

2015 Western Gas Measurement Short Course  
Portland, OR

## 2015 Short Course Topics

The Short Course is designed to offer basic track and advanced track classes in the field of natural gas Measurement, Regulation, and General Interest subjects. In addition, a variety of Hands On workshops and Roundtable discussions are also presented, for more direct interaction with knowledgeable industry personnel.

### **15 Measurement Classes**

#### **Introduction to Basic Gas Laws**

For those new to measurement or needing a refresher, a great introduction to the basic gas laws including Boyle's Law, Charles' Law, Ideal Gas Law, and supercompressibility; and how they are used in gas measurement.

#### **Fundamentals of Gas Metering**

A discussion of positive displacement (diaphragm, rotary) and inferential (orifice, coriolis, vortex, turbine, and ultrasonic) meter basics and their application in natural gas measurement.

#### **Fundamentals of Gas Turbine Meters**

The basic fundamentals of single and dual rotor turbine meter measurement.

#### **Fundamentals of Flow Computers**

Presentation on the fundamental parameters to consider when designing an Electronic Flow Measurement (EFM) system

#### **Ultrasonic Meter Operation**

Discussion of the theory of operation of ultrasonic meters including velocity of sound determination; effects of gas composition, gas velocity, flow conditioning, and flow profiles; accuracy and uncertainty; and flow calibration of ultrasonic meters.

#### **Clamp-on Ultrasonic Meter Applications and Installations**

An introduction to the operation of clamp-on ultrasonic meters in gas measurement, including the latest innovations in clamp-on technology for check metering and custody transfer applications.

#### **Practical Selection and Usage of Coriolis Meters for Gas Measurement**

Intermediate level presentation regarding the application, installation, and maintenance of Coriolis meters.

#### **Regulator and Industrial Meter Station Design**

Presentation on regulator and meter station design from concept to installation. Emphasis on district regulator stations, large industrial meter stations, and custody transfer facilities.

#### **Meter Run Switching**

This class will provide an overview of run switching for multiple meters runs to handle ranging flowrates.

#### **Electronic Volume Corrector Basics**

This class will discuss the use of volume correctors in natural gas measurement.

#### **Distribution Gas Meter Proving**

Presentation on current gas meter proving equipment and methodology.

#### **Differential Testing of Rotary Meters**

A discussion on how to conduct differential testing of rotary meters, how to interpret and act on the results, and the various state commission rules pertaining to differential testing.

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**Measurement Classes (cont.)**

**Working with Combined Accuracy**

Presentation will introduce the student to methods for calculating the overall accuracy/uncertainty of a gas measurement facility.

**Verifying Gas Ultrasonic Meter Accuracy and Stability**

Ultrasonic flow meters inherently offer excellent self-diagnosis capabilities. Presentation will address both meter-supported procedures and further measurement processing options to evaluate measurement applications.

**Measurement Standards Updates**

Presentation will focus on recently updated U.S standards, guidelines and recommended practices pertaining to dry natural gas volume/mass measurement and energy/content/heating value determination.

**10 Regulation Classes**

**Introduction to Gas Regulation**

The fundamentals of pressure regulation covering spring and pilot type regulators, sizing, operation, and troubleshooting.

**Introduction to Overpressure Protection**

Introduction of methods available to prevent over-pressurization of downstream piping including §49 CFR Part 192 code requirements.

**Introduction to Regulator and Relief Sizing**

Introduction to concepts required to size regulators, relief valves, and monitor stations.

**Flexible Element Regulators**

Presentation of the advantages and disadvantages of flexible element regulators including a review of monitor and relief applications, operation, sizing, installation, and maintenance.

**Industrial Pressure Control at Turbine Engine Power Plants**

Regulation of large industrial customers and power plants subjected to rapidly changing flow conditions. Concentration on high volume installations with large combustion turbine engine power plants coupled with small auxiliary loads.

**Noise Mitigation in Regulator Stations**

Introduction to the causes of regulator station noise and methods used to mitigate.

**Regulator Freeze Protection**

Application of technologies to mitigate freezing issues associated with the Joule-Thomson effect in the natural gas industry.

**Troubleshooting Regulators**

Presentation will offer a systematic approach to troubleshooting and correcting regulator-control issues at Regulator Facilities.

**Troubleshooting Control Valves**

Presentation will offer a systematic approach to troubleshooting and correcting problems with pressure control valves.

**Three Mode Control (PID) – Tuning**

Presentation will offer methods for tuning Three Mode Control (PID) loops, including PID definition and basic theory.

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**13 General Interest Classes**

**Gas Odorants; Safe Handling, Health, and Environment**

A detailed discussion on safe odorant handling, PPE, and preventative procedures as well as emergency response and disposal issues.

**Odorant Transfer Systems and Safe Delivery**

Presentation regarding odorant transfer systems (including closed loop, flare, and venting) for product transfers from stationary and portable tanks. The presentation will focus on operations safety, closed loop designs, and system integrity.

**Overview of Odorant Systems**

A review of odorization systems, the chemistry and characteristics of gas odorants, along with a discussion of the requirements for DOT compliance and effective protection of the customer.

**Introduction to Gas Quality**

An introductory level presentation on the fundamentals of gas quality parameters, analysis and methods used to determine gas composition.

**Measuring Hydrocarbon Dew Point Accurately**

Methods and economics of Hydrocarbon Dew Point (HCDP) measurement.

**Gas Chromatograph Maintenance**

Gas Chromatograph - Operations and general maintenance.

**Use of LNG/CNG to Support Customers and Other Utility Operations**

Use of LNG and CNG to support planned pipeline outage, emergency pipeline outage, and other creative opportunities found to be suitable for the equipment, processes, and technicians.

**Pulsation mitigation and Its Effects on Metering**

Identify sources and mitigative measures to manage pulsation and effects upon metering. Addresses both theory and system design.

**Hazardous Area Classification**

A review of AGA and API standards utilized in determining the hazardous location classification for electrical wiring, along with discussion of typical hazardous location classifications encountered in the gas industry.

**Considerations for M2M Hybrid Networking**

A detailed discussion of machine-to-machine communications and its use in Gas Operations.

**Pipeline Alarm Management**

A review of API 1167 along with detailed discussion of practical solutions for solving the most common alarm problems.

**Polyethylene Pipe Standards & Updates**

A comparative review of the existing Polyethylene Pipe Standard ASTM D2513 and the impact if/when standard D2513-99 is accepted. Differences between the two standards will be highlighted. The presentation will address utilization, installation, and operation of PE gas piping and highlight changes regarding PE Designation codes; cell classification, and material properties, design factors, and UV resistance properties.

**Plug Valve Maintenance**

A detailed discussion on valve maintenance requirements and best practices for establishing an effective valve maintenance program.

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**12 Round Table Discussions**

These discussions are for the industry novice and expert. Diverse experience ensures a rich and dynamic experience for all involved. Bring your expertise, share with others, and further your industry contacts.

**Wireless Communications and Data Collection**

Discuss new communication bands, competing technologies, line of site limitations, and regulatory issues.

**AMR/AMI Selection, Deployment, and Operations**

Discuss major deployments, limited strategic deployments, telecommunication devices, communication methods, implementation problems, validation methods, and host hardware and software.

**Control Room Management Rules**

Discuss implementation, audit findings, and program enhancements necessary to comply with the recently implemented control room management rule.

**Fixed Factor vs. Electronic Volume Corrector Measurement**

Discuss criteria for installing electronic correctors, determining and verifying pressure/temperature values to apply to fixed factors, applying compressibility to fixed factor meters, the use of temperature compensated meters, and determining pressure zones.

**Automatic and Remote Control Valves, Applications and Considerations for Line Break Control**

Discuss experiences and challenges associated with the design, and installation of Automatic Shutoff and Remote Control Valve systems on gas transmission and distribution pipelines. Specific areas of discussion include: response to regulatory and customer expectations for system isolation, criteria for deployment, design approaches, use of ASV versus RCV operational mode, managing customer service and related risks, project management, installation complexities, importance of base pipeline system configuration and control, measurement and monitoring considerations.

**Gas Quality Management and Interchangeability**

Discuss the effect of blending natural gas from various sources including LNG, bio-gas, landfill, and multiple pipeline suppliers.

**Meter Sampling Programs**

Discussion will focus on both random and prescriptive meter sampling programs. Discussion will address inspection criteria, sampling practices, and inspection intervals.

**Operational Improvement, All Equipment Types**

**Multipath Ultrasonic Meters**

Discuss performance and health monitoring, installation and operation experiences, diagnostics, maintenance issues, accuracy integrity, and inspection frequencies.

**Pipeline Conditioning and Pickling**

Discuss issues and technical approaches associated with the pickling and odorant conditioning of steel and plastic pipelines. Specific areas of discussion include regulatory/code requirements, utility responsibilities, specific odorization techniques, verification processes, and customer/contractor outreach.

**Alternative Supply Sources (Bio) and Issues**

**Field Meter Testing/Proving**

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**36 Hands-On Classes**

1. ABB Chromatograph
2. ABB Total Flow
3. Becker Control Valve VRP Pilots
4. Itron Regulators
5. Elster/American Meter RPM/RABO Rotary Meters
6. Elster/American Meter Regulators
7. Elster/American Meter Turbine Meters
8. Elster/American Meter Snap Prover
9. Emerson/Daniel Ultrasonic Meter Setup and Repair
10. GE/Dresser Electronic Volume Correctors
11. GE/Dresser Model 5 Prover
12. GE/Dresser Rotary Meter Repair
13. GE/Dresser Electronic Temp Correcting Index (ES3/ETC)
14. GE/Dresser DP Testing on Rotary Meter
15. GE/Dresser D-800 Meter
16. BPE Control Valve & Positioners (Pneumatic & Electronic)
17. Emerson/Fisher Regulators
18. Emerson/ROC PID Control
19. Emerson/Daniel GC
20. CGI - (Combustible Gas Indicators)
21. Heath "Odorator" Odorant Testers
22. Hy-Loc - Tube Fitting and Bending
23. Eagle Research Corp - Electronic Volume Corrector
24. Elster/Instromet Ultrasonic Meter Setup and Repair
25. Honeywell/Mercury TCI Installation & Maintenance
26. Mooney Flowgrid Operation & Maintenance
27. Mooney Flowmax Operation & Maintenance
28. Sick Inc. Ultrasonic Meter Setup and Repair
29. Romet Rotary Meter Install, Maintenance & Service
30. Emerson/Rosemount Smart Transmitters Operation & Calibration
31. Sensus Turbine Meter Repair
32. Spectra Sensors H2O Analyzer and Sample System
33. YZ Odorant Pumps
34. YZ DTEX Odorant Detection
35. Swagelok Tube Fitting and Bending
36. Flow-Cal Test-It Application