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Abstract - Note

The Integration of Geological Parameters: Procedure, Importance, Practical Value

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PROCEEDINGS

1. INTRODUCTION

The procedure from petroleum exploration through field development to production activities in any region is undoubtedly a very expensive and risky business. Recent changes in the traditional organization of many oil and gas companies has been caused by several factors. In an area of fluctuating oil and gas prices, an increased emphasis on profit margins, finding and development costs, production expenses, and the optimal exploitation of producing properties have been of major importance. In attempt to reduce down predrilling risks/costs, with the intention of production optimization, the integration of all the geological, petrophysical and other parameters is obvious. Carefully selected "players" with special skills work together, resolving the particular problems, from the microscopic point to interwell and fieldwide scale via a depositional model and log/seismic analysis. Technicaly, the first step is necessary to make the petrophysical and geological integration of all the available, laboratory "in situ" parameters. In addition to "mechanical" properties (ALHILALI & SHANMUGAM, 1991), the other geological disciplines (LUČIĆ & KRIZMANIĆ, 1993) like sedimentology (JOHNSON & STEWART, 1987), sequence stratigraphy (PAYTON, 1977; LUČIĆ, 1995), biostratigraphy, palaeoecology (KRIZMANIĆ & PREMEC-FUČEK, 1996), geochemistry etc., also have to be taken into account for the better understanding of the dynamic history of the reservoir (VAVRA et al., 1991), or source rock development. The results of such integration process should be used as the calibration tool for additional methods e.g. wire-line logging, seismic etc. (SERRA, 1985), which enable lateral correlation. In this way, with a relatively low budget a real and naturally created object is described within a chronostratigraphicaly defined environment (SNEIDER et al., 1987), and should be prepared for the additional exploration or production development.

A very important aspect in such geological integration is a management philosophy. The key to the integration process is to take a company's respective capabilities, and apply them routinely as the team in a front line operating mode. Something like solving a puzzle of technological pieces, creating artificial intelligence by forming a synergistic[1] organization (SNEIDER, 1991).

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2. SYNERGY BETWEEN GEOLOGY, PETROPHYSICS AND ENGINEERING

The rocks are basic. The industry's technological advances continually provide new measurements and sensors to indirectly image the reservoir. One can lose sight of the simple fact that it is a real rock that is being described.

Any study should be based on detailed palaeontological and petrographic analyses, sedimentological descriptions of cored intervals, petrophysical analysis and detailed log analysis of the same cored wells.

3. OBJECTIVES

1. Stratigraphic setting
2. Lithofacies/petrofacies/mechanical facies definition
3. Establishing the internal geometry of the reservoir
   - zonation of reservoir flow units
   - discrimination of pay from non-pay intervals
   - evaluation of the continuity of different pay zones and of barriers to flow
4. Depositional environment
   - relationships between petrofacies and depositional environment
   - reservoir quality control (diagenesis/depositional environment)
   - subdividing the formation into stratigraphicaly correlative units
5. Recognition of litho/petro/mechanical facies from the well logs
6. Well to well correlation

[1] Synergy is defined as the "action of discreet agencies so that the total effect is grater than the sum of the effects taken independently". In the petroleum exploration and production business, synergy means that geologists, geophysicists, petroleum engineers and others work together on a project as a team.

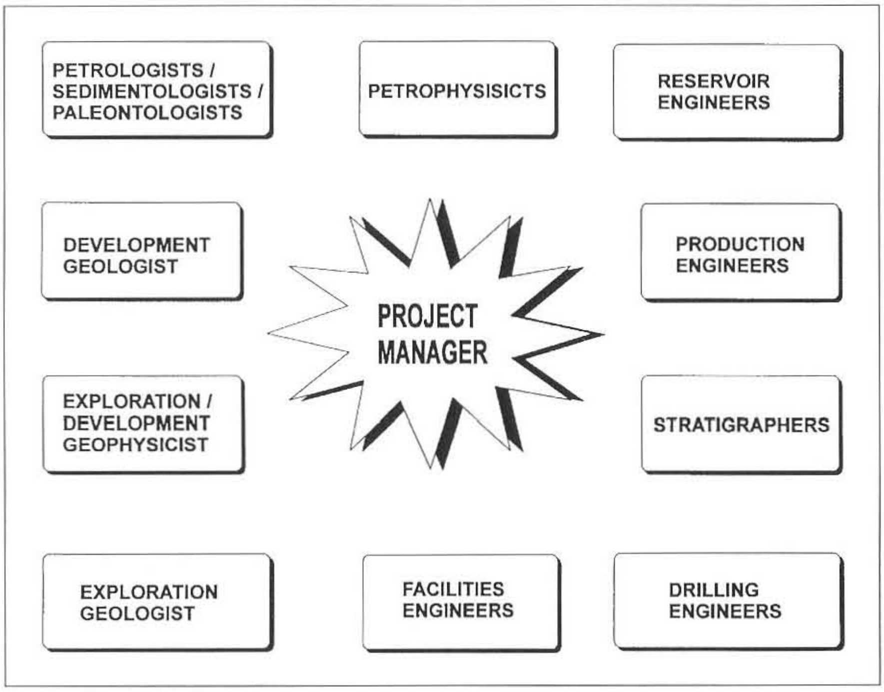

Fig. 1 Synergistic organisation.

RESULT = Production operation optimization - Optimized field development (drilling less wells in better places), optimizing individual well production, planning a production facility designed specifically to the long-term requirements of the field.

The study demonstrates the utilisation of an integrated palaeontological, petrological, sedimentological and wireline log analyses in identifying the controls on reservoir quality at the pore level and extending this to the interwell and fieldwide scale via a depositional model and log analysis. An interactive approach would have to employ engineers, a geologist, and a petrophysicist to "fine tune" the model to actual field results (Fig. 1)

4. TEAM ORGANIZATION AND MANAGEMENT PHILOSOPHY

In the previous chapter some technical details concerning the integration procedure were presented. Here are some comments on the sociological aspect of teamwork organization.

The fundamental worthwhile problems today in finding oil are a mixture of engineering-geology-mathematics-geophysics with the variable addition of finance, gas/oil marketing, drilling costs, ecology etc. Consequently it requires a large and sometimes very complex organization. No genius will come alone to solve such a problem, we have to build a genius by ourselves. What do we need? After MASTERS (1991) the main points are:

A. FIND OIL

Come together to find oil not only to make footage. Drill a hole that can be properly evaluated and optimally completed.

B. FREEDOM

Freedom to contribute and communicate.

C. DISBAND

Disband the team when the problem is solved.

The team building is a social activity. What are the building blocks? What is necessary?

1. RECOGNITION OF TEAMS

(integrated brain power of numerous specialists)

2. COMMITMENT FROM THE TOP

(financial and technological support)

3. PEOPLE

(consistently high-quality people)

4. TRUST & FRIENDSHIP

(trust from the management and amongst themselves)

5. CONTRIBUTE

(freedom to contribute)

6. COMMUNICATE

(freedom to communicate)

7. ACHIEVEMENT

(job satisfaction by achievement rather than title)

8. FLEXIBLE ORGANIZATION

(flexible, fluid organization; less administration)

9. PARTICIPATION

(anyone who doesn't participate is out; vital rule)

5. CONCLUSION

The successful employment of task focused teamwork and technology can provide a company with a competitive advantage in the oil and gas industry of the future. Comparison of the organization of the traditional large company division and the small synergistic company of several foreign examples (SNEIDER, 1991; MASTERS, 1991) was amazing. Small synergistic teams found about 2.8 times the reserves at about half the cost, beside that the development costs are of course significantly lower for the smaller group. We have to try together to improve the running of our exploration-production business and become more competitive in the increasingly complex technological search for oil that we are involved in.

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