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Influence of temperature on the hydrothermal clay soils' shear strength of the Nizhne-Koshelevsky and Verkhne-Pauzhetsky thermal fields.

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Nizhne-Koshelevskoe and Verkhne-Pauzhetskoe thermal fields are located in the south of Kamchatka, the first - within the Koshelevsky volcanic massif, the second - on the territory of the Pauzhetsky geothermal field. The first horizon from the surface in these fields is formed by clayey soils, that have been formed as a result of hydrothermal alteration of volcanic rocks. And in the natural conditions clayey soils are at temperatures reaching 100 °C.

Samples of undisturbed clay soils were taken within the thermal fields. The samples are characterized by a density of 1.29 - 1.42 g/cm³, rather high values of the weight moisture (90-110%), and temperatures of 50 - 70 °C.

The samples are dominated by clay minerals: kaolinite and mixed-layer - kaolinite-smectite, their content is about 75%. The other 25% are microcline, cristobalite, anatase, gypsum, pyrite, marcasite, quartz and alunite.

For samples of undisturbed clay soils, direct shear tests were carried out at a temperature of 20 °C and at a temperatures of the samples close to their natural temperatures (50–70 °C). Thus, the values of cohesion and the angle of internal friction of the samples were determined.

The obtained results can be interfered as follows: as a result of an increase in the temperature of clayey soils, the thickness of electric double layer on the surface of clay particles decreases. On the one hand, it leads to a decrease of cohesion value between the clay particles and the beginning of shear deformations at lower vertical loads. On the other hand, a smaller thickness of electric double layer brings particles closer to each other, which is the reason for an increasing angle of internal friction and shear resistance at higher vertical loads.