Dates and Locations at www.clarion.org
HE COURSES DESCRIBED in this brochure continue to represent some of the best-available industry-based technical training courses for those working in the oil and gas pipeline industry, both onshore and offshore. Ranging in length from one to five days, all are designed to be both informative and intensive; some are well known and have been presented to thousands of participants worldwide (the pipeline defect assessment course and the subsea pipeline engineering course are examples of these), while some are still relatively new to our program. All, however, are presented by recognized industry experts, and all undergo continuous development and improvement, based both on industry advances and participants’ feedback.

While each course can be considered as ‘stand-alone’, they all have been planned to fit into the schematic shown opposite, with the intention of providing engineers and technical specialists in this industry with a defined route for training and continuous professional development. By following one or other of the various routes shown, an individual can be sure to receive an intensive and complete overview of the different subjects involved, starting at the basic level and progressing to an advanced understanding.

Clarion Technical Conferences® and Tiratsoo Technical™ are committed continuously to update, revise, and augment this course programme, and for the latest information on what is planned, readers are referred to www.clarion.org and www.pipeconferences.com.

BJ Lowe, Director, Clarion Technical Conferences

Contents Please see the website for dates and locations: www.clarion.org

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NEW! Fracture Mechanics for Pipeline Engineers

INTRODUCTION AND OVERVIEW

Continuing Education Units: 1.4

Who should attend?

• Pipeline engineers
• Designers and service professionals who are involved with the maintenance, inspection, and repair of pipelines.

Lecturer

Dr. Ted Anderson is the author of a best-selling book on fracture mechanics, which has been adopted as a required text in over 150 universities. He recently returned to independent consulting after serving as Senior VP of Technology Development for Team Inc. and the Chief Technology Officer for Quest Integrity. He founded a consulting and software company in 1995, which was acquired by Quest Integrity in 2007. He holds a Ph.D. in Metallurgy from the Colorado School of Mines.

NEW! Inspection of Challenging Pipelines

THE COURSE WILL provide an in-depth introduction into the inspection of challenging pipelines, i.e. pipelines that cannot be inspected in a straightforward manner using traditional free-swimming in-line inspection tools. The course will introduce typical flaws and anomalies found in challenging assets, including a wide range of metal loss and crack features. Assets covered in the course include difficult-to-inspect onshore and offshore pipelines in the up-, mid- and downstream sector, including gathering and distribution lines, loading lines, storage lines, risers, flexible pipe and risers, laterals. The course includes an introduction of all relevant inspection technologies and related non-destructive testing principles as well as operational procedures, data analysis and reporting.

Who should attend?

• Pipeline Engineers
• Integrity Engineers
• Corrosion Specialists
• Engineering Consultants in the field of pipeline inspection and integrity,

Course Objectives

Approximately 40% of all pipelines installed globally are considered “un-piggable,” which means they cannot be inspected with traditional free-swimming in-line inspection tools. However, these other lines also have to be inspected to investigate whether there are geometric, metal loss or crack-related issues that would affect their mechanical integrity. Many of these challenging lines can be inspected from within, i.e. using specially designed or modified tools. Some, however, will have to be inspected from the outside because internal inspection is not possible at all.

The important questions relating to the inspection of Challenging Pipelines are:

• Accessibility: how can the line be accessed and how can an inspection device be introduced into the line?
• Negotiability: how does the operation of the pipeline. It also relates to issues such as bends, diameter variations and other issues relating to the design or the operation of the pipeline.
• Propulsion: How is the tool moved through the line? Can it be pumped, is a cable or tether needed or maybe even a robotic approach?

All this will be covered in order for the participants to fully understand the difference between “piggable” and “unpiggable” pipelines. The objective of the course is to build this understanding and provide an awareness of a wide range of solutions available on the market.

Dr. Michael Beller has more than 28 years’ experience in the pipeline inspection industry. Having served in both technical and management positions with Prewagag Pipeline Services, Pipetronics, PII and NDT Systems & Services, he is currently Director of Corporate Strategy - Pipelines with Rosen Technology & Research Center in Karlsruhe, Germany. Michael holds a master’s degree in mechanical engineering, and obtained his PhD in fracture mechanics. He has been involved with a large number of inspection projects all around the world, including on- and offshore inspection work. Michael has considerable experience as a presenter and trainer, and in lecturing. He has authored more than 75 papers on the subject of pipeline inspection and intelligent pigging, and is also co-author of a German reference book on pigging technology. Currently, Michael serves on a number of Technical Committees and is also a member of the editorial board of The Journal of Pipeline Integrity. He is a former president of the Pipeline Products and Services Association.

Dr. Konrad Reber studied physics and material science at the University of Mains and Erlangen. For his Ph.D. thesis he worked on stray flux methods for the testing of magnetic materials. At Pipetronics he was responsible for the development of data analysis algorithms and the design of MFL pigs. After moving to NDT Systems & Services AG in 2000, his focus changed to defect assessment and integrity management. Between 2000 and 2006 Konrad was with TUV Rheinland as an expert within the Pipeline Technology Group. Since 2008 he has been head of research and development for the Innonpection Group. His department is responsible for designing new inspection equipment for the oil and gas industry. His focus is on the development and refinement of testing technologies with applications for underwater and otherwise difficult-to-inspect structures.

Continuing Education Units: 1.4

Who should attend?

• Pipeline Engineers
• Integrity Engineers
• Corrosion Specialists
• Engineering Consultants in the field of pipeline inspection and integrity, personnel from regulators or certifiers involved with pipeline inspection and assessment.

Course Objectives

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Continuing Education Units: 1.4

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Lecturer

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Hydrostatic Testing of Pipelines

This course is designed for pipeline personnel in engineering, integrity management, operations, and regulatory compliance roles. This course will cover a wide range of topics related to hydrostatic testing of pipelines for gas and hazardous liquid service for both in-service and new construction according to CFR 49 Parts 192 and 195.

Course Objectives

To provide attendees with necessary information for planning and conducting a successful hydrostatic test, whether it’s for initial service or retesting existing lines. Planning will cover review of integrity prior to testing through evaluation of test results. The course will focus on testing with water but testing with other mediums will be discussed.

Instructor

Gary Zunkel, PE, is the Director of Mainline Engineering with Lake Superior Consulting in Duluth, MN. He has been involved in the oil and gas industry for over 30 years with the past 10 years focusing on pipeline integrity management. He has been involved with over 100 pipeline tests; planning, managing, and reviewing. In recent years, he has planned and conducted multiple, simultaneous tests on large diameter in-service pipelines for integrity verifications.

Continuing Education Units: 1.6 (14 for the 2-day version)

Who Should Attend

The course is intended to cover the technical aspects of planning and conducting a hydrotest. It is designed for engineers, project managers, integrity management, and operations personnel to prepare for testing. The following topics will be covered:

- Pipeline integrity review
- Water source identification, disposal, and permitting
- Leak detection
- Risk assessment and contingency planning

2. Conducting a Safe Test

- Risks of potential energy
- Compressed gas
- Compressed liquid
- Protecting the public
- Managing test safety
- Immediate area
- Equipment
- Communication prior to and during a test

3. Preliminary Planning

- Pipeline evaluation
- Historical records evaluation
- Repairs
- Previous test records
- Integrity records
- Equipment pressure ratings
- Elevation profile
- Water sources
- Water crossings
- Exposed pipe

4. Test Schedule

- Preliminary Scheduling
  - Water source & landing
  - Outage
  - Permits
  - Pipeline rehabilitation
  - Notifications
- Test Setup
  - Site preparation
  - Line isolation
  - Line fill
- Test Sequence
  - Stabilization
  - Pressurization
  - Test time
- Depressurization
- Water movement & discharge
- Restoring a line to service

5. Water as a Test Medium

- Source
  - Permits

6. Other Test Medium

- Liquid hydrocarbon
- Natural gas
- Nitrogen
- Air

7. Leak Detection

- Dye
- Gas
- Acoustic pressure
- Section isolation
- Valves
- Freeze plugs
- Test headers/caps

8. Test Documentation

- Graphs
- Calibration certificates
- Drawings
- Elevation profile
- Test procedure
- Summary of results
- Explanation/calculations of pressure changes
- Test pressure interpretation
- Temperature effects on pressure
- Air entrapment
- Examples of test results and interpretation
- Pressure Volume (PV) Plot
- Creation of a PV Plot
- Off line
- Interpretation of a PV Plot
- Test log
- OQ documentation
- Historical records evaluation
- Repairs
- Previous test records

9. Managing water movement

- Fill rate
- Purging prior to line fill
- Desaltering
- Product
- Air
- Drying
- Explanation of terminology
  - Penetration depth
  - Dew point and temperature
  - Air lock
- Contamination
- Contingency
- Drain up calculations

10. Instrumentation

- Types – Pressure & Temperature
- Bourdon Tube (Pressure & Temperature)
- Bi-metallic (Temperature)
- Resistance Temperature Detector (RTD)
- Quartz electronic
- Accuracy vs. Repeatability
- Calibration
- Pressure measurement
- Deadweight – Mechanical/Electronic
- Gauges
- Recorders
- Temperature
- Thermometer
- Recorders
- Quantity
- Placement
- Type
- Volume measurement
- Stroke counter
- Flow meter

11. Data Interpretation & calculations

- Pipeline evaluation
- Historical records evaluation
- Repairs
- Previous test records

12. Test Failure

- Rupture
- Leak
- Pressure reversal
- Equipment failure
- Location of failure
- Repairs
- Retesting

13. Contingency Planning

- Repair materials
- Sluices
- Replacement Pipe
- Stopplugs
- Emergency Response
- Public relations
- Notications
- Cleanup and remediation
- Retesting
- Venting & refill

Course Outline

1. Establishing Test Requirements

- Purpose of the test
  - Evaluate integrity of the pipeline
  - Confirm integrity program
  - Establishing pressure requirements
  - Federal regulatory requirements
    - Liquid – 49 CFR 195
    - Gas – 49 – CFR 192
  - Pressure parameters based upon MOP/MAOP requirements
  - Strength Test
  - Leak Test
  - Spike Test
  - Segment Isolation
  - Headers & End Caps
  - Valves
  - Gel Isolation

2. Conducting a Safe Test

- Risks of potential energy
  - Compressed gas
  - Compressed liquid
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13. Contingency Planning

- Repair materials
- Sluices
- Replacement Pipe
- Stopplugs
- Emergency Response
- Public relations
- Notications
- Cleanup and remediation
- Retesting
- Venting & refill
NEW! Engineering Assessment of Onshore Pipeline Gathering Systems

The aim of this course is to help engineers understand the most important considerations in developing a plan for managing onshore gathering system integrity. The intent is to provide a thorough background of systems and processes in order to develop customized Mechanical Integrity Management plans and strategies.

Accordingly, the course will focus on these primary areas:
- Types of gathering systems
- Integrity threats affecting gathering systems and flowlines
- Gathering system construction materials and practices
- Risk assessment
- Risk management
- Codes and regulations
- Pipe inspection and assessment
- Anomalies, imperfections, and defects
- Assessing anomalies
- Pipe repairs
- Forward planning

Who should attend?

Project managers, pipeline engineers and maintenance personnel who are involved or responsible for the maintenance, inspection, assessment and repair of pipeline systems.

Continuing Education Units: 1.4

Documentation

Participants will receive a full set of course slides and notes in paper and electronic form, in color throughout.

Lecturer

Bryan Melan has 40 years of experience in mechanical and structural engineering and project management in the upstream and midstream oil & gas industries, including 27 years specializing in pipeline integrity management and engineering with Sunoco Logistics and, for 16 years, with Marathon Oil, where he was most recently Pipeline Integrity Subject Matter Expert for Marathon’s worldwide assets. Bryan is currently owner and principal engineer at Tide Water Integrity Services LLC, an engineering consultancy providing expertise on pipeline and fixed equipment structural integrity engineering, risk assessment, inspection, data integration, data validation, asset fitness-for-service, and design life-extension analyses for fixed equipment such as pipelines, process piping, pressure vessels, and tanks. He is also currently engaged to provide expert witness services in new pipeline construction and patent infringement litigation.

Lecturers

Moneesa Rizkalla is president of Visitless Integrity Assessment Ltd. in Calgary. Prior to forming VIA he held positions with WorleyParsons, TransCanada / NOVA, and PRCI. Mr. Rizkalla is a recognized specialist in pipeline design and integrity management. His experience includes several management and senior technical roles in pipeline design, project management, pipeline risk assessment and integrity management planning, operations support, and associated technology development and applications. His professional experience has been gained in both Canadian and international settings. Within the pipeline integrity management area, Mr. Rizkalla has specialized in the management of external load hazards – geotechnical and mechanical damage. He has been involved in a wide range of pipeline geotechnics with an extensive list of associated publications. In 2000 he founded Visitless Integrity Management, a company that delivers commercial proactive prevention solutions to the pipeline industry’s mechanical damage challenges. Mr. Rizkalla holds a BSc in Civil Engineering and an MSc in Civil Engineering (Geotechnical).

Dr. Rodney S. Read is a practicing consulting engineer specializing in applied rock mechanics and geotechnical engineering. He is president of RSRd Consulting, Inc., based in Okotoks, Alberta. Dr. Read has been involved in projects ranging from concepts for nuclear waste disposal to geohazard assessments for pipelines in challenging physiographic environments. He was geotechnical lead on the Turtle Mountain monitoring project at the historic Frank Slide in southern Alberta, the site of Canada’s deadliest landslide. His current interests involve geotechnical risk assessment of linear systems in difficult terrain. Dr. Read holds a BSc in Geological Engineering and a Ph.D. in Civil & Geological Engineering.

Who should attend?

Supervisors, engineers and technicians responsible for ensuring the adequate protection of pipeline assets, regulators.

Course notes

All delegates will receive a detailed set of lecture notes on cd providing an invaluable reference document. The course documentation also includes the reference book Pipeline Geo-Environmental Design and Geohazard Management edited by Moneesa Rizkalla (2008) as well as the 2009 PRCI study Guidelines for Constructing Natural Gas and Liquid Hydrocarbon Pipelines Through Areas Prone to Landslides and Subsidence Hazards, a combined $225 value.

Syllabus

DAY 1

1. Introduction
2. An overview of regional Geohazards – focusing on the more commonly encountered hazards such as landslides, seismic, subsidence and water course related integrity issues
3. Data Management Requirements and Utilization
4. Hazard Assessment Methodologies – Prioritizing and Addressing risk
5. Hands-on Exercise

DAY 2

6. Monitoring – An overview of options
7. Design and Operational Mitigation - an overview of options
8. Hazard Reduction strategies during design, construction and operations
10. Hands-on Exercise
11. Conclusion

Continuing Education Units: 1.4

Geohazard Management for Pipeline Engineers

The course is an introduction to Geohazard Management for non-geotechnical pipeline managers and regulators within the Canadian context. It focuses on the key issues in Pipeline Geohazard Management, including:

- Leading concepts and practices for the entire pipeline life-cycle
- Identification of Geohazards and their effects on pipelines
- Risk reduction strategies during design, construction and operations

The course covers the management of related data, risk assessment, monitoring and mitigation technologies. It also reviews the range of risk assessment methods with examples from the pipeline industry.

In recent years, the pipeline engineering and construction community has gained valuable experience associated with routing, design and construction of new major pipeline projects in challenging environments, and in meeting the heightened expectations of ensuring the integrity of aging operating systems. Worldwide, regulatory agencies are raising their expectations of the pipeline industry to deal more rigorously with Geohazards including landslides, erosion and seismicity.

The topics addressed in this course have recently seen significant advances that have redefined the state-of-practice in how to design, construct, and ensure the integrity of operating pipelines in areas prone to Geohazards. An important guiding philosophy for practically managing these hazards in a responsible yet cost-effective manner is to consider Geohazard effects from the pipeline out, as opposed to a purely geotechnical treatment of Geohazard occurrence independent of the pipeline.
Onshore Pipeline Engineering

THERE ARE MILLIONS of kilometers of onshore oil and gas pipelines around the world. As the industry expands and new staff are introduced into it, there is an increasing need for full appreciation of the engineering design of pipelines. Additionally, many staff in the pipeline industry have not received basic pipeline engineering training, and some staff are only exposed to specialized areas. This course is a formal introduction to pipeline engineering.

Who should attend?
- Engineers who are new to the pipeline industry and those who wish to update their knowledge, including: pipeline engineers, pipeline construction engineers, project managers, maintenance engineers, contractors, supervisors, inspectors, operators, equipment suppliers, inspection and quality control engineers, pipeline design engineers.
- Engineers who need a wider appreciation of onshore pipeline engineering.

Documentation

Included with the course fee is a detailed set of lecture notes (700 pages, COLOR) and a CD containing an additional 300 pages of text reference material.

Continuing Education Units: 3.0

Good experience and lots of knowledge for someone new to pipeline engineering like me. All topics covered were very informative and the piping explained, regardless of time constraints. Dr. King and Prof. Hopkins did an excellent job. Thanks to Clarion and GPM for this great course.

“The instructors’ knowledge and experience are first rate.”

Course Program

Day 1

Pipelining Engineering Basics (HOPKINS)
- Basics of Oil and Gas
- The Petroleum Industry
- Introduction to Pipelines
- Basic pipeline and material parameters
- Pipeline Safety
- History of Pipelines

Pipelining Materials Selection (KING)
- Steels used for Line pipe
- Compositional Limitations, Mechanical Properties, Grades
- Fabrication of Line pipe – Seamless, Longitudinal Welded, EFW, Spiral
- Toughness and Weldability
- Improving Corrosion Resistance
- Solid Corrosion Resistant Alloy Pipe
- Internally Clad Pipe
- New Materials

Pipelining Design (HOPKINS)
- Legislation and regulations
- Development of pipeline design codes
- Design Process
- Detailed design:
  - Pipeline Crossings
  - Pipeline Valves

Day 2

Other Pipeline Design Considerations (HOPKINS)
- Surges/overpressures
- Bends
- Pipe protection
- Fracture control
- Fluids and Hydraulics

Pipelining Welding (KING)
- Basics of Welding
- Types of Welding Processes
- Effects on Line pipe of the Welding Process
- Welding Procedures
- Inspection of Welds

Day 3

Pipelining Routing and Construction (HOPKINS)
- Basics of routing
- Classification schemes
- Easements and rights of way
- Legislation and permits
- Routing methodologies
- Pipeline construction

Internal Pipelining Corrosion (KING)
- Why Pipelines Corrode
- Sweet Corrosion, Sour Corrosion, Microbiological Corrosion
- Cracking Mechanisms
- Calculating Corrosion Rates
- Effect of Flow on Corrosion
- Water Injection Pipelines

Monitoring of Internal Pipelining Corrosion (KING)
- Inhibition of Corrosion
- Biocide Treatment of Pipelines

Day 4

Monitoring Internal Corrosion
- Supplementary Inspection Techniques

Pipelining Testing, Operation, Inspection (HOPKINS)
- Pressure Testing
- Batching
- Incorrect operation
- Control System, Leak Detection
- Inspection and monitoring of operational pipelines

Pipelining Project Control (HOPKINS)
- Management
- Scheduling and resource planning
- Execution
- Contracting strategies

External Pipelining Corrosion and its Prevention (KING)
- External Corrosion in Soils
- Coatings and their Application
- Field Joints
- Interaction of Coatings and Cathodic Protection

Day 5

Cathodic Protection (KING)
- How Cathodic Protection Works
- Monitoring of CP at Test Points
- Full Line Surveys with CIPS and Instant Off Surveys
- Coating Surveys using Pearson and DCVG Techniques
- Interference from Third Party Lines and DC/AC systems

Utility and Intelligent (Smart) Pig Inspection (HOPKINS)
- The History of Internal Inspection
- Why Pig?
- Types of Pig
- The History of Internal Inspection
- Why Pig?
- Types of Pig
- Intelligent (Smart) Pigs:
  - What do they find and how accurate are they?
- Pigs versus Hydrotest

Pipeline Equipment and Systems (MIESNER)
- Hydraulic tools
- Equipment – pumps, compressors, motors, pressure control devices
- SCADA
- Leak detection

Pipeline Engineers (HOPKINS)
- Responsibilities duties and ethical behavior

Pipeline Integrity Management (HOPKINS)
- Risk and risk analysis
- Integrity management methods
- Class tutorial – risk analysis of 3 pipelines

Close with Question and Answer Session (HOPKINS & KING)
Pipeline Pigging and ILI

The use of in-line tools for inspection and cleaning is accepted as essential for the safe and profitable operation of all pipelines. Internal inspection is required for detecting changes in circumference, anomalies, or wall loss due to corrosion. Pipeline operators offshore wage a constant battle for flow assurance against paraffin, hydrate, and asphaltenes formation in deepwater lines, and pigging, combined with chemical treatment, is their primary weapon. The course is designed to provide a comprehensive introduction to all aspects of utility and in-line inspection pigging.

Lecturers

Dr. Tom Rubenik is Vice President of Integrity Services at CC Technologies Service, Inc. He has more than 20 years of experience in pipeline management and has been involved in all aspects of Asset Risk Management of Pipelines and Facilities, evaluating risk of pipeline segments based on multiple integrity threats and data sets, assisting clients in developing their Integrity Management Programs and more specifically their Inline Inspection programs.

Pam Moreno has over 25 years of experience assisting clients in getting the most from their pipeline integrity efforts, including Inline Inspection programs. She specializes in conducting risk and threat assessments of pipeline facilities. She is involved in all aspects of Asset Risk Management of Pipelines and Facilities, evaluating risk of pipeline segments based on multiple integrity threats and data sets, assisting clients in developing their Integrity Management Programs and more specifically their Inline Inspection programs.

George Williamson is a registered professional engineer, NACE certified corrosion and a cathodic protection specialist. He has managed compliance and safety systems, liquid and gas transmission pipelines and has more than 25 years of Operations, Maintenance and Integrity Management experience. He is a registered professional engineer, NACE certified corrosion and a cathodic protection specialist. He has managed compliance and safety systems, liquid and gas transmission pipelines.

Practical Pigging Operations

His new training course is being developed to provide a wide-ranging overview of all aspects of pigging operations. The course will be held at several different pressurized test loop facilities around the world.

Who should attend?

Engineers and technical personnel involved in field pigging operations.

Course Notes

The classroom portions of the course will be fully documented with all slides and related documents printed in a durable 3-ring binder for reference during and after the course.

Syllabus

The syllabus will include both hands-on exercises using the test loop(s), and classroom instruction, and include full documentation. The content of the course is being developed jointly by Penspen, Rosen Engineering, and Clarion/Scientific Surveys Ltd. Rosen Engineering, through its Rio de Janeiro office, has agreed to provide cleaning, geometry-, and intelligent tools for use during the course, along with its expert technicians. Among subjects that the syllabus will cover are:

- Pig trap doors: design, operation
- Types of utility tool
- Types of intelligent tool
- Post-in-line inspection design
- Launching and receiving utility and intelligent tools
- How to assess a tool’s performance
- Signalizing and pig location
- Locating and reporting sample defects
- Site safety: procedures and performance

The syllabus will include both hands-on exercises using the test loop(s), and classroom instruction, and include full documentation.
Defect Assessment in Pipelines

Many transmission pipelines are now over 50 years old. This is “middle aged” in pipeline terms, and even the best-designed and -maintained pipeline will become defective as it progresses through its design life. Therefore, operators need to be aware of the effect these defects will have on their pipeline, and — more importantly — be able to assess their significance in terms of the continuing integrity of the pipeline. The increasing use of high-technology maintenance (for example, intelligent pigs) is helping pipeline owners to assess the condition of their lines, and if these modern maintenance methods are combined with modern defect-assessment methods, they can provide a very powerful, and cost-effective, tool.

This course will present the latest defect-assessment methods to pipeline engineers and managers. These methods will range from simple, quick, assessment methods, to the more-detailed — fitness for purpose — analysis. The course is highly interactive and takes the form of lectures, workshops, and case studies. The course will cover methods available to assess the significance of defects detected in onshore and offshore pipelines. It will introduce simple analytical methods used to assess internal and external corrosion, dents and gouges, cracks (e.g. SCC), weld defects, and fatigue. The course is unique as it is a holistic approach to defect assessment, and it ensures the student appreciates all aspects of the subject, including repair and risk management.

Who should attend?

Pipeline engineers, designers and service professionals who are involved with the maintenance, inspection, and repair of pipelines.

Documentation

All participants will receive a detailed set of lecture notes (700 pages in colour) plus a CD containing 500 pages of documents for further reference.

Lecturer

Dr. Phil Hopkins is a consulting engineer with more than 25 years’ experience in pipeline engineering. Phil formed his consultancy company in 2015, after being Technical Director with Penupen Ltd in the UK, and previously Managing Director of Andrew Palmer and Associates, in the UK. He has worked with most of the major oil and gas companies and pipeline companies around the world, providing consultancy on management, business, design, maintenance, inspection, risk analysis and safety, and failure investigations. He is the past-chairman of the ASME Pipeline Systems Division, and is a Fellow of ASME. More than 15,000 engineers and technical personnel around the world have attended his courses. He also teaches extensively on masters’ programmes at Newcastle and Northumbria Universities in the UK.

Continuing Education Units: 1.7 (1.4 for the 2-day version)

Course Program

DAY 1

Introduction to basic pipeline engineering principles

- Basic pipeline design principles
- Stressors in pipelines
- Routing of pipelines
- Basic pipeline operating and maintenance parameters
- Maintenance and inspection methods

Introduction to pipeline defects — why pipelines fail

- How safe are pipelines?
- How often do they fail?
- What causes pipelines to fail?
- Pipeline risk
- History of pipeline defect assessment

Introduction to fracture mechanics (handouts and notes only, no lecture)

- Basic theory
- Brittle and ductile fracture
- K, J, and CTOD

Fundamental pipeline defect failure relationships

- Why pipeline defects fail
- Fundamental failure relationships
- Explanation of key parameters

DAY 2

How to assess corrosion defects

- Introduction to basic theory
- Background, strengths and weaknesses
- Methods to assess corrosion
- ASME RS1.8 and RSTRENG methods
- DNV, BG, etc., methods
- Interacting defects
- Universal curves for assessing corrosion defects.

Workshop: corrosion assessment using fitness for purpose

How to assess gouges

- Introduction to basic theory
- Methods to assess gouges
- Additional problems and concerns with gouges

How to assess dents

- Introduction to basic theory
- Methods to assess dents
- Methods to assess dents containing gouges
- Rock dents
- Problems with fatigue loadings

How to assess cracks

- Basic theory
- The problems with cracks in pipelines
- Stress corrosion cracking (low and high ph)

How to assess weld defects

- Welds in pipelines
- Assessing defects in pipeline girth welds
- Assessing non-planar defects in welds
- The EPRG girth weld defect guidelines
- Fatigue design of girth welds

Setting intelligent pig inspection levels

- Pigs — where they came from and what they can do
- Basic theory
- Magnetic, ultrasonic pigs – their accuracy and limitations
- What pigs can detect
- What operators want to detect
- Setting intelligent pig inspection levels

Workshop: setting intelligent pig inspection levels

How to assess fatigue

- (handouts and notes only, no lecture)
- Why do pipelines fatigue?
- Basic fatigue theory
- Fatigue assessment – design
- Fatigue assessment – service

Fracture propagation and arrest

- Why fractures propagate
- Brittle and ductile propagation
- Fracture arrest
- Calculating toughness requirements

DAY 3

Pipeline repair and rehabilitation

- Repair and rehabilitation strategy
- Response to discovering defects
- What are the cost implications?
- Repair methods: grinding, weld deposition, sleeves, clamps, tape wrapping, composite wraps
- Time to repair

Risk and integrity management and analysis

- What is risk and risk analysis?
- Risk management around the world
- Risk management in the USA
- Risk management methods – API 1160 and ASME RS1.8
- Baseline and direct assessment – discussion item
- Integrity management programs
- Prioritization schemes

Workshop: setting priorities

“Great presenter. Good at keeping the class’ attention and making the information interesting.”
— Alexander Woll

“Surpassed my best expectations”
— M. Odigie

“I found the course to be extremely educational and well presented.”
— Dr. Hopkins is very knowledgeable, and he communicates the course content well... makes it easy to understand.”
— Kenton Waddell, Southern California Gas Co.

“The broad subject matter approach filled a lot of knowledge gaps”
— Charles Reznick, Transco/Transco Pipeline Company

“Good lecturer, attentive to students’ queries and knowledgeable of the pipeline business.”
— Brent S. Smith, Engineer in Mantua/Northeast/Inspection/Structural (company name not filled by request)

Continuing Education Units: 1.7 (1.4 for the 2-day version)
Managing Cracking and Dents in Pipelines

“Very good course and well taught; numerous takeaways to review and use to be a better operator.”
— Mark Walmus

“Very knowledgeable instructor; great use of examples and experiences to complement the material.”
— Hector Knoll

If the operator has reason to believe any pipeline segment contains or may be susceptible to cracks or crack-like defects … the operator must perform fracture mechanics modeling for failure stress pressure and crack growth analysis to determine the remaining life of the pipeline. . . .

PHMSA Notice of Proposed Rulemaking

Various forms of cracks or crack-like indications are known to be present in pipelines, which could become a safety concern to their safe operation. The most common forms of cracking are manufacturing-related, environmentally induced, and mechanically driven, such as Stress Corrosion Cracking, Corrosion Fatigue Cracking, Hydrogen-Induced Cracking, Hook Cracks, and anomalies associated with the Seam Weld (as found in vintage ERW/flash-welded pipe).

This course will provide an integrated, data-driven approach for addressing these forms of cracking and seam-weld anomalies. It covers in greater detail the formation of these types of features and the conditions that drive their growth until they become unstable, leading to leaks or ruptures. The appropriate assessment methods such as ILI crack tools, pressure testing and direct assessments will be presented as well as traditional and current engineering approaches for establishing crack severity and determining future integrity. Case studies will be reviewed and discussed throughout course instruction. Appropriate repairs options for cracks will also be covered.

Who should attend?

• Pipeline engineers and maintenance personnel who are involved in, or responsible for, the maintenance, inspection, assessments and repair of pipeline systems
• Non-Destructive Inspection personnel who wish to acquire or increase their knowledge of crack formation and growth in pipelines
• Analysts who review ILI Crack tool data and issue inspection reports

Documentation and Materials

Participants will receive a full set of course slides and notes in paper and electronic form, in color throughout.

Continuing Education Units: 1.6
(1.4 for the 2-day version)

Lecturer

Sergio Limon has worked in the oil & gas pipeline industry for more than 15 years with emphasis on pipeline integrity threat analysis and response. He was employed for 10 years with a large owner and operator of natural gas gathering, processing and transportation services. He led for six years the Asset Integrity group for the western division responsible for the analysis, response and remediation of integrity threats as well as the implementation of the Gas Integrity Management Program. Sergio holds B.Sc. and M.Sc. degrees in Mechanical Engineering with emphasis in fracture mechanics and materials from the University of Utah. He is the founder of Limon Pipeline Integrity Analytics.

Topics covered

1. Formation and Growth of Cracks, Crack-like Features and Dents in Pipelines
2. Foundations of Engineering Fracture Mechanics
3. Performing Engineering Evaluation of Cracks and Seam Weld Anomalies
4. Performing Engineering Evaluation of Dents
5. Integrity Assessments for Addressing Cracks and Dents
6. In-Ditch Non-Destructive Evaluation (NDE) and Repair Methods

Who should attend?

• Pipeline engineers
• Designers and service professionals who are involved with the maintenance, inspection, and repair of pipelines
• Regulatory compliance specialists

Documentation and materials

All presentation material will be documented in an Adobe Acrobat PDF provided by download prior to the class. For this reason it is necessary to bring your laptop or tablet computer. In addition participants will receive macro-enabled Excel spreadsheets that perform various calculations, including effective area metal loss assessment and pressure-cycle fatigue analysis. A laptop is required.

Lecturer

Ian Smith is a consulting engineer with over 20 years in the pipeline industry. He formed his own consulting company, ID Smith Pipeline Engineering, in 2016 after having leadership roles within inline inspection, pipeline operating, and Fitness-for-Service consulting organizations. This has provided Ian with a unique perspective on the complete process of pipeline integrity from data collection to defect fitness-for-service assessment through to integrating assessment results into integrity management programs. He is a Professional Engineer and a member of AIME.

Syllabus

1. Introduction to Pipeline Integrity
2. Assessment of Metal Loss
3. Assessment of Cracks
4. Assessment of Plain Dents
5. Combined Anomalies
6. FSF Case Studies
7. API 1163 Compliance Review

Continuing Education Units: 1.4/2.

Pipeline Defect Assessment Workshop + API 1163* Compliance Review

* (optional half-day)

This course involves practical application of the principles and methods learned in our Defect Assessment in Pipelines course. It takes those who want to take their defect assessment knowledge to the next level, it goes into greater detail on the various defect assessment methodologies and provides participants with hands-on practical experience performing calculations based on them. Participants will become comfortable performing and reviewing a wide variety of anomaly assessment methodologies and will understand when to best apply them within an Integrity Management Program. Cases and problems worked in class will be based on actual inspections of working pipeline systems. The course addresses both traditional pipeline methodologies as well as recent innovations, including the API 579 Fitness-for-Service Standard.

API 1163 provide not only provides requirements for qualification of in-line (ILI) systems, it also provides a framework for the successful development, implementation, and execution of a successful ILI program. As of January 23, 2017, CFR Part 195 requires compliance with API 1163 for interstate hazardous liquid pipeline operators under PHMSA jurisdiction.

This half-day workshop will provide attendees with a thorough understanding of API 1163 requirements and how to best utilize this standard within an operator’s integrity management program before, during and after an inspection. Specific topics include the following:

• How to evaluate and select appropriate ILI technology for specific pipelines,
• How to develop operational procedures to ensure that ILI tools are operated successfully,
• How to report ILI results using a common nomenclature, and
• How to verify that ILI results meet quality and accuracy expectations.

• Compliance with API 1163

Ian Smith

Consulting Engineer
ID Smith Pipeline Engineering
Introduction to Excavation Inspection and Applied NDE for Pipeline Integrity Assessment

The course is specifically designed for project managers, engineers and technical personnel responsible for the management, implementation and reporting of pipeline integrity inspection activities.

Who should attend?

The course was excellently presented and much useful information was shared.

Presenters were extremely knowledgeable and took time to explain things. The hands on was great.

—Brian Bruce

Important to data collection and correlation

• What / why information to collect
  • Industry guidelines
  • General work flow
  • Case investigations

Contract considerations for ILI and or DA vendors

• Reporting format
• Deletability tolerances
• Sizing tolerances
• Re-grading of the log

Contract considerations for NDT vendors

• Qualifications
• Availability technology
• Allowable limits NDT inspection techniques
• Procedure demonstration
• Documentation

Optimize NDT results with ILI or DAS results

• Excavation location verification
• Universal naming systems for anomalies
• Universal location and sizing system for anomalies
• Reporting format

What do you do if you don’t find an anomaly in the excavation?

• General procedures
• ILI tool specific procedures (MTL, UT, mechanical)
• Advanced NDT techniques and technology
• Corrosion
• SCC
• Mechanical
• ERW and girth welds

Specialized excavations

• Pre 1970 ERW
• SCC soils modeling

Continuing Education Units: 1.4

Lecturers

Jim Marr is President of Marr Associates Pipeline Integrity Ltd. Marr Associates has been in the pipeline integrity business since 1992. For the last eight years he was the SCC Program Planning Manager for TransCanada Pipelines. Jim has worked in pipeline integrity for the past 30 years, focusing on SCC, external corrosion, direct assessment, direct examination, ILI development and correlation, data management and integration and the characterization of the environment around the pipeline. He graduated with a degree in earth sciences in 1986 from the University of Guelph, Ontario. He is a member of NACE and a past vice-chair of the NACE SCDCA committee.

Rick Dessaulles is currently Line Product Manager (Analysis) with Baker Hughes Management Group. He has been involved in the pipeline industry for the past 24 years in the Data Interpretation Department analyzing 1000's of miles of pipelines around the world, specifically in Magnetic Flux Leakage type tools. He has been involved in past NACE conferences as Chairman of the Pipeline Integrity Symposium and presented/co-write papers on Excavation Data Collection and Data Analyst Qualification Processes. He was on the Standards Development Committee for ANSI/ASNT ILI-PQ-2005 In-Line Inspection Personnel Qualification and Certification Standard. He received his Bachelor of Science in Geology from McMaster University in Hamilton, Ontario.

Advanced Pipeline Risk Management

From the National Transportation Safety Board Safety Study Integrity Management of Gas Transmission Pipelines in High Consequence Areas, January 27, 2015:

“The study did find that IM programs…require expert knowledge and integration of multiple technical disciplines including…probabilistic and statistics, and risk management…The study found that aspects of the operators’ threat identification and risk assessment processes require improvement.”

In 2017 PHMSA will implement a wide range of stricter regulations for improving pipeline safety. At the top of the list are these:

• Requirements for conducting risk assessment for integrity management, including seismic risk.
• Expanded mandatory data collection and integration requirements for integrity management, including data validation and seismicity.
• Increased focus on a data- and risk-informed approach to safety by requiring integration of available data, including data on the operating environment, pipeline condition, and known manufacturing and construction defects.
• Required annual evaluation of protective measures in High Consequence Areas, with established deadlines for internal inspections where possible for any new or replaced pipeline that could affect an HCA.

Who should attend?

Anyone requiring a general knowledge of pipeline risk concepts and how they can be practically integrated into pipeline operations, maintenance, design, or regulation.

Documentation

Participants will receive a detailed set of course notes for reference after the course. Also included is the recently-published third edition of the definitive reference book, Pipeline Risk Management Manual, by W Kent Muhlbauer, as well as a comprehensive course notebook for future reference.

Lecturers

W. Kent Muhlbauer is a principal of WKM Consultancy and is the author of the widely-repected reference book Pipeline Risk Management Manual. Since its inception in 1994, WKM has been an advisor to government regulatory agencies and academia as well as the primary consultant in numerous pipeline technical projects for more than 50 clients, including many major US and international pipeline-operating companies.

Who should attend?

Course Program

DAY 1

Introduction

• Methodology quickview
• Objectives of risk management
• Gathering and effectively utilizing information
• Using model results in decision-making

Definitions

• Risk assessment concepts
• Tools
• Methodology choices
• Choosing the optimum approach
• Data collection issues
• A proposed methodology—the basic algorithm with assumptions
• Customizing the methodology for specific applications
• Sensitivity analyses
• Databases and software issues
• Tips and learning experiences in practicing risk assessment

DAY 2

Risk management

• Data analysis
• Data-based decision making
• Project prioritization based on risk assessments
• Building a resource allocation model
• Correlating relative risk scales with absolute risk

DAY 3

Administrative processes—ingredients for continued success

• Administrative support structures
• Data maintenance
• Reporting
• Procedures
• Training
• Performance measurements

“A good opportunity to learn and discuss new ways to think about risk.”
—Charlie Childs, Kinder Morgan

“Very good presentation and overview of risk.”
—Jan VYTHIEL, SEPS, a.s.

“Great class, great instructor. Kent did a great job of providing and explaining the formulas.”
—Gregory Post, Valero Corp.

“The course covered the risk assessment approach in a very comprehensive way.”
—Anil Ilaiparith

Continuing Education Units: 1.4
Stress-Corrosion Cracking in Pipelines

Although stress-corrosion cracking (SCC) is responsible for a very small percentage of pipeline failures each year, it continues to be a safety concern to pipeline operators, and it must be treated in integrity management plans. This course will provide a detailed description of what is known about its appearance and causes, and it will discuss various approaches to mitigating and managing the problem. Practical information on recognizing and dealing with SCC will be presented, along with descriptions of research results that have led to our current understanding of causes and methods of management.

Who should attend?
- Pipeline engineers, designers, and service professionals who are involved with the maintenance, inspection, and repair of pipelines
- Researchers who want to be aware of the current understanding of SCC in pipelines

Lecturers
- John Mackenzie is a senior pipeline specialist with Kiefner & Associates, focusing on the areas of Integrity Management Plans and Stress-Corrosion Cracking. He has extensively managed the laboratory portion of that program from 1985 to 1982, which added significantly to an understanding of the phenomenon, and has explored a number of possible solutions to the problem. For the past several years, he has been the SCC consultant for GRZ and FRG. He recently completed a comprehensive literature analysis on SCC, and he actively participated in drafting the NACE Recommended Practice on SCC Direct Assessment.

Microbiologically Corroded Pipelines: Prevention, Detection, Mitigation

Microbiologically influenced corrosion (MIC) caused by sulfate-reducing bacteria has been found to be a serious threat to pipeline integrity, safety, and reliability. Numerous pipeline failures have been attributed to sustained, localized pitting corrosion. Bacterial colonies that can form in some pipelines will produce combinations of products that pit the metal. Preventing, detecting, and mitigating this type of pitting is often difficult and requires monitoring of the physical, chemical, and biological characteristics of the pipeline. This course will address these issues in detail, with particular emphasis on prediction and monitoring, and testing methods for managing MIC.

Who should attend?
- Pipeline engineers, technicians, and service professionals who are involved with the maintenance, inspection, and repair of liquids, gas, and products pipelines, storage tanks, and related components
- Project and facility managers concerned with system integrity assessment
- Researchers who want to be aware of the current understanding of MIC in pipelines

Course Program

DAY 1
- Basics of Corrosion and Microbiology
  - Sulfate-reducing bacteria (SRB)
  - Historical data
  - Occurrence
  - Mechanism
- Ecosystems
  - Corrosion by SRBs
  - Theory
  - Reserve souring by SRB
  - Sources of the organisms
  - Reservoir cooling
  - Sulfide production
  - SRB corrosion and growth
  - Redox potentials
  - Checklist for evaluating sediments and soils
- Case histories
  - External corrosion and internal corrosion
  - Typical corrosion rates experienced
  - Operator methods used to prevent continued corrosion.

DAY 2
- Predicting internal corrosion of pipelines by SRB
  - Pipelines at risk
  - Checklist for evaluation of risk of SRB corrosion
  - Limitations of growth and activity
  - Location of growth of SRB
  - Pipeline profile
  - Water cut
  - Product flow rate and water settlement
  - Effect of internal roughness
  - Re-population
  - Typical pipeline failure mechanisms

Monitoring and testing methods for SRB Control of SRB
- Chemical treatment to control SRB
- Biocide treatments in water systems
- Biocide treatment of oil systems
- Effectiveness of corrosion inhibitors
- Use of pigging as an adjunct to chemical
- Re-establishment of corrosion inhibitor films

Prevention of external corrosion by SRB
- Impact of SRB on coatings
- Calcareous backfill in the pipeline trench
- Cathodic protection
- Consumption of sacrificial anodes by SRB in sour sediments
- Options for protecting non-piggable pipelines
- UV sterilization

Internal inspection and defect assessment
- Internal inspection methods for detecting MIC damage
- Prioritizing inspection of pipeline networks
- Assessing reported defects

Documentation
- Participants will receive a full set of the course notes and slides in COLOR, in ring-binder format.

Lecturer
- Dr Roger King

Continuing Education Units: 1.4

DAY 1
- Pipeline engineers, designers, and service professionals who are involved with the maintenance, inspection, and repair of pipelines
- Researchers who want to be aware of the current understanding of SCC in pipelines

Lecturers
- John Mackenzie is a senior pipeline specialist with Kiefner & Associates, focusing on the areas of Integrity Management Plans and Stress-Corrosion Cracking. He has extensively managed the laboratory portion of that program from 1985 to 1982, which added significantly to an understanding of the phenomenon, and has explored a number of possible solutions to the problem. For the past several years, he has been the SCC consultant for GRZ and FRG. He recently completed a comprehensive literature analysis on SCC, and he actively participated in drafting the NACE Recommended Practice on SCC Direct Assessment.

Pipeline Repair Methods, Hot Tapping, & In-Service Welding

Who should attend?
Pipeline engineers, operations and maintenance personnel, inspectors, and welders.

Lecturers
Bill Bruce is director of welding technology with DNV - formerly CC Technologies. Prior to joining DNV, he was a technology leader at Edison Welding Institute and a senior engineer at Panhandle Eastern Pipeline Co. He is a member of the American Petroleum Institute, and the APLI 1104 Committee and is the chairman of the Maintenance Welding Subcommittee.

Dr. Chris Alexander is principal stress engineer at Stress Engineering Services, Inc. He has been involved in assessing the effects of dents and mechanical damage on the structural integrity of pipelines. Mr. Alexander has also been involved in assessing the use of composites in repairing pipelines and has published numerous papers and made international presentations on this subject.

Day 1
DAY 1
Defect assessment prior to repair
• Reason for assessment
• Types of pipeline defects
• Pressure reduction requirements
• Corrosion measurement methods
• Corrosion assessment methods

Selecting an appropriate repair method
• Pipeline repair manual
• Detailed selection criteria

Burnthrough and related safety concerns
• Factors affecting burnthrough
• Effect of wall thickness
• Effect of heat input
• Effect of flow rate/pressure

Avoiding burnthrough

Hydrogen cracking concerns
• Recent significant incidents
• Common factor/recommendation
• Hydrogen cracking requirements
• Welding metallurgy 101
• Prevention of hydrogen cracking
• Full encirclement repair sleeves
• Full encirclement sleeve types
• Principle of operation
• Assuring effective reinforcement
• Sleeve design
• Sleeve fabrication

Hot tap branch connections
• Branch connection design
• Reinforcement types
• Integrity reinforced

Pipe repair by weld deposition
• Physical concept
• History of weld deposition repair
• Burnthrough risk
• Integrity restoration
• Practical application

Documentation
All delegates will receive a detailed set of lecture notes containing more than 250 pages, providing an invaluable reference document.

Continuing Education Units: 1.7
(1.4 for the 2-day version)

Day 2
Non welded repairs
• Repair by grinding
• Composite repairs
• Epoxy filled shells
• Visit to testing facility for demonstration of repair methods and testing for qualification of repairs

Code and regulatory requirements
• Recent changes to APLI 1014
• Code requirements for weld deposition repair

Day 3
Procedure selection for hot tap and repair sleeve welding
• Burnthrough risk summary
• Prevention of hydrogen cracking
• Welding procedure options
• Welder/procedure qualification
• Predicting required heat input
• Selecting an appropriate procedure

Practical aspects of hot tap and repair sleeve welding
• Proper electrode handling
• Proper finishing
• Proper welding sequence
• Control of heat input levels
• Inspection and testing

Lessons to be learned from past pipeline repair incidents
• Reported incidents
• Previously unreported incidents
• Ten commandments of in-service welding

Performing Pipeline Rehabilitation

This course is centered on the practical aspects of pipeline rehabilitation and covers both internal and external rehabilitation. The course goes into depth on how to safely rehabilitate operating pipelines using manual and automated equipment. Movement of in-service pipelines is analyzed in detail including the application and methodology of recommended practices API 1117. Other industry standards applicable to pipeline rehabilitation are discussed as well as how they should be incorporated into project specifications.

Approximately half of the course is spent in analyzing case studies of field rehabilitation projects from around the world. Over 400 photographs are used to illustrate how the work was performed and the results obtained. The course presents techniques for performing the work with a combination of in-house personnel and outside contractors to minimize costs while maintaining clear lines of responsibility.

Who should attend?
Engineers involved in:
• Determining the best way to rehabilitate a section of pipeline
• Preparing the project specifications,
• Performing the necessary engineering calculations to insure the project is carried out safely,
• Health and safety issues specific to rehabilitation projects.

Field Operations Personnel and contractors who need to be aware of many alternatives available for pipeline rehabilitation and their cost impact.

Inspection Personnel involved in evaluation of defects and selection of proper repair techniques.

Documentation
All delegates will receive a detailed set of lecture notes providing an invaluable reference document.

Continuing Education Units 1.4

Course Program
Day 1
Introduction
Rehabilitation Options
In-Plant Rehabilitation of Pipeline
Out of the Ditch Rehabilitation Projects
In-situ and Short Segment Rehabilitation Projects

Day 2
New Approach to In-Situ Rehabilitation
Internal Pipeline Rehabilitation Projects
Inspection of the pipeline
Making necessary repairs
Environmental Issues
Industry Standards to be incorporated in Job Specifications

Visit www.clarion.org for the complete program details

Day 1

23
Pipeline Integrity Management

The seminar provides a sound review of Pipeline Integrity Management strategies, in compliance with regulatory requirements, including self-assessment. It is highly interactive and takes the form of lectures and case studies. On completion of the seminar, participants will have a solid understanding of the procedures, strengths, limitations, and applicability of the main issues that comprise a Pipeline Integrity Management Program.

Course Objectives

To provide attendees with the latest techniques used to develop a comprehensive integrity management program covering both pipelines and their associated facilities. The necessary elements of such a program are described in detail with examples of typical program content including an overarching view of where detailed Risk Analysis and Defect Assessment fits in the Program.

Documentation

The accompanying course notes, in ring-binder format, are written in such a manner as to provide a starting point for a company in either developing its own integrity management plan or updating its current plan. The course documentation also includes the newly published reference book Pipeline Integrity Assurance: A Practical Approach, by Alan Murray, Mohitpour, Michael McMains, and Ian Calquevian, a $155 value.

Who should attend?

Supervisors, engineers and technicians responsible for ensuring the adequate protection of pipeline assets; maintenance planners, regulators and service-providers to the pipeline industry will also benefit from attending the course.

On completion of this course, you will be able to understand:

- Codes used in developing Integrity Management Plans
- The elements of an Integrity Management Plan
- Threat assessment
- Critical aspects of risk assessment.
- Prevention and mitigation measures
- Characteristics and limitations of different inspection methods
- A risk-based approach to maintenance

Continuing Education Units: 1.7
(1.4 for the 2-day version)

Visit www.clarion.org
for the complete program details

Practical Application of Machine Learning to Pipeline Integrity

Attendees will learn how to apply inferential statistical and machine learning methods to common pipeline integrity and risk management use cases. In this interactive hands-on course, participants will be presented the technical basis of machine learning fundamentals and will use their own data with open source software to experience its practical application.

Course Objectives

This is a practical hands-on course structured as a "teach and do," where attendees will be presented the technical concepts of machine learning which they will then apply to their data. The objective of the course is for the attendee to learn how machine learning methods can support the following use cases:

- Learn & validate data driven algorithms
- Validate existing rule-based algorithms
- Measure the influence and importance of underlying threat data
- Infer missing or unknown data
- Establish optimal assessment intervals
- Support the assessment of un-piggable pipelines
- Support monetized risk-based decision-making

Who should attend

- Integrity managers & engineers
- Risk managers & engineers
- Data analysts

Preparation to attend

- Install machine learning desktop software on PC (a download link and installation instructions will be provided prior to the course)
- Prepare example data set (template will be provided)
- Watch software instructional videos (.2 hrs)

Course notes

- Presentation slides and related documentation will be printed in full color in spiral-bound book form as well as PDF download
- Machine learning configuration file (example machine learning process)

Continuing Education Units: 1.4

Visit www.clarion.org
for the complete program details

Lecturer

Dr. Alan Murray is a consulting engineer with Principia Consulting in Calgary, AB. Prior to forming Principia in 2010, he was Chief Engineer at the Canadian National Energy Board. Dr. Murray’s industry experience has included a number of senior management positions with a large pipeline operating company in North America with responsibility for system planning, construction, maintenance and contracting functions. His 42 years of work experience spans research, regulation, third-party assessment, design and development in pipelines and offshore structures. He was the founding chairman of the ASME Pipeline Systems Division and is the co-author of the ASME Press text book Pipeline Design and Construction – A Practical Approach and Pipeline Integrity Assurance and is a Fellow of the ASME.

Lecturer

Michael Glaven, P.E., is Managing Partner of EIS (www.expertinfrasolutions.com) a Denver-based engineering consultancy focused on machine learning and risk management practices for the natural gas, hazardous liquids and water industries. He started his career with Conoco Pipeline holding various operational, engineering and management positions throughout the US. He then went on to co-found Bass-Trigon, a software and engineering company, and as president helped build the organization as a leading provider of risk and cathodic protection data management software. After acquisition of Bass-Trigon, he became an advisor to several international energy and technology companies, and soon afterwards started a new company focused on API 1173 process management for the pipeline industry which was then acquired in 2015. For the last several years, Mike has merged his software, engineering and domain expertise with machine learning practices to advance problem solving in the pipeline industry.
The Pipeline Integrity Master Class

Over the last 15 years Clarion-Tiratsoo Technical, Penopen and others have educated thousands of pipeline engineers in the essential tools and methods of pipeline integrity assessment. While there remains a need for these training courses, more-experienced engineers, who may have risen to senior technical-management positions, need a 'next-level' course that will focus on more complex, sophisticated and nuanced issues – not just in the application of PIM technologies and methods, but in the real management of the asset from a risk and business point of view.

That is the objective of The Pipeline Integrity Master Class to be offered for the first time in 2012 in the UK and the USA.

The five-day syllabus content will be flexible to match the particular needs and interests of each group of class participants, who will receive a questionnaire in advance of the class. Led by a world-class team of instructors, it will have a heavy emphasis on group problem solving exercises and case study analysis and will also feature guest lectures from senior operating–company executives and technical specialists.

To facilitate and optimize interaction between participants and instructors, and among the participants themselves, the course will take place at excellent-quality conference centers offering residential accommodation: in the USA, The Woodlands Resort & Conference Center near Houston, in the UK, the Low Wood Bay Hotel on Lake Windermere, near Ambleside in the Lakes District of England. To obtain the full benefits of the class, participants are urged to book in at the class venue for the duration, as discussions and activities will continue into the evenings.

Who should attend?
The class is recommended for technical team leaders, asset managers, integrity managers, chief engineers, engineering VPs or other experienced personnel who meet the recommended prerequisite criteria above.

Continuing Education Units: 3.0

Recommended experience

It is strongly recommended that class participants have at least five years’ experience in pipeline integrity management and a minimum of 120 hours instruction in relevant professional courses.

Documentation

Included with the course fee is a detailed set of lecture notes (600 pages est., COLOR) and a CD containing an additional reference material.

Faculty

Dr Jane Haswell is a principal consulting engineer with Pipeline Integrity Engineers in the UK, which she joined in 2001. Prior to this, she had over 20 years’ experience in pipeline transmission engineering, initially involved in pipework / pipeline stress analysis and 3-D FEA for British Gas. She then became responsible for developing a team of specialist engineers, covering defect assessment, stress analysis, and technical input into developing Codes such as IGE/TV/TS-D12, and BS 6969. Subsequently, she became divisional manager for British Gas’ Engineering Sciences group, with responsibility for SS engineers.

Dr. Phil Hopkins is a consulting engineer with more than 35 years’ experience in pipeline engineering. Phil joined his consultancy company in 2015, after being Technical Director with Penopen Ltd in the UK, and previously Managing Director of Andrew Palmer & Associates, in the UK. He has worked with most of the major oil and gas companies and pipeline companies around the world, providing consultancy on management, business, design, maintenance, inspection, risk analysis and safety, and failure investigations. He is the past-chairman of the ASME Pipeline Systems Division and is a Fellow of ASME. More than 15,000 engineers and technical personnel around the world have attended his courses. He also teaches extensively on masters’ programme at Newcastle and Northumbria Universities in the UK.

Dr. Alan Murray is a consulting engineer with Principia Consulting in Calgary, AB. Prior to forming Principia in 2010, he was Chief Engineer at the Canadian National Energy Board. Dr. Murray’s industry experience has included a number of senior management positions with a large pipeline operating company in North America with responsibility for system planning, construction, maintenance and contracting functions. His 42 years of work experience spans research, regulation, third-party assessment, design and development in pipelines and offshore structures. He was the founding chairman of the ASME Pipeline Systems Division and is the co-author of the ASME Press text books Pipeline Design and Construction – A Practical Approach and Pipeline Integrity Assurance and is a Fellow of the ASME.

Patrick Vieth is President of Dynamic Risk USA, Inc. Pat has 27 years’ experience in management, research, and technical innovation within the pipeline industry. Some of his accomplishments have provided the foundation to modern pipeline integrity, such as his key contributions to validation and implementation of the RSTRENG corrosion assessment method and development of a Transverse Field Inspection (TFI) program to identify longitudinal seam weld defects.
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