

Evaluation of drill cuttings for determination of formation change using particle-size analysis, San Diego, California

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The Municipality of San Diego is reliant on imported water and is in need of control over future water supplies. Outside factors affecting imported supply are of growing concern; drought, periodic cutbacks and the potential for price increases are just some of the realities that have fueled the need for the exploration of new sources. Thus, in an effort to become less reliant on imported water, United States Geological Survey in cooperation with the City of San Diego has sought to investigate the feasibility of using groundwater aquifers, in particular the San Diego Formation and its overlying and underlying units as possible sources of groundwater. This study focuses on a quantitative approach to delineate subsurface formations using drill cuttings. The analysis was conducted using digital image processing to determine grain-size distributions of samples taken at various depths of a single water test well at the intersection of Home and Federal Boulevard. The data were then analyzed and correlated to assess formation changes in the subsurface. These quantitative data delineated formations that were consistent with geophysical logs, thereby aiding in the effort to better understand the hydrogeology of subsurface San Diego. The data are consistent with the 6 known subsurface formations: San Diego Fm., Stadium Cong., Mission Valley Fm., Poway Cong., Otay Fm, and Friars Fm. Because the drill cuttings lack formation clay and silt, the sediment-size analysis is skewed to providing useful information about sand, granule, and gravel components.