

**Training Title:**

**GAS FIELD OPERATIONS:**

**GAS PROCESSING, HYDRATES, DEHYDRATION, SWEETENING, NGL RECOVERY, FRACTIONATION, SULPHUR RECOVERY & HANDLING**

**Training Duration:**

**5 Days**

**Training Venue and Dates**

REF PE067	Gas Field Operations Gas Processing, Hydrates, Dehydration, Sweetening, NGL Recovery, Fractionation, Sulphur Recovery & Handling	5	04-08 March 2024	\$6000	KL Malaysia
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In any of the 5-star hotels. The exact venue will be informed soon.

**Training Fees**

- \$6,000 per participant for Public Training including Course Materials/Handouts, Tea/Coffee, Refreshments & International Buffet Lunch

**Training Certificate**

Define Management Consultancy & Training Certificate of course completion will be issued to all attendees.

**TRAINING INTRODUCTION:**

The rapidly increasing worldwide demand for natural gas as an energy source requires expertise in gas engineering technology, which involves several production operations such as dehydration, acid gas removal, recovery of natural gas liquids, and the production of liquefied natural gas. In addition, one involved in such an industry needs to be familiar with different gas sources, specifications, storage requirements, transportation, and distribution.

**TRAINING DESCRIPTION:**

This course will start by defining what natural gas is, its properties, specifications, and end-use. Then, typical gas processing operations will be discussed, including dehydration, acid gas removal, recovery of ethane, propane, and NGL (natural gas liquids), and liquefied natural gas (LNG) 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.

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This short course is designed to give the attendants the fundamentals of natural gas handling systems and facilities including some of the details of the process. Specifically, by attending this course you will:

- Gain a deep knowledge of the properties, specifications, and end uses of natural gas.
- Gain a deeper understanding of typical natural gas processing operations, including:
  - Dehydration
  - Acid gas removal
  - Recovery of ethane, propane, and NGL (natural gas liquids)
  - Sulfur recovery
- Gain a deeper understanding of the production of liquefied natural gas (LNG).
- Gain a deeper knowledge of the different equipment and facilities found in natural gas processing plants.

**TRAINING OBJECTIVES:**

Upon attendance to the Oil & Gas Field Operations training course, the participants will be able to:

- Gain an overview of global oil & gas related statistics
- Gain an overview of the upstream operations and related facilities
- Understand various methods and techniques used in the Oil & Gas Fields to explore, drill, produce, treat and transport oil, gas and their products
- Gain knowledge about reservoir behavior such as pressure, temperature, rock and fluid properties and different recovery methods
- Identify the types and purpose of production equipment such as wellheads, Manifolds, separators, chemical injection, pipelines, pig launchers and receivers, heat exchangers, valves, pumps and compressors
- Be familiar with emulsion problems and treatment
- Increase understanding in water and gas injection technology for pressure maintenance.
- Have knowledge of the following: Characteristics of Crude Oil, Oil & Gas Separation, The Petroleum Production Facility
- Understand gas dehydration and processing, absorption, refrigeration and fractionation, cryogenics and LNG production
- Understand various field facilities from the reservoir to end users
- Understand oil & gas separation operations and troubleshooting
- Understand various production and recovery techniques and methods
- Gain an understanding with regards to evaluating oil & gas reserves, artificial lift and enhancing recovery
- Get a general feel for conducting an economic evaluation on field development projects including risk analysis

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## WHO SHOULD ATTEND?

Technical and non-technical personnel involved in the activities of the natural gas industry. Specifically, technical, operations, and maintenance personnel who had limited exposure in this area, or professionals involved in other areas of the gas industry who require a comprehensive overview of natural gas processing will find this course ideally suited for them.

## TRAINING METHODOLOGY

A highly interactive combination of lectures and discussion sessions will be managed to maximize the amount and quality of information and knowledge transfer. The sessions will start by raising the most relevant questions, and motivate everybody to find the right answers. The delegates will also be encouraged to raise their questions and to share in the development of the right answers using their analysis and experiences.

- 30% of Lectures
- 30% Workshops and work presentation
- 20% Group Work & Practical Exercises
- 20% Videos & General Discussions

## COURSE OUTLINE

### Day One:

- 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

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- Surface tension
- Viscosity
- Thermal conductivity of gases
- Thermodynamic properties
- Sampling and analysis

**Day Two:**

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

**Day Three:**

- Hydrates
  - Determination of hydrate formation temperature or pressure
  - Condensation of water vapor
  - Temperature drop due to gas expansion
  - Thermodynamic inhibitors
  - Kinetic inhibitors and anti-agglomerates
- Low-temperature Exchange (LTX) units and line heaters
  - LTX units
  - Line heaters
  - Heat duty
  - Fire-tube size
- Condensate stabilization
  - Partial pressure
  - Multistage separation
  - Multi flashes
  - Cold feed distillation tower
  - Distillation tower with reflux
  - Condensate stabilizer design

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- Trays and packing
- Condensate stabilizer as a gas processing plant
- LTX unit as a condensate stabilizer

**Day Four:**

- Acid gas treating
  - Gas sweetening processes
    - Solid bed absorption
    - Chemical solvents
    - Physical solvent processes
    - Direct conversion of H<sub>2</sub>S to sulfur
    - 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
    - System sizing
    - Glycol-powered pumps
  - Solid bed dehydration
    - Process description
    - Design consideration

**Day Five:**

- Gas processing
  - Absorption/lean oil
  - Refrigeration

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- Choice of process
- Compressors
  - Types of compressors
  - Specifying a compressor
  - Reciprocating compressors process considerations
  - Centrifugal compressors process considerations
- Mechanical design of pressure vessels
  - Design considerations
  - Inspection procedure
  - Specification and design of pressure vessels
- Pressure relief
  - Relief requirements
  - Type of devices
  - Valve sizing
  - Installation
- Valves, fittings, and piping details
  - Valve types
  - Chokes
  - Piping design considerations

**Summary Open and Close Forum**

**NOTE:**

**Pre & Post Tests will be conducted**

**Case Studies, Group Exercises, Group Discussions, Last Day Reviews & Assessments will be carried out.**

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