The volume of gas released from a drilled formation is dependent upon the porosity, permeability, gas saturation, and differential pressure. Gas magnitude is relative when gas is being used as a measure of differential pressure. Low permeability formations with low gas saturation, and high permeability formations with low gas saturation, are both likely to yield only low background gas.

Background gas is the total drilled gas resulting primarily from the unit volume of formation cut by the drill bit, i.e. liberated gas. A continued increase of background gas indicates a higher formation porosity and/or a higher hydrocarbon saturation in the available pore space. Thus if lithology, permeability rate, rate of penetration, gas saturation, and mud density are given due consideration, then an increasing background gas may indicate increasing pore pressure. The background gas after a gas peak should be compared with the background gas prior to the peak. A higher background gas after a peak than that before the peak may suggest an underbalanced hole condition.

Produced gas, i.e. gas produced into the drilling fluid from a specific zone in response to formation pressure that exceeds the opposing effective hydrostatic pressure (e.g. connection gas, swab gas, and trip gas), are also important factors to consider in pore pressure analysis. Their presence indicates a near balanced hole condition for permeable hydrocarbon bearing formations, and that at least some degree of effective permeability is present.

Connection gas results from momentary underbalance due to pump shutdown, and/or pipe movement while making a pipe connection. Negative differential pressure caused in part by the loss of annular pressure drop during periods of no circulation and in part by the swabbing action of drilling string, could lead to feeding into the borehole of formation fluid.