

COMPUTER ROCK ZONATION

The Bass Basin was chosen as the subject for a computer rock zonation research evaluation project because of the volume of digitized log data available. In addition, the basin was the subject of a detailed geological interpretation, and the results of the research project would be useful in the evaluation.

The wells chosen for the computer rock zone analysis were to be wells with the greatest core coverage, but variation in log suites and differences in logging vintage in the wells precluded exclusive use of those wells with the greatest core coverage. The most recently drilled wells having identical log suites were used for the computer analysis of zones. The ten wells chosen for this study were the Aroo-1, Dondu-1, Konkon-1, Koorkah-1, Pelican-5, Pipipa-1, Tarook-1, Tilana-1, Yolla-1 and the Yurongi-1. The wells with multiple cores are the older wells. The location of these wells includes addressing rock zonation correlations in close wells, i.e., the Pelican area.

The purpose of the computerized rock zonation system is to allow users to interactively determine how many subpopulations (i.e., rock types, porosity zones, density zones, interpreted facies, and other derived curve populations) exist in a large population. The large population is composed of thousands of feet of electric log data. Multiple curves are always used as input. Output from the rock zonation system consists of statistical tables, cross plots, data files, and a lithologic-column-type plot showing the relationships between the various subpopulations or zones. Input curves also can be plotted. Saved mathematical functions can be output for use in well-to-well correlation.

The sequence of steps in the Bass Basin data analysis was as follows. First, the data were examined for log quality, and interpreted bad data were flagged. Additional curves were created (i.e., apparent grain density, cation exchange capacity, etc.). The new curves were created because they do not primarily reflect variations in porosity or pore fluid characteristics. Based primarily on the SP and density curves, another new curve composed of codes relating to lithology types was created. This 'key' curve was created by observing log characteristics on the LPS system. The 'key' curve was later used to verify the reliability of the computer system's population assignments.

All pairs of logs were then cross plotted. The plots were used to evaluate which curves, or combinations of curves, best segregated the populations (rocks). Subsets of curves were created later. The subsets included curves which contributed most to the identification of a particular rock type or to the separation of certain rocks.

Next, the curve files from five of the ten wells were concatenated because the computer system works best when a single dataset contains all of the rock types or zones that are likely to be encountered in any well in the study area. The merged file contained about 27,000 feet of curve data for the five wells. The merged file was treated as a single well