



## **Course 1 - Introduction to Onshore Pipeline**

**Engineering** Monday, March 2 - Tuesday, March 3, 2020

By Phil Hopkins

### **PIPELINE BASICS**

- Oil and gas and the petroleum business:
  - hydrocarbons; transportation of hydrocarbons; and, creating and extraction, and reserves
  - the early days of the industry... and power in the industry today;
  - the price of oil and the oil 'balance'
- Pipelines and line pipe:
  - pipelines' history, types, and basics;
  - line pipe manufacture, types, mill testing, and coatings;
  - key properties (strength, ductility, toughness, weldability, hardness, fatigue)
- Why pipelines fail:
  - pipeline failure statistics; threats to pipelines; and, causes of failures

### **PIPELINE DESIGN**

- The design process
- Pipeline standards
- Substance classification
- 'Sizing' the pipeline
- Calculating the wall thickness
- Location classification and changes during operation
- Proximity distances
- Pipeline bends, crossing, and valves
- Pipeline protection
- Hydraulics

### **PIPELINE CONSTRUCTION**

- Pipeline routing
- Construction
- Pressure testing (strength testing, leak testing, 'spike' testing)

### **PIPELINE OPERATION**

- Operation (control of gas and liquid lines, line packing, batching, SCADA)
- Pipeline inspection and surveillance (including inspection using in-line inspection vehicles to detect corrosion, dents, and cracks)

## **Course 2 – Pipeline Integrity Management**

Wednesday, March 4 – Thursday, March 5, 2020

By Alan Murray

### **PIPELINE INTEGRITY MANAGEMENT**

- History and overview of pipeline integrity management
- Elements of an integrity management plan (IMP)
- Roles and responsibilities
- Data collection and record keeping
- Threat assessment
- Change management

### **APPROACHES TO RISK ASSESSMENT ANALYSIS**

- Four places risk features in an IMP
- Qualitative and quantitative approaches
- Prevention and mitigation measures
- Cost/ benefit considerations in mitigation

### **INSPECTION METHODS**

- Characteristics and limitations of in line inspection tools
- External and internal direct assessment methods

### **PIPELINE DEFECT ASSESSMENT\***

- Determining fitness for service for common threats:
- Corrosion
- Cracking
- Mechanical damage gouging and denting
- Combined modes
- Limitations and assumptions
- \*Assumes a prior understanding of theories of failure and basic fracture mechanics
- Pipeline repair methods
- Sleeve repairs
- Weld deposition
- Composite repairs
- Hot tapping