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1. mars 1965

Vedr. Nikkelundersøkelser på Senja

Vi har mottatt Deres brev av 9. f.m. vedrørende nikkellundersøkelser på Senja. Det er riktig at vi i 1963 hadde en geolog-gruppe til å foreta en befaring i og omkring den gamle grube ved Hamn. Noen gjennomført geologisk undersøkelse var dette ikke, idet den foreløbige befaring ikke syntes å gi tilstrekkelige indikasjoner på at det var umaken verdt å ofre mere tid og penger på dette område.

Vi sender Dem vedlagt 2 kopier av den rapport som ble utarbeidet etter besøket. Der henvises i rapporten til et oversiktskart i skala 1:50.000. Dette foreligger kun i original som bilag til originalrapporten, og denne befinner seg hos vårt kanadiske moderselskap i Toronto. Vi beklager derfor at vi ikke kan skaffe kopier av dette kart.

Med hilsen

p. p. FALCONBRIDGE NIKKELVERK, AKTIESELSKAP

R. Johann.

Vedlegg

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Report on the Nickel Deposits

SENJA ISLAND - TROMS
NORWAY

Introduction:

During the period August 15th to 21st 1963, five days were spent examining the main Senja Island gabbroic intrusive at Hamn and one day on a smaller mass, a mile to the south east. The outlines of both intrusives were mapped and the interiors traversed to observe internal structures and to try to determine their geometrical form. The main sulphide deposit at Hamn was examined; the discoveries in the south east border of the main intrusive and in the central portion of the smaller intrusive were mapped and sampled.

Herr E. Hansen, a former prospector for Herr Berg spent one day with us.

Summary and Conclusions:

1. The larger gabbro massive averages one mile in width and extends for four miles to the southeast of Hamn. The three observable contacts dip inwards giving it a rude funnel or lepolithic outline. Differentiation progressed to the partitioning of thin feldspar and pyroxene layers when the melt was disturbed and masses of gabbro and pyroxenite were infected into the layered series.
2. The smaller intrusives, roughly 1.2 miles in diameter looks more like a reef pendant in the gneiss. Nearly 10 per cent of its volume is composed of northwest trending acid dykes. A banding in the central portion is north south with a vertical dip.
3. Sulphides in the main deposit near Hamn occur as disseminations in a pyroxenite layer and as bands with pyroxenite inclusions injected into the surrounding gabbros. The open pit is 246 feet long, 57 feet wide at surface, 8 feet wide at the bottom and 200 feet deep. The ore zone was nearly vertical to the water table where it curved south, opposite to the dip of the layering in some gabbros to the north. From the longitudinal projection, there is no apparent plunge to the deposit. Disseminated sulphides on strike to the east have been explored by two adits, 100 feet and 200 feet east of the pit. Traverses with a vertical loop electromagnetic unit didn't detect any conductors. It appears unlikely that any extensions or parallel occurrences will be found.

4. The zone near the south east border of the intrusive is a dissemination of blebs of pyrrhotite, pyrite and chalcopyrite in a fresh looking dark green to grey medium grained gabbro and, to a lesser extent, surrounding the pyroxenes in the adjacent coarse grained, light coloured gabbro. Mineralisation can be traced for 200 meters but the main concentration is in the central 150 meters. Widths are up to 12 meters but the attitude is uncertain. Visual estimation is less than one half percent nickel and copper for the zone.
5. An intermediate zone is shown on Consul Berg's maps, aligned with the Hamn and the south east deposit. It is only a few grains of pyrite in a coarse grained gabbro.
6. The percentage of outcrop area in this mountainous terrain is too large to permit any sizeable deposit to be hidden especially a long stratiform layer more extensive than the one described in paragraph 4.
7. The weak mineralization in the Shapsvatn gabbro is well exposed and not worth further investigation.

Ownership:

Consul Odd Berg - Troms.

Location and Access:

Hamn Steamship stop on Senja Island is 56 miles, S 70° W from Tromsø. Bardufoss is the nearest airfield, a three and a half hour bus-ferry-taxi-boat ride to Hamn.

Topography:

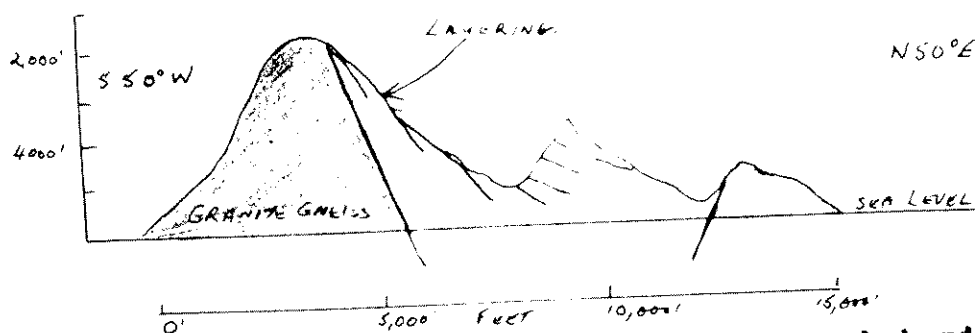
See accompanying 1:50,000 topographic map.

Hamn Gabbro Intrusive:

General Geology

The intrusive is rudely lopolithic in form if the topography can be combined with the few observable contacts to indicate its geometry. At two places on the south west margin the contact dips 45 degrees to 55 degrees north east. At the south east end near the mineralized zone, the contact dips 70 degrees north west. The attitude of the north east margin may be taken from the south dipping, dip slope that forms the cliff on the east side of Finn-sæterrann. There is also a good exposure of this south east dipping contact in a road east north of Bjørnervatn. Naturally the attitude of the north west contact under the ocean is unknown.

Large portions of the intrusive consist of massive structureless phases ranging from dark pyroxenites to white, coarse grained, nearly pegmatitic gabbro. But in a few places there is sufficient layering to indicate that differentiation took place during a period of cooling of the magma. It is best developed in the vicinity of the falls of the river draining Barstindalen where there is an excellent exposure of a layered sequence nearly 30 meters thick. The layers here are a few centimeters to decimeters thick of white feldspar and thinner pyroxene-rich bands. They strike north west parallel to the long axis of the intrusive and dip 15 to 20 degrees to the north east. In the road cuts by the ocean at Hann, the layering strikes north west and dips 20 to 30 degrees to the north east, steepening to 60 degrees southward towards the old mine. Along the south west contact in the mountains above the mine some soft weathering bands strike and dip parallel to the contact. I am not sure whether this is bedding or plastic shearing. In cross section the intrusive appears to be shaped:



During differentiation the magma was disturbed and masses of gabbro and pyroxenite were injected into the layered series, truncating the bands. This can be seen better in the road cuts than in the weathered interior.

The gabbro is enveloped by a pale pink to white granite of 70% quartz, 25% feldspar, and 5% biotite and sericite and sparse magnetite. Dykes of this material, 2 to 5 meters wide, intrude the gabbro for several hundreds of meters, generally parallel to the long axis of the gabbro. In many areas the granite grades into a thin banded amphibole biotite gneiss, often severely crevassed. The gabbro becomes finer grained and biotitic over one or two meters at the contact.

The last igneous phase was the injection of a large number of trap dykes a few centimeters to several meters wide that cut gneiss and gabbro in random directions.

Joints and Faulting

The only fault observed was at the contact in the road cut north of Bjornerratn. It is a zone of shearing and pyrite mineralization $\frac{1}{2}$ meter wide that only locally forms the contact. Plastic shearing of gabbros during cooling is common, usually transgressing the banding at a low angle.

There are two dominant joint directions, one N 45° W dipping 40 to 60 degrees NE, the other nearly north south and vertical. Minor joints box the compass. The N 45° W joints cross the open pit causing no apparent control to the mineralization.

Mineralization

A 1:50,000 plan of the Hann Intrusive received from Consul Odd Berg shows three zones of sulphide mineralization aligned N 40° W, nearly parallel to the long axis of the intrusive. The most northwesterly is the old mine at the ocean; at the south east edge of the gabbro is the most recent discovery but the one shown on a mountainside north of in Tolevtan is only a dissemination of pyrite in medium grained, leucogabbro. Such pyrite mineralization is ubiquitous and faint rust zones can be found anywhere in the gabbro.

(1) Hann Mine:

The open pit is 246 feet long, 57 feet wide at surface, 8 feet wide at the bottom and 200 feet deep. It is nearly vertical for 75 feet to the water table, flattening to 53 degrees for 70 feet and narrowing to 15 feet wide, then steepening to 70 degrees to the bottom. There is no plunge apparent from the outline of the pit or from the old longitudinal projection.

It is difficult to reconstruct a mined out ore body from the remnants on the wall. In the adit that enters the south side of the pit and in the east end of the pit, pyrrhotite, pyrite and chalcopyrite form up to 20 percent of a dark green pyroxenite and are associated with the coarse pyroxenes in the adjoining leucogabbros. At the west end of the pit the sulphides are massive bands with pyroxenite inclusions, injected into fractures in the gabbro. In the road cut east of the mine exposures of pyroxenite, presumably continuous with the pyroxenite on the north side of the pit, contain less than 5 per cent pyrrhotite. Adits 100 feet east and 200 feet east of the pit explored this pyroxenite but no better mineralization was reported. Reconnaissance traverses with a vertical loop electromagnetic instrument in this area didn't detect any conductors. Halls were broad, confirming the disseminated mineralization.

(2) South East Zone:

Two sub-parallel zones about 100 meters apart are shown on Odd Berg's map. The northerly band is a weak shear cutting coarse grained leucogabbros, slightly rust stained from the weathering of weak pyrite mineralization. The southerly band consists of up to 10 percent sulphides in a dark grey to green, fresh looking, medium grained gabbro. The sulphides blebs of pyrrhotite rimmed with chalcopyrite, plus pyrite, often as pyrrhotite - are interstitial to the euhedral silicates. Some sulphides also occur with the pyroxenes in adjoining coarse grained leucogabbros. Rust stained outcrops can be traced for 200 meters, beginning 50 meters west of granite contact. The strongest mineralization is confined to the central 150 meters as shown on the accompanying 1:1000 plan. Although exposures are numerous, the attitude of this disseminated mineralization wasn't positively determined. Softer bands in the adjoining gabbros dip steeply to the south but the mineralization could have been continuous with the sulphides in the outcrops (sample No. 4) north of the stream shown on the plan.

The five samples were sent to Kristiansand for assaying. From the percentage of sulphides, it is doubtful that the zone would average better than $\frac{1}{2}$ percent nickel and copper.

Skipsvatn Gabbro:

(a) General Geology

The rocks in this small massive centred about Skipsvatn are similar to those in the Hsæn Gabbro except that no pyroxenitic phases were found. Layering in the rocks is imperfect and local but uniformly north-south and vertical in contrast with the low angle dips to most of the Hsæn Gabbro banding. Acid dykes are common forming nearly 10 percent of intrusive. The majority strike northwest, parallel to the long axis of the lake and dip 45 to 70 degrees to the north.

The dark green line on the 1:50,000 plan encloses the less altered portion of the intrusive. Outside this line to the border of the gabbro, the feldspars are an aggregate of fine feldspar laths less than 3 mm. long with sugary quartz; the ferro-magnesian are subhedral, rimmed with biotite.


S. N. Charteris

(b) Mineralisation - for location see 1:50,000 plan

In a medium to coarse grained leuco gabbro there is situated a rust-zone, with its length axis striking N 10° W, which also seems to be the strike direction of the primary banding in the gabbro. The zone is about 60 m long, and the maximum width can not be more than 10 m.

In most of the zone the sulfides, mainly pyrrhotite, occur as scattered grains in the gabbro. In the Northern and the Southern part of it the sulfide content is mostly 2%.

In the middle part of it two shots are fired within a distance of about 15 m. Some of the nearly fresh specimens from here shows a comparatively higher sulfide content, and pyroxene seems to compose the gangue mineral. The sulfides partly appear in up to 2-3 cm wide veins.

A granite dyke striking NE-SW cuts the gabbro and the rust-zone.

There is a complete lack of structures in the gabbro in the nearest vicinity of the mineralised zone.

Norway - August 24th, 1963

SNC-EQ/jl

August 30th, 1963.


E. Overwien