Natural Gas Transportation & Metering

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Introduction:

The efficient and effective movement of natural gas from producing regions to consumption regions requires an extensive and elaborate transportation system. In many instances, natural gas produced from a particular well will have to travel a great distance to reach its point of use. The transportation system for natural gas consists of a complex network of pipelines, designed to quickly and efficiently transport natural gas from its origin, to areas of high natural gas demand.

Transportation of natural gas is closely linked to its storage: should the natural gas being transported not be immediately required, it can be put into storage facilities for when it is needed. This course covers the area of interest of industrial companies using natural gas through a pipe line and metering system. It, also, covers general information on gas properties and processing operations.

Natural gas pipe lines are widely distributed all over the world for industrial use. Transporting natural gas thousands of miles through pipelines is the safest method of transportation. The transportation system for natural gas consists of a complex network of pipelines, designed to quickly and efficiently transport natural gas from its origin, to areas of high natural gas demand. There are three major types of pipelines along the transportation route: the gathering system, the interstate pipeline system, and the distribution system. The gathering system consists of low pressure, small diameter pipelines that transport raw natural gas from the wellhead to the processing plant.

Objectives:

By the end of this BTS training course, participants will be able to:

- Be introduced to natural gas fundamentals
- Gain knowledge of natural gas flow metering
- Learn about natural gas quality metering principles
- Be introduced to custody transfer systems, definitions
- Learn best practices in gas flow measurement
- Learn best practices in gas quality measurement
- Understand metering policy
- Know types of meters used in gas operations
- Learn about raw gas transmission
- Know about gas flow process
- Understand pipeline operations

Who should attend?

Gas measurement engineers, operators, technicians, analysts, senior and junior engineers and chemists, senior technicians, production engineers, petroleum engineers, and personnel who witness or audit natural gas measurement Professionals who have been allocated crisis management tasks yet have had insufficient time to devote to the subject

Course Outline:

Natural Gas Fundamental

- Introduction
- Natural Gas History
- Natural Gas Origin and Composition
- Gas Sources
- Non-associated Gas
- Associated Gas
- Natural Gas Phase Behavior
- Natural Gas Properties
- Chemical and Physical Properties
- Gas-Specific Gravity
- Ideal and Real Gas Laws
- Gas Formation Volume Factor
- Gas Density
- Isothermal Compressibility of Gases
- Gas Viscosity
- Quality, Transportation
- Pipelines

- Liquefied Natural Gas
- Compressed Natural Gas
- General information on Gas treatment and processing.

Raw Gas Transmission

- Introduction, Multiphase Flow Terminology
- Superficial Velocity
- Multiphase Flow Mixture Velocity
- Holdup
- Phase Velocity
- Slip, Multiphase Flow Density
- Multiphase Flow Regimes
- Two-Phase Flow Regimes
- Three-Phase Flow Regimes
- Calculating Multiphase Flow Pressure Gradients
- Steady-State Two-Phase Flow

- Steady-State Three-Phase Flow
- Transient Multiphase Flow
- Multiphase Flow in Gas/Condensate Pipelines
- Temperature Profile of Multiphase Pipelines

- Velocity Criteria for Sizing Multiphase Pipelines
- Erosion Criteria, Corrosion Criteria
- Multiphase Flow Assurance
- Gas Hydrates
- Corrosion
- Wax
- Severe Slugging
- Real-Time Flow Assurance Monitoring
- Multiphase Pipeline Operations
- Leak Detection
- Pigging

Sales Gas Transmission

- Introduction
- Gas Flow Fundamentals
- General Flow Equation
- Friction Factor Correlations
- Practical Flow Equations
- Predicting Gas Temperature Profile
- Transient Flow in Gas Transmission Pipelines
- Compressor Stations and Associated Pipeline Installations
- Compressor Drivers
- Compressors Configurations
- Reduction and Metering Stations
- Design Considerations of Sales Gas Pipelines
- Line Sizing Criteria
- Compressor Station Spacing
- Compression Power
- Pipeline Operations
- Metering Stations Operation