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Three-D Mapping of Sequence Stratigraphic Time Slices Via Well-Cuttings, Carboniferous Big Lime, West Virginia, USA.

Well-cuttings analysis largely pre-dated modern carbonate facies analysis, sequence stratigraphy, reflection seismic and advanced down-hole logging techniques. These higher tech methods have resulted in well-cuttings being neglected as an important data source for subsurface analysis. However, binocular analysis of well indurated Paleozoic well-cuttings from relatively shallow wells (0-4000 ft.), can provide detailed vertical facies successions when tied to wireline logs, and can be used to generate high resolution sequence stratigraphic frameworks for the subsurface, at a higher resolution than is available from other methods. The coarse fraction (1-2 mm) of the cuttings for each sample interval were washed and examined. For each sample interval the lithofacies present were separated into groups, and counted to determine relative abundance. These were recorded on a data sheet, and plotted against depth for each well to form a percent lithology log. Digitized wireline logs were plotted and the cuttings-percent logs were slipped (typically 10 ft or so) for the best match to take into account drilling lag and lithologic columns are produced. Gamma ray logs typically show 5-6 distinctive marker horizons that along with the lithologic columns were used to produce sequence stratigraphic cross sections through the basin and into the outcrop belt reference sections, with a resolution of 10 feet. Sequence stratigraphic time slices showing the thickness variation and distribution of environmentally sensitive facies were then made. This allowed us to track the complex influence of tectonics and eustasy and their effects on the stacking patterns of reservoirs.