Verse

يقول جل وعلا:

(بـــديع الســـموات و الأرض و اذا قضـــى أمـــرا فانما يقول له كن فيكون)

البقرة (117)

Dedication

To My:

Father….

Mother….

Family.

To My:

Teachers….

Students….

Colleagues.

Acknowledgments

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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.
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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 uints 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 s 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 extinuishing.

The the laboraotory tests such as: water content, chemicals content and solid materials were done for the sudasnese 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.

الخـــــــــــــــلاصة:

تمت الدراسةالفنية لمركز معالجة حقلي للزيت الخام و قد ناقشت الدراسة الوحدات الأساسية و المطلوبة للوحدة الرئيسية و الدراسة توضح الوحدات الرئيسية و التي يجب تأسيسها حتى تعطى خام معالج و بجودة عالية و بمواصفات تؤدى الغرض من الدراسة (0.5% - 3% محتوى الماء في الخام).
الدراسة تضمنت وحدة فصل الماء من الخام كمرحلة أولى لعمليات المعالجة. أيضا" وحدة المعالجة الأساسية و التي تضمنت وحدة المعالجة بالعمليات الكيميائية , الالكتروكهروبائية والمعالجة بالتسخين وضعت في الاعتبار لاعطاء المزيد من التحسين لموصفات الخام.
الدراسة أيضا" شملت وحدة ترسيب و تخزين وتسليم الزيت الخام لمحطات الضخ كمرحلة نهائية.كما و شملت وحدة الحماية من الحرائق و الاعتبارات الأساسية للمكافحة و ذلك كالمكافحة بالماء, الرغوة و معدات الإطفاء الأخرى
تمت عمليات اختبارات للزيت الخام السوداني المعالج بالمختبرات مثل نسبة الماء و الغاز المصاحب للخام , المواد الكيماوية غير الصالحة و بعض المواد الصلبة العالقة وتمت مقرنتها بنتائج الاختبارات الأولية قبل المعالجة فوجد إن نسبة الماء قد قلت من 10% (قبل المعالجة) إلى 0.5% و انعدام بعض المواد الكيماوية. وهذا يوضح الأداء العالي و المقبول 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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Crude Oil Field Processing Facilities Design

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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