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Tittel

THE COPPER DEPOSITS OF OXFJORDDAL

Forfatter	Dato År	Bedrift (oppdragsgiver og/eller oppdragstaker)
Rickard, Thomas	1.11| 1901	

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Nordreisa	Troms		17343	Nordreisa

Fagområde	Dokument type	Forekomster (forekomst, gruvefelt, undersøkelsesfelt)
Geologi		Vaddas
Råstofgruppe	**Råstofftype**	
Malm/metall	Cu, S	

Sammendrag, innholdsfortegnelse eller innholdsbeskrivelse

Rapporten beskriver kobber- og kisforekomstene i Vaddas området. Rapporten er antagelig et prospekt i forbindelse med tegning av kapital for å sette igang drift.

F. E. Harman

THE COPPER DEPOSITS OF OXFJORDDAL,

FINMARK, NORWAY.

Report by Mr. THOMAS RICKARD and Abridged Report by Mr. F. E. HARMAN.

Report by Mr. THOMAS RICKARD, of London.

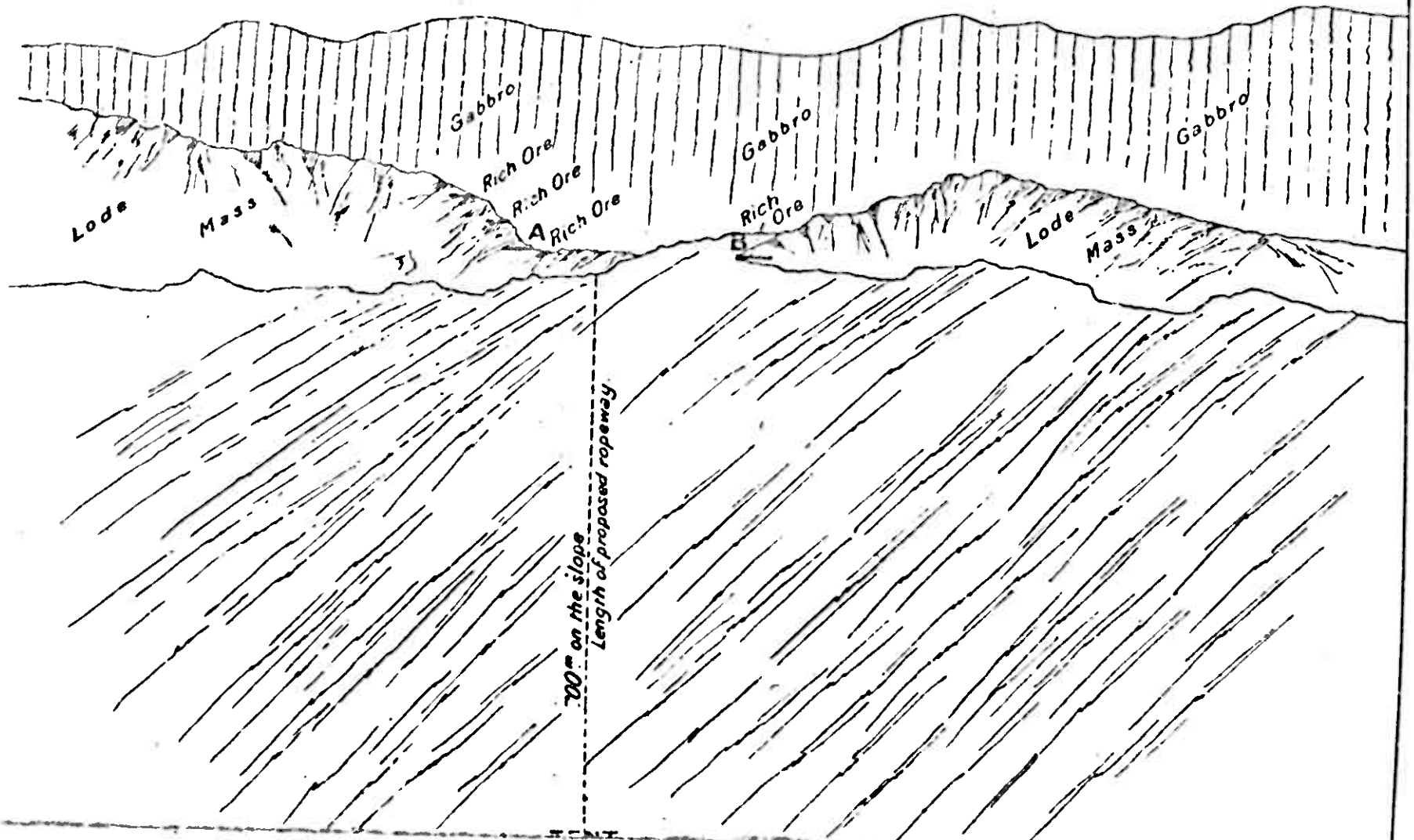
THESE belong to what are technically known as the fahlbandic or interbedded order of deposits. They are concordant in dip and strike with the crystalline schists in which they occur. In this and other respects these deposits bear strong resemblance to those of the famous Roros and Sulitelma Mines, though as regards bulk and strength of outcrop, Oxfjorddal far surpasses both these.

The outcrops form bold ranges of brick-red cliffs dominated by frowning escarpments of gabbro in the background. The gabbro forms the edge of an irregular plateau 2,500 to 3,000 ft. above the valley, while the jagged line of the lode-mass has been weathered down to a serrated line running to altitudes of 1,500 to 2,000 ft.—very imposing, and, as an outcrop, unique.

VADDAŚGAISA NORTH.

(VIEW FROM TENT)

Shewing the first or outer Gap.



Altitudes

1000 Met 3300 Feet

450 to 650 Met 1500 to 2000 Feet

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The lode formation dips at a steep angle into the hill and underneath the gabbro. The presence of this eruptive rock is generally regarded as being of good augury for the metal-bearing crop with which it is associated, and I think may be so considered in the present case.

Twenty-six claims or locations, each of 280 met. length, have been taken along the outcrop, which, beginning about 5½ miles from the inner end of the fjord, continues five miles eastwards in unbroken range. This five-mile-section is known as the Vaddasgaisa group. The 26 claims also cover two other sections of outcrop, extending four to five miles still further from the sea. Vaddasgaisa, which is considered to present the best prospect, is, fortunately, the section nearest to the coast.

Notice was, doubtless, first drawn to the copper of this valley by the occurrence of lumps of lodestuff with ore in the debris that has slidden down the hill slopes, and prospecting has been facilitated by two great gaps in the otherwise almost inaccessible cliffs, corresponding with two mountain shoots or *couloirs*, where the immense lode-mass has been broken through and worn down in such a manner as to expose its full section as effectually as if the effect of design or laborious mining.

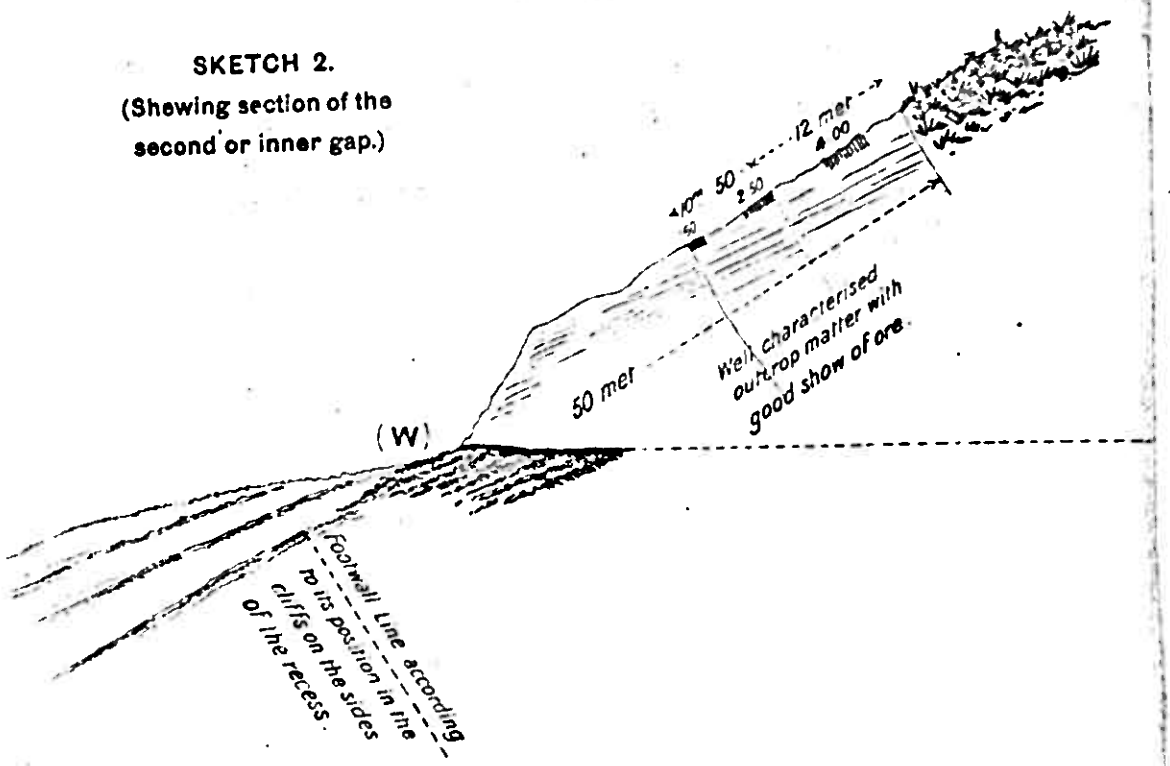
The outer or western gap (shewn between the points A and B in the view from the tent), which is 7½ miles distant from the sea, and at an altitude of 1,350 ft. above the valley, exhibits a lode formation 150 ft. wide, containing in its hanging wall portion a 7 ft. to 10 ft. streak or belt of compact ore, which has been followed along the cliff rising immediately on the eastern side of the *couloir*. Assays of samples obtained here by means of a series of shots at two places about 100 ft. apart have given 3·96 and 6 per cent. of copper respectively, and 44 per cent. of sulphur.

The lowest exposed portion of this ore section would be the proper place to run in a drift. Starting in the ore it would advance underneath a rich outcrop, and it would rapidly gain ground overhead (backs). It would be well also to sink in the ore so as to be able to open out in it to the west where it disappears underneath the drift matter of the *couloir*.

Leaving the outer couloir, I proceeded some three miles along the foot of the cliff-like outcrop in its trend to the south-east, where, at an altitude of about 2,200 ft. (660 met.), the second or inner gap is reached. This inner breach, a semi-circular recess deep into the mountain, is much larger than the preceding, showing still more the effect of denudation. The steep cliffs of rock forming the sides of the gap exhibit, in full section, two lode formations, each 150 to 160 ft. thick, separated by an interval of 350 to 400 ft. of rock, and dipping into the hill under an angle of 60 degrees.

There are abundant exposure[illegible] at this place, more, in fact, than with the limited time at command it was possible to properly inspect. I was, however, able to examine a large section of the inner lode, which stands out in the midst of the couloir as a great hogback protruberance.

SKETCH 2.
(Shewing section of the second or inner gap.)



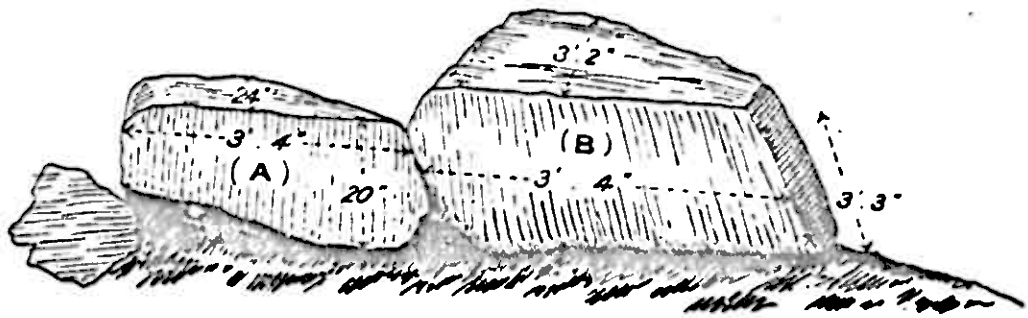
This exposure being of mixed milling material with splashes of clean ore and not of compact sulphides, as in the former instance, it was found impossible to take even an approximately average sample. This must be deferred until some mining shall have been done, and meanwhile the examining engineer must needs be content with recording the existence of two immense regular lode formations with a great width of ore, which, with development, will in all probability prove to consist of sulphides of substantially the same quality as in the outer couloir.

Some portions of the lode will, of course, be richer in copper than others, but the bulk of the extracted ore will sort and mill to an average of 5 to 6 per cent., and the rest, a variable but important portion, will contain 2 to 3 per cent. with 40 to 50 per cent. of sulphur suitable for sulphuric acid manufacture.

This central mass can be attacked and laid open by means of a tunnel drift put in at (W) in sketch No. 2. It would advance crosswise into the lode, cutting through it underneath the ore exposed at the surface. This would be a fine piece of exploratory work justifying great anticipations.

From this place, as from the preceding, the extracted ore can be sent down to the valley by swing wire ropeway, though in this case the line will needs be built in two sections.

The occurrence of much fragmentary lodestuff with ore in the hillside debris has already been referred to; a 200 lb. lump, found to the east of the outer couloir, has been sent to London for inspection, and below will be found the copy of a sketch I made



of two blocks A and B some tons in weight, the position of which corresponds with the portion of the outcrop-mass immediately to the west or north-west of the inner gap. Such float stones, or pointers, as they are sometimes called by miners, are quite a notable feature of this Vaddasgaisa ground, and will prove valuable aids in prospecting the hitherto unexplored three miles of range between the two couloirs.

The only, or at all events the chief, drawback would seem to be geographical. In this respect, however, the place is no less favourably situated than Roros and Sulitelma and other mines in the north of Norway, where work proceeds the year round without any serious hindrance from the extreme cold. Though situated between the 69th and 70th parallel of latitude, and therefore well within the Arctic Circle, the Oxfjord Valley is well wooded, and the outcrop line which runs along its southern flank at an altitude of 1,500 ft. to 2,000 ft. is not much above the timber line. The valley will supply fuel in abundance, chiefly birch, and there is a large area of well-preserved young forest which, I am told, is procurable for the service of the mines.

The valley can easily be made carriageable from the end of the lake (see map) to the mines. The river presents the required volume constancy and fall for power purposes. The fjord waters are open throughout the year, and the place of shipment is remarkably well land-locked and sheltered. The district supports a considerable population of fishers and farmers, who are Laps.

GENERAL CONSIDERATIONS AND CONCLUSION.

That these copper deposits of Oxfjorddal are of great magnitude and value admits of no reasonable doubt. Already there is evidence of the existence of ore masses of proportions that foreshadow capabilities of output, running into prodigiously large figures.

Experience with these remarkable interbedded deposits in Finmark and in the north of Norway seems to justify the expectation that the ore bodies will prove to be conterminous with the ironstained caprock. The immense width of ore exposed in the central mass of the inner couloir, taken together with what is brought to view in both these couloirs—the only two places where the outcrop has been removed by denudation below the line of oxidation—point to this as a not improbable contingency.

Though acquainted by personal examination with most of the great copper fields of the world, I certainly have not seen any copper ground, developed or undeveloped, which, for magnificence of outcrop, can compare favourably with Oxfjorddal. Given the necessary capital for development and rational treatment it is highly probable that this Finmark deposit will prove to be among the most important discoveries of its kind.

DEVELOPMENT.

The way to go to work to develop this mine will, no doubt, be to start drifts into the lode at the points indicated, and in this way obtain early experimental consignments of ore while opening up the lodes and preparing for stopes.

This could be done during the ensuing winter already.

Transport from the Mines will best be provided for by means of swing wire ropeway down to the valley, practicable in both cases, and thence by fixed aerial tramway down the valley to port, the distance to which is about 7½ miles from the outer and 10 miles from the inner couloir.

In view of possible mining during the coming winter, I may say that, in the case of the outer couloir, the ropeway will have an angle of 27 degrees, and the length of cable will be about 750 metres. The full bucket will bring up the empty one, and the ore would be tipped in a sorting shed, whence the portion suitable for shipment to England would be conveyed to port by means of sledging. For further suggestions as to development, *see addendum* 2.

Later on, after the first exploratory work has been done, it will become necessary to provide plant arrangements for working, say, the outer section of the ground. The first thing to do will be to spend £300 to £400 in improving the existing rough carriage road and extending it along the valley to the mine, and in making telephone and telegraph connections; 7½ miles of fixed aerial tramway from mine to port will have to be built, which, with mine buildings and port accommodation, will cost about £10,000. To this add £5,000 for the mine development work during the first 18 months, and other £5,000 for the construction of the first mill—one, say, of capacity sufficient to treat 200 tons of ore stuff per day. The total is thus brought up to about £20,000.

It may still later be thought advisable to provide a matting plant for the treatment of, say, 2,000 tons of furnace ore per month. This will entail a further outlay of some £5,000, and make the total £25,000.

These figures, though necessarily only roughly approximate, will, at all events, serve to give a tolerably correct idea of the demands which the business is likely to make on Capital.

In thus foreshadowing the plant requirements, I purposely speak of a section of the ground, for it is obvious that in the event of the result of work during the exploratory stage being such as may reasonably be anticipated, there will be scope for operations on a very large scale, many times that contemplated by the above capital outlay.

There can, I think, be little doubt that a few months of exploration by the proposed opening, supplemented by some core-boring, will reveal the existence of sufficient ore ground, about the outer couloir, to serve of itself as the basis for very large operations, and the further ground at Vaddasgaisa—some four miles of it—will provide scope for other arrangements or for subsidiary organisations.

Addendum No. 1.

I recommend, as among the very first things to be done, that so soon as may be, a 2-cwt. average sample of the first 10 tons of ore extracted be sacked and sent home for assay and for mill experiment—2 cwt. from each of the two couloirs. This could be done at once without waiting for the erection of the ropeway.

Addendum No. 2.

Development will not at first involve any expense in crosscuts and shaft-sinking, but will be entirely by adit drifts or day levels, opening into the lode with ore at the very outset. This is due to the great rifts across the lode answering all the purposes of gigantic exploratory trenches.

Obviously the first opening and exploratory work to be undertaken will be nearly as follows.

Outer or Western section.

(*a*) Drift adit tunnel eastwards in the ore belt near the hanging wall.

(*b*) Sink in the same ore at lowest exposed point and open out laterally on it both towards the cliff and underneath the couloir.

(*c*) Bore about 50 met. below the ore outcrop, commencing in such a manner as to explore the whole thickness of lode.

(*d*) Bore at about the same level 100 to 150 met. further east in such a manner as to get cores from the full section of the lode mass which at this place is particularly fine.

Inner or Eastern Section—

(*a*) Open transversely into the lode by large section adit drift beginning near the footwall (See W in sketch No. 2).

(*b*) Open into the ore on the opposite flanks of the gap or breach.

(*c*) Bore through the full substance of the outer lode in that part of its outcrop corresponding with the large ore blocks lying on the hillside debris (see sketch).

As already suggested, some of this work might, with evident advantage, be commenced at once and be proceeded with during the winter already, to help to determine more exactly the nature and value of the ore and the bulk and capabilities of the deposit.

(Signed) THOMAS RICKARD.

LONDON, 1st *November*, 1901.