

## Field Processing & Surface Production Facilities

### Effluent Treatment & Equipment Technology

10 days

PROP/FPSPF

#### Overview

#### LEVEL

Foundation

#### PURPOSE

This course provides a comprehensive understanding of onshore and offshore Oil & Gas field processing techniques, along with knowledge of technology and operating principles of surface production facilities equipment.

#### LEARNING OBJECTIVES

Upon completion of the course, participants will be able to:

- grasp fundamentals of Oil & Gas production techniques,
- explain operating principles and conditions of oil, water and gas treatment,
- detail the technology of main equipment and specificities of offshore production techniques,
- ascertain fundamentals of process control, draw a typical safety system layout,
- explain main metering techniques, corrosion issues, its prevention and monitoring.

#### WAYS AND MEANS

Very interactive training by industry specialists.  
Numerous applications and illustrations.

#### LEARNING ASSESSMENT

Assessment by test at the end of the course.

#### PREREQUISITES

No prerequisites for this course.

### Agenda

#### WELL EFFLUENTS BEHAVIOR

Different types of well effluent. Main characterization parameters. Liquid/vapor equilibrium of pure substances and mixtures. Effluent behavior. Constituents that pose problems for storage, transport or commercialization. Main specifications to conform with and required treatments.

0.5 d

#### FUNDAMENTALS OF RESERVOIR & DRIVE MECHANISM

Reservoirs: types, exploration techniques. Drive mechanisms. Enhanced Oil Recovery (EOR): aim and principle of the main techniques.

0.25 d

#### FUNDAMENTALS OF DRILLING, COMPLETION & WELL PERFORMANCE

Drilling principle. Case of offshore drilling. Main completion equipment. Well performance. Needs for artificial lift: principle of artificial lift by pumping, gas lift...

0.25 d

<p><b>WELL EFFLUENT TRANSPORTATION, FLOW-ASSURANCE &amp; GAS HYDRATES PREVENTION</b></p> <p>Gathering network design and operation: main flow assurance issues; multiphase flow, flow patterns; hydrates formation prevention strategies, hydrates inhibition.</p> <p>Case studies: gas condensate field development; deep-offshore production.</p>	0.5 d
<p><b>CRUDE OIL PROCESSING</b></p> <p>Crude stabilization by Multi Stage Separation (MSS). Management of foam issues. Crude dehydration and desalting. Emulsion treatment.</p> <p>Crude sweetening (H<sub>2</sub>S removal).</p> <p>Examples of oil treatment and associated gas compression process schemes.</p>	1 d
<p><b>PRODUCTION &amp; INJECTION WATER TREATMENT</b></p> <p>Quality requirements for production water. Environment related constraints.</p> <p>Main produced water treatments: API oil-water separators, plate separators, flotators, hydrocyclones...</p> <p>Reasons for water injection.</p> <p>Quality requirements and necessary treatments: chlorination, filtration, oxygen removal, sulfate removal.</p> <p>Examples of process schemes for production and injection water treatment.</p>	1 d
<p><b>GAS PROCESSING &amp; CONDITIONING</b></p> <p>Gas dehydration: TEG units, solid desiccants (molecular sieves) units. Gas sweetening. Acid components (H<sub>2</sub>S and CO<sub>2</sub>) removal: amine units, molecular sieves, membranes. Natural Gas Liquids (NGL) extraction: use of cryogenic refrigeration, Joule-Thompson expansion, turbo-expander.</p>	1 d
<p><b>LIQUEFIED NATURAL GAS</b></p> <p>Fundamentals of Liquefied Natural Gas (LNG) chain.</p>	0.5 d
<p><b>CASE OF OFFSHORE DEVELOPMENTS</b></p> <p>Offshore production structures: jacket, semi-submersible, spar, TLP, FPSO... Storage and offloading vessels (FSO, FPSO, FPU, buoy...). Deep offshore developments. Examples of subsea architecture. Flow assurance in (deep) offshore developments. Main preservation techniques and pigging solutions.</p>	1 d
<p><b>ROTATING MACHINERY</b></p> <p>Fundamentals of pumping circuits and gas compression. Operating principles, technology, selection criteria, performances and operating conditions of centrifugal &amp; volumetric pumps and centrifugal &amp; reciprocating compressors. Gas turbines. Turbo-expanders.</p>	1 d
<p><b>THERMAL EQUIPMENT</b></p> <p>Heat exchangers, air coolers, furnaces: types, operation, technology.</p>	0.5 d
<p><b>FUNDAMENTALS OF CORROSION</b></p> <p>Different types of corrosion, prevention and monitoring.</p>	0.5 d
<p><b>ELECTRICAL SYSTEMS - INSTRUMENTATION &amp; PROCESS CONTROL - SAFETY SYSTEMS</b></p> <p>Electrical power generation. Electrical power distribution network and equipment. Field instrumentation; controllers; control loop structures. Distributed Control System (DCS). Safety Instrumented Systems (SIS): ESD, HIPS, fire and gas system.</p>	1.5 d
<p><b>METERING &amp; ALLOCATION</b></p> <p>Importance of metering and production allocation. Production accounting &amp; material balance. Introduction to material balances: liquid and gas balances. Transactional metering of liquids and gas. Multi-phase metering: advantage, principle and fields of application.</p>	0.5 d