

GEOLOGICAL SOCIETY SPECIAL PUBLICATION NO. 237

Understanding Petroleum Reservoirs: towards an
Integrated Reservoir Engineering and
Geochemical Approach

EDITED BY

J. M. CUBITT

ES Information & Consultancy Ltd, Wrexham, UK

W. A. ENGLAND

BP, Sunbury-on-Thames, UK

and

S. R. LARTER

University of Calgary, Canada

2004

Published by

The Geological Society

London

Contents

ENGLAND, W. A. & LARTER, S. Understanding petroleum reservoirs: towards an integrated reservoir engineering and geochemical approach. Introduction	1
New approaches, analytical and geochemical developments	
THOMPSON, K. F. M. Interpretation of charging phenomena based on reservoir fluid (PVT) data	7
WILHELMS, A. & LARTER, S. Shaken but not always stirred. Impact of petroleum charge mixing on reservoir geochemistry	27
PHILP, R. P., HSIEH, M. & TAHIRA, F. An overview of developments related to the characterization and significance of high molecular weight paraffins/hydrocarbons (>C ₄₀) in crude oils	37
HOLBA, A. G., WRIGHT, L., LEVINSON, R., HUIZINGA, B. & SCHEIHING, M. Effects and impact of early-stage anaerobic biodegradation on Kuparuk River Field, Alaska	53
MEULBROEK, P. CATHLES, L. & GODDARD, W. A. HCToolkit/EOS interface: an open source, multi-platform phase equilibria framework for exploring phase behaviour of complex mixtures	89
Physical, chemical and numerical models	
SMALLEY, C., ENGLAND, W. A., MUGGERIDGE, A., ABACIOGLU, Y. & CAWLEY, S. Rates of reservoir fluid mixing: implications for interpretation of fluid data	99
STAINFORTH, J. G. New insights into reservoir filling and mixing processes	115
SKEIE, J. E., DI PRIMIO, R. & KARLSEN, D. A. An integrated basin modelling study applying asphaltene kinetics from reservoired petroleum in the Snorre Area, northern North Sea	133
DI PRIMIO, R. & SKEIE, J. E. Development of a compositional kinetic model for hydrocarbon generation and phase equilibria modelling: a case study from Snorre Field, Norwegian North Sea	157
Case studies – Water and petroleum fluid compositional variations	
LINES, M. D. & AULD, H. A. A petroleum charge model for the Judy and Joanne Fields, Central North Sea: application to exploration and field development	175
WAVREK, D. A. & MOSCA, F. Compositional grading in the oil column: advances from a mass balance and quantitative molecular analysis	207
MUELLER, E. & SCHOLZ, T. Application of geochemistry in the evaluation and development of deep Rotliegend dry gas reservoirs, NW Germany	221
WEISSENBURGER, K. S. & BORBAS, T. Fluid properties, phase and compartmentalization: Magnolia Field case study, Deepwater Gulf of Mexico, USA	231
TAYLOR, T., STANCLIFFE, R., MACAULAY, C. & HATHON, L. High temperature quartz cementation and the timing of hydrocarbon accumulation in the Jurassic Norphlet sandstone, offshore Gulf of Mexico, USA	257
DUTTON, S. P. & FLANDERS, W. A. Evidence of reservoir compartmentalization by calcite cement layers in deepwater sandstones, Bell Canyon Formation, Delaware Basin, Texas	279
MCCARTNEY, R. A., WINEFIELD, P., WEBB, P. & KUHN, O. Spatial variations in the composition of formation waters from the central North Sea: implications for fluid flow in the deep high-pressure high-temperature hydrocarbon play	283

KARLSEN, D. A., SKEIE, J. E., BACKER-OWE, K., BJØRLYKKE, K., OLSTAD, R., BERGE, K., CECCHI, M., VIK, E. & SCHAEFER, R. G. Petroleum migration, faults and overpressure. Part II. Case history: The Haltenbanken Petroleum Province, offshore Norway	305
RUSHING, J. A., CHAUCHE, A. & NEWSHAM, K. E. A mass balance approach for assessing basin-centred gas prospects: integrating reservoir engineering, geochemistry and petrophysics	373
Index	391