Oil and Gas Production & Process Facilities

Course general description:

Oil and Gas Production & Processing Facilities are critical components of the energy supply chain, responsible for extracting hydrocarbons from reservoirs, processing them into usable forms, and preparing them for transportation or end-use. These facilities encompass a wide range of operations, from upstream production to midstream processing and downstream refining. This course is a comprehensive overview of oil and gas production and processing facilities, including their types, processes, technologies, challenges, and best practices.

Audience:

This course is intended for professionals working in oil and gas production and processing plants and units, including:

- Petroleum refining engineers ,
- Chemist who interest in oil and gas industry
- Mechanical engineers.
- Operators in oil and gas industry (refining, gas processing, oil treatment , oil production
- Operators in petrochemicals and fertilizers refining, gas processing, oil treatment , oil production
- Supervisors in oil and gas industry refining, gas processing, oil treatment , oil production
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Course objectives:

Provide an understanding of the following:

- Apply and Implement International Oil Companies HSEMS standards and procedures as applicable. ·
- Operate & check control systems functions (DCS, PLC, UPS, SCADA, etc) then take remedial action
- Perform studies on production surface facilities to minimize negative impact on environment such as emission control.(eg gas flaring), effluent water disposal to the surface evaporation pits

Course duration:

5 days

Course location:

Cairo-Dubai-Istanbul

Course contents:

Day-1:

1. **Introduction**

- Basic Concepts to remember
- Properties of produced fluids
- Production Surface Facilities
- Flow diagrams
- Piping and Instrumentation Diagrams (P&IDs)
- Process equipment

- Introduction to mass and energy balances
- Risk Assessments and Hazard Studies
- Flammability and Electrical Area Classification
- Workshop Session

2. **Fluid Flow**

- Pressure and Head
- Bernoulli's Theorem
- Flow of Liquids
- Reynolds number, pressure drop in pipes
- Compressible flow
- Introduction to Thermodynamics
- Principle of process relief devices and process design of relief systems
- Two-phase and Multi-phase Flow

Day-2:

3. **LINE SIZING CRITERIA**

- Design Basis
- Sizing of Liquid Lines
- Sizing of Gas Lines
- Sizing of Gas/Liquid Two-or Multi-Phase Lines
- Sizing of Gas Relief Lines
- Maximum allowable velocities due to reaction forces

4. **Separation / treating:**

- Two and three phase separation
- Free water removal
- Treatment of emulsions
- Hydrate prevention and treatment
- Vapor recovery
- Gas conditioning for sales

5. **Heat Transfer**

- Thermal conductivity
- Conduction and convection
- Insulation
- Heat transfer coefficients
- Heat exchangers, type and sizing

Day-3:

6. **Fluid measurement and instrumentation:**

- Liquid and gas metering using positive displacement meters
- Orifices
- Sonic meters
- Mass measurement meters
- Three phase flow measurement
- New metering devices

7. **Control systems**

- Introduction
- Main process variables in the refinery

- Control of refinery process
- Open loop system
- Closed loop system
- Fundamentals of process control
- The feedback control loop
- On - off controller
- Proportional controller
- Proportional &integral controller
- Proportional &integral & derivative controller
- Description of key points in the operation of control systems like: DCS, PLC, UPS, SCADA, etc .
- Logic, integration and loops in control systems .
- Control system response and best practices in ESD .
- Key points in emergency response action plan (ERAP).
- Identification of control systems' discrepancies .
- Monitoring and evaluation of equipment performance.
- Complex and detailed root cause analysis both within and outside the GC.
- Optimization of corrective actions.
- Advanced control techniques
- Fail safe

Day-4:

8. **Operational Responsibility for Safety**

- Roles and Responsibilities
- Routine Operations
- Operating within Process and Equipment Limits
- Written Procedures
- Communication
- Communication during Shift Changes
- Special Safety Considerations of Batch Processes
- Process Control Software
- Nonroutine Operations
- Abnormal Operations
- Standby Operations
- Emergency Operations
- Management of Change
- Safety Protective Systems
- Safety Shutdown Systems
- Pressure Relief Equipment
- Operator Training
- Refresher Training
- Playing “What-if” Games
- Incident Investigation

Day-4:

- Recognizing and Reporting Incidents
- The Investigation

- Investigation Results and Followup
- Human Factors
- Human-process Interfaces
- Behavioral Issues
- Spontaneous Response
- Audits, Inspections, Compliance Reviews
- Accident Investigation
- Accident Reporting & Recordkeeping
- Working safely in confined spaces
- Hazardous (classified) locations
- Risk management process

Methodology:

- 50% lectures & concepts
- 10% Videos
- 10% Case studies
- 10% Exercises
- 10% Discussions
- 10% Software (if applicable or examples)

Course code: (TPRS047)