Bergvesenet

Postboks 3021, N-7441 Trondheim

Rapportarkivet

Bergvesenet rapport nr	Intern Journal nr	Internt arkiv nr	Rapport lokalisering	Gradering
2404				
Kommer fra ..arkiv	**Ekstern rapport nr**	**Oversendt fra**	**Fortrolig pga**	**Fortrolig fra dato:**
Elkem Skorovas AS		Elkem Skorovas AS		

Tittel

Preliminary proposal for project: Exhalite stratigrsphy and facies variations as a guide in exploration and structural interpretation in the metavolcanics of the Skorovas region.

Forfatter	Dato	År	Bedrift (Oppdragsgiver og/eller oppdragstaker)
Halls, Christopher	08.09	1975	Elkem Skorovas AS

Kommune	Fylke	Bergdistrikt	1: 50 000 kartblad	1: 250 000 kartblad
[redacted]amsskogan	Nord-Trøndelag		18242	Grong

Fagområde	Dokument type	Forekomster (forekomst, gruvefelt, undersøkelsesfelt)
Geologi		Skorovasfeltet Skorovasforekomsten

Råstoffgruppe	Råstofftype
Malm/metall	Cu, Zn

Sammendrag, innholdsfortegnelse eller innholdsbeskrivelse

[redacted]egrunnelse for et forslag til regional geologisk kartlegging av eksalitthorisonter, da disse er verdifulle stratigrafiske ledesoner til mulige malmdannende episoder.
Inntil nå har en hatt vansker med å korrelere vulkanske enheter som følge av laterale forandringer i de vulkanske fasene og av inntrengning av intrusiver.
En ser for seg bruk av stratigrafisk kartlegging og geokjemisk sammensetning av eksalittene samt mulige korte borhull og magnetiske målinger. Analyser er ment gjennomført ved Royal School of Mines (RSM).

PRELIMINARY PROPOSAL FOR PROJECT:

EXHALITE STRATIGRAPHY AND FACIES VARIATION AS A GUIDE IN EXPLORATAION AND STRUCTURAL INTERPRETATION IN THE METAVOLCANICS OF THE SKOROVAS REGION

Background:

Regional mapping in the Skorovas felt 1971 - 1975 has demonstrated certain problems in the correlation of volcanic units which are the result of

(1) Primary lateral changes in volcanic facies of equivalent ages

(2) coeval intrusive episodes (gabbroic and granodioritic) which cause some disruption of the stratigraphy.

The allochthonous nature of the "greenstones" and their associated intrusives has meant that the primary complexity of the volcanic sequence has been again magnified by tectonic work which the nappe has suffered. Because of gross differences in the comptency of the component rock types, the geometry of deformation has been determined to a large extent by the distribution of competent rock types (Lenses and intrusive masses of gabbro. Diorite and Granodiorite and compact flow units of acid composition, Dacite porphyries and aphanitic eqvivalents ("Keratophyres"). The primary folding and tectonic compression in the region has produced a general penetrative schistosity S_1, which is related to isoclinal folding on various scales. Deformation continued by local sliding and thrusting which resulted in componental, translation and relative rotation of one relatively competent mass against another. The horizons along which this rotation and shearing occurred are frequently the limbs of minor and major isoclines of the first stage of deformation (F_1 by convention). The second stage of sliding and compoonental movements emphasises the heterogeneous style of deformation in the region and adds to the difficulty of correlation of the volcanostratigraphy. Tectonism within the slike horizons results in the development of shear folds and crenulation, accosionally producing a new penetrative schistosity (S_2) which is well displayed in highly deformed basic rocks in these horizons. (Pillows lavas and Gabbros and their tectonic facies equivalents).

Exhalite Horizons:

Results of mapping during 1973 - 1974 - 1975 have demonstrated the close relationship between acid volcanism (various facies of dacitic volcanics, quarts porphyries, quarts-feldspar porphyries, pyroclastics, tuffs and indeterminate aphanitic equivalents viz: "Keratophyres") and the formation

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of sedimentary layers rich in IRON & SILICA. These sedimentary layers vary in appearance according of the complexity of events which have produced them and their primary mineralogical facies.

All the geological evidence points to their formation as a result of the liberation of iron and silica into the marine environment during the climacitic explosive phase of a dacitic eruption or in the SUBSEQUENT STAGES OF FUMAROLIC ACTIVITY WHICH IMMEDIATELY FOLLOWED IT.

In general it is clear that the EXHALITES of the region mapped outside the MINE AREA, are DISPERSE PHENOMENA and contain only IRON and SILICA in significant amounts. In most cases, according to type 3 in the acompanying figure, the heavy metals of economic significance viz Cu, Pb & Zn will have been infinitely diluted in the sea water. In contrast the Fe and silica, which are in concentrations several orders higher in the initial solutions, become rapidly unstable in the oxiding sea water and flocculate as iron and silica HYDROSOLS (COLLOIDAL PRECIPITATES) which settle to the seafloor and form exhalite sediments in various states of reduction. According to the variation in bottom conditions the possibilities for bacterial reduction of Fe^{3+} in Fe OOH. $Fe.(OH)_3$ precipitates will vary, thus a variaty of laterally equivalent facies may be formed:

(a) Banded pyrite + magnetite ± cherts (=Vasskis)

(b) Magnetite ± siderite + Haematite + cherts

(c) Haematite + chert

All facies may rarely be represented in the some band, in which case the most oxidised assemblage, usually JASPER occurs as a capping some form of APHANITIC SILICEOUS SEDIMENT (CHERT) is always associated with the iron minerals of the exhalite, however its colour depends strongly on the concentration of iron within it and upon its state of crystallinity and oxidation. Locally also GRAPHITIC concertrations are found in the reduced facies as, for example, in FINNKRUDÅMA.

Experience in mapping has shown that the exhalite horizons are geologically valuable indicators for the following reasons.

(1) They are the most laterally persistent of the volcanostratigraphy units and can both define and be traced through complicated fold structures to connect many of the isolated exhalite exposures (skjerps) mapped by FOSLIE.

(2) They provide conclusive evidence of "way-up" in the volcanostratigraphy and can be used ot determine the extrusive volcanic character of certain highly deformed acid bodies.

(3) They are less subject to "Tectonic facies" effects than many of the associated extrusive volcanic rocks.

IMPORTANCE IN EXPLORATION

The exhalites represent the distal effects of major acid eruptions with associated hydrothermas activity. For one bodies to form, the metal-bearing colutions must be confined for physical or hydrological reasons to a REDUCED INTENSIVE ENVIRONMENT (e.g. Skorovas malm).

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Mapping within the mine has, however, shown that the heary metal enriched sulphide (REDUCED) facies of the orebody are laterally and vertically transitional to oxidised facies viz CHLORITE-MAGNETITE and CHERT facies, locally JASPERS.

The EXHALITES are thus valuable stratigraphic guides to possible ore-forming episodes in the volcanostratigraphy and could be used as tracers.

Frequently it is observed that the exhalite extends beyond the periphery of obvious acid rocks or acid pyroclastics because of the extreme dispersion with the colloidal suspension of iron and silica hydrosols. Thus the exhalite can also be a secondary guide to the sequences of geologically & economically interesting acid rocks in which a potential ore body could be found.

MICROSTRATIGRAPHY, STRATIGRAPHIC SETTING AND GEOCHEMICAL COMPOSTION OF THE EXHALITES.

The exhalites are clearly the most geologically useful criteria for progressive mapping in a terrain such as that surrounding Skorovas, and, in this sense the most valuable tool in exploration.

It is therfore proposed that a more detailed study of these units be undertaken with a view to the following objectives.

(1) To study and compare the microstratigraphy of bands in different part of the area in order to account for the complexity shown by certain band in certain facies (viz T-BANDS of NESÅKLUMPEN - SVARTBERGEN area), and to relate this stratigraphy to the sequence of fumarolic events. This should lead to improved correlation and characterisation.

(2) To investiagte the geochemistry of the bands and determine the significance of whatever variations may be present laterally and vertically within them so that some criteria of POLARITY with respect to the eruptive and hydrothermal centre can be established.

Personnel, logistics and relationship to current work in the Grong project and Skorovas Gruber

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It is suggested that the project be undertaken by I. Ferriday in collaboration with A. Haugen & O. Sivert Hembre (Norge) and C. Halls (S.B. R.S.M.)

Fieldwork has so for (1974 - 1975) been undertaken within the framework of the Grong project. A further season of fieldwork (2 men - 2½ month) is possible in 1976 in connection with the completion of 1:25.000 geological coverage (under discussion with A. Haugen).

SPECIAL ASPECTS OF WORK

(1) Possible diamond drilling: Short holes < 10 m. could be drilling at certain stations in the Ø Nesåvatn basin region to give definitive sections of exhalite stratigraphy.

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To be discussed with D. S. Hembre.

(2) Investigation of use of magnetometer (grond magnetometer) as rapid tracer tool (DSH).

SUPPORT FOR LABORATORY WORK IN LONDON

Application is to be made to the NATURAL ENVIRONMENT RESEARCH COUNCIL (N.E.R.C.) in London to obtain support for the proposed programme of laboratory work. The main aim of this application would be to obtain financial assistance for I. Ferriday while working in London (R. S. M.) on this project.

For circulation & discussion

8 sept. 1975

Christopher Halls

SCHEME OF INTERACTION OF HYDROTHERMAL BRINES WITH SEAWATER Modified from Sato 1972.