

THE EFFECT OF HYDROTHERMAL ALTERATION ON PETROPHYSICAL PARAMETERS OF ROCKS AT KUUSAMO, FINLAND

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Hydrothermal alteration is one of the main geological processes that has practical meaning in ore prospecting as alteration is commonly accompanied by ore deposition. Deposited ore minerals have more or less marked effect on the physical properties of the rocks, but it is worth of testing if pure alteration causes detectable anomalies. Especially in non-exposed areas, if the altered zones could be found from airborne data, detailed ground prospecting could be concentrated more effectively on the right spot. At Kuusamo, Finland, loggings and laboratory measurements from 56 holes drilled in hydrothermally altered gold and nickel deposits were used to test the hypothesis. The first observation was that the content of ore minerals causes density, magnetic susceptibility and intensity of remanence to rise and resistivity to fall. After removing the mineralized samples it was found that density and effective susceptibility tend to rise, and resistivity to fall, as the alteration proceeds from unaltered to complete. All changes are, however, minimal. The changes of the parameters are not consistent as the contributions from albitization, chloritization, carbonitization and silification seem to have conflicting effects on the parameters. As an example, the ground magnetic anomaly caused by a zone containing 50000 tons/m of altered rock would be less than 10 nT and gravity anomaly less than 0.2 mgal. The electrical anomaly would be even more difficult to detect. Anomalies of this height are easily ignored as noise.