

Geology of the North-West European Continental Shelf

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Klemme, particularly for basins bordering continental margins. John Moody concludes the volume with a study of giant fields. He demonstrates a strong preferential post-Hercynian (i.e., post-Triassic) concentration of ages of the world's giant oil field reservoirs which he feels is a clear indication of the importance of the new global tectonics in understanding the origin of most giant oil fields. In a very literal sense the new global tectonics only began in post-Triassic time.

This volume suffers from some defects. The major annoyance from the point of view of the reader is the proliferation of plate tectonic classification schemes of basins. Curray's classification particularly is unnecessarily complex and bears little relation to the bulk of his otherwise informative paper. Also, Erdman's important paper is too short. One would like to know more about the specifics of organic maturation as it relates to heat flow and basin setting. For example, although Erdman shows the striking correlation between the decrease towards unity of the ratio of odd numbered versus even numbered n-alkanes and the occurrence of petroleum in several basins, he does not discuss the origin of this phenomenon. Except for the possibly major editorial lapse in Morgan's article, most editorial mistakes appear to be confined to occasional spelling mistakes. One occurs on Figure 13 (p. 274) of Klemme's article where Florida is misspelled as Flordia. But that's how the natives pronounce it anyway. All things considered, this volume is a worthy contribution to the literature in its synthesis of data and complementary viewpoints from both industry and academia. A list price of \$16.50 for this book does not seem excessive in this age of inflation.

MS received December 10, 1975.

Geology of the North-West European Continental Shelf

Graham Trotman Publishers Limited,
Publishers

Volume 1
by David Naylor and Nicola Mounteney
157 p., 1975
£6.50 (\$15.50)

Volume 2
by Richard Pegrum, Graham Rees and
David Naylor
217 p., 1975
£8.50 (\$19.95)

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The single title for the two volumes is misleading in that the material covers not only the geology but all aspects of the oil and gas industry. Also, the area treated is beyond the continental shelf to include the continental margin.

The authors state the purpose of the books is to provide for groups outside the industry, such as the banking community, offshore supply industries and generally the non-specialist, timely and important information of developments within the industry.

To this end the first chapter of Volume 1 of 23 pages is an introductory course of geological principles beginning with the globe, types of rocks at its surface, and formation and accumulation of hydrocarbons in the sedimentary layers. The chapter continues with short resumés of the history of the oil industry from its beginning in 1859 in the United States on land to the start of offshore exploration in UK waters. A typical procedural method of an oil company is described, beginning with seismic techniques, operation of an oil rig, types of offshore oil rigs and finally the oil and gas exploratory efforts on the continental shelf of the British Isles. Much of the descriptive material is supplemented at the end of the volume with definition of terms used and illustrated with excellent drawings.

Volume 1 deals with the continental shelf and margin off southern and western British Isles which includes Ireland. Chapter 2 introduces the reader

to the concept of plate tectonics or sea floor spreading and shortening in the world. The description and the good illustrations should prove interesting reading.

The succeeding chapters, 3 to 10, discuss the local recognized basins in the offshore of southern and western British Isles. These are Channel Basin, Western Approaches, Celtic Sea, Rockall Plateau and Trough, Porcupine Seabight, Irish Sea Basins, Northern Ireland and South West Scotland, and West Scottish Basins. The information is in sufficient detail to provide a ready reference to geologists who have not concerned themselves with the interpretation of the original data. To the non-specialist the chapters may prove difficult reading. The description is in considerable detail, some names of rock units used are not shown on columnar section, many maps are of poor quality due to missing geographical names, missing lines of sections, and poor reproduction. The bibliography given at the end of each chapter is limited but is adequate for the non-specialist.

Chapter 11 discusses, with authority, the Paleogeography and Evolution of Western Britain.

Finally, in chapter 12, the authors give a comprehensive and up to date account of the History of Oil and Gas Exploration in both east and west coasts of Britain. References are made in the text to the drilled wells to date but the locations are not shown on the maps. The chapter involves a factual description of the licensing system of both Ireland and Britain and discusses the still unsettled median lines and the disputed ownership of the Rockall area.

Volume 2 covers the North Sea: the geology, published data of oil and gas discoveries, economics and reserves, potential production, and government's tax regulations and expected revenue.

The introductory chapter repeats a considerable amount of the first chapter of Volume 1 and includes additional structural information specifically related to the North Sea area. This is followed by chapters 2 to 7 which describe the deposition of sediments and tectonic movements in the periods of geological time, Devonian, Carboniferous, Triassic, Jurassic, Cretaceous and Tertiary. With each period is an excellent map showing

subcrop of pre-period rocks and distribution and thickness of sediments of the period discussed.

Chapter 8, 27 pages long, titled "Exploration Techniques" discusses all the techniques used in finding, evaluating and producing offshore oil and gas pools. It covers the field of geophysical methods in considerable detail, more so than that presented in Volume 1. The sub-chapter 8.2 discusses offshore drilling rigs and typical operation during the drilling of a well from its initial to final completion as an expendable or future production well. Sub-chapter 8.3 discusses well logging. The account is presented in almost conversational form that will prove interesting reading but will not make the reader a log specialist.

Sub-chapter 8.4 treats, in some detail, production methods, the various types of production platforms, and the fields where they have been or are being installed. The section on pipelines is highly informative. The capital expenditure involved in exploration and production of oil or gas in the North Sea is discussed in terms of each barrel per day of productive capacity. A comparison of costs in the North Sea to those in the Middle East should prove informative and of interest to the reader.

Chapter 9 is of great interest because it discusses the historical events leading up to the world's most exciting exploration scene, the North Sea in the early 1970s. It began with the International Convention in 1958 which established the principles of boundaries in the North Sea. This opened the way for exploratory work, first, in the southern North Sea basin in 1962 and then in the northern basin in 1969. In the account of the latter area the authors give in detail the state of exploration prior to and following the fourth round of awards in 1972. This is followed by a description of the government's reaction to the high rate of success of exploration since 1972. This resulted in changes in legislation. The authors close the chapter with their thoughts on the future of the industry in the North Sea.

Chapter 10 submits important data on oil and gas discoveries and fields which were presented at the November 1974 conference sponsored by the Institution of Petroleum, Exploration Society of Great Britain and the American Association of Petroleum Geologists.

The data are accompanied by excellent maps and geological cross-sections through the fields.

Chapter 11 titled "Economics and Reserves" contains information of great significance. Reserves in the ground are discussed in some length, how they are calculated, their importance in decision-making by exploration companies active in the North Sea, and estimates of recoverable reserves for fields discovered to mid 1974 given at the late 1974 conference. Up to date information on price of oil and government taxation is given, followed by a discussion and columns of figures with reference to economics leading up to the ultimate topic of revenues to the government and the producers. "When production reaches 2.5 million barrels a day the yearly revenue to the exchequer will be a staggering 4,812 million dollars (£2,005 m)". The profitability of an oil field to an oil company is presented in a cash flow model of a large North Sea oil field.

In the opinion of the reviewer, the authors have achieved their aim to tell the fascinating story of the oil industry in such a way that both volumes should have a place in the libraries of non-specialists, bankers and, yes, even oil companies.

MS received February 26, 1976.

Methods of Estimating the Volume of Undiscovered Oil and Gas Resources

Edited by John D. Haun
American Association of Petroleum Geologists, 206 p., soft cover, 1975.
 AAPG and SEPM members \$8.00,
 others \$10.00

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This volume, No. 1 of the AAPG Studies in Geology series, contains 17 of the 21 papers presented at an AAPG research conference in August, 1974, at Stanford University. It was the intention that this and subsequent volumes be published as quickly as possible to disseminate the results of similar such conferences.

It is obvious from these papers that the estimation of undiscovered resources is still one of the most complex, uncertain and controversial aspects of the artistic science of petroleum geology. This book illustrates the difficulties inherent in accurately assessing a finite resource which is well hidden, if present at all. Some idea of the background behind the papers may be gained from the fact that four were prepared by geologists from the USGS, one was co-authored by a geologist from the GSC, two by major oil company geologists, the rest being from smaller organizations or from the academic community. Eighteen of the papers were by U.S. authors.

The papers by the USGS are basically a review of concepts and definitions, relating to reserves and resource evaluation. Probably the two best documented and most relevant papers are firstly, "Basic Consanguinity in Petroleum Resource Estimation" by J. W. Porter and R. G. McCrossen (published in part in CSPG Memoir No. 1), which examines world-wide accumulations in the light of a proposed basin classification; and secondly "Assessing Regional Oil and Gas Potential", by D. A. White *et al.*, (Exxon geologists) outlining probability concepts in resource estimation, based upon examples from Louisiana.