
Habitat and Petroleum Geology of Iraq: A 2003 Review

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1 Abstract

Iraq remains one of the premier countries for exploration potential. However, along with political, economic, and safety issues that confront future production, exploration problems remain. Dry holes will be drilled along with discoveries. In 2000, the USGS estimated undiscovered reserves at mean of 45 billion barrels of oil in Iraq and in their 2002 Country Analysis Briefing, the US Energy Information Administration (EIA) reported the oil reserves of Iraq to be 112 billion barrels with "probable and possible reserves" of 220 billion barrels. The total resource base receives an additional boost from an estimated 110 TCF proven and 150 TCF probable gas reserves.

At face value, Iraq has the appearances of a place where any prudent exploration company should aspire to be. But, are there other perspectives? In a year 2000 United Nations report a grim status was given concerning the northern and southern producing regions. The report pointed out production problems from both Kirkuk and Rumaila that risk irreversible reductions in ultimate recovery. In Rumaila the risk, according to the UN, is having recoveries of 15 to 25 percent instead of 35 to 60 percent, with the latter being normal expectations elsewhere for similar reservoirs. In the current (year 2002) Country Analysis Brief for Iraq,

the EIA points to similar emerging field and production problems.

In this paper we focus on the future of true exploration in Iraq. Certainly the conditions are right to expect more giant oil accumulations. However, we believe that there is also reason to exercise caution and that exploration success will depend on identifying discrete areas where there is an efficient bottom-to-top petroleum system. In effect, given that not all concession positions will high grade equally, we address the question of whether or not Iraq can live up to the 45 billion undiscovered barrels expected of it.

In addressing exploration potential in Iraq, we have chosen to work on what we perceive to be fundamental geological attributes. The foundation of our work is a set of chronostratigraphic isopach and structural maps for both Iraq proper and surrounding areas. We have further used these maps to construct a series of derivative products, including regional structural cross-sections extending NE to SW from the Zagros of Iran to Syria, Jordan and Saudi Arabia and petroleum generation scenarios.

The basis and ultimate test of our work, however, is data taken from the study of wells, field information, and hydrocarbon distribution from the region. Several issues, particularly spatial coincidences and discrete geographic areas, deserve discussion. These include:

- Kirkuk and the probability of finding another "Kirkuk,
- the Euphrates Graben and why the productive trend appears to terminate at the Syria - Iraq border,
- the close relationship between Neogene cover and productive trends,
- the importance of gathering systems in Burgan, Rumaila and Majnoon (and the potential for more) and
- the future of emerging petroleum systems, such as the Paleozoic (Silurian) in Saudi Arabia and the Sinjar Trough (with specific to the Triassic) within Iraqi territory.

We feel that Iraq will host additional, and large, discoveries. However, we additionally believe that exploration will be most successful where solid technical work is applied to the task of deciding where to be and, perhaps more importantly, where not to be.

This Talk will be given in London at the Mena 2003 Meeting, at Imperial College, University of London.

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OUTLINE OF TALK

Introduction

1. Fields
2. Production
3. Reserves
4. Undiscovered Hydrocarbons

Methodology

1. Control
2. Cross-sections

Basin Modeling of Maturation

Regional Gradient Mapping

1. Dual Gradient System
2. Maturation Profiles
3. Maturation Mapping
 - Base Lower Cretaceous
 - Base Upper Jurassic
 - Base Triassic

Gas Trend

Source Rock

Oils

1. Sulfur intercepts

Reservoirs (Porosity and Permeability)

Cumulative Reserves by Age

Structural and Stratigraphic Oil Distribution

1. Neogene
2. Paleogene
3. Upper Cretaceous
4. Middle Cretaceous
5. Lower Cretaceous
6. Upper and Middle Jurassic
7. Lias and Triassic
8. Silurian

Main Fields

1. Kirkuk Field
2. Rumaila Field

Plays

1. Anah Graben
1. Zubair Play
1. Mishrif Play

Summary

1. Future Undiscovered
2. Iraq Production

Conclusions

1. Predictive models can help explain oil distribution in the context of Cenozoic subsidence of Jurassic and lower Cretaceous source Rock
2. Most undiscovered oil will likely be found in Cretaceous reservoirs in areas of Neogene Subsidence
3. Excellent and diverse reservoirs
4. Much more work needs to be done on the stratigraphic distribution and quality of these reservoirs.
5. Major Seals include Middle Cretaceous Shales (Nahr Umr), Upper Cretaceous Shales, and Neogene evaporites.
6. Western Desert exploration is at a Frontier Stage

Iraq Schematic Stratigraphic Structural Cross-section

