PETROPHYSICS VOLVE 15/9-F-15 C

1 Modell

Well 15/9-F-15 C is evaluated accordingly to the Model reported in : Sleipner Øst and Volve Model 2006, Hugin and Skagerak Formation , Petrophysical Evaluation, Dokument 3781-06, 2006-11-10, Authors: E. Solfjell, K.A. Lehne

1.1 Porosity

The porosity is derived from the density log which is calibrated to overburden corrected core porosity for wells drilled with OBM and WBM.. The neutron log has been used to correct for mud filtrate invasion. The equation in use is:

Phif = Phid + A*(Nphi-Phid) + B

Here A and B are regression konstants. Phid is the density porosity.

Phid = (Rhoma – Rhob) /(Rhoma – Rhofl).

1.2 Clay Volume

The Clay volume is entirely derived from the gamma ray log GR. The function used is the linear realationshi :

VSH = (GRmax – GR) / (GRmax – GRmin) (API units)

Grmax : Gamma ray Claystone . Grmin : Gamma ray clean Sandstone.

1.3 Water Saturation

The water saturation is evaluated with the Archie formula :

$$Sw = (a*Rw / Rt*Phif^{m})^{**\ 1/n}$$

Here Sw = Water saturation, a = Archies lithology konst., Rw = Formation Water Resistivity,
Rt = True Resistivity, Phif = porosity, m = cementation exponent, n = saturation exponent.

1.4 Permeability

Permeability is based on multivariable regression analysis between log porosity and shale volume against overburden corrected core permeability., The following functions are being used on the Volve Field :

Klogh = 10**(8* Phif-9*Vsh+2)	Hugin
Klogh = 10**(32*Phif-2*Vsh-3)	Sleipner
Klogh = 10**(17.4*Phif-3*Vsh-1.85)	Skagerak*

* Not in this well

1.4.1 MagTrak Permeability

MPERM based on data from MagTrak (NMR) has been added on to the CPI permeability track. The MPERM is based on Coates equation.
Ref Chapter 2.3.

1.5 Evaluation parameters

The different evaluation parameter are seen in table 1.

Tab 1.

Evaluation Parameters 15/9-F-15 C				
Parameter	Draupne	Heather	Hugin	Sleipner
Rhoma	2.66	2.66	2.65	2.65
Rhofl	1	1	0.9	0.9
A	0	0	0.4	0.4
B	0	0	0.01	0.01
Grmin	5	5	5	5
Grmax	150	120	120	120
a	1	1	1	1
n	2	2	2.45	2.45
m	2	2	*	*
* m = 1.865 * (Klogh ** -0.0083)				
Rw = 0.07 ohmm at 20 ^{o}C, Temp Gradient : 2.6 ^{o}C				
Reservoar Temperature : 111 ^{o}C at 2800m TVDSS.				

2 Results

2.1 Pressure tests StethoScope (LWD)

Depth	Tvd-msl	Test nr.	Pressure (Bar)	Mob. (Md/cp)
3127.00	2891.88	4	312.04	93
3129.00	2893.73	3	312.17	11
3134.00	2898.36	2	312.62	95
3141.00	2904.85	1	313.18	190
3149.00	2912.56	8	313.79	220
3152.00	2915.04	7	314.06	39
3156.00	2918.74	6	314.61	12
3160.00	2922.45	5	315.53	24

Tests plotted columns 8 and 9 .

2.2 Petrophysical Parameters from Log Evaluation 15/9-F-15 C

Petrophysical Parameters						
Formation	NetGros	Phif	Sw.	Klogh_A *	Klogh_H	Klogh-G
Hugin	0.910	0.237	0.419	391	7.1	127
Sleipner	0.220	0.188	0.893	1215	4.5	126

*A: Aritmetic , H: Harmonic , G: Geometric

2.3 NMR LWD (MagTrak)

MagTrak was logged in this well. The intention was to get a log of the Bound- and Free Fluid phases of the reservoir. The data are presented in track 6 in the CPI..

Color codes of the shaded data are :

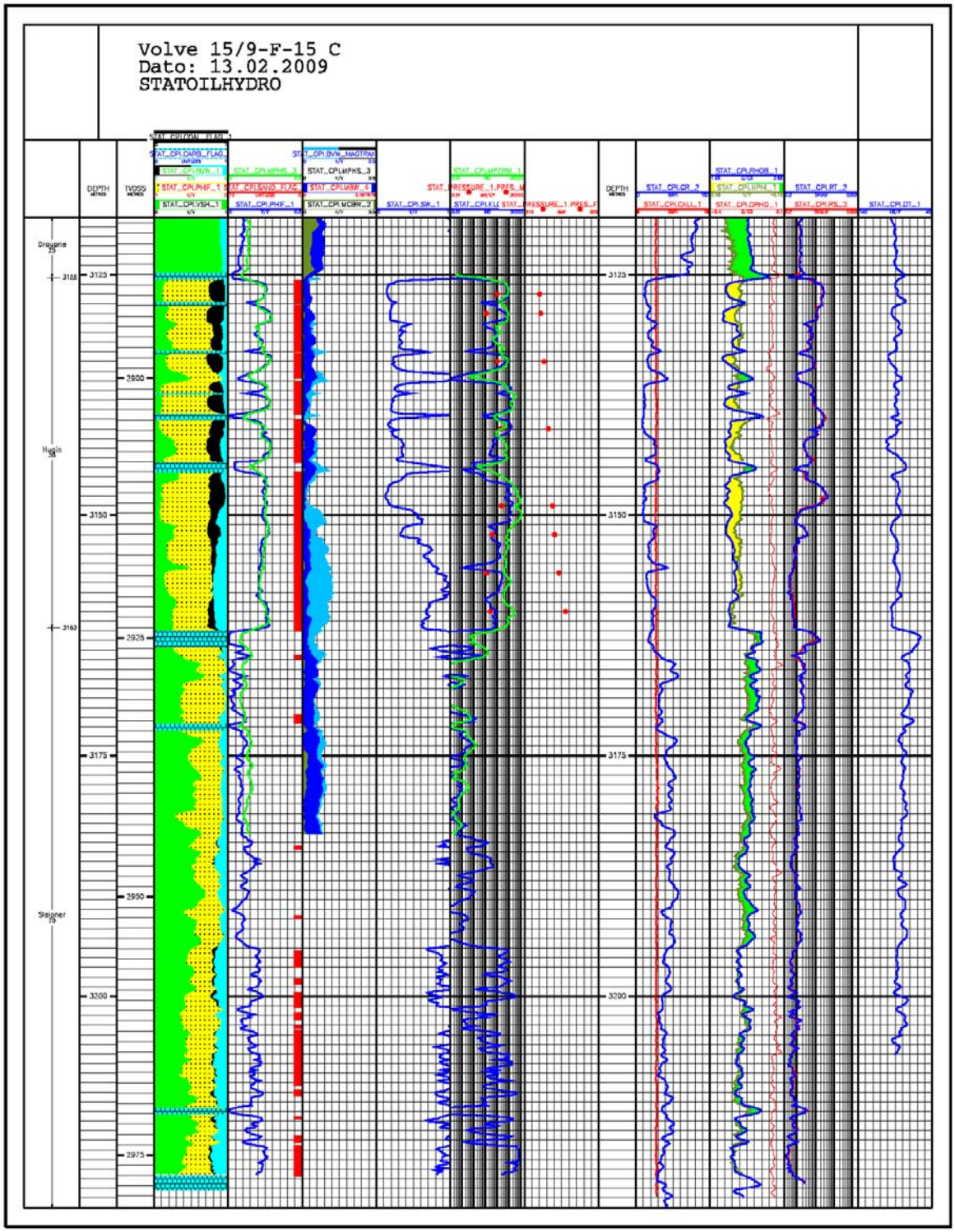
Olive : Clay Bound Water (3.3ms), Dark Blue : Capillary Bound Water (80ms), Light Blue : Mobile Water, Black : Oil.

Note that the water phase in the bottom part of Hugin (3149 – 3162 m MD-RKB) is dominated by mobile water.

In track 8 CPI is the the NMR-Permeability presented in green. It is the standard Coates eq.

$MPERM = C^* (MPHI)^A * (FFI/BVI)^B$, C : 10^4, , A : 4 , B: 2

2.4 CPI


Volve 15/9-F-15 C
Dato: 13.02.2009
STATOILHYDRO
DEPTH
TVDSS
Draupne
Hugin
Sleipner
3123
3150
3175
3200
2900
2925
2950
2975