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Digital Rock Characterization - A Powerful Tool for Rapid Quantification of Rock Properties

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X-ray scanning at two energy levels on cores not only provides superior visualization but also detailed quantitative core assessment. These deliverables are available before the core is removed from the inner core barrel and other measurements are commenced. These data include a solid interpretation of core mineralogy and therefore, a mineralogy log, high resolution bulk density, photoelectric factor, porosity, and unconfined compressive strength index log.

Micro CT imaging is now also being used in the sample selection process for sophisticated, reservoir-condition flow studies. The high-resolution, three-dimensional imaging of core plug samples helps Core's clients better understand how variations in the pore-system properties will impact both laboratory test results and reservoir performance.

Micro CT scans at very high resolutions can resolve features as small as 0.3 micrometers. Image acquisition and segmentation at sub-micron resolutions helps characterize pore systems. This information, when consolidated with appropriate physical measurement-based calibrations, provides porosity, permeability, and capillary pressure data. These data are rapidly generated as only one set of images needed to be acquired to run Corelab's physically-constrained empirical simulators.

At this resolution, grains can be segmented and well separated for consolidated to un-consolidated clastics. Using sophisticated measurement techniques, individual grains down to medium silt size can be measured in three axes resulting in unique particle size distributions which were not possible before. These sophisticated grain distributions can

help understand source and provenance of geologic depositions. They can provide information for sand/gravel pack designs and quantification of flow zone indicator as well.

These new image acquisition and processing techniques not only provide tools to characterize reservoirs but also deliver rapid and accurate petrophysical measurements.

