Course Title: GAS CONDITIONING & NGL EXTRACTION

Course Duration: 4 days Classroom Training

Course Level: Intermediate

Training Overview :

The course covers the physical and chemical nature of natural gas and its processing to remove water and Natural gas Liquids.

The main topics covered include natural gas properties, phase behaviour, primary liquid separation, hydrate control, gas dehydration, NGL extraction and NGL stabilisation.

The course concentrates on NGL extraction to different levels of recovery factor ranging from light recovery through cooling to deep recovery through cryogenic processes such as turbo-expansion.

The course also covers an introduction to liquid distillation and to gas sweetening to remove CO_2 and H_2S contaminants.

DESIGNED FOR YOU, IF YOU ARE...

- A Facilities or Process Engineers, either a Graduate or a more experienced Technical Professional looking to develop your theoretical competence in natural gas treating
- A Project Manager who seeks greater understanding of the process principles of gas production
- An Operations Engineer looking to deepen your knowledge of the design principles of the plants that they operate
- A Sub-Surface Engineer seeking to broaden your technical knowledge

HOW WE BUILD YOUR CONFIDENCE

The course links theory to application. It reinforces this through real industry problems and examples which are solved by the participants as part of the sessions.

The course is highly interactive and participants are encouraged to share their own experiences and problems to the benefit of all.

THE BENEFITS FROM ATTENDING

By the end of the course, you will have gained a technical understanding of the main methods used for conditioning gas in upstream field plants. You will have seen the principles and practices of treating gas to remove water and to extract valuable NGL products to a variety of recovery factors. You will also have a basic understanding of more advanced processing such as distillation of NGLs, gas sweetening and Sulphur recovery. You will have gained this from seasoned professionals who have been involved directly with the processes and have real life experiences to offer not just textbook knowledge.

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TOPICS

- Properties of Reservoir Gas
- Primary Gas Processing
- Hydrates and Hydrate Control
- Extraction of NGLs via Cooling, JT Expansion, Refrigeration, Turbo-expansion, Adsorption & Absorption
- NGL Stabilisation
- Introduction to Distillation
- Introduction to Gas & Liquid Sweetening
- Sulphur Recovery

DAILY AGENDA

Day 1: Gas Production, Dehydration & Hydrate control

- Introduction

Session 1 – Properties of Gas Reservoirs

- Properties of Natural Gas
    - Phase Envelopes
- Associated & Non-Associated Gas Reservoirs
    - Hydrocarbon & non-hydrocarbon compositions
    - Production of Gas from different Reservoir Types

Exercise 1 : Producing a Gas Condensate Field

- Gas Product Specifications

Session 2 – Primary Gas Processing

- Primary Separation
- Water Content of Gas
- Reasons to Dehydrate Gas
- Introduction to Hydrates

Exercise 2 : Hydrate Inhibition

- Hydrocarbon & Water Dew-Pointing
- Overview of Gas Dehydration
    - Cooling, Expansion & Refrigeration
    - TEG Dehydration
    - Absorption Dehydration
    - Membrane Dehydration

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Day 2: NGL Extraction, Refrigeration & Turbo-expansion

Session 3 – NGL Extraction

- Extraction of NGLs
    - Phase Behaviour
    - Cooling
        - Process Schemes & Equipment
    - JT-Expansion
        - Process Schemes & Equipment

Exercise 3 : Estimation of Process Conditions to meet a Sales Gas Specification

Session 4 – Refrigeration

- Refrigeration
    - Refrigerants
    - Process Schemes
    - The Propane Refrigeration Cycle
    - Equipment
        - Heat Exchangers
        - Refrigerant Compressors

Exercise 4 : Propane Refrigeration Example

Session 5 – Turbo-Expansion

- Turbo-Expansion
    - Process Schemes
    - Equipment
        - Turbo-Expanders
        - Re-compressors
    - Deep NGL Extraction

Session 6 – Process Integration for Efficiency

- Process Integration for Efficiency

Day 3: Absorption, NGL Stabilisation & Gas Sweetening

Session 6 – Process Integration for Efficiency cont.

- Pinch Analysis

Exercise 5 : Process Integration

Session 7 – Absorption & Adsorption Technologies

- Lean Oil Absorption
- Adsorption-Extraction

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- Adsorbents
    - Silica Gel, Molecular Sieves, Alumina, Activated Carbon
- Process Schemes & Equipment
- Limitations of Adsorbents for NGL Recovery

Exercise 6 : Concept Studies planning for Gas Treating

Session 8 – NGL Stabilisation

- NGL Markets & NGL Specifications
- NGL Stabilisation
    - Fundamentals of Stabilisation
- Introduction to Distillation
    - Distillation Columns
    - Ethane, Propane & Butane Production
    - Process Schemes

Exercise 7 : Economics of NGL Extraction

Session 9 – Gas Sweetening

- Contaminants in Natural Gas
- Gas Product Specifications
- Gas Sweetening Processes
    - Absorption Processes
        - Amine Processes
        - Carbonate Processes
        - Physical Solvents

Day 4: Gas Sweetening, Liquid Sweetening & Sulphur Recovery

- Adsorption Processes
    - Molecular Sieves
    - Iron Oxide
- Solvent Circulation Rate

Exercise 8 : Solvent Circulation Estimation

- Disposable & Scavenger Processes

Session 10 – Liquid Sweetening

- Liquid Sweetening
    - Some example liquid treating processes
- Other Contaminants Removal

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Session 11 – Sulphur Recovery

- The Standard Claus Sulphur Recovery Process
- Other Sulphur Recovery Processes
- Tail Gas Treating

Exercise 9 : Sulphur Recovery Process Scheme

Recap and Course Close

INSTRUCTOR:

Phil Tudhope is currently Director of a consulting company, specialising in technical and project management training for graduates and more senior technical staff. He has a first class honours B.Sc. in Mechanical Engineering from Bristol University and is a Chartered Engineer, Fellow of the Institution of Mechanical Engineers and Associate Member of the Institution of Chemical Engineers.

Phil has over 40 years' experience in Project Management, Technical Development and Change Management in the oil & gas industry and proven technical and managerial capabilities to achieve results with a strong business focus and to effect significant positive change. He is a specialist in front-end (feasibility & concept selection) phases of upstream oil & gas developments with midstream (LNG) experience and project execution experience and has the ability to perform analysis and development work as well as lead and motivate teams.

Amongst other roles, he was Specialist Front End Advisor at Petronas Carigali, Chief Process Engineer at BG Group and Head of Upstream Engineering at Shell Technology India. He has experience worldwide in differing political, social and remote environments, having worked overseas for 28 years including the Far East, USA, Europe, the Middle East and India.

Phil is an experienced instructor including the development and delivery of technical and project management courses.

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