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LABORATORY MEASUREMENTS OF CEMENTATION FACTOR AND SATURATION EXPONENT UNDER RESERVOIR CONDITIONS ON ASAB RESERVOIR ROCK SAMPLES

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ABSTRACT

The evaluation of saturations and thus of oil reserves from resistivity logs requires determination of both the cementation factor (m) and the saturation exponent (n) used in Archie's equation. Special laboratory apparatus using actual fluids (formation brine and crude oil) at reservoir temperature and under effective overburden pressure has been developed. Saturation was varied by the Porous Plate technique adapted for reservoir conditions. Prior to the test the effect of net overburden pressure on porosity and the formation factor was evaluated. For each rock sample, the formation factor and the resistivity index were measured first under room conditions and then under reservoir conditions. In addition, wettability indices were determined using Amott's test.
Data were collected on cores from the five main facies of the Asab Thamama Zone B reservoir.

The restoration of the effective overburden pressure gave a relative increase for m of about 6 % depending on the facies. Under reservoir conditions, the value of n was always higher than under room conditions. This increase of n was attributed to the change in the wetting properties. n increases up to 2.5 as the core becomes more oil-wet.

The consequence of the new m and n values on the calculated Sw is also discussed. Finally this paper emphasizes the need to determine electrical and capillary properties under reservoir conditions.