

**Gas Processing and Conditioning Course****Training Date:** 09 - 13 July, 2012**Training Venue:** Kuala Lumpur, Malaysia**Training Time:** 0900 – 1600 hours**Training Fee:** USD3,500.00 per participant**INTRODUCTION**

This course studies all aspects of gas handling, conditioning and processing facilities with particular focus on the practical aspects of managing, evaluating, sizing, selecting, installing, operating and trouble-shooting.

A proper understanding and execution of each of the above is a key in assuring a surface production facility that operates at maximum efficiency and experiences minimal problems.

**COURSE DESCRIPTION**

This course will start by defining what natural gas is, its properties, specifications and end uses. Then, typical gas processing operations will be discussed, including dehydration, acid gas removal, recovery of ethane, propane and natural gas liquids and liquefied natural gas operations. Sulfur recovery will also be discussed.

Typical equipment and facilities that are found in typical natural gas processing operations will also be discussed including compressors, vessels, relief systems and safety systems.

**COURSE METHODOLOGY**

A highly interactive combination of lecture and discussion sessions will be managed to maximize the amount and quality of information, knowledge and experience transfer. The sessions will start by raising the most relevant questions, and motivate everybody finding the right answers.

The attendants will also be encouraged to raise more of their own questions and to share developing the right answers using their own analysis and experience.

**WHO SHOULD ATTEND?**

Managers, engineers and specialists who are engaged in managing, evaluating, selecting, specifying, installing, testing, operating, maintaining, or trouble-shooting gas handling, conditioning and processing facilities.

**COURSE OUTCOMES**

At the end of the training delegates should be able to:

- Develop a “feel” for the important parameters in designing, selecting, sizing, installing operating and trouble-shooting gas handling, conditioning and processing facilities.
- Describe the uncertainties and assumptions inherent in designing and operating the equipment in these systems and the limitations, advantages and disadvantages associated with their use.
- Evaluate, select and evaluate processes used to dehydrate natural gas, meet hydrocarbon dew point specification and extract NGL's.
- Size, select, specify, operate, maintain, test and trouble-shoots surface equipment used with the handling, conditioning and processing of natural gas and associated liquids such as separators, heat exchangers, absorption units, adsorption units, hydrocarbon recovery units, gas sweetening systems, recovery and fractionation systems, dehydration systems, refrigeration, low temperature separation units, JT plants compression systems, facility piping considerations, process control and safety systems.
- Perform and review equipment sizing correlations for major process equipment
- Evaluate and select the correct process for a given situation.
- Develop practical solutions to operating problems typically encountered in gas handling, conditioning and processing facilities including glycol loss, debottlenecking, “off spec” moisture content, etc.

# **COURSE OUTLINE**

## **DAY 1**

- What is natural gas?
- Origins
- Properties
- Specifications
- End uses and markets for natural gas
- Environmental advantages
- Physical behavior of natural gas systems
- Physical and thermal properties
- Phase behavior analysis:-
  - ⊕ Pure substances
  - ⊕ The phase rule
  - ⊕ Behavior of mixtures
  - ⊕ Vaporization by gas pressure
  - ⊕ Molecular theory of gases and liquids
  - ⊕ Natural gases
  - ⊕ Density of natural gas
  - ⊕ Density of liquids
  - ⊕ Dense phase
- Surface tension
  - ⊕ Viscosity
  - ⊕ Thermal conductivity of gases
  - ⊕ Thermodynamic properties
  - ⊕ Sampling and analysis

## **DAY 2**

- Natural gas processing plant
  - ⊕ Flow sheet
  - ⊕ Equipment and components
- Heat exchange in gas processing
  - ⊕ Heat transfer theory - Mechanisms of heat transfer and Process heat duty
  - ⊕ Heat exchangers types - Shell and tube, Double-pipe, Plate and frame and Aerial coolers
  - ⊕ Fired heaters
  - ⊕ Heat recovery units

## **DAY 3**

- Hydrates
  - ⊕ Determination of hydrate formation temperature or pressure
  - ⊕ Condensation of water vapor
  - ⊕ Temperature drop due to gas expansion
  - ⊕ Thermodynamic inhibitors
  - ⊕ Kinetic inhibitors and anti-agglomerators
- Low temperature exchange (LTX) units and line heaters
  - ⊕ LTX units
  - ⊕ Line heaters
  - ⊕ Heat duty
  - ⊕ Fire-tube size
  - ⊕ Coil size
  - ⊕ Standard size line heaters

- Condensate stabilization
  - ⊕ Partial pressure
  - ⊕ Multistage separation
  - ⊕ Multi flashes
  - ⊕ Cold feed distillation tower
  - ⊕ Distillation tower with reflux
  - ⊕ Condensate stabilizer design
  - ⊕ Trays and packing
  - ⊕ Condensate stabilizer as a gas processing plant
  - ⊕ LTX unit as a condensate stabilizer

## **DAY 4**

- Acid gas treating
  - ⊕ Gas sweetening processes - Solid bed absorption, Chemical solvents, Physical solvent processes, Direct conversion of H<sub>2</sub>S to sulfur and Sulfide scavengers
  - ⊕ Process selection
  - ⊕ Design procedure for iron-sponge units
  - ⊕ Design procedure for amine systems
- Amine absorber
- Amine circulation rates
- Flash drum
- Amine reboilers
- Amine stripper
- Rich/lean amine exchanger
- Amine cooler
- Amine solution purification
- Materials of construction
- Gas dehydration
  - ⊕ Water content determination
  - ⊕ Glycol dehydration - Process description, Choice of glycol, Design considerations and System sizing
  - ⊕ Solid bed dehydration

## **DAY 5**

- Gas processing
  - ⊕ Absorption/lean oil
  - ⊕ Refrigeration
  - ⊕ Choice of process
- Compressors
  - ⊕ Types of compressors
  - ⊕ Specifying a compressor
  - ⊕ Reciprocating compressors process considerations
- Mechanical design of pressure vessels - Design considerations, Inspection procedure, and Specification and design of pressure vessels
- Pressure relief - Relief requirements, Type of devices, Valve sizing and Installation
- Valves, fittings and piping details
- Safety systems - Hazard tree, Developing a safe process, Failure Mode Effect Analysis (FMEA), API recommended practice 14C, Manual emergency shutdown, Hazard analysis and Safety management systems
- Gas transportation and distribution

## About the Course Instructor

**Engr. Maurice Michel Hanna**, graduated with Bachelor of Science in Petroleum Refining Engineering from Suez Canal University, Egypt and Master Degree in Petroleum Refining and Petrochemical Industry from Petroleum Institute of Romania, and he is a Certified Saudi Aramco Training Specialist.

He has more than 30 years of extensive field experience oil & gas, petrochemical and other process plants, and mainly in project management, design, selection, specification, installation, maintenance, operation, plant optimization and trouble-shooting of oil, water and gas handling facilities in the oil and gas industry.

Throughout his professional career he have served for several oil & gas companies such as;

- Process Engineer at El-Nasr Petroleum Company, Alexandria, Egypt.
- Senior Technical Instructor at Saudi Aramco, Saudi Arabia.
- Technical Instructor (On-Job-Training) at Saudi Arabian marketing and Refining (SAMARC), Jeddah - Saudi Arabia.
- Process Advisor at Al-Furat Petroleum Company (AFPC), Shell Joint Venture (Subcontractor: IHRDC), Syria.
- Production Trainer (On-Job-Training) at Abu Dhabi Marine Operating Company (ADMA – OPCO, Subcontractor: IHRDC), United Arab of Emirates.
- Commissioning (Process) Engineer at Middle East Oil Refinery (MEDOR, Subcontractor: TECNIP International), Egypt.
- Production Advisor at Al-Furat Petroleum Company (AFPC) Shell Joint Venture (Subcontractor: TriStar Meddle East), Syria.



## About CfPE Technology Solutions

The **Center for Professional Enhancement Technology Solutions** (known as CfPE Technology Solutions) is incorporated in July 2001 and began as a training and consulting company for power plant, oil & gas and petrochemical sectors in Malaysia.

With a small team of experienced and dedicated engineers and multi skilled technical staff we have come a long way. From those humble beginnings, we have successfully grown and today we have achieved reorganization as a premier in organizing short training in Malaysia. Our professional experience and excellent consulting strengths provide insights and understanding of the challenges facing the industries we serve. CfPE Technology Solutions aims to make a difference.

The need for leading-edge training has intensified and is advancing beyond all expectation; it is the basis upon which performance can be measured in an increasingly competitive marketplace. In the world of today, it is not simply a case of having the necessary professional skills; people must develop interpersonal skills alongside their ability to handle the changes brought about by technological progress.

We expect the people who attend our training courses to make an immediate impact, both back at the workplace and in their career and personal development. CfPE Technology Solutions is a training and consulting company dedicated to increasing our client's competitive edge through the improved performance of their human and capital assets.

### SELECTED CUSTOMERS



ارامكو السعودية  
Saudi Aramco



MALAYSIA LNG SDN. BHI

دولفين للطاقة  
DOLPHIN ENERGY

قطر للبترول  
Qatar Petroleum



QAPCO  
شركة قطر البتروليكيماويات  
QATAR PETROCHEMICAL COMPANY

# Registration Form

## Please Send Your Registration to:

|             |                 |             |                |               |                 |
|-------------|-----------------|-------------|----------------|---------------|-----------------|
| <b>Tel:</b> | 006.013.2082143 | <b>Fax:</b> | 006.09.6178443 | <b>E-mail</b> | info@cfpets.com |
|-------------|-----------------|-------------|----------------|---------------|-----------------|

## Course Details

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| <b>Course Name:</b> | Gas Processing and Conditioning Course |
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| <b>Course Date:</b> | 09 - 13 July, 2012 |
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| <b>Course Fee:</b> | USD 3,500.00 per participant |
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| <b>Venue:</b> | Kuala Lumpur, Malaysia |
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## Company Information

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| <b>Organization</b> |  |
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| <b>Address</b> |  |
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### HR / Training Manager

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### Invoice to be sent to

## Participant Information

### Participant # 1

### Participant # 2

### Participant # 3

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| <b>Full Name :</b> |  |  |  |
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| <b>Job Title :</b> |  |  |  |
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| <b>Department :</b> |  |  |  |
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| <b>E-mail Address :</b> |  |  |  |
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## Please Pay by Telegraphic Transfer to:

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| <b>Account Name :</b> | CFPE TECHNOLOGY SOLUTIONS |
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| <b>Account No. :</b> | 563064120047 |
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| <b>Bank Name :</b> | Maybank Islamic Berhad |
|--------------------|------------------------|

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## CFPE TECHNOLOGY SOLUTIONS

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