Tutorial Title	Confirmed Summary
Monday Full Day	
Pipeline Integrity Evaluations & Engineering Assessments	An introduction to the assessment of defects in pipelines. Defect types will be discussed, with emphasis on their potential to result in failure. The background to the commonly applied defect assessment methods will be presented, ranging from workmanship acceptance levels to fitness-for-service assessments. 1. Why do pipelines fail? 2. The assessment of defects in pipelines. 3. How to assess corrosion defects. 4. How to assess mechanical damage (dents and gouges). 5. Pipeline integrity.
Pipeline Defect and Threat Interaction in Pipeline Integrity Management - Industry Practices on Assessment and Mitigation	This tutorial is intended to focus on emerging topics with respect to interaction of defects, threats and hazards on and off the pipeline including monitoring and mitigation strategies. The tutorial presentations will feature advanced assessment techniques and case studies for combined defects (e.g. dents with gouge/metal loss), external loading, geohazards and bending strain analysis, girth weld assessment and crack management with discussion of Engineering approaches used by pipeline operators and industry subject matter experts.

Pipeline Risk Management	The Pipeline Risk Management tutorial will provide an overview of risk and reliability methodologies, with concrete examples given, and an in-depth look of where the industry is moving from the perspective of risk based integrity program. The focus areas will be: 1. Hazard and threat identification, focusing on reliability methodologies that can be used to manage integrity hazards. Additionally, a number of practical examples will be given, including reliability based corrosion and crack management methodologies. 2. Determination of acceptable levels of risk, including the risk measures used, proposed updates of CSA Z662 Annex B, and an overview of the history of risk criteria. 3. Risk control measures and how to evaluate the application and effectiveness of risk controls. 4. Industry approach to overcoming challenges when performing risk assessments, including transitioning from qualitative to quantitative risk assessment, communicating risk results, and making effective decisions through risk assessment. 5. Case studies on practical applications of Risk Assessment in industry.
Pipeline Design and Construction	Overview of the following fundamentals: • Concept development. • Hydraulic design considerations for gas, liquid and two-phase systems. • Route selection, water crossings and geotechnical issues. • Criteria for materials and coating selection. • Design loads on buried pipe. • Working Stress and Limit States Design Principles • Construction methods, bending,welding,trenching directional drilling • Pressure testing

Pipeline In-Line Inspection – Validation and Use of Results & Effective ILI Based Program with Improved Performance and Economy	This tutorial will address what companies need to do after the data is received from the ILI vendor. The checks that should be done to evaluate whether the data quality meet the expectation based on ILI tool specifications and whether there are significant outliers that will trigger additional integrity actions. Different API 1163 validation levels and metrics such as probability of detection (POD), probability of identification (POI) and sizing accuracy will be covered. Decisions based on the validation results will be discussed.
Pipeline Dent Assessment & Management	The Pipeline Dent Assessment & Management tutorial will provide an introduction of dent management and its purpose, current regulations (US and Canada), and available assessment methods. The tutorial will also discuss dent program management, field investigation experience, and examples of defects discovered. Examples of assessment methods and calculations will be presented as well as an overview of advanced assessment methods, such as finite element analysis (FEA).
Fracture mechanics for pipeline engineers	This workshop covers historical and modern fracture mechanics concepts used to analyze and manage cracking on pipeline systems. The workshop will introduce commonly used fracture analysis technologies from the ln-secant method to CorLAS(TM), MAT-8, and others. Students will learn the strengths and weaknesses of each methodology, as well as understanding which technology works best for today's pipeline analyses.

Monday Half Day AM	
Effective Risk Management in Horizontal Directional Drilling (HDD) Crossings	Horizontal Directional Drilling (HDD) is a trenchless technology extensively utilized for pipe installations. Although highly effective, HDD involves inherent high risks that can pose significant challenges during project execution. This tutorial delves into recent research that highlights the risks associated with HDD and identifies key factors influencing these risks, such as unpredictable ground conditions and operational variables, including the efficiency of hole cleaning. We will explore various risk mitigation strategies and demonstrate how leveraging data analytics can substantially reduce the risks in HDD projects. Additionally, we will introduce and examine the latest advanced tools designed to manage these risks effectively.
Machine Learning Basics for the Pipeline Industry Workshop	
CO2 Pipelines	
Linepipe Materials, Welding and Pipeline Construction	This tutorial will provide the fundamentals of linepipe specifications and manufacturing, field welding and pipeline construction. Linepipe areas will focus upon alloy systems, steel processing methods and fracture control. Welding and construction will focus on process overview, procedure and welder qualification, NDE inspection methods and general construction quality issues.

Geohazards In Pipeline Design and Operation	The purpose of this tutorial is to emphasize the importance of identifying and managing the impact of geohazards, such as landslides and river erosion on pipeline feasibility and operations. This course is intended for engineers and project managers involved in pipeline routing, design, operations and pipeline integrity. Content will be based around case-histories to illustrate how to identify, manage and mitigate geohazards. Major themes will include: · Introduction to geohazards and their significance on pipeline integrity. · Case histories of geotechnical geohazards including landslides, flow slides, and subsidence. · Overview of seismic hazards including faulting, liquefaction/lateral spreading and induced seismicity. · Case histories of hydrotechnical hazards including exposures and failures from scour and flooding. · How to prioritize and manage geohazards: · Development of a geohazard management program. · Use of tools such as Lidar and IMU to assess sites. · Monitoring Strategies – Determining when and how to monitor a site. · Mitigation Strategies – How to protect the pipeline against geohazards.

Monday Half day PM	
Pipeline Stress Analysis	Stress analysis plays a crucial role in ensuring the safety, reliability, and longevity of buried pipelines. This tutorial provides a high-level overview of the fundamentals and applications of buried pipeline stress analysis, covering key topics such as: • Purpose of Pipeline Stress Analysis: Understanding the significance of stress analysis in assessing the structural integrity and performance of buried pipelines under various operating conditions and environmental factors. • Typical Inputs Required for Stress Analysis: Exploring the essential data and parameters needed to conduct a thorough stress analysis, including pipeline geometry, material properties, operating conditions, and external loads. • Typical Loads Acting on a Buried Pipeline: Identifying the distinct types of loads that can affect buried pipelines, such as internal pressure, soil weight, thermal expansion, and external forces. • Stresses Generated by Loads: Analyzing the stress distributions and magnitudes induced by several types of loads acting on the pipeline, including axial, bending, and hoop stresses. • Pipe-Soil Interaction Modeling: Investigating the complex interaction between pipelines and surrounding soil, including soil properties, trench conditions, and the effects of soil settlement on pipeline stress behavior. • Case Studies: Illustrative examples and real-world applications demonstrating the practical implementation of pipeline stress analysis techniques in addressing usual challenges and scenarios. This tutorial serves as a valuable resource for engineers, researchers, and practitioners involved in the design, operation, and maintenance of buried pipelines, offering insights into the principles, techniques, and best practices of pipeline stress analysis.
AI in Pipeline Engineering	
Pipeline Assessment Methods: Selection of Appropriate Technology On A Threat By Threat Basis	

International approach of Audits	The purpose of the tutorial to empower international pipeline professionals with methodologies, best practices and practical lessons learned for conducting pipeline integrity self-assessments. This will contribute to their goals on identifying strengths and areas for improvement, crucial for safeguarding life, protecting the environment, and ensuring safe, continuous, and reliable fluid transportation. The tutorial is based on international experiences conducting management systems & program-based pipeline integrity self-assessments (internal/external audits) in Canada, USA, South America, France, Australia, Fiji and Saudi Arabia.
IMU ILI analysis	In-line inspection internal measurement unit technology (ILI IMU) has been used effectively since the turn of the millennium to monitor and manage soil to pipeline interactions due to landslides, settlement/subsidence, and other external/internal forces. The course will detail the technology focusing on vendor analysis and understanding how: • the reports are produced, • to read reports, • to classify features with the introduction of the feature classification system and feature library, • to understand the current limitations of the technology, and • how to apply to a geohazard/pipeline integrity program including a discussion of geo-mechanical strain limits. The course will spend a significant amount of time reviewing actual examples of ILI IMU features. Attendees are invited to send in ILI IMU features for confidential analysis as part of the course.

Wednesday Half Day PM	
Role of Pipe-Soil Interaction Analysis in Pipeline Integrity Management	Within this tutorial, we'll delve into the fundamental principles, methodologies, and pragmatic factors concerning the pipe-soil interaction analysis. Expect a thorough examination of pipe-soil interaction and its pertinent real-world implementations especially in the operator's pipeline integrity management plan, catering to engineers, project managers, and individuals engaged in the domains of buried pipeline. The tutorial will cover the following topics: • Fundamentals of soil mechanics & structural mechanics related to pipe-soil interaction analysis. • Role of pipe-soil interaction in the geohazard integrity management plan. • Overview of pipe-soil interaction analysis including calculation of soil spring forces and associated displacements using the design guidelines and limitations of the design guidelines. • Pipe-soil interaction analysis from strain-based design perspective. • Real life case studies.

Mastering Root Cause Analysis: Unveiling the Secrets of Pipeline Failure Prevention	The goal of a Root Cause Analysis (RCA) is to identify the direct and underlying causes of an unexpected event, such as a pipeline operational failure or product release. In this comprehensive tutorial, we will explore the critical processes to identify and address the root causes of pipeline failures. You will learn how to apply powerful industry tools such as "TapRooT," "Fault Tree," and "MORT" to your RCA process, providing consistency and reliability in defining best practice benchmarks. Additionally, examples of root causes from pipeline incident investigations conducted by the Tutorial Leaders over several years will be provided to facilitate learning and promote open discussion. Finally, the tutorial will address the challenges and issues associated with the RCA process and the development of actionable findings. Throughout this journey, we will ask you to remember that identifying the root cause is about uncovering the truth to improve processes, not assigning blame Join us as we reveal the secrets of effective root cause analysis, setting the stage for a more secure and efficient pipeline infrastructure.

Welding Practice and Linepipe Specifications for Enhanced Resilience of Girth Welds inTraditional and Emerging New Pipelines	This tutorial is a follow-up to the tutorial on "Enhanced Welding Practice and Linepipe Specifications to Improve Strain Resistance of Newly Constructed Pipelines" given at IPC 2022. In the 2022 tutorial, mitigative measures were recommended to reduce the risk of low strain failure of girth welds in newly constructed pipelines. This tutorial continues the scheme developed in the 2022 tutorial with updates on new developments. The lessons learnt are further applied to emerging new pipelines, such as hydrogen and CO2 pipelines, by integrating new material degradation mechanisms with the failure mechanism of traditional pipelines. The scope of this tutorial is as follows: (1) Recap of the major recommendations of the 2022 tutorial including a brief background information/data that supported the recommendations, (2) New development in technical understanding and implementation of the recommendations since the 2022 tutorial, (3) Material degradation mechanisms of hydrogen and CO2 pipelines, (4) Recommendations for improved welding practice, including welding procedure qualifications, for traditional and emerging new pipelines, (5) Recommendations for enhanced linepipe specifications, including associated test methods, for traditional and emerging new pipelines, (6) Holistic risk assessment with the integration of fundamental causes of past incidents and material degradation mechanisms of emerging new pipelines, and (7) Systemic and technical gaps that require further attention.
Hydrogen Pipeline Integrity	What is the Energy Transition? Background to Hydrogen and Introduction to the Differences Between Hydrogen and Natural Gas Hydrogen Embrittlement H2 Pipeline Codes, Developments and Requirements Industry Approach Integrity Assessment and Management