



# Evaluation of Influencing Factors in Outflow Control and Self-healing Property of Clay Core (case study: Vanyar dam- Iran)

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## ABSTRACT

Compacted clay layers are the most common impermeable layers of earth dams. Due to the specific nature of clay and its unique geotechnical properties, these layers are damaged over time by cracking. The crack healing property of clay is its ability to close up its external cracks and reduce the outflow rate. Hence, in this study, a new method is presented to assess the self-healing phenomenon of clays using pinhole test. In this regard, three soil samples from Vanyar dam (Iran) were treated to obtain the Plasticity Index (PI) between 7 to 26. Different percent of bentonite was added to samples (i.e. 5%, 10%, 15%, 20%) and the impact of bentonite percentage increasing was investigated on self-healing property and outflow rate of clay soil. The obtained results showed that soil dispersion reduced and it became non-dispersive when bentonite was added to the soil samples with the optimum water content and 2% below it. Self-healing phenomenon was visible and predictable with the increase of bentonite in natural soil. For the sample with 20% bentonite, this phenomenon was observed from an early age due to high PI and the potential for high inflation. The sample with 20% bentonite and a moisture content of 2% less than the optimum showed the most reduction in outflow (38%) when compared with the natural soil sample. Therefore, it can be concluded that the PI increment for mixed bentonite-clay soil (between 7 to 26) can increase the self-healing ability.

## Keywords:

Bentonite, Clay, Core, Pinhole Test, Outflow, Self-Healing