The American Association of Petroleum Geologists gratefully acknowledges and appreciates the leadership and support of the AAPG Foundation in the development of the Treatise of Petroleum Geology.
EXPLORING FOR OIL AND GAS TRAPS

EDWARD A. BEAUMONT
NORMAN H. FOSTER
Editors

TREATISE OF PETROLEUM GEOLOGY
HANDBOOK OF PETROLEUM GEOLOGY

TREATISE EDITORS:
NORMAN H. FOSTER
AND
EDWARD A. BEAUMONT

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Preface to the
Handbook of Petroleum Geology

Exploring for Oil and Gas Traps is one of four books of the Handbook of Petroleum Geology, which is part of the Treatise of Petroleum Geology. The Treatise comprises three different publication sets: the Reprint Series, the Atlas of Oil and Gas Fields, and the Handbook of Petroleum Geology. The Treatise is AAPG’s Diamond Jubilee project, commemorating AAPG’s 75th Anniversary in 1991.

With input from an advisory board of more than 250 geologists and geophysicists from around the world, we designed this entire effort so that the set of publications will represent the cutting edge in petroleum exploration knowledge and application. The Reprint Series provides useful literature from various geological, geophysical, and engineering publications. In some cases, reprinted articles are from obscure sources. The Atlas is a collection of detailed field studies that illustrate the myriad ways oil and gas are trapped. It is also a guide to the petroleum geology of the basins where these fields are found. Field studies like those published in the Atlas are the documentation of petroleum geology. They form the basis for all of our assumptions regarding petroleum geology. From the standpoint of the explorationist who is building and selling prospects, details from field studies can be stored as memories and used to build stronger prospects and convince doubters of the validity of any unique features of a prospect—nothing is more convincing than a close analogy.

The third part of the Treatise, the Handbook of Petroleum Geology, is a professional explorationist’s guide to the methodology and technology used to find fields similar to those described in the Atlas.

The Handbook set is divided into four volumes, each of which addresses one of the four steps of oil and gas prospecting—evaluation of source rocks and migration, evaluation of reservoir quality and properties, evaluation of trapping conditions, and evaluation of economic opportunity. Accordingly, the four volumes of the Handbook are Source and Migration Processes and Evaluation Techniques; Reservoirs; Exploring for Oil and Gas Traps; and The Business of Petroleum Exploration. These publications should be kept close at hand so that when a question arises, an answer can be found quickly and easily.

Edward A. Beaumont and Norman H. Foster
Editors of the Treatise of Petroleum Geology
## Preface

### Purpose of the book
This book presents, in succinct form, basic concepts of petroleum geology and proven petroleum exploration techniques for locating oil and gas accumulations.

### Book theme
This volume is a handbook about prospecting for oil and gas traps. It is a how-to discussion of techniques used to evaluate the critical elements necessary for discovering oil and gas accumulations. For the most part, the chapters focus on procedures first and then discuss concepts that one must understand to apply the procedures effectively.

### Book format
The book format is a structured technical writing style known as information mapping. Information mapping makes information more accessible, easier to understand, and easier to remember. It is especially well suited for procedure-based books such as this one.

### Intended audience
This volume is directed at professionals with two or more years’ experience. It assumes a basic knowledge of most aspects of petroleum geology and petroleum exploration methods. Basic well log analysis, seismic theory, structural geology, stratigraphy, or sedimentology are not detailed. Instead it concentrates on elements of petroleum geology and petroleum exploration methods that are critical for generating viable prospects.

### Contents
The book consists of twenty-one chapters subdivided into four parts. The first chapter serves as a jump-off point for the book’s vision. It contains five sections that discuss various aspects of developing an exploration philosophy. Exploration begins in the mind. How one approaches exploration for oil and gas traps is a result of a philosophy developed through experience, interaction with others such as a mentor, and reading.

- **Part I** contains chapters that deal with the concept of a trap and the geological context of a trap in a petroleum system.
- **Part II** contains chapters discussing sedimentary basin analysis and the behavior of fluids within the basin. These chapters show methods of understanding the development and current condition of a basin and its plumbing system.
- **Part III** narrows the focus to specific critical elements of the trap. It contains chapters that discuss tried-and-true methods for predicting the critical elements of a trap, including reservoir performance, seal existence and quality, and preservation of traps.
- **Part IV** contains chapters that discuss various exploration methods and methods for predicting the location of structural and stratigraphic traps.

### Acknowledgments
Our thanks to the authors of this book for their contributions and their patience with us during the editing process. We thank companies and individuals who supported the *Treatise* project through financial contributions and the committee that asked companies for financial support: P.W.J. Wood, James E. Gibbs, David S. Holland, and Jack C. Threet. Special thanks go to the AAPG Foundation and its trustees: Larry Funkhouser, John Amoruso, Jack Threet, Lewis “Bud” Fearing, and Paul Dudley. We especially appreciate the support of Executive Director Fred Dix. Finally, we gratefully acknowledge the persistence, patience, and professionalism of the book’s Project and Content Editor, Kathryn E. Pile. Its quality is the result of her skill and diligence.
Norman H. Foster was an oil and gas finder. During his lifetime, he found lots of it. He found it in basins where others had found it and he found it in basins where others said it couldn't be found. What made Norm Foster so good at finding oil and gas?

Finding oil and gas results from the skillful application of geologic concepts; it is not merely a matter of being lucky. The successful application of the science of petroleum geology is an art that requires the creative flair. That was Norm Foster's philosophy. That is the philosophy of this book. Using an analogy from golf, he used to say, “You have to get the ball close to the hole in order to have a chance for luck.” He hoped that this book will help get you close.

Norman Foster was a geologist's geologist. He was the model of what all professionals should strive to be. At the local level (as a member of the Rocky Mountain Association of Geologists, in Denver, Colorado) he published, led field trips, worked on committees, and served in various offices including president. At the national level (AAPG) he published, taught continuing education courses, served on committees, and was Treasurer and President. AAPG and RMAG recognized Norm for his involvement and contributions. The RMAG made him a honorary member and presented him with its most prestigious award, Explorer of the Year. The AAPG made him an honorary member and presented him with its most prestigious award, The Sidney Powers Medal.

This book is about finding oil and gas. People working together to find oil and gas. People who are good at finding oil and gas are optimistic, creative, persistent, resourceful, and enthusiastic. Norman Foster was all of those things and more. He wanted to help others become oil and gas finders, and that is why he served as co-editor of this book. We dedicate this book to Norman H. Foster—to his spirit, to his professionalism, and to his generosity.