

Influence of Produced Water Mixed With Crude Oil on the Geotechnical Properties of Sandy Soil

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Abstract : This study investigated the effects of oil contamination due to produced water leaks that created lakes decades ago, as well as the extent of its impact on altering the geotechnical characteristics of the soil, which could act as a barrier to groundwater access. The concentration of total petroleum hydrocarbons (TPH), which is the main component in the contaminated soil, was measured using a variety of analyses. Additionally, some extensive laboratory tests were performed to examine the effects on the soil's geotechnical properties, including particle size distribution, shear strength, consistency limits, specific gravity, and permeability coefficient. A clear decrease in TPH concentration was observed with increasing depth, and it is expected to end within only a few meters. It was found that there is a significant effect of this pollutant on the size of the soil particles, which led to them becoming coarser than the uncontaminated soil particles. Moreover, it causes a decrease in fluid and plastic boundaries, as well as an increase in cohesion between soil particles. However, the angle of internal friction decreases with the increase in the content of petroleum hydrocarbons in the soil samples. It came to light that determining the permeability coefficient as one of the physical characteristics of the most important factors responsible for the passage of pollutants in the groundwater, as it showed an obvious reduction in the permeability, which is the main reason dealt as an obstacle to the arrival of oil pollutants to the groundwater.

Keywords : TPH, specific gravity, oil lake, Libya

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