Calculation of recoverable oil

One of the most commonly asked questions about a prospect or a new discovery is "how much recoverable oil is there?". The answer requires calculating oil reserves, the volume of oil that can be removed from the ground. The equation below is used for that calculation. From left to right, it asks (1) "what is the geologic volume of the accumulation (the volume of oil-filled rock), (2) what is the proportion of that oil-filled rock that is pore space, (3) what proportion of the pore space is filled with oil (i.e., the pore space not filled with water, (4) and of the oil in the pores, what proportion will we actually get out of the ground? Note that the equation does not use percents and instead uses ratios, from 0 to 1.

Porosity, from 0 to 1, as determined from cores and/or logs; may range from 0.04 to 0.35

Water saturation, from 0 to 1, as determined from resistivity logs or from direct testing of the formation via drill-stem tests or production tests. Values can range from ~0.1 to 1.0, where the latter represents no oil at all.

Volume of oil-filled rock, as determined from sub-surface mapping based on seismic and/or borehole data.

Recovery factor, 0 to 1, as estimated from analogy with other accumulations; typically between 0.15 and 0.40, with an average of 0.26

$$\text{Recoverable oil} = \frac{V \times \phi \times (1 - S_w) \times R}{\text{FVF}}$$

$$\text{Formation Volume Factor} = \frac{\text{Volume of oil and dissolved gas in-situ (at formation T \&P)}}{\text{Volume of oil at surface (and thus after release of gas)}}$$

a number almost always great than 1.0, and between 1.0 and 2.0