Best Technology Solutions (BTS)

# Advanced Oil & Gas Handling Surfaces (Level 3)

**Training program**

## Introduction:

This course is designed to provide the basic knowledge of surface facilities from the wellhead to the custody transfer. The topics covered in the course will facilitate the communication of the subsurface engineers with surface facilities engineers during the development phase or production of a gas and oil field. The emphasis of this course is on oil production facilities, from the wellhead, to the delivery of a specification crude oil product, to the refinery. Produced water treating and water injection systems are also covered. Solution gas handling processes and equipment will be discussed as well. In addition to the engineering aspects of oil production facilities, practical operating problems will also be covered, including emulsion treatment, sand handling, dealing with wax and asphaltenes, etc.

This course will cover the oil processing and conditioning of a surface facilities system. Participants will learn about the concept of the oil production and processing system. This course will cover the system all the way from the wellhead to the delivery of a specific oil product. The participants will learn how select and evaluate processes and equipment used to meet fluid specifications and how to apply physical and thermodynamic property correlations. They will also learn about the principles of the design and evaluation of oil production and processing facilities, how to perform equipment sizing calculations for major production facility equipment, and evaluate processing configurations for different applications.

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The purpose of this course is to present an understanding of the wide range of oilfield production handling and treatment equipment. The participant should learn field fluid treating equipment operation. The fundamental principles of fluid behavior are first introduced, and then applied to all of the various equipment and systems comprising production operations. Emphasis is on understanding the internal workings inside the piping, valves and vessels. A major goal of this course is to improve communication among the technical disciplines, field and office in order to enhance operational efficiencies, lower costs and improve production economics. This course describes the process for the gathering system, fluid treatment, transportation, measurements and storage facilities associated with surface production operations. Natural gas and oil physics characteristics are presented together with their effect on separation, treatment and measurements. The delegates will learn through how to operate the surface facilities production equipment and process. The candidates will learn about:

- The physical properties and phase behavior of crude oil and natural gas that govern production operations
- Field processes for treating and conditioning full well stream production for sales or final disposition
- An introduction to the wide range of equipment used to process, treat, transport, and store oilfield produced fluids
- The basics of oilfield corrosion prevention, detection and treatment
- How to determine and minimize pressure drop in pipelines, valves and pressured vessels



- Internal workings of separators, pumps, compressors, valves and other treating equipment
- An overview of the processes and equipment used to handle acid gases
- A basic understanding of a wide range of produced fluid volume measurement and metering devices

## Who Should Attend?

Production, Operations, Facilities and Petroleum Engineers, Field Production Supervisors, Surface Equipment Technicians, who interact with field facility engineers/operators Surface Facility Operation Engineers, Surface Facility Design, Production Operation Engineers, Production Managers, Project Engineers, Field Operators, Chemical Engineers, Production Facilities Supervisors, Subsurface engineers, production technology engineers, reservoir engineers and managers involved in the field development and production of oil and gas, Process/facilities engineers and senior operating personnel involved with the design and operation of oil and produced water processing facilities, senior operating personnel, and production chemists

## Course Objectives:

**By the end of this course delegates will learn about:**

- Learn theory behind measurement and control process skills
- Be familiar with production systems and be able to describe them in details
- Learn about the right sampling procedure and be able to identify it



- Be familiar with and acquire knowledge on the daily production data base, well monitoring, and the function of processing production
- Understand the function of the common control process production systems
- Know how to enhance knowledge, skills and abilities to collect the production data and reporting them
- Diagnose wellhead problems and take corrective actions respectively
- Be able to deal with the production process area and troubleshooting problems
- Take basic corrective action based on reviewing the daily production report and be able to troubleshoot the problems and report them
- Be familiar with the different tools of production, data base and reporting skills as well as well and process monitoring surveys
- Detect and diagnoses the well and process problems by utilizing the database of production process and well monitoring
- Learn how to collect and utilize the production data base

## Course Outline:

**I – Hydrocarbon Reservoirs**

- Hydrocarbon Traps
    - Structural traps
    - Stratigraphic traps



- Reservoir Drive Mechanisms

    - Depletion drive
    - Gas cap drive
    - Water drive
    - Combination drive

**II – Well Production Systems**

- Natural Flow System

    - Natural conditions
    - Dead well reasons

- Artificial Lift System

    - Beam pumping system
    - Electrical submersible pumping system
    - Gas lift system
    - Progressive cavity pumping system
    - Hydraulic jet pumping system

**III - Oil and Gas Gathering Systems**

- Well head and X-mass trees
- Chokes and valves
- Flow lines
- Manifolds



- Well Head Problems

    - Hydrate formation
    - Scale formation
    - Sand plugging
    - Paraffin and asphaltenes
    - Corrosion problems
    - Valve passing flowline leaks and spills

**IV – Well Fluids Sampling**

- Sampling procedures
- Liquid sampling
- Gas sampling
- Bottom hole sampling

**V – Process Facilities / Crude Oil Treatment and Storage**

- Process functions
- Process facilities

    - Process inlet header
    - Production separator
    - Knock out drums and oil skimmers
    - Heater theaters
    - Desalters
    - Gas scrubbers



- Gas Separation
    - Separation mechanism
    - Separator internals
    - Types of gas separators
- Oil Dehydration
    - Types of emulsions
    - Emulsion stability factors
    - Emulsion breaking
    - Desaling
- Crude Oil Storage
    - Types of storage tanks
    - Tank measurements

**VI – Well Monitoring**

- WHP & WHT
- Telemetry systems
- Well Production testing
- Water cuts / salinity tracking
- Fluid level measurements
- Reservoir pressure measurements
- Artificial lift systems monitoring and performance evaluation



**VII – Production Database Collection / Reporting and Utilizing**

- Daily activities reports
- Well history database reports
- Well performance charts and analysis
- Weekly, monthly and annual reports
- Failure analysis and statistics