Verse

يقول جل وعلا:

(بديع السماوات و الأرض و اذا قضى أمرا
فانما يقول له كن فيكون)

البقرة (117)

Dedication
To My:

Father....

Mother....

Family.

To My:

Teachers....

Students....

Colleagues.
Acknowledgments

I am indebted to:

**Prof. Dr. Sabir Mohammed Salih**
Who has reviewed and commented on finished work and aided greatly in developing many of the illustrations.

**Dr. Alkhawad Ali Alfaki**
*Chairman of Mech. Eng’g. Dept.*
Who has directly contributed the initial preparation of this thesis.

I would like also to thank two of the best companies in their respective oil industry, Sudanese Petroleum Company (SPC) and PetroDar Operating Company (PDOC). Both have given me the opportunity and resources to continue to pursue the goal. I am especially indebted to the following:

- **Mr. Roslee Salamat**, from Petronas Company-Malaysia.
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*I would to express special thanks to my teachers and students in Sudan University*.

Khalid Elsir Khalid

Mech. eng
Abstract

The technical of field processing facilities unit was done and discussed the main parts included in the unit. The study has shown the main units of the field processing facilities that can treat the crude oil and the high qualities and excellent properties can be obtained as a main target (0.5% - 3% water content). The study included the oil separation unit as a first stage of oil treating and for water dehydration, then the treatment unit such as the chemical, electrostatic, heat treatment was considered for more improvement for the oil. Also, the oil sedimentation and storage unit was considered as the final stage and for oil handling and pumping to the pipeline.

Finally, the study included the fire protection considerations and an optimum means to save the unit by the different ways of protection such as fire water system, foaming system and extinguishing.

The laboratory tests such as: water content, chemicals content and solid materials were done for the sudanese treated crude oil and compared with the pre-lementary results and standards. The test has shown that the water content is 0.7% and some of chemicals have a very weak finding. This shows that the unit has done the job with a high and acceptable performance.
الخـلاصة:

تمت الدراسة الفنية لمراكز معالجة حقل زيتي الغاز والبحث، وقد ناقشت الدراسة وحدات الأصلية والوصولية، ووحدات الأمامية الرئيسية، ووضعت الدراسة سلاسلة تحايل اللافتة الأصلية (0.5% - 3% محتوى الماء في الخام). 

الدراسة تضمنت وحدة فصل الماء من الخام كمرحلة أولى لعمليات المعالجة. أيضًا، وحدة المعالجة الأصلية، التي تضمنت وحدة المعالجة بالعمليات الكيميائية، والأدوات الكهربائية، والمعالجة بالتسخين، ووضعها في الاعتبار لتعزيز المزيد من التحسين لموصفات الخام.

الدراسة أيضاً، شملت وحدة ترسيب و تخزين الزيت الخام لمحصول النجك، كما وشملت وحدة الحماية من الحريق والاعتبارات الأمنية للمكافحة، وذلك كالمكافحة بالماء، والرغوة، ومعملة الإطفاء الأخرى.

تم اختبارات الزيت السوداني المعالج والمحترف، حيث وُجدت نسبة الماء و الغاز الصادب للخام، والماء الكيميائي غير المتوافق والمواد الكيميائية غير دقيقة، و تمت مقارنتها بنوات الانتاجية للاختبارات الأولية قبل المعالجة يجد أن نسبة الماء قد قابلت من 10% (قبل المعالجة) إلى 0.5% و انعدام بعض المواد الدهنية، وهذا يوضح الأداء العالي للمقبول للوحدة.
Abstract: -

The research field processing facilities design, which covers five chapters, represents the most important units in the processing facilities and presents the basic concepts and techniques necessary to design and specify the oil field processing facilities. It provides a clear understanding of equipment and process used in common separation and oil and water treating system as well as the design of storage units (tanks) and the selection of the fire fighting system. I hope this will enable to develop a “feel” for the important parameters of designing and operating production facilities. I also wish the readers to understand the uncertainties and assumptions inherent in designing and using the equipment of this system and the limitations, advantages and disadvantages associated with their use. An opportunity has been taken to arrange the chapters in what seems to be a more logical order. The chapter on the introduction to the field processing facilities is given the job of the Field Processing Facilities (FPF) and a background about the oil industry in Sudan. The chapter on separation has been written in amore logical format given a general treatment of oil with the separator by giving an explanation for the two and three phase separators. The chapter on oil treatment is given the vertical and horizontal treaters design and operation and the description of the shell and tube heat exchangers and the design procedure and accessories.
The chapter on the storage tanks units (tank farm), is given the design of the different types of the tanks and the design and conformation from the oil standards. The chapter on fire fighting system is covered the protection mechanism of the whole unit FPF and how to select the appropriated means to protect the unit. Also it is covered the selection and using of the fire fighting equipments.

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Mech. eng
Crude Oil Field Processing Facilities Design

Thesis Submitted for Partial Fulfillment of M.Sc Degree

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CHAPTER-1

Introduction to Field Processing Facilities.

CHAPTER-2

Oil, Water and Gas Separation Unit
CHAPTER-3

Oil Treatment Unit

CHAPTER-4

Oil Storage Unit
CHAPTER-5

Fire Protection Unit