

Schlumberger Well Log Analysis

This book is one in a series of three books by the authors on various aspects of well logging, with the final book to be on reservoir evaluation. The book departs from traditional log analysis books in that it has a very strong emphasis on geologic principles with an extensive review of the processes that influence hydrocarbon accumulations. The chapters are written in a stand-alone format. This book is beautifully illustrated with colored plots, charts, and block diagrams on virtually every page.

This second volume on carbonate reservoirs completes the two-volume treatise on this important topic for petroleum engineers and geologists. Together, the volumes form a complete, modern reference to the properties and production behaviour of carbonate petroleum reservoirs. The book contains valuable glossaries to geologic and petroleum engineering terms providing exact definitions for writers and speakers. Lecturers will find a useful appendix devoted to questions and problems that can be used for teaching assignments as well as a guide for lecture development. In addition, there is a chapter devoted to core analysis of carbonate rocks which is ideal for laboratory instruction. Managers and production engineers will find a review of the latest laboratory technology for carbonate formation evaluation in the chapter on core analysis. The modern classification of carbonate rocks is presented with petroleum production

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performance and overall characterization using seismic and well test analyses. Separate chapters are devoted to the important naturally fractured and chalk reservoirs. Throughout the book, the emphasis is on formation evaluation and performance. This two-volume work brings together the wide variety of approaches to the study of carbonate reservoirs and will therefore be of value to managers, engineers, geologists and lecturers.

This publication is a general introduction to common openhole logging measurements, both wire line and MWD/LWD, and the interpretation of those measurements to determine the traditional analytical goals of porosity, fluid saturation, and lithology/mineralogy. It is arranged by the interpretation goals of the data, rather than by the underlying physics of the measurements. The appendix files contain digital versions of the data from the case studies, a summary guide to the measurements and their interpretation, and a simple spreadsheet containing some of the more common interpretation algorithms.

Several excellent books on well log interpretation have already been published. However, I feel that these books do not place enough emphasis on the inherent uncertainties in tool responses or on the related and very practical problem of selecting suitable data points for statistical or quantitative calculations. Thus, I have written this book not only to introduce the newcomer to this very complex art and science, but also to provide him or her with the necessary tools to produce better interpretations. The

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problems at the end of each chapter are essential to a more complete understanding of the subject matter and include many practical notes based on problems I have encountered in actual applications. This book emphasizes that you develop your own concepts and understanding of the underlying principles, rather than acquiring a compendium of knowledge based on certain rules of thumb. If you are to successfully interpret welllogs, you need to be able to apply your knowledge to new problems that may not follow the preconceived ideas and approaches you would follow if you approached well log analysis from a cookbook standpoint.

From the reviews: "...is a "must" for serious field novices, and for seasoned middle-career and senior practitioners in hydrogeology, mainly those people who answer a calling to offer honest and accurate hydrogeological approximations and findings. Any engineering geologist or groundwater geologist who claims capability as a "Hydrogeologist" should own this book and submit it to highlighting and page tabbing.

Of course, the same goes for those who practice in karst terranes, as author LaMoreaux is one of the pioneers in this field, worldwide..." (Allen W. Hatheway)

The first edition of this book demystified the process of well log analysis for students, researchers and practitioners. In the two decades since, the industry has changed enormously: technical staffs are smaller, and hydrocarbons are harder to locate, quantify, and produce. New drilling techniques have engendered new measurement devices incorporated into the drilling string. Corporate restructuring and the "graying" of

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the workforce have caused a scarcity in technical competence involved in the search and exploitation of petroleum. The updated 2nd Edition reviews logging measurement technology developed in the last twenty years, and expands the petrophysical applications of the measurements.

This book addresses vital issues, such as the evaluation of shale gas reservoirs and their production. Topics include the cased-hole logging environment, reservoir fluid properties; flow regimes; temperature, noise, cement bond, and pulsed neutron logging; and casing inspection. Production logging charts and tables are included in the appendices. The work serves as a comprehensive reference for production engineers with upstream E&P companies, well logging service company employees, university students, and petroleum industry training professionals.

Logging has come a long way from the simple electrical devices of the early years. Today's tools are considerably more accurate and are used for an increasingly diverse number of tasks. Among these are tools that characterise geological properties of rocks in the borehole. Combined with new technology to drill deviated wells, the geoscientist now has tools which allow him to characterise and develop reservoirs more accurately than ever. This book, written for researchers, graduate students and practising geoscientists, documents these techniques and illustrates their use in a number of typical case studies.

These three works cover the entire field of formation evaluation, from basic concepts

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and theories, through standard methods used by the petroleum industry, on to new and exciting applications in environmental science and engineering, hydrogeology, and other fields. Designed to be used individually or as a set, these volumes represent the first comprehensive assessment of all exploration methodologies. No other books offer the breadth of information and range of applications available in this set.

The past few decades have witnessed the growth of the Earth Sciences in the pursuit of knowledge and understanding of the planet that we live on. This development addresses the challenging endeavor to enrich human lives with the bounties of Nature as well as to preserve the planet for the generations to come. Solid Earth Geophysics aspires to define and quantify the internal structure and processes of the Earth in terms of the principles of physics and forms the intrinsic framework, which other allied disciplines utilize for more specific investigations. The first edition of the Encyclopedia of Solid Earth Geophysics was published in 1989 by Van Nostrand Reinhold publishing company. More than two decades later, this new volume, edited by Prof. Harsh K. Gupta, represents a thoroughly revised and expanded reference work. It brings together more than 200 articles covering established and new concepts of Geophysics across the various sub-disciplines such as Gravity, Geodesy, Geomagnetism, Seismology, Seismics, Deep Earth Processes, Plate Tectonics, Thermal Domains, Computational Methods, etc. in a systematic and consistent format and standard. It is an authoritative and current reference source with extraordinary width of scope. It

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draws its unique strength from the expert contributions of editors and authors across the globe. It is designed to serve as a valuable and cherished source of information for current and future generations of professionals.

Well Logging and Geology Technip Editions

Contents of volumes 1 and 2 give a general view of the essential material knowledge for students and professionals. Opportunity for deeper investigation is available from the extensive complementary references featured.

Following the success of the Drilling Data Handbook, Editions Technip has designed this book to cover the well logging principles and its applications. This well logging handbook first edition starts with a summary on geology and petrophysics focusing mainly on its applications. The wide range of logging measurements and applications is covered through eleven sections, each of them organized into four chapters. All in all, this is a strongly-bound, user-friendly book with useful information for those involved in all aspects and applications of well-logging. The paging is notched and externally labelled alphabetically to allow a quick access.

Conceived and written by a geologist for geologists, Fundamentals of Well-Log Interpretation is a considerably revised and updated translation of the French edition. Part 1 dealt with the acquisition of logging data and when it appeared, one reviewer wrote: Serra has written a major reference work which is unusually well-organized, well-illustrated, and information-rich...If volume 2 is as thorough and exacting in detail as volume 1, it will do much toward furthering geologists' knowledge of well logging." (AAPG Bulletin). The fundamental objective of this second volume is to show that wireline log data constitute a remarkable source of geological information of the utmost importance for geologists, but also for reservoir engineers,

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geophysicists and petrophysicists. Too often, by nature of their training, geologists do not realize that wireline log data, which are physical data, hold in fact a tremendous variety of geological information covering practically all branches of geology. They are reluctant to use these data because often they are not familiar with them and do not know how to interpret wireline logs.

These three works cover the entire field of formation evaluation, from basic concepts and theories, through standard methods used by the petroleum industry, on to new and exciting applications in environmental science and engineering, hydrogeology, and other fields. Designed to be used individually or as a set, these volumes represent the first comprehensive assessment of all exploration methodologies. No other books offer the breadth of information and range of applications available in this set. The first volume, *Introduction to Geophysical Formation Evaluation*, is the perfect introductory reference for environmental professionals without previous training in the field. It explains the fundamentals of geophysical exploration and analysis, illuminates the underlying theories, and offers practical guidance on how to use the available methodologies. General information on material behavior, porosity, tortuosity, permeability, cores, resistivity, radioactivity, and more provides a solid foundation for more advanced studies. The second volume, *Standard Methods of Geophysical Formation Evaluation* builds on the basic precepts presented in the first work but can be used alone as a self-contained reference. It covers all the petroleum-oriented standard methods which, until recently, have comprised the majority of applications of geophysical formation evaluation. It also points out non-hydrocarbon uses of petroleum methods. This volume provides complete practical information and instructions on using the standard exploration and evaluation

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methods. It presents comprehensive, painstakingly detailed instructions for resistivity, radiation, and acoustic methods. The third volume, *Non-Hydrocarbon Methods of Geophysical Formation Evaluation*, discusses uses of formation evaluation in environmental science and engineering, hydrogeology, and other fields outside the petroleum industry, and demonstrates how the standard methods can be adapted to these non-hydrocarbon purposes. It presents step-by-step instructions for photon, magnetic, nuclear, and acoustic methods of exploration, and gives special attention to the analytical techniques used in non-hydrocarbon exploration. Individually, each book is a complete, stand-alone reference on an important area of this changing field. Together, the three volumes provide the most complete practical compendium available on all aspects of formation evaluation.

The Acquisition of Logging Data

A synthesis of years of interdisciplinary research and practice, the second edition of this bestseller continues to serve as a primary resource for information on the assessment, remediation, and control of contamination on and below the ground surface. *Practical Handbook of Soil, Vadose Zone, and Ground-Water Contamination: Assessment, Prevention, and Remediation, Second Edition* includes important new developments in site characterization and soil and ground water remediation that have appeared since 1995. Presented in an easy-to-read style, this book serves as a comprehensive guide for conducting complex site investigations and identifying methods for effective soil and ground water cleanup. Remediation engineers, ground water and soil scientists, regulatory personnel, researchers, and field investigators can access the latest data

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and summary tables to illustrate key advantages and disadvantages of various remediation methods.

Written by some of the world's most renowned petroleum and environmental engineers, *Petrophysics: The Fundamentals of Oil and Gas Reservoirs* is the first book to offer the practicing engineer and engineering student these new cutting-edge techniques for prediction and forecasting in petroleum engineering and environmental management. *Reservoir Characterization* is a collection of papers presented at the Reservoir Characterization Technical Conference, held at the Westin Hotel-Galleria in Dallas on April 29-May 1, 1985. Conference held April 29-May 1, 1985, at the Westin Hotel—Galleria in Dallas. The conference was sponsored by the National Institute for Petroleum and Energy Research, Bartlesville, Oklahoma. Reservoir characterization is a process for quantitatively assigning reservoir properties, recognizing geologic information and uncertainties in spatial variability. This book contains 19 chapters, and begins with the geological characterization of sandstone reservoir, followed by the geological prediction of shale distribution within the Prudhoe Bay field. The subsequent chapters are devoted to determination of reservoir properties, such as porosity, mineral occurrence, and permeability variation estimation. The discussion then shifts to the utility of a Bayesian-type formalism to delineate qualitative "soft" information and expert interpretation of reservoir description data. This topic is followed by papers concerning reservoir simulation, parameter assignment, and method of calculation of

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wetting phase relative permeability. This text also deals with the role of discontinuous vertical flow barriers in reservoir engineering. The last chapters focus on the effect of reservoir heterogeneity on oil reservoir. Petroleum engineers, scientists, and researchers will find this book of great value.

Formation Evaluation with Pre-Digital Well Logs covers the practical use of legacy materials for formation evaluation using wireline logging equipment from 1927 until the introduction of digital logging in the 1960s and '70s. The book provides powerful interpretation techniques that can be applied today when an analyst is faced with a drawer full of old "E logs." It arms the engineer, geologist and petrophysicist with the tools needed to profitably plan re-completions or in-fill drilling in old fields that may have been acquired for modern deeper and/or horizontal drilling. Includes more than 150 figures, log examples, charts and graphs Provides work exercises for the reader to practice log analysis and formation evaluation Presents an important source for academia, oil and gas professionals, service company personnel and the banking and asset evaluation teams at consultancies involved in reserve and other property evaluation

While the first well logs recorded seventy years ago had no provision for data quality control, the development of increasingly sophisticated logging techniques has led to the introduction of a large number of tests to validate acquired data. Log quality can be assured by stringent control of depth, calibrations, signal processing and operating

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procedures. This work gives a thorough description of these features. The meaningful interpretation of well logs depends on valid input. An understanding of log acquisition, and the performance of rigorous quality checks are the prerequisites for an accurate evaluation of a formation. These elements also enable log users to make decisions based on calculated risks. The book is primarily written for earth science specialists who use log data. It also addresses the needs of logging engineers who seek a better understanding of the log acquisition process. Exercises and their solutions are scattered in the book to complement practical chapters. Contents : I. Premises. 1. Introduction. 2. Evaluation of hydrocarbon volume. 3. Data collection and decision-making. 4. Elements of metrology I: error analysis. 5. Elements of metrology II: volume considerations. 6. Elements of metrology III: other attributes. 7. Mathematical preliminary: propagation of errors. II. Data acquisition. 8. Data acquisition. 9. Sensor and source technology. 10. Effect of measurement duration on precision. 11. Signal processing: filtering. 12. Enhancement of vertical resolution through processing. 13. Tool response. 14. Environmental corrections. 15. The real environment. 16. Density logging. 17. Calibration. 18. Monitoring of tool behavior. 19. Measurement of depth. 20. Directional surveys. III. Data quality control. 21. Data quality plan. 22. Completeness of information. 23. Data management. 24. Log quality checks. 25. Data quality evaluation. 26. Images and nuclear magnetic resonance. 27. Comparison of logged data with other information. 28. Optimum logging and uncertainty management. Bibliography. Index.

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This book covers the fundamentals of the earth sciences and examines their role in controlling the global occurrence and distribution of hydrocarbon resources. It explains the principles, practices and the terminology associated with the upstream sector of the oil industry. Key topics include a look at the elements and processes involved in the generation and accumulation of hydrocarbons and demonstration of how geological and geophysical techniques can be applied to explore for oil and gas. There is detailed investigation into the nature and chemical composition of petroleum, and of surface and subsurface maps, including their construction and uses in upstream operations. Other topics include well-logging techniques and their use in determining rock and fluid properties, definitions and classification of resources and reserves, conventional oil and gas reserves, their quantification and global distribution as well as unconventional hydrocarbons, their worldwide occurrence and the resources potentially associated with them. Finally, practical analysis is concentrated on the play concept, play maps, and the construction of petroleum events charts and quantification of risk in exploration ventures. As the first volume in the Imperial College Lectures in Petroleum Engineering, and based on a lecture series on the same topic, An Introduction to Petroleum Geoscience provides the introductory information needed for students of the earth sciences, petroleum engineering, engineering and geoscience. This volume also includes an introduction to the series by Martin Blunt and Alain Gringarten, of Imperial College London.

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Provides information on where to go to find detailed guidance on how to use these techniques. Covers: remote sensing & surface geophysical methods; drilling & solids sampling methods; geophysical logging of boreholes; aquifer test methods; ground water sampling methods; Vadose Zone (VZ) hydrologic properties: water state, infiltration, conductivity, & flux; VZ water budget characterization methods; VZ soil-solute/gas sampling & monitoring methods; & chemical field screening & analytical methods. Charts, tables, graphs & drawings.

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