

Table of Contents

Table of Contents.....	2
1. Introduction	5
2. The Basics.....	6
2.1 Documentation & Audit Trails	6
2.2 Total and Effective Porosities.....	6
2.3 Evaluation Workflows	6
2.4 Why Use Core Analyses?	9
2.5 Core Calibration – Don’t Do It	10
2.6 Core Analysis Programs	10
3.0 Facies & Rock Type Modelling.....	14
3.1 Is “Rock Typing” Necessary	14
3.2 Reservoir Quality Indicator	15
3.3 Data-Driven	16
4.0 Uncertainty Modelling.....	17
4.1 Input Uncertainties	17
4.2 Uncertainties in the Literature	17
4.3 Recommended Uncertainty Quantification Techniques.....	18
5.0 Porosity Interpretation	21
5.1 Grain Density from Core	21
5.2 Core Porosities.....	24
5.3 Simple Log Porosity Calculation.....	24
5.4 Hydrocarbon-Corrected Density Porosities	25
5.5 Density-Neutron Porosities.....	26
5.6 Sonic Based Porosities.....	26
5.7 NMR Based Porosities.....	27
5.8 Shale Fraction Based Porosities	27
5.9 Neutron Based Porosities.....	27
5.10 Resistivity Based Porosities.....	28
5.11 Comparison with Core Data & Reasons for Discrepancies.....	28
6. Permeability Interpretation	30
6.1 Which Permeability to Model?	30
6.2 Core Permeability Corrections	30
6.3 Porosity to Permeability Transforms	32

6.4	Probe Permeability	35
6.5	Relative Permeability	36
7.0	Log Derived Water Saturations	43
7.1	Core-Based Cementation Exponents	43
7.2	Core-Based Saturation Exponents	45
7.3	Log Corrections	47
7.4	Formation Water Salinity	47
7.5	Archie Equation	49
7.6	Clay Conductivity	50
7.7	Clay Corrected S_w with Waxman-Smits	51
7.8	Determining Likely Mobile Fluids	53
7.9	Log Uncertainties & Uncertainties in Derived Properties	56
8.0	Shale Fraction Definition	57
8.1	Gamma Ray	57
8.2	Density-Neutron	57
8.3	Spontaneous Potential	58
9.0	Net Reservoir Definition	59
9.1	Industry Defaults	59
9.2	Cumulative Hydrocarbon Plots	59
9.3	Data Driven	61
10.0	Capillary Pressure & Saturation-Height Interpretation	63
10.1	Capillary Pressure Curves	63
10.2	Capillary Pressure Measurement	65
10.3	Basic Forces Involved	68
10.4	Basic Formulae	72
10.5	Working with Capillary Pressure Measurements	73
10.6	Comparing Different Measurement Types	79
10.7	Quality Control	81
10.8	Creating Saturation-Height Functions	84
10.9	Irreducible Water Saturations	87
10.10	Drainage Saturation-Height Modelling	88
10.11	Imbibition Modelling	92
10.12	Checking for “Good Behaviour”	93
10.13	Uncertainty	95
10.14	Practical Implementation	96
10.15	Reconciliation with Log Evaluation	96

11.0	Residual hydrocarbons	102
11.1	Core Measurements	102
11.2	Residual Hydrocarbons Definition	103
11.3	Likely Relationships	103
11.4	Deriving Relationships from SCAL	106
11.5	Deriving Relationships from Log Data	106
12.0	Thin-Bedded & Low Resistivity, Low Contrast Systems	107
12.1	Laminated Sequences	107
12.2	Low Resistivity, Low Contrast Systems.....	108
13.0	Formation Pressure Tester Interpretation	110
14.0	NMR Log Integration	113
	References	114