1. Record Nr. UNINA9910806125703321

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Titolo	Stress corrosion cracking of pipelines / / Y. Frank Cheng
Pubbl/distr/stampa	Hoboken, N.J., : John Wiley & Sons, Inc., [2013]
ISBN	1-5231-2380-X 1-118-53702-5 1-299-06838-3 1-118-53698-3
Edizione	[1st ed.]
Descrizione fisica	1 online resource (283 p.)
Collana	Wiley Series in Corrosion
Disciplina	621.8/672
Soggetti	Pipelines - Corrosion Pipelines - Cracking Steel - Corrosion
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Stress Corrosion Cracking of Pipelines; Contents; Foreword; Preface; List of Abbreviations and Symbols; 1 Introduction; 1.1 Pipelines as "Energy Highways"; 1.2 Pipeline Safety and Integrity Management; 1.3 Pipeline Stress Corrosion Cracking; References; 2 Fundamentals of Stress Corrosion Cracking; 2.1 Definition of Stress Corrosion Cracking; 2.2 Specific Metal-Environment Combinations; 2.3 Metallurgical Aspects of SCC; 2.3.1 Effect of Strength of Materials on SCC; 2.3.2 Effect of Alloying Composition on SCC; 2.3.3 Effect of Heat Treatment on SCC; 2.3.4 Grain Boundary Precipitation 2.3.5 Grain Boundary Segregation2.4 Electrochemistry of SCC; 2.4.1 SCC Thermodynamics; 2.4.2 SCC Kinetics; 2.5 SCC Mechanisms; 2.5.1 SCC Initiation Mechanisms; 2.5.2 Dissolution-Based SCC Propagation; 2.5.3 Mechanical Fracture-Based SCC Propagation; 2.6 Effects of Hydrogen on SCC and Hydrogen Damage; 2.6.1 Sources of Hydrogen; 2.6.2 Characteristics of Hydrogen in Metals; 2.6.3 The Hydrogen Effect; 2.6.4 Mechanisms of Hydrogen Damage; 2.7 Role of Microorganisms in SCC; 2.7.1 Microbially Influenced Corrosion; 2.7.2 Microorganisms Involved in MIC; 2.7.3 Role of MIC in SCC Processes 2.8 Corrosion Fatigue2.8.1 Features of Fatigue Failure; 2.8.2 Features

of Corrosion Fatigue; 2.8.3 Factors Affecting CF and CF Management; 2.9 Comparison of SCC, HIC, and CF; References; 3 Understanding Pipeline Stress Corrosion Cracking; 3.1 Introduction; 3.2 Practical Case History of SCC in Pipelines; 3.2.1 Case 1: SCC of Enbridge Glenavon Pipelines (SCC in an Oil Pipeline); 3.2.2 Case 2: SCC of Williams Lake Pipelines (SCC in a Gas Pipeline); 3.3 General Features of Pipeline SCC; 3.3.1 High-pH SCC of Pipelines; 3.3.2 Nearly Neutral-pH SCC of Pipelines; 3.3.3 Cracking Characteristics
3.4 Conditions for Pipeline SCC3.4.1 Corrosive Environments; 3.4.2 Susceptible Line Pipe Steels; 3.4.3 Stress; 3.5 Role of Pressure Fluctuation in Pipelines: SCC or Corrosion Fatigue?; References; 4 Nearly Neutral-pH Stress Corrosion Cracking of Pipelines; 4.1 Introduction; 4.2 Primary Characteristics; 4.3 Contributing Factors; 4.3.1 Coatings; 4.3.2 Cathodic Protection; 4.3.3 Soil Characteristics; 4.3.4 Microorganisms; 4.3.5 Temperature; 4.3.6 Stress; 4.3.7 Steel Metallurgy; 4.4 Initiation of Stress Corrosion Cracks from Corrosion Pits; 4.5 Stress Corrosion Crack Propagation Mechanism
4.5.1 Role of Hydrogen in Enhanced Corrosion of Steels4.5.2 Potential-Dependent Nearly Neutral-pH SCC of Pipelines; 4.5.3 Pipeline Steels in Nearly Neutral-pH Solutions: Always Active Dissolution?; 4.6 Models for Prediction of Nearly Neutral-pH SCC Propagation; References; 5 High-pH Stress Corrosion Cracking of Pipelines; 5.1 Introduction; 5.2 Primary Characteristics; 5.3 Contributing Factors; 5.3.1 Coatings; 5.3.2 Cathodic Protection; 5.3.3 Soil Characteristics; 5.3.4 Microorganisms; 5.3.5 Temperature; 5.3.6 Stress; 5.3.7 Metallurgies; 5.4 Mechanisms for Stress Corrosion Crack Initiation
5.4.1 Electrochemical Corrosion Mechanism of Pipeline Steels in a Thin Layer of Carbonate-Bicarbonate Electrolyte Trapped Under a Disbonded Coating

Sommario/riassunto

Explains why pipeline stress corrosion cracking happens and how it can be prevented Pipelines sit at the heart of the global economy. When they are in good working order, they deliver fuel to meet the ever-growing demand for energy around the world. When they fail due to stress corrosion cracking, they can wreak environmental havoc. This book skillfully explains the fundamental science and engineering of pipeline stress corrosion cracking based on the latest research findings and actual case histories. The author explains how and why pipelines fall prey to stress corrosio