøli area a great number of small, abandoned mines and prospects delineate an extensive zone of abundant sulphide mineralization in the Røsjø formation along the strike between Øvre Gauldalen and Tydal. Most of the deposits were discovered and ultimately exploited during the 18th and 19th centuries. The Kjøli mine is the largest one; it was discovered in 1766, and worked intermittently until it was finally abandoned in 1941.

62. Svenskmenna (Gauldalsgruvhøgda) UTM 0628531 6968978

Location:
The mine is located just east of the Menna river, 805m a.s.l., 1.3km north of the Reitan-Tydal road, at UTM 0628531 6968978 (GPS37T).

Description of the mine:
The orebody is exploited by an approx. 160m long, branching, gently inclining adit; the entrance (UTM 0628531 6968978, GPS37T) is at the northern edge of the dump pile (see sketch map). The mine site also reveal two ventilation shafts and stone wall ruins. 130m

WNW of the adit opening is a 4x3 m2 waterfilled digging at the westbank of Menna (UTM 0628457 6969044, GPS41T).

Mineralization:
The area is covered and no outcrops are to be found, except along river Menna. Ore types observed at the dump pile:

- Massive, medium to fine grained, brecciated Po-Py-Cpy ore with twisted and rotated schist fragments, quartz eyes and in places scattered, mm-sized garnets; in places containing large, up to 10mm, rounded (corroded) Py porphyroblasts, and locally Cpy-rich. This ore type is seen to be bordered by sericite schist, chlorite schist, and a few samples show a 7-10cm thick, concordant ore layer capped on both sides by cm-thick Py-Cpy impregnated graphitic muscovite-sericite schist (in the massive ore Cpy is here enriched towards the wallrock).
- Massive, partly banded Py(-Cpy-Sl) ore (up to at least 0.5m thickness). Variable Py grain size, generally fine grained with scattered euhedral Py up to a few mm size; local bands containing coarse, up to 10mm, subhedral, cataclastic Py. In the Py-dominant ore, Cpy and/or Sl are enriched in thin bands. Sl is seen to be concentrated in a few-mm thick contact zone to the schist. Slightly magnetic bands might contain scattered, fine grained Mt (or Po).
- Garnet-mica schist with thin, concordant bands of massive Py.
- Sericitic schist and chloritic schist with impregnation, thin bands and stringers of Po and Cpy. In places Cpy mobilized along thin crosscutting fractures in the schist.
- Cpy and Po concentrated at the contact between sericite schist and up to 10cm thick quartz lenses; Cpy-Po-infilled fractures in the quartz lenses. In places thin biotitite layer capping the quartz lenses.

Apart from the mentioned alteration rocks, muscovite-sericite schist, sericite schist and chlorite schist, the dominating wallrocks at the dump are grey schist and biotite schist.
A very interesting mineralization with promising Zn-potential , at a higher level than the exploited orebody, appears 130m WNW of the adit (GPS41T). It is only tested with a shallow pit. The digging is located 5m west of a waterfall, which runs over a 2m high cliff. At the bottom of this runs a distinct thrust fault with direction 243°/25°. The ore zone is embedded in the thrust zone, between overlying 2-3m thick mylonitic gabbro (fine grained, dense, epidotized and partly banded) and underlying chloritized mica schist. Mica schist above the gabbro lens/layer exhibit open folds (330-340°/0-10°).
In addition to a small outcrop in the digging, the ore is exposed 5m to the NE, at the edge of the waterfall. 60cm thick massive ore consists of banded Sl-Py-Cpy ore. The banding is typically in cm-scale, with alternating bands of Sl, Py and Cpy, but up to 10-15cm thick massive Sl with scattered Py crystals, up to 8cm thick massive, fine grained Py, and 2-3cm thick massive Cpy occur. Immediately above the massive ore appears 60cm thick, rich impregnation of Sl, Cpy, Py and traces of Gn in tectonized, partly brecciated chloritic schist and sericitic schist. The disseminated ore, which exhibits a reddish color from fine grained Sl, also contain some few-cm thick bands of alternating massive Sl, Cpy and Py. Frequent minor faults offsets these ore bands with few mm to cm.
The 1.20m thick ore zone wedges out NE-wards. On the NE side of the waterfall, 10-15m NE of the above mentioned exposure, the mineralization is only a few cm thick, squeezed into the thrust zone.

A drill hole (drilled in 1917) is seen at the river bank a few meters north of the outcropping ore. According to a sketch by Aasgaard (1927), this hole did not intersect mineralization above the lower, exploited orebody. Aasgaard also mentions a digging close to the river at least 150m to the south, which I did not find. This could be the same Zn-rich ore zone! At the riverbank (125 SW, 45 N in the geophysical grid) appears a 20-30cm thick chlorite schist with impregnation and thin veins of Cpy, surrounded by mica schist with garben-hornblende needles. Schistosity: 210°/10°.

Dump volume: 2500 m3.

Susceptibility:
Massive Po-Py-Cpy ore: 300-5000, typically 1000-2000; Massive Py(-Cpy-Sl) ore: 500-2000; Po-Cpy impregnation in chloritic- and sericitic schist: 500-800; The Sl-rich ore at GPS41T is not measured.

Samples for analysis:
399768 (GPS37T): Massive Py-Po-Cpy ore with chlorite schist fragments and mm-sized garnets; at the contact to sericite schist.
399769 (GPS37T): Massive, fine grained Po-Py-Cpy ore with chlorite schist fragments, scattered garnets and up to 10mm sized, rounded Py porphyroblasts.
399770 (GPS37T): Sericitic schist with Po-Cpy impregnation in thin bands.
399771 (GPS37T): Chloritic mica schist with sulphide impregnation as thin stringers.
399772 (GPS37T): Massive Po-Py-Cpy ore with contact layer of graphitic muscovite-sericite schist with Cpy impregnation.
399773 (GPS37T): Massive, fine grained Py(-Cpy-Sl) ore.
399774 (GPS37T): Same as 773.
399775 (GPS37T): Rich Cpy(-Po) mineralization along schist/quartz lens contact, and Cpy fracture filling in quartz.
399794 (GPS41T): Massive, fine grained Sl with minor, scattered Py.
399795 (GPS41T): Mylonitic chlorite(-sericite) schist with impregnation and bands of Sl, Cpy and Py.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	Ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399768	47	3,3	10000	88	1364	207	> 10.00
399769	44	6,5	19000	83	5791	213	> 10.00
399770	45	2,2	5321	22	805	147	7,98
399771	11	< 0.2	821	24	269	166	8,61
399772	1248	7,4	12000	163	9707	394	> 10.00
399773	113	9,2	8965	314	36000	221	> 10.00
399774	193	4,1	3224	153	36000	224	> 10.00
399775	571	11,8	48000	94	2146	97	> 10.00
399794	198	136,8	507	83600	349900	51	18,8
399795	193	14,2	3031	284	149000	58	16,9

63. Rørosmenna (Gauldalsgruvhøgda) UTM 0629032 6969607

Location:
Rørosmenna is located 800m NE of Svenskmenna, at GPS38T (UTM 0629032 6969607).

Mineralization:
The workings consist of 4 shafts over a NNE-SSW direction of 50m (see sketch map). In the covered terrain, exposures are limited to the workings. Two different ore types are encountered at the tailings, as well as in outcrop: 1) massive, fine grained, brecciated Po-Cpy ore (pyrrhotitic ore), and 2) massive, fine grained, banded, Zn-rich Py-Sl-Cpy ore (pyritic ore). Observations of the outcropping ore in the shafts lead to an assumed interpretation of the mineralization as two sheets of different ore types, an upper Po-dominated and a lower Py-dominated, that are folded, with relative gentle plunge towards WNW to NW. Shaft 2 and 4 are located at the outcropping crests of two antiforms, with thickening of the ore, whereas shaft 1 and 3 intersect the limbs. The west-wall of shaft 4 exposes the pyrrhotitic ore in an open antiform (axis 285°/15°). Ore thickness is 40-60cm, with thickening up to 80cm at the hinge zone. 40cm of the footwall is exposed, which is kink folded chlorite-sericite schist with impregnation and mm-banding of Py, Cpy, Sl and Gn. Less chloritized mica schist make up the hangingwall. The ore layer dips 40° to the north in the north-wall. At the eastern edge of the shaft is exposed an at least 5-10cm thick, massive Sl-Py mineralization, which is embedded in sulphide-impregnated sericite schist, obviously below (approx. 0.5m?) the pyrrhotitic ore. Chlorite is the dominant alteration product surrounding the upper, pyrrhotitic ore, whereas sericite alteration envelops the pyritic ore.

The pyrrhotitic ore follows the gently dipping limb along the wall of shaft 3, and emerges in shaft 2, which is located at the outcropping crest of a closed to tight antiform. The ore is here thickened to 3m width, and it seems like the lower pyritic layer is upfolded into the upper pyrrhotitic layer, forming the core in the tight fold. It seems like the fold axis plunge 135°/5-10°. The pyrrhotitic ore layer emerges in the north-wall of shaft 1.
5m east of shaft 1 the pyritic ore type appears as several, massive, concordant ore bands (up to 15cm thick) within a thickness of at least 0.5m in chlorite schist, following along the here prevailing direction, 125°, of a horizontal fold axis. A possible refilled excavation, with adjacent ore material and gossan, 30m north of shaft 4, indicates reappearance of the ore zone.

Two ore types are sorted at the dump: The pyrrhotite ore is dominated by Po, with subordinate Cpy and Sl, and scattered euhedral Py porphyroblasts of 1-3mm (up to 7mm) size. The ore is brecciated, and contain frequent bent and rotated chlorite schist fragments and quartz eyes and –lenses.

The banded pyritic ore consists of Py and Sl with minor Cpy and traces of Mt. The ore is Zn-rich, containing cm-dm thick bands of almost pure Sl with scattered Py crystals (up to 2-3 mm size) in Sl matrix. As in shaft 2, dump samples show that the two ore types can appear in contact (sharp) with each other, and that subordinate, cm-thick, Sl-rich layers appear in the pyrrhotitic ore.

85m west of the shafts, at 762NE, P2+65NW in the grid (see sketch map), is a small digging. In immediate vicinity, rusty, mineralized boulders are spread over an approx. 60

m2 area. This is local up-weathered material and probably partly derived from the digging.

They show: 1) bands (3-4cm thick) of massive, fine grained Sl-Gn-Cpy, some are very Gn-rich, in altered, white quartz-feldspar schist, 2) Gn-Cpy(-Sl) impregnation in bands and lenses in greenish schist, 3) silicified rock with sulphide impregnation, and 4) brecciated quartz lenses with Sl-Gn-Cpy infilling and associated 3-4cm thick layer of massive Sl-Gn-Cpy in chloritic schist, which also holds mobilized Cpy at thin joints. Another small digging at 750NE, P2+100NW exposes no visible mineralization, but at an adjacent hillock is spread small rocks showing massive Po-Cpy. Six drill holes N and NW of Rørosmenna intersected a number of massive Po-Cpy horizons of up to 85cm thickness (Rui & Bakke 1975).

Dump volume: 5000 m3.

Susceptibility:
Massive Po-Cpy-Py ore: 200-700; Massive Sl(-Py) ore: 50-100; Massive, banded Py-Sl-Cpy-Mt ore: 800-1500; The Gn-rich ore type from the digging at UTM 0628947 6969627 is not measured.

Samples for analysis:
399776 (GPS38T): Massive, fine grained Sl with scattered Py crystals.
399777 (GPS38T): Zoned ore; massive fine grained Po-dominated Po -Cpy(-Sl) ore with Py porphyroblasts, chlorite schist fragments and quartz lenses, and 2cm thick band of massive Sl, with quartz eyes, at the contact to chlorite schist.
399778 (GPS38T): Massive, fine grained, brecciated Po-Cpy ore with 1-7mm sized Py crystals, chlorite schist fragments and quartz eyes.
399779 (GPS38T): Same as 778.
399780 (GPS38T): Sericite-chlorite schist with mm-thin bands of Py -Cpy-Sl-Gn; footwall of massive Po-Cpy-Py ore, northernmost digging.
399781 (GPS38T): Massive, banded Py-Sl-Cpy-Mt ore.
399796 (UTM 0628947 6969627): Massive, fine grained Sl-Gn-Cpy bands in quartz-feldspar-sericite schist.
399797 (UTM 0628947 6969627): Quartz-breccia with Sl-Gn-Cpy-infilling.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399776	770	121,4	2329	38100	342700	115	27,5
399777	113	10,4	8817	1713	115000	123	26
399778	148	4,6	18000	168	9498	91	> 10.00
399779	99	2,8	12000	108	7710	113	> 10.00
399780	59	3,7	663	9402	15000	168	10,3
399781	240	45,6	6127	21800	126000	112	> 10.00
399796	65	9,4	2587	33400	68000	38	5,35
399797	76	5,6	2348	8560	109000	10	5,86

64. Guldal (Gauldalsgruvhøgda) UTM 0629912 6970382

Location:
The mine site is located at Gauldalsgruvhøgda, 950m a.s.l. at (GPS39T, UTM 0629912 6970382 at northernmost shaft) to UTM 0629966 6970164 (GPS40T, at southernmost digging). This is 1100m NE of Rørosmenna.
Description of workings, mineralization and wallrocks:
Numerous shafts, adits and diggings are spread over an area of 200x100 m2 (see sketch map), following what is presumably the same, undulating ore horizon. Only the brecciated, pyrrhotitic ore type with Cpy, and associated discontinuous iron formation, is meat with. The Zn-containing pyritic type, known from Svenskmenna and Rørosmenna, do not occur. The workings are numbered at the sketch map.

1) No digging, but outcropping, up to 40cm thick lens of massive, fine grained Mt. Wallrock is a light feldspatic rock containing garnet, chlorite and hornblende, which is found exposed around the adjacent stone wall ruin of an old house.
2) 1-1.5m thick massive Po-Cpy ore, with massive Mt(-Cpy-Po) layers and lenses intercalated and along the contacts, is exposed in a waterfilled pit. Wallrock is garnet-hornblende-chlorite schist with Cpy(-Po) stringers. Also lens of same, with coarse grained hornblende, and Cpy in stringers and along late joints, incorporated in the ore. This lens is rimmed by few-cm thick massive Mt.
3) Small pit; only gossan.
4) Waterfilled pit; small outcrops of both massive Po-Cpy and massive Mt; both types appear at the dump.
5) Waterfilled pit; ore not exposed; biotite schist in the footwall, with chlorite schist along the contact to where the ore is assumed to be. The small dump show mainly brecciated Po(-Cpy) with minor Sl, and a few samples of brecciated Py ore.
6) Outcropping dm-thick chloritic schist with Cpy impregnation.
7) Waterfilled pit; no ore exposed, only wallrock of silicified hornblende-chlorite rock with weak Cpy-Po-Sl impregnation. The dump material shows brecciated Po-Cpy ore with contact layer of finely laminated Mt-Po-Cpy against chlorite schist (with large hornblende needles), which is often Cpy-rich along the contact to the massive Mt.
8) Waterfilled pit; exposed mica schist; no outcropping ore. Dump material shows Po-Cpy breccia ore with traces of Sl, and subordinate massive Mt-Cpy at the contact to the former.
9) Waterfilled inclined shaft to the SW; no outcropping ore.
10) Deep waterfilled shaft ("Tydølernes skjerp"); outcropping brecciated Po-Cpy ore that seems to be 2-3m thick, folded and steeply dipping to the SW. Wallrock is mica schist.
11) Waterfilled adit towards SW ("Gammelgruben"); no outcropping ore. Folded chlorite schist in the hangingwall. Gently dipping towards SW.
12) South-directed adit with connection to 11). At least 0.7m thick massive, brecciated Po-Cpy ore with intercalated quartz lenses crops out at the entrance. Garnet (up to 10mm sized)-chlorite schist in the hangingwall.
13) Two small, adjacent excavations exposes massive Po-Cpy ore with intercalated lenses and bands of massive Mt.
14) Small digging at chloritic schist with Cpy impregnation.

15) Small digging at massive Mt(-Cpy) mineralization.
16) Three adjacent, interconnected shafts with rails ("Hovedgruben"); outcropping rustband in the shaft wall. In addition to the dominating Po-Cpy ore, the dump material shows massive Mt bands alternating with bands of massive Po and Cpy-rich bands (mm-cm scale). Gabbro is exposed 20m north of the shafts.

As above mentioned the ore zone is assumed to be continuous along the two NE-SW directed rows of diggings (see sketch map), and in-between them, forming an open synform. The appearance of this synform is also indicated by the direction of the adit at "Gammelgruben", which is gently inclined towards SW before it rises in the direction of digging 4) (see profile sketch in Aasgaard (1927)). It is possible that the NE-ernmost inclined shaft "Hovedgruben" exploit the NE-limb of a subsequent antiform. The fold axis affecting the structure of the ore horizon plunge gently to the NW.
The relationship between the two ore types seem rather complex and irregular, but it look like the oxide facies is associated with the massive sulphide ore along the entire extension, as intercalations and rims; and also dispersed into the wallrock with no immediate relationship to the sulphide ore. The finely laminated, massive Mt mineralization carries fine banding of Cpy and Po. The wallrocks are dominated by mica schist with layers of more massive greywacke away from the ore horizon, and a light feldspatic rock below the ore. Gabbro lens(es) appears close to "Hovedgruben". Chlorite schist (±garnet) occurs both along the hangingwall and the footwall of the ore.
Approx. 300m to the west, at 1625 NE, P2+50 NW in the grid, is a digging which shows a lens of up to 70cm thickness, thinning to 20-30cm, of the same massive, brecciated Po-Cpy ore. 30m westwards is another small digging at the same ore horizon, here 60cm thick. The terrain surrounding the diggings is covered. Approx. 800m west of the Guldal mine, at UTM 0629080 6970200, is a possible excavation. It is a waterfilled pit with strong rust staining at the bottom, surrounded by boulders of massive, brecciated Po-Cpy ore.

Dump volume: Estimated at 4000 m3.

Susceptibility:
(Obtainable from S.Gamsts diary.)

Samples for analysis:
399782 (GPS39T): Massive, brecciated Po-Cpy ore with fragments of chlorite-biotite-amphibole schist and quartz eyes.
399783 (GPS40T): Finely laminated, fine grained Mt-Cpy(-Po) ore at the contact to massive Po(-Cpy) ore.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399782	64	2,9	14000	72	1946	87	> 10.00
399783	31	4,7	13000	80	8871	176	> 10.00

65. Godthåb (Nyrønningsbua) UTM 0630655 6970742

Location:
The Godthåb shaft is located 900m NE of the Guldal mine, 940m a.s.l., at UTM 0630655 6970742 (GPS42T).

Mineralization:
The mineralization is tested with a 3x3 m2 shaft, now waterfilled.
The ore zone is not exposed in the shaft, but the dump material shows the ore to be massive, brecciated Po with subordinate Cpy and Py (Py as ≈1mm (up to 5mm) porphyroblasts), and chlorite schist fragments and quartz nodules. The chlorite schist fragments often carry Cpy stringers. A few samples of massive Py ore appear at the dump. Chlorite schist and muscovite-sericite schist appear at the ore contact.
Wallrock is light grey-green mica schist with muscovite and chlorite. Gabbro is exposed in the vicinity. Schistosity: 245°/35°.
The mineralization is followed with an excavated, shallow trench (with short branching trenches) to the ENE. Massive, medium grained Py with subordinate Cpy, Sl and Mt is exposed 3 places along the trench, up to 60m away (ENE of) from the shaft. The small exposures show the ore zone to be at least 20cm thick.
Some graphite is observed at the ore contact.
An alteration zone of chlorite-muscovite schist can be followed 50m further to the ENE.
West of the shaft the terrain is covered.

Dump volume: 40 m3.

Susceptibility:
300-800 at massive Po-Cpy ore.
100-1100 at massive Py(-Cpy-Sl-Mt) ore.

Samples for analysis:
399798 (UTM 0630655 6970742): Massive Po(-Cpy) ore.
399799 (UTM 0630655 6970742): Massive Po-Cpy ore, Cpy-rich.
399800 (UTM 0630655 6970742): Semimassive Py ore with quartz eyes.
399801 (UTM 0630710 6970762): Massive Py(-Cpy-Sl-Mt) ore; loc.trench.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399798	332	2,9	8606	90	1621	52	> 10.00
399799	665	5,5	26000	82	1313	14	> 10.00
399800	1393	2,5	599	45	289	35	> 10.00
399801	421	4,1	19000	61	951	94	> 10.00

66. Godthåb north (Nyrønningsbua) UTM 0630517 6970944

Location:
250m NNW of Godthåb, adjacent to a ropeway station, at UTM 0630517 6970944 (GPS43T).

Mineralization:
2 diggings, 5 and 20m east of the river, show no exposed mineralization, but dump material shows chlorite-biotite schist with Po-Cpy-Py stringers. The mineralization is outcropping in the river as a 30cm thick rustzone.
40m to the east is a tiny digging in the same type of impregnation mineralization (shown by the <1 m3 dump material).
100m SSW of the 2 above mentioned diggings is a small excavation (<1 m3 dump) which shows a small exposure of chlorite-biotite schist with Cpy stringers and Py-crystal dissemination.

Dump volume: 40 m3.

Sample for analysis:
399802: Chlorite-biotite schist with Po-Cpy-Py stringers.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399802	33	1,3	5995	25	2930	25	23,2

67. Jensåsbekken west UTM 0630963 6971283

Location:
600m NNE of Godthåb shaft, 950m a.s.l., at UTM 0630963 6971283 (GPS44T).

Mineralization:
The workings consist of an approx. 200m(!) long NNW-SSE running, shallow excavation trench, with some smaller excavations nearby. Almost no outcrop to be seen. Dump material shows stringers of Po-Cpy-Py in both chlorite schist (partly brecciated) and biotite schist with hornblende. Most of the rusty boulders consist of chloritic mica schist with weak sulphide impregnation. Subordinate graphite is associated with the mineralization.

Dump volume: 30 m3.

Sample for analysis:
399803: Semimassive Po-Cpy-Py as stringers in brecciated chlorite schist.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399803	19	2,1	12000	45	941	7	> 10.00

68. Jensåsbekken UTM 0631232 6971628

Location:
1100m NNE of Godthåb shaft, 1000m a.s.l., at UTM 0631232 6971628 (GPS45T).

Mineralization:
A 8m long, NE-SW running digging in the hillside shows an up to 40cm thick pinch and swell layer of massive, brecciated Po-Cpy ore with schist fragments and quartz nodules, bound to a chlorite schist horizon.
Wallrock is biotite dominated garnet-mica schist.
Dump material also shows a few cm-thick bands of massive Cpy in the garnet-biotite schist.
Schistosity: 230°/15°.

Dump volume: 30 m3.

Samples for analysis:
399804: Massive, brecciated Po-Cpy ore.
399805: Garnet-biotite schist with two 1cm thick massive Cpy bands.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399804	28	1	5483	45	481	< 5	> 10.00
399805	36	2,3	69000	164	582	< 5	17,5

69. Kjøli grube (Kjøligruva) UTM 0633900 6973670

Location:
Accessible by car along 4.5km road from Jensåsvollan. A short visit was conducted during this campaign.

Geology, references:
Kjøli Mine was found 1776, and until 1920 about 200,000 tonnes of ore had been extracted with 1,8-2,0%Cu and 42-46%S. The content of Zn is less than 0,2%.
For further reading:
Aasgaard 1927, NGU no 129: "Gruber og skjerp i kisdraget Øvre Gauldal – Tydal.
Rui & Bakke 1975, NGT Vol. 55 pp.51-75: "Stratabound Sulphide Mineralization in the Kjøli Area, Røros District, Norwegian Caledonides".

The mine openings and dumps have recently been completely covered due to environmental reasons. Representative samples from the dumps were therefore difficult to find. One sample was, however, collected and shipped for analysis.

Sample for analysis:
399651: Massive fine grained ore with Py, Po, Mt, Quartz and Hbl.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399651	356	5,5	28000	44	3722	< 5	23,9

70. Midtgruben (Rundhaugen) UTM 0635514 6974434

Location:
The mineralization crops out along the SE slope of a ridge, 1km NE of Kjølihytta and 2km NE of the Kjøli mine, 1020m a.s.l., at UTM 0635514 6974434 (GPS50T).
Mineralization:
There are 6 diggings over a strike length of 180m. The NE-ernmost is a shaft inclined towards WNW (600 m3 dump) in chloritic and phyllitic grey-greenish, kinkfolded (axis 320°/5°) schist, at the border to overlying massive and dense rock. A rustzone is seen in the shaft wall 1m below the massive rock. Schistosity in the rustzone and hangingwall is 210°/34°. It seems like it has occurred local thrusting at the lower contact of the rustzone (along which is associated quartz lenses), and in the schist below, schistosity is 210°/5-10°.
Ore types observed at the dump pile:

- Massive, fine (to medium) grained Py(-Cpy-Sl-Mt) ore, which often appears banded in chlorite schist, with intercalated chlorite lamellae. In bands containing more silicate minerals (quartz and chlorite), the Py crystal grain size is increased to up to 2mm. Calcite is relatively abundant.
- Massive, fine grained Po with minor Cpy and traces of Sl; in places with up to 1mm sized Py porphyroblasts, and small fragments of amphibole-chlorite rock. The Po-dominated ore is alternating with cm-thick bands of Py-dominated ore.
- Chlorite-amphibole rock with semimassive Po-Cpy ore, partly Cpy-rich, with small aggregates of some Sl, and cm-thick bands of fine grained Py at the ore contacts.
- Quartzitic rock (silicified?) with thin sulphide bands.

35m south of the shaft is a 3x3 m2, shallow, waterfilled pit (10 m3 dump). A tiny outcrop shows massive Py in chlorite schist.
55m further to the SW is a 3x2 m2, shallow, waterfilled pit (2 m3 dump). No outcropping mineralization. Kinkfolded (320°/20°) chlorite schist. Weak sulphide impregnation in the dump material.
15m further SW: small excavation (<1 m3 dump); no mineralization, no outcrop.

30m further SW: 2x2 m2 shallow, waterfilled excavation in barren grey schist (schistosity 250°/60°); no mineralization observed at dump (1 m3).
45m further west, 25m east of small lake: 10x5 m2 waterfilled pit with additional 30m long excavation trench northwards (10 m3 dump). No exposures. The dump material shows massive, fine grained Mt with scattered euhedral Py as crystals up to 2mm in size, and in places abundant Cpy as 1-2mm sized, round spots. The sulphides are partly enriched in bands, up to 10cm thick, while bands of same thickness containing pure Mt occur. Chlorite schist appears at the dump, partly containing abundant Py in scattered grains. Chlorite schist with thin, concordant Mt-bands is also encountered.
The strong magnetic compass-influence around the pit can be followed 15-20m westwards.

Dump volume: 625 m3.

Susceptibility:
Massive Po-dominated ore typically shows 800-1500; Massive to semimassive Py-Cpy-Sl ore 300-500, while the same containing Mt shows 4 000-15 000; Massive Mt-Py-Cpy from the SW digging shows > 100 000.

Samples for analysis:
399812 (GPS50T): Massive, fine grained Py(-Cpy-Sl-Mt) ore.
399813 (GPS50T): Massive, fine grained Po-dominated ore.
399814 (GPS50T): Massive to semimassive Py-Cpy-Sl ore.
399815 (GPS50T): Semimassive Cpy-Po(-Sl) ore with cm-thick Py band, in fine grained amphibolite.
399816 (GPS50T): Semimassive, schist-laminated, Cpy-rich Cpy-Py(-Sl-Mt) ore.
399817 (UTM 0635400 6974320): Massive Mt-Py-Cpy mineralization.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399812	312	5,6	16000	655	5104	162	> 10.00
399813	341	8,7	1296	1497	53000	195	> 10.00
399814	142	6,5	15000	472	35000	193	> 10.00
399815	131	7,1	28000	452	6597	52	20,3
399816	104	9,9	40000	383	1433	193	> 10.00
399817	60	1,8	9830	46	447	12	> 10.00

71. Grønskar (Skardhøgda) UTM 0636227 6977696

Location:
The best access to the Grønskar field is by road from Lauvøya in Tydal to Grønsjøen, from where a tractor road continues to Grønsjøvollan (cottage possible to rent). From here it is a 3-4km walk southwards to the mining area, which is located at an elevation of 900-950m a.s.l., between UTM 0636227 6977696 (GPS95T) and 0635930 6979932.

Description of the workings and mineralization:
There are a number of workings exploiting and testing separate lenses of both sulphide mineralizations (dominantly pyrrhotitic and very minor pyritic; only traces of Sl) and iron formations along a north-south extension of 2230m. Their inter-relationship are complicated, occurring intermixed and separately, at different levels in the metasediments. The workings are plotted on the sketch map based on the GPS coordinates. The workings from south to north are:

A) 5x5 m2 waterfilled shaft (40 m3 dump) at UTM 0636227 6977696 (GPS95T). Sulphide impregnated chlorite schist can be seen only in the shaft wall. Wallrock is greenish mica schist with chlorite schist close to the mineralization on both sides. The dump material shows chlorite schist (folded) with Py(-Cpy) stringers and quartz lenses, and subordinate chlorite schist with Cpy-Po(-Sl) stringers.

B) 4x4 m2 waterfilled shaft (20 m3 dump) at UTM 0636295 6978008 (GPS94T). The dump material show two ore types: 1) Garnet (up to 5mm)-chlorite schist with folded stringers, and massive sections of Po and Cpy with chlorite schist fragments (often rounded) and quartz eyes. 2) Massive, fine grained, laminated Mt mineralization. Otherwise, chlorite schist at the dump. Outcrop of 30cm thick massive Mt, with tiny exposure of underlying (0.5-1m below) Po-Cpy mineralization. Approx. 3m above the Mt layer is yet another Mt layer of 20-30cm thickness. The two Mt bands can be followed 50m southwards, and also 20m northwards as compass influence above covered bedrock. Emerging compass influence 100m NNE of B).

C) 5x4 m2 waterfilled pit (10 m3 dump) at UTM 0636349 6978462 (GPS96T). Rusty lens containing irregular (crumpled and folded) bands and lenses of massive, fine grained Mt with hornblende needles and subordinate Cpy (and Po) in chlorite schist with lenses and irregular aggregates of coarse grained amphibolite. At the dump appears also massive Po-Cpy ore with intercalations and rims of massive Mt layers and lenses. The 20-80cm thick mineralized lens is accompanied by 10cm and 1m thick chlorite schist in the immediate hangingwall and footwall respectively, surrounded by light green quartz-feldspar-mica schist. Dip changes from steep to gentle downwards (below water table). Mineralization can be followed 5m south of the pit, and the covered north-extension by compass influence 10m.

D) D1 is a 6x4 m2 waterfilled shaft (40 m3 dump) at 0636308 6978515 (GPS97T), at an apparently higher level than C. Exposed 5 dm-thick rustbands over 4m thickness in light grey-greenish mica schist, with chlorite schist as few-cm thick rims along the rustbands. The middle band is 20cm thick massive Mt (wedges out 5m south of the digging), while the others are Po-Cpy impregnations in chlorite-amphibole schist (the most extensive stretches 10-15m southwards). Massive Po-Cpy ore, often in contact to medium grained, massive amphibolite with sulphide dissemination, appears at the dump. A few samples show minor, thin Py bands in the schist. The folded, mineralized schist has a variable dip, 30-70°, to the west. A fault (35°/65°) is observed in the shaft wall.

D2: 30m NNW of D1: 5x4 m2 waterfilled pit (15 m3 dump). Only folded schist exposed, with a 0.5m thick quartz vein adjacent to the pit. Ore samples are scarce at the dump, a few show massive Po-Cpy of at least 10cm thickness, with weak Po-Cpy

impregnation in surrounding chlorite schist. Enrichment of Cpy as 2-3cm rim along quartz lens. Probably the same level of mineralization as in D1.

E) 4 large (up to 15x15 m2) waterfilled pits/shafts (50 m3 dump) between 12 and 100m south of the river Fremmergrøna, along a NNW-SSE direction, the southernmost at UTM 0636260 6978817 (GPS98T). Bedrock is not exposed. Dump material show: 1) massive, durchbewegt Po-Cpy-Mt ore with chlorite schist fragments and quartz eyes, 2) massive, fine grained Mt, with Cpy finely scattered and in veins, 3) bands of semimassive Mt with minor Po and Cpy in garnet-chlorite schist, 4) chlorite-amphibole schist with impregnation to semimassive Py mineralization, with quartz lenses and -nodules; Py is anhedral (birdseye) and occur as stringers, folded mm-bands and minor as scattered euhedral crystals (up to 10mm sized in one band), 5) chlorite schist with Po-Cpy stringers and impregnation, 6) sulphide-impregnated massive, medium grained amphibolite, and 7) grey-green schist.

F) Flogruben (2000 m3 dump), 40m north of Fremmergrøna, consists of a waterfilled shaft (UTM 0636229 6978991, GPS99T) inclined towards a 4x2.5 m2 vertical shaft located 30m to the WSW. From the entrance of the inclined shaft a 65m long trench runs towards NW. Only the trench exposes mineralization, as 7-8m(!) thick (fold-determined) semimassive (irregular bands and lenses) to stringer-impregnation of 1) massive, durchbewegt Po-Cpy ore with locally small massive-Mt lenses, 2) Po-Cpy stringers in chlorite schist, and 3) Py-Cpy stringers in chlorite-amphibole schist. In the north wall of the trench, however, very limited sulphide impregnation show up in the wallrock, grey to greenish schist which contain some chlorite and hornblende needles, which means a very local thickening of the ore zone.

G) Kjørergruben (2000 m3 dump) consists of a NW-inclined shaft (UTM 0636061 6979185, GPS101T), following a knife-sharp slip plane to hangingwall gabbro (diamond drill hole 20m to the NNW), and 40m to the south a waterfilled adit directed NNE-wards. No outcropping ore; dump material show: 1) massive, durchbewegt Po-Cpy ore with chlorite schist fragments and quartz eyes, locally Cpy-rich, and locally containing minor Py as up to 5-6mm sized crystals, and 2) semimassive Po-Cpy(-Py) as stringers in lamellar chlorite schist.

Respectively 70m ESE and 120m SE of Kjørergruben are tiny diggings at small rustlenses dominated by impregnation and minor massive Po-Cpy mineralization.

H) Grønskar 2 consists of a waterfilled, inclined shaft (100 m3 dump) towards NW at UTM 0636184 6979303 (GPS102T), and two small diggings (15 m3 dump) respectively 20 and 60m to the south, probably along the same ore horizon. At the shaft opening is exposed 1.2m thick grey, silicified quartzitic rock, with overlying 30 40 cm thick hard, dark schist (containing chlorite and amphibole) with veins and impregnation of Cpy (and Po), and dm-thick lenses of almost massive Py with schist fragments and quartz lenses. In the southernmost digging dump material shows alternating bands of massive Py and Cpy, both containing schist fragments. The dump material derived from the shaft also show massive, fine grained, brecciated Po-Cpy ore, in places with thin (<1mm) interlayers of schist. The hangingwall of all three diggings consists of grey mica schist with subordinate chlorite and hornblende. Strike and dip: 180°/35°.

I) Grønskar 1 is a 15x5 m2 waterfilled pit (5000 m3 dump) at UTM 0636104 6979370 (GPS103T). In the inaccessible northern wall is seen an isoclinally infolded, 0.5m thick, massive Mt horizon, partly incorporated, or in the footwall of a massive, brecciated Po-Cpy mineralization, which also exhibits folding. Overall mineralized thickness is approx. 3m. The footwall is weakly chloritized mica schist. 60m SE of the pit is a refilled digging (20 m3 dump), and another small digging occur 20m further SE. These diggings and the Grønskar 1 pit exploit an assumed higher level mineralization than Grønskar 2. At the ridge, 25m SW of the Grønskar 1 pit is a small digging at an up to 1.5m thick lens (actually the crest of an antiform plunging 140°/20°) of massive Mt with no more than 20m extension. The mica schist surrounding this lens is not altered, and the exposed footwall at Grønskar 1 pit is only weakly chloritized mica schist.

J) Grønskar 3 is a 3x3 m2 shaft covered with a lid, at UTM 0636078 69794 (GPS104T), which exploits the same ore horizon as Grønskar 1, and between them 3 shafts follow the ore zone. It is an additional digging 20m NW of the covered shaft (altogether 1500 m3 dump from these 5 workings). At the dump appear both massive, brecciated Po-Cpy ore and massive Mt-Cpy ore.

K) 7x5 m2 waterfilled shaft (25 m3 dump) in the valley, 30m SSW of a small lake, at UTM 0636190 6979439 (GPS105T). The dump material shows impregnation and stringers of Po and Cpy in chlorite schist, and some small (few cm thick) lenses of massive, brecciated Po-Cpy ore. The sulphide-impregnated horizon is followed 50m northwards with 4-5 small excavations (2 m3 dump).

L) Small digging (5 m3 dump) at the bottom of a steep slope at UTM 0636109 6979490 (GPS106T). 2 dm-thick rustbands, with 1.5m separation, consisting of Po-Cpy impregnation and small lenses of massive, brecciated Po-Cpy. The bands are tectonized and show discordant relationship to the wallrock schist. 20m to the NNW is a small digging (1 m3 dump) at assumed same level, with outcropping 20cm thick massive Mt mineralization; possibly lateral change from sulphide to oxide facies. This iron formation extends 35m further NNW-wards (5 small diggings, 2 m3 dump).

M) Magnetgruben, UTM 0636161 6979606 (GPS107T), consists of 6 shafts and diggings (60 m3 dump) over 90m ESE-WNW extension. At the couple of places the massive Mt ore is exposed, the thickness of the ore bands and –lumps varies between 30cm and 1m. In places the ore is banded, containing up to cm-thick bands consisting of quartz, feldspar, amphibole and mica. Hangingwall and footwall consists of at least 10cm thick chlorite-amphibole schist. Dump material also shows garnet (3-5mm sized)-chlorite alteration rock with rich Cpy-Po impregnation. Strike and dip varies because of folding (isoclinal folds observed in the Mt ore), generally 290°/20°.

N) Waterfilled shaft inclined towards WNW (100 m3 dump) at UTM 0635930 6979862 (GPS108T). In the shaft wall is seen an irregular rustlense with irregular branching (folded). The north-south extension is 10m. It consists of semimassive stringer mineralization of Cpy-Po-Sl ore with quartz eyes.

O) 70m north of N) is an insignificant excavation (no dump) at a 1m thick massive Mt horizon, which occupy a lower level than the sulphide mineralization at N).

Interlayered a few bands (few cm thick) rich in epidote, garnet and hornblende. This Mt horizon can be followed 40-50m to the NW.

Dump volume: 1100 m3.

Susceptibility:
Noted in parenthesis below.

Samples for analysis:

399997 (UTM 0636295 6978008): Semimassive-massive, brecciated Po-Cpy ore in garnet-chlorite schist (1 000).

399998 (UTM 0636227 6977696): Chlorite schist with Py-Cpy stringers (70).

399999 (UTM 0636227 6977696): Chlorite schist with Py-Cpy(-Sl) stringers (600).

400000 (UTM 0636349 6978462): Massive, fine grained Po-Mt-Cpy mineralization (90 000).

400001 (UTM 0636308 6978515): Massive Po-Cpy ore (2 000).

400002 (UTM 0636260 6978817): Chlorite-amphibole schist with Py impregnation (40-60).

400003 (UTM 0636260 6978817): Massive, brecciated Po-Cpy-Mt ore with chlorite schist fragments and quartz eyes (8 000).

400004 (UTM 0636229 6978991): Same as 400003 (6 000).

400005 (UTM 0636061 6979185): Massive, brecciated Po-Cpy ore (5 000).

400006 (UTM 0636061 6979185): Massive, brecciated Po-Cpy-Py ore (4 000).

400007 (UTM 0636184 6979303): Massive, fine grained, brecciated Po-Cpy ore (3 000-4 000).

400008 (UTM 0636104 6979370): Same as 400007 (5 000-10 000).

400009 (UTM 0636161 6979606): Garnet-chlorite alteration rock with rich Cpy-Po impregnation (1 000).

400010 (UTM 0635930 6979862): Chlorite schist with stringers of Cpy, Po and Sl, and quartz eyes (100-1 000).

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399997	376	1,7	6779	10	7655	16	> 10.00
399998	122	1,8	15500	12	260	6	> 10.00
399999	120	7,9	34500	13	9189	< 5	> 10.00
400000	158	5,7	32000	10	2869	< 5	> 10.00
400001	388	9,9	66200	19	1685	7	> 10.00
400002	154	0,9	5398	7	213	69	> 10.00
400003	105	0,6	4265	4	553	< 5	> 10.00
400004	95	1,2	8682	4	397	9	> 10.00
400005	171	7,1	13100	5	976	< 5	> 10.00
400006	78	9,1	29100	30	829	10	> 10.00
400007	58	2,4	13600	8	7553	12	> 10.00
400008	38	1,5	12100	4	195	< 5	> 10.00
400009	55	1,7	21200	13	308	< 5	> 10.00
400010	78	2,6	14700	10	1291	8	> 10.00

72. Allergodt (Allergodt) UTM 0634884 6982139

This mine was from the beginning in 1815 named "Alltid Godt" ("always good"), but as the mining progressed, this was changed to the more appropriate name: "Aldri Godt" ("nevergood") which in the local dialect sounds: "Aillergodt"→"Allergodt"

Location:
Best access to the mine by road from Lauvøya in Tydal to Grønsjøen; then along tractor road to Grønsjøvollan, wherefrom it is a 2km walk. The workings are situated in the mountainside north of Blåhåmmårtjønna, between UTM 0634884 6982139 (GPS93T) and UTM 0634219 6983183 (GPS90T).

Mineralization:
Several lenses with no observed connection to each other, of pyrrhotitic mineralizations with associated iron formations, are exploited along an extension of 1.25km, close to the overthrusted greenstone sequence. The NW-ernmost group of diggings (see sketch map): The SE-ernmost working at UTM 0634219 6983183 (GPS90T) is a 8x5 m2, waterfilled shaft inclined towards SW. In the SE end a rustzone (gossan) is observed, which does not emerge in the NW end. Wallrock is grey-green schist, which is chloritized adjacent to the rustzone, both above and below. Schistosity: 135°/25°. The dump material show: 1) massive, fine grained Po-Cpy-Sl ore; Sl is sometimes seen to rim the ore contact, 2) massive Po, and 3) medium grained amphibolite with dissemination and bands of Cpy and Sl with wallrock fragments. 40m to the NW is a waterfilled, inclined shaft towards south. Outcropping in the SE end is 0.5m thick massive Mt with overlying 30-50cm thick massive, Cpy-rich Cpy-Po(-Sl) ore with quartz lenses. Also quartz lenses (up to 0.5m

thick) in the hangingwall greenish schist, approx. 1m above the ore. Weakly chloritized wallrock approx. 20cm above and below the ore. In the NW end of the shaft the mineralization thickness has decreased to 20cm, her with the massive Mt mineralization (5cm thick) interlayered in the massive sulphide ore. Outcrops NE of the shaft, respectively 5, 8 and 18m NE, show: 1) at least 40cm thick massive Mt in light greenish schist, 2) and 3) thin, dark, quartzitic rock with Cpy-Po impregnation, surrounded by a massive, dark and hard rock. 30m NW of the last mentioned shaft is a small digging in 2-m thick banded iron formation. The lower 1m consists of massive Mt, both fine grained and coarse-grained parts, containing minor Cpy (and malachite), partly as lamellar banding. The upper 1m is quartz-banded Mt-mineralization. Immediate wallrock is coarse-grained amphibolite. Altogether 120 m^3 dump at these three workings.
The thrust zone to the overlying volcanic sequence is located less than 100m to the SW, and consists of Po-impregnated, rusty, graphitic blackschist, mylonitic schists, quartz bands, and lenses and bands of fine to medium grained, partly porphyritic gabbro, often with a network of felsic veins. In the mountain side, NE of the plateau which host the Allergodt mine, at UTM 0634743 6982669 (GPS89T), are two small, adjacent diggings (20 m3 dump). Here is outcropping 30cm thick (could be more) massive, fine grained, brecciated Po-Cpy ore with chlorite schist fragments and quartz eyes (up to 2cm in size). The hangingwall consists of 1-1.5m thick chlorite schist with an overlying, 80cm thick, semiconcordant quartz vein. The footwall is more quartz-rich, greenish mica schist, containing some chlorite and hornblende, and small biotite porphyroblasts. Schistosity: 145°/20°. 150m to the SSW, and higher up, at UTM 0634711 6982529 (GPS91T), is a 4x2 m2, shallow and waterfilled digging (3 m3 dump) at a nearly 1m thick and 10m long rustlens, containing impregnation and small, local, semimassive lenses of Po and Cpy.
The Allergodt main mine is located at UTM 0634703 6982345 (GPS92T), and consists of three workings:

1) The northernmost is a 4x2 m2 shaft inclined 30° towards west, and a side branch southwards, with assumed connection to the other shaft.
2) 20m to the south is a 4x2 m2, shallow, waterfilled digging.
3) 10m further south, and 20m north of a river is a waterfilled shaft inclined towards NW.

A thin rustband can be seen through the workings. The ore type appearing at the dump is massive, brecciated Po-Cpy with wallrock fragments and quartz eyes. Also massive Mt mineralization is seen at the dump, and some samples show that these two ore types probably occur in contact to each other, or even intermixed. On the southern side of the river, 75m SE of shaft 3), is a 4x2 m2 waterfilled shaft inclined towards west (10 m3 dump). The dump material shows massive Po-Cpy ore. Further SE, at UTM 0634884 6982139 (GPS93T), is a 5x4 m2 waterfilled shaft (70 m3 dump). The dump shows massive Mt mineralization, and possibly some Po-Cpy ore (too dark to see anything!).

Dump volume: 5200 m3.

Susceptibility:
Noted in parenthesis below.

Samples for analysis:

399989 (UTM 0634743 6982669): Massive, fine grained, brecciated Po-Cpy ore with chlorite schist fragments and quartz eyes (800).

399990 (UTM 0634219 6983183): Medium grained amphibolite with dissemination and bands of brecciated Cpy-Sl ore (400).

399991 (UTM 0634169 6983228): Massive, fine grained Po-Cpy ore (600-900).

399992 (UTM 0634219 6983183): Massive, quartz-banded Mt mineralization (80 000).

399993 (UTM 0634219 6983183): Massive Po-Cpy-Sl ore (600).

399994 (UTM 0634703 6982345): Massive, brecciated Po-Cpy ore with wallrock fragments and quartz eyes (6 000).

399995 (UTM 0634703 6982345): Same as 399994 (300).

399996 (UTM 0634703 6982345): Same as 399994 (600).

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399989	45	1,9	11700	15	2671	9	> 10.00
399990	334	20,2	67100	80	88500	8	> 10.00
399991	315	8,7	28600	22	116900	8	> 10.00
399992	84	0,4	1216	< 2	776	7	> 10.00
399993	1008	9,7	29300	80	122600	10	> 10.00
399994	59	2,1	11800	8	3368	10	> 10.00
399995	38	1,4	9230	9	1246	18	> 10.00
399996	39	3,4	17000	15	5817	7	> 10.00

Tydal district:

73. Sæterå prospect (Sæterå) UTM 0622952 6997662

Location:

The mineralization is exposed in a road cut 5m NW of the bridge crossing the river Sæteråa, at (GPS87T).

Mineralization:

In a thickness of 2.5m of quartzo-feldspatic gneisses with mica-rich layers (both biotite- and muscovite-dominated respectively), dominated by quartzite in the lower part, and garnet-muscovite schist in the upper, appears in the middle an up to 3cm thick concordant layer of massive Sl-Cpy-Po-Gn. It seems like this is not one consistent layer, but rather thin sulphide lenses emplaced en echelon, and the layer wedges out upwards and emerges higher up as impregnation and 2-3 mm-thick sulphide bands over a thickness of 6-7 cm.

The immediate hostrock to the thicker massive-sulphide band is quartzite, with lateral change and dilution of the sulphides into garnet-muscovite-dominated schist. Only a few cm of the immediate hostrocks seems weakly sericite altered. Strike and dip of foliation is 354°/60°. The extension of the mineralization is not known outside the 2m high road

cut. Both above and below, the 2.5m thick gneiss package is bordered by 1-2m thick, concordant layers/lenses of diabase porphyrite. Further westwards, along the road down to river Nea, the dominant rock type is diabase porphyrite. On the eastside of the bridge, about 8-10m below the mineralization, the road cut exposes similar quartzitic quartzo-feldspatic gneisses, with intercalated 3m thickness rich in garnet and unoriented amphibole needles. The upper part of the road cut is rusty, with traces of Po in a white quartz (±sericite) schist.

Dump volume: 0

Susceptibility:
The mineralization shows 100-200.

Samples for analysis:
399985: Quartzo-feldspatic gneiss with bands of massive Sl-Cpy-Po-Gn.
399986: Same.
399987: Garnet-mica schist with Sl-Cpy-Po impregnation.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	Ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399985	2335	68,1	3852	18300	43800	68	> 10.00
399986	6002	84,7	3291	25100	50800	131	8,68
399987	2084	8,9	2756	1295	20100	294	6,17

74. Nea UTM 0623270 6995949

Location:
The mineralization is exposed in a small road cut on the eastside of the road to Sæteråvollen, at (GPS88T).

Mineralization:
In the upper part of a rusty, white to light grey quartzite(±sericite) schist, at the contact to quartzo-feldspatic gneiss with garnet and mica, appears a 2cm thick, concordant layer of massive, fine grained Po-Cpy mineralization. Schistosity: 15°/45°.
The mineralized layer is exposed over only 1m strike length.

Dumpvolume: 0

Susceptibility:
5-10 at the massive sulphide layer.

Sample for analysis:
399988: Massive, fine grained Po-Cpy mineralization.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399988	27	0,6	184	101	274	11	5,39

75. Gressli (Gressli) UTM 0624407 6993665

Location:
The ore deposit is located at UTM 0624407 6993665 (GPS59T), 100m south of a local road just south of river Nea.

Core drilling:
A number of 12 drillholes totaling 899m are stored at The Geological Survey's storage.

Geology:
The Gressli deposit is located in The Hersjø formation essentially composed of volcanic greenstone/greenschist.
The ruler shaped ore body crops out over a length of about 70 metres. It strikes in a WNW-ESE direction with a 30 to 55° dip towards the SSW. Reserves are calculated at 78,000 tonnes with 0,9% Cu and 5,5% Zn. The deposit was drilled and studied by Aspro (A/S Sydvaranger) in the mid seventies.

Mineralization:
In the immediate hanging wall in the westernmost digging appears stratabound Gn-Cpy impregnation, partly in bands, bound to mm-thick carbonate bands in sericitic schist. In the same digging can be observed a few-cm thick carbonate vein, cutting up in the hanging wall, consisting of finegrained, partly porphyritic amphibolite. Both the carbonate vein and the immediate amphibolite are Gn-impregnated.
Two inclined shafts are made at the ore horizon. In the western shaft the ore horizon has a thickness at more than 7 metres. The outcropping ore at the western shaft is leached and "the remaining ore" is mostly quartz. A more massive unweathered ore may be seen in the easten shaft opening and in a trail about10m east of the shaft.

Dump volume:
The dump volume is estimated at 1000m3.

Susceptibility:
20-300 at massive ore.

Samples for analysis:
399845: Massive, medium grained Py-Sl ore from dumps.
399846: Same.
399847: Massive, medium grained Py-Sl-Cpy ore from dumps.
399848: Massive, fine grained Py-Sl-Cpy ore from dumps.
399849: Semimassive Py-Sl in quartzite (±sericite) from dumps.

399850: Fine grained amphibolite (from hanging wall?) with impregnation and thin fracture filling of Po and Gn from dumps.

399873: Quartz-sericite schist with carbonate bands and stratabound bands of Gn, and Cpy as fracture filling. From immediate hanging wall, westernmost digging.

399874: Porphyritic amphibolite with Gn-impregnated carbonate vein. Hanging wall, westernmost digging.

399875: From enriched section of outcropping ore at the easternmost side of the ore horizon. RCS of the silicified hanging wall zone about 0,5m with Py, Cpy and Sl.

399876: RCS of outcropping massive sulphide ore 1,5m of thickness at the easternmost side of the ore horizon with Py Sl and Cpy.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399845	97	14,9	18000	68	150900	396	> 10.00
399846	56	10,7	6442	60	168900	311	> 10.00
399847	195	34,3	26000	143	106000	191	> 10.00
399848	48	21	12000	120	106000	245	> 10.00
399849	53	6,9	3498	482	37000	207	21,9
399850	2308	54,4	2468	17500	552	1894	3,38
399873	820	26,1	9102	8172	3154	1012	3,88
399874	407	133,9	114	37400	181	82	2,34
399875	89	6,9	19000	147	32000	186	21,3
399876	75	4,8	7311	193	82000	209	28,6

76. Våråviken (Livollen) UTM 634756 6996866

Location:
The mineralization is located approx. 450m WSW of Livollen, 610m a.s.l., at UTM 0634756 6996866 (GPS65T). Access along footpath from Livollen.

Core drilling:
A number of 4 drillholes totaling 190m are stored at The Geological Survey's storage under the location name Vorreviken.

Mineralization:
The workings consist of a small digging with a waterfilled shaft, and three shallow, refilled excavation trenches (see sketch map).The area is heavily covered, and the ore is not exposed. The wallrock is exposed in the digging, which show strike and dip to vary considerably, from relatively flat in the west wall to steep at the east edge. The footwall consists of sericite schist with biotite porphyroblasts.

Dump material show following ore types:

- Massive, fine grained, banded (mm to cm scale) Py-Sl-Cpy ore (with up to 4-5 cm thick bands of massive Sl).
- Massive, fine grained, banded Sl-Cpy with Py porphyroblasts up to 15 mm size.
- Massive, fine grained Py-Sl-Gn ore.
- Massive Sl-Po with Py porphyroblasts up to 10 mm.
- Massive Po ±minor Cpy and Sl, and frequently wallrock fragments.
- Quartzitic schist with biotite porphyroblasts, Po-dust, and weak impregnation of Cpy and Sl.

Wallrock at the dump is dominated by yellow-brown sericite schist, and minor greygreen quartzitic schist with biotite porphyroblasts.

Dump volume: 250 m3.

Susceptibility:
Great variation on the massive ore: 10-2000; typically 200-300.

Samples for analysis:
399890: Massive, fine grained Cpy-Sl ore with Py porphyroblasts.
399891: Massive, Po-dominated Po-Sl ore.
399892: Massive, fine grained Sl-Py ore, Sl-rich.
399893: Massive, fine grained Py-Sl ore, Py-dominated.
399894: Massive, fine grained Po-Sl ore with Py porphyroblasts and wallrock fragments.
399895: Quartz-rich rock with biotite porphyroblasts and Po-Cpy-Sl impregnation.
Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399890	363	53,9	30600	20400	94200	565	> 10.00
399891	199	26,9	11200	5691	75800	82	> 10.00
399892	322	82,5	13600	39500	152700	660	> 10.00
399893	831	56	16600	25300	87200	776	> 10.00
399894	448	44,2	5062	19900	69700	410	> 10.00
399895	210	3,9	5075	1195	5445	109	7,16

77. Øifjellet (Gammelgruvhøgda) UTM 0643140 6994210

Aasgaard (1927) has plotted a sulphide occurrence between Øifjellet and Skorsåsjøen. No excavations were found. The only sign of sulphide mineralization was rusty, white quartzite(±sericite) schist with Py impregnation, occurring in some-meter thick, parallel layers over a strike length of more than 1km. The mineralization was sampled at two localities: at UTM 0643140 6994210and 0642330 6994600. The occurrence is probably inaccurately plotted by Aasgaard, and should be at Langdalsvollen about 3km to the SSW.

Dump volume: 0

Susceptibility: Py-impregnated quartzite: 5.

Samples for analysis:
399843 (UTM 0643140 6994210): White sericite-quartz schist with Py impregnation.
399844 (UTM 0642330 6994600): Grey quartz-sericite schist with Py impregnation.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399843	18	< 0.2	13	5	90	< 5	3,79
399844	< 5	< 0.2	47	13	141	< 5	4,33

78. Langdalsvollen (Langdalsvollen) UTM 0641073 6991492

Location:
The claim is located at UTM 0641073 6991492 just 400m East of the eastern side of the Vessingen lake barrage. About 10km SE of the center of Tydalen a good gravel road leads to western side of the barrage.

Geology, outcrops:
The claim is located in a swampy area with few outcropping rocks. According to the geological map it is located in the Hummelfjell formation which is allochthon of presumed Late Precambrian or Silurian age. Outcropping amphibolite – muscovite schist is found 150 to 200m south of the claim with strike/dip: 153°/10°W.
Enclosed sketch map shows the situation in the claim area. In the center of the claim area, an area of mineralized rock is exposed over about 30m2 by removing of the overburden. Sample 399906. Towards the east, only two collapsed pits may be seen. By the eastern-most pit a small dump (about 1m3) with rich ore samples may be found. Sample 399907. In the western part of the claim area two small exposures also shows some mineralization. Sample no 399905. The foliation of the western-most outcrop is 300°/25°NE (Uncertain registration).
Total length of presumed outcropping mineralization is 30m or more, while the width could be 10m or more which brings the potential area of presumed outcropping mineralization up to 300m2 or more.
The claim is mentioned in "Tydalen bygdebok". It was found 1760.

Mineralization:
The mineralization is very fine grained with chalcopyrite, sphalerite, malachite and most likely some pyrrhotite. It occurs as disseminated, as fine bands, as veinlets and as massive ore in a very finegrained amphibolite with small garnets and sometimes with bands of carbonate. Some samples have a high content of carbonate. The reason for the limited work carried out on the claim is believed to be the problems to extract the copper because of its fine grained and often disseminated nature and the presumed high content of zinc.

Dumps:
The dump volume is estimated at 100m3.

Geophysics:
Some recognition geophysical measurements (VLF) was carried out over the claim area August 98. An EM – anomaly was recognized with a SE strike direction.

Samples collected for analysis (Susceptibility 20 – 250):
399904: Rich fine grained ore from main dump with Cpy, Sl and Po.
399905: Sample of fine grained disseminated ore from loc. 0E/1N with Cpy and Sl.
399906: Sample of fine grained disseminated ore from loc. 15E/5S with Cpy and Sl.
399907: Sample from dump of eastern-most pit loc. 26E/5S with fine grained Cpy and Sl ore.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399904	128	5,8	36700	17	113300	58	9,48
399905	54	24,9	216900	41	5689	31	> 10.00
399906	85	1,4	8688	7	4511	54	4,66
399907	71	2,4	16400	10	39900	50	5,55

79. Storvollvola UTM 0644310 6986976

Location:
The mineralization is located below the power line, 300m south of Nesjøen, 770m a.s.l., at UTM 0644310 6986976 (GPS64T). Accessible by car to the dam, then 700m walk.

Mineralization:
Two claims are plotted at Storvollvola in "Bergarkivet", and they are also mentioned by Aasgaard (1927). During the search for the northernmost one, only rustlenses in the amphibolite were detected. At GPS64T a few meter thick amphibolite lens contained coarse grained Py as stringers, bands and impregnation.

Dump volume: 0
Sample for analysis:
399889: Py-impregnated amphibolite.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399889	9	0,4	521	82	328	62	7,7

80. Ramsjø (Ramsjø) UTM 0637532 7007442

Location:
Ramsjø Mine main inclined shaft D at UTM 0637532 7007442. See enclosed sketch map. It may be reached first by car on a good forestry gravel road about 20km NNE of the center of Tydalen to one km N of Kranklia, and by foot on a well marked trail towards Ramsjøhytta for about 4km.

Geology, outcrops:
The Ramsjø deposit is located to the Kjølhaug group in the north, which is the same stratigraphic formation as the Røros formation in the south. The area is well exposed, and the ore, which can be followed along strike for 1100m is hosted in a NE – SW striking tectonic zone dipping to the NW. See enclosed sketch map.
A: Small working on a waterfilled inclined shaft to the NW in lime rich greenschist.
B: About 10m above A, a waterfilled inclined shaft to the NW in the same rocks as above.
C: About the same level as B, also a waterfilled inclined shaft to the NW. The mineralized zone can be seen as a 1,5m thick rusty zone in lime rich greenschist.
D: About 5m above C, the main inclined shaft of the mine in lime rich greenschist. Ruins and the largest dumps estimated at about 5000m3 are found here.
E-F: A 35m long trench in lime rich greenschist. E has the same level as D, and F is about 3m above E.

Mineralization:
The ore horizon is connected to a tectonic zone striking NE – SW and dipping 27°-45° to the NW. Its thickness varies from less than 0,1m up to 1,5m in the outcropping zone.
The main mineral is chalcopyrite, and it occurs as schlieren. Pyrrhotite is found in about equal amounts as chalcopyrite. No other ore minerals could be identified by hand lens.
In general, the copper content seems to be quite low.

Dumps:
The sketch map shows the different dump volumes along the worked outcrop of the ore. Total volume of the dumps is estimated at about 6000m3.

Samples collected for analysis:
399901: Sample from dumps at location A. A little Cpy as schlieren and Po in a lime rich greenschist.
399902: Sample from dumps at location B. As above.
399903: Sample from dumps at location D. As above.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399901	132	0,5	2147	10	545	134	> 10.00
399902	376	0,9	5722	13	3330	127	> 10.00
399903	111	1,7	7435	11	1547	50	> 10.00

Meråker østfelt:

81. Stadåsen (Faldslettet nord) UTM 0641355 7035901

Location:
The prospect (GPS76T) is located where a shallow WNW-ESE running valley cuts the Faldslettet ridge, and is best reached by a 2 km walk northwards from the road to the Hammerskallen prospect.

Description of the mine:
The mineralization is followed with a 32m long and 3m deep NNE-SSW running trench. From this, an adit runs 16m SW, and halfway a NW directed, inclined branch runs at least 6m (water filled). 4m north of the adit is a waterfilled, inclined shaft to the NNW. See sketch map.

Mineralization and wall rocks:
The footwall consists of silicified, hornfels like greenstone, while the hangingwall constitutes of large lenses of partly silicified greenstone surrounded by calcareous greenschist, which is weakly chlorite altered up to 20-30cm above the ore zone.
The hangingwall greenschist with greenstone lenses and internal folds lies tectonically discordant above the rigid footwall greenstone. Remobilized sulphide mineralization is bound to this tectonic contact, as a 20-40cm thick zone of quartz-rich chloritic greenschist with impregnation, typically as irregular veining, and lenses of semimassive to massive Po, Cpy, and minor Sl. In the adit massive ore lenses up to 30 cm in thickness are observed. These richer lenses contain folded and rotated schist fragments ("rags").
A few scattered, small rusty lenses are seen in the hangingwall above the 20-40cm thick ore zone. 50m SSW of the trench is a small (4x2 m2) waterfilled digging (2 m3 dump) which display only weak sulphide dissemination. The ore zone has variable direction 220-245°/20-30°. Extension of the ore zone outside the workings is unknown (covered), but geophysical measurements are conducted (Dalsegg & Lauritsen 1993).

Dump volume: 250 m3.

Susceptibility: 200-300 for the semimassive ore.

Samples for analysis:
399944: Semimassive Po-Cpy-Sl in greenschist
399945: Same
399946: Same

399947: Same

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399944	89	18,4	81600	64	40100	7	> 10.00
399945	528	5,6	25100	15	30600	8	> 10.00
399946	114	2,8	9009	7	27400	< 5	> 10.00
399947	174	8,7	28900	9	37200	6	> 10.00

82. Geitberget (Faldslettet) UTM 0641093 7035490

Location:
approximately 500m SSE of Stadåsen prospect. (GPS77T)

Description of workings:
The mineralization outcrops in a bog with a few exposures, and is tested with a 3x2.5 m2, and 1m deep pit, and a tiny digging 4m to the north.

Mineralization:
Two types of mineralization are encountered in the dump:

1) Massive, fine grained, banded (few-mm to few-cm scale) Py-Sl dominated ore with minor Cpy, Po, and Mt. Typical appearance is massive Py with alternating cm-thick bands enriched in respectively Sl and Cpy, and mm-thick Po-bands and Mt-bands.
2) Greenschist with thin bands and impregnation of Py, Po, Sl, and Cpy, with few-cm sized lenses / nodules of fine grained greenstone with Po dust.

Only type 2) is found exposed in the diggings, as 10-30cm thick horizons on either side (surrounding) of an up to 2.5m wide greenstone lens. The westernmost horizon dips steeply to the west, and the easternmost to the east. In addition, two similar, parallel (striking 10°/90°) sulfide horizons (each 0.5m wide) appear to the west, making up 4m thickness containing these 4 sulfide horizons. A small exposure 30m to the north shows a rusty, sulphide-impregnated band.

Dump volume: 3 m3.

Susceptibility:
Type 1): 8000 at Sl-rich Py-Sl ore, and 10 000-15 000 at Py-Sl-Cpy-Po-Mt banded ore.
Type 2): 100-200.

Samples for analysis:
399948: Massive, fine grained, banded Py-Sl ore, Sl-rich.
399949: Massive, fine grained, banded Py-Sl-Cpy-Po-Mt ore.
399950: Greenschist with bands and impregnation of Py, Po, Sl, Cpy, and lenses of greenstone with Po impregnation.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	Ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399948	41	6,6	3506	42	216600	14	> 10.00
399949	78	10	5484	241	183900	30	> 10.00
399950	42	6,5	4606	52	27800	12	> 10.00

83. Statsåsgrubba (Faldslettet) UTM 0641521 7035086

Location:
UTM 0641521 7035086 (GPS78T). 550m SE of Geitberget prospect. In a small creek, surrounded by bog, it is a regrown blasted hole.

Mineralization:
No mineralization is found in the few exposures of grey to green, schisty greywacke nearby the digging. Three types of mineralization are encountered in the dump material:

1) Massive, brecciated Po-Cpy(-Sl) ore with quartz nodules (up to 1-2cm) and chlorite schist fragments ("rags"). Only a few samples show this massive ore.
2) Fine grained quartzite with Po-Cpy dust, mm-thick bands of Cpy-Po(-Sl), and remobilized Cpy in thin fractures.
3) Sericite-quartzite with Cpy-Po(-Sl) impregnation.

Dump volume: 100 m3.

Susceptibility:
Type 1): 200
Type 2): 20-60
Type 3): 10

Samples for analysis:
399951: Massive Po-Cpy-Sl ore with wall rock fragments.
399952: Quartzite with Po-Cpy-Sl impregnation.
399953: Sericite-quartzite with Cpy-Po-Sl impregnation.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399951	18	5,2	4773	763	71400	< 5	> 10.00
399952	30	1,1	4029	19	21200	< 5	6,01
399953	63	4,9	15100	79	4137	8	6,24

84. Skarbekken (Faldslettet syd) UTM 0641556 7034502

Location:
A 5x2.5 m2 water filled pit is located in a small depression at the NE edge of a bog, (GPS79T), 900m NNE of Hammerskallen prospect.

Mineralization:
Dump material shows light grey quartzite and greygreen, slightly chloritic schist with irregular, thin bands and impregnation of Cpy and traces of Po, in places with associated brecciated quartz bands / lenses. One richer band is seen – 4 cm thick semimassive Po-Cpy bound to a brecciated quartz band, where the sulphides fill around 1-2cm sized quartz lenses. It is a tiny blasting approx. 100m to the SW, in similar Cpy-impregnated greenish schist. The metasediments in this area are frequently sulphide (mainly Po)-impregnated, and the digging (UTM 0641450 7034300) mentioned by Birkeland et al. (1996) as massive Sl-Po-Cpy is probably not the above described mineralization, but an adjacent one.

Dump volume: 5 m3.

Susceptibility:
30-50 at semimassive type, 20 at impregnation type.

Samples for analysis:
399954: Brecciated semimassive Cpy-Po band with quartz lenses in greenish schist.
399955: Greygreen schisty greywacke with Cpy impregnation.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399954	90	10	31400	15	949	32	> 10.00
399955	85	3,4	16200	9	356	< 5	8,37

85. Hammerskallen (Hammerskallen) UTM 0640904 7033446

Location:
Two waterfilled shafts are located 40 and 60m north of the road from Meråker railway station, at UTM 0640904 7033446 (GPS80T). The northernmost shaft is 5x4 m2, and the other is 4x4 m2 (see sketch map).

Mineralization:
Mineralization is not exposed in or adjacent to the shafts. In the otherwise covered terrain only the host rock, fine grained, massive, grey quartzitic greywacke, is exposed in the shaft walls. Dump material shows that the greywacke also contain variable amounts of mica, chlorite and garnet. The mineralization appears to be rich impregnation of Cpy, Po and traces of Sl as more or less parallel stringers (<1 mm thick), and minor irregular network and dissemination; locally enriched to semimassive ore with small quartz lenses. Local segregations of coarse grained calcite (and malachite) are observed.

Dump volume: 40 m3. Most of the dump pile is removed, utilized as road filling.

Susceptibility: 50-400, typically around 100.

Samples for analysis:
399956: Fine grained quartz-chlorite(-hornblende?) schist with thin Cpy-Po stringers.
399957: Dark grey quartzitic rock with thin Cpy veins.
399958: Chlorite schist with rich Cpy-Po impregnation.
399959: Contact quartzite/chloritic schist, with Cpy(-Sl) stringers in both.
399960: Chloritic schist with Cpy-Po impregnation.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399956	112	3,2	18400	24	1187	< 5	> 10.00
399957	600	0,5	6388	7	202	< 5	6,03
399958	46	3,6	19600	5	850	< 5	> 10.00
399959	294	1,8	14400	6	704	< 5	8,84
399960	66	7,8	38600	13	2224	< 5	> 10.00

86. Skomakermoen (Skomakermoen) UTM 0640694 7032104

Location:
A 6x4 m2 waterfilled shaft inclined towards NW (and a small digging 10m to the NE) is located 65m north of a power line, at UTM 0640694 7032104 (GPS75T) (see sketch map). A weak footpath lead from the road NE-wards to the digging.

Mineralization:
The sulphide mineralization occurs in quartzitic greywacke with thin chlorite laminae and mica schist layers. Lateral change of hangingwall, from the NE-digging, with layers of pure quartzite (white, green, and pink) in the greywacke, to the shaft, with frequent chloritic layers intercalated in the greywacke. Fine grained gabbro occurs both in foot- and hanging wall, few meters away from the ore zone. The ore is massive, fine grained, brecciated Po-Sl-Cpy with some-cm sized nodules / fragments of wallrock: quartzite, greywacke, chlorite schist and quartz. Cpy and Sl are often concentrated in rims around the fragments. The ore zone is exposed over a strike length of only 20m, but can be followed as a strong VLF anomaly of 250 m length (Dalsegg & Lauritsen 1993). The thickness is approx. 1m (including some schist layers) in the shaft, and at least 20-30cm in the NE-digging. Schistosity is generally 215°/30°.

Dump volume: 50 m3.

Susceptibility:
200-300(-500) at the mineralization.

Samples for analysis:
399932: Massive, fine grained, brecciated Po-Sl-Cpy ore with wall rock fragments.
399933: Same

399934: Same
399935: Same
399936: Same, but Sl-rich.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399932	35	3,9	5469	970	116100	7	> 10.00
399933	44	2,4	4505	621	117200	12	> 10.00
399934	40	4,4	17400	447	83000	8	> 10.00
399935	28	3,6	10500	683	78100	< 5	> 10.00
399936	29	3,1	9312	556	98000	6	> 10.00

87. Øyan UTM 0640065 7031317

Location:
A 7x3 m2 waterfilled shaft is located in the power line gate 100m east of river Dalåa, UTM 0640065 7031317 (GPS86T).

Mineralization:
No outcrops are found in the area. Material in the overgrown dump shows grey-greenish quartzite / quartzitic greywacke and chlorite schist. Judged from the dump material, the mineralization is insignificant and remobilized. The only visible sulphide, Cpy, is bound to chlorite schist (as thin bands and impregnation) which is "smeared" around few-cm sized quartzite lenses. In places brecciation is observed, with cm-sized, edged quartzite fragments in mineralized chlorite schist. Locally Cpy is enriched along thin quartz (±calcite)-lens bands in the chlorite schist, and more seldom as mm-bands (probably remobilized fracture filling) in the quartzite, and minor irregular Cpy-veins in connection with them.

Dump volume: 40 m3.

Susceptibility:
20-30 at the mineralization.
Samples for analysis:
399982: Cpy-impregnated chlorite schist surrounding quartzite lenses and –fragments.
399983: Quartzite with thin Cpy-bands and –veins.
399984: Chlorite schist with small quartz lenses and Cpy-impregnation.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399982	27	4,1	25800	50	1225	25	6,86
399983	32	1,6	12900	14	267	11	5,41
399984	80	4,2	19600	288	1033	13	> 10.00

88. Sagskjerpet (Fossvannet nord) UTM 0637755 7028317

Location:
The prospect is located just east of the creek Ingridbekken, UTM 0637755 7028317 (GPS72T).

Mineralization:
The stratiform Py-dominated Py-Sl-Cpy ore is well exposed in the open pit and short adit (see sketch map), and can be followed over a strike length of 30m. Ore thickness is approx. 1m in the open pit, 0.7-1m in the smaller digging to the east, and in the adit from the open pit it is a sudden thinning of the ore body. Here, three massive ore bands (3-15cm thick) appear over a thickness of 0.5-0.6m in greenstone. Probably it is the same horizon that is isoclinally folded. A later fold face (kink folds) with direction 350°/flat gives the ore body an undulating appearance. General direction of the ore body and schistosity is 145°/15°.
Wallrock is a fine grained, partly schistose greenstone, that in at least 1-2m thickness of the hangingwall seems silicified. Chloritization occurs in an up to 10cm thick zone both in foot- and hangingwall, and a 2-3cm thick layer of chlorite schist appears in the ore close to the hangingwall. The massive ore consists of fine grained Py with minor bands (1-3cm thick) enriched in Sl and Cpy respectively. Approx. 0.5m of the schistose greenstone above and below the ore body contains mm-thick stringers, more or less concordant to the scistosity, and mobilizates on shear planes, of Cpy, Po, Py and Sl; and thin Py laminae with up to 2-3mm sized euhedral Py and deformed, squeezed Py.
Close to the adit opening a 2-3cm wide Py vein can be seen to shoot up from the massive ore, following a shear zone.

Dump volume: 400 m3.

Susceptibility:
Massive, banded Py-Sl-Cpy ore: Large variation, 10-5000. Typically around 50-100. The high values are probably due to Mt-rich bands. Wallrock greenstone with Cpy-Po-Sl impregnation: 70-80.

Samples for analysis:
399925: Schistose greenstone with Cpy-Po-Sl impregnation. From hangingwall, 10cm above massive ore.
399926: Chip sample of 1m thick massive Py(-Sl-Cpy) ore.
399927: Massive, fine grained, banded Py-Sl(-Cpy) ore.
399928: Massive, fine grained Py(-Sl) ore.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	Ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399925	723	3,9	14900	64	2861	5	7,49
399926	32	5,1	4566	86	9923	25	> 10.00
399927	53	4,8	4014	72	192800	23	> 10.00
399928	34	3,5	3758	144	29900	22	> 10.00

89. Brenthaugvollen (Røssåsen) UTM 0638619 7028415

Location:
The mineralization is located 400m NW of Brenthaugvollen at UTM 0638619 7028415 (GPS74T). Access by 1km footpath NNE-wards from the Fossvatn road to Brenthaugvollen.

Mineralization:
Two shafts at 40m N-S interval are situated along the eastside of a low steep slope (see sketch map). The southernmost is 4x3 m2, waterfilled and inclined towards west (40 m3 dump). Here appears an approx. 30cm thick impregnation type mineralization of Cpy and Po in chlorite schist. Richer, semimassive mineralization with occasional quartz eyes is up to 10cm thick. Wallrock is fine grained quartzitic greywacke, in the footwall with intercalated thin mica schist- and chloritic layers. Approx. 2m below the mineralization appears very weak stringer-Cpy mineralization. A 1.5-2m wide zone through the shaft appears sheared, and the sulphide mineralization is probably shearzone-related.
40m to the north is another waterfilled shaft (5x2.5 m2, 15 m3 dump) in the same mineralization. A 10-20cm wide rustzone can be seen in the north wall of the shaft. Dump material shows chloritic schist with thin (up to 1mm), concordant stringers of Cpy and Po, and in places few scattered, small Mt grains, and Cpy as fracture coating. Direction of schistosity and mineralization is 180°/40°. Approx. 150m to the NE is a small digging (1/2 m3 dump) in dense forest (UTM 0638716 7028517, GPS73T). Alternating (dm-scale) layers of quartzitic greywacke and more schistose, chloritic layers, and more or less concordant, cm-thick quartz bands. A 15cm wide chloritic band contain weak Cpy impregnation, somewhat enriched along a thin quartz band. Schistosity: 200°/35°. This insignificant mineralization is supposedly not related to the above mentioned (no exposures in between).

Dump volume: 55 m3.

Susceptibility:
100-200 at the main mineralization, and 10-20 at the NE-ernmost, weak impregnation.

Samples for analysis:
399929 (UTM 0638716 7028517): Chloritic schist with Cpy impregnation.
399930 (UTM 0638619 7028455): Chloritic schist with Cpy stringers.
399931 (UTM 0638619 7028415): Chloritic schist with Cpy-Po impr.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399929	80	1,4	9900	13	2650	8	7,09
399930	135	2,8	24000	16	1056	8	> 10.00
399931	85	6,4	47100	29	2806	8	> 10.00

90. Langsundgruva (Røssåsen) UTM 0638890 7027061

Location:
The deposit is situated just north of a creek, and 400m east of the Fossvatn road at UTM 0638890 7027061 (GPS66T).

Mineralization:
The ore zone is tested over a strike length of 50m with three shafts (see sketch map). They are waterfilled and hardly accessible, so observation of the ore has to be done on dump material. Thickness of the ore appears to be 1-1.5m in one of the shafts. Geophysical measurements indicate a strong conductor of more than 250m extension (Dalsegg & Lauritsen 1993). The ore is both impregnation, semimassive and massive, bound to chlorite-hornblende schist in greywacke. The massive ore is fine grained, brecciated Po-Sl-Cpy(-Py) with fragments of schist and quartz. Strike/dip of schistosity and ore is 245°/70°.

Dump volume: 2500 m3.

Susceptibility: 20-200 at impregnation. 100-800, typically 300-400 at massive ore.

Samples for analysis:
399896: Chlorite-hornblende schist with Sl-Po-Cpy impregnation.
399897: Same as 399896.
399898: Same, with quartz lenses.
399899: Massive, fine grained, brecciated Po-Sl-Cpy ore with chlorite-hornblende schist fragments and quartz eyes.
399900: Same as 399899.
399937: Same as 399899.
399938: Same as 399899.
399939: Same as 399899, +Py.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399896	100	4,5	14000	270	22100	86	> 10.00
399897	38	1,3	4987	35	31700	77	> 10.00
399898	92	4,6	20800	40	34000	81	> 10.00
399899	54	2	5132	22	77400	109	> 10.00
399900	71	2,7	5658	18	88300	121	> 10.00
399937	87	3,3	7305	9	74500	7	> 10.00
399938	50	3,5	14700	10	73000	< 5	> 10.00
399939	112	4,6	18000	35	2943	6	> 10.00

91. Nordre Knoll (Husmannsberget) UTM 0638443 7024623

Location:
This mineralization is located just west of Kjerringåsbekken at UTM 0638443 7024623 (GPS71T). Can be reached by a 0.9km walk along the creek, southwards from the end of the Fossvatn road.

Mineralization:
The mineralization is tested with a 17m long N-S running trench at the eastside of a small hill (see sketch map). The sulphide mineralization is emplaced in metasediments close to the contact to a rather small, coarse grained gabbro body. The sulphides are bound to two narrow bands with 50cm spacing, of massive Sl-dominated Sl-Po-Cpy ore, in places with schist fragments. The upper is up to 5cm thick, and the lower is 2-3cm thick. The metasediments between the lower sulphide band and the gabbro constitute of fine grained, greygreen schist with varying chlorite content, and in places some sericite and muscovite. 10cm thick quartzite, with underlying mica schist with layers of chloritic phyllite, constitutes the footwall of the lower ore band. The gabbro cuts the schistosity and banding (195°/50°), including the conformable sulphide bands, in the metasediments. The upper ore band occurs 0.7m below the gabbro contact north in the trench, while 5m to the south it appears 1.5m below the contact. In the metasediments, a few cm below the gabbro contact, appear two 1cm thin, boudinaged quartz veins, which is parallel to the contact and consequently cut through the schistosity. The mineralization can not be traced for more than the approx. 20m extent in the trench, due to covered bedrock.

Dump volume: 20 m3.

Susceptibility:
Variation between 10 in Sl-rich ore, to 400 in Po-dominant parts. Generally 100-250 at typical massive Sl-Po-Cpy ore.

Samples for analysis:
399922: Massive finegrained Sl ore with sericite schist fragments. Sample from upper ore band.
399923: Massive finegrained Sl(-Po-Cpy) ore.

399924: Massive Po(-Cpy) ore.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399922	137	472	681	156200	256300	39	5,23
399923	47	8,1	7447	522	229300	34	> 10,00
399924	11	1,7	1768	666	8976	30	> 10,00

92. Søndre Knoll (Husmannsberget) UTM 0638297 7024520

Location:
Approx. 150m SW of Nordre Knoll, at UTM 0638297 7024520 (GPS70T).

Mineralization:
The mineralization can be followed along strike for approx. 50m along the immediate footwall contact of a coarse grained gabbro body. It is tested with two shafts (see sketch map). The easternmost is 5x2 m2, waterfilled and inclining steeply towards NW (80 m3 dump), while 35m to the west it is a 4x2 m2 waterfilled shaft (GPS70T) with 50 m3 dump. The ore zone is up to 1.20m thick in the easternmost shaft, and consists of 3, up to 15cm thick massive ore bands and some narrow sulphide bands and -impregnation in sericite-, quartz-sericite- and chloritic schist. The upper ore band is banded (probably primary banding) Py, Sl and Cpy, the middle band is massive laminated Cpy, and the lower ore band is massive Po with some Sl along the hangingwall. The schistosity and ore banding has direction 215°/50° in the east wall of the shaft and 215°/75° in the west wall, while it is bending around the gabbro westwards. In the west shaft the ore zone appears thicker (inaccessible) where it is upfolded in the gabbro (between two lenses?). Just west of the west shaft is a small digging where the ore zone has turned to 295°/20°.

Dump volume: 130 m3.

Susceptibility:
The massive, banded Py-Sl-Cpy ore generally shows 10-20, locally up to 200. Massive Po-Sl(-Cpy) shows 200-300.

Samples for analysis:
399918: Massive, fine grained, banded Py-Sl-Cpy ore; from upper ore band in west shaft.
399919: Same as 399918, from dump pile.
399920: Same as 399919.
399921: Massive Po-Sl(-Cpy) ore.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	Ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399918	1396	19,6	26600	1270	232700	329	> 10.00
399919	412	16,7	10400	2051	259100	260	> 10.00
399920	174	9	4684	1068	233900	227	> 10.00
399921	29	9,4	1533	1063	159600	32	> 10.00

93. Anna (Husmannsberget) UTM 0637478 7023853

Location:
Anna prospect is located 1km SW of Sander Knoll. The main shaft is found 100m west of the river Vatnelva at UTM 0637478 7023853 (GPS69T).

Mineralization:
The prospect contain two different ore types in apparently different tectonostratigrafic levels (see sketch map). Where it is done most work, two waterfilled shafts with approx. 500 m3 dump pile, the mineralization type is fine grained chlorite-hornblende schist with quartz lenses and partly irregular, cm-thick bands of Cpy and minor Sl and Po. Among the scarce ore samples in the dump a few show semimassive mineralization, while others show impregnation of sulphides. Wall rocks seen in the dump are quartzitic, greenish (some chlorite and hornblende) greywacke and chloritic schist. Exposure in the shaft wall shows the hangingwall greywacke to contain carbonate spots. Just NW of the NNW-ernmost shaft is outcropping a foliated, carbonaceous gabbroic rock, which exhibit folding with axis 105°/5°. The mineralization is partly exposed between the shafts, and seems to have a NNW-SSE direction (150°). Extension and thickness of the mineralization are not known (overburden).
80m east of the shafts, on the other side of a bog, another mineralization shows up in a small, 3x2 m2, waterfilled digging (15 m3 dump). Dump samples show chlorite-muscovite-sericite schist with thin quartzite bands and up to 5-10cm thick, conformable bands of massive, fine grained Py-Sl-Cpy ore. Larger dump samples show that the cm-thick banding of massive and semimassive sulphides extend for at least 30cm width. The mineralization is banded, and a typical observation shows 2-4cm thick massive, fine grained Py with 0.5cm thick massive Sl along the contacts to sericite schist. The massive sulphide bands are frequently durchbewegt, with breccia fragments of quartzite and chlorite-muscovite-sericite schist, and quartz eyes. The incomplete exposure in the digging shows the weakly rust stained mineralization to be chlorite dominated in the lower part, and sericite-muscovite dominated towards the hangingwall. Only the footwall of the wallrock is exposed, and prove to be quartz-rich, grey greenish schist. Schistosity in the footwall is 155°/40°, and in the upper part of the mineralization 155°/60°. Because of overburden the extension of the mineralization is unknown.

Dump volume: 515 m3.

Susceptibility:
Semimassive Cpy-Sl-Po ore from the westernmost mineralization: 40-80.

Massive Py-Sl-Cpy ore from the easternmost mineralization: 10.

Samples for analysis:

399915 (UTM 0637563 7023843): Massive fine grained Py-Sl-Cpy ore.

399916 (UTM 0637478 7023853): Chlorite-hornblende schist with semimassive Cpy-Sl-Po mineralization.

399917 (UTM 0637478 7023853): Chlorite-hornblende schist with semi-massive Cpy-Sl mineralization.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399915	71	10,5	9070	1738	121800	91	> 10.00
399916	893	16,6	95300	102	7920	69	> 10.00
399917	120	16,9	99100	38	9016	45	> 10.00

94. Gøsta (Husmannsberget) UTM 0637626 7023700

Location:

In dense forest between Anna and Duddu prospects.

Mineralization:

At pos. UTM 0637626 7023700 is a small digging (no dump) in greenish, rusty chlorite-hornblende-mica schist with insignificant Py-dissemination. At pos. UTM 0637725 7023600, 10m west of a bog, there are two 10m long, east-west running, shallow, refilled excavations at 20m north-south interval. No sign of mineralization in the excavation material.

95. Duddu (Husmannsberget) UTM 0637669 7023277

Location:

Duddu prospect is located west of a bog, at the east slope of Husmannsberget. At UTM 0637669 7023277 (GPS67T) an adit (300 m3 dump) is running towards SW, and 80m to the SW is a 3x2 m2 waterfilled shaft inclined towards NW (1000 m3 dump). The ruins of a cottage are found 10m west of the shaft. See sketch map.

Mineralization:

The mineralization is exposed above the adit where it is a small waterfilled pit. A 7m wide zone contains semimassive to massive bands, lenses and aggregates of Py, Sl and Cpy parallel the foliation. Mineralized thickness is estimated to be approx. 5m. Folding with axis 32-40°/20-30° can be observed. Strike and dip of schistosity is generally 225°/20-30°. The footwall part of the mineralization is dominated by finely laminated, mm-banded light green greywacke; thin chloritic layers in quartz-rich greywacke, grading upwards to quartz-sericite schist in the upper meter. Chlorite schist is the immediate host to the sulphide bands. The massive ore bands prove to be up to at least

20cm thick, including thin schist layers. The Py-dominated ore is slightly banded, with Sl-rich and Cpy-rich bands. Durchbewegung has occurred, leading to frequent, rotated chlorite schist fragments and quartz lenses/eyes in the massive ore.
Impregnation of euhedral Py (0.5-2mm) is common in the chlorite schist adjacent to the ore bands. The mineralized zone contains semiconcordant to discordant quartz bands of up to a few cm thickness. The hangingwall of the sulphide-banded quartz-sericite schist is constituting of at least 40cm thick phyllite, with a 20cm thick zone containing cm-thick bands of Py(-Sl-Cpy) between the quartz-sericite schist and barren phyllite.

The mineralization has direction towards the shaft 80m SW of the adit, but the area in-between is covered. The mineralization emerging in the shaft is different from the above mentioned. It is massive to semimassive, brecciated Po-Cpy-Sl ore with chlorite schist fragments. It is seen to be at least 40cm thick in the shaft wall, with sulphide impregnation in the adjacent wallrocks. Along the hangingwall, occur up to 40-50cm thick, boudinaged quartz lenses, and also minor quartz lenses along the footwall.
Wallrock is greenish quartz-amphibole-chlorite schist, which is probably chloritized greywacke at the contact to the overlying (not exposed) Husmannsberget gabbro. Chlorite schist is frequently encountered in the dump material. The mineralization is not exposed outside the shaft opening.

Dump volume: 1300 m3.

Susceptibility:
From the adit, Py (and Cpy) dominated Py-Sl-Cpy ore show values in the range 40-100, while some minor sections of Sl-rich Py-Sl-Cpy ore show approx. 4000, probably due to magnetite.
Massive, brecciated Po-Cpy-Sl ore from the shaft shows 400-500.

Samples for analysis:
399908 (UTM0637609 7023207): Massive brecciated Po-Cpy-Sl ore.
399940 (UTM 0637669 7023277): Typical massive Py-Sl(-Cpy) ore.
399941 (UTM 0637669 7023277): Sl-rich Py-Sl-Cpy ore.
399942 (UTM 0637669 7023277): Cpy-rich Cpy-Sl-Py ore.
399943 (UTM 0637669 7023277): Semimassive Py-Sl-Cpy ore in chlorite schist.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399908	44	11,5	56900	43	97100	42	> 10.00
399940	269	17,3	21700	2179	123100	82	> 10.00
399941	281	46	16200	9035	229600	82	> 10.00
399942	222	63,2	123900	1435	88400	73	> 10.00
399943	148	10,9	13900	351	27500	75	> 10.00

96. Ebba (Husmannsberget) UTM 0637286 7023051

Location:
The Ebba deposit crops out on the SW slope of Husmannsberget, at UTM 0637286 7023051 (GPS68T).

Mineralization:
The mineralization is well exposed in the hillside along the southern contact to the Husmannsberget gabbro. The ore zone is tested with a shaft (250 m3 dump), inclining 30° to the NW, in the NE end of the deposit – from where a shallow trench follows the mineralization SW-wards. Extension of mineralized outcrop is 26m. 10m west of the SW end of the trench an adit runs at least 20m to the NNE (150 m3 dump). See sketch map. The mineralization has wedged out, and no sulphides are observed in the adit opening. The ore zone is hosted in hornblende schist, approx. 1m thick, between the fine grained gabbro and greenish greywacke with some chlorite and amphibole. Along the border zone the gabbro is deformed to lens development; typical size of the lenses are 1-3m by 1-2m. Locally carbonate spots occur in the vicinity to the ore zone. In the shaft the ore zone is up to 1m thick, consisting of 4 massive ore bands of 10-15cm thickness and a few few-cm thick bands intercalated in the hornblende schist. The ore bands are repeated by isoclinal folding, axis 80°/10°. Lineation (and open folds?) in the hanging wall (gabbro contact) is 295°/10°. In the trench, direction of fold axis is 260°/60°. Strike and dip of schistosity (and ore bands) varies considerably; generally at approx. 15°/30° along the trench, and 30°/30° at the adit entrance. The massive ore consists of Po and Cpy, and is commonly brecciated, containing hornblende schist fragments. In parts of the ore zone the sulphide minerals are separated to almost pure Po and Cpy respectively. Massive Cpy appears in 1-2cm thick bands and up to 10x5 cm2 sized clusters. The width of the ore zone decreases to 10-30cm SW of the shaft, containing thin massive and semimassive bands and impregnation. Cpy is seen to be mobilized along thin fractures, and one place a 5cm thick fracture filling of massive Po and Cpy cuts down in the footwall greywacke.

Dump volume: 400 m3.

Susceptibility: Variation between 100 and 800, and locally up to 9000.

Samples for analysis:
399909: Massive Po-Cpy ore.
399910: Same.
399911: Same, brecciated, with schist fragments.
399912: Massive Cpy.
399913: Semimassive Po-Cpy in hornblende schist.
399914: Semimassive Po(-Cpy) in hornblende schist.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399909	8	6,4	43600	15	2100	31	> 10.00
399910	76	7,7	45500	20	1330	29	> 10.00
399911	17	14,2	122000	24	2534	39	> 10.00
399912	430	4,8	26700	10	27100	45	8,82
399913	26	12,1	66100	15	1246	78	> 10.00
399914	33	5,3	4142	1442	5864	93	> 10.00

97. Lillefjell (Gruvefjellet) UTM 0638631 7016457

Location:
The mine is situated about 800m a.s.l. at the eastslope of Gruvefjellet, and a 3km long, marked tourist track from Rotvoll leads up to the mine.
Shafts and partly collapsed excavations follow along the approx. 100m long outcropping ore body, UTM 0638631 7016457 (GPS85T), and a WSW directed adit is located at UTM 0638771 7016583 (GPS84T).

Mineralization:
Due to horrible weather, no detailed sketch map was prepared from the mine site, but detailed descriptions can be found in Haugen (1966) and Birkeland et al. (1996). Wallrocks encountered on the dumps are greywacke (quartzitic to schisty and clayish), quartzite and gabbro. Of alteration rock types are frequently observed chlorite schist, chlorite-sericite schist and white to light grey sericite schist, quartz-sericite schist and quartz-pyrite schist. Where observed, the ore zone consists of an upper pyritic ore layer and a lower pyrrhotitic ore, with approx. 0.5m separation. The Py-Sl-Cpy(-Po) ore is massive, Py-dominated, in places banded (Sl and Cpy bands), and often brecciated with chlorite schist fragments. The lower pyrrhotitic ore is massive Po-Cpy ore with wallrock fragments. Outcrops of the ore deposit and wallrocks are frequent around the mine openings.

Dump volume: Estimated at 30 000 m3.

Susceptibility: Variation between 50 and 300 at massive ore.

Samples for analysis:
399967: Massive, fine grained, banded Py-Sl-Cpy ore.
399968: Massive Po-Cpy dominated ore.
399969: Massive, fine grained, Py-dominated Py-Sl ore with wallrock fragments.
399970: Banded quartzite with thin Cpy(-Sl-Py) bands.
399971: Massive, banded Cpy-Py-Sl-Po ore
399972: Massive, banded Cpy-Py-Po(-Sl) ore with chlorite schist fragments.
399973: Same as *399972.*
399974: Massive Py-Cpy-Sl ore.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399967	140	16,3	11000	5853	175500	228	> 10.00
399968	45	8,4	7470	1661	68400	11	> 10.00
399969	87	3,2	4951	585	62200	186	> 10.00
399970	37	5,8	15500	979	37700	16	5,9
399971	434	13,1	39200	956	98400	237	> 10.00
399972	177	14,7	52700	608	51600	72	> 10.00
399973	266	17,4	43900	973	76200	157	> 10.00
399974	164	20,1	60900	1099	59600	145	> 10.00

98. Peder Bentzens skjerp (Litlefjellet) UTM 0638665 7016049

Location:
Two shafts are located in apparently higher tectonostratigrafic levels, and approx. 400 (Peder Bentzen north) and 800m (Peder Bentzens skjerp (south)) south of Lillefjell mine.

Mineralization:
Peder Bentzen south: UTM 0638665 7016049 (GPS81T). 3x3 m2 waterfilled shaft.
The bedrock is dominated by greywacke with layers of phyllitic mica schist and lenses of fine grained gabbro. The shaft is placed on a 1.5-2m wide rust zone containing Po-Cpy impregnation and bands of Cpy-Po stringers in chlorite schist. In the mineralized chlorite schist occur cm-thick quartz lenses, in one band up to 10-20 cm thick lenses.
Strike and dip of schistosity: 145°/70° 50m to the SSE is a small (1 m3 dump) digging in the same rust zone; only weak sulphide impregnation. The area is well exposed, and several small rust zones (weak sulphide impregnation) can be observed.

Dump volume: 70 m3.

Susceptibility:
70-150 at mineralized chlorite schist.

Samples for analysis:
399961: Chlorite schist with Cpy-Po stringers.
399962: Chlorite schist with Cpy and Po bordering quartz lenses.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399961	32	1,4	6281	9	483	< 5	> 10.00
399962	90	1,1	6067	8	297	< 5	8,52

99. Peder Bentzen nord (Litlefjellet) UTM 0638678 7015681

UTM 0638678 7015681 (GPS82T). 5x3 m2 waterfilled shaft, 30 m3 dump. An at least 1-1.5m thick rust zone consists of light rusty-yellow quartz-sericite schist with approximately concordant, folded, mm-cm (up to 4cm) thick bands of massive Po-Cpy-Sl mineralization with rotated schist fragments. Also crosscutting and irregular, thin sulphide veins. Wallrock is a greenish-grey schist. The immediate (approx. 2m) hangingwall is chlorite containing, while up to 2m of the footwall contains some sericite. Schistosity: 140°/70°.

50m to the NNW is a small, 4x2 m2 digging (2 m3 dump) in presumably the same horizon. Approx. 1m thick rust zone consisting of quartz-chlorite- and quartz-sericite-mica schist with Py-impregnation (up to 1-2mm euhedral Py) and banding of Py (few-mm to 1cm thick), and one layer (at least 10cm thick) with 2-4mm sized, rounded Py-Cpy aggregates in the quartz-sericite-mica schist. The wallrock is chloritized 1-2m above and below the mineralization. Occasional dump samples of the same type, Po-Cpy, mineralization as above mentioned from the shaft 50m to the SSE.

At UTM 0638898 7015487, just south of a creek, is an insignificant excavation (<1 m3 dump) in a rust zone, consisting of greenish greywacke with greenish schist intercalations and traces of Po (and Cpy?) dust.

Dump volume: 30 m3.

Susceptibility:
Variation from 10 to 600 at the mineralization.

Samples for analysis:
399963 (UTM 0638678 7015681): Quartz-sericite schist with Po-Cpy-Sl bands.
399964 (UTM 0638678 7015681): Same.
399965 (UTM 0638658 7015726): Quartz-sericite-mica schist with Py-Cpy impregnation.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399963	65	6,2	18500	418	9565	< 5	> 10.00
399964	146	8,1	22300	479	19100	38	> 10.00
399965	181	6,6	51900	26	171	29	> 10.00

100. Litlfjellet south UTM 0639154 7014916

Location:
SW of Litlfjellet, at UTM 0639154 7014916 (GPS83T) immediately west of the track between Rotvoll and Gilså mine.

Mineralization:
At a small outcrop in a bog is an insignificant digging. The greenish greywacke with greenish schist intercalations here contain a 10cm thick band of quartz lenses and connected partly rich Cpy (and traces of Sl) impregnation bound to a chloritic schist layer.
The mineralization can be followed for just a few meters.

Dump volume: << 1 m3.

Susceptibility:
20 at the mineralization.

Sample for analysis:
399966: Chloritic schist with quartz lenses and Cpy(-Sl) impregnation.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399966	464	16,2	36800	24	14100	14	> 10.00

101. Gilså (Gilsli gruve) UTM 0639465 7012739

Location:
The Gilså mine is situated at Gilsåfjellet, 920m a.s.l. at UTM 0639465 7012739 (GPS60T) (GPS-locality at northernmost shaft). 40min. walk along marked tourist route from the road to Finnkoisjøen.

Mineralization:
The ore body is followed with shafts and two shallow pits over a strike length of about 200m (see sketch map). Outcrops of the main ore zone are not found, only scarce exposures of the immediate wallrock, alternating sandy and clay-rich greywacke, and adjacent mica schist. Judged from the dump material, only very weak alteration (sericitic) of the wallrocks has taken place. Very little ore material is left at the dumps, but from the remaining, the ore proves to be massive, fine grained, brecciated Po-Cpy-Sl-Py with schist fragments ("rugs"). Some, 5-10cm thick lenses of coarse grained calcite are observed in the dump material.

At UTM 0639395 7012539, SW of, and above the main ore body, appears an impregnation-type mineralization in a 4x3 m2 and 2m deep digging. In 2m thickness of alternating sericite schist, chlorite schist and quartzitic layers Po, Cpy and Sl occur as mm-bands and impregnation. A 40cm thick semiconcordant quartz vein is emplaced in the highly folded schists in the excavation. An insignificant digging is found 100m to the south at presumably the same level. Only very weak sulphide impregnation shows up here.

Dump volume: Approx. 15 000 m3.

Susceptibility:

50-200 at massive ore, and 20 at higher-level impregnation from the SW-ernmost digging.

Samples for analysis:

399877 (UTM 0639395 7012539): Sericite schist with mm-bands and impregnation of Po, Cpy and Sl.

399878 (UTM 0639465 7012739): Massive, fine grained, Cpy-dominated Cpy-Po-Sl ore with schist fragments.

399879 (UTM 0639465 7012739): Massive, fine grained Po-Sl-Cpy ore.

399880 (UTM 0639465 7012739): Massive, fine grained Po-Py-Sl-Cpy ore.

399881 (UTM 0639465 7012739): Massive, fine grained Po-Sl-Cpy-Py ore.

399882 (UTM 0639465 7012739): Semimassive Po-Sl-Cpy in sericitic schist.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399877	35	2,3	5198	48	27900	122	9,86
399878	536	30,3	85600	99	59800	78	> 10.00
399879	42	1,6	4413	4	72700	71	> 10.00
399880	337	3,9	10200	210	74900	59	> 10.00
399881	87	6,9	12800	30	60700	57	> 10.00
399882	54	11,3	29600	210	48400	53	> 10.00

102. Dronningen (Bjørneggfjellet) UTM 0642182 7014431

Location:

Access along marked track from Rotvoll to Storerikvollen; 4.5km walk to the mine, which is situated on the eastside of Bjørneggfjellet, 775m a.s.l., at UTM 0642182 7014431 (GPS62T).

Description of the mine:

The mine consists of a narrow, generally around 5m wide, open pit (trench) which follows the ore zone more or less continuous for 155m length (see sketch map). The deepest part is the north end with 8-10m depth. Central in the pit is a refilled inclined shaft towards NW. From the southern end an adit runs at least 20m southwards. 40m NNE of the northern end of the pit is an assumed adit (refilled) at the SW-end of a 25m long trench. Several small, waterfilled diggings occur up to 100m west of southern part of the open pit.

Mineralization:

The mineralization is bound to a shearzone in an approx. 100m wide gabbro lens, presumably close to its footwall contact to the metasediments. This outer part of the gabbro lens is fine grained, dense and light green, while the central part is coarse grained and saussuritic. Very little mineralization (except of malachite coating) can be seen in the walls of the open pit, only some thin, irregular veins of Cpy (and Po), thin fracture fillings (mainly east-west running) of Cpy, and evenly distributed, fine grained Po-

dissemination. Calcite veins occur in the gabbro in the pit walls. In the northern end of the open pit the main ore zone can be seen as a 25cm thick rust zone, with direction 200°/70°. In the south-end of the pit, however, the strike and dip of a thin ore band, and schistosity in the shearzone is 145°/50°.

The gabbro hosting the mineralization in the shearzone is schistose, partly chloritized and partly silicified. Among the scarce ore samples in the dump, only a few small samples show massive Cpy-Po ore, while others show rich to weak impregnation. Sorted hydrothermal quartz is also encountered at the dump. Further into the gabbro lens, the mentioned diggings west of the southern part of the open pit show only narrow bands of Cpy-Po impregnation, which is also the case in a few small diggings 40-50m NW of the north-end of the open pit.

250m NW of the open pit, at UTM 0641959 7014590 (GPS61T), is a small digging (3 m3 dump) in quartzite (schist) with some sericite in places, and a 10-20cm thick rust zone, containing Cpy-dissemination and a few bands (few-cm thick) of almost massive Cpy. The massive bands are partly irregular, and partly follow the foliation. Some of the bands contain Sl in addition to Cpy. Cpy is also mobilized in thin fractures. Schistosity: 135°/60°. 250m SSE of the open pit, at UTM 0642253 7014177 (GPS63T), is yet another small digging (15 m3 dump). Here, a 2-m thick rust-stained alternation of chloritized schist, sericitic schist and silicified gabbro (with gabbro as wallrock) contain Cpy(-Po-Sl) impregnation. Approx. 100m further to the south is a tiny digging with just a few boulders in the dump, which show rather rich Cpy-impregnated quartzitic rock.

Dump volume: 8 000 m3.

Susceptibility:
Cpy-Po impregnation from the open pit shows 50-500, while sulphide mineralization from the diggings NW and SSE of the open pit shows 20-30.

Samples for analysis:
399883: (UTM 0641959 7014590): Light grey quartzite with Cpy(-Sl) vein and – impregnation.
399884: (UTM 0642182 7014431): Fine grained silicified gabbro with rich Cpy(-Po) impregnation.
399885: (UTM 0642182 7014431): Fine grained gabbro with Cpy(-Po) impregnation.
399886: (UTM 0642182 7014431): Quartzite(?) with Cpy(-Po) impregnation.
399887: (UTM 0642182 7014431): Fine grained gabbro with Cpy(-Po) impregnation.
399888: (UTM 0642253 7014177): Silicified gabbro with rich impregn. of Cpy(-Po-Sl).

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399883	8	3,2	25000	32	859	157	6,83
399884	80	9	39200	28	2185	80	> 10.00
399885	59	3,4	19100	27	835	67	> 10.00
399886	122	8	28600	13	840	183	7,7
399887	83	8,5	37000	19	985	89	> 10.00
399888	162	11,3	26500	1253	6237	419	8,61

103. Svartåtjern (Husmannsberget) UTM 0637800 7019040

Location: Svartåtjern claim UTM 0637800 7019040 may be reached by foot from Gilså Hytte, Hyttmoen (Smelter) UTM 0640460 7020850. Follow trail towards Lillefjell gruve.

Geology, outcrops:
Svartåtjern claim is located in Kjøhaug group, which is the same as Røros formation in the south. The area is well exposed and is dominated by a folded quartz-muskovite-aktinolite-schist often greenish in color. Its foliation is 149°/18-72°SW. Fold axes is measured at 329°/54°N.
The ore has been mined from a small waterfilled pit covering about 6m2.

Mineralization:
Chalcopyrite, pyrrhotite and pyrite occur as schlieren and enriched around eyes of quartz.

Dumps:
Dump volume is estimated at 8m3.

Sample collected for analysis:
399975: Only one sample with Cpy, Po and Py was collected for analysis.
Susceptibility: 40.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399975	162	10,9	27600	29	1172	19	> 10.00

Gauldalen:

104. Fløttum (Fløttum) UTM 0587382 6975507

Location:
The mine is located in Fordalen, 505m a.s.l., at (GPS109T). Accessible by car at gravel road from Midttun in Forbygda (by the main road), except 100m by foot up to the mine.

Core drilling:
A number of 16 drillholes totaling 2110m are stored at The Geological Survey's storage.

History of the mine:
The deposit was found by a local farmer in 1883, who sold the mining rights to Røros Kobberverk in 1888, and the first of three mining periods was initiated the same year (small scale test mining occurred in 1883-88). The mining activity ceased in 1892. The second production period was 1904-10, and the third, 1915-17. Drilling have been conducted by Røros Kobberverk in 1890, 1913, 1917 and 1951-53, totaling 2650m. Geofysisk Malmleting conducted electromagnetic ground measurements in 1949-50. The deposit is treated in a thesis (NTH) by Ljøkjell (1953). Terratest A/S conducted in 1970 airborne geophysics in the area, and anomalies were followed-up by Røros Kobberverk, with ground measurements in 1971 (Mag. and EM) and 1974 (VLF and SP). In 1974 Røros Kobberverk / A/S Sydvaranger did stream-sediment sampling around Fløttum, and the same year NGU mapped the heavy-metal pollution in streams draining the deposit. Pettersen (Røros Kobberverk) conducts ore calculations in 1967, in 1990 by Gvein (Prospektering A/S), and in 1991 by Juhava (Folldal Verk A/S Outokompo Oy).

Mineralization:
The deposit is followed with underground mining over a strike length of approx. 200m (see sketch map). The ore is outcropping in a trench at UTM 0587382 6975507 (GPS109T). The deposit consists roughly of 4 ore lenses, with axis plunging towards SE, in one (or more) impregnation zone(s). The A- and B-lenses are confined to one level, C two levels, and D to a hanging-level, plus a footwall ore consisting of several ore-bearing zones. The different ore levels are possibly the same, repeated by folding. Ore mineralogy: Py, Po, Sl, Cpy, minor Gn and a variety of trace minerals. In the inclined shaft, the ore is described as an upper Py-Sl ore zone, and a lower Po-Cpy-Sl(-Gn-Apy-fahlerts) ore zone. It is not clear if this zonation has general applicability. Both ore types, the pyritic (Py-Sl-Cpy) ore and the pyrrhotitic (Po-Cpy) ore outcrop at two different places in quartz-sericite schist in the mentioned trench. The metasedimentary wallrocks consists of light grey, carbonaceous quartz-biotite schist and graphite-quartzite / banded quartzite. The ore zones are enveloped in alteration rocks of muscovite-bearing quartz-sericite schist.

Ore types encountered at the dump:
- Massive Py (average grain size 1-3mm; occasionally up to 10mm) with Sl-Cpy-quartz-matrix.
- Massive, banded Py-Sl(-Cpy) ore.

- Massive to semimassive Sl(±Py) in quartz matrix, containing Gn-impregnated quartz lenses.
- Quartz-sericite schist with mm-cm bands of Py-Cpy-Sl.
- Massive Po(-Cpy-Sl) ore.

Dump volume: 7000 m3.

Susceptibility:
Noted in parenthesis below.

Samples for analysis:
400011: Massive, medium grained Cpy-Sl-Py ore (200).
400012: Semimassive, coarse grained Py-Sl ore in quartz-rich groundmass (20).
400013: Massive, coarse grained Py-Sl ore.
400014: Massive to semimassive Sl ore in quartz matrix with Gn-impregnated quartz lens (20).
400015: Quartz-sericite schist with mm-cm thick Py-Cpy-Sl bands (40).
400016: Massive, fine grained Po-Cpy-Sl ore (100).
400017: Massive, fine grained Po-Cpy-Sl ore (100).
400018: Massive Sl-rich Sl-Py ore (10).

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
400011	409	56,9	78500	997	101300	286	> 10.00
400012	64	6,4	6567	110	147700	304	> 10.00
400013	97	28,8	12000	3749	112400	264	> 10.00
400014	87	15,1	874	2934	329500	31	6,17
400015	450	27,9	26600	795	6060	133	8,77
400016	110	7,4	18900	194	99000	40	> 10.00
400017	142	17,4	16600	342	213400	166	> 10.00
400018	96	32,4	762	3652	287000	172	> 10.00

Tolga district:

105. Vingelen (Vingelen) UTM 0596450 6924750

Location:
The Vingelen deposit is located 2.5km north of the center of Vingelen, at the NE ridge of Kletten, 960-1000m a.s.l., at UTM 0596450 6924750. Approx. 500m walk from the nearest road.

Core drilling:
One drillhole at 220m is stored at The Geological Survey's storage.

Mineralization:
The ore body is followed along a NNE-SSW strike length of approx. 780m with workings, from UTM 0596610 6925050 to 0596240 6924370.The entrance of an adit to the mine is located at UTM 0596820 6924720. The ground is covered, and most of the workings are refilled; the ore is not found outcropping. The NNE'ernmost digging (UTM 0596610 6925050) is a 20m long, up to 4m deep NE-SW running trench (1500 m3 dump), with a 15m long, shallow, refilled excavation trench towards NW. Poisoning in the hillside below the trench. A small exposure in the SW end of the trench shows white to weakly greenish feldspatic schist (quartz keratophyre) with two rusty (only traces of sulphides), dm-thick layers. Below this is weakly chloritic greenschist. The same rock types constitute the dump material, and very little mineralization appears – only impregnation and bands of mm- to 4-5cm thickness of massive Py-Sl-Cpy in the quartz keratophyre, and thin Py bands in greenschist with thin (≈1mm) carbonate bands.
At UTM 0596450 6924750 are tailings over a considerable area (100x50 m2; 9000 m3) and refilled mine openings. Between this place and the above mentioned trench occur 8-10 small excavations, where only gossan is encountered.

The large dump show:
- Massive, fine grained, banded Py-Sl-Cpy(±Mt) ore. Py is dominant, with very Zn-rich bands, and minor Cpy and Mt enriched in bands. The ore is very carbonate-rich, as matrix mineral and in up to 5cm sized nodules.
- Massive, fine grained Po-dominated ore with Py, Cpy and Mt enriched in thin bands.
- Massive, fine grained Mt-Po mineralization with occasional Py phenocrysts (≈1mm) and minor Cpy.
- Carbonate-rich rock with semimassive Sl-Py ore.
- Massive ankerite with Py dissemination and thin chlorite layers.
- Chlorite schist with Py (up to 8-10mm size; euhedral) dissemination.

Wallrocks seen at the dump are quartz-sericite schist, chlorite schist (ore at the contact to both), and calc-silicate rock. As mentioned, the pyritic ore is very carbonate-rich, with lenses and nodules of carbonate, and marble layers up to 5-6cm thickness are seen at the dump. Between the large dump and UTM 0596240 6924370 there are several small, refilled excavations with no outcropping mineralization; in places gossan. Some dump samples show semimassive to massive Py-Sl-Cpy ore. The dump (7000 m3) outside the refilled adit entrance (UTM 0596820 6924720) shows the same ore types as above mentioned.

Dump volume: 17 500 m3.

Susceptibility:
Large variation at the massive Py-Sl-Mt ore, depending on the Mt-content: 500-10 000. Carbonate rock with Sl(-Py) mineralization: 40-60. Po-dominated ore: 10 000-20 000. Mt-dominated ore: 60 000-90 000.

Samples for analysis:
399787 (UTM 0596610 6925050): Massive, fine grained, banded Sl-Py-Cpy ore.
399788 (UTM 0596260 6924430): Semimassive Py-Sl-Cpy ore in quartzitic rock.

399789 (UTM 0596450 6924750): Massive, fine grained Mt-Po mineralization with occasional Py phenocrysts (≈1mm size) and minor Cpy.
399790 (UTM 0596450 6924750): Po-dominated ore: massive, fine grained Po with cm-thick bands of Py-Cpy in quartzitic rock, and mm-bands of Mt.
399791 (UTM 0596450 6924750): Massive, fine grained Py-dominated ore, with thin Sl-rich bands and minor Cpy; up to 5cm sized carbonate nodules.
399792 (UTM 0596450 6924750): Massive, fine grained Sl-rich Sl-Py ore.
399793 (UTM 0596450 6924750): Carbonate-rich rock with semimassive Sl-Py ore.

Result of chemical analysis:

Element	Au30	Ag	Cu	Pb	Zn	As	Fe
Units	ppb	ppm	ppm	ppm	ppm	ppm	%
L.R.L.	5	0,2	1	2	1	5	0,01
399787	798	13,8	27000	192	136000	106	23,8
399788	77	5,6	14000	92	34000	155	19,7
399789	28	1,8	2728	47	199	161	> 10.00
399790	25	2,3	4912	63	265	137	> 10.00
399791	48	2,8	7333	70	10000	103	> 10.00
399792	77	9,4	2544	1684	224100	106	21,3
399793	52	1,3	317	81	169400	122	> 10.00

5. Prospects and claim targets not found:

Røros Nordgruvefelt:

Bergarkivet (obs! refers to ED50 coord. syst.) plots 4 unknown occurrences:
017 Orvsjøen, 0619200 6953450: Not attempted found.
022 Koieberget, 0622350 6953200: Thick overburden.
024 Kopphammerdal, 0617250 6952400: Not found; few outcrops of greywacke.
598 Grøtåtjern, 0614700 6956450: Not attempted; probably mistaken for Lille Mugg.

Lieungh (1973) has two plots on the west side of Storfjellsjøen:
No outcropping mineralization was found here, but close to one of the plots, at UTM 0615950 6954760, 5m north of a creek and 30m from Storfjellsjøen, is upweathered(?) small boulders of massive Po(-Py) and massive Py.
300m to the SSW, at UTM 0615775 6954475 (GPS07T), is upweathered different massive ore types containing Po, Py, Cpy and minor Sl in a small (2x2 m2) area in the moraine. A sample (RFS) was collected for analysis: *399687.*

Røros Østgruvefelt:

Bergarkivplot 016 Nilsgård, UTM 0648250 6950300: Registered as a Cr-deposit, but at the 1:250 000 geological map it is marked as a sulphide-deposit. According to local people it is a digging approx. 5-600m upwards from Gjartrudstjønna, that means about 2km ENE of the plotting. Search in this area gave no result. Bergarkivet plot two occurrences respectively 2km SSE (west slope of Bekkosvola) and 1.5km NE (Svarthåmmåren) of Klasberget, which is not yet attempted found. Bergarkivplot 023 Koiedalen, 0632500 6945850: The digging was pointed out by local people. At UTM 0631935 6945957 (GPS115T) is a 5x5 m2 pit in the overburden (filled with garbage). No

mineralization was found in the overgrown dump, only calcareous mica schist. After the field season attention was called to two NGU-registrations at Sommerhøgda (between Koiedalen and Storwartz), at UTM 0631200 6945600 and 0631400 6945300, of Cpy-Sl-Po-Py mineralization (ought to be checked!). 900m to the SW, the name "Trønnesstollen" called attention. It proved to be the entrance to what was planned to be an adit to Storwartz, but it was given up. Inscription "1849" at the nice stonewalled entrance.

Holtålen district:

Aasgaard (1927) plots an occurrence called "Saksvoll skjerp" approx. at UTM 0626300 6966900. Search in this area led to no result. His locality description "600m SW of Saksvollen, north of Knippen (probably Bønskneppen), close by Storbekken", however, suggests a location about 10km ENE'wards. According to locals, Lunderengvollen was earlier named Saksvollvollen. Even though the description fits very well with an approximate location at UTM 0635000 6969000, the search along Storbekken, with good exposure, was negative. Aasgaard also mentions "Lillevoll skjerp, just south of Lillevoll", which is located at UTM 0618900 6965000. No attempt was done to find this. Claim Vattåsen II (no 46II), =Skargruben was most likely not found. At UTM 0621620 6962693 a cliff with only some dessiminated Po was found. No trace of human activity was seen. The actual location of Skargruben may therefore not have been found.

Kjøli area:

One important digging at Svenskmenna not found (mentioned by Aasgaard).

Tydal area:

Lauvøykleppen, UTM 0634750 6988250 was not found, and not known among local people. Østby: A sulphide occurrence is plotted on the geological map 1:250 000, approx. at UTM 0634600 6994300. According to a local farmer he thought it could be "something" further up towards Heknåsberget. Search in that area was resultless.
Esna grube is now flooded and located below the dam of the regulated Essandsjøen.

Meråker østfelt:

In this area it is a lot of unexplained plottings at the 1:50 000 and 1:250 000 geological maps (which the claims are based on), which is most probably due to inaccuracy and uncritical use of the plottings from Bergarkivet.
The plots not found are:
Vektarhaugen: 0642400 7037400, 0642500 7037200, and 0641800 7037900.
Risvoll: 0638950 7033250. No mineralization found. Several local people were asked about the claim. No one had heard about it – not even the oldest man Mr. P. Risvoll!
Dolmen: 0639150 7032450. A house is located here. No one at home.
West of Copper: 0640050 7032950. No mineralizations seen in road cuts of Kopperå-road.
Dalvola: 0643750 7028800, and 0644350 7027900.
ESE of Skomakermoen: 0641450 7031600.
Fossvatnet: 0637700 7027900, 0638000 7028750, 0638300 7028000, 0638400 7027550, and 0638400 7026100. At 0638200 7027400, at the roadside, is a rusty greenish (subordinate chlorite) greywacke with weak Cpy dissemination.
Knollen: 0639000 7024800, and 0637200 7023750.

In the claim area from Svartåtjern and 6km NNE'wards past Nysætervollen, no mineralization, except the digging just north of Svartåtjern, was found.
Claim area Øvervollen (Reingroen), 0635000 7024700: no mineralization found. The area is densely forested and covered by a thick moraine layer.
Claim area Gåsvollfjellet, 0635500 7017000: no mineralization found.
Claim area Litlfjellet(SE), 0639500 7015700: no mineralization found.
Gilså: 3 diggings plotted by Haugen (1966) in an area from Gilså mine and 1km eastwards was not attempted found.
"Bjørneggen skjerp" is plotted by Haugen at 0642400 7012400. It was not found on the evening return trip from Dronningen – might be located by more thorough search.

6. Discussion and evaluation:
Approx. 400 rock samples are collected for analysis from 107 deposits in the Røros-Meråker district. As mentioned in chapter 3, stratiform massive Sulphide deposits are hosted in the majority of stratigraphic units in the area, but the main targets are defined to sedex-type deposits in the Røros and Røsjø formations and vulcex-type deposits in the Hersjø formation.
The ores in question show great macroscopic similarities in all the lithostratigraphic units, irrespective of the hostrock being volcanics (Hersjø formation and Sulåmo group) or sediments (Røsjø and Røros formations and Gula group). It is a striking feature of the massive stratiform mineralizations to constitute two distinctly different (according to mineralogy, texture (and genesis?)) ore types/paragenesis, often occurring in close spatial association to each other:

1) Zn-Cu-pyritic ore; massive, fine grained, commonly banded Py-Sl-Cpy(±Mt and Po) ore with compositional variation from almost pure pyritic(±Mt) to pyrite-dominated with variable content of the matrix components Sl, Cpy and Po. This ore type often exhibits assumed primary sedimentary and tectonic banding of alternating (mm-dm scale), well-defined bands rich in Py, Sl and Cpy respectively. Almost pure Sl-layers with minor dispersed Py grains are found to occur in layers up to 50-60cm thickness (e.g. Svenskmenna and Klinkenberg). The Pb-content is low, and Gn is seldom observed in significant amounts. Banded enrichments of Mt are common in many of the pyritic ores, or parts of the ores. The pyritic type is seldom brecciated, containing wallrock fragments.

2) Cu-pyrrhotitic ore; massive, fine grained, almost invariably brecciated (durchbewegt) with rotated, twisted and bent wallrock fragments of dominantly chlorite schist and quartz eyes/nodules, a combination of ore-type and –texture well known from several Caledonian sulphide deposits, and described among others by Vokes (1968). Subsequent penetrative deformation of the ores and hosting schists has thoroughly disrupted the sulphide masses and developed durchbewegung textures.
Po is the dominant sulphide, with subordinate Cpy. Generally, Py is a minor constituent, almost absent, but can locally be a major component contained in coarser grains in fine grained Po groundmass. The content of Sl is generally low compared to the pyritic ore type, and range in abundance from almost absent to several percent in some deposits. Oxide facies intercalations (Mt) are frequently encountered, though

clear areal variation occur, in the pyrrhotitic type (see below). Gn is not observed macroscopically.

The close connection between the two ore types is met upon in numerous deposits in the Røros-Meråker district. The degree of relationship is variable: commonly they are separated by dm- to few-meter thick wallrock, with variable tectonostratigraphic position; occasionally in contact to each other, and seldom intermixed (e.g. Midtgruben). In spite of their common spatial association, texturally they are very different: the pyrrhotitic ore being reworked and brecciated, and the pyritic ore pronouncedly banded (and in a few cases brecciated); the wallrock fragments giving rise to a distinctly higher gangue mineral fraction in the pyrrhotitic ore. This association of pyrite+Zn+Pb and pyrrhotite+Cu has earlier been noted by Vokes (1976) in Norwegian sulphide deposits. When the two ore types occur together in the same deposit, Zn is clearly enriched in the pyritic ore compared to the pyrrhotitic ore, but the pyrrhotitic ore type is occasionally Zn-rich, especially when no connected pyritic ore occur (e.g. Lergruvbakken, Skjellåfjell, Stømnbekken).

The deposits bound to the Hersjø formation volcanics also exhibit this bimodal nature of pyritic and pyrrhotitic ores. These volcanic-hosted deposits north of Røros seem to occur in an area almost totally dominated by basic volcanites, while the greenstone belt becomes more felsic to the south, with the greatest concentration of felsic volcanites occurring around the Nonsvola-Vingelen deposits. Further south, the volcanics become more irregular mixed; basic-felsic tuffs with much intercalations of phyllite and graphitic phyllites in the south, near the Sivilvangen deposit.
The fact that, as the volcanism becomes more acidic, the sulphide chemistry tend to change from Cu- to Zn-dominant, favors the greenstone belt south of Røros compared to the Holtålen district regarding Zn-potential, although at Hultrå the banded Zn-Cu-pyritic deposit is capped by rhyolite. In the Vingelen-Sivilvangen area, with a more differentiated sequence of bimodal volcanism, with accumulations of felsic volcanics (especially rhyolite flows, often seen to exist in close association to Zn-rich horizons), indicative of local centers of volcanic activity, the sulphide concentrations (rich in Zn) lie along the contact zones between felsic and basic volcanites.

Compared to the mineralizations in the Hersjø formation, the mineralizations in the Røros and Røsjø formations and the Gula group bears less evident relationship to exhalative nature of formation, a genetic model favored by many workers concerning sulphide deposits in wholly metasedimentary lithologies.
Rui & Bakke (1975) state that the deposits in the Kjøli area is probably precipitated primary on the sea floor, and Vokes (1968, 1976 and 1980) explains the sediment hosted deposits lacking recognizable feeder channels in terms of distal exhalations of sedimentary-exhalative-syngenetic character.
An example given by Sundblad (1980) from the Ankarvattnet Zn-Cu-Pb deposit in Sweden, however, suggests that massive sulphide deposits in immature greywacke sequences need not necessarily be formed distal to a hydrothermal solution outlet, and that the occurrence of penecontemporaneous igneous intrusions within rapidly depositing sediments may well be an important factor governing ore deposition in this environment. The disc-shaped Ankarvattnet stratiform sulphide deposit (5.5% Zn, 0.45% Cu) is hosted in an approx. 3000m thick, gabbro-intruded calcareous phyllite belonging to the Køli

nappe of the Seve-Køli Nappe Complex. The deposit consists of both a massive, banded Py-Sl-Cpy ore layer and a massive, brecciated (durchbewegt) Po-Cpy-Sl ore layer, with hostrocks of sericite quartzite, chlorite quartzite and dolomitic phyllite.

Sundblad points to the similarities of the Ankarvattnet deposit with the idealized, well-established model for volcex deposits. He suggests that the brecciated pyrrhotitic ore in chlorite quartzite corresponds to the stringer zone, and that the sericite quartzite hosting the pyritic ore is a ferruginous chert layer. Sundblad ascribe the anomalously high Zn-content in the presumed stringer zone (brecciated pyrrhotitic ore) in Ankarvattnet to the high calcite content in the country rocks, affecting the pH of the ore-bearing fluids, thus allowing Zn to precipitate at a higher temperature than in volcanogenic deposits.

The mineralization types, metal zonation and morphology found in the Ankarvattnet deposit, can according to Sundblad be explained by deformation comprising both pure and simple shear.

The conspicuous similarities with the Røros-Meråker pyritic and pyrrhotitic deposits, hosted in greywacke and accompanied by chlorite schist and sericite-quartz (and garnet quartzite) schist, also includes the affinity to gabbro intrusions. As the Røros-Meråker deposits often occur in the vicinity to conformable sheets and lenses of fine- to coarse grained gabbros, concordant meta-gabbro lenses occur in the phyllite sequence, near (≥10m) but never in contact to the mineralization at Ankarvattnet. They themselves may not be the source of heat required for the establishment of a hydrothermal system, but may have been merely a shallow expression of a deeper situated pluton which could have been the heat source for a hydrothermal system (Sundblad 1980).

A similar setting is the Sullivan deposit in Canada, a conformable sulphide deposit in a metagreywacke sequence; the only magmatic rocks present are diabase sills and dikes occurring exclusively beneath the deposit (Gilmour 1971).

Literature prove numerous examples of sediment-hosted deposits analogue to the Røros-Meråker deposits, e.g. from the U.S. Appalachians, where:

1) massive pyrrhotitic deposits with minor to significant base metal contents (Great Gossan Lead District) are hosted in metagreywacke with meta-gabbro, meta diorite and amphibolite. The ores have been subjected to durchbewegung and reveal extensively developed fragmental textures; the ductility of the pyrrhotite was apparently responsible for the development of shearing in the sulphide zones during metamorphism (Craig 1980).
2) massive, banded pyritic deposits with significant base metal (mainly Zn) contents (Mineral District). Subsequent metamorphism has altered the size, shape and composition of ore and gangue minerals, but has little affected the primary textures (Craig 1980).

Concerning the possible relationship sulphide deposits-gabbro intrusions in the Røros-Meråker district, it is worth having in mind the gabbro-hosted, Zn-rich pyrrhotitic deposit at Skjellåfjellet, in the Hyllingen gabbro complex, and Stømnbekken, although considered marginal deposits with small quantities.

Magnetite is often associated with both the pyritic and pyrrhotitic ores, as scattered, more or less evenly dispersed grains, in the pyritic ores often enriched in bands. Iron

formations of massive magnetite and conformably embedded oxide/silicate assemblages are often associated with the ores (commonly with the pyrrhotitic type) in the Hersjø formation and in certain areas of the Røsjø and Røros formation, specially in the Kjøli area, between Guldal and Allergodt. They are often finely laminated with Cpy, Po (and Py), hornblende, and at Allergodt is observed quartz-banded iron formation. These oxide layers/lenses occur both intermixed in, and at the sulphide ore contact, and separately away from the sulphide ore.
In the volcanics at the Rogn mine occur cherty oxide components resembling oxide exhalites, and, also in the sediments, the rather common pyritic-ore-associated sericite quartzite and garnet quartzite (e.g. at Klasberget) might represent synvolcanic ferruginous chert exhalites (or probably partly sericite alteration products).
Graphite is found to occur as a minor constituent in, or rather at the wallrock contact to some ores, e.g. Svenskmenna, Pustbakken, Stømnbekken, Godthåb and Jensåsbekken west.

Alteration zones are ubiquitously associated with the ores, as K-alteration (sericite and muscovite) and chloritization (±garnet), both above and below the ore zones, ranging in width from a few cm to more than one meter. It seems to be a tendency for chlorite alteration to accompany pyrrhotitic ore, and sericitic alteration to accompany pyritic ore, even though this is not a general implication.

Occurrences classified as disseminated sulphide mineralizations with sulphide content commonly far below 50%, often tested with small prospect pits, occur throughout in the metasedimentary sequence between Røros and Meråker. Mainly, they constitute of stringers and bands of Po and Cpy in chlorite schist, some are clearly related to shearing in (e.g. Dronningen), or at the contact (e.g. Molingdalsskarven) to gabbro intrusives, while others might represent feeder zones in hydrothermal convection systems.
Some of the often remobilized, disseminated mineralizations contain Sl as major sulphide in addition to ±Po, Py, Cpy, and seldom Gn (e.g. Rognåsen, Pustbakken, Fjellgjelt, Sødal, Storhøgda, Tjørnvollmyran and Anna).

Apart from these solely disseminated mineralizations, sulphide-impregnated wallrocks are common adjacent to many massive-sulphide-dominated ores.

The shape of the ore deposits are frequently ruler- or stockformed, while in comparatively weakly deformed parts of the area they tend to occur as thin lens- or sheet-like bodies.
Fold hinges appear to be favourable loci for the ore bodies, while others have been made workable due to repetition of the sulphide layer by isoclinal folding.
As stated by Rui & Bakke (1975) concerning the Kjøli deposits, although the stratabound character of the mineralizations is apparent, and their genesis during accumulation of the volcano-sedimentary sequence is probable, the formation of the ore bodies appear to be related to secondary thickening during orogeny.

The mineralization frequency is conspicuously high in the Røsjø formation, including Nordgruvefeltet, the Kjøli area and the Meråker østfelt (possibly correlated with the Røros formation?).
In Nordgruvefeltet, apart from the historic, more or less exhausted mines, also more recent deposits are detected as a result of follow-up of airborne geophysics (e.g.

Lergruvbakken, Kvernenglia and Lobekken). South of Nordgruvefeltet the Røsjø (and Røros) formation lack any known mineralizations, until the Oscar II mineralization (hosted in phyllites in the vicinity of gabbro and ultrabasite), west of Os is met upon. North of Nordgruvefeltet the Røsjø formation thins out towards the Tydal Thrust, reappears between Killingdal and Svenskmenna, and continues as a sulphide-rich formation past the Allergodt mine, possibly all the way to Meråker. Airborne geophysics are carried out in the Kjøli area (between Svenskmenna and Grønskar) in 1959 and 1970, in the Tydal area in the 1980's, and in the Meråker østfelt in 1991.
In the Røros and Hersjø formations scattered sulphide deposits, often Zn-rich, occur from Røros in the south to Meråker in the north.

Considering the high degree of overburden in many areas, the chance for potentially covered mineralizations is great, and a comprehensive prospecting campaign, including initial airborne geophysics, is required.
The magnetic properties, though weak, of many of the mineralizations, is an important discriminatory factor, and the conductive character is obvious. Even the poorly conductive Zn-rich ores seem to contain substantial Py-banding detectable by EM. In the cases of almost pure Sl (e.g. Klinkenberg), stratigraphic zoning into more Py- and Cpy-contained portions seem to be valid.
It would be appropriate with a radiometric method able to pick up K-alteration associated with the mineralizations, but cover-masking may represent a problem.
Alteration halos should be emphasized in exposed areas.

In a way "guide to ore is ore itself", having in mind the close spatial association of the two distinctive sulphide paragenesis, pyritic and pyrrhotitic ores. F.ex. in the case of the Guldal mine (not drill tested), the exploited Cu-pyrrhotitic ore horizon could well hide an underlying Zn-Cu-pyritic ore zone, as in the case of the adjacent mineralizations at Svenskmenna, Rørosmenna and Godthåb.
The fact that the early miners were not interested in the Zn-rich ores or Zn-rich portions of the ores, is obvious, e.g. at Svenskmenna, where the adjacent, almost pure Sl-ore is rejected with an insignificant prospect pit, and passed by in the earlier reports. This could well be the case for the 80 years old drill holes in this area; if not overlooked, the drill logs might lack information on potential Zn ore; as mentioned from Svenskmenna, where massive Sl ore outcrops close to a drill hole. This massive Sl ore zone is in any case not delineated by drilling, and having in mind the undetected digging to the SW, mentioned by Aasgaard (1927), this is an interesting target.

Klinkenberg is another target demanding follow-up, and again the Cu-pyrrhotitic ore (and the Py-rich part of the Zn-Cu-pyritic ore) is exploited, while the Zn-rich portions are rejected. The deposit is never drill-tested, and the possible displaced NW-extension, indicated on the geophysics from 1949, should be checked.

One could even speculate the same way about the considered exhausted Storwartz field, where only the four westernmost mines reveal the Zn-pyritic ore at the dumps, while it seems to be lacking at the four easternmost. If the two ore types are associated all the way from Gamle Storwartz to Solskinn, it could mean that undetected Zn-pyritic ore still remains in the eastern part.

Even though one should of course not rule out the importance of the pyrrhotitic ore type, the banded pyritic type seems to be the most favourable concerning Zn-potential, and many of the investigated deposits demand follow-up work.
Some of the deposits in question are drill-tested, and the available drill-cores could give valuable information. So also concerning, the distant from the main area, Fløttum and Vingelen deposits.
The Vingelen deposit, drill-tested as late as 1983 (Folldal Verk A/S); one drill hole intersected 1.7m containing 2.35% Zn and 0.81% Cu, is considered open to the depth.
At Fløttum, where Sl and Cpy are the dominant matrix sulphides, also evaluation of the available drill cores should be considered.

Acknowledgements
Thanks to the Weather-God who blessed us with ponderous amounts of rain, increasing the potential for dryer working conditions the next ten years, and thanks to the comforting words of Vokes (1969): "It is difficult, at times impossible, to be certain of the true origin of a metamorphosed deposit".

References:

Aasgaard, G. 1927: Gruber og skjerp i kisdraget Øvre Guldal – Tydal. NGU no. 129.

Birkeland, A., Solli, A., Øyvik, M., Sandstad, J.S., Grenne, T. & Erichsen, E. 1996: Malmgeologiske undersøkelser i det østlige Meråkerfelt, Nord-Trøndelag. NGU rep. no. 96.041.

Bjerkgård, T. & Bjørlykke, A. 1994: Geology of the Folldal area, southern Trondheim Region Caledonides, Norway. NGU Bull. 426, 53-75.

Craig, J.R. 1980: Stratiform sulfide mineralization in the Central U.S. Appalachians. NGU 360, 295-325.

Dalsegg, E. & Lauritsen, T. 1993: Geofysiske undersøkelser, Meråkerfeltet – øst, Meråker, Nord-Trøndelag. NGU rep. no. 93.001.

Eidsvik, P. 1968: Geofysiske målinger Pustbakken – Slettmo. NGU rep. no. 769.

Gilmour, P. 1971: Strata-bound massive pyritic sulfide deposits – a review. Econ. Geol. 66, 1239-1249.

Gjestland, T. 1992: Gruvene i Storwartz-feltet. Bergstuderendes Forening / Olavsgruvas Venner.

Grytdal, I. 1989: Fløttumsgruva. Singsås Bygdemuseum.

Haugen, A. 1966: En malmgeologisk beskrivelse av Gilså-Dronningen-Lillefjell-området i Meråker. Unpubl. Thesis NTH.

Juhava, R. 1991: Ore calculation. Fløttum. Int. rep. Folldal Verk A/S / Outokompo Oy. (Available at Bergmester office.)

Lieungh, B. 1973: Geologiske, petrografiske og malmgeologiske undersøkelser i Nordgruvefeltet, Røros. Unpubl. Thesis UiO.

Ljøkjell, P. 1953: Fløttum. Unpubl. Thesis NTH.

Nilsen, O. 1971: Sulphide mineralization and wall rock alteration at Rødhammeren mine, Sør-Trøndelag, Norway. NGT, vol. 51, pp. 329-354.

Rui, I.J. & Bakke, I. 1975: Stratabound sulphide mineralization in the Kjøli area, Røros district, Norwegian Caledonides. NGT, vol. 55, pp. 51-75.

Sakshaug, G.F. 1941: Slettmo – Pustbakken. GM rep. no. 24.

Sakshaug, G.F. 1961: Elektromagnetisk undersøkelse Kvernenglia. GM rep. no. 274A.

Sakshaug; G.F. 1961: Elektromagnetisk undersøkelse Mugg – Lille Mugg. GM rep. no. 274B.

Singsaas, P. & Brækken, H. 1944: Geofysiske undersøkelser Solskinnsfeltet. GM rep. no. 37.

Singsaas, P. & Brækken, H. 1950: Rapport over elektromagnetisk kartlegging over og omkring Klinkenberg gruve og Abrahams gruve. NGU/GM? rep. no. 72.

Singsaas, P. & Brækken, H. 1951: Geofysisk undersøkelse over området ved Storwartz Grube. NGU/GM? rep. no. 82.

Singsaas, P. & Brækken, H. 1952: Geofysisk undersøkelse Fjellsjøfeltet, Glåmos. NGU/GM? rep. no. 85.

Singsaas, P. 1961: Geofysisk undersøkelse Lergrubebakken/Glåmos. NGU/GM? rep. no. 293.

Singsaas, P. 1965: Geofysisk undersøkelse Lobekken. NGU rep. no. 647.

Sturt, B.A., Ramsay, D.M. & Neuman, R.B. 1991: The Otta Conglomerate, the Vågåmo Ophiolite – further indications of early Ordovician orogenesis in the Scandinavian Caledonides. NGT 71, 107-115.

Sturt, B.A., Bøe, R., Ramsay, D.M. & Bjerkgård, T. 1995: Stratigraphy of the Otta-Vågå tract and regional stratigraphic implications. NGU Bull. 427, 25-28.
Sundblad, K. 1980: A tentative "Volcanogenic" Formation Model for the Sediment-hosted Ankarvattnet Zn-Cu-Pb Massive Sulphide Deposit, Central Swedish Caledonides. NGU 360, 211-227.
Vokes, F.M. 1968: Regional metamorphism of the Palaeozoic geosynclinal sulphide ore deposits of Norway. Trans. Inst. Mining Met. 77, B53-B59.
Vokes, F.M. 1969: A review of the metamorphism of sulphide deposits. Earth Sci. Rev. 5, 99-143.
Vokes, F.M. 1976: Caledonian massive sulphide deposits in Scandinavia – a comparative review. In Wolf, K.H. (ed.) Handbook of Stratabound and Stratiform ore deposits, 6, 79-127 Elsevier.
Vokes, F.M. 1980: Some aspects of research into the Caledonian stratabound sulphide deposits of Scandinavia. NGU 360, 77-93.
Vogt, T. 1949: Forslag til geofysisk malmleting i traktene nord for Aursunden. Bergarkivet rep. no. 2094.
Wolff, F.C. 1973: Beskrivelse til de berggrunnsgeologiske kart 1721 I og 1722 II – 1:50 000. NGU no. 295.