UNDERSTANDING PIPELINE LEAK DETECTION TECHNOLOGIES –
An Overview of Regulations, Standards, Requirements, Design & Operations

Why: This course is directed to pipeline operators and engineering firms who are involved in the requirements analysis, design, procurement, commissioning, testing and operation of Leak Detection Systems (LDS). The course covers multiple factors involved in decision-making, ranging from regulatory requirements, economic and practical issues, technical performance, and operational/organizational issues. It aims to cover the spectrum of currently available technologies and to describe current industry best practices in the area of LDS, with a particular emphasis on liquids pipelines.

What: This is a one-day, classroom course. The printed materials include copies of the main regulations and best practices documents covered during the seminar. The course will cover several case histories and examples to illustrate the theory. Attendees are encouraged to suggest any of their own case studies for discussion in the class.

Instructor: David Shaw - Dr. Shaw has over 20 years of technical experience in the application of advanced modeling and IT concepts to the energy industry worldwide. Following academic appointments both in mathematical and engineering disciplines, he has held a wide variety of research, development, consulting assignments, both in the upstream and pipeline & facilities modeling; and real-time automation sectors. Recent experience involves senior consulting assignments at major international pipelines; and automation and control suppliers.

Dr. Shaw is a past Chairman of Professional Education at the Society of Petroleum Engineers, a past Royal Society Lecturer, and is an external examiner in Mathematics and Computer Science at Rice University.

Where: Technical Toolboxes
3801 Kirby Dr. #501
Houston, TX 77098

Price: $800.00 per student

Course Syllabus

I. Practical Requirements and Regulatory Compliance

A. Federal Regulations, PHMSA, the PIPES Act and EPA State Regulations
   1. Recommended Best Practices
   2. 2001 PHMSA IM Rules, 2008 PIPES Act
   3. EPA - 40 CFR Part 280

B. Legal and Practical Sensitivity and Reliability Thresholds, and How they are Measured.
   1. API RP 1130
   2. API RP 1149
   3. Naval Facilities Engineering Service Center (UG-2028-ENV)

Focus Study - Alaska State Regulations overview

II. Current LDS Technology

A. Categorization:
   1. Visual Inspection/Observation
   2. Instrumented Monitoring of Internal Pipeline System Conditions
      -- Regular or Periodic Monitoring of Operational Data
      -- Computational Pipeline Monitoring (CPM)
      -- Data Analysis Methods
   3. External Instrumentation for Detecting Spilled Hydrocarbons

B. Overview - Key Considerations for Evaluating Adequacy

III. Major LDS Performance Issues

Overview Discussion of:
Rate of False Alarms and Misses
Instrument Accuracy
Personnel Training and Qualification
System Size and Complexity (Including Batch Line Factors)
Leak Size vs. Leak Flow Rate
Response Time
Leak Location Estimation
Release Volume Estimation
Detecting Pre-existing Leaks
Detecting a Leak in Shut-in Pipeline Segments
Detecting a Leak in Pipelines under a Slack Condition During Transients
Sensitivity to Flow Conditions
Multiphase Flow
Robustness
Availability
Retrofit Feasibility
Testing
Cost
Maintenance

713-630-0505  www.ttoolboxes.com
IV. Effectiveness of External Leak Detection Technologies

A. Technology Summary:
   -- Liquid Sensing Cables
   -- Fiber Optic Cables
   -- Vapor Sensing
   -- Acoustic Emissions

B. Performance Factors:
   -- Soil Conditions
   -- Water Table
   -- Continuous Monitoring
   -- Spacing of Sensors
   -- Leak Rate Estimation

V. Effectiveness of Internal Leak Detection Technologies

A. Regular or Periodic Monitoring of Operational Data by Controllers:
   -- Volume balance (over/short comparison)
   -- Rate of pressure / flow change
   -- Pressure point analysis
   -- Negative pressure wave method

B. Computational Pipeline Monitoring (CPM)
   -- Mass balance with line pack correction
   -- Real time transient modeling
   -- Statistical Pattern Recognition
   -- Pressure / flow pattern recognition
   -- Negative pressure wave modeling / signature recognition

C. Data Analysis Methods
   -- Statistical methods
   -- Digital signal analysis

VI Deployment

System Selection and Design Process
Redundant Systems/Backup Systems/Systems Run in Tandem
Sources of Supply
Procurement and Implementation Processes
Training / Technology Transfer / Operator Upgrades
Ongoing Operations - Testing - Maintenance
Process Issues
Continual Improvement
Budgetary Requirements

VII Case Histories