

Particle Characterization and Size Distribution

Case Study 1

Size Distribution of Produced Water Particulate Enhances Understanding of UIC Well Particulate Load

The concentration and size distribution of produced water particulates is highly dependent on the source of the brine. Brine particulate causes concern for UIC operators who want to preserve the permeability of the well. Measuring the particle size distribution of the water particulate provides a measure of the filtration efficiency and assesses the potential for formation damage. Characterization of the particulate can be used to evaluate the effectiveness of particle abatement by mechanical and chemical treatment.

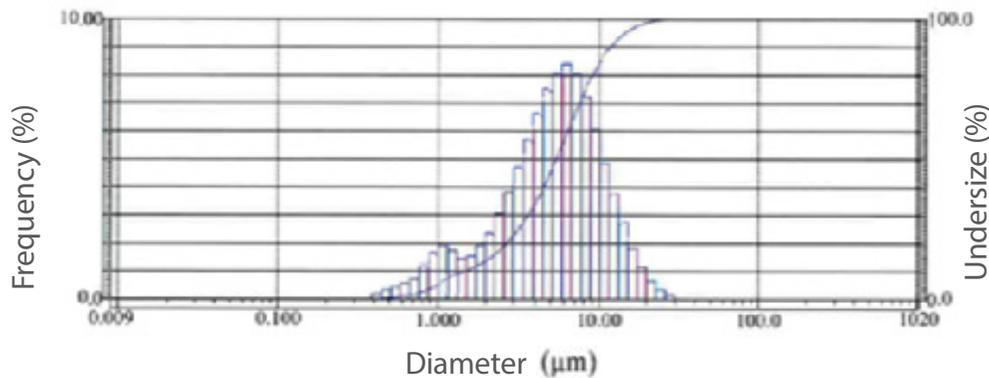


Figure:

Particle size distribution (top) and scanning electron microscopy (SEM) image with energy dispersive x-ray spectrum (EDS) of particulate in produced water.

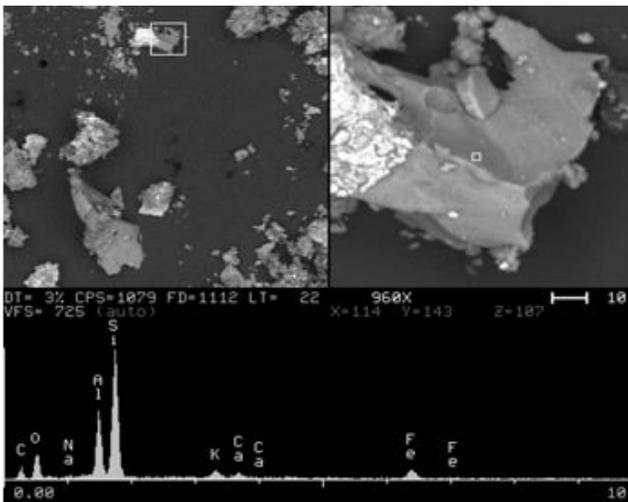
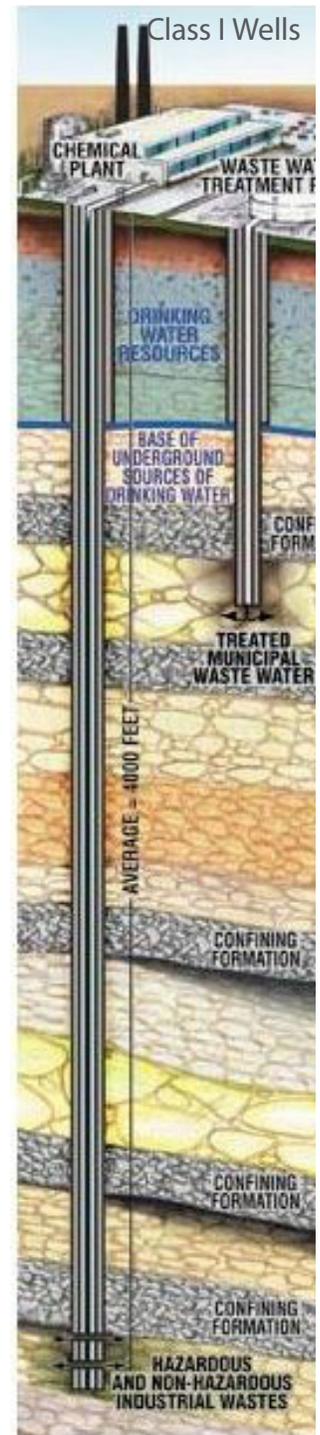


Figure:

Underground injection control (UIC) well diagram

<https://www.epa.gov/sites/production/>



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Case Study 2

CCSEM EDS Provides a More Comprehensive Characterization of Drilling Mud Solids

The particle size and composition of drilling mud solids have a significant effect on drilling mud performance. Laser diffraction particle size distribution analyzers and API RP 131 are commonly used to obtain particle size information. However, laser diffraction-based analyzers are limited in their ability to accurately measure the particle size of non-spherical particles, are susceptible to bias from petroleum/emulsion droplets, provide a volume percent rather than a weight percent particle size distribution, and provide no compositional information.



Figure: Solids Management System

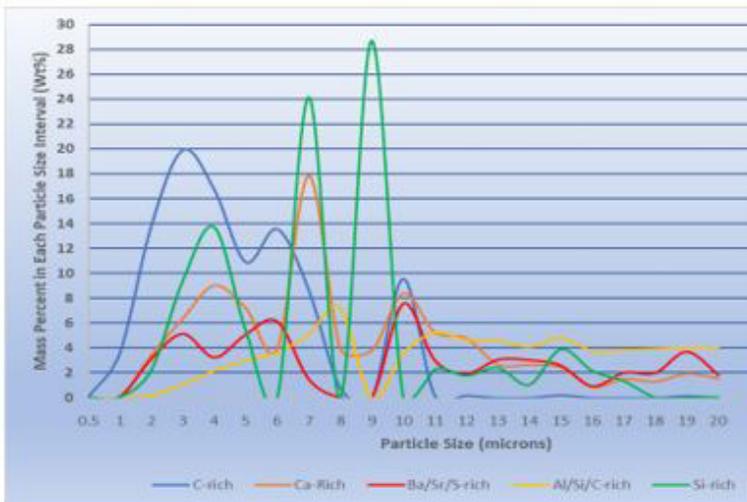


Figure: Particle Size Distribution of Drilling Mud by Major Particle Type (RJ Lee Group image)

Computer-controlled scanning electron microscopy with energy dispersive x-ray spectroscopy (CCSEM EDS) provides RJLG clients with an alternative to laser diffraction particle size distribution analysis. CCSEM EDS provides an accurate particle size distribution regardless of particle shape and it is not biased by oil or emulsion droplets. Additionally, CCSEM EDS acquires compositional information for each particle, enabling a particle size distribution to be obtained for each major particle type. Clients use the data to evaluate the efficiency of the solids management equipment and to provide a more complete assessment of how the mud solids may affect drilling.

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