Neutron –Density Combination

N-D Combination

- By combining these 2 logs we can:

- Identify lithology

- Compute porosity

- Qualitative Identification for fluid.

N-D Combination

- In well log interpretation we always need to combine logs together to come out with interpretation solution
- N-D combination is the most common method, these curves always displayed together and there scale is adjusted in such away that we can give quick answers just by looking on them.

D-N Compatible scale

- First consider Neutron scale as reference
- Find the bulk density value that is corresponding to the neutron value in one end of the scale
- MATR parameter should already be match with compatible scale and with the formation matrix

N-D Compatible scale

Limestone Scale

+0.45	NPHI	-0.15
+1.95	RHOB	+2.95
+111	Δt	+26

Sandstone Scale

+0.60	NPHI	0
+1.65	RHOB	+2.65
+136	Δt	+56

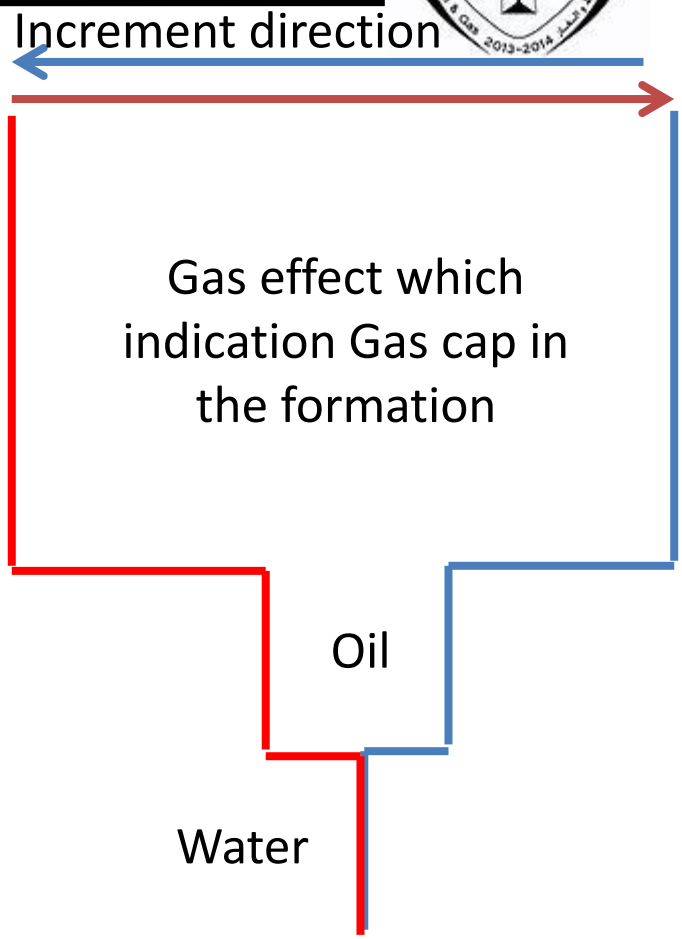
$$\Phi_D = \frac{\rho_{ma} - \rho_B}{\rho_{ma} - \rho_f}$$

$$\Phi_S = \frac{\Delta t_{ma} - \Delta t_B}{\Delta t_{ma} - \Delta t_f}$$

N-D logs quick lock (Lime scale and Lime Formation)

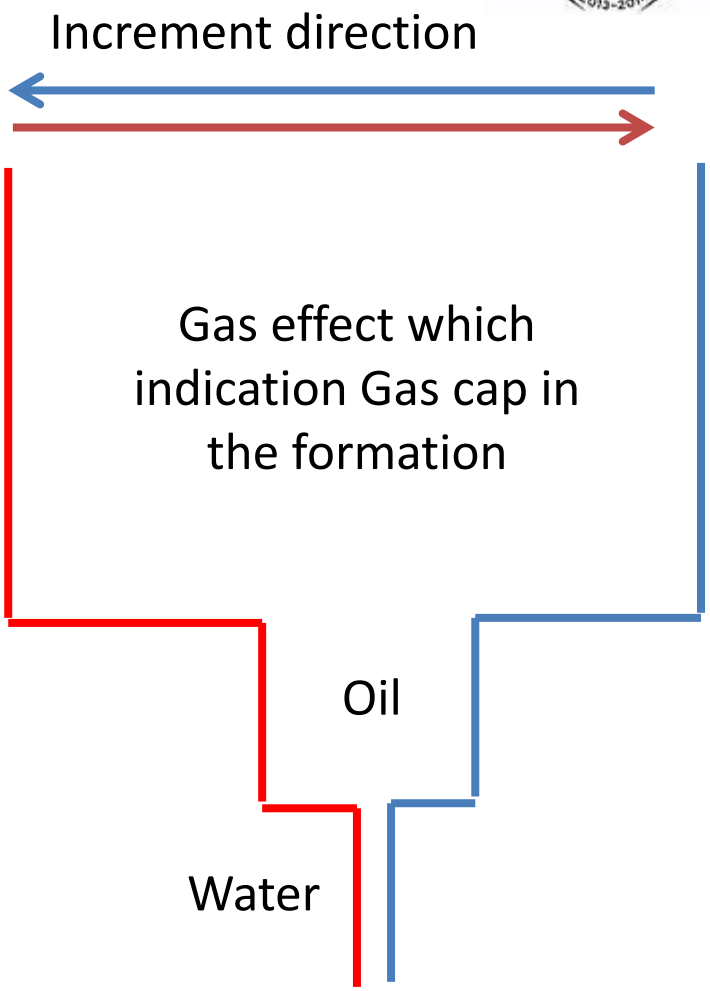
- When Neutron and density are in the same Track with compatible scale(and correct MATR), it is possible to identify fluid type.

- In water zone they will be over each other
- In oil zone they will separate neutron to the lower value and density to the lower value as well
- In gas zone there will big separation toward the lower values of each other



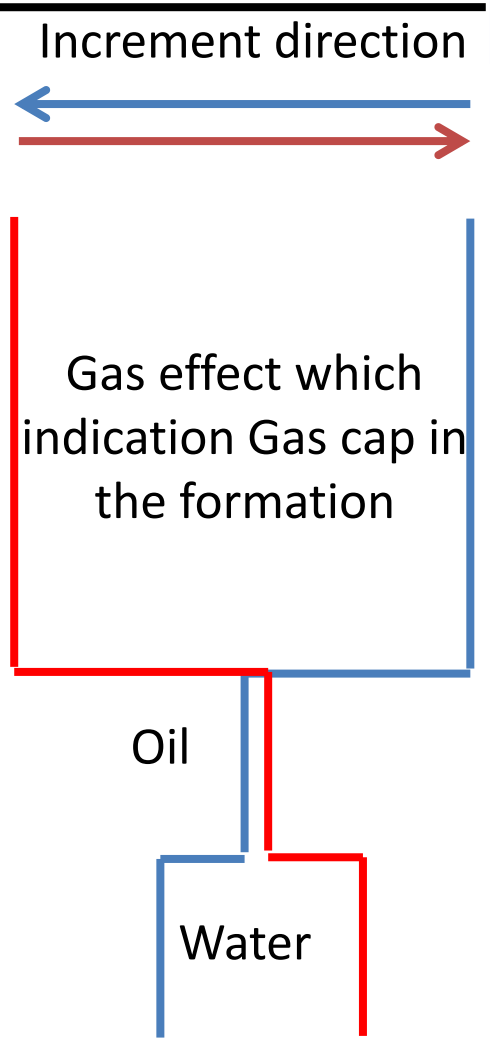
N-D log Lime scale in sandstone formation case

- If we have N-D track are on compatible scale for limestone and the logging interval in sandstone there will be separation between them all the way of the log interval. But it will be less in water, and higher in gas and oil between them.



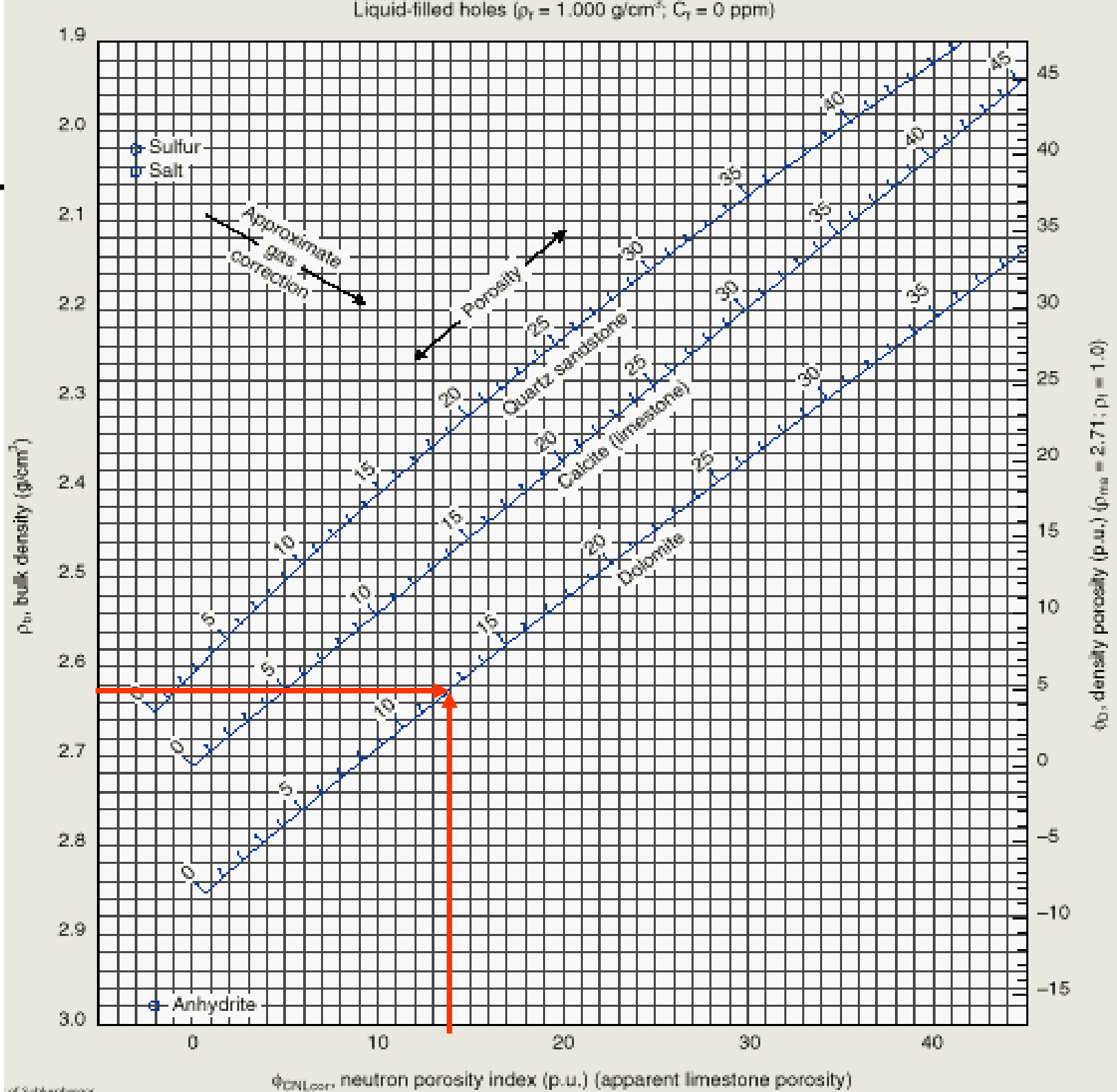
N-D log quick lock interpretation in case of Lime scale in dolomite formation

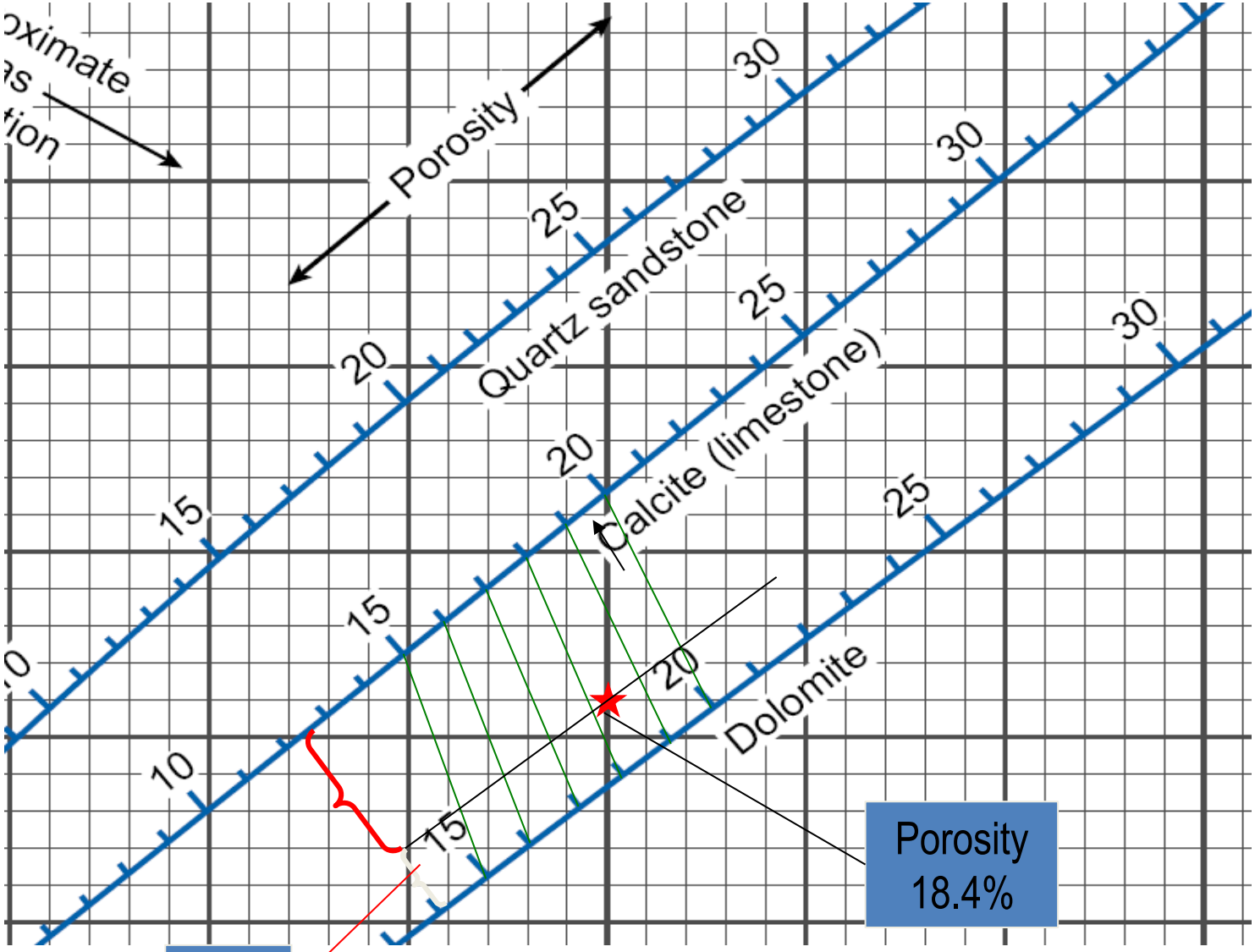
- In case of lime scale and the logging interval in dolomite zone there will be cross over between N-D. So neutron will go to the higher value and density as well. The cross over is higher in water zone less in oil zone and the gas effect will be lees appeared on the log



Lithology Identification

- Cross plot method between N and D is the most common method.
- Chose the point from the log, read the value of App. Porosity from Neutron and the value of he




oximate
as
tion
Porosity
Quartz sandstone
Calcite (limestone)
Dolomite
30
25
20
15
10
0
70%
DOL
30%
LS
Porosity
18.4%

- Identify reservoir zone
- Identify fluids
- Consider neutron density is on limestone scale