COURSE OVERVIEW PE0734
Onshore Gas Gathering Systems Design and Operation (E-Learning Module)

Course Title
Onshore Gas Gathering Systems Design and Operation (E-Learning Module)

Course Reference
PE0734

Course Format & Compatibility
SCORM 1.2. Compatible with IE11, MS-Edge, Google Chrome, Windows, Linux, Unix, Android, IOS, iPadOS, macOS, iPhone, iPad & HarmonyOS (Huawei)

Course Duration
30 online contact hours
(3.0 CEUs/30 PDHs)

Course Description

This E-learning course is designed to provide participants with an up-to-date overview of onshore gas gathering systems design and operation. It covers the gas gathering systems design and operation, project life cycle, planning phase, EPC phase and operations phase; the estimation of cost and gathering equipment selection feed; the pipe, size and material selection; the liquid in gas gathering systems, line drip, dual-line piggable drip and pigging equipment; the compressor-station piggable bypass, valve technologies and project safety plan; the alternate approach to evaluating stored energy impacts of pneumatic tests; and the static test design considerations, static testing conclusion and construction issues.

During this course, participants will learn the gathering-system operation, procedures and corrosion control processes; the block flow diagram, gas treatment plant schematic, mathematical model assumptions and diffusivity equation; the impact of gathering system pressure on gas well deliverability; the pressure transient testing standard conditions for gas wells; the diffusivity equation observation and diffusivity equation general solution including Horner analysis assumptions and analysis procedure; the radius of investigation, simplified backpressure analysis (SBA) method and deliverability test analysis; the flow regime and Reynolds number; the pipeline safety management systems; and the recommended practice in accordance with API RP 1173.

Course Objectives

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

- Apply and gain a comprehensive knowledge on onshore gas gathering systems design and operation
- Discuss gas gathering systems design and operation, project life cycle, planning phase, EPC phase and operations phase
- Estimate cost and gather equipment selection feed as well as employ pipe, size and material selection
- Describe liquid in gas gathering systems, line drip, dual-line piggable drip and pigging equipment
- Illustrate compressor-station piggable bypass, valve technologies and project safety plan
- Apply alternate approach to evaluating stored energy impacts of pneumatic tests
- Discuss static test design considerations, static testing conclusion and construction issues
- Employ gathering-system operation, procedures and corrosion control processes
- Review block flow diagram, gas treatment plant schematic, mathematical model assumptions and diffusivity equation
- Determine the impact of gathering system pressure on gas well deliverability
- Identify the pressure transient testing standard conditions for gas wells
- Discuss diffusivity equation observation and diffusivity equation general solution including Horner analysis assumptions and analysis procedure
- Describe the radius of investigation, simplified backpressure analysis (SBA) method and deliverability test analysis
- Recognize flow regime and Reynolds number as well as employ pipeline safety management systems
- Apply recommended practice in accordance with API RP 1173

Who Should Attend

This course provides an overview of all significant aspects and considerations of onshore gas gathering systems design and operation for production and facilities department engineers/senior operating personnel responsible for the design, operation and optimization of onshore gas gathering systems and their associated field facilities.

Course Certificate(s)

Internationally recognized certificates will be issued to all participants of the course.

Certificate Accreditations

Certificates are accredited by the following international accreditation organizations: -

- USA International Association for Continuing Education and Training (IACET)

  Haward Technology is an Authorized Training Provider by the International Association for Continuing Education and Training (IACET), 2201 Cooperative Way, Suite 600, Herndon, VA 20171, USA. In obtaining this authority, Haward Technology has demonstrated that it complies with the **ANSI/IACET 1-2013 Standard** which is widely recognized as the standard of good practice internationally. As a result of our Authorized Provider membership status, Haward Technology is authorized to offer IACET CEUs for its programs that qualify under the **ANSI/IACET 1-2013 Standard**.

  Haward Technology's courses meet the professional certification and continuing education requirements for participants seeking **Continuing Education Units** (CEUs) in accordance with the rules & regulations of the International Association for Continuing Education & Training (IACET). IACET is an international authority that evaluates programs according to strict, research-based criteria and guidelines. The CEU is an internationally accepted uniform unit of measurement in qualified courses of continuing education.

  Haward Technology Middle East will award **3.0 CEUs** (Continuing Education Units) or **30 PDHs** (Professional Development Hours) for participants who completed the total tuition hours of this program. One CEU is equivalent to ten Professional Development Hours (PDHs) or ten contact hours of the participation in and completion of Haward Technology programs. A permanent record of a participant's involvement and awarding of CEU will be maintained by Haward Technology. Haward Technology will provide a copy of the participant's CEU and PDH Transcript of Records upon request.

- British Accreditation Council (BAC)

  Haward Technology is accredited by the **British Accreditation Council** for **Independent Further and Higher Education** as an **International Centre**. BAC is the British accrediting body responsible for setting standards within independent further and higher education sector in the UK and overseas. As a BAC-accredited international centre, Haward Technology meets all of the international higher education criteria and standards set by BAC.

Training Methodology

This Trainee-centered course includes the following training methodologies:-

- Talking presentation Slides (ppt with audio)
- Simulation & Animation
- Exercises
- Videos
- Case Studies
- Gamification (learning through games)
- Quizzes, Pre-test & Post-test

Every section/module of the course ends up with a Quiz which must be passed by the trainee in order to move to the next section/module. A Post-test at the end of the course must be passed in order to get the online accredited certificate.

Course Fee

As per proposal

Course Contents

- Gas Gathering Systems Design and Operation
- Overview
- Project Life Cycle
- Planning Phase
- EPC Phase
- Operations Phase
- Cost Estimating
- Gathering Equipment Selection (Feed)
- Design Standards
- Pipe Selection
- Size Selection
- Material Selection
- Steel Pipe Wall Thickness Example
- HDPE. Pipe Wall Thickness Example
- HDPE
- Pipe Summary
- Ditch
- Open Ditch

- Pipeline Obstructions
- Rivers
- Liquid in Gas Gathering Systems
- Line Drip
- Dual-Line Piggable Drip
- Pigging Equipment
- Closure
- Barrel
- Flange for Extension Spool
- Pig Signal
- Process Valves
- Barred Tee
- PSV
- Chemical Injection Port
- Vents/Drains
- Sweeps
- Compressor-Station Piggable Bypass
- Gathering-System Valves
- Gate Valve
- Valve Technologies
- Valve Actuation
- Pipeline Valve Locations
- Valve Summary
- Positive Energy Isolation
- Double Block and Bleed
- Insert Blind
- Misalign/Remove Piping
- Design Issues (EPC)
- Environmental Assessment
- Arch Report
- T&E Species
- Drawings
- Project Safety Plan
- Purging Air from Lines

- Static Testing
- Energy Involved in Testing
- Alternate Approach to Evaluating Stored Energy Impacts of Pneumatic Tests
- Brittle Failure
- Static Test Design Considerations
- Static Testing Conclusion
- Construction Issues
- Inspection
- Trenching Equipment
- Welding
- Backfill and Cleanup
- Gathering-System Operation
- Procedures
- Corrosion Control Processes
- Schedules
- Qualifications
- Gas Treatment Plant Overview
- Gathering System
- Block Flow Diagram
- Gas Treatment Plant Schematic
- Liquid Knockout
- PFD-001 Liquid Knockout
- Sour Gas Treatment
- Why LO-CAT II?
- PFD-002 Gas Sweetening
- Gas Dehydration
- Gas Dehydration & CO_2 Rejection
- PFD-003 Gas Dehydration
- NGL Recovery + CO2 Removal
- NGL Recovery
- NGL Stabilization
- PFD-005 NGL Stabilization
- Inert Removal-N2
- PFD-006 Nitrogen Rejection Unit

- LNG Production
- Equipment Cost Estimates
- Estimated Capital Cost
- Revenues
- The Impact of Gathering System Pressure on Gas Well Deliverability
- Outline
- Gas Well Pressure Transient Testing
- Purpose of Gas Well PTT
- Mathematical Model Assumptions
- Common Flow Regimes
- Pressure Transient Testing Standard Conditions for Gas Wells
- Diffusivity Equation
- Diffusivity Equation Observation
- Diffusivity Equation General Solution
- Flow Regimes
- Pressure Build Up
- Horner Analysis Assumptions
- Horner Analysis Procedure
- Radius of Investigation
- Gas Well
- Dewatering Gas Wells
- Gas Well Deliverability Single Well Case
- Stabilization Time
- Conventional Backpressure Test
- Isochronal Test
- Modified Isochronal Test
- Simplified Backpressure Analysis (SBA) Method
- LIT Method
- Deliverability Test Analysis
- Flow Regime and Reynolds Number
- Pipeline Safety Management Systems
- Regulation
- Recommended Practice API RP 1173
- PSMS

- PSMS Elements
- Leadership and Management Commitment
- Stakeholder Engagement
- Risk Management
- Operational Controls
- Incident Investigation, Evaluation, and Lessons
- Safety Assurance
- Management Review and Continuous Improvement
- Emergency Preparedness and Response
- Competence, Awareness, and Training
- Documentation and Record Keeping
- PSMS Requires
- PSMS Rewards
- Hydrate Formation
- Hydrates
- Formation of Hydrates
- Ground Temperature Effects
- Controlling Hydrate Formation
- Glycol injection ports marked by arrows
- Flow-line Heaters
- Indirect Heaters w/Water Bath
- Thermosiphon Baffle
- Long-nosed Choke
- Field Gas as Fuel Supply
- Corrosion and Scaling
- Safety Drilling
- Alternate Bath Solutions
- Dehydration of Natural Gas
- Dehydration
- Dew Point Depression
- Dew Point – Example
- Glycol must be Reused
- Definitions
- Flow Diagram of Liquid Desiccant System

- Absorber Tower
- Bubble Caps
- Mist Extractor
- Operational Targets
- Solid Desiccant Dehydrators
- Essential Features
- Regeneration
- Terms
- Regeneration Cycle
- Adsorption Process
- Effects of Contaminants
- Hydrocarbon Recovery Units
- Three-tower System
- Flow Control in Oil/Gas Wells and Pipelines
- Outline
- Norwegian Oil and Gas Production
- Trends and Facts in Oil and Gas Production.
- Multiphase Transport Solutions
- Multi-Phase Fluid Flow (Oil/Water/Gas)
- What is the Sea Depth of Future Fields?
- Challenges for Deep Water Developments
- Flow Control
- Flow assurance
- Flow Control: Emulsion Viscosity
- Sand Control
- Outline
- Multiphase Transport
- Horizontal Two-Phase Flow
- Example – Horizontal Slug Flow
- Inclined Flow
- Horizontal Flow Map
- Vertical Flow
- Example - Vertical Flow
- Vertical Flow Map

- Slug Flow
- Consequences of Slugging
- Slug Flow Classification
- Slug Flow Generation
- Hydrodynamic Slugging
- Slugs from Gas Lift
- Slug Formation in Pipeline/Riser
- Conditions for Severe Slugging
- Important Severe Slugging Parameters
- Outline
- Slug reduction/Elimination Techniques
- Gas Injection at Riser Base
- Self Gas Lifting
- Choking
- Active Choking
- Optimize Well Production
- Increased/controlled Gas Injection Rate in Gas Lifts
- Miniseparators
- Slug Reduction/Elimination Techniques
- Outline
- Slugg Control at Heidrun Nordflanken Use of Active Slug Control
- Slugging in Riser Heidrun D-line
- Active Well Control at Brage A-21
- OptimizeIT Active Well Control on Brage A-21
- Conclusions
- Thanks
- Flow Control in Petroleum Production
- Drag Reduction
- Teague Treating Plant
- Amine Contactor Feed Heater (exchanger)
- Amine Contactor Lean Amine Feed Points
- Amine Contactor Lean Amine Feed Points and Time
- Amine Contactor Lean Amine Feed Points and Trays
- Amine Contactor “Bulge Temperature”

- Amine Contactor Integral Overhead Scrubber
- Amine Contactor Overhead Scrubber
- Amine Contactor Gas Cooler
- This is a Summary Page of the Gas flow in an Amine Plant
- Corrosion and its Prevention
- Introduction of Corrosion
- Facts about Corrosion
- Causes of Corrosion
- Types of Corrosion
- Galvanic Corrosion
- Crevice or Contact Corrosion
- Corrosion in Concrete
- Erosion Corrosion
- Dealloying
- Effects of Corrosion
- Factors Affecting Corrosion
- Prevention of Corrosion
- Methods of Preventing Corrosion and Rusting
- Tarring
- Painting
- Enameling
- Galvanizing
- Sheradising
- Tin Plating
- Electroplating
- API Recommended Practice 80 (API RP 80) “Guidelines for the Definition of Onshore Gas Gathering Lines"
- Definition
- Applicability
- Incorporation by Reference
- Gas Gathering Compliance
- Beginning of Gathering
- API RP 80 - Gathering Line
- API RP 80 – Production Operation

- Beginning of Gathering.
- End of Gathering
- API 80 - Gathering Line
- End of Gathering – Processing Plant
- API 80/Part 192 Combined – Processing Plant
- API 80 – Gas Treatment
- API RP 80 - Gas Treatment
- End of Gathering – Gas Treatment
- API 80 – Commingling
- End of Gathering – Commingling
- API 80/Part 192 Combined – Commingling
- API 80 – Compressor
- End of Gathering – Compressor
- API 80/Part 192 Combined – Compressor
- What are regulated segments?
- Categories of Gathering Lines
- Regulated Type A
- Regulated Type B
- Regulated Type B – Area 2 Determinations
- Compliance Activities
- Compliance Deadlines ~192.9(e)
- Compliance Deadlines