IOPTC

MODERN PIPELINE LEAKAGE DETECTION

A Virtual Instructor Led Training Programme

Principal Course Leader
Dr. Stephen Ramsay, P.Eng.

- More than 40 years 'experience in the field of pipeline, oil & gas, energy, transportation and related Industries.
- Author of three internationally published books covering pipeline and process risk assessment
- Internationally recognized expert in matters related to pipeline risk assessment, integrity management and leak detection

Virtual, live

9th -12th (2nd Week) January- 16th -19th (3rd week) January 2021

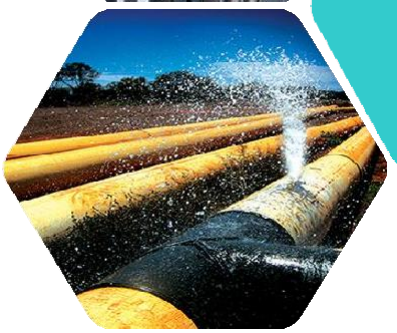
Early Bird Registration: 25th December, 2021

International Organizer

Traning & Consulting Group
MAT GROUP

www.matgroup.org

MODERN PIPELINE LEAKAGE DETECTION



"Modern Pipeline Leakage Detection Course" has been designed to improve the scientific and professional level of engineers knowledge. This course will be held for two hours per day over 8 successive days starting on Sunday 9th January 2021 from 8:30 AM to 10:30 AM – Tehran time.

Course Objectives

Although pipelines used for the transportation of hydrocarbon fluids are designed to ensure safe and reliable distribution, leaks in pipeline networks are a major source of innumerable losses and environmental disasters. Incidents of pipeline failure can result in serious ecological disasters, human casualties and financial loss. In order to avoid such menace and maintain safe and reliable pipeline infrastructure, substantial research efforts have been devoted to implementing pipeline leak detection and localisation using different approaches. This course discusses pipeline leakage detection technologies and summarises the state-of-the-art achievements. Different leakage detection and localisation in pipeline systems are reviewed and their strengths and weaknesses are highlighted. Comparative performance analysis is performed to provide a guide in determining which leak detection method is appropriate for particular operating settings.

What You Will Learn

This course highlights alternative solutions to many problems:

- Identify the fundamental problems related to the impact of oil spillage on society.
- Compare the essential differences between exterior, visual, and computational based methods.
- Evaluate the advantages and disadvantages of each of the different methods and compare their strengths and weaknesses.
- Explore the use of infrared thermography in detecting gas leakages.
- Describe the use of autonomous underwater vehicles in subsea monitoring.
- Explain the potential shortcomings of modern computational methods and how these are gradually being overcome.

COURSE OUTLINE

1. Introduction
- Introduction
- Pipeline Basics
- Pipeline Design Essentials
- Pipeline Leaks, Ruptures, Spills, and Theft
- Leak Detection Approaches

2. Pipeline Leak Detection Basics
- The Challenges of Detecting Pipeline Leaks
- Leak Location and Other Issues
- Leak Detection and Theft
- Functional Requirements
- The Fundamental Principles Summarized
- Architectural Foundations
- A Taxonomy of Pipeline Leak Detection Systems

3. Mass Balance Leak Detection
- Leaks and Conservation of Mass
- Pipeline Mass Balance Section
- Leak Detection by Mass Balance: Foundational Principles
- Volume Balance at Standard Conditions as a Proxy for Mass Balance
- Impact of Uncertainties in Mass/Volume Balances on Leak Detection
- API 1130 Applicable Classification of Mass Balance Systems
- Classification of Mass Balance–Based Leak Detection Systems

4. Real-Time Transient Model–Based Leak Detection
- The Real-Time Transient Model
- Numerical Methods
- Measurements and Boundary Conditions
- State Estimation and Related Subjects
- Leak Detection Signals
- Using the Leak Signals to Detect Leaks
- Estimating Leak Location
- Impact of Fluid Type: Liquids, Gases, and Multiphase Flows
- RTTM Uncertainty

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COURSE OUTLINE (Count)

5. Statistical Processing and Leak Detection
- Introduction to Leak Signal Processing
- Signal Processing Basics
- Statistical Processing and Significance Testing

6. Rarefaction Wave and Deviation Alarm Systems
- Rarefaction Wave Physical Basis and Equations
- Pressure Signal and Event Processing
- Leak Detection and Location Using Rarefaction Waves
- Rarefaction Wave Leak Detection Issues, Improvements,
- and Assessment
- Deviation Alarm Systems

7. External and Intermittent Leak Detection System Types
- Spill Migration
- Direct Observation
- Distributed Cable-Based Leak Detection Technology
- Fiber Optic Cable–Based Sensor Systems
- Hydrocarbon-Sensing Tubes
- Fixed/Discrete Sensor Leak Detection Systems
- Other External Methods
- General Assessment

8. Leak Detection System Infrastructure
- Field Instrumentation
- Supporting Telecommunication and Network Infrastructure
- SCADA System Considerations
- Historical Archiving of Data
- Resilient System Design

9. Leak Detection Performance, Testing, and Tuning
- Performance Metrics
- Tuning and Tradeoffs
- LDS Performance Testing and Evaluation
- LDS Tuning
- Performance Standards

10. Human Factor Considerations in Leak Detection
- The Human–Machine Signal Detection Control Loop
- Direct Observation Leak Detection

11. Implementation and Installation of Pipeline Leak Detection Systems
- Performance Requirement Specification
- Leak Detection Technology/Methodology Decision
- LDS System Integration Requirements
- System Testing
- Vendor Identification and Assessment
- Commissioning
- Long-Term Support Issues

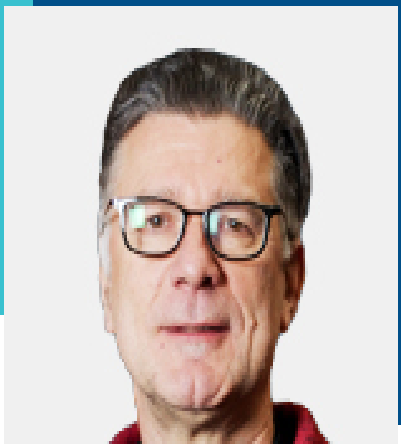
12. Regulatory Requirements
- US Regulatory Environment
- Canada
- Germany
- Regulatory Requirements in Other Jurisdictions

13. Leak Detection and Risk-Based Integrity Management
- Quantifying Integrity Breach Risk and Impact
- Understanding the Consequences of a Spill
- Leak Detection as a Component of Pipeline Loss-of-Integrity Risk Management

Who Should Attend

This training course is suitable to a wide range of professionals but will greatly benefit:

- Chemical Engineers
- Consulting Engineers
- Design Engineers
- Electrical Engineers
- Electricians
- Installation and Maintenance Technicians
- Instrument and Process Control Engineers
- Instrument Fitters Maintenance Engineers
- Mechanical Engineers and Technicians
- Operations Engineers
- Process Engineers
- Process Operators
- Production Managers



MODERN PIPELINE LEAKAGE DETECTION

Principal Course Leader
Dr.Stephen Ramsay,P.Eng.

Dr. Stephen Ramsay is a professional engineer with over 40 years of experience in consulting, teaching and research related to the pipeline, oil & gas, energy, transportation and related industries.

Dr. Ramsay's expertise includes pipeline engineering, risk assessment, optimization, process engineering and simulation. Dr. Ramsay is an internationally recognized expert in matters related to pipeline risk assessment, integrity management and leak detection.

Dr.Ramsay was the author of the Canadian Association of Petroleum Producers (CAPP) Pipeline Leak Detection Best Practice and now he is Senior Consultant with Grey Owl Leak Detection (GOLD) in Calgary, Alberta, a leading organization in the development and application of pipeline leak detection technology.

Dr. Ramsay is an expert in risk assessment of hazardous industrial operations and transportation systems. Dr. Ramsay is the author of the textbook "Dense Gas Dispersion and Risk Assessment" and is an internationally recognized expert in dense gas dispersion. Dr. Ramsay has worked extensively in safety case regimes for risk management.

Dr. Ramsay obtained a BASc and MASc degrees in Civil Engineering and Mechanical Engineering from the University of British Columbia and a PhD in Engineering and Applied Mathematics & Theoretical Physics (Fluid Mechanics) from the University of Cambridge. Dr. Ramsay was Professor of Engineering Science at the University of Western Ontario.

Dr. Ramsay has provided expert testimony in numerous hearings and trials in many jurisdictions in Canada and internationally.