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SERVICES

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WebCorr Corrosion Consulting Services Presents

Internal Pipeline Integrity Assessment and Pigging Technology

Date: As published on website Venue: As published on website

Course Overview

Corrosion is a dominant contributing factor to failures and leaks in pipelines. The high cost of corrosion and corrosion control in multiphase (oil, gas, and brine) pipelines represents a significant operating expense for the field. Corrosion severely affects pipeline operations, leading to lost production, unscheduled downtime for maintenance or repair, and even catastrophic failure that impacts health, environment, and safety. Maintaining the ageing infrastructure such as underground pipelines is always a challenge to facility owners worldwide. This 5-day course covers internal pipeline corrosion, inline inspection and assessment methodology, and pigging technology. A practical field guide for investigating internal corrosion of pipelines is also presented.

This course is available for in-house training, online and distance learning worldwide. It can also be customized to meet the specific needs of your organization.

Who Should Attend

- Engineers and technologists who are in charge of pipeline integrity;
- Technicians and maintenance personnel who deal with pipeline inspection and maintenance.
- Facility owners and users who are concerned with pipeline internal corrosion.

Course Outline

1.1 Natural Gas Internal Pipeline Corrosion
- 1.1.1 Definition
- 1.1.2 The threats and impacts of internal corrosion in the oil and gas transmission systems
- 1.1.3 Natural gas transmission systems vs. oil or mixed-phase transmission systems
- 1.1.4 Internal corrosion vs. external corrosion

1.2 Different forms of internal corrosion
- 1.2.1 Uniform Corrosion
- 1.2.2 Localized Corrosion
- 1.2.3 Pitting
- 1.2.4 Crevice Corrosion
- 1.2.5 Mesa Corrosion

- 1.2.6 Weld Zone Corrosion
- 1.2.7 Environmentally Assisted Cracking (EAC)
- 1.2.8 Flow-Assisted Damage

2.1 Internal Corrosion Mechanisms
- 2.1.1 Galvanic Corrosion
- 2.1.2 Concentration Cells
- 2.1.3 Environmentally Assisted Cracking Mechanisms
- 2.1.4 Hydrogen Damage
- 2.1.5 Hydrogen Induced Cracking (HIC)
- 2.1.6 Hydrogen Embrittlement (HE)
- 2.1.7 Stress-Oriented Hydrogen Induced Cracking
- 2.1.8 Sulfide Stress Cracking (SSC)
- 2.1.9 Stress Corrosion Cracking (SCC)
- 2.1.10 Liquid Metal Embrittlement (LME)

Course Outline

- 2.1.11 Flow-Assisted Damage Mechanisms
- 2.1.12 Erosion
- 2.1.13 Impingement
- 2.1.14 Erosion-Corrosion
- 2.1.15 Cavitation

3.1 The Corrosive Species and their effects on internal corrosion
- 3.1.1 Carbon Dioxide (CO2)
- 3.1.2 Hydrogen Sulfide (H2S)
- 3.1.3 Oxygen
- 3.1.4 Microbiologically Influenced Corrosion

3.2 The type of pipelines affected by internal corrosion
- 3.2.1 Upstream Petroleum Production Pipelines
- 3.2.2 Transmission Pipelines
- 3.2.3 Distribution Pipelines
- 3.2.4 Pipeline Facilities
- 3.2.5 Other Service Pipelines

4.1 Internal corrosion inspection and assessment methodology
- 4.1.1 Inspection methods
- 4.1.2 Direct Assessment Methodology

4.2 Internal corrosion monitoring
- 4.2.1 Details of failure
- 4.2.2 Direct Intrusive Techniques
- 4.2.3 Direct Non-Intrusive Techniques
- 4.2.4 Indirect Methods
- 4.2.4 Monitoring techniques

4.3 Modeling and Prediction of Internal Corrosion
- 4.3.1 Corrosion rate prediction flow chart
- 4.3.2 Corrosion rate prediction models

5.1 Control and Treatment of Internal Corrosion
- 5.1.1 Eliminating the Corrosive Environments
- 5.1.2 Altering Operating & Maintenance Procedures (e.g. Regular Cleaning by Pigging)
- 5.1.3 Chemical Treatment (Inhibitors & Biocides, pH stabilisation)

5.2 Design to Prevent Internal Corrosion
- 5.2.1 Design and Operation
- 5.2.2 System Design
- 5.2.3 Gas Transmission Pipeline Drips
- 5.2.4 Dead Legs/Ends
- 5.2.5 Pipeline Fittings
- 5.2.6 Compressor Stations and Associated Piping
- 5.2.7 Water Removal
- 5.2.8 Removal of Potentially Corrosive Gases
- 5.2.9 Modifying Flow Characteristics
- 5.2.10 Physical Design Changes
- 5.2.11 Selecting & Implementing Appropriate Methods
- 5.2.12.Effectiveness of Mitigation Method

5.3 Optimization of Internal Corrosion management Program
- 5.3.1 Risk management
- 5.3.2 Risk identification
- 5.3.3 Risk evaluation
- 5.3.4 Risk mitigation
- 5.3.5 Risk monitoring
- 5.3.6 Risk based decision making

5.4 NACE Standards on International Corrosion

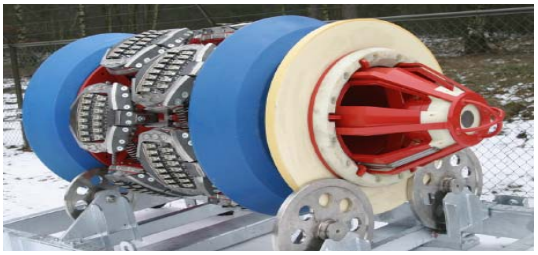
5.5 Field Guide for Investigating Internal Corrosion of Pipelines

6.1 Introduction to Pigging Technology
- 6.1.1 How pigs work
- 6.1.2 Pig functions and selection
- 6.1.3 Pipeline design for pigging
- 6.1.4 Pigging Techniques

6.2 Pigging for Pipeline Integrity Assessment
- 6.2.1 The needs for pigging
- 6.2.2 Overview of pipeline internal inspection and monitoring methods and capabilities
- 6.2.3 Advanced ILI technologies
- 6.2.4 Capabilities and functions of ILI tools

6.3 What Pipeline Operators Need to Know About Pigging:
- 6.3.1 Type of pigs available
- 6.3.2 How intelligent pigs work
- 6.3.3 Piggable vs unpiggable pipelines
- 6.3.4 Impact of pigging inspection on the operation of pipelines
- 6.3.5 When to use intelligent pigs
- 6.3.6 Budgeting for ILI inspection
- 6.3.7 Typical costs of ILI inspection
- 6.3.8 Selection of intelligent pig for pipeline internal inspection
- 6.3.9 Comparison between low resolution and high resolution MFL pigs
- 6.3.10 Reliability of intelligent pigs
- 6.3.11 Accuracy of intelligent pigs
- 6.3.12 Comparison between UT pigs and high resolution MFL pigs
- 6.3.13 Detection of cracks in pipelines by intelligent pigs
- 6.3.14 Inspection by intelligent pigs vs. in-service hydrotest
- 6.3.15 Consideration of 'fingerprint' ('baseline') inspection
- 6.3.16. When, and How frequent, ILI tools should be used for pipeline internal inspection.

7.1 End of course examination



Course Registration

Please register online at www.corrosionclinic.com
Or use the form below (photocopies of this form may be used for multiple bookings).

Dr/Mr/Ms_____
Organization_____
Contact Person_____
Contact Dept_____
Tel_____ Fax _____
Email_____

Payment should be made by TT or online banking. Currencies in Australian Dollar, Canadian Dollar, US Dollar, Euro and Sterling Pound can be transferred directly without conversion. Our bank details can be found at the link below:
http://www.corrosionclinic.com/payment.html

Course Fee and Discount

Standard: $3,500 **Discount**: $3,150

The fee includes a hardcopy of course note, certificate, light lunch, coffee breaks each day during the course.

Discount applies to a group of 3 or more persons from the same organization registering at the same time, or early-birds making payment at least 8 weeks before the course commencing date.

Cancellation and Refunds

Cancellation or replacement should be conveyed to WebCorr in writing (email or fax). An administration charge of 50% of the course fee will be levied if the cancellation notice is received from 14 to 7 days before the course commencing date. No refund will be made for cancellation notice received 6 days and less. No refunds will be given for no-shows. Should WebCorr find it necessary to cancel a course, paid registrants will receive full refund. Refund of fees is the full extent of WebCorr's liability in these circumstances.

WebCorr has NACE certified Corrosion Specialist (#5047) providing customized in-house training, online and distance learning corrosion courses, corrosion seminars and workshops on corrosion, materials, metallurgy, paints and metallic coatings. Our corrosion courses are developed and taught by NACE certified Corrosion Specialist with over 30 years of practical experience in the field. Our training success is measured by your learning outcome.