Magnetic Tests made on Diamond Drill Core from Cobar

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MAGNETIC TESTS MADE ON DIAMOND DRILL CORE FROM COBAR.

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(Four Core Samples Submitted by New Occidental Gold Mines N.L. on 4th December, 1944.)

Description of Core: The following geological notes are based on a brief megascopic examination of the cores by H.B. Owen, Geologist of Mineral Resources Survey.

Core No.1:

Hole No.: - Surface No.4.

Inclination of Hole: Not stated. Direction of Hole: S 86°W.

Depth of Core: - 370 feet.

Diameter of Core: $1\frac{1}{8}$" Length of Piece Tested: $4\frac{1}{2}$".

A soft brownish sandstone or mudstone with bedding well defined. Bedding planes fairly consistently about 70 degrees from the long axis of the core.

Core No.2:

Hole No. - No.69A.

Inclination of Hole: Vertical Angle 70°. Direction of Hole:S54°W.

Depth of Core: - 645'.

Diameter of Core: 1 5/8". Length of Piece Tested: 12".

A dark grey chlorite slate with one prominent mineralised vein about 1/8" wide containing quartz and sulphides. Bedding is not distinct throughout. Where visible it is 5 to 35 degrees from the long axis of the core.

Core No.3:

Hole No.: - No.70A.

Inclination of Hole: Vertical Angle 60°. Direction of Hole:S67°W.

Depth of Core: 110' - 115'.

Diameter of Core: 1 5/8". Length of Piece Tested: $7\frac{1}{2}$".

Similar to core No.2, with narrow mineralised veins. Bedding is fairly distinct throughout the core and where visible is 25 degrees from the long axis of the core.

Core No.4:

Hole No.: - No.5, No.5 Level, New Cobar.

Inclination of Hole: Dip 30°. Direction of Hole: N 48°E true.

Depth of Core: 34' - 36'

Diameter of Core: 13/16". Length of Piece tested : 14"

A quartz breccia with sulphides.

Results of Tests for Magnetic Orientation and Susceptibility.

The process of magnetic orientation of drill core consists of,

(a) Experiments on the core to determine the position and polarity of the transverse component of any uniform permanent magnetisation exhibited by the core.

(b) The determination of the original orientation of the piece of core on the basis of the assumption that the permanent magnetisation of the core was in the direction of the earth's magnetic field.

(c) The calculation of the strike and dip of bedding planes visible on the core.

Core No.1: The curves for this core show very small deflections due to induced magnetisation, with no evidence of permanent magnetisation. Under the operating conditions of instrument sensitivity and procedure the lack of permanent magnetisation effects means that any uniform transverse permanent magnetisation common to the whole piece of core has intensity less than 3×10^{-6} c.g.s. units.

The average induced magnetisation effect of 0.35 gammas gives by calculation (assuming the piece of core to be a cylinder of infinite length uniformly magnetised by induction due to the horizontal component of the earth's field) a susceptibility value of 22×10^{-6}.

Core No.2: The curves for this core show strong deflections but the magnetisation responsible is not uniform in the core and is apparently arising from the prominent mineralised vein which probably therefore contains pyrrhotite. Results of this kind cannot be used for magnetic orientation purposes due to the assymetrical arrangement and form of the magnetic material.

The average induced magnetisation effect of 1.85 gammas gives a susceptibility value of 60×10^{-6} c.g.s. units.

Core No.3: As in the case of Core No.1 there is not sufficient permanent magnetisation in this core for detection with the present instrument. In this case any uniform transverse permanent magnetisation present is less than 2×10^{-6}.

The average induced magnetisation effect of 1.1 gammas gives a susceptibility value of 35×10^{-6} c.g.s. units.

Core No.4: The curves for this core show strong transverse permanent magnetisation and they are ideal for magnetic orientation purposes but unfortunately in this case there is no bedding (or cleavage) to operate on and therefore nothing to orient.

The average permanent magnetisation effect, 12.3 gammas gives, by calculation, 410×10^{-6} c.g.s. units as the value of the intensity of the transverse permanent magnetisation.

The average induced magnetisation effect of 6.5 gammas gives a susceptibility value of 890×10^{-6} c.g.s. units.

Conclusions and Remarks.

The magnetic susceptibility shows the normal low values for sediments of the type represented by cores 1, 2 and 3 with an appreciably higher value for the breccia represented by Core No.4. It is likely that pyrrhotite is largely responsible

for this hgiher value. If this breccia is structurally related to orebodies the relatively high value of its susceptibility is of interest in connection with any geophysical investigation which may be made the Cobar area using the magnetic method.

Cores No.1 and No.2 could not be oriented because the intensity of their permanent magnetisation is too low to be detected by the instrument now in use. It is expected that a new instrument giving greater sensitivity will be available in due course for the investigation of cores of this type.

Core No.3 exhibits non-uniform magnetisation which produces curves unsuitable for core orientation.

Core No.4 can be satisfactorily oriented but bedding is not shown so the orientation is of no value. If cores of similar type can be found showing bedding it is probable that useful results could be obtained from them.

It is suggested that additional specimens be submitted and in selecting them it is desirable that the following important aspects be borne in mind:-

1. The cores must exhibit well defined bedding or some structural feature such as cleavage.

2. The piece of core should be not less than 6 inches in length, although experiments may be conducted on shorter lengths.

3. The end of the core which was uppermost (or nearest the drilling machine) when drilled, must be clearly marked, otherwise alternative values for strike and dip may be deduced from magnetic orientation results.

4. Core exhibiting narrow veins of pyrrhotite is, generally speaking, not suitable for magnetic orientation purposes.

5. Where there is choice of drill holes from which specimens may be selected, those holes drilled in or near to the direction of the earth's magnetic field should be avoided. At Cobar the direction of the earth's magnetic field is to the south about 60 degrees from the horizontal.

6. Cores should be plainly marked in respect of direction of hole and inclination of hole using clearly understood terms. The specimen No.2 is marked "Vetical Angle 70°" while specimen No.4 is marked "Dip 30°".

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