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Electrical and Electromagnetic Prospecting

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By electrical prospecting, orebodies that do not otherwise manifest themselves at the surface may be located. Conditions favorable to success with the methods are: Favorable geological conditions, such a proportion of minerals of good electrical conductivity in the orebody as will render the latter materially a better conductor than the enclosing rock, situation of the orebody within the range of influence of the electrical currents used and in proportion to this range a sufficient area of horizontal cross section of the orebody. The result is to permit of spotting drill holes accurately and to save the expense of drilling barren ground.

THE art of prospecting, like other branches of mining, has developed rapidly during the last ten years, mainly because of the advancement of mining geology, but also because of the development of "geophysical methods," which are based on the different physical characters of minerals and rocks, *e. g.*, specific gravity, elasticity, and magnetic and electric properties. These methods have proved of great value, especially in countries where the rock is covered by soil and direct geologic investigation is out of the question.

In prospecting for orebodies, the methods based on studying differences in electrical conductivity have proved most successful; for which reason, the methods of electrical prospecting have been subject to the most energetic and systematic work, especially in Sweden. This paper gives a brief description of the methods of electrical prospecting now in use, especially the new electromagnetic methods, which have not been described before.

The great differences in the electrical properties, especially in conductivity, between ore minerals and rock minerals are fundamental to all methods of electrical prospecting; for which reason, the electrical conductivity of ore minerals and rock minerals has been carefully studied in connection with and previous to the development of the various methods of prospecting with electricity.

Ore minerals with a metallic luster, such as chalcopyrite, iron pyrite, galena, specular iron, magnetite, etc., also graphite and a number of coals, have considerably higher conductivity than the surrounding rock and soil (see Table 1). The figures of the table denote the specific resistance W , expressed in ohms for a cube with an edge of 1 centimeter.