

## NOTES

Abstract:

The Cement Bond Log, A Sonic Method for Analyzing the Quality of Cementation of Borehole Casings, by M. Grosmangin, F. P. Kokesh, and P. Majani \*

Determining the quality of cementation of the casing in oil wells has, in the past, involved inflow and circulation tests to insure that the producing zones are adequately sealed off from the adjacent zones. Existing logging methods, such as temperature and radioactivity surveys, may detect the presence of cement behind the casing. However, the qualities of the cement, i. e., its hardness and, in particular, its bond to the casing, are not indicated.

The new logging method described in this paper operates on the principle that the attenuation of a sonic pulse transmitted by a casing is greatly increased when that casing is bonded to an outer annulus of hard material (such as set cement) which has a sonic wave velocity substantially less than that of the casing.

The down-hole tool contains a source of recurrent sound pulses which are detected by a receiver spaced a few feet from the source. The amplitude of the detected pulse is measured and the resulting signal is transmitted to the surface where it is recorded versus depth. Amplitude is a function of attenuation, and the log is thus readily interpreted.

Laboratory studies have shown straightforward relations between attenuation and such variables as source-detector spacing and percent of circumference bonded. It is shown that cement that is not set or not bonded has comparatively little attenuating effect. Field examples show not only the cement top but also the variation in cementation quality below the top, and, further, the increase of bonding with time and after squeeze-cementation is depicted. The detection of poor cement jobs is confirmed by production tests and formation test results.

It is anticipated that the method will have wide application in evaluating cementation quality prior to formation testing in completions and re-completions. The analysis it affords may be an aid in the further improvement of cementation techniques.

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