UTVÄRDERING AV CPT-RESULTAT I ANRIKNINGSSAND

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Abstract

Tailings is a residual product from the extractions of minerals. To protect the surrounding environment it is placed in tailing storage facilities. Depending on the design of the dam the tailings become part of the construction in various degrees. The strength of the tailings needs therefore to be considered in regards of the load bearing capacity. The dam is constructed in sequences, and is raised when more volume capacity is needed.

The first step is to evaluate tendency to dilatancy of tailings, as this controls which calculation models should be used to calculate the strength of the tailings. When subjected to shear, a volume decrease of the soil is called a contractive soil, and a volume increase is called a dilatant soil. In undrained conditions a contractive soil can loose a significant amount of strength which can lead a failure of the dam.

Calculation models are needed to analyse the dilatancy of the soil when using CPTdata. The purpose of this study is to examine the influence of assumptions in some of these calculation models on detemination of the dilatancy of the tailings. Two calculation models are examined in this study, Robertson's Qtn,cs, and the state parameter according to Plewes. This is examined with data from laboratory testing and CPT from LKAB's tailing storage facility in Svappavaara. The laboratory testing mainly consists of triaxial tests. The study is performed as a parameter study where one assumption is tested at a time. For comparison one initial calculation is created which all variations are compared against.

None of the calculation models give more conservative results than the other. Both investigated calculation models give, when changing the effective vertical stress, $\sigma'v0$, an estimate of a more dilatant soil when $\sigma'v0$ is reduced and a more contractant soil when $\sigma'v\ 0$ is increased. $\sigma'v\ 0$ is considered in assumptions by varying the unit weight of the soil, the capillary rise and the position of the groundwater surface.

The result show that the standard deviation regarding absolute change is greatest in tailings where the grain size clay is dominating its behaviour in both calculation models. Robertson's calculation model show a greater change at greater depth. Plewes' calculation model show greater change in tailings with high content of grains with size clay. These observations should be verified with more measurement points to draw conclusions.

Since the tailings are placed in the tailings storage facility as a slurry it is possible to know what material to expect at different points. The classification by CONRAD and Soil Behavoir Type-index usually show similar results and are in line with the expected material. However, a point, far from the emission point, Soil Behavior Typeindex identifies layers of sand which is not expected and not in confirmed by laboratory results. CONRAD show silt in these layers which is in line with expectations and lab results.