Introducing the Book

I am pleased to introduce to the readers this new book, probably the first of its kind in Arabic, which deals with one of the major issues in the sustainability of reservoir pressure in oil fields to maintain oil production rates. Discussing water injection requires researchers to cover various processes accurately and present the outcomes in a clear smooth way, which the writer successfully accomplishes in this book.

Issuing a second edition of the book coincides with Iraq entering a new phase targeting what could be record oil production rates in the Iraqi oil production history and requiring the implementation of water injection projects in several fields. The experience of the writer in this field, extending over decades, will undoubtedly be a substantial and important addition to the technical cadres, engineers and managers who will find in this book a rich resource in dealing with water injection issues in oil fields and reservoirs.

Thamir Al Ghadban
Chairman of the Advisory Commission – Prime Minister Office
Former Minister of Oil
Baghdad – October 2011

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THE FIRST ARABIC PETROLEUM ENGINEERING BOOK OF IT'S KIND IN WATER INJECTION

Dr Thamirf Al-Uqaili, Second Edition 2011
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Introduction by the Author

Water injection in oil reservoirs is an important vital issue that workers in the oil industry, such as technical departments, production and reservoir engineers, operators, those pursuing this knowledge, and university students and specialized professors should be aware of. Water injection is one of the leading methods for maintaining pressure in oil reservoirs to promote production and prevent its deterioration as a result of the decrease in drive arising from that pressure.

Maintaining pressure in the reservoir through this method is common practice all around the world, with its use in our region increasing. Due to the extensiveness of the issue, the multiple disciplines involved in its various phases, and lack of comprehensive references, I have found it useful to author this book based on the (few) available works and research, in addition to my experience of more than forty years in the various branches of oil industry. In handling the different topics of this book, I have sought to use simplicity to ensure benefit to a larger number of readers, while not losing sight of the specialization aspect and suitable complexity to benefit those working in this field.

The book includes six chapters, with the first chapter providing an introduction to the topic, starting with the exploration of oil fields, the assessment phase, the need to support pressure by injecting water, and finally the technical economic study and identification of project components and cost. The second chapter reviews some basic topics of reservoir engineering to the extent of their relevance to methods of extraction, types of injection, and the various ways for distributing injection wells, i.e. the efficiency of these methods in supporting oil production.

The third – and main – chapter of the book reviews in details the technology of injection and accompanying operations, which are both important and sensitive and have to be taken into consideration, especially by the authorities responsible for operation so as to provide the appropriate level of monitoring for the various processes. Some of the main issues are the preservation of the characteristics of the water used for injection, which requires knowledge of filtration processes, reproduction of microorganisms, formation of crust, and corrosion; in addition to the methods for dealing with these issues, mainly through analytical chemistry.

The fourth chapter introduces the main surface and subsurface components of the water injection wells.

To present a complete picture of the implementation of the project, the fifth chapter introduces the reader to the various methods of project implementation and the implementation phases, starting with the technical economic feasibility studies and ending with the operation and delivery of the project. It includes the preparation of designs in some detail so that unspecialized readers are still able to benefit from this chapter. The chapter also deals with some important indicators that need to be taken into consideration when preparing quarterly designs, and the available information on the totality of operational problems that may result from disregarding these facts while preparing the designs.

The sixth and last chapter reviews regular operational problems in the form of specialized chemical processing, in addition to more general matters. It also addresses irregular problems that occur outside the scope of the hypothesis used for designing. By offering the usual methods of monitoring and analysis, the chapter raises the issue of continuous monitoring and analysis of results, which operators need to take into consideration to be able to make the necessary corrective procedures.

To ensure that no information has been left out, I have included the views and comments of several specialized and experienced colleagues whose support was most useful in the execution of this book in its current form; especially those whose names are included in the Acknowledgments section. I hope that my humble efforts would benefit the readers of our region and the Arab World in general.

The Author

Born in Al Kadhimiya in 1939, where he completed his primary and secondary studies. In 1962, he received a B.A. in petroleum engineering at the University of London, UK, on a scholarship from the Iraqi Ministry of education. He was awarded a second scholarship to study for his Master's Degree in water resources technology from the University of Birmingham, then a PhD in oil reserve engineering from the University of London in 1974.

In July 1963, he worked for the Iraq Oil Company in Kirkuk, then moved to Basra in 1964. He continued working in petroleum engineering till July 1969, when he was awarded a scholarship to study for a PhD.
He returned to Basra in 1975 to work as manager of petroleum engineering at the South Oil Company.

He worked in the Kirkuk and Ain Zalah fields in the south and middle of Iraq, and was the first to supervise the use of directional drilling in Iraq (east of Baghdad). He implemented the pioneering production project in the east Baghdad fields, and assessed the suitability of the Iraqi bentonite mud for well drilling.

He held high-ranking positions at the National Oil Company and the Ministry of Oil, including:

. General Manager of Kirkuk fields in 1978.

· Founder and manager of the Midlands Oil Company, 1980-1983.

· Studies, Planning and Monitoring General Manager, Ministry of Oil, 1983-1986.

· Technical advisor for the Oil Projects Company, 1987.

· Founder and general manager of the Iraqi Drilling Company, 1990-1993.

· Worked in the field of petroleum engineering, production and drilling in several countries, including Libya (1993-1995), Spain (1997-2000), Dubai (2003-2006), Oman, Muscat (2007), Jordan and Yemen.

· He is currently a consultant in the assessment and development of oil and gas fields.

Dr Thamirf Al-Uqaili

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