

A QUANTITATIVE FLUORESCENCE TECHNIQUE (QFT) FOR THE EVALUATION OF OIL SHOWS

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Fluorescence has been used by wellsite geologists and mud loggers to identify oil shows for decades. However, the method used to determine the fluorescence of samples at the rig site has not improved appreciably and is limited in its usefulness and applicability. Consequently, Texaco has developed the QFT as a means to make a more quantitative, more sensitive, and more discriminating measurement of the fluorescence of well samples. This development has resulted in a log much more indicative of the true oil content of the drilled formation than previously employed techniques. QFT reduces the risk of overlooking potential oil pay zones in wells being drilled and provides a method of looking for bypassed oil zones in older wells.

At present, fluorescence is “determined” when an operator shines a broad-spectrum ultraviolet light source (black light) on samples and then records what he sees. There are several problems inherent in this procedure which make it non-quantitative at best and misleading at worst. First, the presence or amount of oil on the surface of the cuttings samples may not be representative of the oil in the pore structure of the formation. The mud logger or wellsite geologist sees only the surface with this technique. Second, the excitation source is not concentrated in the spectral region where the oil is likely to absorb radiation and re-emit it as fluorescence. Third, and most serious, the oil is quite likely to emit a fluorescence radiation predominately, if not totally, at wavelengths which cannot be seen by the human eye. Of course a fourth problem is the fact that the operator’s descriptions of the phenomenon are highly subjective. Such words as strong, weak, bright, dull, yellow, gold, etc. prohibit any quantitative analysis of the data.

Texaco has therefore developed a drill site QFT method in which oil is extracted from samples with an alkaline solvent and the fluorescence of the extract quantitatively measured by a fluorometer in the spectral region most likely to fluorescence strongly.

The technique is both specific and sensitive, the procedure is quickly accomplished, and the instrument is portable and field rugged. QFT is an operational technique currently in use worldwide by Texaco on exploration wells.
