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Tittel Geoly, Exploration and Exploitation of High Grade Gold zones, Bidjovagge Mines, Northern Norway				
Forfatter Nixon, Frank Søderholm, Krister		Dato År mai 1988	Bedrift (Oppdragsgiver og/eller oppdragstaker) Bidjovagge Gruber A/S	
Kommune Kautokeino	Fylke Finnmark	Bergdistrikt	1: 50 000 kartblad 18334	1: 250 000 kartblad Nordreisa
Fagområde Geologi Malmgeologi	Dokument type	Forekomster (forekomst, gruvefelt, undersøkelsesfelt) Bidjovaggefeltet		
Råstoffgruppe Malm/metall	Råstofftype Cu,Au			
Sammendrag, innholdsfortegnelse eller innholdsbeskrivelse Foredrag holdt ved Bicentennial Gold 88, Melbourn. Beskriver den geologiske settingen, malmtypene med reserver og gehalter. Fordelingen av mineraliseringen er kontrollert av en komplisert skjærsone-tektonikk, og alltid nær en grafittisk felsitt. Prospektering har resultert i funn av flere soner med høy Au-gehalt, de beste over 30 g/t. Det er en klar korrelasjon mellom Au og radioaktivitet som skyldes uran- REE, og med tellurider. Det antydes at det er muligheter for nye funn av denne typen mineralisering i Kautokeino-grønnsteinen som strekker seg inn i de øvrige land i nord- Skandinavia.				

GEOLOGY, EXPLORATION AND EXPLOITATION OF HIGH
GRADE GOLD ZONES, BIDJOVAGGE MINE, NORTHERN NORWAY

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The Bidjovagge gold-copper mine is located 40 km northwest of Kautokeino in Finnmark, Northern Norway. Exploration from 1956-66 led to the discovery of several mineralizations with total ore reserves of approximately 3 mill. tons averaging 1.8% Cu and 0.5 g/t Au. The deposit was leased and mined from 1970-75, closure being due to low copper prices and technical problems. New and detailed data on gold distribution made it possible for Outokumpu Oy to re-open the mine in 1985 and it is now operated as a gold (copper) mine with an annual production of 360,000 t from open pits. In 1987 1.220 kg Au and 3 435 t Cu were produced. Present reserves indicate a further 1-2 years production.

The Precambrian of Finnmark is dominated by Archaen gneisses and amphibolites separated by three north-south trending proterozoic greenstone belts, of which the westernmost Kautokeino greenstone belt hosts the Bidjovagge area.

The Bidjovagge mineralizations are situated in the lower part of the Cas'kejas Formation on the eastern limb of a N-S trending antiform. Diabase sills and dykes occur in a sequence of primary shallow marine sediments with dolomites, black shales, grey-green shales, limestones, tuffites and thin greenstones. In the mine area both the sediments and diabases are albitized. This sodic alteration is thought to have been caused by seawater circulation or by sodium rich brine of seawater origin and is pre mineralization. Gold-copper mineralizations are dominantly hosted by albite felsite and to a lesser extent by altered diabase. Non economic copper mineralization with low gold is also found in graphite felsite.

Mineralization distribution is controlled by complex shear zone tectonics and the ore-bodies always occur in close proximity to and often as extensions of graphite felsite. Continuous transitions from graphite to albite felsite are interpreted as oxidation fronts.

The ores are relatively small tabular bodies (50-100 x 5-35m) with tonnages of 50-400,000 t grading 2-6 g/t Au (Cut) and 0,5-1.5% Cu. Several ore-types can be distinguished but the only economic ore minerals are gold and chalcopyrite.

Recent exploration has resulted in the discovery of several high grade gold zones. The D ore exploited in 1986/87 contained in the hanging wall contact a 50 x 50 x 4 m zone grading 26 g/t Au and 0,1% Cu. The hostrock is a carbonate rich albite felsite

characterized by late, zoned hastingsite porphyroblasts. The EVA ore (in production from 1988) has intersections up to 40-50 m. grading in excess of 10 g/t Au and 1.5-2.0% Cu, with richer parts in excess of 30 g/t Au over 10-15 m. Gold occurs mainly as native metal and grain size is usually less than 50 microns.

There is a clear positive correlation between gold and radioactivity and also between the occurrence of gold and tellurides. High radioactivity is caused by the occurrence of davidite and other uranium-rare earth minerals. The correlation between gold and copper is often poor.

In the ore bodies the high grade gold zones are located close to oxidation fronts whilst copper contents increase away from the fronts.

In order to achieve optimum results, highly selective mining techniques are used at Bidjovagge. This is difficult both due to arctic conditions and to difficulties in distinguishing between ore and waste rock. Prior to mining the ores are divided into classes according to grade. Zones with subeconomic ore are mined and stock-piled separately for possible later use. Zones of waste rock are also separately removed.

Grade control utilizes effective sampling methods such as diamond drilling, percussion drilling and sampling of production holes. Rapid analyses are carried out in the mine laboratory. Effective radiometric grade control methods have also been developed and scintillometers are routinely used in diamond, percussion and production holes and also in the open pits for determining ore/waste boundaries.

Experience has shown that the main mineralizations are restricted to oxidized areas in a shear zone system where graphite felsite has been oxidized to albite felsite and where magnetite bearing diabases have been altered and hematite deposition has taken place. These geological features can be defined by detailed electromagnetic and magnetic ground surveys, where breaks in the EM pattern combined with magnetic lows indicate interesting target areas. These features can also in certain cases be discerned by a close evaluation of airborne surveys.

Radiometric surveys form an important part of exploration work, where especially radiometric logging of drillholes has proved to be extremely successful.

New discoveries of similar gold-copper deposits in N. Sweden and N. Finland in greenstone belts of the same age as the Kautokeino greenstone belt indicate that there is a good chance of finding more Bidjovagge type deposits in Northern Scandinavia.