Oil Field Surface Facility Operations: From Wellhead to Midstream Processing

Course general description:

The oil and gas industry relies heavily on efficient surface facilities to process raw hydrocarbons into marketable products. These facilities play a critical role in preparing crude oil, natural gas, and associated fluids for midstream transportation and refining. This course, "Oil Field Surface Facility Operations: From Wellhead to Midstream Processing," provides a comprehensive exploration of the processes, equipment, and safety protocols required to handle hydrocarbons effectively at the surface. Participants will gain an in-depth understanding of field processing operations, including separation, dehydration, stabilization, compression, and water treatment, as well as quality control, process optimization, and safety measures.

Audience:

This course is designed for:

1. Production engineers and operators working in oil and gas surface facilities.
2. Plant managers and supervisors overseeing upstream processing operations.
3. Maintenance and reliability engineers responsible for equipment performance.
4. HSE (Health, Safety, and Environment) professionals working in the oil and gas sector.
5. Researchers and consultants specializing in upstream processing and production optimization

Course objectives:

1. Understand the key processes involved in oil and gas surface facility operations, including separation, dehydration, stabilization, and compression.
2. Identify and analyze the functions and performance parameters of critical equipment such as separators, compressors, heat exchangers, and pumps.
3. Implement quality control measures to ensure product specifications are met for downstream processing.
4. Apply process control strategies to optimize facility performance and energy efficiency.
5. Evaluate and mitigate risks through robust process safety management systems.
6. Troubleshoot common operational challenges and develop solutions for improved reliability

Course duration:

5 days

Course location:

Cairo-Dubai-Istanbul

Course contents:

Day 1: Introduction to Oil Field Surface Facilities

- Overview of Surface Facilities – Role in upstream and midstream operations, key processes like separation, dehydration, and stabilization.
- Fundamentals of Fluid Behavior – Multiphase flow, pressure drop, and phase separation principles.
- Separator Types – Differences between two-phase and three-phase separators and their applications.
- Case Study & Calculations – Analyzing a two-phase separator's performance and solving basic separator design calculations.
- Pretest Assessment – Evaluating baseline knowledge of surface facility operations.

Day 2: Dehydration and Stabilization Processes

- Crude Oil Dehydration – Chemical, thermal, and electrostatic methods, and impact on downstream processing.
- Stabilization Techniques – Flash vaporization, fractional distillation, and stripping for pipeline and storage readiness.

- Process Optimization – Importance of meeting water content and vapor pressure specifications.
- Case Study & Group Exercise – Evaluating dehydration efficiency and designing a stabilization system.
- Quiz – Assessing understanding of dehydration and stabilization fundamentals.

Day 3: Gas Compression and Sweetening

- Gas Compression Principles – Types of compressors, performance parameters, and efficiency optimization.
- Gas Sweetening Process – Amine systems for H_2S and CO_2 removal, control, and monitoring.
- Operational Challenges – Diagnosing inefficiencies in compressors and sweetening units.
- Hands-on Tutorial – Simulating gas sweetening performance under variable conditions.
- Discussion – Best practices for optimizing gas compression and sweetening operations.

Day 4: Produced Water Treatment and Quality Control

- Produced Water Treatment – Separation, filtration, and chemical treatment methods for compliance.
- Environmental Standards – Regulatory discharge limits and environmental impact mitigation.
- Quality Control in Surface Facilities – Monitoring oil, gas, and water parameters for process efficiency.
- Process Control Systems – SCADA, DCS, and automation technologies in water treatment.
- Case Study & Quiz – Developing a quality control plan and reinforcing learning on water treatment.

Day 5: Process Safety and Final Assessment

- Process Safety Fundamentals – Hazard identification, risk assessment, and mitigation strategies.
- Emergency Response Planning – Safety management systems and operational emergency preparedness.
- Best Practices – Ensuring safety compliance in surface facility operations.
- Post-Test Assessment – Comprehensive evaluation covering all course topics.
- Course Review & Closing – Discussion, feedback, and certification distribution.

Methodology:

- 50% lectures & concepts
- 10% Videos
- 15% Case studies
- 15% Exercises & Quizes.
- 10% Discussions

Course code: (TPR0022)