

“OLD” [Pre 1958] Electric Logs: a Quick Review G.B. Asquith, Texas Tech University

Hilchie (1979) reported that in North America alone there are approximately 1 million wells that were logged with “old” logs. In many of our fields that we are studying “old” logs make up 50% or more of our log data. This amount of control can not be ignored. This review is designed to illustrate how these logs work and how to interpret them for your log analysis and field studies.

Fresh mud ($R_{mf} > 2 \cdot R_w$) surveys from 1932 to 1958 consisted of the following logs in order of their depth on investigation: 18' LATERAL(deep), 64" NORMAL (intermediate), 16" NORMAL(shallow). All of these logs were non-focused resistivity tools that required a set of rules to properly interpret the results. These rules were based on the ratio of bed thickness to tool electrode spacing, and whether the bed had greater or less resistivity than the adjacent beds. In 1945 the 32" LIMESTONE LATERAL log was introduced as a porosity tool that was run only in western Canada and the Permian Basin, and most of these were run in the Permian Basin. In 1948 the MICROLOG was added as an R_{xo} device that could be run in fresh mud, and was also used as an indicator of permeability.

Logging tools suitable for running in salt mud ($R_{mf} = R_w$) were available after 1952. The following are salt mud logs in order of their depth of investigation: LATEROLOG-3 or LATEROLOG-7(intermediate) and MICROLATEROLOG (flushed zone – R_{xo}). All of these logs were focused resistivity tools that could be analyzed much like modern laterologs.

The only non-electrical logs available during this period were the “old” GAMMA RAY – NEUTRON LOGS. The “old” gamma ray logs were recorded in various units (i.e. mg Raeq/ton: micrograms Radium equivalent/ton) and not standardize in API units like modern gamma ray logs. The “old” neutron logs were recorded in neutron counts and not in porosity units like modern neutron logs. Therefore, the “old” gamma ray – neutron logs had to be normalized to modern gamma ray and neutron logs before they could be applied to any quantitative log analysis.

In a recent field study (Ramachandran, 2006) of an eighty five well Permian San Andres Field in west Texas where approximately half of the wells were logged with “old” gamma ray – neutron logs, the OOIP(stb) calculated with and without using the normalized “old” gamma ray – neutron logs resulted in the following:

OOIP(stb) 81million barrels (modern logs only)

OOIP(stb) 70million barrels (modern + normalized old logs)

The above results indicate the critical importance of working with our older logging suites when doing field studies.