Estimating Datum Pressure from downhole pressure gauge

In order to translate pressure from downhole gauge to the Datum one needs to:

1	Estimate gauge readings at formation top p_{top} using the wellbore fluid density ρ_f gradient	(1) $p_{\text{top}}(t) = p_{\text{gauge}}(t) + g \cdot \int_{z_{\text{gauge}}}^{z_{\text{top}}} \rho_f(z) dz$
2	Recalculate the pressure at formation top to the Datum using regional hydrostatic pressure gradient GP	(2) $p_{\text{dat}}(t) = p_{\text{top}}(t) + GP \cdot (z_{\text{dat}} - z_{\text{top}})$

where

z_{gauge}	TVDss of downhoile gauge
z_{top}	TVDss of formation top
$p_{\text{gauge}}(t)$	gauge pressure readings
$p_{\text{top}}(t)$	estimated wellbore pressure at formation top
$p_{\text{dat}}(t)$	estimated Datum Pressure
GP	regional hydrostatic pressure gradient
$\rho_f(z)$	wellbore fluid density as function of TVDSS
g	Standard gravity constant

When wellbore fluid density is fairly constant between the gauge location and formation top then one can simplify the Datum Pressure calculation to:

(3) $p_{\text{dat}}(t) = p_{\text{gauge}}(t) + g \cdot \rho_f \cdot (z_{\text{top}} - z_{\text{gauge}}) + GP \cdot (z_{\text{dat}} - z_{\text{top}})$

In flowing conditions the equations (1) and (3) are both inaccurate as they do not account for pressure losses due to friction.

The equation (1) should be replaced with a proper solver for wellbore pressure profile.

See Also

Petroleum Industry / Upstream / Subsurface E&P Disciplines / Pressure Testing & Production Analysis