

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ



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College of Petroleum Engineering and
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Graduation project about:

Reservoir rocks characterization in Bentiu formation, block
(6), Muglad rift basin through wire line logs and laboratoty
analyses

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الاستهلال

قال تعالى:

" وما توفيني إلا بالله عليه توكلت وإليه أنيب "

سورة هود الآية (88).

DEDICATION

To our lovely mothers whom we bare this success and never slept in night to see us on the top.

To our fathers that helped us through the way by giving us all we need of advices, care and support through all the things we have been through in our life.

To our doctors and lecturers that helped us through our studies and spent a lot of their times to supply us with knowledge and worked hard to graduate us.

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To our dear friends who supported us in these journey.

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ABSTRACT

The present study could provide valuable informations will be helpful in oil production from Bentiu formation in the future. The study objective is to characterize the reservoir rocks of Bentiu formation in the Muglad rift basin block-6, Sudan. The subsurface sediments were investigated essentially by two methods are wirelines log interpretation and core analysis.

The log interpretation of two wells (Fula-1, Fula-2) showed that the rock type is dominantly Sandstone and the dominant depositional regime is braided channel fluvial system. As well as, most of the Sandstone layers in Fula-1 containing hydrocarbons, and the Sandstone layers in Fula-2 is more contain hydrocarbons than Fula-2.

Megascopic core description and observation of sedimentary sequences were done before any other detailed analyses. The main types of facies are Conglomerates, Sandstones, Siltstones, Mudstones and Shales. From the lithofacies analysis of the conventional cores, seven (7) different major lithofacies types have been recognized from Fula-1 and six (6) different major lithofacies types have been recognized from Fula-2.

Thin section analysis has been carried out on 4 core samples Fula-1 well, from different existing sandstone facies types. The prepared thin sections were studied using a polarized microscope with different colour, form, relief and extinction angle. Counting was conducted using a point counter machine in order to account the minerals percentages in each slide. The minerals and components which are recognized in the thin sections include: Detrital components (quartz, feldspar, mica, lithics and detrital clays) and authigenic components (carbonates, quartz overgrowth, iron oxides cement and pyrite). The pore connectivity ranging between fair to good.

The study of the clay minerals has involved two analytical techniques, X-ray diffraction and Scanning Electron Microscopy (SEM). Five clay mineral species were identified (kaolinite, smectite, illite, chlorite and illite/smectite) from the size fraction less than 2 micron.

التجريد

هذه الدراسة تقدم معلومات قيمة لإنتاج النفط من طبقة بانتيو في المستقبل، أهداف هذه الدراسة هي تحديد خصائص صخور المكن في طبقة بانتيو في حوض المجد، مربع ٦، وتم استخدام تفسير تسجيلات الآبار وتحليل عينات اللباب كطرق أساسيه في هذه الدراسة.

تفسيرات تسجيلات البئر (فوله-١، فوله-٢) يوضح ان النوع السائد من الصخور هو الصخور الرملية، وان النوع السائد من البيئات الترسيبية هو نظام نهري متشعب، كما ان معظم طبقات الصخور الرملية في فوله-١ تحتوي على هيدروكربون وان فوله-٢ تحتوي على كميات أكبر من الموجودة في فوله-١.

وصف عينات اللباب ورصد تتابع الرسوبيات تم تنفيذه قبل القيام بأي عمليات تحليل مفصلة أخرى، من التحاليل تم ملاحظة ان الانواع الرئيسية من السحنات هي: الحصى، الحجر، الرملي، الغرين، الحجر الطيني والحجر الطيني الصفائحي، وتم رصد ٧ انواع مختلفة من السحنات الطبقيه في فوله-٢، و ٦ أنواع مختلفة من السحنات الطبقيه في فوله-١.

تحليل القطاع الرفيع على ٤ عينات من فوله-١ من انواع مختلفة من السحنات، درست عينات المقطع الرفيع المجهزة وذلك بواسطة المايكروسكوب المستقطب بألوان وأشكال وأنماط وزوايا مختلفة، وحسبت نسبة المعادن باستخدام جهاز ال (point counter) في كل شريحة، والمعادن التي تم ملاحظتها هي: معادن منقوله (كوارتز، فلبسار، مايك، فئات وطين منقول) ومعادن أصلية (كاربونات، نمو الزائد للكوارتز، اكاسيد الحديد اللاحمة والبايريت)، وتتراوح النسبة المسام المتصلة بين مقبولة إلى جيدة.

دراسة المعادن الطينية تضمنت تقنيتين تحليليتين هما: X-ray diffraction and Scanning Electron Microscopy (SEM) خمسة انواع من المعادن الطينية وجدت في العينات هي (الكاولينايت ، السمكتايت ، الإللايت ، الكلورايت و الإيللايت\السمكتايت) في حجم أقل من ٢ مايكرون.

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