
Article Title

John Smith, *University of California*

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Petrophysical logs

To find hydrocarbons buried underneath the sea bed we can drill and study cores from drilling or we can use petrophysical logging. The latter is not only cheaper but gives information that cannot be found by drilling. The different logs are used by combining the results to deduce whether or not hydrocarbons are present. These logs are categorized into:

Selfpotential

This log utilizes differences in electric potential. Giving information on shale boundaries which can give us information on the reservoir rock. It also gives us information on ρ_w which helps us calculate the pore space occupied by the hydrocarbons. The SP can give a constant value when the sand is clean and bed is thick. We then call it a static SP. This is used to determine the resistivity ρ_w , which we will talk about in the next section.

Resistivity

The resistivity measures the pore space that is occupied by the water in the rock, which we call the water saturation. This value is used to find the saturation of hydrocarbons in a given rock formation. A rock saturated with hydrocarbons will typically have a high SP and high resistivity.

Radioactivity

As the name indicates this log uses radioactivity in the rock to determine the rock type. Where shale rocks have a high radioactivity, and coal has low radioactivity. This log can also be used to monitor the cement, by injecting radioactive material into the cement. The rock is identified through the radioactivity log by looking at the density and porosity of a given rock formation. The radioactivity reader is usually held against the side of the dug hole with detectors so to get an accurate reading.

Neutron

This logging type is similar to that of radioactive logging, only that it utilizes the effects of neutrons. The neutrons are sent into the rock and clashes with atoms causing γ rays to be sent back and read. The stronger the signal the more hydrogen is present. Which is an integral part in both water and hydrocarbons. This log is therefore used to measure the porosity in which the hydrocarbons reside.

Sonic

This logs the variation of acoustic sound waves sent down and reflected, which is also known as seismic. The different times at which these waves return determines the porosity, which again can tell us something about the rock.

Free water level and oil water contact

Since water, oil and gas have different density they will tend to layer on top of each other. With gas being

Table 1: *Random table*

Name		
First name	Last Name	Grade
John	Doe	7.5
Richard	Miles	2

the lightest and water being the heaviest. The free water level is the highest level in which the pressure of the hydrocarbons is the same as the water. Or where the water saturation is 100%. The oil water contact is the lowest point where oil occurs. These boundaries can be determined by studying pressure gradients. These contact points are not very sharp, and usually gradual over several feet.

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Subsection 2

Section 2

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References

[Cambridge, 2000] Musset, Khan (2000). Looking into the earth *Subsurface Geophysics* , 18:285–305.