

M I West Field Report

approach a method to calculate pore volume compressibility from logs that shows reasonable agreement with direct measurements on both whole cores and rotary sidewall cores. Liu et al. (2004) quote a range of compressibility between 1 and 10 microsiips for Gulf of Mexico reservoirs of similar geological age to Macondo, with a base case of 3 microsiips.

Ostermeier from Shell (2005) presents an overview of the compressibility of Gulf of Mexico sandstones. He distinguishes two classes of sandstone: the first are poorly consolidated and highly compressible with a compressibility that increases as the fluid pressure declines. He reports compressibilities as high as 100 microsiips. In Macondo, however, the sandstone is of the second class (again this is clear from a study of data from other fields in the Gulf of Mexico provided by BPTM), with a lower porosity and a compressibility that declines with declining pore pressure. He reports one set of measurements with values less than 10 microsiips.

There are correlations in the literature to predict pore volume compressibility from porosity for sandstones. For instance, the Hall (1953) correlation can be used to calculate compressibility from porosity. For Macondo, this gives a value of 3.5 microsiips.

given by the initial reservoir conditions and is equal to 0.114 (Hall, 1953), which is the value that I used in my reading of the literature.

I conclude, for reference, with Figure A.1 which shows the correlations used by BP to estimate compressibility before drilling. While consistent with a value of 0 microsiips, the considerable scatter emphasizes the importance of checking the value with directly measured data.

TM BP-11553-21-TREX-011553-0000 (M I West Field Review, slide 17) [21].
TM BP-11553-21-TREX-011553-0001 (Weatherford rock compression analysis) [13].

There are correlations in the literature to predict pore volume compressibility from porosity for sandstones. For instance, the Hall (1953) correlation can be used to calculate compressibility from porosity. For Macondo, this gives a value of 3.5 microsiips.