



# Bergvesenet

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## Rapportarkivet

Bergvesenet rapport nr <b>BV 1848</b>	Intern Journal nr	Internt arkiv nr	Rapport lokalisering Trondheim	Gradering
Kommer fra ..arkiv	Ekstern rapport nr LV 12	Oversendt fra	Fortrolig pga	Fortrolig fra dato:
Tittel Geological investigations in the Brustadmarka area Preliminary report				
Forfatter Grenne, Tor		Dato 22.01 1982	Bedrift Orkla Industrier A/S NGU	
Kommune Melhus	Fylke Sør-Trøndelag	Bergdistrikt Trondheimske	1: 50 000 kartblad 15212	1: 250 000 kartblad
Fagområde Geologi	Dokument type		Forekomster Brustadmarka	
Råstofftype Malm/metall	Emneord			
Sammendrag				

BV 1848

KB  
Arkiw  
160



GULF - ORKLA

LØKKEN VENTURE

REPORT NO.: L.V. 12      DATE:  
TITLE:      Jan. 22nd 1982

Geological investigations in the  
Bustadmarka area. Preliminary  
report.

# ORKLA INDUSTRIER A.S.

## MINING SECTION, EXPLORATION

Report no: LV (Løkken Venture) 12	Date: January 22, 1982
Title: Geological investigations in the Bustadmarka area. Preliminary report	
Prepared by: Tor Grenne	Areas name: Bustadmarka
Map no., name: 1521III Hølanda	Coordinates (UTM): NR3625-385, 007-030
Field work period(s): July - August, 1981	Pages: 4 Map enclosures:
<p>Summary (purpose, execution, results):</p> <p>Alteration zones within the greenstones north of Bustadvatn are investigated by geological mapping, in order to find their size/extension. The zones are locally carrying considerable amounts of pyrite/pyrrhotite and minor chalcopyrite mainly as disseminations. The alteration/mineralization is restricted to lavas stratigraphically below a level of frequent greenstone breccias and 'vasskis'/jasper within the inverted greenstone sequence.</p>	
Key words: Geology, alteration, sulphide disseminations	
Project initiated (date):	Report finished (date):
Distribution to:	

## INTRODUCTION

In October 1981 alteration rocks similar to those found in the stringer-feeder zones to the Høydal and Løkken massive sulphide deposits, were discovered in road-cuttings NNW of Bustadvatnet. This initiated new geological mapping and some geophysical investigations of the area N and NE of Bustadvatn. The mapping is not completed, but the present report will summarize some of the preliminary results.

## STRUCTURAL PATTERN

Where pillows are not too much deformed, they consistently indicate inversion of the stratigraphy. In the southern part of the area generally south of the small road between Løkken and Åmot, the sequence is younging southwards with a north-northeasterly dip of about 30-60°. North of the road the dip is variable, from fairly to the north-northeast through flat and to steeply southdipping in the extreme north, in late open folds that deform also the early foliation. South of the road the greenstones are generally little deformed. Comparatively thin intensely deformed zones are however seen. These zones are believed to reflect small-scale thrusting, similar to what is seen in the Brannåsen area (report LV 10), and indicate some tectonic repetition of the stratigraphy. Towards north the rocks are increasingly sheared.

## LITHOLOGY

The greenstones in the area comprise pillowed and massive lavas, doleritic dykes and a conspicuously high proportion of variably altered basaltic rock types. Usually the altered rocks show a bluish-grey colour, varying to light grey in a few places. A zone of weak (occasional bluish-grey) alteration stretches from southeast of Jordhus (Langenglia) west-northwestwards over Vidmyråsen to the farm Bustad (UTM coordinates NR381018) where light grey, probably albitized basalts occur here and there together with less altered types, carrying pyrrhotite or pyrite and minor amounts of chalcopyrite at several localities, as disseminations, filling of vesicles or locally thin veins. Strong alteration is also found about 1 km NNW of Bustadvatnet (as mentioned in the introduction), and this is probably the most interesting part of the area. The zone extends northeastwards and then appears to curve more to the north, over a distance of about 5-600 metres. Intense albitization, quite similar to that seen in the Høydal and Løkken stringer-zones can be followed for about 200 metres as a 50(?) metres wide zone trending NE from the road. On both sides there occur less altered basalts, varying between greenish-grey, bluish-grey and dark purple. Pillow structures, sometimes with amygdalae can be seen, even in the most altered basalts consisting almost purely of fine-grained albite with some leucoxene

and sulphides. Primary phenocrysts are altered to albite, quartz or chlorite. Although sulphides can hardly be seen by eye, thin-sections show a high content of sulphides. Subhedral to euhedral pyrite of the size 0.01 to 0.04 mm is evenly disseminated or enriched in thin veins. Irregular grains of chalcopyrite occur in trace amounts. The content of sulphides appears to be decreasing towards north in the alteration zone.

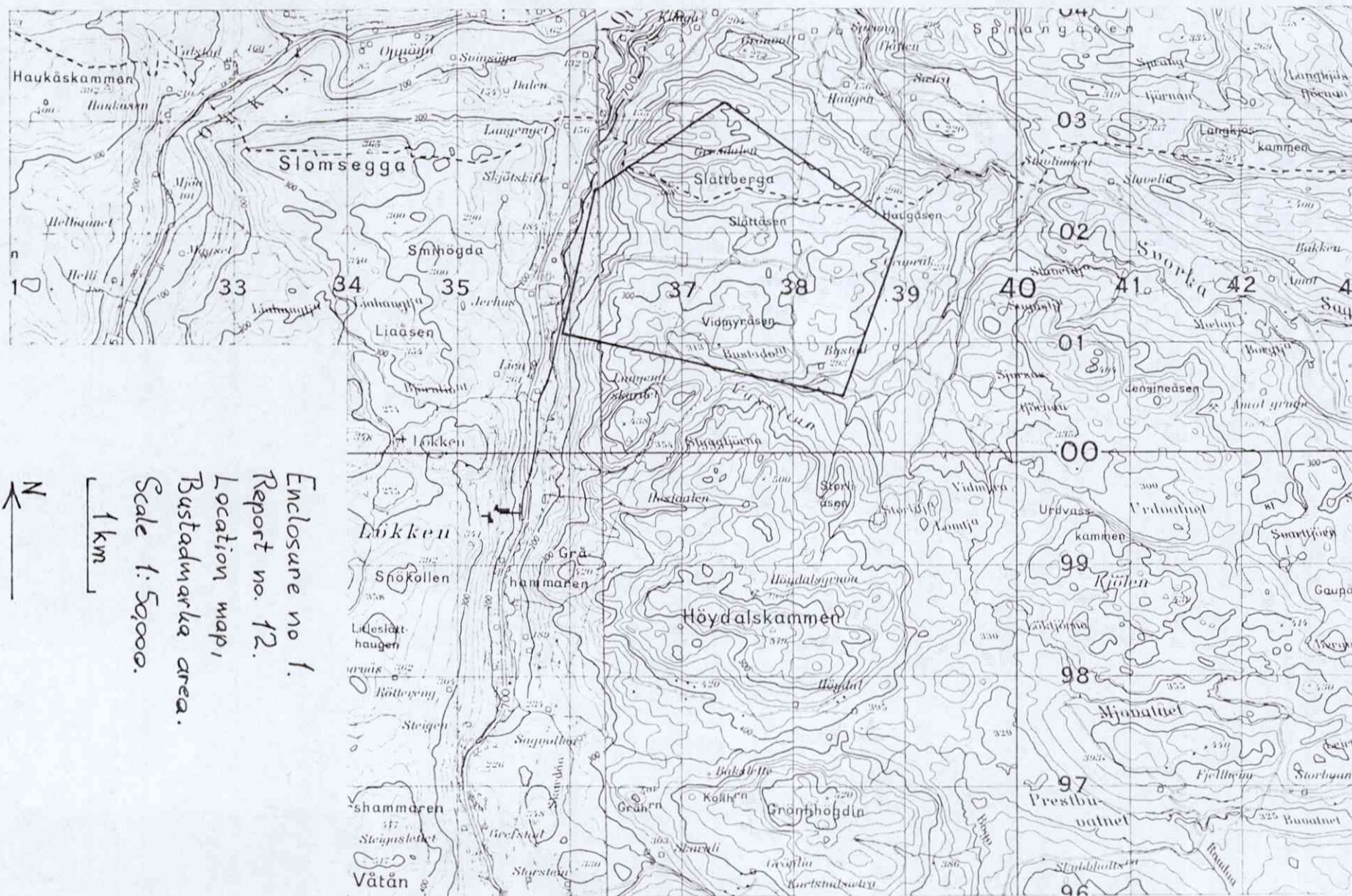
The alteration/sulphide dissemination zone is found stratigraphically below (structurally above) a level of greenstone breccias occurring both to the south and to the north, possibly in a kind of open (late) synform structure. These breccias are not as continuous along strike as indicated on Horikoshi's old maps, but seem to form smaller lenses here and there. They are composed of angular-subrounded greenstone fragments of variable size. The breccias south of the road also contain some jasper fragments. Quite often the metabasalt fragments are altered in the same way as the underlying rocks. Associated with this level of greenstone breccias where the alteration/sulphide mineralization stops, is an horizon of alternating jasper and 'vasskis' with magnetite-bearing 'svartfjell'. This is found close to the road 800 metres NNW of Bustadvatnet. The horizon extends towards WNW from where a greenstone (-jasper) breccia thins out laterally, and is most likely reflecting the episode of sea-floor hydrothermal activity, indicated also by the alteration of the underlying rocks. In other words, this horizon is the most interesting with respect to the location of a possible massive Cu-Zn sulphide orebody.

In addition to the various members of the greenstone sequence, one can also find Hølanda porphyrite dykes (to the north) and WNW-ESE-trending dykes of quartz-feldspar porphyrites or felsites, a few tens of centimetres to about a metre wide.

#### CONCLUSION

Several zones of alteration and sulphide dissemination occur in the area north of Bustadvatn. At least one of these appears to extend comparatively deep down into the stratigraphically underlying rocks, and is interesting as regards the localization of possible massive sulphides. However, with our present knowledge we can say very little about the statistical probability of massive sulphide deposition above such hydrothermal feeder zones. Although there is a relation between the most extensive of the zones that are known and massive sulphides (Løkken, Høydal) one can not exclude the possibility that many similar zones are overlain

by nothing but chert, jasper and/or 'vasskis' as the only reflection of the sea-floor hydrothermal emanations. With this reservation in mind, extensive/deep alteration zones like those in the Bustadmarka area should be regarded as objects of further investigations, for instance Induced Polarization measurements and possibly hard-rock geochemistry accompanying the geological mapping. At least such studies would give valuable information about the relationships between the zones of hydrothermal activity and massive sulphides/cherts, probably one of the most important tools in prospecting within these greenstones.



Enclosure no 1.  
 Report no. 12.  
 Location map,  
 Bustadmarka area.  
 Scale 1:50,000.