NACE International
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Click on Meeting Name to Add to Itinerary

ISO Meetings

Time	Name	Description	Committee(s)	Location	Location Detail
Friday,8 a.m. to 5 p.m.	OGP 23936 (ISO TC 67/WG 7/TG "Non-Metallics") Session I			Hilton Riverside	Bridge
Saturday,8 a.m. to 5 p.m.	OGP 23936 (ISO TC 67/WG 7/TG "Non-Metallics") Session II			Hilton Riverside	Canal
Sunday,8 a.m. to 12 a.m.	MR0175/ ISO 15156 Maintenance Panel			Ernest N. Morial Convention Center-New Orleans	R-03
Sunday,8 a.m. to 12 a.m.	OGP 23963 ISO TC67/ WG7/ TG Non-Metallics			Hilton Riverside	Canal
Sunday,4 :30p.m. to 5 :30p.m.	MR0175/ ISO 15156 Maintenance Agency			Ernest N. Morial Convention Center-New Orleans	R-03
Tuesday,2 p.m. to 5 p.m.	Ad Hoc ISO Standards Development Committee			Ernest N. Morial Convention Center-New Orleans	Room 212
Wednesday,10 a.m. to 12 a.m.	ISO TC 35 TAG			Ernest N. Morial Convention Center-New Orleans	Room 205
Wednesday,1 p.m. to 3 p.m.	ISO TC 156 TAG			Ernest N. Morial Convention Center-New Orleans	Room 205

Administrative Meetings

Time	Name	Description	Committee(s)	Location	Location Detail
Friday,11 :30a.m. to 6 p.m.	Executive Committee/ Board Orientation			Hilton Riverside	Port
Saturday,7 :30a.m. to 5 :30p.m.	Board of Directors			Hilton Riverside	Quarterdeck Ballroom

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Sunday,8 a.m. to 11 a.m.	Area Coordination Committee			Ernest N. Morial Convention Center-New Orleans	Room 207
Sunday,9 a.m. to 11 a.m.	Annual Conference Program Committee (ACPC) Session I			Ernest N. Morial Convention Center-New Orleans	Room 213
Sunday,12 a.m. to 4 p.m.	Publications Activities Committee			Ernest N. Morial Convention Center-New Orleans	Room 204
Sunday,1 :30p.m. to 4 :30p.m.	Technical Coordination Committee (TCC) Session I			Ernest N. Morial Convention Center-New Orleans	Room 207
Monday,10 a.m. to 11 a.m.	NII Board of Directors			Ernest N. Morial Convention Center-New Orleans	Room 215
Monday,11 :30a.m. to 1 :30p.m.	CORROSION journal Editorial Board			Ernest N. Morial Convention Center-New Orleans	Room 215
Monday,1 p.m. to 5 p.m.	TCC Operations			Ernest N. Morial Convention Center-New Orleans	Room 203
Monday,1 :30p.m. to 5 :30p.m.	Policy Committee			Hilton Riverside	Windsor
Tuesday,8 a.m. to 11 :30a.m.	TCC Planning Committee			Ernest N. Morial Convention Center-New Orleans	Room 209
Tuesday,10 a.m. to 12 :30a.m.	Public Policy & Outreach Committee			Ernest N. Morial Convention Center-New Orleans	Room 204
Wednesday,2 p.m. to 4 p.m.	TCC Reference Publications Committee			Ernest N. Morial Convention Center-New Orleans	Room 204
Thursday,10 a.m. to 12 a.m.	Conferences & Expositions Administrative Committee			Ernest N. Morial Convention Center-New Orleans	Room 203
Thursday,12 :30a.m. to 2 :30p.m.	Technical Coordination Committee (TCC) Session II			Ernest N. Morial Convention Center-New Orleans	Room 207
Thursday,2 :30p.m. to 4 :30p.m.	Technical & Research Activities Committee (TRAC)			Ernest N. Morial Convention Center-New Orleans	Room 207

Symposium Officer Training ACPC1

Time	Name	Description	Committee(s)	Location	Location Detail
Tuesday,11 :30a.m. to 1 p.m.	Annual Conference Program Committee (ACPC) Symposium Officer Training		ACPC1	Ernest N. Morial Convention Center-New Orleans	Room 207

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ACPC Session 2 ACPC2

Time	Name	Description	Committee(s)	Location	Location Detail
Wednesday,10 a.m. to 12 a.m.	Annual Conference Program Committee (ACPC) Session II		ACPC2	Ernest N. Morial Convention Center-New Orleans	Room 203

MP Editorial Advisory Board MP EDIT

Time	Name	Description	Committee(s)	Location	Location Detail
Sunday,10 a.m. to 12 a.m.	MP Editorial Advisory Board		MP EDIT	Ernest N. Morial Convention Center-New Orleans	Room 203

Research Committee RAC

Time	Name	Description	Committee(s)	Location	Location Detail
Thursday,8 a.m. to 12 a.m.	Research Committee Meeting		RAC	Ernest N. Morial Convention Center-New Orleans	Room 207

Other Meetings

Time	Name	Description	Committee(s)	Location	Location Detail
Friday,2 p.m. to 5 p.m.	International Area Director's Meeting			Hilton Riverside	Pelican Room
Saturday,8 a.m. to 5 p.m.	Train the Trainer Session I			Hilton Riverside	St. Charles Ballroom
Saturday,10 a.m. to 4 p.m.	Volunteer Day	Join the NACECares team as we partner with New Orleans Area Habitat for Humanity to provide families a chance to attain their dream of home ownership. Transportation and lunch will be provided. Please sign up today at nace.org/volunteernola		Ernest N. Morial Convention Center-New Orleans	
Sunday,8 a.m. to 10 a.m.	NII Certification Commission			Ernest N. Morial Convention Center-New Orleans	Room 224

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Sunday,8 a.m. to 5 p.m.	Conference Proceedings Flash Drive	Conference proceedings are available via USB flash drive and online. The USB will be provided at the registration desk. Additional USBs are available for purchase at registration or CorrStore for $149. Online access will be available to advance registrants starting 27 March 2017.	Ernest N. Morial Convention Center-New Orleans	Registration Desk
Sunday,8 a.m. to 5 p.m.	Train the Trainer Session II		Hilton Riverside	St. Charles Ballroom
Sunday,9 a.m. to 10 a.m.	Technical Committees 101 Session I	Is this your first time at CORROSION? Have you been a member and always wondered how our standards are developed or how you can play a role in the process? If so, technical committee officers and NACE staff members are offering two separate sessions, one on Sunday and a second opportunity for Monday, to welcome you to Technical Committees 101. As a participant, this session will benefit you by: • Providing a basic understanding of how technical committees work • Learning how you can get involved in technical standards development • Identifying research topics of greatest interest to you and your company • Answering your technical committee questions	Ernest N. Morial Convention Center-New Orleans	Room 227
Sunday,10 a.m. to 12 a.m.	NII Specialty Board for Protective Coatings		Ernest N. Morial Convention Center-New Orleans	Room 224
Sunday,11 :30a.m. to 4 p.m.	Western Area Board of Trustee Meeting		Ernest N. Morial Convention Center-New Orleans	Room 208
Sunday,12 a.m. to 5 p.m.	Latin American Area Board of Trustees		Ernest N. Morial Convention Center-New Orleans	Room 209
Sunday,1 p.m. to 3 p.m.	SBP Levee Tour for student		Ernest N. Morial Convention Center-New Orleans	

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Sunday,1 p.m. to 3 p.m.	NII Specialty Board for Pipeline Certifications		Ernest N. Morial Convention Center-New Orleans	Room 224
Sunday,1 p.m. to 4 p.m.	East Asia and Pacific Area Board of Trustees Meeting		Ernest N. Morial Convention Center-New Orleans	Room 221
Sunday,1 p.m. to 4 p.m.	Central Area Board of Trustees Meeting		Ernest N. Morial Convention Center-New Orleans	Room 226
Sunday,2 :30p.m. to 5 :30p.m.	Nigerian Corrosion Professionals		Ernest N. Morial Convention Center-New Orleans	Room 232
Sunday,3 p.m. to 5 p.m.	NII Policy and Practices Committee Meeting		Ernest N. Morial Convention Center-New Orleans	Room 224
Sunday,4 :30p.m. to 5 :30p.m.	General Membership Business Meeting		Ernest N. Morial Convention Center-New Orleans	Room 210
Monday,7 a.m. to 8 a.m.	Speaker's Breakfast Monday		Ernest N. Morial Convention Center-New Orleans	D-3
Monday,8 a.m. to 8 :45a.m.	Plenary Lecture	Presented by: David H. Kroon, P.E	Ernest N. Morial Convention Center-New Orleans	R-01
Monday,9 a.m. to 10 a.m.	Technical Committees 101 Session II	Is this your first time at CORROSION? Have you been a member and always wondered how our standards are developed or how you can play a role in the process? If so, technical committee officers and NACE staff members are offering two separate sessions, one on Sunday and a second opportunity for Monday, to welcome you to Technical Committees 101. As a participant, this session will benefit you by: • Providing a basic understanding of how technical committees work • Learning how you can get involved in technical standards development • Identifying research topics of greatest interest to you and your company • Answering your technical committee questions	Ernest N. Morial Convention Center-New Orleans	Room 227

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Monday,9 a.m. to 12 a.m.	Monday Guest Tour: The Big Easy	From the sultry history of the French Quarter to the majesty of St. Charles Avenue’s stately mansions, this is a thorough and fascinating introduction to the endless variety of sights found in the “Big Easy.” Come on a fascinating roundabout of the city’s unique neighborhoods.	Ernest N. Morial Convention Center-New Orleans	
Monday,9 a.m. to 12 a.m.	Award's Committee		Ernest N. Morial Convention Center-New Orleans	Room 216
Monday,9 :30a.m. to 11 :30a.m.	Education Committee and Subcommittee		Ernest N. Morial Convention Center-New Orleans	R-07
Monday,10 a.m. to 11 :30a.m.	Student Poster Orientation		Ernest N. Morial Convention Center-New Orleans	Room 217
Monday,1 p.m. to 4 p.m.	Monday Guest Tour: Garden District Tour with Elms Mansion	Learn about the fascinating history and splendor of the Garden District of New Orleans with a narrated walking tour of this famed neighborhood and tour of a private home. Travel down the renowned St. Charles Avenue, leading the way to the Garden District. During the 19th century, this area was known as the “American Sector”, where English, rather than French, was the primary language. A professional guide will escort you through the residential street and recall stories of how the wealthy American Planters, snubbed by Creole society, spared no expense to build palatial mansion and gardens.	Ernest N. Morial Convention Center-New Orleans	
Monday,5 p.m. to 5 p.m.	Drink Ticket	Monday, March 27th 5:00 PM THRU Wednesday, March 29th 5:00 PM	Ernest N. Morial Convention Center-New Orleans	Exhibit Hall
Tuesday,7 a.m. to 8 a.m.	Speaker's Breakfast Tuesday		Ernest N. Morial Convention Center-New Orleans	D-3
Tuesday,7 a.m. to 9 a.m.	Fellow's Breakfast	NACE Fellow's only	Ernest N. Morial Convention Center-New Orleans	Room 207
Tuesday,8 a.m. to 9 a.m.	Corrosion in Mining Exploratory		Ernest N. Morial Convention Center-New Orleans	Room 225

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Tuesday,8 a.m. to 9 :30a.m.	Northern Area Board of Trustees Meeting		Ernest N. Morial Convention Center-New Orleans	Room 208
Tuesday,8 a.m. to 11 a.m.	World Corrosion Organization Board of Administrators		Hilton Riverside	River Room
Tuesday,8 :30a.m. to 11 a.m.	NII Contractor Accredidation Program		Ernest N. Morial Convention Center-New Orleans	R-06
Tuesday,9 :30a.m. to 11 a.m.	NACE U Student Meeting		Ernest N. Morial Convention Center-New Orleans	Room 212
Tuesday,9 :30a.m. to 12 a.m.	Tuesday Guest Tour: That Deep South Cuisine	How can we sum up New Orleans cuisine in one dish? Creole Gumbo? Andouille Jambalaya? Soft-Shelled Crabs? Barbecued Shrimp? Black-Eyed Peas? Crawfish? Beignets? Pralines? What's the difference between Cajun cooking and Creole cooking? And what is a roux?	Ernest N. Morial Convention Center-New Orleans	
Tuesday,10 a.m. to 11 a.m.	Global Partnership Program		Hilton Riverside	Ascott/Newberry
Tuesday,11 :15a.m. to 11 :45a.m.	Willis Rodney Whitney Lecture	The Whitney Award recognizes public contributions to the science of corrosion.	Ernest N. Morial Convention Center-New Orleans	Room 206
Tuesday,11 :30a.m. to 1 :30p.m.	TCC International Liaison		Ernest N. Morial Convention Center-New Orleans	Room 209
Tuesday,12 :30a.m. to 3 p.m.	European Area Board of Trustee		Ernest N. Morial Convention Center-New Orleans	Room 208
Tuesday,12 :30a.m. to 3 :30p.m.	Tuesday Guest Tour: Sacred & Mysterious Churches & Cemeteries	Religion is an integral part of the culture and history of New Orleans. On thi, you will delve into the religious culture and spirit of Louisiana by visiting its most famous churches and cemeteries. It is here that you will admire great architecture, exquisite wood, stained glass and stone, and learn about the "Cities of the Dead."	Ernest N. Morial Convention Center-New Orleans	
Tuesday,1 p.m. to 3 p.m.	Internal Corrosion Subcommittee		Ernest N. Morial Convention Center-New Orleans	Room 203

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Tuesday,1 :30p.m. to 5 :30p.m.	Chinese Society of Corrosion and Protection Seminar		Ernest N. Morial Convention Center-New Orleans	Room 220
Tuesday,2 p.m. to 4 p.m.	West Asia and Africa Board of Trustees meeting		Ernest N. Morial Convention Center-New Orleans	Room 205
Tuesday,2 p.m. to 4 :30p.m.	World Corrosion Organization General Assembly		Hilton Riverside	River Room
Tuesday,2 p.m. to 5 p.m.	Eastern Area Board of Trustees		Ernest N. Morial Convention Center-New Orleans	Room 209
Wednesday,7 a.m. to 8 a.m.	Speaker's Breakfast Wednesday		Ernest N. Morial Convention Center-New Orleans	D-3
Wednesday,8 :30a.m. to 10 a.m.	Keynote Address	Presented by: Frank Abagnale	Ernest N. Morial Convention Center-New Orleans	Great Hall A & D
Wednesday,9 :15a.m. to 1 :30p.m.	Wednesday Guest Tour: Louisiana Flatboat Swamp	Forget about the hustle and bustle of the French Quarter and experience another kind of “wildlife”. Enter the land of swamps and marshes, home to hundreds of species of unique and interesting animals and discover the land that gave birth to Cajun culture and cuisine. Boarding a specially designed pontoon boat, this excursion starts on a bayou… local parlance for small rivulet or stream. Gnarled and twisted cypress stumps and branches lushly draped with Spanish moss line the banks of this waterway. Boxed lunch included.	Ernest N. Morial Convention Center-New Orleans	
Wednesday,11 :15a.m. to 11 :45a.m.	Frank Newman Speller Award Lecture	The Speller Award Lecture recognizes contributions to the practice of corrosion engineering	Ernest N. Morial Convention Center-New Orleans	Room 206
Wednesday,11 :30a.m. to 1 p.m.	New Orleans Section		Hilton Riverside	Jackson
Wednesday,11 :30a.m. to 1 p.m.	STG Officer Training		Ernest N. Morial Convention Center-New Orleans	Room 208
Wednesday,11 :30a.m. to 1 p.m.	Technology and Program Coordinator Training		Ernest N. Morial Convention Center-New Orleans	Room 217
Wednesday,12 a.m. to 2 p.m.	Section Officer Meeting		Ernest N. Morial Convention Center-New Orleans	Room 207

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Wednesday,1 p.m. to 2 :30p.m.	Student Poster Winner's Lunch			Ernest N. Morial Convention Center-New Orleans	Room 224
Thursday,7 a.m. to 8 a.m.	Speaker's Breakfast Thursday			Ernest N. Morial Convention Center-New Orleans	D-3
Thursday,8 a.m. to 10 a.m.	Expositions Committee			Ernest N. Morial Convention Center-New Orleans	Room 203
Thursday,9 a.m. to 5 p.m.	NATO STANAG WP			Ernest N. Morial Convention Center-New Orleans	Room 219

Oil and Gas Production–Metallurgy STG 32

Time	Name	Description	Committee(s)	Location	Location Detail
Wednesday,8 a.m. to 9 :30a.m.	STG 32 Officers Meeting		STG 32	Ernest N. Morial Convention Center-New Orleans	R-01

Technical Committee Meetings

Corrosion Prevention and Control for Concrete, Land Transportation, and Coating Technology C1

Time	Name	Description	Committee(s)	Location	Location Detail
Thursday,11 a.m. to 12 a.m.	Corrosion Prevention and Control for Concrete, Land Transportation, and Coating Technology		C1	Ernest N. Morial Convention Center-New Orleans	Room 204

Reinforced Concrete STG 01 - Reinforced Concrete

Time	Name	Description	Committee(s)	Location	Location Detail
Sunday,10 a.m. to 12 a.m.	Reinforced Concrete: Cathodic Protection		TEG 043X [01]	Ernest N. Morial Convention Center-New Orleans	Room 232
Sunday,11 a.m. to 12 a.m.	Cathodic Protection of Prestressed Concrete Elements		TG 046 [01](05, 41)	Ernest N. Morial Convention Center-New Orleans	Room 213
Sunday,2 p.m. to 3 p.m.	Reinforced Concrete: Electrochemical Chloride Removal and Realklization		TG 054 [01](41)	Ernest N. Morial Convention Center-New Orleans	Room 213
Sunday,3 p.m. to 4 p.m.	Reinforced Concrete: Anode Test Procedures		TG 045 [01](05)	Ernest N. Morial Convention Center-New Orleans	Room 213

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Sunday,4 p.m. to 5 p.m.	Testing and Evaluation of Corrosion on Steel-Framed Buildings		TG 460 [01](02)	Ernest N. Morial Convention Center-New Orleans	Room 213
Tuesday,1 p.m. to 2 p.m.	Inspection Methods for Corrosion Evaluation of Prestressed Concrete Structures		TG 504 [01]	Ernest N. Morial Convention Center-New Orleans	Room 222
Tuesday,1 p.m. to 2 :30p.m.	Reinforced Concrete: Stray-Current- Induced Corrosion		TG 356 [01](05)	Ernest N. Morial Convention Center-New Orleans	Room 204
Tuesday,2 p.m. to 4 p.m.	Reinforced Concrete: Proposed Revision to NACE SP0290-2007		TG 044 [01](05)	Ernest N. Morial Convention Center-New Orleans	Room 222
Tuesday,3 p.m. to 5 p.m.	Reinforced Concrete: Corrosion-Resistant Reinforcement		TG 057 [01](11)	Ernest N. Morial Convention Center-New Orleans	Room 226
Tuesday,5 p.m. to 5 :30p.m.	Reinforced Concrete: Design Considerations for Corrosion Control		TG 290 [01](41)	Ernest N. Morial Convention Center-New Orleans	Room 226
Wednesday,10 a.m. to 11 a.m.	Review and Revise TM0294-2007		TG 472 [01](05)	Ernest N. Morial Convention Center-New Orleans	Room 207
Wednesday,1 p.m. to 3 p.m.	State of the Art Report: Criteria for Corrosion Control of Steel in Concrete		TG 545 [01]	Ernest N. Morial Convention Center-New Orleans	Room 216
Wednesday,3 p.m. to 5 p.m.	Reinforced Concrete		STG 01	Ernest N. Morial Convention Center-New Orleans	Room 227

Coatings and Linings, Protective: Atmospheric STG 02 - Coatings and Linings, Protective: Atmospheric

Time	Name	Description	Committee(s)	Location	Location Detail
Sunday,10 a.m. to 12 a.m.	Offshore Coatings: Laboratory Testing Criteria		TEG 346X [02](03, 44)	Ernest N. Morial Convention Center-New Orleans	Room 205
Sunday,4 p.m. to 5 p.m.	Hot-Dip Galvanizing for Steel Corrosion Protection		TEG 428X [02](03, 04)	Ernest N. Morial Convention Center-New Orleans	Room 203

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Monday,10 a.m. to 12 a.m.	Coatings System for Reinforced Concrete Structures in Marine Atmospheric Environments		TG 541 [02](44)	Ernest N. Morial Convention Center-New Orleans	R-08
Tuesday,8 a.m. to 10 a.m.	Threaded Fasteners: Coatings & Methods of Protection for Threaded Fasteners Used w/ Structural Steel		TEG 311X [02]	Ernest N. Morial Convention Center-New Orleans	Room 213
Tuesday,10 a.m. to 12 a.m.	Threaded Fasteners: Coatings for Protection of Threaded Fasteners Used with Structural Steel		TG 148 [02]	Ernest N. Morial Convention Center-New Orleans	Room 213
Tuesday,1 p.m. to 3 p.m.	Determining True Insulative Value of Liquid Insulative Materials Applied on Steel Surfaces		TG 525 [02]	Ernest N. Morial Convention Center-New Orleans	Room 213
Tuesday,3 p.m. to 5 p.m.	Review of NACE Standard TM 0304-2004	Joint Meeting Between TG 260, TG 263, TG 264 and TG 312 (STG 02 & 03)	TG 312 [02]	Ernest N. Morial Convention Center-New Orleans	Room 227
Tuesday,3 p.m. to 5 p.m.	Review of NACE Standard TM 0304-2004	Joint Meeting Between TG 260, TG 263, TG 264 and TG 312 (STG 02 & 03)	TG 260 [02](33)	Ernest N. Morial Convention Center-New Orleans	Room 227
Thursday,8 a.m. to 11 a.m.	STG 02, 03 & 04 Joint Meeting		STG 02	Ernest N. Morial Convention Center-New Orleans	Room 225

Coatings and Linings, Protective: Immersion and Buried Service STG 03 - Coatings and Linings, Protective: Immersion and Buried Service

Time	Name	Description	Committee(s)	Location	Location Detail
Sunday,8 a.m. to 10 a.m.	High Temperature, High Pressure, Corrosive, Service Enviornments pertaining to Oil and Gas and other		TEG 526X [03](33)	Ernest N. Morial Convention Center-New Orleans	Room 205
Sunday,1 p.m. to 2 :30p.m.	Coating Systems (External) for Pipeline Directional Drill Applications		TG 352 [03](04, 35)	Ernest N. Morial Convention Center-New Orleans	Room 214
Sunday,2 :30p.m. to 4 :30p.m.	Coating Conductance		TG 030 [03](05, 35, 62)	Ernest N. Morial Convention Center-New Orleans	Room 214

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Sunday,4 :30p.m. to 5 :30p.m.	Consequences of Coating Failures as Related to Interaction with Cathodic Protection		TG 523 [03]	Ernest N. Morial Convention Center-New Orleans	Room 214
Tuesday,8 a.m. to 10 a.m.	Pipeline Coating Peel Strength Test		TG 520 [03]	Ernest N. Morial Convention Center-New Orleans	Room 215
Tuesday,10 a.m. to 11 a.m.	Review and Revise or Reaffirm SP0109-2009		TG 251 [03](04, 35)	Ernest N. Morial Convention Center-New Orleans	Room 215
Tuesday,10 :30a.m. to 12 a.m.	Review and Revise SP0298-2007		TG 540 [03]	Ernest N. Morial Convention Center-New Orleans	Room 216
Tuesday,11 a.m. to 12 a.m.	Review of NACE Standard RP0402-2002		TG 249 [03](04, 35)	Ernest N. Morial Convention Center-New Orleans	Room 215
Tuesday,1 p.m. to 4 p.m.	Coating, Polyolefin Resin Systems: Review of NACE SP0185-2007		TG 265 [03](04, 05, 35)	Ernest N. Morial Convention Center-New Orleans	Room 215
Tuesday,2 p.m. to 3 p.m.	Cathodic Disbondment Test for Coated Steel Structures Under Cathodic Protection		TG 470 [03]	Ernest N. Morial Convention Center-New Orleans	Room 227
Tuesday,3 p.m. to 5 p.m.	Review of NACE Standard TM 0304-2004	Joint Meeting Between TG 260, TG 263, TG 264 and TG 312 (STG 02 & 03)	TG 263 [03](33)	Ernest N. Morial Convention Center-New Orleans	Room 227
Tuesday,3 p.m. to 5 p.m.	Review of NACE Standard TM 0304-2004	Joint Meeting Between TG 260, TG 263, TG 264 and TG 312 (STG 02 & 03)	TG 264 [03](33)	Ernest N. Morial Convention Center-New Orleans	Room 227
Tuesday,3 p.m. to 5 p.m.	Standard Practice for Evaluating Protective Coatings for Use Under Insulation		TG 516 [03](02, 04, 43)	Ernest N. Morial Convention Center-New Orleans	Room 213
Tuesday,4 p.m. to 6 p.m.	Coatings, Heat-Shrink Sleeves for External Repair, Rehabilitations, and Weld Joints on Pipelines		TG 248 [03](04, 35)	Ernest N. Morial Convention Center-New Orleans	Room 215
Thursday,8 a.m. to 11 a.m.	STG 02, 03 & 04 Joint Meeting		STG 03	Ernest N. Morial Convention Center-New Orleans	Room 225

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Coatings and Linings, Protective: Surface Preparation STG 04 - Coatings and Linings, Protective: Surface Preparation

Time	Name	Description	Committee(s)	Location	Location Detail
Sunday,4 p.m. to 5 :30p.m.	Lining Tanks and Vessels for Immersion Service--Review of NACE SP0178-2007		TG 295 [04](02, 03, 43)	Ernest N. Morial Convention Center-New Orleans	Room 204
Wednesday,10 a.m. to 12 a.m.	Soluble Salt Limits based on Service Environment		TG 546 [04]	Ernest N. Morial Convention Center-New Orleans	Room 204
Thursday,8 a.m. to 11 a.m.	STG 02, 03 & 04 Joint Meeting		STG 04	Ernest N. Morial Convention Center-New Orleans	Room 225

Cathodic/Anodic Protection STG 05 - Cathodic/Anodic Protection

Time	Name	Description	Committee(s)	Location	Location Detail
Sunday,9 a.m. to 11 a.m.	Cathodic Protection: Pipe-Type Cable		TEG 197X [05]	Ernest N. Morial Convention Center-New Orleans	Room 215
Sunday,10 a.m. to 12 a.m.	Alternating Current (AC) Power Systems, Adjacent: Corrosion Control and Related Safety Procedures		TG 025 [05](03, 35)	Ernest N. Morial Convention Center-New Orleans	Room 223
Sunday,1 p.m. to 3 p.m.	Standard Practice for Cathodic Protection of Structures Submerged in Fresh Water		TG 526 [05]	Ernest N. Morial Convention Center-New Orleans	Room 215
Sunday,2 p.m. to 3 p.m.	Interference Problems		TEG 262X [05](35)	Ernest N. Morial Convention Center-New Orleans	Room 223
Sunday,3 p.m. to 4 p.m.	Corrosion Control Coordinating Committee		TEG 022X [05](01)	Ernest N. Morial Convention Center-New Orleans	Room 215
Sunday,3 p.m. to 5 p.m.	Cathodic Protection		TEG 179X [05]	Ernest N. Morial Convention Center-New Orleans	Room 223
Monday,3 p.m. to 5 p.m.	Cathodic Protection Coupon Technology		TG 210 [05](35)	Ernest N. Morial Convention Center-New Orleans	Room 223
Wednesday,3 p.m. to 5 p.m.	Steel, Structural: Corrosion Control of Pilings in Nonmarine Applications		TG 018 [05](01, 03)	Ernest N. Morial Convention Center-New Orleans	Room 225

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Thursday,8 a.m. to 12 a.m.	AC Corrosion on Cathodically Protected Pipelines: Risk Assessment, Mitigation, and Monitoring		TG 430 [05](35)	Ernest N. Morial Convention Center-New Orleans	Room 222
Thursday,10 a.m. to 12 a.m.	Review of NACE SP0388-2007 & SP0196-2011 Joint Meeting TG 167 & 284		TG 167 [05]	Ernest N. Morial Convention Center-New Orleans	Room 224
Thursday,10 a.m. to 12 a.m.	Review of NACE SP0388-2007 & SP0196-2011 Joint Meeting TG 167 & 284		TG 284 [05](11, 35)	Ernest N. Morial Convention Center-New Orleans	Room 224
Thursday,1 p.m. to 3 p.m.	Joint Meeting STG 05 Cathodic/Anodic Protection & STG 35 Pipelines, Tanks & Well Castings		STG 05	Ernest N. Morial Convention Center-New Orleans	Room 228

Corrosion Management STG 08

Time	Name	Description	Committee(s)	Location	Location Detail
Tuesday,3 p.m. to 5 p.m.	Corrosion Management		STG 08	Ernest N. Morial Convention Center-New Orleans	Room 208
Thursday,8 a.m. to 10 a.m.	Asset Integrity Management		TEG 529X [08]	Ernest N. Morial Convention Center-New Orleans	Room 217

Nonmetallic Materials of Construction STG 10 - Nonmetallic Materials of Construction

Time	Name	Description	Committee(s)	Location	Location Detail
Monday,1 p.m. to 4 p.m.	Non-Metallic Materials Basic Education		TEG 528X [10](33)	Ernest N. Morial Convention Center-New Orleans	Room 228
Tuesday,1 p.m. to 5 p.m.	Nonmetallic Material of Construction: Basic Education		TEG 239X [10](39)	Ernest N. Morial Convention Center-New Orleans	Room 225
Wednesday,10 a.m. to 12 a.m.	Plastics: Managing Corrosion with Polymer-Based and Composite Materials: Session I		TEG 191X [10](39)	Ernest N. Morial Convention Center-New Orleans	Room 218
Wednesday,1 p.m. to 5 p.m.	Plastics: Managing Corrosion with Polymer-Based and Composite Materials: Session II		TEG 191X [10](39)	Ernest N. Morial Convention Center-New Orleans	Room 218

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Thursday,8 a.m. to 10 a.m.	Nonmetallic Materials of Construction		STG 10	Ernest N. Morial Convention Center-New Orleans	Room 208

Water Treatment Systems STG 11 - Water Treatment Systems

Time	Name	Description	Committee(s)	Location	Location Detail
Sunday,9 a.m. to 12 a.m.	Boiler Waterside Failure Analysis		TEG 163X [11](62)	Ernest N. Morial Convention Center-New Orleans	Room 228
Sunday,1 p.m. to 2 :30p.m.	Steam Generating Systems: Shut-Down/Lay-Up/Start-Up		TG 160 [11]	Ernest N. Morial Convention Center-New Orleans	Room 225
Sunday,2 :30p.m. to 5 :30p.m.	Practical Applications of Water Treatment in Industrail & Commercial Systems		TEG 503X [11]	Ernest N. Morial Convention Center-New Orleans	Room 225
Monday,1 p.m. to 4 p.m.	Biocide Application/Misapplication		TEG 149X [11]	Ernest N. Morial Convention Center-New Orleans	Room 226
Monday,4 p.m. to 5 :30p.m.	Cooling Water Equipment, Initial Conditioning		TG 234 [11]	Ernest N. Morial Convention Center-New Orleans	Room 226
Wednesday,10 a.m. to 12 a.m.	Building Fire Protection Systems: Corrosion & Deposit Control		TEG 159X [11]	Ernest N. Morial Convention Center-New Orleans	Room 225
Wednesday,1 p.m. to 3 p.m.	Fire Protection Systems		TG 381 [11]	Ernest N. Morial Convention Center-New Orleans	Room 225
Wednesday,3 p.m. to 5 p.m.	Recovery & Repassivation After Low pH Exursions in Open Recirculating Cooling Water Systems		TG 375 [11]	Ernest N. Morial Convention Center-New Orleans	Room 205
Thursday,8 a.m. to 11 a.m.	Review & Revise or Reaffirm NACE Publication 46107		TG 157 [11](61)	Ernest N. Morial Convention Center-New Orleans	Room 215
Thursday,11 a.m. to 12 :30a.m.	Water Treatment, Physical Process: Guidelines for Testing		TG 235 [11](46, 62)	Ernest N. Morial Convention Center-New Orleans	Room 215
Thursday,1 p.m. to 3 p.m.	Water Treatment		STG 11	Ernest N. Morial Convention Center-New Orleans	Room 226

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Oil and Gas Production–Cathodic Protection STG 30 - Oil and Gas Production –Cathodic Protection

Time	Name	Description	Committee(s)	Location	Location Detail
Monday,9 a.m. to 11 a.m.	Cathodic Protection Systems, Retrofit, for Offshore Platforms		TG 168 [30]	Ernest N. Morial Convention Center-New Orleans	Room 208
Monday,1 p.m. to 3 :30p.m.	Cathodic Protection in Seawater- Discussion of Current Topics		TEG 166X [30]	Ernest N. Morial Convention Center-New Orleans	Room 227
Tuesday,8 a.m. to 10 a.m.	Offshore Steel Platforms- Corrosion Control: Review of NACE SP0176		TG 170 [30](05)	Ernest N. Morial Convention Center-New Orleans	Room 226
Tuesday,10 a.m. to 12 a.m.	Review and Revise as Necessary ANSI/NACE SP0115-2015/ISO 15589-2:2012		TG 169 [30](05, 35)	Ernest N. Morial Convention Center-New Orleans	Room 226
Thursday,8 a.m. to 10 a.m.	Oil and Gas Production-Cathodic Protection		STG 30	Ernest N. Morial Convention Center-New Orleans	R-05

Oil and Gas Production–Corrosion and Scale Inhibition STG 31 - Oil and Gas Production–Corrosion and Scale Inhibition

Time	Name	Description	Committee(s)	Location	Location Detail
Sunday,9 a.m. to 11 a.m.	Downhole Corrosion and Scale Inhibitor Application via Capillary Tubing		TG 512 [31](60, 61)	Ernest N. Morial Convention Center-New Orleans	Room 208
Sunday,11 a.m. to 5 p.m.	Oil & Gas Production, Sour Corrosion: Information Exchange		TEG 282X [31](60, 61, 62)	Ernest N. Morial Convention Center-New Orleans	R-01
Sunday,1 p.m. to 5 p.m.	Oil & Gas Production, Oil Sands: Information Exchange		TEG 341X [31](11, 33, 34)	Ernest N. Morial Convention Center-New Orleans	Room 222
Monday,9 a.m. to 12 a.m.	Oil & Gas Production, Deepwater Corrosion & Scale Control: Information Exchange		TEG 202X [31](61, 62)	Ernest N. Morial Convention Center-New Orleans	Room 226

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Monday,9 :30a.m. to 11 a.m.	Summary of Knowledge and Experience on Internal Corrosion of Pipeline Under Dewing Conditions: (TOL)		TG 478 [31](35)	Ernest N. Morial Convention Center-New Orleans	Room 204
Monday,11 a.m. to 12 a.m.	Under-Deposit Corrosion		TEG 092X [31](11, 38, 60, 61)	Ernest N. Morial Convention Center-New Orleans	Room 204
Monday,1 p.m. to 3 p.m.	Oil & Gas Exploration Corrosion: Information Exchange		TEG 514X [31](32, 60)	Ernest N. Morial Convention Center-New Orleans	Room 204
Tuesday,1 p.m. to 3 p.m.	Oil and Gas Production, CO2 Corrosion: Information Exchange		TEG 059X [31](60, 61)	Ernest N. Morial Convention Center-New Orleans	Room 226
Thursday,8 a.m. to 10 a.m.	Corrosion Inhibitor Program Management for Oil and Gas Fluids		TG 550 [31](08, 61)	Ernest N. Morial Convention Center-New Orleans	Room 204

Oil and Gas Production–Metallurgy STG 32 - Oil and Gas Production–Metallurgy

Time	Name	Description	Committee(s)	Location	Location Detail
Sunday,1 :30p.m. to 4 :30p.m.	Oversight of Maintenance Panel		TG 299 [32]	Ernest N. Morial Convention Center-New Orleans	R-03
Monday,9 a.m. to 11 a.m.	Ripple Load Test for evaluation of Sour Service Cracking Resistance		TG 544 [32]	Ernest N. Morial Convention Center-New Orleans	Room 209
Monday,10 a.m. to 12 a.m.	Review and revise as necessary NACE Standard MR0176-2012, "Metallic Materials for Sucker-Rod Pumps f		TG 084 [32]	Ernest N. Morial Convention Center-New Orleans	Room 203
Monday,11 a.m. to 12 a.m.	Computerized Environmental Cracking Database		TG 257 [32](34, 62)	Ernest N. Morial Convention Center-New Orleans	Room 209
Monday,1 p.m. to 2 :30p.m.	Cracking, Stepwise: Pipeline Steels-Review of NACE Standard TM0284		TG 082 [32](34, 62)	Ernest N. Morial Convention Center-New Orleans	Room 222

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Monday,2 :30p.m. to 4 p.m.	Evaluation of Carbon and Low-Alloy Steels for Resistance to Stress-Oriented Hydrogen-Induced Crackin		TG 536 [32](34, 62)	Ernest N. Morial Convention Center-New Orleans	Room 222
Tuesday,8 a.m. to 10 a.m.	Double-Cantilever-Beam (DCB) Test		WG 085c [32](62)	Ernest N. Morial Convention Center-New Orleans	Room 217
Tuesday,10 a.m. to 12 a.m.	Development of Test Method for Elevated Temperature in TM0177		WG 085e [32]	Ernest N. Morial Convention Center-New Orleans	Room 217
Tuesday,1 p.m. to 4 p.m.	Sulfide Corrosion Cracking: Metallic Materials Testing Techniques		TG 085 [32](62)	Ernest N. Morial Convention Center-New Orleans	Room 217
Thursday,2 p.m. to 4 p.m.	Oil & Gas Production Materials Information Exchange		TEG 374X [32](33)	Ernest N. Morial Convention Center-New Orleans	R-01
Thursday,4 p.m. to 6 p.m.	Oil & Gas Production-Metallurgy		STG 32	Ernest N. Morial Convention Center-New Orleans	R-01

Oil and Gas Production–Nonmetallics and Wear Coatings (Metallic) STG 33 - Oil and Gas Production–Nonmetallics and Wear Coatings (Metallic)

Time	Name	Description	Committee(s)	Location	Location Detail
Wednesday,10 a.m. to 12 a.m.	Accelerated Testing of Nonmetallic Materials		TEG 501X [33]	Ernest N. Morial Convention Center-New Orleans	Room 215
Wednesday,1 p.m. to 2 :30p.m.	Insulation for Upstream and Downstream Oil and Gas Operations		TEG 086X [33]	Ernest N. Morial Convention Center-New Orleans	Room 215
Thursday,2 :30p.m. to 4 :30p.m.	Oil and Gas Production—Nonmetallics and Wear Coatings (Metallic)		STG 33	Ernest N. Morial Convention Center-New Orleans	R-03

Petroleum Refining and Gas Processing STG 34 - Petroleum Refining and Gas Processing

Time	Name	Description	Committee(s)	Location	Location Detail
Tuesday,8 a.m. to 10 :30a.m.	Refining Info Exchange Session I		TEG 205X [34]	Ernest N. Morial Convention Center-New Orleans	R-03

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Tuesday,10 :30a.m. to 12 a.m.	Gas Treating Control Systems Corrosion Minimization		TEG 113X [34]	Ernest N. Morial Convention Center-New Orleans	R-03
Tuesday,1 p.m. to 5 p.m.	Refining Info Exchange Session II		TEG 205X [34]	Ernest N. Morial Convention Center-New Orleans	R-03
Wednesday,10 a.m. to 11 a.m.	Crude Column OVHD Corrosion- Update of Publication 34109		TG 342 [34]	Ernest N. Morial Convention Center-New Orleans	Room 209
Wednesday,11 a.m. to 12 a.m.	Petroleun Refining Sulfide Stress Cracking (SSC): Review of NACE Standard MR0103		TG 231 [34](60)	Ernest N. Morial Convention Center-New Orleans	Room 209
Wednesday,1 p.m. to 2 p.m.	Petroleum Refinery Corrosion Specialist Certification		TG 393 [34]	Ernest N. Morial Convention Center-New Orleans	Room 209
Wednesday,2 p.m. to 3 p.m.	Crude Quality Parameters for Corrosion		TG 489 [34](31, 35)	Ernest N. Morial Convention Center-New Orleans	Room 209
Wednesday,2 p.m. to 3 p.m.	API 751 Advisory on HF Alkylation		TG 510 [34]	Ernest N. Morial Convention Center-New Orleans	Room 227
Wednesday,3 p.m. to 4 p.m.	Injection & Mix Points SP0114		TG 174 [34]	Ernest N. Morial Convention Center-New Orleans	Room 209
Wednesday,4 p.m. to 5 p.m.	Carbonate SCC- Update of Publication 34108		TG 347 [34](60)	Ernest N. Morial Convention Center-New Orleans	Room 209
Thursday,8 a.m. to 8 :30a.m.	Review of NACE Publication 8X194		TG 301 [34](32)	Ernest N. Morial Convention Center-New Orleans	Room 229
Thursday,8 :30a.m. to 9 a.m.	Reaffirmation of NACE SP0407-2007		TG 302 [34](36)	Ernest N. Morial Convention Center-New Orleans	Room 229
Thursday,9 a.m. to 11 a.m.	STG 34 Steering Committee		STG 34	Ernest N. Morial Convention Center-New Orleans	Room 229

Pipelines, Tanks, and Well Casings STG 35 - Pipelines, Tanks, and Well Casings

Time	Name	Description	Committee(s)	Location	Location Detail
Sunday,10 a.m. to 11 a.m.	Technical Guidance for Using Self-Propelled In-Line Inspection Devices in the Direct Examination		TG 522 [35](31, 41)	Ernest N. Morial Convention Center-New Orleans	Room 212

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Sunday,11 a.m. to 12 a.m.	Pipeline Crossings: Steel-Cased, Thrust-Bored, & HDD	TEG 208X [35](05)	Ernest N. Morial Convention Center-New Orleans	Room 227
Sunday,1 p.m. to 2 p.m.	Pipelines, Steel: Standard for In Situ Internal Cleaning and Coating	TG 223 [35](03)	Ernest N. Morial Convention Center-New Orleans	Room 227
Sunday,1 p.m. to 3 p.m.	Pipelines: Liquid Petroleum Industry Corrosion Control Issues Forum	TEG 314X [35](02, 03, 04, 05)	Ernest N. Morial Convention Center-New Orleans	Room 212
Sunday,1 p.m. to 3 p.m.	Review of NACE SP0186-2007	TG 446 [35](05)	Ernest N. Morial Convention Center-New Orleans	Room 218
Sunday,2 :30p.m. to 5 :30p.m.	Report on Underdeposit Corrosion (UDC) of Pipelines	TG 533 [35](31, 60)	Ernest N. Morial Convention Center-New Orleans	Room 205
Sunday,3 p.m. to 5 p.m.	Pipeline Corrosion Management	TG 370 [35](02, 03, 05)	Ernest N. Morial Convention Center-New Orleans	Room 218
Monday,1 p.m. to 3 p.m.	Cathodic Protection Monitoring: Use of Coupons	TEG 338X [35](05)	Ernest N. Morial Convention Center-New Orleans	Room 223
Monday,3 p.m. to 4 p.m.	Review & Revise as Necessary NACE Standard TM0212-2012	TG 254 [35]	Ernest N. Morial Convention Center-New Orleans	Room 204
Wednesday,10 a.m. to 12 a.m.	Well Casings, Corrosion Control: Information Exchange	TEG 080X [35]	Ernest N. Morial Convention Center-New Orleans	Room 227
Wednesday,1 p.m. to 2 p.m.	Review of NACE SP0286-2007	TG 539 [35](05)	Ernest N. Morial Convention Center-New Orleans	Room 204
Wednesday,1 p.m. to 3 p.m.	Pipelines: In-Line Inspections	TEG 267X [35]	Ernest N. Morial Convention Center-New Orleans	Room 226
Wednesday,3 p.m. to 5 p.m.	Review & Revise as Necessary NACE Publication 35100	TG 039 [35]	Ernest N. Morial Convention Center-New Orleans	Room 226
Thursday,8 a.m. to 10 a.m.	Standard for External Corrosion Control of On-Grade Carbon Steel Storage Tank Bottoms	TG 543 [35](05)	Ernest N. Morial Convention Center-New Orleans	Room 228
Thursday,8 a.m. to 10 a.m.	3D Laser and Structured Light	TG 502 [35](05)	Ernest N. Morial Convention Center-New Orleans	Room 226
Thursday,10 a.m. to 11 :30a.m.	Corrosion Management of Aboveground Storage Tanks	TEG 132X [35]	Ernest N. Morial Convention Center-New Orleans	Room 209

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Thursday,10 a.m. to 12 a.m.	Underground or Submerged Metallic Piping Systems		TG 020 [35](05)	Ernest N. Morial Convention Center-New Orleans	Room 217
Thursday,10 a.m. to 12 a.m.	Review of NACE Standard RP0193-2001		TG 013 [35](05)	Ernest N. Morial Convention Center-New Orleans	Room 228
Thursday,10 a.m. to 12 a.m.	Review and Revise or Reaffirm as Necessary SP0208-2008		TG 315 [35]	Ernest N. Morial Convention Center-New Orleans	Room 205
Thursday,1 p.m. to 3 p.m.	Joint Meeting STG 05 Cathodic/Anodic Protection & STG 35 Pipelines, Tanks & Well Castings		STG 35	Ernest N. Morial Convention Center-New Orleans	Room 228

Process Industry—Materials Performance in Chemicals STG 36 - Process Industry—Materials Performance in Chemicals

Time	Name	Description	Committee(s)	Location	Location Detail
Sunday,1 p.m. to 2 :30p.m.	Hydrofluoric Acid and Hydrogen Fluoride: Review of NACE Publication 5A171		TG 358 [36](34)	Ernest N. Morial Convention Center-New Orleans	Room 203
Sunday,1 p.m. to 3 p.m.	Failure Prevention Case Histories		TEG 118X [36](39)	Ernest N. Morial Convention Center-New Orleans	Room 228
Sunday,2 :30p.m. to 4 p.m.	Hydrofluoric Acid: Materials for Receiving, Handling, and Storing		TEG 119X [36](34)	Ernest N. Morial Convention Center-New Orleans	Room 203
Sunday,3 p.m. to 5 p.m.	CUI: Revision of NACE SP0198		TG 325 [36](03, 04)	Ernest N. Morial Convention Center-New Orleans	Room 228
Monday,9 a.m. to 12 a.m.	Materials Selection and Corrosion Control in the Mineral Processing Industries		TEG 509X [36]	Ernest N. Morial Convention Center-New Orleans	Room 221
Monday,1 p.m. to 4 p.m.	Sulfuric Acid: Material and Experiences		TEG 115X [36]	Ernest N. Morial Convention Center-New Orleans	Room 221
Tuesday,10 a.m. to 12 a.m.	Hydrochloric Acid & Chlorine: Materials & Experiences		TEG 398X [36](10)	Ernest N. Morial Convention Center-New Orleans	Room 225

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Process Industry—High Temperature STG 37 - Process Industry—High Temperature

Time	Name	Description	Committee(s)	Location	Location Detail
Thursday,1 p.m. to 3 p.m.	Reformer Componets: Material Issues		TEG 270X [37](34, 39)	Ernest N. Morial Convention Center-New Orleans	Room 231
Thursday,3 p.m. to 5 p.m.	Materials, High Temperature: Current Issues		TEG 126X [37](39)	Ernest N. Morial Convention Center-New Orleans	Room 231
Thursday,5 p.m. to 6 p.m.	Process Industry: High Temperature		STG 37	Ernest N. Morial Convention Center-New Orleans	Room 231

Process Industry—Pulp, Paper, and Biomass Conversion STG 38

Time	Name	Description	Committee(s)	Location	Location Detail
Monday,1 p.m. to 3 p.m.	Process Industry—Pulp, Paper, and Biomass Conversion		STG 38	Ernest N. Morial Convention Center-New Orleans	Room 208

Process Industries—Materials Applications and Experiences STG 39 - Process Industries—Materials Applications and Experiences

Time	Name	Description	Committee(s)	Location	Location Detail
Tuesday,8 a.m. to 10 a.m.	Metals: Reactive		TEG 120X [39]	Ernest N. Morial Convention Center-New Orleans	Room 221
Tuesday,10 a.m. to 12 :30a.m.	Stainless Steels, Duplex & Ferritic: Application		TEG 114X [39]	Ernest N. Morial Convention Center-New Orleans	Room 221
Tuesday,1 :30p.m. to 4 p.m.	Stainless Steels: Austenitic and Nickel Alloys		TEG 116X [39]	Ernest N. Morial Convention Center-New Orleans	Room 221

Military and Aerospace Systems and Facilities STG 40

Time	Name	Description	Committee(s)	Location	Location Detail
Thursday,8 a.m. to 10 a.m.	Military and Aerospace Systems and Facilities		STG 40	Ernest N. Morial Convention Center-New Orleans	Room 205

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Electric Utility Generation, Transmission, and Distribution STG 41 - Electric Utility Generation, Transmission, and Distribution

Time	Name	Description	Committee(s)	Location	Location Detail
Sunday,9 a.m. to 10 a.m.	Nuclear Power Plant Buried Pipe Coatings Condition Assessmnet		TG 481 [41](03)	Ernest N. Morial Convention Center-New Orleans	Room 216
Sunday,10 a.m. to 11 a.m.	Identification of Existing Buried Pipe Coatings in Nuclear Power Plants		TG 485 [41](03)	Ernest N. Morial Convention Center-New Orleans	Room 216
Sunday,11 a.m. to 12 a.m.	Power Generation and Delivery Education Roadmap		TEG 473X [41]	Ernest N. Morial Convention Center-New Orleans	Room 216
Sunday,1 p.m. to 2 p.m.	Combustion & Conversion of Fossil & Alternative Fuels		TEG 183X [41]	Ernest N. Morial Convention Center-New Orleans	Room 216
Sunday,2 p.m. to 4 p.m.	Minimum Performance Standard for Above-Grade Corrosion Control of Original Equipment Transmission, D		TG 441 [41](02)	Ernest N. Morial Convention Center-New Orleans	Room 216
Sunday,3 p.m. to 5 p.m.	Renewable Energy Facilities Design, Construction and Commissioning		TEG 530X [41]	Ernest N. Morial Convention Center-New Orleans	Room 212
Sunday,4 p.m. to 5 p.m.	Geothermal System Corrosion		TEG 182X [41]	Ernest N. Morial Convention Center-New Orleans	Room 216
Monday,9 a.m. to 12 a.m.	Electric Utility Transmission and Distribution Corrosion and Grounding: Discussion of Issues		TEG 368X [41]	Ernest N. Morial Convention Center-New Orleans	Room 220
Monday,1 p.m. to 3 p.m.	Inspection of Below Grade Weathering Steel		TG 538 [41](02, 03)	Ernest N. Morial Convention Center-New Orleans	Room 216
Monday,3 p.m. to 5 p.m.	Inspection of Above grade Electrical Structures		TG 529 [41](02)	Ernest N. Morial Convention Center-New Orleans	Room 216
Tuesday,8 :30a.m. to 10 :30a.m.	External Cathodic Protection for Nuclear Power Plant Piping Systems		TG 491 [41](05, 35)	Ernest N. Morial Convention Center-New Orleans	Room 216
Thursday,1 p.m. to 2 :30p.m.	Electric Utility Generation, Transmission , & Distribution		STG 41	Ernest N. Morial Convention Center-New Orleans	Room 232

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Thursday,1 p.m. to 3 p.m.	Nuclear System Corrosion		TEG 224X [41]	Ernest N. Morial Convention Center-New Orleans	Room 216

Transportation, Land STG 43 - Transportation, Land

Time	Name	Description	Committee(s)	Location	Location Detail
Tuesday,9 a.m. to 10 a.m.	Railcars: Coating Application on Exterior Surfaces of Steel Railcars		TG 339 [43]	Ernest N. Morial Convention Center-New Orleans	Room 219
Tuesday,10 a.m. to 10 :30a.m.	Maintenance Overcoating of Railcar Exteriors		TG 437 [43](02, 04)	Ernest N. Morial Convention Center-New Orleans	Room 219
Tuesday,10 :30a.m. to 11 a.m.	Surface Preparation by Encapsulated Blast Media for Repair of Existing Coatings on Railcars		TG 379 [43]	Ernest N. Morial Convention Center-New Orleans	Room 219
Tuesday,11 a.m. to 11 :30a.m.	Guidelines for Qualifying Personnel as Abrasive Blasters and Coating and Lining Applicators		TG 394 [43](04)	Ernest N. Morial Convention Center-New Orleans	Room 219
Tuesday,1 p.m. to 1 :30p.m.	Review and Revise or Reaffirm as Necessary NACE SP0386-2007		TG 332 [43](02, 03)	Ernest N. Morial Convention Center-New Orleans	Room 219
Tuesday,1 :30p.m. to 2 p.m.	Coating Thickness Measurement, Methods, and Recording—Specific to the Railcar Industry		TG 456 [43](02, 03, 04)	Ernest N. Morial Convention Center-New Orleans	Room 219
Tuesday,2 p.m. to 2 :30p.m.	Revision of NACE SP0592 (formerly RP0592), "Application of a Coating System to Interior Surfaces of		TG 061 [43](03, 36)	Ernest N. Morial Convention Center-New Orleans	Room 219
Tuesday,2 :30p.m. to 3 :30p.m.	Review and Revise or Reaffirm NACE SP0302-2007		TG 067 [43](02)	Ernest N. Morial Convention Center-New Orleans	Room 219
Wednesday,10 :30a.m. to 11 a.m.	Review and Revise or Reaffirm as Necessary NACE SP0295-2008		TG 333 [43](03)	Ernest N. Morial Convention Center-New Orleans	Room 219
Wednesday,11 a.m. to 12 a.m.	Corrosion and Protection of Tank Cars in Crude Oil Service		TG 535 [43](03, 31, 34, 35)	Ernest N. Morial Convention Center-New Orleans	Room 219

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Time	Name	Description	Committee(s)	Location	Location Detail
Wednesday,1 p.m. to 2 p.m.	Land Transportation: Information Exchange on Corrosion and Coating-Related Issues		TEG 291X [43]	Ernest N. Morial Convention Center-New Orleans	Room 219
Wednesday,2 p.m. to 3 p.m.	Transportation, Land		STG 43	Ernest N. Morial Convention Center-New Orleans	Room 219

Marine Corrosion: Ships and Structures STG 44 - Marine Corrosion: Ships and Structures

Time	Name	Description	Committee(s)	Location	Location Detail
Monday,2 p.m. to 5 p.m.	Marine Corrosion of Copper Alloys		TEG 523X [44]	Ernest N. Morial Convention Center-New Orleans	Room 207
Wednesday,3 p.m. to 5 p.m.	Standard for Underwater Evaluation of Degree of Fouling on Ship Hulls		TG 475 [44](61, 62)	Ernest N. Morial Convention Center-New Orleans	Room 215
Thursday,1 p.m. to 4 p.m.	TIE Technical Information Exchange		STG 44	Ernest N. Morial Convention Center-New Orleans	R-04

Pollution Control, Waste Incineration, and Process Waste STG 45 - Pollution Control, Waste Incineration, and Process Waste

Time	Name	Description	Committee(s)	Location	Location Detail
Tuesday,8 a.m. to 10 a.m.	FGD Pollution Control Industries Corrosion Control		TEG 230X [45]	Ernest N. Morial Convention Center-New Orleans	Room 203
Tuesday,10 a.m. to 10 :30a.m.	Pollution Control, Waste Incineration, And Process Waste		STG 45	Ernest N. Morial Convention Center-New Orleans	Room 203

Corrosion Mechanisms STG 60 - Corrosion Mechanisms

Time	Name	Description	Committee(s)	Location	Location Detail
Sunday,8 a.m. to 5 p.m.	Nanotechnology and Corrosion		TEG 474X [60]	Ernest N. Morial Convention Center-New Orleans	Room 229
Sunday,11 a.m. to 12 a.m.	Environmentally Assisted Cracking		TEG 186X [60]	Ernest N. Morial Convention Center-New Orleans	Room 215
Tuesday,8 a.m. to 10 a.m.	Biomedical Implant Device Corrosion		TEG 331X [60]	Ernest N. Morial Convention Center-New Orleans	Room 204

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Time	Name	Description	Committee(s)	Location	Location Detail
Tuesday,1 p.m. to 5 p.m.	Microbiologically Influenced Corrosion		TEG 187X [60](11, 46)	Ernest N. Morial Convention Center-New Orleans	Room 218
Thursday,8 a.m. to 10 :30a.m.	Biodegradable Magnesium Alloys		TG 495 [60]	Ernest N. Morial Convention Center-New Orleans	Room 216
Thursday,10 :30a.m. to 12 :30a.m.	Corrosion Mechanisms		STG 60	Ernest N. Morial Convention Center-New Orleans	Room 216
Thursday,4 :30p.m. to 6 p.m.	Atmospheric Corrosion		TEG 189X [60](02, 40, 62)	Ernest N. Morial Convention Center-New Orleans	R-06

Inhibition—Corrosion and Scaling STG 61 - Inhibition—Corrosion and Scaling

Time	Name	Description	Committee(s)	Location	Location Detail
Sunday,10 a.m. to 11 a.m.	Vapor Corrosion Inhibitors and Rust Preventives for Interim (Temporary) Corrosion Protection		TG 261 [61](02)	Ernest N. Morial Convention Center-New Orleans	Room 225
Sunday,1 p.m. to 5 p.m.	State-of-the-Art Research on Corrosion Inhibitors		TEG 094X [61]	Ernest N. Morial Convention Center-New Orleans	Room 217
Thursday,8 a.m. to 10 a.m.	Volatile Corrosion Inhibitors (VCIs)		TEG 093X [61](11)	Ernest N. Morial Convention Center-New Orleans	Room 206
Thursday,10 a.m. to 12 a.m.	Vapor Corrosion Inhibitors and Rust Preventives for Interim (Temporary) Corrosion Protection		TEG 145X [61](02)	Ernest N. Morial Convention Center-New Orleans	Room 206
Thursday,10 :30a.m. to 12 a.m.	Inhibitors, Corrosion and Scale/Deposit		TEG 184X [61](31, 46)	Ernest N. Morial Convention Center-New Orleans	Room 226
Thursday,1 p.m. to 3 p.m.	Inhibition—Corrosion and Scaling		STG 61	Ernest N. Morial Convention Center-New Orleans	Room 206

Corrosion Monitoring and Measurement–Science and Engineering Applications STG 62 - Corrosion Monitoring and Measurement–Science and Engineering Applications

Time	Name	Description	Committee(s)	Location	Location Detail
Sunday,9 a.m. to 5 p.m.	Electrochemical Measurements		TEG 097X [62](41)	Ernest N. Morial Convention Center-New Orleans	R-08

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Sunday,10 a.m. to 12 a.m.	Acoustic Emission Testing and Measurement		TEG 098X [62]	Ernest N. Morial Convention Center-New Orleans	Room 214
Sunday,3 p.m. to 5 p.m.	Hydrogen Permeation Technology—Online		TEG 108X [62](31, 34)	Ernest N. Morial Convention Center-New Orleans	Room 206
Monday,9 a.m. to 10 a.m.	Revise NACE Publication 3T199		TG 390 [62](11, 31)	Ernest N. Morial Convention Center-New Orleans	Room 205
Monday,10 a.m. to 12 a.m.	Sensors: Corrosion & Corrosiveness Senor Technology		TEG 100X [62](41)	Ernest N. Morial Convention Center-New Orleans	Room 205
Tuesday,10 a.m. to 12 a.m.	Corrosion Monitoring & Measurement		STG 62	Ernest N. Morial Convention Center-New Orleans	Room 216

Networking Meetings

Time	Name	Description	Committee(s)	Location	Location Detail
Sunday,8 a.m. to 11 a.m.	NACE Foundation - C17 NACE Race Individual Entry	22nd Annual NACE Race will be held at Crescent Park. Individual entry is $20 USD, and includes official race t-shirt and post-race refreshments. Participants will meet at convention center to ride shuttle to park.		Crescent Park	
Sunday,8 a.m. to 3 p.m.	NACE Foundation - C17 Golf Tournament Corporate Package	Play like the pros…or at least where they play! The NACE Foundation makes a return visit to TPC Louisiana during CORROSION 2017 for the Darrel D. Byerley Memorial Golf Tournament. Corporate Package includes a foursome and Hole Sponsor recognition.		TPC Louisiana Golf Course	
Sunday,8 :30a.m. to 3 p.m.	NACE Foundation - C17 Golf Tournament Corporate Team	Play like the pros…or at least where they play! The NACE Foundation makes a return visit to TPC Louisiana during CORROSION 2017 for the Darrel D. Byerley Memorial Golf Tournament. Corporate Team includes a foursome.		TPC Louisiana Golf Course	

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Sunday,8 :30a.m. to 3 p.m.	NACE Foundation - C17 Golf Tournament Individual Player	Play like the pros…or at least where they play! The NACE Foundation makes a return visit to TPC Louisiana during CORROSION 2017 for the Darrel D. Byerley Memorial Golf Tournament. Sign up as an individual player, and we will place you with a foursome.	TPC Louisiana Golf Course	
Sunday,5 :30p.m. to 7 p.m.	Opening Reception	Opening Night Reception opens CORROSION 2017 in New Orleans as attendees and exhibitors interact over drinks and hors d'oeuvres. Drink tickets will be provided at registration. This reception is co-sponsored by Carboline Company and NACE International. The two organizations are bound together by a common vision of corrosion prevention, environment preservation, and education.	Ernest N. Morial Convention Center- New Orleans	Great Hall A
Monday,8 p.m. to 0 a.m.	30 Below- For Young Students & Professionals Under 30	Students and professionals under the age of 30 are invited to unwind and network during a night out on the town in the "Big Easy." Connect with the brightest new minds in the world of corrosion as you enjoy an evening of music and food. Ernst Cafe is 600 South Peters Street, New Orleans, LA 70130	Ernst Cafe	
Tuesday,8 a.m. to 5 p.m.	Headshot Station		Ernest N. Morial Convention Center- New Orleans	R-07
Tuesday,1 p.m. to 5 p.m.	Career Fair		Ernest N. Morial Convention Center- New Orleans	R-07
Tuesday,7 p.m. to 11 p.m.	NACE Foundation - C17 GenNEXT Bash Individual Ticket	Join the NACE Foundation for our GenNEXT Bash and let the "good times roll," as we recognize outstanding students and scholarship recipients for 2017, and celebrate the vibrant spirit of New Orleans with good food, live music, and dancing! Individual Ticket is $65 USD, and includes admission to Scholarship Awards Ceremony from 7-8 PM.	Republic NOLA	

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Wednesday,6 :15p.m. to 7 p.m.	Awards Banquet Reception	Pre Awards Banquet Reception Foyer of St. Charles Ballroom Hilton Riverside Hotel Cash Bar only	Hilton Riverside	St. Charles Ballroom
Wednesday,7 p.m. to 9 p.m.	Awards Banquet		Hilton Riverside	St. Charles Ballroom
Wednesday,7 p.m. to 9 p.m.	Awards Dinner -Table 10	Awards Dinner Ticket for reserved table, admittance of 10 guests.	Hilton Riverside	St. Charles Ballroom

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Thursday,7 :30a.m. to 12 a.m.	Encouraging Diversity & Collaboration in Leadership	For over a decade, CORROSION attendees have benefited from Women in Corrosion luncheon. Last year, we expanded the luncheon to a half-day workshop, Engaging Women in Leadership. After recognizing the 2016 workshop's high level of audience participation and the industry's need for even greater diversity and inclusiveness, this annual networking event has evolved for 2017 into Encouraging Diversity & Collaboration in Leadership. Join us for this interactive workshop that demonstrates the new culture of successful leaders. Key highlights: • Learn how diversity increases team performance • Discover how to lead successful collaboration— talking is not the same as collaborating • Strengthen your own growth strategies by emphasizing diversity and collaboration Karen Dawson is an executive coach and organizational consultant who received high praise and admiration for her interactive workshop: Engaging Women in Leadership presented at CORROSION 2016. Karen helps her clients develop next generation ways of working while getting their own work done. She heads up Deeper Funnier Change, a boutique consultancy with clients ranging from oil and gas companies and high tech startups to the department of national defense.	Ernest N. Morial Convention Center-New Orleans	R-07

Symposia Meetings

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Time	Name	Description	Committee(s)	Location	Location Detail
Monday,9 a.m. to 9 :25a.m.	Evaluation of Nickel-Base HYBRID-BC1 Alloy Explosion Clad	Steve Sparkowich, John Banker, Paul Manning - Nickel-base HYBRID BC1 Alloy offers superior corrosion performance to established Ni-Mo and Ni-Cr-Mo alloys in several specific severe corrosive environments. Explosion cladding of BC1 to a lower cost base metal provides significant cost reduction for pressure vessels and other process equipment requiring heavier thicknesses (typically 12mm (0.5 in) and greater). Alloy BC1 explosion clad plate with SA-516-70 base metal was extensively evaluated for compliance with clad metal specifications, corrosion resistance, thermal stability and ability to be formed, fabricated and heat treated for ASME Code pressure vessels. The corrosion resistance properties of the BC1 cladding layer were unchanged from typical solution annealed properties after the sequence of explosion cladding, head forming, and post weld heat treating. Bond shear strength and product ductility of the clad plate were compliant with the requirements of SA-265. Ultras		Ernest N. Morial Convention Center-New Orleans	

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Monday,9 a.m. to 9 :25a.m.	Challenges of Implementing Chemical Treatment Preservation Programs on Oil Production Wells During a	Tariq Kamshad, AbdulRahman AL-Ghamdi, Siriki Ravi Shankar, Douglas Kellow - This paper presents an overview of the challenges encounter within the Wafra Oilfield during an unscheduled and prolonged shutdown along with the chemical treatment solutions that were developed for the preservation of the downhole equipment, tubing and casing strings. Challenges include the evaluation and selection of the most suitable chemical treatment and monitoring methodologies to be implemented for reducing damage posed by increased corrosive stagnant conditions which were more severe than experienced during normal operations. When possible the anticipated duration of the shutdown period needs to be taken into careful consideration along with downhole completion and artificial lift pumping systems before implementing the preferred treatment and monitoring programs. A well designed preservation treatment program should be suitable for preventing both short term and long term deterioration of dow	Ernest N. Morial Convention Center-New Orleans

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Monday,9 a.m. to 9 :25a.m.	Comparison of Corrosion Management Strategies of RC Structures Using a Reliability-Based Approach	Qindan Huang, Siavash Sajedi, Mohammad Mohebbi - Chloride induced corrosion is one of the main causes of premature damage in steel reinforced concrete (RC) structures such as highway bridges exposed to deicing salts. Corrosion can affect the service life performance of the RC structure by reducing the diameter and yielding strength of rebar, and weakening the bond at the steel-concrete interface. These effects could change stiffness, load carrying capacity, and even failure mode of the structure, which increases the risks of sudden failure without warning. It is reported that the costs associated with monitoring, maintenance, repair, and rehabilitation of corroded RC bridges in the US are overwhelming. To ensure the serviceability and safety of the RC structure, and reduce the corrosion related costs, optimum corrosion management strategies should be utilized. Different procedures can be used to manage the corrosion related problems in RC structures (e.g., using various repair	Ernest N. Morial Convention Center- New Orleans

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Monday,9 a.m. to 9 :25a.m.	Aim Corrosion Management: Perfect Key Performance Indicators	Sankara Papavinasam - Asset integrity management (AIM) ensures that the assets perform effectively and efficiently for the entire duration of their designed life. Implementation of AIM process requires evaluation of all risks. One of the risks to oil and gas infrastructures including pipelines is corrosion. Therefore, controlling corrosion risk is a key component of AIM. The 5-M methodology is available to develop and implement strategies to control corrosion. The 5-M methodology consists of five individual elements: modeling, mitigation, monitoring, maintenance and management. The 5-M methodology implementation requires establishment of several key performance indicators (KPIs). These KPIs track corrosion control implementation of an asset for its entire life, i.e., during design, construction, commission, operation, and abandonment stages. This paper illustrates fifty (50) KPIs that were developed based on industry surveys and failure analysis; application of these 50	Ernest N. Morial Convention Center-New Orleans

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Monday,9 a.m. to 9 :25a.m.	Evaluate Ammonium Chloride Corrosion Potential with Water Partial Pressure	Huang Lin, Vishal Lagad - Ammonium chloride (NH_4Cl) salt, because of its hygroscopic characteristic, can be very corrosive and often leads to heavy pitting and localized corrosion. Even in the absence of free liquid water, at a certain high relative humidity, ammonium chloride salts start absorbing water from the vapor phase and forming a concentrated NH4Cl aqueous phase. This concentrated liquid NH4Cl solution has a low pH and can be very corrosive, causing pitting even in stainless steels and some nickel alloys. Hydroprocessing and catalytic reforming reactor effluent streams, FCCU and coker fractionator overheads and crude tower overheads are typically subject to severe NH4Cl corrosion, especially when the crude slates have high chloride contents. The potential of NH4Cl salt deposition has been related to NH3 and HCl partial pressure. With high amounts of NH3 and chlorides in the vapor phase, a large amount of NH4Cl salt can form and might foul equipment. However, this does	Ernest N. Morial Convention Center-New Orleans

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Monday,9 a.m. to 9 :25a.m.	Influence of Anodic Current on Corrosion Protection Conditions of Buried Steel Pipeline Under Cathod	Tomoyuki Nagai, Yamanaka Hidefumi, Akinobu Nishikawa - Cathodic protection is being applied to buried steel pipelines and polarized potential of pipelines is kept less noble than the protection potential criterion, -0.85 V vs. Cu/CuSO4. However, instantaneous anodic current has been infrequently observed in some fields even though polarized potential of pipelines is kept less noble than the protection potential criterion. In this study, the influence of instantaneous anodic current on corrosion protection of buried steel pipelines under cathodic protection was evaluated and the oxidation reaction causing anodic current was investigated to some extent. As a result, it was found that most of the anodic current was not attributed to corrosion reaction and the maximum value of corrosion rate of steel was as little as 1.8 µm/year. Therefore, it was considered that there was no matter on buried steel pipelines even though the instantaneous anodic current occurred under the protection	Ernest N. Morial Convention Center-New Orleans

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Monday,9 a.m. to 9 :25a.m.	In-vitro to In-vivo Correlation of Corrosion in Nitinol Cardiovascular Stents	Srinidhi Nagaraja, Stacey Sullivan - There is public health need to understand the effects of corrosion in nickel-containing implantable medical devices. Corrosion of these devices may result in adverse events such as loss of the implant's mechanical integrity and nickel toxicity/sensitization. This is particularly important for Nitinol devices since its corrosion resistance is highly dependent on manufacturing process. The objective of this study was to assess whether current bench testing for corrosion accurately captures observed in-vivo corrosion and nickel leaching of Nitinol cardiovascular stents. Generic Nitinol stents were manufactured using one of four different surface treatments that produced stents with distinct thermal or native oxides. In-vitro assessments such as Auger surface characterization, nickel leach testing, and potentiodynamic polarization (ASTM F2129) were performed. In addition, these stent groups were implanted into minipigs in either a single stent o	Ernest N. Morial Convention Center-New Orleans

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Monday,9 a.m. to 9 :25a.m.	Synchrotron based X-ray fluorescence microscopy confirms copper in the corrosion products of metals	Samuel Zelinka, Joseph Jakes, Grant Kirker, Stefan Vogt, Vine David - Copper based waterborne wood preservatives are frequently used to extend the service life of wood products used in outdoor environments. While these copper based treatments protect the wood from fungal decay and insect attack, they increase the corrosion of metals embedded or in contact with the treated wood. Over the past ten years, several studies have looked at the corrosion mechanisms for metals in contact with copper treated wood. These studies have concluded that the most plausible corrosion mechanism involves the migration of copper ions from the wood treatment through the wood to the metal surface, where they are then reduced. Despite this, under almost all conditions, copper has not been detected in the corrosion products as the proposed mechanism would imply. Recently, synchrotron based X-ray fluorescence microscopy (XFM) was used to examine the wood that had been in direct contact with metal	Ernest N. Morial Convention Center-New Orleans

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Monday,9 a.m. to 9 :25a.m.	A Novel Non-Toxic Method for the Decontamination of Silicate Scales - A Case Study	Samar Gharaibeh, Roxanne Shank, Tom McCartney - Silicate scale formation is a technical challenge for industrial process water operators and a financial burden for all industries that use water to support their operations. Silicates are mainly present in power-generating units such as boilers and condensers, heat exchangers in refineries and petrochemical plants, water desalination, and other industrial equipment such as degreasers in paper mills. Wherever this scale is present, its removal is crucial due to the fact that it decreases thermal conductivity and fluid flow rate. The chemical nature of the silicate scale depends on the chemistry of the water, and the acceptable “industry standard” for dissolving silicates deposits is hydrofluoric acid, often delivered by adding ammonium bifluoride, NH4·HF2 to a stronger acid solution. Although, this approach is effective, it also requires meticulous attention to issues such as hazard potential (generation of HF in-situ) and acid-dr	Ernest N. Morial Convention Center-New Orleans

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Monday,9 a.m. to 9 :25a.m.	Corrosion resistance of the super-austenitic stainless steel UNS S31266 for geothermal applications	Ralph Baessler, Sandra Lemanchet, Joana Sobetzki - Super-austenitic stainless steels cover grades with high chromium (20 to 27%), high nickel (18 to 31%) and high molybdenum (4 to 6%) contents. Within this family, the 6%Mo high nitrogen grade UNS S31266 was developed to combine the beneficial influence of chromium, tungsten, molybdenum and nitrogen on its mechanical and corrosion properties. Due to 22% nickel, 24% chromium and 0.4% nitrogen additions, this alloy exhibits a very stable microstructure, less prone to intermetallic phase precipitation than the other highly alloyed super-austenitic stainless steels. This paper will deal with the corrosion resistance of UNS S31266 in artificial geothermal water with high salinity and low pH. Long-term static exposures and electrochemical tests were conducted at various temperatures to evaluate the pitting, crevice and stress corrosion cracking resistance of this material. The results show that this grade is resistant up to 220°C.	Ernest N. Morial Convention Center-New Orleans

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Monday,9 a.m. to 9 :25a.m.	New developments in coatings for extended lifetime for offshore wind structures	Claus Weinell, Troels Mathiesen, Peter Nielsen, Anders Black - After more than 15 years' service life of the first large offshore wind farms in the North Sea, mostly positive experiences are reported regarding the condition of the protective coating systems. Today however, the requirements for corrosion protection for new projects are often extended to at least 25 years' maintenance-free lifetime. In comparison, the highest durability class described in ISO 12944 is more than 15 years until first expected maintenance. Therefore, much needed committee work is in progress with the intent to update ISO 12944 with extended durability classes. In order to bring down the construction cost of the support structures for offshore wind, initiatives have been taken to industrialize the coating application process and to use standard components wherever possible. Extended pre-qualification tests are needed in order to convince owners and certifiers that new coating systems may actually hav	Ernest N. Morial Convention Center-New Orleans	
Monday,9 a.m. to 12 a.m.	Cost of Cleaning or Not; Review of Methods and Fundamentals of Chemical and Mechanical Cleaning	This symposium includes technical papers on the economics of chemical and mechanical cleaning and studies on increased efficiency due to new methods. Sponsoring Committee: TEG 188X Chair: Roxanne Shank Vice Chair: TBD	Ernest N. Morial Convention Center-New Orleans	Room 225
Monday,9 a.m. to 12 a.m.	Corrosion Control in Pulping, Papermaking & Biomass Conversion Industries	This symposium includes technical papers to increase awareness of corrosion problems in the pulp, paper & biomass conversion industries, including material solutions, new corrosion data, and preventative corrosion methods. Sponsoring Committee: STG 38 Chair: Matthew Tunnicliffe	Ernest N. Morial Convention Center-New Orleans	Room 232

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Monday,9 a.m. to 3 p.m.	Corrosion of Biomedical Materials and Devices	This symposium includes technical papers concerning the effects of the biological environment within the human body as it pertains to the performance of biomedical materials and devices. Topics that include corrosion, failure analysis, oxidation of metals and polymers, absorbable materials, biocompatibility are welcome. Sponsoring Committee: TEG 331X Chair: Amir Eliezer Vice Chair: Vilupanur Ravi	Ernest N. Morial Convention Center-New Orleans	Room 213
Monday,9 a.m. to 4 p.m.	Geothermal Scaling and Corrosion	This symposium includes technical papers on scaling and corrosion in geothermal energy systems from drilling and completions through production and reinjection. Sponsoring Committee: TEG 182X Chair: Sigrun Karlsdottir Vice Chair: Keith Lichti	Ernest N. Morial Convention Center-New Orleans	Room 231
Monday,9 a.m. to 5 p.m.	Recent Experiences with Nickel, Titanium, Zirconium and Other Corrosion Resistance Alloys	This symposium includes technical papers related to experiments with corrosion resistant alloys such as nickel, titanium and zirconium alloys in both aqueous and high temperature environments. Sponsoring Committee: STG 39 Chair: Suresh Divi Vice Chair: Ralph Baessler	Ernest N. Morial Convention Center-New Orleans	Room 214
Monday,9 a.m. to 5 p.m.	Anodic & Cathodic Protection (Day 1)	This symposium includes technical papers about oil, gas and water and anodic and cathodic protection. Sponsoring Committee: STG 05 Chair: David Kroon Vice Chair: TBD	Ernest N. Morial Convention Center-New Orleans	R-01

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Monday,9 a.m. to 5 p.m.	Offshore Coating Technology Symposium	The Symposium includes technical papers on the following technical subject; (1) offshore coating test methods, (2) Surface tolerant maintenance coating, (3) New offshore coating development, (4) Failure analysis of premature offshore coating failures. (5) offshore ballast water tank coating, (6) Subsea Pipeline Coatings. Sponsoring Committee: STG 02 & STG 03 Chair: Benjamin T. A. Chang Vice Chair: Andy Bodington	Ernest N. Morial Convention Center-New Orleans	R-04
Monday,9 a.m. to 5 p.m.	Pipeline Integrity (Day 1)	This symposium will include technical papers on pipeline integrity topics such as inline inspection, direct assessment, internal corrosion, fitness for service, etc. Sponsoring Committee: TEG 267X Chair: Harry Tsaprailis Vice Chair: Bryan Melan	Ernest N. Morial Convention Center-New Orleans	R-05
Monday,9 a.m. to 5 p.m.	Refining Industry Corrosion	This symposium includes technical papers related to corrosion and material issues within the refining industry, topics will explore case histories, materials performance, corrosion mechanics and failure analysis. Sponsoring Committee: TEG 205X Chair: Joe Koerner Vice Chair: Trace Silfies	Ernest N. Morial Convention Center-New Orleans	R-06
Monday,9 a.m. to 5 p.m.	Achieving Intended Service Life; Corrosion Control Strategies for Reinforced Concrete Structures (1)	This symposium includes technical papers regarding construction practice, methods analyses, or other technical information related to achieving intended service lives for concrete structures. Sponsoring Committee: TEG 053X Chair: Andrea Sanchez Vice Chair: Doug Leng	Ernest N. Morial Convention Center-New Orleans	Room 210

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Monday,9 a.m. to 5 p.m.	Control of Corrosion in Oil and Gas with Inhibitors	This symposium includes technical papers related to the use and/or understanding of corrosion inhibitors in the oil and gas industry. Sponsoring Committee: TEG 184X Chair: Johnathon Brooks Vice Chair: Alyn Jenkins	Ernest N. Morial Convention Center-New Orleans	Room 212
Monday,9 :25a.m. to 9 :50a.m.	Recent Experiences with UNS N08031 Plus Roll Bond Cladding	Helena Alves, Franz Winter - Recent experiences with UNS N08031 Plus roll bond cladding Helena Alves, VDM Metals GmbH Plettenberger Str. 2, 58791 Werdohl, Germany Franz Winter, voestalpine Grobblech GmbH voestalpine-Strasse 3, 4020 Linz, Austria Abstract Alloy UNS N08031 Plus (official UNS number under application) was developed very recently to create a material of the same corrosion behaviour as the conventional Alloy UNS N08031 but with improved fabrication characteristics to facilitate manufacturing of large components as much as in hot roll cladding as in shaping and heat-treating of large dished vessel heads. The requirement of improved manufacturing characteristics was met by an increase of the nickel content from 31 to 34 % supported by a careful balanced addition of nitrogen. The new alloy UNS N08031 Plus can be solution annealed at lower temperatures between 1140 and 1160 °C and can be technically hot roll bonded using conventional methods and equipment. Therefo	Ernest N. Morial Convention Center-New Orleans	

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Monday,9 :25a.m. to 9 :50a.m.	Repair coatings for TSA	Ole Knudsen - Thermally sprayed aluminium (TSA) has successfully been used for corrosion protection for several decades. Coating lifetimes of 30 years in corrosive marine atmosphere has been documented. However, it has also been found that coating TSA with thick, protective organic coatings will result in rapid corrosion of the TSA and very short lifetimes. The TSA under a protective coating corrodes in a crevice corrosion like mechanism. Corrosion of the TSA under the paint film results in formation of aluminium chloride, which hydrolyze and acidify the electrolyte. The acidification destabilizes the protective aluminium oxide and corrosion of the TSA accelerates. The problem is avoided by not covering TSA with thick organic coatings. However, in some situations it is difficult to avoid coating the TSA. E.g. when repairing damages in the TSA in the field, the repair coating often overlaps with the TSA around. Hence, a repair coating that can protect steel, but not trigger the c	Ernest N. Morial Convention Center-New Orleans

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Monday,9 :25a.m. to 9 :50a.m.	[Corrosion testing of coating materials for geothermal turbine application]	Kolbrun Ragnarsdottir, Helen Haraldsdottir, Adalsteinn Arnbjornsson, Sigrun Karlsdottir, Kristján Leósson, Sæmundur Guðlaugsson, Ioana Csaki, Aurelian Buzaianu, Gabriela Popescu - Development is needed for new materials and methods for material surfaces of geothermal steam turbines to extend their lifetime and reliability. A test unit was designed so that steam flows directly from the wellhead into the test unit, through a nozzle where the steam is flashed at high velocity on the target area, simulating the effect of erosion and erosion-corrosion in geothermal steam turbines in Iceland. Well HE-29 at Hellisheiði geothermal power plant was selected for testing. The steam from the wellhead had temperature around 210°C with 18 bar pressure and contained dissolved gases, including H_2S and CO_2. In the preliminary experiment 12 low carbon steel plates were coated with different spraying methods and materials to obtain protective layers with improved erosion-corrosion resistance in geot	Ernest N. Morial Convention Center-New Orleans

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Monday,9 :25a.m. to 9 :50a.m.	Benefits of Partial Removal of Corrosion Deposits from Nuclear Steam Generators: ASCA and CODE Appli	Charles Marks, Marc Kreider, Michael Little, Robert Varrin - As with many heat exchangers, nuclear steam generators are subject to the accumulation of corrosion deposits on heated tube surfaces and other internal components on the secondary (shell) side. These deposits can have adverse effects on thermal efficiency, material integrity, and in some cases plant operability. Accordingly, plant operators routinely devote substantial resources to limiting the rate of deposit accumulation and periodically removing the deposits through various mechanical and chemical approaches. Since the 1980s, chemical cleaning processes with solvents designed to remove all (or nearly all) of the iron- and copper-based deposit material from the SG secondary side have been employed in dozens of different units worldwide. Although these full-bundle "hard" chemical cleaning processes have generally been quite successful in removing large fractions of the deposit mass (typically >95%), they are comple	Ernest N. Morial Convention Center-New Orleans

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Monday,9 :25a.m. to 9 :50a.m.	Evaluation of 316L and 2205 steels under flow effects in caustic environments	Bedi Aydin Baykal - Over the 20th and early 21st century, pulp and paper machinery has transformed little in terms of configuration, but materials used to construct said machines has changed from carbon steel to austenitic stainless steel and then to duplex stainless steel (DSS). Even with the new material, the reliance of the industry on insufficient data on erosion-corrosion or flow induced accelerated corrosionhas led to the selection of inadequate materials and thus frequent failures in pulp mills, evaporator and concentrator tubes etc. This warrants a study of the materials in simulated environments that they will encounter in this application. In this study, the materials that are typically used in pulp mills, including 2205 DSS and 316L Austenitic SS, were subjected to simulated black liquor and flow conditions. The response in terms of both corrosion rate and repassivation kinetics were observed using a three electrode electrochemical experiment with a rotating cylinder	Ernest N. Morial Convention Center-New Orleans

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Monday,9 :25a.m. to 9 :50a.m.	Behavior of Titanium-Boron Alloys in Simulated Physiological Environments	Kevin Robles, Shay McCarthy, Ruby Rodriguez, Jacqueline Medina, Luan Nguyen, Vilupanur Ravi - Modern structural biomedical implants are made from titanium alloys due to their excellent corrosion resistance and biocompatibility. This study was motivated by the need for longer-lasting implant alloys because of the increasing life expectancy of patients and the need to avoid revision surgery. The purpose of this project is to quantitatively compare the corrosion behavior of candidate titanium alloys, i.e., commercially pure titanium with and without boron (CPTi and CPTi +B) as well as Ti64 with and without boron. Previous studies in this group have shown that small additions of boron to CPTi and Ti64 reduce the rate of corrosion compared to the parent alloys in different physiological media. This study expands the earlier work to additional test solutions, hardness measurements and microstructural evaluations.	Ernest N. Morial Convention Center-New Orleans

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Monday,9 :25a.m. to 9 :50a.m.	Degradation of Carboxylic Acids and the Impact on Refinery Feed Preparation and Overhead Corrosion	Karl Kuklenz - This paper reviews the thermal and hydrolytic stability behavior of carboxylic acid solutions commonly used in refinery feed preparation units, and if possible, will characterize their associated daughter molecules. Crude oils are often treated with carboxylic acids to help accomplish some of the goals of feed preparation such as pH adjustment, amine removal, and metals removal. These acids, like the crude oil itself, are subjected to the extreme temperatures of the crude furnace when they pass through the desalter dissolved in the crude oil, or as unresolved water carryover. Often, the thermal decomposition values for a pure acid are used to indicate the level of risk to the crude unit. The hidden assumption is that the behavior observed with an aqueous solution is the same as it would be for the neat acid. This paper documents the solution and headspace chemistry of aqueous solutions of carboxylic acids that have been thermally stressed in a laboratory set	Ernest N. Morial Convention Center- New Orleans

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Monday,9 :25a.m. to 9 :50a.m.	Enhanced Corrosion Management Analysis of Pipelines	Angel Kowalski - A pipeline Enhanced Corrosion Management Analysis (ECMA) was conducted over transmission pipelines that experienced considerable external metal loss after a relative short time in operation. Pipeline historical and present data: pipe design, construction, soil, corrosion control, monitoring, inspection and operational were reviewed and, together with the in line inspections (ILI) data, aligned to aboveground surveys and compared to field excavation results. The ECMA methodology proofed to be a cost effective approach to determine the engineering root causes of the external metal loss identified and to develop adequate short, mid and long term mitigation plans.	Ernest N. Morial Convention Center- New Orleans

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Monday,9 :25a.m. to 9 :50a.m.	Cathodic Protection on Steel Reinforced Concrete Marine Structures	Douglas Leng - The corrosion of reinforcing steel in concrete is considered the major cause of deteriortaion on steel reinforced concrete structures located in marine environments. Millions of dollars are spent every year in repairing the damaged structures to assure their safe use. This deterioration is most evident on substructure components - foundations, footers, pilings, etc. - in southern climates. However the deterioration can also be present on superstructure components - bridge decks, beams, pile caps, etc. on the Pacific coast or in northern states where deicing salts are commonly used. The use of cathodic protection has become the preferred method for mitigating corrosion of steel reinforcement in concrete on marine structures. A wide variety of both impressed current and sacrificial systems have been effectively used to control the effects of corrosion on steel reinforced concrete structures. This presentation will discuss: - Various types of marine structures	Ernest N. Morial Convention Center-New Orleans

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Monday,9 :25a.m. to 9 :50a.m.	Development of Application Friendly Products for Wet Gas Corrosion Inhibition	Jeffery Clark, Joshua Addis, Boyd Laurent, James Williams - An operator in North America discovered an internal corrosion failure in a wet gas system directly below the point of injection of a water soluble corrosion inhibitor (CI). Upon further investigation an inconsistency was found between the standard laboratory based carbon steel immersion corrosion rate of the neat water-soluble corrosion inhibitor and the observed corrosion rate based on the field time to failure. For this reason studies were conducted to uncover the discrepancy between the laboratory compatibility test and the observed field corrosion rate in a wet gas system. Tests using low shear rotating cage autoclaves were performed as a corrosion screening method of the neat CI. Additionally it was desired to ensure that the product would travel with the gas and provide corrosion inhibition throughout the entire system. For this reason an additional study was conducted using a dual autoclave system to study the abil	Ernest N. Morial Convention Center-New Orleans

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Monday,9 :25a.m. to 9 :50a.m.

Combined Cathodic and Anodic Interference in Pipeline - An Analysis

Rituraj Mishra - CORROSION 2017 –PAPER NO.
A PAPER ON ANALYSIS OF THE COMBINED CATHODIC AND ANODIC CRITICAL INTERFERENCE ON A PIPELINE   - DETECTION, ANALYSIS AND MITIGATION OF CORROSION RISK   Rituraj Mishra (Dy. Manager Maintenanace), PIPELINES (email id mishra2050@gmail.com) BHARAT PETROLEUM CORPORATION LTD (R), MAHUL, MUMBAI

Keywords: Corrosion, Stray Current Mitigation, Current Attenuation Test, A frame survey, Cathodic Interference, Anodic Interference, Interference Bond
 Abstract
Interference can impact the ability to protect a pipeline from corrosion. Common sources are cathodic protection on other lines and DC transit systems .Detecting these stray currents is done by field study trials to monitor the pipe to soil potential over
 an extended time period. In this paper, exhaustive field study and subsequent analysis of data has been discussed with reference to the critical Combined Cathodic and Anodic Interference phenomena observed on pipeline

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Monday,9 :50a.m. to 10 :15a.m.	Corrosion Properties of Ni-44Cr-1Mo Alloy in Acidic Solutions and High Temperature Environments	Yuzo Daigo, Katsuo Sugahara - Chromium is one of the most important elements that determine corrosion resistance of alloys in acidic solutions. Chromium is also the key alloying element to resist sulfurization and oxidation at elevated temperatures. A Ni-44Cr-1Mo alloy has been developed for applications in chemical process industry and coal fired coiler. This paper indicates that corrosion resistant properties of the alloy in acidic solutions and at elevated temperatures show more excellent than those of conventional corrosion resistant alloys.	Ernest N. Morial Convention Center-New Orleans

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Monday,9 :50a.m. to 10 :15a.m.	A Mechanistic Study of Corrosion Inhibitor Partitioning and Performance in Sweet Corrosion Environme	Fang Cao, Yao Xiong, Shuji Luo, Shiun Ling, Mennito Anthony - Nitrogen containing surfactants (e.g. amines, amides, imidazolines, and quaternary ammonium salts) have been commonly used active corrosion inhibitors (CI) in commercial CI packages for many years to control corrosion of carbon steel pipelines in oil and gas industry. However, in the literature, not many systematic studies have been done to compare the partitioning behavior and corrosion performance of nitrogen based CIs with different functional groups, and their inhibition mechanisms are currently not fully understood. In this study, amine-based model CI compounds with different functional groups and sulfur containing synergist molecules were selected for mechanistic study. The oil-water partitioning behavior and corrosion performance of these model compounds were investigated and correlated to their chemical structures in a variety of sweet corrosion environments. The adsorption and desorption behavior of the mode	Ernest N. Morial Convention Center-New Orleans

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Monday,9 :50a.m. to 10 :15a.m.	Extent of Cathodic Reaction on Epoxy Coated Rebar with Partially Disbonded Coating	Sylvia Kessler, Alberto Sagues, Kingsley Lau - Corrosion of epoxy coated rebar (ECR) in chloride exposed concrete can be enabled by the oxygen reduction cathodic reaction taking place on steel exposed by coating breaks. The total cathodic current would be expected to increase if the reaction locus were to extend into crevices formed at disbonded coating regions around coating breaks. To examine the possible amount of this effect, distress in the form of controlled surface breaks was created on production samples of ECR, some of which were further subject to cathodic disbondment to create surrounding disbonded regions around the breaks. The samples were cast in concrete specimens kept at ~80% RH in air and fitted with electrodes to perform cyclic polarization (CYP) in the cathodic direction and electrochemical impedance spectroscopy (EIS) measurements under open circuit conditions. Measurements performed initially and after 6 years of aging showed for the disbonded specimens a	Ernest N. Morial Convention Center- New Orleans

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Monday,9 :50a.m. to 10 :15a.m.	Pipeline Defect Matching Strategy for Optimization of External Corrosion Remediation	Luke Jain, Ningyu Wang, Zongqi Sun, Mark Mateer - External corrosion of two refined fuel pipelines was assessed to require significant remediation based on an assessment of in-line inspection data. The two pipelines were projected to require approximately USD 50 million in repair costs over the next 10 years. In response, a software tool was developed to calculate defect-specific corrosion rates by comparing in-line inspection data from multiple pipeline inspections. Individual defect growth rates were calculated from the matched external metal loss defects. The individual defect growth rates were then applied as projected future corrosion rates for each individual defect. Around 90% of the metal loss indications were successfully matched having axial displacement of approximately 0.1 m or less. Corrosion rate and remaining life distributions for the pipelines were generated to facilitate detailed pipeline assessment. An optimal pipeline de-rating and repair strategy was develo	Ernest N. Morial Convention Center-New Orleans

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Monday,9 :50a.m. to 10 :15a.m.	Development of High Temperature Non-Triazine based Hydrogen Sulfide Scavenger	Geeta Rana, Michael Braden, Julian Gallardo III, Ian Jones, Matthew Trevino - Development of High Temperature Non-Triazine based Hydrogen Sulfide Scavenger: Corrosion Mitigation and Impact on the Refinery Operations Authors: Geeta Rana*, Julian M. Gallardo III *, Michael Braden‡, Ian Jones‡, Matthew Trevino*, Nalco Champion, Fresno, TX, Asset Integrity RD&E; H2S Scavenger Team*; Downstream RD&E‡ NALCO Champion | An Ecolab Company 3130 FM 521, FRESNO, TX 77545 Triazines have been an industry standard as hydrogen sulfide scavengers for the past 40-50 years but their use has been associated with scaling issues, increasing the nitrogen content in refinery applications that can lead to increased overhead corrosion in distillation columns in refineries. In our efforts to develop a new hydrogen sulfide scavenger, the current work has led to the development of a new non-triazine, non-scaling, low nitrogen content and thermally stable hydrogen sulfide scavenger. The laboratory perform	Ernest N. Morial Convention Center- New Orleans

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Monday,9 :50a.m. to 10 :15a.m.	Dealing with Pipelines Positive Potential a Case of Study	Javier Montanez Villamizar, Andres Leon Chacon, Ludy Prada Ardila - Structure to electrolyte potential survey is a useful and important test to evaluate cathodic protection systems. The structure to electrolyte potential values on carbon steel pipelines should be negatives when the voltmeter positive terminal is connected to the structure and the negative terminal is connected to the copper sulfate reference electrode, however in this case of study those values were electropositive. Ones no operational mistakes in measures were verified, discarding causes like rectifier incorrect connections or interferences from others systems, additional measures were performed to find possible causes. At locations with positive potentials the measures showed severe corrosion on coupon test stations when coupons were connected to the pipeline, and showed moderate corrosion on coupons expose to soil with no connection to the pipeline. These results were confirmed by current direction, from t	Ernest N. Morial Convention Center-New Orleans

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Monday,9 :50a.m. to 10 :15a.m.	Patient-specific Orthopaedic Implants Manufactured by Additive Manufacturing – A Corrosion Study	Ben-Hamu Guy - The increase in population of the world and aging has resulted in a significant growth of orthopaedic implant surgeries. Hip and knee replacement surgeries are one of the most common surgeries in the older population. Most of the joint replacements, implants, and bone plates are generic, mass-produced components, which may not always be compatible with the patients having a specific or unusual anatomy. In these situations, custom designed implant components are required. Additive manufacturing finds its potential utilization for the manufacturing of human bone implants. However, the deep understanding of mechanical, corrosion and fatigue properties of additive manufactured implants are still lacking. The main objective of present research is to investigate the optimum part properties for two different additive manufacturing processes, selective laser melting (SLM) and electron beam melting (EBM), for their application to medical implants. The two processes will	Ernest N. Morial Convention Center- New Orleans

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Monday,9 :50a.m. to 10 :15a.m.

Pitting behavior of lean duplex stainless steels in thiosulfate-containing paper machine environment

Liang He, Yushu Wang, Preet Singh -

The presence of thiosulfate ions in the paper machine white water environment has been shown to increase the pitting susceptibility of stainless steels. Understanding how different grades of stainless steels behave in thiosulfate containing environments

not only helps with material selection, but also contributes to the understanding of mechanisms by which thiosulfate ions affect pitting in different alloys. As new grades of lean duplex stainless steels become available as candidate materials for the pulp

and paper environments, it is important to evaluate their behavior in the thiosulfate and chloride containing environments. This paper focuses on lean duplex stainless steel grades UNS S32304, UNS S32003, and LDX 2404. Electrochemical methods were used to

study the stable and metastable pitting susceptibility of selected alloys in simulated white water environments.

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Monday,9 :50a.m. to 10 :15a.m.	Decontamination of a Vacuum Distillation Unit: Mechanical Versus Chemical Cleaning - A Case Study	Roxanne Shank, Tom McCartney - Vacuum Distillation is a key aspect of the petroleum refining process, with over 80% of US refineries and nearly all Canadian refineries and upgraders capitalizing on the operational benefits of this unit. A secondary processing unit, the vacuum distillation unit (VDU) receives the heavy bottoms from the atmospheric distillation unit (ADU) and further separates them with the benefit of vacuum pressure to prevent the cracking, or break down, of the oil. The VDU is composed of an outer shell, distillation columns and a fired heat exchanger. When fouled with heavy residuum, the efficiency of the heat exchange process declines, reducing throughput and flow rate, and can introduce hot spots in the system leading to coking of the oil in the VDU. Maintenance of these units is imperative to the refining process; however, potential contamination by the heavy residuum poses significant environmental and health issues when the exchanger unit is pulled from the	Ernest N. Morial Convention Center-New Orleans

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Monday,9 :50a.m. to 10 :15a.m.	Geothermal Corrosion: High-temperature pitting of stainless steels and Ni-alloys	Walter Bogaerts, I. Winston - It is well recognized that geothermal environments are highly corrosive to metals and alloys. The high corrosiveness of the environment typically arises from the combination of elevated temperatures (e.g. up to 150, 200 … 300°C) with the presence of a high concentration of chloride ions, and sometimes sulfur species. Chloride-induced pitting corrosion is an imminent materials failure mechanism under these conditions. Accordingly, a major factor in the economic exploitation of geothermal resources will be the cost-effective selection of materials that have sufficient resistance to pitting, and related corrosion phenomena such as stress corrosion cracking, to maintain component integrity. In this paper we describe the temperature dependence of the pitting corrosion resistance of a number of traditional Fe-Cr-Ni and Fe-Cr-Ni-Mo materials (e.g. Type 304 & Type 316 stainless steels, Alloy 800, 825, 600, 625) in a series of high-temperature high-pressure	Ernest N. Morial Convention Center-New Orleans

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Monday,9 :50a.m. to 10 :15a.m.	Evaluating Corrosion under Protective Coatings for Steel in Marine Environments	James Ellor, Patrick Cassidy, John Wegand, James Martin, Paul Slebodnick, James Tagert - Protective organic coatings are the primary form of corrosion control for steel structures exposed in a marine environment. For more than fifty years, testing of coatings suitable for various service environments has relied substantially on exposure of coated steel panels of different configurations followed by evaluation via visual inspection. Exposure may include accelerated testing or natural environmental exposure in immersion or atmospheric conditions. Common visual inspection practices include semi-quantitative evaluation of the degree of rusting, degree of blistering, and extent of scribe creep (i.e., cutback). Coatings performing well in these evaluations versus specification standards are often deemed “acceptable.” Recent research suggests that common visual inspection protocols, while useful for judging aesthetic concerns, may not be sufficient in identifying the substrate corro	Ernest N. Morial Convention Center- New Orleans

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Monday,10 :15a.m. to 10 :40a.m.	Development of Environmentally-Friendly Corrosion Stain Remover for Navy Topside Coatings	Colton Spicer, Cameron Miller, John Wegand - The presence of rust staining on surface ship topside and freeboard areas has been a continuing cosmetic problem for the U.S. Naval Fleet. In an effort to maintain the appearance of a well maintained ship, the U.S. Navy is estimated to expend more than $1.0M annually on silicone alkyd topside coatings, governed by Navy specification MIL-PRF-24635, purely for cosmetic over-coating purposes. With the introduction of polysiloxane topside coatings, cleaning becomes a viable and more cost effective alternative to aesthetic re-coating due to polysiloxane's superior color retention, gloss retention, and service life beyond the older silicone alkyd coatings. The focus of this paper will be on the investigation, development, and implementation of an effective corrosion stain remover that NRL conducted to reduce maintenance costs in the Navy associated with cosmetic over-coating and increase environmental compliance by reducing shipboard coat	Ernest N. Morial Convention Center-New Orleans

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Monday,10 :25a.m. to 10 :40a.m.	Controlling the Degradation Profile of Mg Biomedical Devices by Alloy Design and Thermomechanical Pr	Stephen LeBeau, Raymond Decker, Boyce Collins, Charles Sfeir - Magnesium alloys are gaining interest for biodegradable medical implant devices due to a good combination of mechanical properties and biocompatibility. Nevertheless, the fast degradation rates of magnesium and its biocompatible alloys in the aggressive physiological environment impose limitations on their clinical applications. This necessitates the development of magnesium based implants with controlled degradation rates to match the kinetics of the bone and tissue healing process and to avoid any complications or issues that might negatively impact surrounding tissues. The current study presents an overview of the application of alloy design and thermomechancial processing to optimize the mechanical and biological properties of a new proprietary Mg based alloy, BioMg 250. The corrosion profiles of the new materials combinations have been evaluated by a combination of in-vitro and in-vivo experimental studies. The corr	Ernest N. Morial Convention Center-New Orleans

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Monday,10 :25a.m. to 10 :40a.m.	Application of Permasense Real-time Ultrasonic Thickness Monitoring at The Geysers	John Farison - This paper presents a case study of Permasense ultrasonic thickness (UT) sensors and monitoring software installed at The Geysers Geothermal Field. The Permasense sensors and software were installed on steam wellhead tie-in piping in a remote area of the Geysers field to monitor steam piping thicknesses downstream of a corrosion mitigation steam scrubbing system. The Permasense system provides online time graphs of wall thicknesses and early warning that our scrubbing system was not completely mitigating the corrosion rate. The process piping and steam scrubbing equipment were modified and the Permasense UT system confirms that our process modifications were successful. Geothermal steam and hot water piping networks are very extensive and are typically constructed primarily of carbon steel. Geothermal fluids can be very corrosive and undetected internal corrosion can lead to through-wall leaks or even ruptures. Routine periodic ultrasonic thickness (UT) mea	Ernest N. Morial Convention Center-New Orleans

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Monday,10 :25a.m. to 10 :50a.m.	Laboratory Testing of OCTG grades UNS N08028 and UNS N08029	Wenle He, Daniel Svedberg, Magnus Olaison, Katarina Persson, Per olsson-artberger - Standard ISO 15156-3 (NACE standard MR0175) is essentially used for the material selection in H2S-containing environments when choosing cracking-resistant corrosion-resistant alloys (CRAs) in oil and gas production. Temperature and H2S partial pressure are considered as main parameters for materials selections. Laboratory testing is normally required for qualification of the materials by customer specifications. However earlier experiences indicated that UNS N08028 and UNS N08029 could withstand more severe environmental testing conditions compared to the standard required for type 4c alloys. Recently a laboratory testing program has been carried out on the tube materials of UNS N08028 and UNS N08029 in 91000 mg/L chloride, 1000 psi CO2, 2200 psi H2S at temperature from 150 °C and up to 220 °C, by means of tensile constant load per NACE TM0177 and slow stain rate testing (SSRT) per NACE TM0198.	Ernest N. Morial Convention Center-New Orleans

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Monday,10 :25a.m. to 10 :50a.m.	Ultra tolerant coating technology: the 15 years path from maintenance to new construction	Joao Salvado Azevedo - Concepts for “maintenance coatings”, “new construction” and “high durability” do not overlap in the offshore context. Maintenance coatings often do not aspire to “high durability” status while new construction processes, aspiring to such status, often fail to deliver such performance. The “high durability” aspiration, still, produces a divide between surface tolerant materials for maintenance operations and new construction coatings, driving the adoption of different material types, surface preparation methods and pre-qualification test protocols aimed at delivering an always illusive “high durability” performance. Facing this puzzle, four questions may come to mind of an optimistic coating formulator or a demanding offshore asset owner: 1) can a surface tolerant maintenance coating deliver high durability despite the less favorable conditions in which is applied? 2) if that is possible, could such tolerant coating technology be applied in a new construct	Ernest N. Morial Convention Center-New Orleans

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Monday,10 :25a.m. to 10 :50a.m.	Work Life Balance – Revisiting the Relationship Between Desalting Efficiency and Overhead Corrosion	James Noland, David Comer, Parag Shah, Nigel Hilton, James Ondyak - It has been well documented that improved desalting efficiency reduces the risk of corrosion and vice versa. The work life balance of the refinery corrosion engineer is frequently challenged by concerns that risk of overhead corrosion is increasing as refineries process more challenging crudes and run lengths increase. One component of this problem is the risk of ammonia and amine salt formation. As the concentration of the ammonia and amines increase, the risk of salt formation increases. Computer modelling is employed to calculate this risk and to assure the selection of neutralizing amine used to control overhead pH does not also contribute to the risk of salt formation. Traditionally however, the natural level of ammonia and amines that are present in the system, meaning those not due to addition of the neutralizer, has been a “given” in the risk calculation. They are typically monitored, but not c	Ernest N. Morial Convention Center-New Orleans

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Monday,10 :25a.m. to 10 :50a.m.	Towards an Effective Corroded Pipelines Integrity Analysis	Mona Abdolrazaghi, Steven Bott, Sherif Hassanien - This paper is aiming at providing practical recommendations for effective and efficient integrity analyses of corroded onshore pipelines. The focus herein is on comparing integrity analysis approaches; namely, deterministic safety factors, calibrated safety factors, and probabilistic analysis. The comparison study utilizes real life application of In-Line-Inspection (ILI) and field measurements of corroded onshore pipelines. The study addresses the advantages and disadvantages of each analysis approach emphasizing on the ability to capture measurements uncertainties and learnings from trending data properly. Such learnings can be addressed by a relative comparison of both ILI and field measurements (i.e. relative uncertainty measurements). Common practice showed that both measurements are contaminated with errors and/or biases. In this paper, a new methodology for estimating ILI uncertainties based on minimizing the relative er	Ernest N. Morial Convention Center-New Orleans

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Monday,10 :25a.m. to 10 :50a.m.	Combining Field Data, Lab Tests, Modeling and LCCA to Select Optimal Repair Options	Eric Samson, Etienne Gregoire, Douglas Leng - The paper presents a complete methodology that allows selecting optimized solutions for the extension of service-life of concrete structures exposed to aggressive environments. The methodology combines the use of field data and advanced modeling in a comprehensive approach. The first step of the method consists in collecting data on the structures using a combination of techniques such as half-cell potential and linear polarization. The field activities also include extracting cores from selected concrete elements. Samples from cores are tested to measure physical and chemical properties of the material. The data generated from the previous steps are used as input parameters in an advanced mechanistic chloride transport model to predict future performances of the structure. Depending on the results, different remediation scenarios can be modeled such as concrete repairs, sealer applications, and cathodic protection, and compared to	Ernest N. Morial Convention Center-New Orleans

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Monday,10 :25a.m. to 10 :50a.m.	Appropriate Rotating Cage Speed for Testing Inhibitors Under Field Simulated Flow Conditions	Jose Vera, Anchal Jatale, Mustafa Kara, Partha Sharma, Xiaoji Li, Mazdak Parsi - The rotating cage (RC) has been widely used for evaluating the performance of corrosion inhibitors in CO2 and H2S containing systems at high temperatures and pressures, under flow conditions. The RC methodology has several practical advantages for assessing uniform and localized corrosion, and has shown to be a more stringent test than others typically used, since some inhibitors (at a given concentration) loose effectiveness beyond a critical flow intensity. Wall shear stress (WSS), which could be related to mass-transfer coefficient, is typically used to establish the appropriate RC velocity for simulating a field condition (e.g., pipe flow). The empirical equation included in ASTM G170-06 is commonly used for calculating the WSS of RC under homogeneous flow. However, it has been shown using Computational Fluid Dynamic (CFD) calculations and experimental measurement that the WSS can vary signi	Ernest N. Morial Convention Center-New Orleans

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Monday,10 :25a.m. to 10 :50a.m.	Challenges in Providing Effective Cathodic Protection to Thermally Insulated Pipeline Risers	Stephen Gibson, Michael Hogarth, Lyndon Crone - Cathodic protection (CP) is a method to mitigate external corrosion on buried metallic pipelines. Electrical isolation and electrolyte homogeneity are key factors that influence the performance of the majority of pipeline CP systems. Based on these factors, this paper details specific challenges encountered in the application of CP to thermally insulated pipeline risers in northern Alberta (Canada). The CP issues resulting from the use and installation of thermal insulation, resistance heating (heat trace), temperature monitoring devices and other instrumentation will be discussed. Specific pipeline construction practices that increase the probability of these issues occurring will also be addressed. Best practices for providing CP to thermally insulated risers will be discussed, along with the challenges of installation and monitoring.	Ernest N. Morial Convention Center- New Orleans

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Monday,10 :40a.m. to 11 :5a.m.	Chemical and Mechanical Cleaning Case Study	Hussain Aldarwish, Salman Al-Dossary, Nader Al Abdulmohsin - This paper outlines a study to assess existing mechanical and chemical cleaning techniques in oil processing plants, NGL, and utility facilities. The cleaning assessment covered the major equipment at crude stabilization unit such as stabilizer columns, fin-fan coolers, reboilers, storage tanks, spheroids, NGL stripper/deethanizer columns, NGL reboilers, NGL coolers & combinaires' tubes, oily water sump pits (OWS), and steam boilers. The core objective of this study is to summarize the methodologies and results of the conventional cleaning methods and the alternative cleaning techniques; i.e. by developing a cleaning matrix to provide suitable cleaning guidelines for each equipment. The benefit of the study is to improve personnel and plants' safety, efficiency, reliability and minimize water and time used for cleaning. The new cleaning techniques have been proven to overcome the conventional cleaning methods' limi	Ernest N. Morial Convention Center-New Orleans

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Monday,10 :50a.m. to 11 :5a.m.	Graphene Based Nanomaterials for Biomedical Coatings	Rigoberto Advincula - Nanotechnology involves scale, function, and composition that enables macroscopic properties with improved performance and high-value adding for any industry including the biomedical industry. The use of graphene based nanomaterials is of high interest for electronic applications and the solid-state display industry. However, this is not as well-known in the biomedical and bio-implant field. The graphene and the oxidized graphene oxide GO nanomaterials can be prepared by plasma, vacuum deposition, solid state catalytic methods, and also by solution exfoliation methods. This talk will highlight work done on utilizing GO coatings and dispersions as anti-microbial and protective barriers for preventing biocorrosion. Utilizing surface analytical tools including electrochemical methods it is possible to characterize theirn ultrathin properties based on electro-deposited and LB deposited films. They have been shown to have good anti-microbial properties against gr	Ernest N. Morial Convention Center-New Orleans

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Monday,10 :50a.m. to 11 :5a.m.	Hydrogeochemical Modelling to Monitor Scaling and Corrosion during Geothermal Energy Production	Helmuth Sarmiento Klapper, Elke Bozau, Anne Bartetzko, Joerg Lehr - Deep formation waters with high salinity and temperature, used for geothermal energy production, generally induce corrosion and scaling. Therefore, tailored material selection and costly chemical treatments are necessary to mitigate these. Technical facilities are adversely affected by corrosion and/or scaling, which significantly reduce their efficiency, resulting in profitability loss of the project. While monitoring corrosion and scaling directly in technical facilities increases their reliability and enables a more cost-effective use of chemical treatments, current commercially available monitoring systems are limited in terms of temperature and pressure. Hydrogeochemical modelling can help to predict chemical reactions due to interactions between the formation fluid, the structural materials in downhole equipment, and pumped fluids such as drilling and stimulation fluids. When combined with chemical monito	Ernest N. Morial Convention Center-New Orleans

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Monday,10 :50a.m. to 11 :15a.m.

The Sensitisation Behaviour of Alloy UNS N08825 After Heat Treatment as Used in Clad Materials

Helena Alves, Julia Rosenberg, Peter Maas -

The sensitisation behaviour of alloy UNS N08825 after heat treatment as used in clad materials

Helena Alves, Julia Rosenberg and Peter Maas
VDM Metals GmbH
Plettenberger Str. 2
58791 Werdohl, Germany

Alloy UNS N08825 is widely used in sour service environments of the oil & gas industry. In case of large vessels alloy UNS N08825 is often explosion clad to carbon steel and needs to undergo the same heat treatment requirements as the substrate material.
Where post weld treatment (PWHT) procedures are required by the Code the behaviour of the clad material has to be considered and standard corrosion tests are frequently used to monitor it.
Most common PWHT procedures require intermediate temperatures in the range of 600-650°C. It is well known that depending on the time of heat treatment at these temperatures nickel alloys may undergo microstructural changes that influence the result of the standard corrosion tests.
The aim

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Monday,10 :50a.m. to 11 :15a.m.	Lessons Learned from Offshore Coating Programs	Michael Yee, Richard Taraborelli - The coatings industry today is facing a myriad of issues in maintaining the offshore platform and assets. Currently in the Gulf of Mexico, most operators are severely behind on the progress of maintaining these assets from corrosion. Through the use of inefficient specifications, less than desirable coating performance, and the lack of maintenance and inspection on these operating facilities; many have fallen into a state of neglect. With the increasing regulations and audits from the American Bureau of Shipping and BSEE, many operators are struggling to keep up with the changes. This paper will cover the background of these changes, the reasons why many coatings and fireproofing systems prematurely fail, and also the solutions that may help address these issues that many operators face today.	Ernest N. Morial Convention Center-New Orleans

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Monday,10 :50a.m. to 11 :15a.m.	Achievement of Cathodic Protection of Buried Steel Pipelines by Either Passivity or Immunity	Fumio Kajiyama - Corrosion control of steel pipelines in soils can be achieved by applying cathodic protection to make either passivity or immunity of the steel surface. Passivity and immunity domains are depicted by potential-pH diagram presented by M. Pourbaix. This paper elucidates the behavior of corrosion protection in passivity and immunity domains, respectively, by considering the relation between cathodically polarized potential and pH at the steel/soil interface. As an example of corrosion protection in passivity domain, steel in aerated sandy soil was taken. Steel in active SRB (sulfate-reducing bacteria)-containing soil was taken as an example of corrosion protection in immunity domain.	Ernest N. Morial Convention Center-New Orleans

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Monday,10 :50a.m. to 11 :15a.m.	Development of Test Methods and Factors for Evaluation of Oilfield Corrosion Inhibitors at High Temp	Boyd Laurent, Brian Bennett, Ryan Harrington - Evaluation of corrosion inhibitors for high temperature (HT) upstream oilfield applications can be challenging due to fixed fluid volume tests typically encountered in laboratory testing. A series of laboratory testing methodologies were conducted in order to further elucidate the factors which affect laboratory corrosion inhibitor performance in high temperature conditions. Under certain HT conditions, inhibitor performance may be skewed due to testing effects which may occur in closed cell testing at HT such as Fe^{2+} saturation and/or scaling of the test fluids which may artificially lower the overall general corrosion rate. This testing program was designed to minimize these effects and ensure that corrosion inhibition in laboratory testing is identified solely due to performance of the inhibitor. For these studies, corrosion measurements in stirred autoclaves were performed by linear polarization resistance (LPR) or with weight	Ernest N. Morial Convention Center-New Orleans
Monday,10 :50a.m. to 11 :15a.m.	Considerations for Concrete Corrosion Control Alternatives	I-Wen Huang, Fred Goodwin - This presentation will discuss the various alternatives for control of corrosion in reinforced concrete structures, including prevention, protection, and mitigation. The strengths and weaknesses of each technique will be reviewed as well as the applicability considerations for the life cycle of the structure. Discussion of the point of intervention during the structure life cycle and use of proactive maintenance will also be presented.	Ernest N. Morial Convention Center-New Orleans

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Monday,10 :50a.m. to 11 :15a.m.	Development of a Probabilistic Framework for Integrity and Risk Assessment of Unpigabble Pipelines	Carlos Melo Gonzalez, Markus Dann, Ron Hugo, Alberto Janeta-Melo - The baseline for pipeline integrity is usually established using a validation technique such as in-line inspection (ILI). However, there are many pipelines that present operational restrictions for the use of ILI tools, these pipelines are known as unpiggable. The purpose of this paper is to present the framework for the risk and integrity assessment of unpiggable pipelines. This paper will focus on internal corrosion including microbiologically influenced corrosion (MIC). The proposed framework will include flow simulation, internal corrosion modelling and risk assessment. The flow simulation will consider a multi-phase fluid to represent the operational conditions of gathering pipelines. For internal corrosion prediction the electrochemical model used will include the influence of solids deposition and also a DNA sequencing analysis for assessing MIC. Then corrosion growth modelling and quantitative risk assess	Ernest N. Morial Convention Center-New Orleans

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Monday,10 :50a.m. to 11 :15a.m.	Naphthenic Acid Corrosion in a High TAN Condensing Overhead System	Kwadwo Sarpong, Joel Lack - Naphthenic acid corrosion (NAC) has been well documented in the petroleum refining industry as a corrosion mechanism that manifests at process temperatures at or greater than 200°C (400°F). Although the concept of this mechanism manifesting at process temperatures lower than 200°C (400°F) has been proposed and debated, to date, real life examples have not been widely documented in peer reviewed literature. This paper presents a case history where an ethoxylated thio-phosphate ester was successfully used to mitigate low temperature NAC in a high TAN condensing overhead system in which a traditional imidazoline corrosion inhibitor failed. Keywords: naphthenic acid corrosion, phosphate ester, condensing overhead system.	Ernest N. Morial Convention Center-New Orleans

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Monday,11 :5a.m. to 11 :30a.m.	Microstructural Study on the Corrosion Effect of an AlCrFeNiMn Multicomponent Alloying Geothermal En	Ioana Csaki, Sigrun Karlsdottir, Ciprian Manea, Radu Stefanoiu, Roxana Trusca, Victor Geanta - A multicomponent High Entropy Alloy (HEA) AlCrFeNiMn processed with vacuum arc remelting procedure was corrosion tested in-situ geothermal environment in the Reykjanes Geothermal Power Plant in Iceland. Microstructural and chemical composition analysis of the material was performed before and after testing in the geothermal steam with an electron scanning microscope (SEM) and X-ray Energy Dispersive Spectroscopy (X-EDS).The corrosion film formed on the surface of the alloy was investigated with cross-sectioning the sample and cast it in conductive polymer and polishing. A weight loss method was also used to measure the corrosion rate of the AlCrFeNiMn high entropy alloy. The results showed that the uniform corrosion rate was low, under 0.1mm/year. But inspection of the sample after the exposure in the geothermal environment revealed pits caused by pitting corrosion. The low corrosion ra	Ernest N. Morial Convention Center-New Orleans

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Monday,11 :15a.m. to 11 :30a.m.	Bio-Functional High Performance Coatings of Titanium and Magnesium Alloys for Biomedical Application	Amir Eliezer - Over the past few years, progresses in orthopedic surgery have helped to improve the quality of life. Approximately 4.5 million procedures related to joint replacement and fracture repair are performed worldwide each year. However, serious complications still occur mostly due to implant loosening or infection. Surface treatments and coatings have been major research axes to address those problems. In this study, the development of a titanium medical grade Ti-6Al-4V alloy bio-active oxide coating containing silver particles and the development of a CaP bio-active oxide coating is reported. Both materials coatings were obtained by Plasma Electrolytic Oxidation (PEO). Corrosion of magnesium W4 alloy was investigated in vitro by electrochemical methods in solutions replicating the body's environment. In addition also gas formation of W4 was also quantified. In order to correlate in-vitro corrosion to in-vivo degradation animal studies were performed. A dedicated ap	Ernest N. Morial Convention Center- New Orleans

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Monday,11 :15a.m. to 11 :40a.m.	Sour Gas and Hydrogen Embrittlement Resistance of High-Strength UNS N07022 Alloy for Oil and Gas App	Jeremy L. Caron - N07022 is a Ni-21Cr-17Mo (wt.%) alloy that has found success in applications requiring corrosion resistance and high strength, which it achieves in the cold-worked condition. The attributes of N07022 alloy make it an excellent candidate for many oil and gas applications. It has been incorporated in the NACE MR0175 / ISO 15156 and NACE MR0103 / ISO 17945 standards at the highest test levels. It has also shown resistance to the NACE Level VII environment with 5 g/L elemental sulfur at 205°C (401°F) and to the demanding conditions of 25% NaCl + 1,000 psi (6.9 MPa) CO2 + 1,000 psi (6.9 MPa) H2S at 288°C (550°F). As higher strength alloys are becoming more common in high-pressure, high-temperature (HPHT) oil and gas service, there have been a number of reported failures involving precipitation-strengthened Ni-base alloys. These failures were attributed to hydrogen embrittlement. Recent results of sour gas and hydrogen embrittlement testing of cold-worked N07022	Ernest N. Morial Convention Center-New Orleans

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Monday,11 :15a.m. to 11 :40a.m.	Accelerated Offshore Coating Performance Testing	Benjamin Chang - Offshore is a very corrosive environment with a high corrosion rate. The offshore coating longevity is relatively short (5 years) and extremely expensive to apply maintenance coatings onsite. It is an economic and effective measure to evaluate the performance of candidate coatings in an accelerated lab testing first to select the most qualified coatings. An effective accelerated lab testing should simulate the failure modes of the offshore coatings in the field. The major failure modes of offshore coatings are (1) high rust creepage at scribes, (2) poor edge retention at the sharp edges, corners, and weld seams, (3) thermal cycle cracking. For offshore maintenance coatings, it is extremely difficult to reach a salt free steel substrates just by abrasive blast cleaning, some residual salts are always remained on steel surfaces. The offshore maintenance coatings have to be salt tolerant. NACE has developed several test standards for offshore coatings-NAC	Ernest N. Morial Convention Center-New Orleans

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Monday,11 :15a.m. to 11 :40a.m.	High Temperature Sulfidic Corrosion of Carbon Steel in Model Oil/Sulfur Compound Blends	Samin Sharifiasl, Ann Liang, David Cooke, Daniel Chapman, Benjamin Chaloner-Gill, Alexander Kuperman - Sulfidic corrosion of steels is defined as a high temperature (≥450oF) degradation phenomenon that occurs in oil containing sulfur species. Over the last few decades, many researchers have studied sulfidic corrosion; however, precisely predicting sulfidic corrosion rate is still a challenging task. In this work, the kinetics of sulfidic corrosion of carbon steel as a function of temperature, model sulfur compound concentration and test duration has been studied by the weight loss method. Hydrotreated vacuum gas oil (HVGO) was used as a solvent, and Dimethyl Disulfide (DMDS) as a model sulfur compound. DMDS is an ideal compound for this type of study, because of its high sulfur content (68%) and its decomposition temperature range of 360oF-450oF. It was found that the corrosion rate strongly depends on the concentration of sulfur species, temperature and time. The activation en	Ernest N. Morial Convention Center-New Orleans

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Monday,11 :15a.m. to 11 :40a.m.	Integrity Evaluation of Seventy Years Old Veteran Pipeline	Mushaid Nauman, Roger King - Pipelines are energy lifelines, networks that deliver the nation's petroleum products within the country and across the borders. However, over the time these lifelines designed to operate reliably for 40 years or more do deteriorate. Detailed Integrity Assessment of one such veteran pipeline is carried out, having passed seven decades in operation while commissioned in 1945. This paper discusses the assessment challenges, inspection findings and recommendations given to keep this old offshore/onshore unpiggable giant in service for crude oil transportaion. Using the complex geometry of the different pipeline sections (pigable and unpigable), ICDA and ECDA along with HAZID study have been modified for both offshore and onshore unpigable sections. ICDA methodology has been modified in view of environmental, operational and inspection data along with flow modelling study. The end result is a risk ranking of the pipeline sections susceptible to intern	Ernest N. Morial Convention Center-New Orleans

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Monday,11 :15a.m. to 11 :40a.m.	Organofunctional Silane Corrosion Inhibitor Surface Treatment of Concrete to Mitigate Corrosion Due	Neal Berke, Kristin Ade, Peter DeNicola, Rungta Atri - Organofunctional silanes(OS) are increasingly being used to protect concrete bridge decks against chloride ingress and resulting corrosion. This paper describes the evaluation of the OS in mitigating ongoing corrosion due to chlorides or carbonation. The procedure used for determining the mitigation of chloride-induced corrosion is a new Test Protocol M-82 developed by the U.S. Bureau of Reclamation in conjunction with the Strategic Development Council of the American Concrete Institute. The mitigation of carbonation induced corrosion was determined using a modified version of ASTM G109 in which the concrete was carbonated and then cyclically ponded with water. The OS inhibitor was effective in mitigating both chloride induced and carbonation corrosion. In the case of the chloride induced corrosion there was a reduction in additional chloride ingress. Implications on the extended service life of treated structures is di	Ernest N. Morial Convention Center- New Orleans

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Monday,11 :15a.m. to 11 :40a.m.	Control of Corrosion of Electrical Submersible Wells and Rod Pumped Wells in Varied Carbon Dioxide E	Sunder Ramachandran, Preston Stewart, Patrick Rodgers, Joseph Penkala, Matthew Morton, George Prescott - Corrosion Inhibition using batch treatment has been extensively used in North America. Batch treatment is attractive to use in North America as there are large numbers of wells and it is expensive to place pumps and capillary injection facilities in fields with large number of wells. Baker Hughes has developed a large set of film persistent corrosion inhibitors that are effective at fairly high temperatures and in systems that see large amounts of carbon dioxide. Wells that have large amounts of carbon dioxide are extremely corrosive and normally thought to require continuous injection of inhibitor in all circumstances. In this paper experimental results on the effectiveness of these corrosion inhibitors are presented. The field performance of the inhibitors in wells where the composition of carbon dioxide is as high as 95% will be presented. Use of batch treatment with th	Ernest N. Morial Convention Center- New Orleans

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Monday,11 :15a.m. to 11 :40a.m.	Deep Anode Bed in a Flowing Atresian Aquifer	Dale Claassen, Mike Ames - The Las Vegas Valley Water District needed to install a deep anode bed in a location with a flowing artesian situation. Research found several costly and time consuming options that were not acceptable. A new, patented technology was adapted for the situation that would allow the abode bed to be installed in an active flowing artesian condition. The installation was successful and succeeded in simultaneous installation of the backfill and sealing the aquifer. The result was a low resistance anode bed, sealing of a flowing artesian aquifer, and prevention of contamination of shallower aquifers.	Ernest N. Morial Convention Center-New Orleans

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Monday,11 :40a.m. to 12 :5a.m.	Effect of Temperature on Adsorption Behavior and Corrosion Inhibition Performance of Imidazoline-Typ	Yuan Ding, Bruce Brown, David Young, Marc Singer - In the present study, the effect of temperature on the adsorption kinetics and thermodynamics of diethylenetriamine talloil fatty acid imidazoline (DETA/TOFA imidazoline) is studied on a gold coated crystal using a Quartz Crystal Microbalance (QCM) in a CO_2 saturated 1wt% NaCl solution. The corrosion inhibition performance of imidazoline on X65 steel is also investigated at different temperatures using Linear Polarization Resistance (LPR). QCM results show that the adsorption of imidazoline generally follows Langmuir adsorption process and the desorption of inhibitor is favored with increasing temperature. The desorption rate constant is found to increase more with temperature than the adsorption reaction rate constant. Inhibition test results generally agree well with those obtained from QCM test and the loss of corrosion inhibition efficiency is attributed to the greater rate of desorption of inhibitor at higher temperature.	Ernest N. Morial Convention Center-New Orleans

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Monday,11 :40a.m. to 12 :5a.m.	Effects of Alloying Elements for Resistance to Naphthenic Acid Corrosion of 18Cr Austenitic Stainles	Masahiro Seto, Masayuki Sagara, Takahiro Osuki - Naphthenic acid corrosion is suffered in chemical plants at an atmospheric distillation unit, vacuum distillation unit and their surrounding equipments such as transfer lines and side cut pipes. The refineries for high TAN (Total acid number) crude cause the naphthenic acid corrosion of carbon steels or low alloy steels. In addition, naphthenic acid corrosion will be inevitable due to increasing of high TAN crude refineries by state-of-art crude refining technologies. Conventional austenitic stainless steels as 316L and 317L containing high molybdenum content are effective for naphthenic acid corrosion compare with carbon or low alloy steels. However, amounts of molybdenum of them are limited because of harmful influences on their metallurgical stability, formability, weldability and fablicability, etc. In this paper, the effective elements such as molybdenum for resistance to the naphthenic acid corrosion are precisely conduc	Ernest N. Morial Convention Center-New Orleans

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Monday,11 :40a.m. to 12 :5a.m.	Methodology to Estimate Edge Effect on Direct Current Cathodic Protection Coupons	Pavan Shukla, Andrew Nordquist, Xihua He, Len Krissa, Jerry Dewitt - Direct Current (DC) Cathodic Protection (CP) coupons are widely used in the pipeline industry to monitor CP potential and estimate current densities at the holidays. Various DC coupon shapes include flat metal surface embedded in an insulating plane, long and small rods, and stubby cylinders. Of these, flat coupons including rectangular and disk shapes are most widely used as they are assumed to be representative of the holidays at the pipe surface. However, flat coupons embedded in insulating plane are prone to current density measurement errors due to edge effect. The current density at the coupon’s edges is expected to be several times higher than the center of the coupon. Because the holidays on pipeline are surrounded by coated surfaces, the current density distribution at the coupons is expected to be different than the holidays. Specifically, a holiday surrounded by the coating will have lesser degr	Ernest N. Morial Convention Center-New Orleans

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Monday,11 :40a.m. to 12 :5a.m.	Effect of Water Soluble Salts affecting Long-term Durability of Epoxy Coating on Carbon Steels	chuljung kim, Taejin Oh, Benjamin Chaloner-Gill, Martin Quintero, Edward Jansen, Minyoung Shon, Chae-Seon Lim, Pyounghwa Shin, Johnny Eliasson, Hyangan Hwang - Offshore platforms are operated more than 30 years without re-docking in very corrosive environment. Therefore, higher level of quality is required for reduction of maintenance cost and long term service life time. In maintenance point of view, coating and surface preparation are very important factors. Especially, water soluble salts concentration on steel surface can significantly affect adhesion strength at the interface of steel and coating. To study the effect of water soluble salts affecting long-term durability performance of carbon steels coated with epoxy paint, the carbon steel surface was contaminated by different soluble salt concentration. Based on NORSOK M-501 and ISO 20340 test method, sea water immersion test was carried out for 6 months and visual observation and pull off adhesion tests were conducted.	Ernest N. Morial Convention Center-New Orleans

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Monday,1 p.m. to 1 :25p.m.	Surface Treatment to Improve Corrosion Resistance of Pure Titanium	Marco Ormellese, Davide Prando, Maria Vittoria Diamanti, Andrea Brenna, Mariapia Pedeferri - Titanium has an outstanding corrosion resistance due to the thin oxide protective layer (max 10 nm) that is formed spontaneously on its surface when exposed to aerated environment, which allow using titanium in severe working condition, such as offshore (up to 260°C), acid environment, aerospace, automotive, high temperature, chemical & food industry. Nevertheless commercially pure titanium may suffer localized corrosion in hot salty water ads well as acidic corrosion in fluoride containing solution or hydrogen embrittlement. Surface treatments, specifically anodic oxidation, has been considered to tune the TiO2 layer in order to increase its thickness and to obtain a mostly amorphous phase with the final aim to improve titanium corrosion resistance in highly aggressive environment.	Ernest N. Morial Convention Center-New Orleans

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Monday,1 p.m. to 1 :25p.m.	Offshore Coating Renovation utilizing Waterjetting and Wet Abrasive Blasting	Jerry Woodson - “A method to test new surface preparation techniques for preparing existing offshore structures for maintenance painting has been developed. A major international oil company (Shell) worked with a consulting engineer (Woodson Engineering LLC) and suppliers (HoldTight and Apache Industrial Services) to develop a way to pre-rust large test panels with salt water, then remove the rust scale using combinations of dry abrasive, power washing, and waterjetting with and without flash rust inhibitor, and determine how long the panels will remain suitable for coating in a marine offshore environment. Some of the test panels were sprayed with ASTM Sea Salt Water to simulate salt spray on an offshore structure. Three methods of measuring beginning and residual salt concentration were evaluated for consistency and the salt removal effectiveness of each surface preparation method of salt removal was determined.” Halina Wisniewski will be co-author of this paper. The NAC	Ernest N. Morial Convention Center-New Orleans

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Monday,1 p.m. to 1 :25p.m.	Influence of Air on the Corrosivity of Geothermal Fluids containing Hydrogen Sulfide	Peter Wilson, Keith Lichti - Materials testing in geothermal fluids have shown that when oxygen is mixed either inadvertently or deliberately with geothermal steam or condensate, its corrosivity is increased substantially causing for example pitting corrosion and stress corrosion cracking of stainless steels. A study has been completed using slow strain rate testing to identify the control parameters available to an operator which define the process conditions which lead to stress corrosion cracking for type 304L and 316L stainless steels. Testing involved controlling the corrosion potential of the stainless steel test specimen while completing the slow strain rate test. The objective of the testing was to establish the pH and temperature boundaries which would allow successful use of type 304L or 316L stainless steel in steam condensate. The tests had a parallel objective of demonstrating the extent and morphology of corrosion damage found under controlled conditions to al	Ernest N. Morial Convention Center-New Orleans

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Monday,1 p.m. to 1 :25p.m.	Assessment of Effects of Cavities and Narrow Channels on CP Design in the Marine Environment	Tim Froome - CP system design work in the marine environment makes use of structure surface area, required current density, and anode resistance formulae to select the number and mass of anodes required to protect a structure. The formulae cannot take account of restrictions to current flow caused by close proximity of structural surfaces to each other, and consequently CP systems which have been designed in the recommended way may sometimes not protect parts of a structure. In some situations it may be judged that cathodic protection is not required on some surfaces, but recommended practise is that current drain to such surfaces needs to be taken into account in the design. This paper first investigates the general effects caused when cavities and narrow channels/annuli are present, and attempts to identify patterns of behaviour. A series of computer-based parameter studies is performed in which, for example, separation between two structural surfaces is varied, and the extent	Ernest N. Morial Convention Center-New Orleans

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Monday,1 p.m. to 1 :25p.m.	Application of Encapsulated Scale Inhibitors - Understanding the Field Success Factors	Mike Jackson, Karina Mackenzie - The Cerro Dragón field in Comodoro Rivadavia, Argentina produces 100,000 bbl/day of oil and 1.3 million bbl /day water in 5 different districts. The field contains 3782 producing wells with more than 1000 ESP wells being treated for mostly scale and some for corrosion. Most of the wells produce via ESP. Due to a high Bottom Hole Temperature (~250oF) and moderate to high $CaCO_3$ scaling tendencies, many wells have a strong tendency for downhole scale formation. More than 1000 wells are treated for scale/corrosion and to minimize the complexity of logistics and cost factors, the preferred control method is via the use of an innovative technology of encapsulated materials. This material is applied downhole via batch treatments where it slowly dissolves offering long term scale or corrosion protection. This paper will describe the management methodology that includes such factors as: statistical interpretation of the results, new laboratory method	Ernest N. Morial Convention Center- New Orleans

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Monday,1 p.m. to 1 :25p.m.	Materials Compatibility Issues in Biofuels – A Review	Narasi Sridhar, Liu Cao, Dave Norfleet, John Beavers, Feng Gui, Greg Quickel, Barbara Padgett - The storage and transportation of biofuels continue to be of interest in a number of industries and countries. Depending on the type of biofuel, different materials compatibility issues arise. For the case of alcohol fuels, stress corrosion cracking of steels, and swelling and leaching of various polymeric materials are important. For the biodiesels, uniform and localized corrosion of steels is important. This paper will provide an overview of research that has been conducted in this area, discuss the results of some of the recent failure analyses, and identify the gaps in knowledge.	Ernest N. Morial Convention Center-New Orleans

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Monday,1 p.m. to 1 :25p.m.	Progressive Reduction of Corrosion Phenomena in a COG Desulfurization Unit	Takao Ohtsu, Masazumi Miyazawa, Kazutaka Akai, Hideaki Ootani, Ariyoshi Matsushige - The environments of chemical plant facilities are complex and multiple corrosion factors are frequently intermingled. When corrosion takes place, these factors interact and may camouflage the underlying causes of the corrosion damage, making it difficult to separate and elucidate them. However, in the continuous processing facilities, the time element is a useful additional factor that often can enable different corrosion phenomena to be tracked and their cause(s) identified. In order to take advantage of this situation, real time monitoring techniques are applied to clarify the contributory causes of corrosion attack that is sustained from time to time by the plant during normal operation. In this report of practical on-line monitoring, the use and benefits of the EN instrumentation, in combination with process chemistry analyses, were employed to monitoring operating conditions in a full-scale	Ernest N. Morial Convention Center-New Orleans

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Monday,1 p.m. to 1 :25p.m.	High Temperature Hydrogen Attack (HTHA) Modeling, Prediction and Non-Intrusive Inspection Review	Mike Nugent, Jonathan Dobis, Trace Silfies - The most significant change in in the last 25 years has been made for API 941 Steels for Hydrogen Service at Elevated Temperatures and Pressures in Petroleum Refineries and Petrochemical Plants (a.k.a The Nelson Curves). In addition to increased emphasis on condition monitoring and reporting practices, the “curve” for Non-Post Weld Heat Treated Carbon Steel will effectively be lowered by 50°F from the existing Carbon Steel line and begin at 50 pisa pp H2. This will place a significant amount of equipment in an area of concern due to High Temperature Hydrogen Attack (HTHA) from a Mechanical Integrity perspective. A brief summary of the background for the evolution of these changes and the potential effect on equipment and piping will be discussed. To address this challenge presented to owner-users, there is an ongoing Joint Industry Program (JIP) on evaluation of existing HTHA methods and evaluation of novel technologies. This pape	Ernest N. Morial Convention Center- New Orleans

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Monday,1 p.m. to 1 :25p.m.	Long Term Structural Integrity Considerations for Abandoned Pipelines	T. J. Prewitt, Joel Kaufman, Shane Finneran - There has been increasing interest across the industry to better understand the possible long term risks associated with out of service pipelines. In Canada, the Canadian Energy Pipeline Association (CEPA), Petroleum Technology Alliance of Canada (PTAC), and the National Energy Board (NEB), have undertaken multiple studies to identify and assess the threats related to pipeline abandonment. The primary hazards typically identified across industry for pipeline abandonment are associated with long term corrosion degradation, potential for creation of water conduits, possible environmental impacts, and potential for pipeline collapse and associated soil subsidence. Unfortunately, little guidance is presently available to the industry for determining remaining structural capacity of a heavily corroded pipeline to establish likelihood, and possible timeline, of collapse, nor for determining possible subsidence magnitudes associated with	Ernest N. Morial Convention Center-New Orleans

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Monday,1 p.m. to 1 :25p.m.	Guidelines for Corrosion Inhibitor Selection for Oil and Gas Production	Johannes Sonke - Application of effective Corrosion Inhibition (CI) in Oil and Gas production is needed to enable long-term use of Carbon Steels (CS) in corrosive systems. The CIs for these application need to be properly validated for the field exposures to assure operational integrity. It is thus essential to assure CI effectiveness within its needed Integrity Operating Window (IOW). CIs continue to change when facing challenges due to field maturation, new recovery approaches, and other like new field developments (e.g. higher H2S content). These needs have spurred new test protocol development. A range of CI test methods have evolved - some useful and others less so. A lack of understanding of corrosion fundamentals can introduce fatal pitfalls into both test design, protocols, execution and Interpretation of results. No standards exist specific to definition of a needed CI testing program, yet proper qualification may require test points at both at the boundary edge and w	Ernest N. Morial Convention Center-New Orleans

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Monday,1 p.m. to 1 :25p.m.	Electrochemical Behavior of Prestressing Steel in Alkaline Electrolytes: Influence of Chloride Ions	Ioan Pepenar - It is generally known that the steel in concrete is protected against corrosion due to the high pH-value of the pore solution of the concrete which leads to the formation of a passive oxide layer on the steel surface preventing its further corrosion. In the presence of an over critical chloride concentration in the concrete at the steel surface, this protective passive layer is locally destroyed (depassivation) and the steel corrosion starts. Therefore, understanding the mechanism of chloride induced breakdown of steel passive layer in concrete is significantly important in order to prevent the initiation of corrosion in prestressed concrete structures. The paper presents the results of research on the electrochemical behavior of prestressing steel in alkaline electrolytes, with various levels of chloride concentration by using cyclic potentiodynamic polarization technique. After each potentiodynamic polarization test which led to pitting corrosion, the steel sp	Ernest N. Morial Convention Center-New Orleans

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Monday,1 p.m. to 1 :30p.m.	Corrosion Behavior of Niobium-containing Titanium Alloys in Biological Solutions	Kevin Robles, Shay McCarthy, Ruby Rodriguez, Jacqueline Medina, Luan Nguyen, Vilupanur Ravi - Currently Ti-6Al-4V (Ti64) is the most commonly used structural implant material. However,Ti64 releases metal ions into the body, which are associated with neurological disorders, inflammation, pain and loosening of the implant. In this project, electrochemical methods were used to quantify the stability of Ti-6Al-7Nb (Ti67) and Ti-35Zr-10Nb (Ti3510) in a range of physiological media. The elastic moduli of Ti67 and Ti3510 are closer to that of human bone ensuring a more equitable redistribution of mechanical stresses, thereby minimizing the phenomenon of stress shielding. Direct and alternating current methods of electrochemical characterization were utilized to obtain insights into alloy behavior. Comparisons to Ti64 will be made.	Ernest N. Morial Convention Center-New Orleans	
Monday,1 p.m. to 5 p.m.	Flow Assurance in Oil & Gas from Inland to Subsea	This symposium includes technical papers scale and corrosion for Deep Water conditions as well as inland Oil & Gas systems. Sponsoring Committee: TEG 202X Chair: Carlos Menendez Vice Chair: Dharma Abayarathna	Ernest N. Morial Convention Center-New Orleans	Room 224
Monday,1 p.m. to 5 p.m.	Novel Methods of Corrosion Monitoring and Management	This symposium includes technical papers on real time monitoring techniques, electrochemical monitoring, nano technology and optical sensors for corrosion monitoring. Sponsoring Committee: TEG 100X Chair: Slawomir Kus Vice Chair: Sean Brossia	Ernest N. Morial Convention Center-New Orleans	Room 225

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Monday,1 p.m. to 5 p.m.	Corrosion Issues of Biofuels/Conventional Fuels	This symposium includes technical papers covering corrosion concerns involving both biofuels and conventional fuels. Sponsoring Committee: TEG 462X Chair: John Beavers Vice Chair: Omar Lopez-Garrity	Ernest N. Morial Convention Center-New Orleans	Room 232
Monday,1 :25p.m. to 1 :30p.m.	The Role of Fenton Reaction in Biodegradable of Magnesium and its Alloys	Ben-Hamu Guy - Replacement of bones by implants could solve major problems, after accidents, or because of aging. When traditional alloys are used as temporary implant devices, a second surgery is required to remove the implant after tissues have healed. Besides the cost of this surgical procedure and inconvenience to patients or risk for older patients, the traditional alloys also cause local inflammation due to potential release of cytotoxic ions. It would be very advantageous if an implant material could be identified that degraded in the physiological environment after completion of the healing process. Magnesium alloys are potential candidates for use as biodegradable temporary implant devices because they can naturally degrade in the human body environment due to their high electrochemical activity. There are many reactions that occur adjacent to the implant degradation in the body. One of these processes is Fenton reaction, common process in biological systems that is ca	Ernest N. Morial Convention Center-New Orleans	

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Monday,1 :25p.m. to 1 :50p.m.	Materials Performance of Corrosion-Resistant Alloys in Individual and Mixed Acids	Ajit Mishra - Nickel-based alloys, containing optimum amount of chromium (Cr), molybdenum (Mo) and tungsten (W) are widely used in the chemical process industries due to their tolerance to both oxidizing and reducing conditions. Surprisingly, most of the corrosion data available in literature for the corrosion-resistant alloys (CRA's) are in individual acids which seldom replicate the field conditions. Although it is not feasible to exactly reproduce the field environment in a laboratory set-up but a better approach, to understand the materials performance in field, can be by conducting the corrosion tests in both individual and mixed acids. One of the most commonly used technique by industrial researchers to determine an alloy corrosion performance in a corrosive environment is weight change measurement method. In the present study, corrosion tests were conducted using weight loss and electrochemical techniques for B-3 (UNS N10675), HYBRID-BC1 (UNS N10362), C-276 (UNS N10276)	Ernest N. Morial Convention Center-New Orleans

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Monday,1 :25p.m. to 1 :50p.m.	Materials Selection Challenges for Geothermal Energy Projects	Keith Lichti - Selection of geothermal energy resources for development historically targeted alkali brines having low to moderate H2S concentrations. Conservative energy generation processes that minimised the risk of scaling were used and materials selection rules of thumb were developed to ensure long service lifetimes for energy equipment: avoidance of air ingress, use of low strength steels for H2S service and use of suitable stainless steels for more demanding service and for corrosive steam condensates. These traditional rules are being augmented for more aggressive acidic environments encountered in some geothermal fields, in Engineered Geothermal Systems and in new energy extraction processes designed to improve efficiency through utilisation of geothermal fluids to lower temperatures. Near magma and volcanic environments are challenging 21st century developers now in the same way as geothermal steam and two-phase fluids challenged the pioneers of geothermal energy	Ernest N. Morial Convention Center- New Orleans

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Monday,1 :25p.m. to 1 :50p.m.	Are drill pipe conventional coatings suitable for subsea early production risers?	Rodrigo Barreto, Robert Badrak, Annelise Zeemann, Guilherme Emygdio - Drill pipe (DP) materials and corrosion protection methods have been designed for a specific envelop of drilling operational characteristics concerning stress level, temperatures (high) and fluids (mud). Changing the functionality of DP from drilling operation to completion operation with early production in a subsea environment, requires a good critical analysis since the typical internal coating, designed for the mud abrasive and erosive actions, may not be suitable for exposure to the potentially corrosive production fluids. This paper presents failures of the internal coating of drill pipe riser (DPR) systems that operated during eight months in extended well testing (EWT) in Brazilian pre-salt fields at 1900 meters sea depth. After two different EWT operations, blisters were seen through the internal coating of the tubes which had been in service. Visual inspection was carried out on a sampling of the	Ernest N. Morial Convention Center-New Orleans

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Monday,1 :25p.m. to 1 :50p.m.	Methods of Monitoring Reinforced Concrete Corrosion in Formulations for Nuclear Facilities	Damián Vazquez - The reinforced concrete is one of the main materials used for the construction of facilities designed for the development of peaceful activities of nuclear energy. This material in addition to being structural, is a barrier for insulation and confinement of the radioactive materials. One of its degradation mechanisms is reinforcement corrosion, a frequent cause of failure in service. Consequently, it is essential to study this mechanism of degradation in formulations developed for this purpose, as well as the development and implementation of monitoring techniques for real structures. The objective of this work is to compare, from the corrosion point of view, two concrete formulations: one made with ordinary portland cement and the other with pozzolanic portland cement. Both formulations are candidates for nuclear applications whose durability requirement is higher than 300 years. The results of approximately four years and six months of monitoring are present	Ernest N. Morial Convention Center-New Orleans

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Monday,1 :25p.m. to 1 :50p.m.	Impact of Surface Finishing on Corrosion Inhibition Performance	Zhengwei Liu - The effect of corrosion coupon surface finishing processes on inhibitors' performance was studied in CO2 environment. Two surface-finishing techniques, aluminum oxide beads blasting and sandpaper polishing, were used in this study. The resulting surfaces were characterized by white light interferometry and other techniques. The corrosion rate with and without the presence of corrosion inhibitors were evaluated using linear polarization methods. Several commercially available inhibitor products, including imidazoline, quaternary amines, phosphate ester, and mercaptans, were evaluated. It was found that the protection efficiency of mercaptans vary significantly with the coupons' surface roughness.	Ernest N. Morial Convention Center-New Orleans

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Monday,1 :25p.m. to 1 :50p.m.	A Method for Assessing Facility Pipe Integrity	Daniel Fingas, Sorin Segall - In recent years, effective techniques have been developed for conducting integrity assessments along cross-country pipelines. In order to provide similar confidence in facility integrity, it was proposed to apply a modified external corrosion direct assessment process to a small station. Until now, congested facility environments have not generally been considered suitable for this approach because of the added complexity associated with electrically-continuous grounding and the large number of pipes and structures in close proximity. This paper describes the technical approach which was developed in order to overcome the expected challenges. The conventional close-interval potential and direct current voltage gradient surveys were also enhanced to allow effective application in a facility. These enhancements are described as they relate to a variety of common conditions, and guidelines for properly interpreting survey results in a station are	Ernest N. Morial Convention Center- New Orleans

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Monday,1 :25p.m. to 1 :50p.m.	Prediction and Assessment of Ammonium Bisulfide Corrosion Under Refinery Service Conditions - Part 3	Sridhar Srinivasan, Richard Horvath, Russell Kane, Kwei Meng Yap - This paper summarizes results from the third phase of the joint industry program (JIP) on refinery alkaline sour water (ammonium bisulfide) corrosion. Phase III included a comprehensive engineering analysis of data from all three phases of the Sour Water JIP and the development of "tie-in plots" based on a single variable (H2S partial pressure), replacing the widely used iso-corrosion diagrams developed in Phase I and Phase II. These tie-in plots enabled corrosion rate data to be contiguously modeled across the entire range of conditions tested (six orders of magnitude of H2S partial pressure – from approximately 0.00004 psia to 150 psia), characterizing effects of H2S-dominated, NH3-dominated and intermediate sour water conditions. The results established that in addition to H2S partial pressure, NH4HS concentration, wall shear stress, and free cyanide concentration in the aqueous phase are the most significan	Ernest N. Morial Convention Center-New Orleans

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Monday,1 :25p.m. to 1 :50p.m.	Observation of Flow Dependent Corrosion Rate by Ultrasound Corrosion Monitoring on a Gas Pipeline	Hanne Martinusssen, Ingar Nerbø, Ole Eek, Harald Sleire - PipeMonit® is an ultrasonic erosion and corrosion monitoring tool which provides real-time and online wall thickness data for onshore and topside piping and pipelines. It is non-invasive and is installed and operated without interfering with production. Pulse-echo ultrasound monitoring provides fast and accurate erosion and corrosion rates, making it an effective tool for feedback of corrosion inhibitor programs. A 6 month trial of ultrasonic monitoring has been performed on an 8 inch OD pipeline in a gas plant. The ultrasonic monitoring system recorded measurements 4 times per day. In addition, manual Ultrasonic Testing (UT) was performed before and after the trial period. Comparison of the results showed that the manual UT measurements overestimated the corrosion rates by more than 100% compared to ultrasonic monitoring. During the trial period, a significant increase of corrosion rate was observed. The increased corro	Ernest N. Morial Convention Center-New Orleans

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Monday,1 :25p.m. to 1 :50p.m.	Material-Biodiesel Compatibility – Survey of Industry Experience	Li Yan, Xin Pang, Muhammad Arafin, Sankara Papavinasam, Natashah Zaver - The regulation in Canada requires that starting from 2011 the renewable fuel content in diesel is at least 2%. Similar USA requirements resulted in the production of more than 1.5 billion gallons of biodiesel in 2009. Several other countries also produce large amount of biodiesel. Two surveys were conducted in 2011 to understand the industry knowledge and experience with respect to the use of biodiesel. This paper summarises the salient features from these surveys. This paper additionally focuses on material-biodiesel interaction at various stages between the production of biodiesel and usage. The main findings from these surveys include, Based on the experience gained so far, no major incident of material incompatibility with biodiesel of concentration up to 5% has been reported. Incidents of corrosion and microbiological influenced corrosion have been experienced in the presence of accumulated wat	Ernest N. Morial Convention Center-New Orleans

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Monday,1 :25p.m. to 1 :50p.m.	Corrosion Inhibitor Film Stability Under High Gas Velocity Conditions of Subsea Wet Gas	Bei Wang, Lei Zhang, Qingping Li, liu yingkun, Wei Chang, Haiyuan Yao, Guang Chen, Yunan Zhang - With the development of the deep water offshore gas field in China recent years, long distance subsea gas pipelines have been built up and flow assurance becomes more and more important. The need to maintain gas production at reducing reservoir pressure had already resulted in much higher gas velocities in the field. However, higher gas velocity leads to higher wall shear stress that can be detrimental to the inhibitor adsorbing on the internal surface of pipeline, which will increase the corrosion risk especially for wet gas transportation. Corrosion is always recognized as one of the biggest flow assurance challenges of natural gas fields. During the pipeline design and maintenance, it is not enough to only use the equations of the limitation for the maximum erosional velocity from API RP 14E to deal with the balance of pipeline diameter, flow rate and the corrosion inhibitor film	Ernest N. Morial Convention Center-New Orleans

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Monday,1 :25p.m. to 1 :50p.m.	Cathodic Protection Coupon Use for Buried Piping in Plant (i.e., Complex) Facilities	Douglas Gilroy - The measurement and interpretation of cathodic protection (CP) data in plant (i.e., complex) facilities present inherent challenges where mixed metals are electrically continuous with the protected structure. Often there is no attempt to electrically isolate the on-plot buried steel piping networks from the facility for safety and practical considerations. Coupons can be used to assist in the evaluation of CP levels on buried steel piping in mixed-metal circuits. However, the present industry practice of disconnecting the coupon from the mixed-metal circuit to measure the potential and polarization, as described in NACE SP0104-2014 and BS EN 14505:2005, raises concern if the instant-disconnect condition is a true representation of the CP conditions. Another common practice of not interrupting the CP current while measuring coupon-to-soil potentials is also a concern where closely coupled impressed current anode systems are installed adjacent to the buried pip	Ernest N. Morial Convention Center-New Orleans

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Monday,1 :50p.m. to 2 :15p.m.	The Performance of Corrosion Resistant Ni-Cr-Mo Alloys in Concentrated Hydrochloric Acid	Suresh Divi, Vinay Deodeshmukh, Derek Spiller - Wrought, corrosion-resistant nickel alloys offer excellent resistance to hydrochloric acid. Of particular interest in this paper is the performance of various nickel-chromium-molybdenum and nickel-molybdenum alloys in concentrations >20% of hydrochloric acid below their boiling points. In this work, the corrosion resistance of N06022, N06200, N10276, N10675, and N10362 was studied in solutions of 20-37% HCl. The goal of this test program is to identify conditions resulting in corrosion rates close to 0.5 mm/y, the accepted maximum for industrial use. Based on the available data, an attempt was made to draw iso-corrosion lines of 0.5 mm/y for selected alloys in the range 20 to 37% HCl. Additionally, the corrosion performance of selected alloys (N10362, N06022, N06200, and N10675) was also studied by electrochemical polarization behavior.	Ernest N. Morial Convention Center- New Orleans

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Monday,1 :50p.m. to 2 :15p.m.	Carbonate SCC Experiences in Unusual Locations	Jeremy Nelson, Michael Cayard, Joe Koerner, Anthony Gerbino - Typically alkaline carbonate stress corrosion cracking (ACSCC) is associated with fluid catalytic cracking unit (FCCU) sour water streams. While it has been recognized that ACSCC risks exist outside FCC sour water services, there have been few published cases of ACSCC in other locations. This paper highlights several cases where ACSCC occurred in atypical locations, including a cold wall FCC regenerator, sour water stripper (SWS) pumparound, SWS ammonia acid gas knockout, and a mercaptan oxidation unit. These unusual failure locations highlight the need for a fundamental understanding of the ACSCC mechanism. This paper discusses work done to monitor on-going ACSCC risks through sour water sampling, chemical analysis, and ionic modeling.	Ernest N. Morial Convention Center-New Orleans

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Monday,1 :50p.m. to 2 :15p.m.	Impact of Pre-Corrosion on Corrosion Inhibitor Performance: Can We Protect Aged Pipelines?	Yao Xiong, Fang Cao, David Fischer, Jorge Pacheco - Oilfield facilities are handling far more complex conditions than what was required a few decades ago. Many existing fields are being operated way over their design life, and new developments are often in harsher environments. To manage safe and reliable operations in such environments, industry heavily relies on corrosion inhibitors to protect from internal corrosion. These chemicals are usually qualified and optimized in laboratories to ensure their performance. The laboratory tests, however, are typically conducted on freshly polished or machined coupons and do not reflect the scenarios for aged pipelines which had corrosion features established over the years. In this work, the impact of pre-corrosion on corrosion inhibitor performance has been investigated by corrosion testing and advanced surface analysis. Results show that the performance of corrosion inhibitors is significantly reduced after 3-day pre-corrosion due to t	Ernest N. Morial Convention Center-New Orleans

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Monday,1 :50p.m. to 2 :15p.m.	Galvanic Cathodic Protection for High Resistance Concrete in Marine Environments	Ivan Lasa, Mohammad Islam, Matthew Duncan - The good performance of galvanic cathodic protection (GCP) systems is well proven and recognized for the protection of corrosion related damage on reinforced concrete (RC) structures located in marine environments. However, these cathodic protection systems are typically installed in areas where the concrete has a high chloride and moisture content. It has been observed that typically in dry conditions, galvanic anodes either passivate or do not maintain a voltage potential sufficient to drive the CP current. On the contrary, for these dry areas, impressed current cathodic protection (ICCP) systems are preferred due to their higher voltages and their ability to force the currents. This paper discusses the installation and performance of galvanic cathodic protection systems using pre-activated zinc anodes installed over dry concrete on bridges in Florida.	Ernest N. Morial Convention Center-New Orleans

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Monday,1 :50p.m. to 2 :15p.m.	Automated Waveform Analysis: Advanced CP Data Processing and Analysis for Corrosion Monitoring	William Mott, Charles Petrie - Most current technologies used in cathodic protection (CP) monitoring do not allow for the collection of accurate data to compare against recognized National Association of Corrosion Engineers (NACE) criteria for adequate cathodic protection. However, the technology to accurately collect CP data can be readily implemented into CP monitoring equipment with reasonably minimal improvement of the software and hardware used to measure and analyze CP monitoring data. By implementing Automated Waveform Analysis during CP surveys, operators of structures using CP systems can accurately and consistently record CP data to better assess their level of protection.	Ernest N. Morial Convention Center-New Orleans

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Monday,1 :50p.m. to 2 :15p.m.	The Impact of Ultra-Low Temperature Sandstone Reservoirs on Scale Inhibitor Retention	Myles Jordan - Control of inorganic scale within oilfield production wells via the scale squeeze process is well documented. The life time of the squeeze treatment is dictated by the cumulative volume of produced water flowing through the treated interval until the minimum inhibitor concentration (MIC) of the scale inhibitor is reached. Inhibitor chemicals with strong retention and low MIC values have been developed, deployed and for many years phosphonates and polymers containing phosphonate functional groups have been widely used. This study looks at the issues faced by an operator with low temperature sandstone reservoirs of only 40C and 60C, the challenges this low temperature brought which include high MIC for sulphate scale control and poor chemical retention & release observed during the reservoir condition corefloods. These findings will be compared and contrasted with two other higher temperature (72C and 95C) sandstone reservoirs where phosphonates and phosphat	Ernest N. Morial Convention Center-New Orleans

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Monday,1 :50p.m. to 2 :15p.m.	Evaluation of the Resistance of Metallic Tank Materials Under the Influence of Biofuels	Margit Weltschev, Ralph Baessler - The question arose whether the resistance of the commercial tank to fuels with bioethanol and biodiesel (rapeseed oil fatty acid methyl ester) is given. Changes in fuel composition and the introduction of alternative fuels often create problems of corrosion and degradation in materials. The objective of this research was to determine the corrosion behaviour of commercial metallic tank materials [unalloyed steels, austenitic CrNi- and CrNiMo-steels, aluminium (-alloys)] in fuels and heating oil with admixtures of biogenic sources such as E10, E85, biodiesel and B10 (heating oil with 10 % biodiesel). Metallic tank materials are evaluated as resistant in a liquid if the annual corrosion rate due to uniform corrosion does not exceed 0.1 mm/year, and localized corrosion effects in form of pitting corrosion, stress corrosion cracking and crevice corrosion do not occur. The corrosion rates of the metallic materials after exposure to E10, E85, non-ag	Ernest N. Morial Convention Center-New Orleans

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Monday,1 :50p.m. to 2 :15p.m.	Application of Raman Spectroscopy for Hydrocarbons Characterization	Igor Kosacki, Sridhar Srinivasan - Process environments, including deep water oil and gas production systems, transmission pipelines and refineries have a great need for instrumentation that can directly measure concentrations and solubilities of hydrocarbons, carbon dioxide, and hydrogen sulfide. Major pipeline and refinery corrosion failures have occurred due to unmonitored and undetected leaks. Therefore, development of new process monitoring technologies will provide enhanced safety and reduce failures. This paper describes recent advances in the development a novel technique to monitor oil and gas production, as well as, hydrocarbon transmission through application of Raman spectroscopy. The paper aims to correlate and describe vibrational properties of hydrocarbons as a basis for Raman-based detection and quantification. Dynamical properties of hydrocarbon molecules were modeled using Density Function Theory and results were correlated with Raman spectra. The influence of	Ernest N. Morial Convention Center-New Orleans

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Monday,1 :50p.m. to 2 :15p.m.	MIC-Resistant HDPE Lining for Seawater Applications	Emily Hunt, Mike Baraky - Two types of corrosion cause the majority of problems in offshore or seawater applications. These are aqueous corrosion from the alkalinity of the seawater itself and degradation from microbiologically influenced corrosion (MIC). It is well recognized that an estimated 40% of all internal pipeline corrosion in the oil and gas industry can be attributed to MIC. In this type of corrosion, microorganisms in the seawater cause corrosion and stress cracking in both metallic and non-metallic materials. When this degradation is combined with aqueous corrosion from the marine environment, it is apparent that any significant advancement in MIC mitigation would prove invaluable to asset protection programs in these conditions. RMB Products’ rotational lining solution can apply a thick, fully bonded, vacuum resistant, monolithic liner of high-density polyethylene (HDPE) to the inner diameter of piping systems. This liner has proven to last over 20 years in brine	Ernest N. Morial Convention Center-New Orleans

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Monday,1 :50p.m. to 2 :15p.m.	Corrosion Behavior of High-Alloy Austenitic Stainless Steel in Simulated Geothermal Environment	Sigrun Karlsdottir - In recent years there has been an increased interest in drilling deeper geothermal wells to obtain more energy output per well with the corresponding higher temperature and pressure and increased corrosiveness of the geothermal environment. To explore the potential of the high alloy austenitic stainless steel UNS S31254 in future deep geothermal wells corrosion testing was done in simulated geothermal environment at 180°C and 350°C with a pressure of 10 bar. The simulated environment was composed of steam with H_2S, HCl and CO_2 gases, with a pH of 3 upon condensation. The testing was done in a flow through reactor for a 1 and 3 week exposures. The UNS S31254 performed well at 180°C with negligible corrosion rate both for the 1 and 3 week test and no localized corrosion damages were detected. Interestingly large NaCl were detected on the surface after testing. After the testing at 350°C localized damage were observed on the surface of the samples and substantia	Ernest N. Morial Convention Center-New Orleans

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Monday,1 :50p.m. to 2 :40p.m.	Using Portable Material Property Devices for Pipe Grade Determination	Steve Biagiotti, Steven Biles, Terry Totemeier - Sweeping changes to the United States (U.S.) pipeline safety regulations were announced in 2016, many of which were prompted by the Department of Transportation (DOT) incident findings. Of special note is the new requirement (49 CFR Part 192.607) to determine and verify the physical characteristics of any installed line pipe, valves, flanges and components where material records are not available. PHMSA estimated in 2013 that at least 5,400 miles of line pipe may lack the Reliable, Traceable, Verifiable and Complete (RTVC) records needed to establish material properties in an HCA, Class 3 or Class 4 locations. The industry has been working toward the development of in-situ techniques to measure pipe properties. Attempts to use hardness, grain size and chemical composition of line pipe are being pursued as a means to compare the responses with API 5L grade specifications. Joint Industry Development efforts have made progress t	Ernest N. Morial Convention Center- New Orleans

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Monday,2 :15p.m. to 2 :40p.m.	A Study on the Microstructure, Mechanical Properties and Corrosion Resistance of Centrifugally Cast	Shankar Venkataraman, Dietlinde Jakobi - The low carbon 46Cr-35Ni-9Mo alloy is a solid solution strengthened cast Ni-Cr-Mo alloy additionally containing Cu and N. This alloy displays the best known mechanical properties and corrosion resistance among the existing cast low carbon Ni-Cr-Mo alloys. This work reports on the properties achievable for a centrifugally cast low carbon 46Cr-35Ni-9Mo alloy tube of 4500 mm length and 55 mm wall thickness. The phase formation after the solidification as well as the influence of heat treatment on the microstructure development is examined. The influence of the various heat treatment states on the mechanical properties as well as corrosion resistance is studied. An extensive testing program has been taken for the determination of mechanical properties on samples taken from different orientations within the centrifugally cast tube. The properties do not exhibit directionality and hence demonstrate the isotropic behavior of the cast product.	Ernest N. Morial Convention Center-New Orleans

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Monday,2 :15p.m. to 2 :40p.m.	Inland Wharves - Challenges of Service Life Modeling	Jonah Kurth - The Houston Ship Channel is a modern engineering feat —major efforts in deepening and widening the channel over the last 100 years have enabled construction of a string of cargo wharves from Galveston Bay into the city limits of Houston. Service life assessment and modeling for these concrete and steel wharf structures present unique challenges compared to more typical coastal maritime structures. The channel contains brackish water with chloride contents ranging from 2000 mg/l upriver to around 10,000 mg/l in Galveston Bay. At the lower ranges, chloride-induced corrosion is a risk to concrete structures primarily where wetting and drying cycles concentrate the chloride; even in those areas the measured surface chloride concentrations overlap the range of typical chloride-induced corrosion thresholds. In addition, subsidence of 5 feet or more over the last 100 years in the Houston region has resulted in a net increase of water level and a change in exposure cond	Ernest N. Morial Convention Center-New Orleans

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Monday,2 :15p.m. to 2 :40p.m.	Inhibitor Partitioning Efficiency Using Fluorescence Spectroscopy Detection	Jody Hoshowski, Rolando Perez Pineiro - Inhibitors have been used to mitigate corrosion in oil and gas producing assets. The efficiency of inhibitors are affected by several variables with the ability of an inhibitor to transport through the produced fluids onto the metal surface being one of the most important requirements. This can be achieved by formulating inhibitor products with a variety of chemistries that minimize their solubility in oil and are either soluble or dispersible in the brine. The partitioning of inhibitor products between the oil and aqueous phases require a reliable method to evaluate different inhibitor products. An analytical method using fluorescence spectroscopy has been developed as a means to measure inhibitor concentration. This new method offers several advantages over other commonly used techniques, such as dye transfer methods. The method offers a greater degree of accuracy, can be performed in the laboratory or at the well site, and indivi	Ernest N. Morial Convention Center-New Orleans

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Monday,2 :15p.m. to 2 :40p.m.	Continuous Monitoring of Atmospheric Corrosion and Coating Degradation	Fritz Friedersdorf, Matthew Merrill, Patrick Kramer, David Ellicks - Organic coating systems with corrosion inhibitors are the primary means of protecting structures from atmospheric corrosion in harsh environments. Environmental compliance and a desire for increased performance continue to drive coating development and new product introductions. Current corrosion tests and measurement methods for selection of aerospace coatings often provide poor correlation to usage environments and do not assess the highest risk failure modes of localized corrosion, galvanic attack, and environment assisted cracking. Furthermore, these tests do not quantify material interactions or corrosion rates needed to establish relative coating performance in accelerated tests, outdoor exposures, or service environments. New coating qualification typically includes accelerated corrosion tests, outdoor exposures, and aircraft trials; however, these product introductions may take 10 – 15 years. Ther	Ernest N. Morial Convention Center-New Orleans

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Monday,2 :15p.m. to 2 :50p.m.	Use of Corrosion Rate Probes to Evaluate Pipeline Cathodic Protection Performance	Vera Kustova, Dale Lindemuth, Joyce Raffone - The natural gas transmission pipelines that are the subject of this paper are routed through South Texas where cathodic protection levels can vary significantly throughout the year based on soil moisture. Recurrent pipe-to-soil potential measurements indicating possible ineffective corrosion control prompted further assessment relative to pipeline integrity management and regulatory compliance. This paper discusses the use of multiple high-precision electrical resistance type corrosion rate probes and continuous remote monitoring of the probe corrosion rate in conjunction with various channels of electrical data to determine/document conditions and establish a suitable path forward.	Ernest N. Morial Convention Center- New Orleans

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Monday,2 :15p.m. to 3 :15p.m.	Validation of Corrosion Growth Rate Models	Yan Ping Li, Mona Abdolrazaghi, Len Krissa - Corrosion growth rate (CGR) is one of the key elements in corrosion threat management. It is used to determine metal loss In-Line Inspection (ILI) re-assessment interval, flag the high growth features that requires excavation before the next ILI and predict probability of failure of an unmitigated feature. Over-estimated CGR may result in unnecessary expenditures for excavations and remediation, while under-estimated CGR could result in pipeline failure. In this paper, several CGR methodologies used by Enbridge to manage corrosion on pipelines including historical CGR, back-to-back CGR and ILI signal based CGR are discussed and validated. Historical CGR refers to the rate that is calculated based on the ILI reported depth and vintage of the line. Back to back CGR refers to the rate that is calculated based on ILI reported depths of two back-to-back ILIs. Signal based CGR refers to the rate that is determined based on ILI raw data r	Ernest N. Morial Convention Center-New Orleans

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Monday,2 :25p.m. to 2 :50p.m.	Chloride Stress Cracking of an Austenitic Stainless Steel Pipe Fitting in a Hydroprocessing Unit	Hayrik Allahverdian, James McVay, Anil Singh, Gabriel Saldivar - A cracking occurred in a stainless steel branch nozzle fitting at a low point in the reactor effluent piping in a Gasoil Hydrotreater unit following start up. Normal preventive measures were implemented to protect the piping system against Polythionic stress corrosion cracking (PTASCC) during shut down (neutralization & nitrogen purging), however cracking occurred in the 321 type austenitic stainless steel weldolet right after the start up. Materials selection of low point drain including the fitting is in accordance with good engineering practice. Failures of such fittings in similar applications are unusual and are not found in literature. The failed sample was removed for metallurgical analysis and determination of the damage mechanism(s). This paper provides the case history and the investigation in to the root cause.	Ernest N. Morial Convention Center-New Orleans

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Monday,2 :25p.m. to 2 :50p.m.	Integrity Management of Oil Wellheads and Flowlines Having Scaling	Abdul Razzaq Al-Shamari, Saleh Al-Sulaiman, Dr. Sandip Kuthe, Sharad Londhe - The producing wells in South Burgan field, Kuwait, have recently reported an increase in water cut with simultaneous drop in oil production. Several wells have showed indications of scale formation to varying degrees at the well-head chokes and in the flowlines. Scale deposits comprised mostly calcium carbonate with lesser amounts of silicon (formation fines). Inhibited acid cleaning was carried out to remove the hard scales from the chokes' beans and sections of the flowlines for wells having significant scale accumulations. Online internal corrosion monitoring coupons were installed on the flowlines to monitor internal corrosion during acid cleaning and routine operation. Similarly, scale coupons were installed to evaluate scale inhibitor efficiency. Fluid sampling was carried out during acid cleaning to check dissolved iron (Fe) content as corrosion monitoring indicator and scaling tendency. Rad	Ernest N. Morial Convention Center-New Orleans

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Monday,2 :25p.m. to 2 :50p.m.	Compatibility Evaluations of Sealing Materials with Aged Biofuels	Margit Weltschev, Manuela Haufe, Martina Heyer - Materials compatibility is a major concern whenever the fuel composition is changed in a fuel system. The question arises of whether sealing materials are resistant to fuels with biodiesel (rapeseed oil fatty acid methyl ester). The objective of this research was to determine the resistance of frequently used sealing materials such as FKM (fluorocarbon rubber), FVMQ (methyl-fluoro-silicone rubber), VMQ (methyl-vinyl-silicone rubber), EPDM (ethylene-propylene-diene rubber), CR (chloroprene rubber), CSM (chlorosulfonated polyethylene), IIR (butyl rubber), PA (polyamides), NBR (acrylonitrile-butadiene rubber) and PUR (polyester urethane rubber) in aged fuels and heating oil with admixtures of biogenic substances such as biodiesel and B10 (heating oil with 10% biodiesel). The mass, tensile strength and breaking elongation of the test specimens were determined before and after exposure for 84 days in non-aged, one-year, two-year, three-	Ernest N. Morial Convention Center-New Orleans

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Monday,2 :25p.m. to 2 :50p.m.	Epoxy High Temperature Coatings and Considerations	Muni Ramakrishnan - Process equipment is increasingly being subjected to higher temperatures and pressures in order to improve productivity and process efficiency. There is a corresponding need for high temperature coatings to protect the metal surface from corrosion and chemical attack, which is also accelerated at these higher temperatures and pressures . Epoxies, due to a combination of adhesion, corrosion resistance and excellent physical and mechanical properties are generally a good choice as coatings. The molecular structure of epoxy is inherently rigid and resistant to heat and chemicals and is capable of reaction with various functional groups such as aliphatic and aromatic amines, amides, phenolics, polyesters, all of which are addition reactions. Unfortunately, most epoxy systems use conventional bisphenol A based resins which are generally limited to a service temperature of around 80-90 C. Even high temperature systems, based on more advanced resins, have an	Ernest N. Morial Convention Center-New Orleans

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Monday,2 :50p.m. to 3 :15p.m.	[Assessing the influence of coating thickness on its mechanically induced loss of integrity]	Shyama Ranade, YongJun Tan, Maria Forsyth - Coatings form an integral part of the corrosion protection system of oil and gas pipelines. It is necessary to assess and analyse the coatings for loss of integrity such as mechanically induced holidays and cracks before they are put into operation. The standard method of assessing coating's behaviour and flexibility under mechanical strain is the mandrel bending test, wherein high voltage holiday test is normally used to determine the existences of discontinuities in coating films. A limitation of the holiday detector is that it can only detect coating defects ex-situ, i.e. after mandrel bending. A new experimental method has been proposed to perform in-situ measurement of the loss of coating integrity under the effect of combined mechanical strain and environmental exposure. The experimental setup consists of a small scale tensile rig capable of applying a mechanical strain, coupled with an electrochemical cell that is used to expos	Ernest N. Morial Convention Center- New Orleans

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Monday,2 :50p.m. to 3 :15p.m.	A Corrosion Fatigue (CF) Assessment Method for High-stressed Engine Components in Corrosive Fuels	Sven Kaefer - Titel: Development and experimental verification of a corrosion fatigue (CF) assessment method for high-stressed engine components in corrosive fuels S. Käfer, T. Melz, TU Darmstadt (SzM), Germany S. Schönborn, H. Kaufmann, T. Melz, Fraunhofer LBF, Germany T. Engler, G. Andersohn, M. Oechsner, TU Darmstadt (MPA/IfW), Germany G. Kripak, B. Clausen, H.-W. Zoch IWT Bremen, Germany Abstract A reliable power train system should be based on fatigue design including very high cycle fatigue (VHCF) effects. Engine components especially for injection systems encounter a large amount of load cycles (1·109) and are exposed to corrosive media such as fossil fuels during their lifetime. To reduce the carbon dioxide (CO2) emission fossil fuels are blended with biogenic components. Biofuels are potentially more corrosive than unblended fuels due to the hydrophobic properties of for example ethanol which is added to gasoline fuels. There is yet not much known about corrosion f	Ernest N. Morial Convention Center- New Orleans

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Monday,2 :50p.m. to 3 :15p.m.	High Accuracy Ultrasonic Corrosion Monitoring	Fangxin Zou - There exist many well-established techniques for corrosion monitoring. These include, but are not limited to, weight measurements, linear polarisation resistance (LPR) measurements and tactile measurements. However, all of these approaches are not easy to apply to fluid conduits in the field since they require access to the interiors of components. Also, weight measurements and LPR measurements are only capable of determining mass loss rates. The corresponding calculation of wall thickness losses requires integration and the assumption of several parameters such as the area over which the measurement is taking place. Ultrasonic measurements, which can be carried out from the exteriors of components, are much more field-deployable. It has been demonstrated that by using permanently installed transducers, a precision in the order of micro-meters in wall thickness measurements can be achieved. This means that for corrosion rates of the order of 0.1 mm/year	Ernest N. Morial Convention Center-New Orleans

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Monday,2 :50p.m. to 3 :15p.m.	Sulphide Scale Fouling in Multiphase Environment	thibaut charpentier, Anne Neville, Andrew O'Brien, William keogh - Understanding the effect of the environment and materials selection on mineral surface fouling is essential in order to design better anti-scaling strategies. This study report on the development of a novel set-up and its utilization to evaluate sulphide scale formation in flow conditions. Results are reported for scaling tests performed under controlled laminar and turbulent dynamic conditions using a rotating cylinder electrode under simple and complex (mixed) scaling environment (supersaturated w.r.t. lead sulphide, zinc sulphide, and calcium carbonate). The effect of multiphase environment that can replicate more accurately real conditions encountered in oil and gas production facilities is also investigating by carrying tests in a single aqueous phase as well as in oil/water multiphase environment. By analysing the change of surface fouling behaviour observed under the range of experimental conditions consi	Ernest N. Morial Convention Center-New Orleans

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Monday,2 :50p.m. to 3 :15p.m.	Can an Intermittent Cathodic Protection System Prevent Corrosion of Buried Pipeline?	Marco Ormellese, Andrea Brenna, Silvia Beretta, Fabio Bolzoni - Usually cathodic protection (CP) is continuously applied to control corrosion of buried pipeline. The effect of cathodic reactions (oxygen reduction and/or hydrogen evolution) taking place on the metal surface is twofold: oxygen consumption and alkalization (pH > 10) at the metal-to-electrolyte interface leading carbon steel to work in passive condition. Aim of the research is to exploit the chemical and electrochemical condition at the metal interface to apply an intermittent CP: during the ON period oxygen is consumed and alkaline pH is established, during OFF period, the alkalinity produced in the previous phase assure passive condition until neutral condition re-establishes, then CP is switched on again. Test has been performed both in normal and overprotection condition, varying the duration of the on and off periods (6 h, 12 h and 18 h), monitoring weekly the protection potential and the protection current. At	Ernest N. Morial Convention Center-New Orleans

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Monday,2 :50p.m. to 3 :15p.m.	Assessing Stress Corrosion Cracking Risks on Stainless Steel Piping and Equipment	Tina Tajalli, Cathleen Shargay, Karly Moore, Lionel Roberts, Jonathan Allen - Stress corrosion cracking (SCC) is one of the most prevalent root causes of stainless steel failures in the refining industry. This paper focuses on the risks of polythionic acid (PTA) and chloride SCC, and reviews the risks from both internal process services and from external atmospheric and/or wet insulation conditions. Steps can be taken to mitigate the risk of SCC, but since changes in the process or external conditions can occur over time, periodic unit reviews are beneficial. This paper also discusses setting the risk-based inspection ratings for these possible damage mechanisms, and suggested methodologies for determining these risk ratings. These methodologies are complimentary to the recommendations given in API RP 581, “Risk-Based Inspection Technology” and this paper gives separate review steps for the internal and external risks.	Ernest N. Morial Convention Center-New Orleans

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Monday,2 :50p.m. to 3 :15p.m.	[Mechanistic Correlations Between Single and Multicomponent Corrosion Inhibitor Blends for CO2 Corros]()	Carlos Menendez, Zhengwei Liu - Information about the corrosion inhibition mechanism of multi-components blends and of their respective individual components is vital to identify the synergistic interactions needed to maximize performance. The mechanistic information was obtained employing such electrochemical techniques as linear polarization (LPR), electrochemical frequency modulation (EFM) and potentiodynamic polarization while using a rotating cylinder electrode (RCE) system under CO2 corrosion conditions. The employed electrochemical methods allow determination of anodic, cathodic or mixed corrosion inhibition mechanisms. The studied individual corrosion inhibitor components included sulfur containing compounds, an imidazoline, a quaternized amine and a phosphate ester. Binary combinations of the individual components were also studied to correlate the results obtained for the individual components with the inhibition mechanism of blends identifying potential synergistic interac	Ernest N. Morial Convention Center-New Orleans

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Monday,2 :50p.m. to 3 :15p.m.	Monitoring Rebar Corrosion Propagation Embedded in Concrete	Francisco Presuel-Moreno - As a mean to assess achieving intended service life on marine exposed bridge structures the corrosion propagation stage was investigated. Corrosion of the steel reinforcement during the corrosion propagation was monitored on selected laboratory specimens for several years. The specimens were prepared with 2 inches of concrete cover and low water to cementitious (i.e., 0.41). Chloride was not present initially. An electric field was applied to drive the chlorides and reach the rebar depth until it exceeded the chloride threshold. Linear polarization tests have been monitored for over 3 years on eight specimens, and for a shorter period (approx. six months) on six other specimens. The proposed study will assist in providing the Florida department of transportation with guidance as to how fast the corrosion rate will be at various chloride concentrations for rebars embedded in concrete. With these corrosion rate values, it would be possible to obtain est	Ernest N. Morial Convention Center-New Orleans

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Monday,2 :50p.m. to 3 :40p.m.	Investigating EMAT Dig Results for a Low Frequency ERW Seam Inspection	Sean Moran, Robert Meyers, Chuck Harris - In November of 2014, T.D. Williamson (TDW) inspected a 16” liquid pipeline using multiple datasets (MDS) and electromagnetic acoustic transducer (EMAT) tools. This particular line had low frequency electric resistance welded (LF-ERW) pipe and the Operator was most interested in utilizing these tools for a seam assessment. From prior non-destructive examination (NDE) results and knowing the possible manufacturing defects associated with LF-ERW seams, the primary threats the Operator wanted to identify, evaluate, and repair were cold welds and hook cracks. In addition to the MDS and EMAT inspections, two other inline inspection (ILI) tools were selected for this integrity study: an ultrasonic crack detection (UTCD) tool and a transverse flux inspection (TFI) tool. The utilization of four advanced technologies to inspect this pipeline allowed the Operator to correlate the data from the final reports, perform a full technology comparison (	Ernest N. Morial Convention Center-New Orleans

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Monday,3 :15p.m. to 3 :15p.m.	High Voltage Direct Current Interference on Buried Pipelines: Case Study and Mitigation Design	Runzhi Qin, Yanxia Du, Guozheng Peng, Minxu Lu, Zitao Jiang - High Voltage Direct Current systems are developing fast in China. But the electrodes in monopolar modes may introduce DC interferences on buried metallic pipelines nearby, and increase the risk of corrosion and hydrogen embrittlement. Focusing on a real case of HVDC interference, this paper aimed to study the field test, the numerical simulation calculation, and the design of mitigation. Firstly, field tests found that a natural gas pipeline system was interfered by a HVDC electrode system in Guangdong province. The pipe-to-soil on potentials along the pipe had deviations up to 300V, posing severe threats to safety operation of the pipeline system. Then, the numerical simulation technique was used to model the electrode and pipeline system based on field parameters. The interference level was computed and the results showed good agreements with the measured values, which indicated the validity of the model. Finally,	Ernest N. Morial Convention Center-New Orleans

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Monday,3 :15p.m. to 3 :40p.m.	Monitoring Pitting Corrosion Growth in Steel Rebar Using Optical Fiber	Fujian Tang - Use of optical fiber sensors to monitor steel corrosion has attracted a lot of interests in the past two decades, due to its small size, high precision and stability, electromagnetic immunity, possibility of being employed in large structures. In this study an optical fiber corrosion sensor is developed to monitor the growth of corrosion pits in steel bars in chloride-laden concrete environment. The sensor was simply made by encasing one end of an optical fiber into a steel straw. As the corrosion penetrates through the steel straw wall, the corrosive solution and corrosion products fill in and contaminate the fiber end surface, resulting in a change in the reflectivity. The change of the optical fiber reflectivity indicates the corrosion pits depth equaling to the straw wall thickness. Therefore, by deploying corrosion sensors with different wall thicknesses in concrete structures, the corrosion pit depth at different time periods can be monitored. The steel straw	Ernest N. Morial Convention Center-New Orleans

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Monday,3 :15p.m. to 3 :40p.m.	Accelerated Corrosion of 304H SS in RFCC Regenerators Involving Low Temperature Eutectic-Forming Sal	Jayant Nair, Fahmi Al Mawali, Naif Abri, Asad Al Ghafri - Residue Fluid Catalytic cracking (RFCC) is a valuable subset of the more conventional Fluid Catalytic cracking (FCC) process which generates most of the world's gasoline pool. The critical distinction of RFCC involves the processing of "dirty" atmospheric residue (AR) directly from crude distillation and not just the more conventional use of relatively pure gasoil feedstocks. By direct catalytic cracking of "dirty" residue the refiner benefits economically by avoiding a whole intermediate process, namely vacuum distillation. Unfortunately direct FCC processing of atmospheric residue (AR) exposes the vessel internals to geological salts naturally present in crude oil but concentrated in the residue fraction during the distillation process. Internals of regenerator vessels (cyclones, refractory anchors, hexmesh, and cross bracing) are typically manufactured in SS304H which is sensitive to corrosive low melting point eutect	Ernest N. Morial Convention Center-New Orleans

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Monday,3 :15p.m. to 3 :40p.m.	Sacrificial Anodes for Reinforced Concrete Structures: A Review	Oladis de Rincon, Andres Torres-Acosta, Alberto Sagues - In recent years the use of sacrificial anodes for cathodic protection in reinforced concrete structures has increased reflecting ease of installation, low maintenance requirements as well as desirability in prestressed concrete structures where the naturally controlled protection potential decreases the risk of hydrogen embrittlement. Zinc-based alloys have been among the most evaluated galvanic materials for concrete structures, especially in USA, in many applications: thermal spray, superficial metal/mesh with and without hydrogel adhesive, embedded in concrete (point anodes) with or without salt activator, etc. However, the protection capacity lifetime of zinc alloys as used has been questioned based both on laboratory and on field application studies. Aluminum alloys have also been evaluated, showing sometimes better results as anode materials than zinc alloys. However, both zinc and aluminum alloy anodes may experi	Ernest N. Morial Convention Center-New Orleans

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Monday,3 :15p.m. to 3 :40p.m.	Tailoring Chemicals for Continuous Injection Downhole via Capillary Line and “Sensitive” Jewelry	Marko Stipanicev, Oeystein Birketveit, Ole Gilje Avaldsnes - As offshore operators explore deeper waters and develop more mature oil and gas fields using complex well structural designs, new and different challenges are encountered that can impact production. Continuous downhole injection of chemicals is increasingly required to manage challenges, such as scale formation and corrosion within the wellbore completion components. Many challenges are met when designing and qualifying chemicals for continuous downhole injection via capillary line. Discussed herein are the physical properties production chemicals injected via capillaries should possess including temperature stability, gunking, compatibility with process fluids, and efficiency. However, the main challenge and focus was addressing the compatibility of neat chemicals with downhole jewellery materials. Two chemical qualification processes are discussed, a corrosion inhibitor and a combined corrosion and scale inhibitor.	Ernest N. Morial Convention Center-New Orleans

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Monday,3 :15p.m. to 3 :40p.m.	Superhydrophobic Coatings and Oil and Water Separation	Rigoberto Advincula - Coatings have the function of resistance to environmental attack, i.e. barrier protection, abrasion, chemical, yet a number of them have not been optimized to give high resistance against wetting when it comes to dual or enhanced properties that can result to higher durability. Moreover, the wetting phenomena in coatings is also under-appreciated when it comes to de-icing and anti-MIC properties. This talk will highlight the fabrication of durable coatings with superhydrophobic coatings that can be fabricated from eletrochemical polymers, casted coatings, and thermosetting curable coatings that can display superhydrophobic coatings and their resistance to corrosion. The use of these materials in screen-mesh or gravity filtration situations have shown their efficient properties in oil and water separation. The applications of these properties could be in the preparation or augmentaion of high peformance properties to existing coatings as well as addressing t	Ernest N. Morial Convention Center- New Orleans

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Monday,3 :15p.m. to 4 :5p.m.	Crack Development in Fatigue Growth Assessment for Pipelines	Kathy Zhang - Assessment of fatigue crack growth for pipelines is critical to evaluate the effects of operation pressure acting on flaws and predict the remaining service life. Under pressure cycling, the crack propagates continuously until it reaches a critical size, resulting in pipeline leaking or rupture. For most fatigue growth models, relatively little attention has been paid is the effects of crack shape or aspect ratio on crack growth behaviors. This may result in less reliable results and thus potentially leads to an unrealistic integrity management and maintenance. As such, developing a fully understanding of crack shape development during crack growth and estimating remaining life can be very important. In this work, the development of crack aspect ratio (crack depth/half-crack length) was studied for semi-elliptical surface crack for pipelines undergoing pressure cycling. The effects of initial crack aspect ratio, pipeline OD and wall thickness on the crack shape	Ernest N. Morial Convention Center-New Orleans

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Monday,3 :40p.m. to 3 :40p.m.	Retrofit and Management of Water Pipelines with Cathodic Protection: Case Studies	Mersedeh Akhoondan, Graham Bell - Corrosion of metallic pipelines is a significant source of failures and financial burden to drinking water utilities. Cathodic Protection (CP) has been a recognized technology for buried metallic pipelines for decades but has not been widely used in the water industry. Some water utilities have been exploring a variety of techniques to fight external corrosion and to preserve the value of their buried assets however a standardized and defensible approach does not exist. As part of an on-going Water Research Foundation Project (WRF # 4618), technical and economic considerations for CP installation and retrofit of buried water pipelines have been investigated to generate a best CP practice guide-tailored for water utilities application. The proposed guideline assist water utilities to better understand the implication of CP on the performance of distribution networks and optimize the implementation and scheduling of future CP programs. Typically,	Ernest N. Morial Convention Center-New Orleans

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Monday,3 :40p.m. to 4 :5p.m.	Modeling of Multi-Pipeline Corridor CP Potential Profile with Common Cathodic Protection System	Rogelio De Las Casas - Modeling of Multi-Pipeline Corridor CP Potential Profile with Common Cathodic Protection System. Rogelio de las Casas Reliable Underground Service Technicians 111 Ambassador Avenue Romeoville, Illinois, 60446 USA ABSTRACT Analytical solutions of the potential profile of several pipelines in the same right of way (ROW) are coupled with analytical solutions of cathodic protection (CP) groundbeds and modeled in 3-D. The combined modelling facilitates the determination of groundbed potential to ground influence on the pipeline attenuation behavior. The distance between the pipeline and the groundbed is taken into account to calculate the final influence of the groundbed potential profile on the pipeline-to-soil potentials. Pipelines with different diameters, different coating characteristics and/or different ages are protected with the same cathodic protection systems (CPS). Different pipeline electrical characteristics implies diffe	Ernest N. Morial Convention Center- New Orleans

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Monday,3 :40p.m. to 4 :5p.m.	Multipoint Flux Monitoring by the Hydrogen Collection Method Using a New Wide Temperature Range Flux	Frank Dean, Andrew Witty, Alex Zanre - The hydrogen collection method is used widely to measure hydrogen flux in various oil processing environments. The inherent advantages are the method's non-intrusivity, ease of application, spead, and dynamic range of measurement, and tolerance of variable steel temperature and curvature. In this paper we present preliminary measurements from a newly developed device engaging the hydrogen collection method, which accomodates measurements from up to four probes of a new design, within a cycle of less than ten minutes. Prospective applications of the new tool will be discussed in the context of the results presented, such as for hydrogen bakeout monitoring.	Ernest N. Morial Convention Center-New Orleans

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Monday,3 :40p.m. to 4 :5p.m.	Use of Micelle Detection for Corrosion Inhibitor Screening	Melanie Reid, Fiona Mackay, Scott Rankin - Corrosion inhibitors are formulated with surfactants, solvents and synergists and applied to mitigate internal corrosion across oil and gas production systems. Candidate corrosion inhibitors for use in these systems are subjected to a series of corrosion mitigation and secondary properties tests. A balance is sought between the product which is most effective for preventing corrosion and that which does not contribute to unwanted effects of dosing such a product, including: emulsion formation, foaming, water haziness etc. The process of determining which the most suitable candidate is may begin with simple linear polarisation resistance and rotating cylinder electrode testing and progress to testing involving high shear, temperature and pressure. These tests will be sequentially dosed and the candidates which show the best inhibition at the lowest dose rate are brought forward to emulsion, foaming and solubility testing. The dose r	Ernest N. Morial Convention Center- New Orleans

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Monday,3 :40p.m. to 4 :5p.m.	Modeling and Projecting the Onset and Subsequent Failure Rate of Corroding Bridge Post-Tension Tendo	William Hartt - Onset and Subsequent Failure Rate of Corroding Post-Tension Tendons with Deficient Grout – Effect of Modeling Variables Post-tensioned (PT) concrete construction was first introduced over 60 years ago and has evolved to become a prime methodology for affecting integrity of large reinforced concrete structures, including bridges. While there are a number of advantages to PT construction compared to conventional reinforcement, corrosion caused tendon failures have recently been reported as a consequence of either chemically or physically deficient grout (or a combination of the two), where the former involves elevated concentrations of chlorides or free sulfates (or both) and the latter voids with free water and soft, chalky, segregated, separated grout. In response to this, a recently proposed predictive model that projects the onset and subsequent rate of wire and strand fractures and tendon failures as a function of time is reviewed along with results from t	Ernest N. Morial Convention Center-New Orleans

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Monday,3 :40p.m. to 4 :30p.m.	Reliability Assessment of Corrosion Features Interacting with Pipeline Dents	Douglas Langer, Muntaseer Kainat, Janine Woo - The existence of corrosion features in energy pipelines can adversely affect the stress/strain state of the pipe body leading to potential integrity concerns. These concerns can be intensified when a corrosion feature is suspected to be interacting with deformations in the pipe geometry such as dents. While explicit models are available for the individual analysis of corrosion and dent features, there is significant room for research and development in the assessment of these features when they interact. Additionally, the uncertainties associated with the input variables (such as in-line inspection measurements, pipe attributes, operating conditions, etc.) are often neglected or considered within a limited scope in the analysis methods typically being implemented in the pipeline industry today. This paper presents a methodology for the assessment of corrosion features interacting with dents in pipelines through the use of Finite El	Ernest N. Morial Convention Center- New Orleans

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Monday,3 :50p.m. to 4 :15p.m.	Sigma Phase Embrittlement of Type 304H Stainless Steel after FCCU Service	Jorge Hau - In line with previous publication NACE paper 06578, results are described of more recent sigma phase embrittlement assessments performed at three different refineries and mainly involving regenerator cyclones at fluid catalytic cracking units but also included one case of regenerator cyclones hanger rods and another case with regenerator flue gas line. The materials of constructions is type 304H (UNS S30409) and 304 Modified, which is similar to 304H with addition restriction on chemical composition. In addition to sigma phase volume fraction measurements and Charpy V-Notch testing done at ambient and warm temperatures, that produced results that are consistent with the previous publication, creep testing was performed to both base metal and weld metal with surprising results. The MPC Omega method was used. Despite significant sigma phase embrittlement revealed by impact testing, the base metal exhibited excellent creep ductility at operating temperature, unlike the	Ernest N. Morial Convention Center- New Orleans

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Monday,4 :5p.m. to 4 :30p.m.	On-Line, Real-Time Corrosion Monitoring Techniques Under Co2 - Brine Environment – Comparative Study	Hui Li, Jie He, Kwei Meng Yap, Kus Slawomir, Sridhar Srinivasan - Injection water/brine handling systems are important elements of the oil & gas field operations. Considering carbon steel as default material of construction for water/brine handling pipelines, a rapid determination of steels' corrosion is the key-element of the oil & gas field's integrity management. Daily, weekly or monthly- corrosion rate quantification with weight-loss coupons or permanent/periodic Ultrasonic Thickness (UT) measurements cannot provide measurements that can be correlated to process upsets. Real time monitoring is achievable through new technologies, including high resolution electrical resistance (ER) technology and multiple electrochemical methods such as Linear Polarization Resistance (LPR) or Electrochemical Noise (ECN) provide capabilities for corrosion monitoring in the matter of hours, minutes or seconds. ER technology depends on physical destruction of the sensing element. Simple corre	Ernest N. Morial Convention Center- New Orleans

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Monday,4 :5p.m. to 4 :30p.m.	Cathodic Protection of Stainless Steel 316L Rotating Screens on Seawater Intake Structures	John Norris, Rod Callon - Reinforced concrete seawater intake structures are a critical component to enable continuous operation of power stations, desalination plants, petrochemical plants and other heavy industries located near to the coast. The primary objective of these structures is to supply a reliable quantity of clean seawater, which can be used as per plant or refinery requirements. For continuous operation, seawater intake structures require protective screens to prevent debris and marine life entering and damaging the pumps. These screens are often manufactured from stainless steel 316L, however within the Middle East this grade of stainless alone is considered insufficient to provide long term corrosion resistance. To overcome this problem, Cathodic Protection systems are utilised to protect the submerged sections of these screens with the aim of extending the life of the stainless steel equipment. This paper will focus on the various design parameters required fo	Ernest N. Morial Convention Center-New Orleans

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Monday,4 :15p.m. to 4 :40p.m.	Continuous Monitoring Delivers Insight on Corrosion Caused by Changing Sulphur Content Crudes	Ruth Wardman, Christiane Lederer, Kevin Clarke - Recent advances in processing of data from continuous corrosion monitoring systems that delivers insights into corrosion events in the crude unit caused by changing sulphur content crudes at a European refinery A European refiner has installed several hundred wireless wall-thickness monitoring sensors in their crude and vacuum distillation units. This system delivers the continuous wall thickness measurements to the corrosion engineer’s desk so that corrosion events are detected and monitored in real time while the process units are in operation. Recent advances in processing, visualisation and analysis of the data delivered by the corrosion monitoring system have afforded previously unavailable insights into when, where and why corrosion has occurred in the refinery’s process units. In particular, the additional insights delivered has enabled this refiner to correlate very small changes to the internal surface condition – the o	Ernest N. Morial Convention Center-New Orleans

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Monday,4 :30p.m. to 4 :30p.m.	Protection of Deep Sea Steel Structures Using Thermally Sprayed Aluminium	Shiladitya Paul - Thermally sprayed aluminium (TSA) has been used in offshore applications for decades. Their effectiveness in mitigating corrosion of steel structures in presence of seawater has been proven over the years. However, very little work is reported on the performance of TSA when damaged. Furthermore, data on the performance of damaged TSA in deep sea is virtually non-existent. The paper addresses these knowledge gaps and reports the corrosion performance of damaged TSA in a simulated deep sea environment. Holidays amounting to 3% of the sample area were drilled to expose the underlying carbon steel and the sample was exposed to synthetic seawater at 5°C in an autoclave at 50MPa to simulate 5000m of water pressure. After testing, examination of the sample revealed the formation of calcareous deposit on the exposed steel surface with no visible steel corrosion product. Detailed microstructural characterisation of the calcareous deposit confirmed the formation of prot	Ernest N. Morial Convention Center-New Orleans

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Monday,4 :40p.m. to 5 :5p.m.	Non-Intrusive Ultrasonic Corrosion-Rate Measurement in Lieu of Manual and Intrusive Methods	Steve Strachan - Recent technological advances in precision, fully-digital ultrasonic wall-thickness measurement systems coupled with IoT (Internet of Things) back-haul data communication schemes are enabling accurate and more cost-effective corrosion monitoring systems that can compete with older and more traditional methods. Comparisons show improved data accuracy of permanently-installed sensors in lieu of larger quantities of manually-taken spot data is presented. This paper will include the design principles used in the creation of this next-generation platform, end-user input used to refine the design and recent installation and operational experiences.	Ernest N. Morial Convention Center-New Orleans

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Monday,4 :40p.m. to 5 :5p.m.	Deployment of Cellular-Based UT Corrosion Monitoring for Refining and Petrochemical Facilities	Steve Strachan, Dr. James Barshinger, Mike Nugent, Sean Lynch - Recent technological advances in precision, fully-digital ultrasonic wall-thickness measurement systems coupled with cellular back-haul data communication protocols are enabling very accurate, easily deployable and more cost-effective corrosion monitoring systems that can compete with traditional manual NDT methods. Comparisons of the improved data accuracy of installed sensors in lieu of larger quantities of manual spot data are presented. Also, areas of episodic high corrosion rates can be measured and correlated with the calendar time and temperature data of the event. These have been installed in temperatures up to 500□C (932□F). This paper will include the design principles used in the creation of this next-generation platform, end-user input used to refine the design and recent installation and operational experiences.	Ernest N. Morial Convention Center-New Orleans

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Monday,5 :5p.m. to 5 :30p.m.	Steel Corrosion Monitoring in Concrete Slab Using a Long Period Fiber Grating Assembly	Fujian Tang, Yizheng Chen - Steel corrosion in concrete structures is a slow process that usually takes several years to a degree that induces concrete cover cracking, and the corrosion amount or the penetration depth is hard to detect due to the presence of concrete cover. Long period fiber grating (LPFG) couples incident light from propagating core mode to co-propagating cladding mode, producing a series of attenuation bands of transmission spectrum. The resonant wavelength of the spectral attenuation bands is closely related to the effective refractive index of the medium surrounding the fiber gratings. As the chemicals in the surrounding medium change, the resonant wavelength is shifted. Therefore, it is widely used for physical, chemical and biochemical sensing. In this study a corrosion sensing assembly to monitor steel bar corrosion in concrete slab based on the LPFG sensing principle is proposed and its performance is experimentally investigated. The assembly was made by	Ernest N. Morial Convention Center-New Orleans

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Monday,5 :30p.m. to 5 :55p.m.	[Safe Processing of Naphthenic Acid Opportunity Crudes Using Chemical Inhibition and Online Monitorin]	Ruth Wardman, Tom Champlin, Kevin Clarke, Sam Lordo - Safe processing of Naphthenic acid opportunity crudes using a combination of chemical corrosion inhibition and online continuous corrosion monitoring. Continuing economic pressures on the refining industry are forcing more refiners to evaluate the possibilities of processing lower priced, opportunity naphthenic acid crudes in order to improve margins. The processing of naphthenic acid crudes introduces significant challenges to the refiner, with the risk of high temperature naphthenic acid corrosion being one of the primary concerns. If refiners are to take full advantage of these discounted opportunity crudes, these challenges need to be addressed in order to avoid margin attrition caused by decreased equipment reliability and run length. Refiners must assess, monitor and mitigate naphthenic acid corrosion and other processing impacts associated with these crudes. One of the most critical aspects of this risk management m	Ernest N. Morial Convention Center- New Orleans

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Tuesday,8 a.m. to 8 :25a.m.	Using Ultrasonic Technique to Determine Fitness for Service of FRP Equipment for Chemical Handling A	Pradip Khaladkar - Fiberglass reinforced plastic materials are well suited to a wide variety of chemical handling equipment where resistance to corrosion is required. A significant impediment to adoption of these materials for many suitable applications lies with the inability to do a fitness for service determination after the equipment and piping have been in service. This is largely due to the lack of effective non-destructive and non-intrusive techniques for plastic materials. This paper presents a case study of a fiberglass reinforced plastic scrubber which was evaluated with a novel ultrasonic technique followed by a destructive evaluation for retained mechanical properties. The results were compared which indicated a good correlation. Although the FRP unit was already discarded this study indicated that significant life had still remained.	Ernest N. Morial Convention Center-New Orleans

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Tuesday,8 a.m. to 8 :25a.m.	Developing and Managing a Coatings & Linings Program in an Electric Utility	Steve Poncio - Maintenance Coatings Programs have all but disappeared today as a recognized way of saving money in most industries. With the budgetary constraints now facing the industry, Electric Utility Companies should adopt a long-term, coatings maintenance program to effectively utilize each dollar spent on coating of Power Generating Facilities, Substation Structures/Equipment and Transmission Structures. Owners of Electrical facilities can reduce the overall cost of maintenance painting projects through the implementation of a Total Quality Program. The information presented should help Utility Personnel develop a Maintenance Coating Program which should encompass cost justification for projects, pre-planning, evaluation of safety and quality assurance programs. This paper will combine elements from two papers previously presented at presented at NACE Conferences that can help prioritize and cost justify a Maintenance Coating Program. Keywords: maintenance painting,	Ernest N. Morial Convention Center-New Orleans

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Tuesday,8 a.m. to 8 :25a.m.	Effect of CP on the Occurrence of SCC in X80 and X100 Pipe Steels in a Near-Neutral pH Environment	Li Yan, Jean-Philippe Gravel, Luyao Xu, Jidong Kang, Muhammad Arafin - Cathodic protection (CP) in conjunction with coating is generally recognized as the most effective mitigation method for pipeline external corrosion and stress corrosion cracking (SCC). However, if not designed properly for a given pipeline system, the applied CP can cause detrimental effects instead such as coating disbondment leading to corrosion and SCC, hydrogen induced cracking (HIC) or hydrogen embrittlement in general. It has been recognized that modern high-strength pipeline steels can be more susceptible to hydrogen embrittlement or related environment assisted cracking such as near-neutral pH SCC compared to their low-strength steels counterparts. However, the role of CP in the prevention or facilitation of such cracking is still not clear. The objective of this study is to examine the effect of CP on the initiation and propagation of SCC in two different high strength pipe steels, namely X80 and X	Ernest N. Morial Convention Center-New Orleans

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Tuesday,8 a.m. to 8 :25a.m.	Effect of Acetic Acid on Sour Corrosion of Carbon Steel	Jon Kvarekval - An experimental study of corrosion of carbon steel in the presence of H2S, CO2 and acetic acid has been carried out. H2S and CO2 partial pressures up to 10 bar each were applied, with temperatures of 25 and 90 deg C. The test solutions consisted of high-salinity brine (100 g/L NaCl, 150 ppm bicarbonate) and low-salinity condensed water (0.1 g/L NaCl). The duration of the tests was around 14 days. Both weight loss corrosion and localized corrosion data were obtained. The entire surfaces of the exposed coupons were scanned with a 3D profilometer, obtaining detailed data on localized corrosion morphology, pit frequency and pit depths. The results are discussed on the background of previous findings and available literature.	Ernest N. Morial Convention Center-New Orleans

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Tuesday,8 a.m. to 8 :25a.m.	Qualification and Application of Ultrasonic Technology for Power Plant Component Fouling Control	Charles Marks, Marc Kreider, Jean Collin, Joshua Luszcz - Initial operation of a wiped-film evaporator used in a power plant installation for waste processing led to high levels of fouling with calcium-containing particulates on various components inside the evaporator. These fouling deposits cause reductions in evaporator thermal efficiency and availability and an increased risk of personnel contamination with airborne particles during periodic maintenance activities. Initial attempts to remove these deposits using water-jet and manual cleaning were very labor intensive. As an alternative, the authors developed two customized, complementary cleaning systems based on the use of ultrasonic technology to remotely remove the fouling deposits. The first system, consisting of multiple ultrasonic transducers mounted on the exterior of the evaporator shell, is designed to operate continuously online during evaporator operation (limiting deposit buildup in a critical location within	Ernest N. Morial Convention Center-New Orleans

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Tuesday,8 a.m. to 8 :25a.m.	Correlation of Inline and Aboveground Integrity Data for Comprehensive Pipeline Integrity Management	Chukwuma Onuoha, Shamus McDonnell, Lloyd Oscar de Guzman, Robert Lennox, Eric Pozniak, Greg Zinter, Parth Iyer, Yoko Nakazato, Corina Blaga - Direct Assessment (DA), Inline Inspection (ILI) and hydrostatic testing (HT) are primary inspection tools acknowledged globally as approved pipeline integrity inspection techniques. These techniques have their merits and demerits, and each reflects a different, unique aspect of the overall integrity of the pipeline. Therefore, an integrated approach that would combine ILI and DA techniques would provide comprehensive pipeline integrity management program for pipeline operators. This paper will provide comprehensive correlation of inline and aboveground pipeline integrity data geared at ensuring overall pipeline integrity management program. ILI tools are designed to inspect the conditions of the pipeline wall with limited disruption to operations. These tools are used to identity and quantify the risk of corrosion, dents and cracks. However,	Ernest N. Morial Convention Center-New Orleans

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Tuesday,8 a.m. to 8 :25a.m.	Reinforced Concrete Corrosion Damage Forecast with Potential Dependent Threshold: Sensitivity to Sys	Andrea Sanchez, Alberto Sagues, Michael T. Walsh - The potential of passive steel embedded in concrete is a key parameter on the value of the chloride corrosion threshold. The phenomenon of a potential-dependent chloride threshold (PDT) together with corrosion macrocell coupling between active and passive steel assembly components needs consideration in corrosion forecast models for reinforced concrete structures in marine service. Initial deterministic corrosion initiation-propagation models incorporating PDT projected much lower damage development in an aged system than when using the traditional potential-independent chloride threshold (PIT) assumption. In contrast, for early stages of corrosion damage the relative effect tended to be in the opposite direction. These diverse outcomes are explained by the interplay between delayed corrosion initiation and concentration of corrosion when it is localized. An expansion of that PDT forecast model case is presented here using advanc	Ernest N. Morial Convention Center-New Orleans

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Tuesday,8 a.m. to 8 :25a.m.	Inspection and Mitigation of Underground Corrosion at Anchor Shafts of Telecommunication Towers	Peyman Taheri Bonab, Abraham Mansouri, Mehrooz Zamanzadeh, Nitesh Ahuja, Badia Bachour - Radio towers support antennas for telecommunication and broadcasting applications. In addition to radio and television broadcasting, nowadays, radio towers enable millions or users around the world to connect via cellular networks, satellites, and two-way radios. In fact, wireless communication has become an essential part of networking for businesses, police, firefighters, ambulances, air navigation and national defense systems. Structural integrity of telecom transmission towers is the key to ensure reliable radio-communication; nonetheless, these towers are constantly under corrosion attack. Many tower facilities are coming of age and corrosion problem is now becoming an industry issue. Among different types of telecommunication towers, guyed towers are the focus of this study, owing to their popularity and vulnerability to corrosion. Guyed towers are held upright by a series of guy wire	Ernest N. Morial Convention Center-New Orleans	
Tuesday,8 a.m. to 11 a.m.	Achieving Intended Service Life; Corrosion Control Strategies for Reinforced Concrete Structures (2)	This symposium includes technical papers regarding construction practice, methods analyses, or other technical information related to achieving intended service lives for concrete structures. Sponsoring Committee: TEG 053X Chair: Andrea Sanchez Vice Chair: Doug Leng	Ernest N. Morial Convention Center-New Orleans	Room 210

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Tuesday,8 a.m. to 12 a.m.	Corrosion Solutions for the Chemical Process Industry with Polymer Based Materials	This symposium includes technical papers to discuss successful use of polymer based materials in chemical processing application and aggressive chemical environments. Case histories are encouraged. Sponsoring Committee: TEG 191X Chair: Kira Kaleps Vice Chair: Michael Stevens	Ernest N. Morial Convention Center-New Orleans	Room 228
Tuesday,8 a.m. to 5 p.m.	Environmental Assisted Cracking (Day 1)	This symposium includes technical papers related to understanding of all kinds of EAC mechanisms including but not limited to hydrogen embrittlement, stress corrosion cracking, corrosion fatigue, liquid metal embrittlement, and so on. The papers can cover root cause failure analysis in service, lab testing methods, materials modeling, industry standards development, state of art EAC research reviews, and so on. Sponsoring Committee: TEG 186X Chair: Xi Shan Vice Chair: Fei Tang	Ernest N. Morial Convention Center-New Orleans	Room 223
Tuesday,8 a.m. to 5 p.m.	Water Treatment Vs. The Economics Associated with Risk and Reliability	This symposium includes technical papers associated with the following areas of interest, mitigation of corrosion and fueling, best practices, new chemistries / new equipment for corrosion and fouling control, failures / failure analysis, chemical cleaning and core histories / studies, all associated with water from pretreatment to the end use and discharge (i.e. wastewater). Sponsoring Committee: STG 11 Chair: Claudia Pierce Vice Chair: Tony Selby	Ernest N. Morial Convention Center-New Orleans	Room 224
Tuesday,8 a.m. to 5 p.m.	Anodic & Cathodic Protection (Day 2)	This symposium includes technical papers about oil, gas and water and anodic and cathodic protection. Sponsoring Committee: STG 05 Chair: David Kroon Vice Chair: TBD	Ernest N. Morial Convention Center-New Orleans	R-01

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Tuesday,8 a.m. to 5 p.m.	Power Industry Corrosion	This symposium includes technical papers related to corrosion causes, issues, studies, experiences, and/or management practices, including coatings, on steel structures and their related components in the Power Industry. Exposures include below grade, transition zone and atmospheric corrosion of weathering, galvanized and other coated steel structures. Sponsoring Committee: STG 41 Chair: Jon H. Brasher Vice Chair: Graig Cilluffo	Ernest N. Morial Convention Center-New Orleans	R-02
Tuesday,8 a.m. to 5 p.m.	Sour Gas Corrosion	This symposium includes technical papers on sour gas corrosion in oil and gas production. Sponsoring Committee: TEG 282X Chair: Hejian Sun Vice Chair: Sandra Hernandez	Ernest N. Morial Convention Center-New Orleans	R-04
Tuesday,8 a.m. to 5 p.m.	Pipeline Integrity (Day 2)	This symposium includes technical papers on pipeline integrity topics such as inline inspection, direct assessment, internal corrosion, fitness for service, etc. Sponsoring Committee: TEG 267X Chair: Harry Tsaprailis Vice Chair: Bryan Melan	Ernest N. Morial Convention Center-New Orleans	R-05

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Tuesday,8 :25a.m. to 8 :50a.m.	Monitoring, Evaluating, and Control of Corrosion and Scaling in Higher Pressure Industrial Boilers	John Kelly - Boiler treatment chemistry has been shown to be critical in maintaining clean heat transfer surfaces and minimizing corrosion in higher pressure industrial boilers. Monitoring corrosion using hydrogen analysis has been shown to be the superior procedure for decades. Minimizing boiler feed water contamination from condensate leakage and upsets is also a critical paramenter required to maintain chemistry parameters necessary to promote passivation and clean heat transfer surfaces. Hydrogen analysis has also been shown to detect FAC and subsequently monitr corrective procedures.	Ernest N. Morial Convention Center-New Orleans

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Tuesday,8 :25a.m. to 8 :50a.m.	The Role of Pyrite in Localized Corrosion of Mild Steel	Jing Ning, Yougui Zheng, Bruce Brown, Srdjan Nesic - Localized corrosion in sour fields is a challenge persisting in the oil and gas industry since it has frequently been seen as a cause for catastrophic failures of upstream pipelines. However, compared to H2S general corrosion, there is minimal understanding of H2S localized corrosion. Mechanisms of H2S localized corrosion are unclear and the causes of H2S localized corrosion are uncertain. Therefore, seeking an experimental condition in the laboratory that can replicate localized corrosion in a sour environment is critical to understand mechanisms of localized corrosion. In the previous study, a strong correlation between the formation of greigite and/or pyrite and onset of localized corrosion was observed. Consequently, the formation of greigite and/or pyrite was hypothesized to play an important role in the initiation of localized corrosion. Novel experiments involving deposition of pyrite on the steel surface were then desig	Ernest N. Morial Convention Center- New Orleans

Tuesday,8 :25a.m. to 8 :50a.m.	Severe Under-Deposit Corrosion Inducing Hydrogen Embrittlment in Water Wall Tubes	Abdelkader Meroufel, Mohammed Al Hajri, Ali Al-Sahari, Mahdi Dewan - Water wall tubes from boiler operating since 14 years were subject repeated failures ranging from pinhole to cracks and ruptures. A failure analysis was carried out including non-destructive and destructive tests on received tubes. Feedwater, drum water and live steam qualities were evaluated based on plant authority provided data. The results obtained through this study indicate a mechanism of caustic gouging inducing hydrogen Embritlment. The root causes determined were improper carryover control, and waterlines creation by low flow and/or high blowdown rate. Therefore, it was recommended to conduct a total inspection of the boiler to determine the extent of damage. As preventive maintenance, a more strict control of the carryover is necessary through the monitoring of sodium/phosphate ratio, reduction in the oxygen allowed level, fixation of the chemical boiler treatment dozing problems.	Ernest N. Morial Convention Center-New Orleans

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Tuesday,8 :25a.m. to 8 :50a.m.	Study on the Mechanism and Influencing Factors of High Voltage Direct Current Interference	Zitao Jiang, Yanxia Du, Xiuyun Wang, Caigang Ge, Guofei Cao, Qinglin Gu - While the high voltage direct current (HVDC) system runs in monopole-ground mode, thousands of amperes direct current will flow into earth through its earth electrode. This current may cause serious interference on buried pipeline even though it is far away from the earth electrode. Field testing results indicate that this interference may arrive beyond one hundred kilometers, and induce hundreds of volt interference potential on the pipeline. In this work, numerical simulation were used to study the mechanism of HVDC interference and analyze influencing factors. The results indicated that while a large direct current flowed into the soil, it could create a strong electric field and induce serious interference on the pipeline. In addition, influencing factors study indicated that the better the pipeline coating was, the higher interference the pipeline suffered from. Soil structure and soil resistivity ha	Ernest N. Morial Convention Center-New Orleans
Tuesday,8 :25a.m. to 8 :50a.m.	Non-Metallic Piping Systems for Corrosive Fluid Processing	Joe Beaumont - Presentation broadly covers all avaible non-metallic material options for piping systems handling corrosive fluids. It will describe thermoplastic, thermoset composite, thermoplastic-lined steel, thermoplasitc lined composite piping. Corrosion/environmental resistance, thermal expansion, temperature/pressure limits, acquisition cost are referenced properties. Each has unique characteristics that end users should be aware of when making their piping material selections.	Ernest N. Morial Convention Center-New Orleans

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Tuesday,8 :25a.m. to 8 :50a.m.	Review of Cathodic Protection Systems for Concrete Structures in Australia	Atef Cheaitani - Impressed current cathodic protection (CP) for reinforced concrete structures is a proven technology which can provide long term corrosion prevention for marine structures if properly designed and installed. This technology has been applied to large a number of concrete structures in Australia over the past 30 years and it is the technology of choice for many asset owners for the protection of structures susceptible to chloride induced corrosion. While this technology has proven to be highly effective in providing corrosion protection to embedded steel reinforcement, in some cases, the maintenance and monitoring costs have been relatively high and this is often due to defects during the design and construction stage of the system. The review of performance of many operating CP systems in Australia has led to the conclusion that there are many areas of improvement which can be implemented to optimise the long term performance of impressed current CP systems. The	Ernest N. Morial Convention Center-New Orleans

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Tuesday,8 :25a.m. to 8 :50a.m.	Detecting Hidden Integrity Threats Using CP Current In-Line Inspection Tools	David Williams - Hidden Integrity threats that go undetected can result in compromised cathodic protection that may lead to pipeline leaks. This paper will discuss three hidden integrity threats that were discovered using an in-line pipeline inspection tool designed to measure cathodic protection current movement along the line. Conventional above grade cathodic protection survey methods failed to detect potentially serious issues on three pipeline systems. The current measurement in-line inspection process, data analysis and findings will be discussed for three separate pipeline projects where conventional above grade cathodic protection testing methodologies failed to locate the threats hidden on the pipelines.	Ernest N. Morial Convention Center-New Orleans

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Tuesday,8 :25a.m. to 8 :50a.m.	Chemical and Electrical Stability of Reference Electrodes in Sand Bed Dosed with Volatile Corrosion	Pavan Shukla, Len Krissa, Jerry Dewitt, Andrew Nordquist - Various types of reference cells including Copper-Copper Sulfate (Cu/CuSO4) are widely used to monitor the structure to electrolyte potential of above-ground storage tank bottoms. Specifically, the reference electrodes are used to measure native, “ON” and “OFF” potentials. Reference electrodes intended for long-term monitoring are placed under the tank bottom and cannot practically be retrieved or replaced. Dependability of the reference electrodes is therefore of paramount importance since electrical and chemical instabilities would lead to erroneous potential measurements and contamination respectively. A preliminary study of the effect a volatile corrosion inhibitor (VCIs) containing environment has on electrode stability has suggested that the reference cells could be influenced from VCI exposure. This work was conducted to diligently evaluate chemical and electrical stability of commercially available referenc	Ernest N. Morial Convention Center-New Orleans

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Tuesday,8 :50a.m. to 9 :15a.m.	Custom Fiberglass Reinforced Plastic Piping (FRP) Proof of Design Testing	Tony Zacharewych - FRP pipe systems that are designed to meet rigid specifications should be tested to prove that they will perform accordingly. FRP pipe systems are used for severe corrosive and erosive process streams and customers need peace of mind in knowing their design has been properly validated. ASME B31.1 “Power Piping” references ASTM D6041 that is a standard specification for contact molded pipe and fittings, and includes requirements for materials, design, and proof testing. Testing a typical fitting such as an elbow or reducer would involve pressure testing with ambient temperature water to four times the rated pressure for one hour without leakage. This paper will review what is required by ASTM D6041 as well as give an overview of our recent program to develop and proof test 290 psi (20 Bar) pipe, fittings, flanges, and laminated joints. - Tony Zacharewych P.Eng	Ernest N. Morial Convention Center-New Orleans

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Tuesday,8 :50a.m. to 9 :15a.m.	An Approach to Detect Steel Corrosion in Concrete Using Global Strain Measurement	Dewan Hossain, David Garber, Kingsley Lau - Premature strength deterioration of concrete structures caused by steel reinforcement corrosion is a concern. The presented work represents results from an experimental investigation involving testing of small scale reinforced concrete and prestressed concrete beams to correlate steel corrosion to global strain changes in the beam. Concrete beams (4inch x 4inch x 15inch) with reinforced and prestressed wire were used in aggressive corrosion environment to accelerate steel cross-section loss. Electrochemical polarization techniques was used to control and measure steel corrosion activity. The mechanical performance of the beam initially loaded in flexure considered linear elastic behavior, but testing to beam failure was also conducted. The strain profile of the loaded corroding beam was monitored by surface strain gauges at the extreme fiber and intermediate beam depths. The test results obtained from the experimental work were furthe	Ernest N. Morial Convention Center-New Orleans

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Tuesday,8 :50a.m. to 9 :15a.m.	Investigation of Hydrogen Embrittlement of High Strength Pipeline Steels Under Cathodic Protection	Lei Zhang - With the more widely application of pipeline steels higher than API X80 grade, the hydrogen embrittlement risk induced by negative cathodic polarization and hydrogen evolution effect under cathodic protection has been recognized. Since the strengthening of pipeline steel might significantly increase the hydrogen cracking sensitivity, more understandings on the different criteria of cathodic protection potential or current density compared with those of traditional pipeline steels are requried. This paper focuses on the hydrogen embrittlement behavior of API X70, X80 and X90 high strength pipeline steel under cathodic protection in soil simulation conditions. The uptake and diffusion of hydrogen in the steels under different cathodic protection level were analyzed by hydrogen permeation test and hydrogen content measurement. Slow strain rate testing (SSRT) under cathodic conditions as well as mechanical performance degradation testing after long term immersion were e	Ernest N. Morial Convention Center-New Orleans

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Tuesday,8 :50a.m. to 9 :15a.m.	Effect of Carbon Dioxide and Hydrogen Sulfide on the Localized Corrosion Susceptibility of Corrosion	Teresa Perez - Corrosion resistant alloys (CRA) and carbon and low alloyed steels used in the upstream oil and gas industry may be susceptible to localized corrosion. Several variables control the occurrence of localized corrosion in CRAs, including alloy composition, heat treatment and environmental effects such as temperature, chloride and other chemical species. Regarding carbon and low alloyed steels, it is recognized that even small concentrations of H2S can have an important effect on general corrosion rate when compared to environments where CO2 controlled the corrosion phenomenon. However, there are still a number of unknowns about the effect of H2S on pitting, which is the most common mode of sour service failure. The purpose of this review is to discuss the environmental effects, especially of hydrogen sulfide and carbon dioxide on pitting susceptibility of CRAs and low alloyed steels.	Ernest N. Morial Convention Center-New Orleans

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Tuesday,8 :50a.m. to 9 :15a.m.

Corrosion Protection Enhancement by the Use of Polymers

John Richardson -
Scale deposition on heat transfer surfaces can seriously affect steam generation in modern boilers. Deposits can lead to a loss of efficiency, serious corrosion, short and long term overheating problems, and ultimately tube failures. Plant profitability and production losses generally cannot be recovered when tube failures occur. Production losses resulting from reduced steam capacity are far greater than the actual repair and maintenance costs incurred during the shutdown. The major problems associated with deposits and scale are corrosion and overheating. Control of iron oxide deposits by using specific polymers is key to maintaining clean heat transfer surfaces and generating passive films within an industrial boiler. This paper will focus on mechanisms that jusitfy this application.

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Tuesday,8 :50a.m. to 9 :15a.m.	Effect of Trench Breaker Foams on Pipeline Cathodic Protection	Sujay Math, David Kroon, Dale Lindemuth, Rick Kimpel - Trench breaker foaming systems are temporary or permanent barriers installed in pipe trenches at regular intervals to prevent trench collapse. The ability of the foaming systems to conduct or shield cathodic protection current has not been extensively studied. Investigations were conducted on trench breaker foams to understand the ability of the foaming systems to conduct cathodic protection (CP) current on an underground pipeline. Two different types of foams, open cell (low density) and closed cell (high density), were used. The testing was conducted on two FBE-coated pipelines buried in a trench with various foaming system combinations applied as breakers. Coating defects (holidays) were created at known locations on the pipeline by disrupting the coating; reference electrodes and electrical resistance (ER) probes were installed at the coating defect locations. Trench breaker foams were sprayed to embed the holidays, refer	Ernest N. Morial Convention Center- New Orleans

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Tuesday,8 :50a.m. to 9 :15a.m.	Penetration of Cathodic Protection into Pipeline Coating Disbondment	Li Yan, Jean-Philippe Gravel - The most effective method to mitigate corrosion on the external surface of a buried pipeline is to utilize a protective coating supplemented by cathodic protection (CP). Ideally, these two systems work together so that if the coating disbonds or has defects allowing ground water solution to contact the pipe steel surface the CP system will continue to function to protect the pipeline. However, the success of this approach greatly depends on the nature of coating failures. CP can only provide corrosion protection to the pipe with coating failures if sufficient CP current is able to reach the exposed pipe steel. For instance, if CP current can penetrate into a coating disbondment, then corrosion related damages may be prevented. Otherwise, the exposed pipe steel could be susceptible to corrosion and environmentally assisted cracking. Due to this very reason, disbondment of pipe coatings, especially, coatings with high impedances is considered to be	Ernest N. Morial Convention Center-New Orleans

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Tuesday,8 :50a.m. to 9 :15a.m.	Uncertainty in Service Life Estimation and Need for a Probabilistic Approach	Sumanth Cheruku - Service life estimate presents the owner with an outline of when the structure would require a corrosion related repair. This provides an owner with an option to prepare a budget plan to support future repairs and its acceptance in the industry is essential. Present service life estimates include a single value (usually the number of years) with rarely considering the uncertainty associated with each parameter in the estimation process. The exclusion of this uncertainty induces a chance for early failure, which is a more critical case, leading to the owner hustling to accommodate the budget for early repair. The paper intends to walk through the service life estimation process for chloride-induced corrosion in reinforced concrete structures highlighting the uncertainty associated with each parameter including the use of closed-form solution for Fick's Law, ASTM process for estimation of diffusion coefficient, the influence of new reinforcing steel and new adm	Ernest N. Morial Convention Center-New Orleans

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Tuesday,9 :15a.m. to 9 :40a.m.

An Integrated Approach to Optimizing Corrosion Control for Refinery Process and Boiler Systems

Gregg Robinson, Trevor dale - Abstract

Treating steam condensate systems with neutralizing and filming amines has been commonplace in industry for several decades. Refinery steam and condensate systems are often considered “tough to treat” due to their complex configuration and uses of the steam – direct injection in furnaces and distillation towers, flash-steam reboilers, high alkalinity make-up water sources, multiple opportunities to introduce hydrocarbon contaminants, and several other factors – requiring extra attention to maintain good system protection while minimizing impact on the process. Specifically, improper selection and application of steam neutralizing amines can contribute to salt-induced fouling and corrosion in crude overhead systems. In response, technology development in the areas of amine performance modelling, neutralizing amine selection, and the use of volatile filming corrosion inhibitors facilitates steam system protection and avoids process syste

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Tuesday,9 :15a.m. to 9 :40a.m.	Corrosion and Corrosion Products in a Sour Environment from 80°C to 200°C	Shujun Gao, Srdjan Nesic, David Young, Peng Jin, Bruce Brown, Marc Singer - The objective of this work was to determine the corrosion rate of mild steel and characterize the corrosion products in sour environments at temperature ranging from 80°C to 200°C. First, a H_2S-H_2O water chemistry model was developed based on available literature for a closed system at high temperature. Then, H_2S corrosion tests were conducted at 80°C, 120°C, 160°C and 200°C with an exposure time of 4 days. Linear polarization resistance (LPR) and weight loss (WL) methods were used to measure the corrosion rates. X-ray diffraction (XRD) and scanning electron microscopy with X-ray microanalysis (SEM/EDS) were employed to characterize the corrosion products and surface morphology. The results show that the initial corrosion rates increased with temperature while the steady-state corrosion rates decreased with temperature. The corrosion product was comprised of two distinct layers. The inner corrosion prod	Ernest N. Morial Convention Center-New Orleans

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Tuesday,9 :15a.m. to 9 :40a.m.	Role of Hydrogen in Intergranular Corrosion of AA2024 Aluminium Alloy: An AFM-KFM Study	Christine BLANC, Marie-Laetitia de BONFILS-LAHOVARY, Cedric Charvillat, Lydia LAFFONT, Manon Lafouresse - Hydrogen embrittlement is suspected to play a major role in the corrosion of aluminium alloys. This work aims at determining the influence of hydrogen on the corrosion damage of AA2024 aluminium alloy, a commonly used alloy in aeronautics. A powerful way to study hydrogen embrittlement at a local scale is by combining atomic force microscope and Kelvin probe force microscope (AFM-KFM). This technique by measuring the surface potential at the nanometer scale allows the detection and localization of hydrogen in the alloy. Firstly AFM-KFM measurements were taken on model materials containing a controlled quantity of hydrogen. Hydrogen was inserted into AA2024 alloy via cathodic charging in H2SO4 through one of the short transverse (ST)/ long transverse (LT) sides. AFM-KFM images taken on the side perpendicular (ST/rolling direction (RD)) revealed a surface potential gradient o	Ernest N. Morial Convention Center- New Orleans

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Tuesday,9 :15a.m. to 9 :40a.m.	Challenging the Performance Myth of Inorganic Zinc Rich vs Organic Zinc Rich Primers	Antoni Prieto, Raquel Morales Roset, Jose Luna - Challenging the Performance Myth of Inorganic Zinc Rich vs Organic Zinc Rich Primers Abstract Zinc rich primer coatings, both organic and inorganic, are extensively used in highly corrosive environments and they are part of a high performance coating system in the Protective Coatings Industry. During the 60’s and the 70’s, zinc rich epoxy primers dominated the market. Later, zinc ethyl silicate primers took over this role, but nowadays it appears as if zinc epoxy primers have made a comeback. Some of the advantages of zinc epoxies compared to zinc silicates are the less demanding curing conditions (epoxies will cure at low humidity), they are easier to overcoat and they are less demanding to substrate preparation prior to application. Zinc epoxies are typically formulated with high loads of zinc dust also zinc epoxies are mechanically stronger meaning that in the real life over thickness is less problematic for new generation o	Ernest N. Morial Convention Center-New Orleans

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Tuesday,9 :25a.m. to 9 :50a.m.	Glassflake Composite Linings For Protection Of Oil Process Vessels and Process Pipework	Graham Greenwood-Sole - Glassflake Composite coating systems have proven track records of long term corrosion protection, even in aggressive service applications, with design and actual life for many applications being measured in decades rather than years. The paper will review of some of the changes which have occurred over recent years. Within process vessels a complex mixture of organic materials and acid gases, temperature, erosion and pressure can make corrosion protection a particular challenge. Vinylester glassflake materials have been used extensively for corrosion protection of oil process vessels. High performance linings are now also being used with carbon steel on many oil projects and offshore oil installations, as a cost effective alternative to stainless steel and super-duplex pipework. These include many environments containing high pressure, high temperatures and sour gas. This paper will review the successful long term track record of these materi	Ernest N. Morial Convention Center-New Orleans

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Tuesday,9 :25a.m. to 9 :50a.m.	Internal Corrosivity Assessment and Ranking of Crude Pipeline	Abdul Razzaq Al-Shamari, Shabbir Safri, Amer Jaragh, Surya Prakash, Akhil Jaithya - Kuwait Oil Company is the national organization responsible for exploration, production and exporting the crude oil for the State of Kuwait. As part of the Company's expansion to increase the production, the mileage of transfer and export crude pipelines along with other pipelines such as gas, condensate, and water have grown to approximately 6000 Km (3,730 miles) as of 2016 whereas the crude pipelines consist approximately 25% of the total length. Inline inspection (ILI) is one of the main assessment tools for piggable pipelines; however, it requires significant budget, resources, flow requirements, and time. As per the company's protocol, new crude pipelines are generally due for ILI after ten (10) years of service unless it is suspected for high internal corrosion indications detected by the online internal corrosion monitoring or sampling analyses. The present paper will discuss on the effec	Ernest N. Morial Convention Center-New Orleans

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Tuesday,9 :25a.m. to 9 :50a.m.	Pipeline New Construction Challenges	Eric Langelund -	Ernest N. Morial Convention Center- New Orleans

 PIPELINE NEW CONSTRUCTION CHALLENGES

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ABSTRACT

What does it take to install a new pipeline? Once the right-of-way is acquired and construction has commenced, what tasks are required to ensure a safe and successful pipeline installation with effective cathodic protection and AC mitigation?
Pipeline installation is accomplished with the efforts of multiple teams of personnel all of whom have their own duties and concerns. Safety, transportation, materials, equipment and construction are some of major parts to the installation of a pipeline.
As corrosion engineers we must work in all of these areas to ensure that test lead wires, bond cables, casing pipes, anode

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Tuesday,9 :50a.m. to 10 :15a.m.	Endurance Regression Testing: A Method to Replace ASTM D2992	David Granderson, Hannah Wright - After decades of use, it is becoming evident that the standard practice ASTM D2992 and referenced Standard test Method ASTM D1598 may not be producing the intended results. Like the current ASTM practices, the goal of “Endurance Regression testing” is to obtain the Hydrostatic Design Basis for “Fiberglass” (Glass Reinforced Thermosetting Resin Pipe, Fittings, and Joints). “Endurance Regression Testing” will similarly measure, plot, and extrapolate the long term hydrostatic strength (LTHS) of fiberglass components upon exposure to a controlled and constant set of aging condition. The constant aging condition is the primary departure from ASTM D2992 methods. The choice of long term aging conditions shall take into account that there exists critical thresholds that should not be exceeded if one plans to predict performance of a similarly undamaged fiberglass component. The tested components are intended to “Endure” a pre-determined maximum d	Ernest N. Morial Convention Center-New Orleans

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Tuesday,9 :50a.m. to 10 :15a.m.	Considerations for Repairing Live Piping Using Engineered Composite Repair Systems	Matt Green - Composite materials are being widely implemented in a variety of repair scenarios within refineries – domestically and around the world. What may go unrecognized, however, are the details behind proper usage of these highly beneficial materials. Industry standards, such as the ASME PCC-2: Repair of Pressure Equipment and Piping, have been developed and written specifically to cover and outline procedures for the safe and successful usage of Engineered Composite Repair (ECR) Systems in this “high risk” piping environment. While these standards cover many of the details regarding qualification, training, inspection, and other considerations associated with the ECR implementation process, there are an unlimited number of concerns when using them in a live, plant environment. The repair of non-leaking (Type A) and leaking (Type B) piping may both be accomplished by using an ECR system, however not only the design, but also the site requirements are considerably diffe	Ernest N. Morial Convention Center- New Orleans

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Tuesday,9 :50a.m. to 10 :15a.m.	Hydrogen-Enhanced Stress Corrosion Cracking in Stainless Steel	Baotong Lu, Jingli Luo - Effects of hydrogen on the stress corrosion cracking (SCC) behavior of 304 and 310 stainless steels under sustained load were investigated in boiling 42% $MgCl_2$ solution. The cracking was accelerated by the incorporation of hydrogen into the steel without altering the crack growth mechanism. The fact that the active dissolution is almost unaffected by the hydrogen charging and tensile stress indicates that the phenomenon of hydrogen-promoted SCC is unlikely a result of hydrogen-facilitated active dissolution. In contrast, hydrogen significantly promotes anodic dissolution in the potential range where the active-to-passive transition occurs. The electrochemical noise detected in the SCC process implies that the crack propagation process is discontinuous and hydrogen charging can raise the frequency of film breakdown at the crack tip. These observations imply that the hydrogen-promoted SCC may result from the hydrogen-induced passivity degradation.	Ernest N. Morial Convention Center-New Orleans

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Tuesday,9 :50a.m. to 10 :15a.m.	Iron Source in Sour Gas/Condensate Wells: Reservoir Fluids or Corrosion?	Giulia Verri - In order to implement an effective iron scale mitigation strategy, one of the key questions operators need to answer is “where does the iron come from?”. The problem is that establishing the main source of Fe2+ in higher temperature sour gas/condensate wells where iron sulphide and iron carbonate are formed is not a straight forward process. Many fields do not have a reliable formation water composition and the analysis of produced water often does not allow us to draw any conclusions when scale formation occurs in the well. This work describes a method to predict the maximum concentration of dissolved iron potentially present at equilibrium in a carbonate reservoir and to identify if iron deposits are formed from naturally occurring Fe2+ (in formation fluids) or solely from corrosion processes. The method uses PVT modelling to calculate the reservoir gas H2S and CO2 mole fraction and associated water carbonate and sulphide concentrations. This information is t	Ernest N. Morial Convention Center-New Orleans

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Tuesday,9 :50a.m. to 10 :15a.m.	The Facts and a Few Urban Legends Too Around Flow-accelerated Corrosion	Luis Carvalho - The incidence of flow-accelerated corrosion, commonly known as FAC, continues unabated throughout many industries. FAC failures, often catastrophic including the loss of life, are not limited to gas-fired combined-cycle power plants where many have occurred, especially in the past 20 years. It has also been reported extensively in other fossil fuel power plants, nuclear energy units as well as the hydrocarbon and chemical processing industries. FAC is a growing and insidious type of failure despite industry efforts to mitigate it. The author, an engineer who has over 20 years of first-hand experience with FAC, expands on the fundamentals of the current understanding of FAC and on the mechanisms of the various forms of this debilitating and costly type of corrosion using several real-world case studies. The paper discusses many of the key variables at play such as system hydrodynamics, materials of construction, and operating practices. Regrettably, some myth	Ernest N. Morial Convention Center-New Orleans

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Tuesday,9 :50a.m. to 10 :15a.m.	Root Cause Analysis of an Upstream Pipeline Failure Due to Multiple Operating Factors	Jenny Been, Evan Bloomfield - An upstream pipeline operator of a NPS 12, 22-year old liquid line experienced an unexpected failure due to internal corrosion only a short time after adding the production fluids of one additional well. A root cause analysis was conducted to discover the reasons for the high corrosion rates experienced after many years of operation, examining ILI records, operating pressures and temperatures, oil pressure / volume / temperature (PVT) data, possible flow regimes, failure analysis reports, and mitigation practices. The dominant corrosion mechanism was found to be carbon dioxide corrosion, which was supported by a change in gas to oil ratio (GOR) leading to the release of CO2 gas in response to pressure changes along the line in areas of relatively high pressure and temperature. Additional contributory factors included a high water cut with chloride concentrations, underdeposit corrosion underneath pipeline deposits and corrosion scale, and microbio	Ernest N. Morial Convention Center-New Orleans

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Tuesday,9 :50a.m. to 10 :15a.m.	Optimization of CP Design with Consideration of Temperature Variation for Offshore Structure	Min Sung Hong, Jin Ho Kim, KyungJin Park, Jong Hyun Hwang - Corrosion is known to be a main damage mechanism deteriorating the structural integrity of offshore structures. Cathodic protection (CP) has been used as a primary method to control the corrosion of metal in conjunction with organic coating. Recently, the importance of CP is being gradually highlighted with a demand for long lasting design life of offshore structure so that the long-term electrochemical performance of CP becomes a key concern to ensure the structural integrity. Design current density is one of the CP design parameters determining the total anode mass and the valid service life of CP systems, which is greatly influenced by temperature. However, it is hard to find studies dealing with the effect of temperature on the CP design. Although industrial standards (e.g. Class rule, NORSOK, NACE, and ISO) suggest guidelines for general CP design, they cannot provide quantitative information on the protection po	Ernest N. Morial Convention Center-New Orleans

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Tuesday,10 :15a.m. to 10 :40a.m.	Failures of Brass Components in Water and Steam Systems	James Dillon - Brass is a commonly used material in water and steam systems for tubing, fittings, fasteners, and various cast components. “Brass” is a generic term that refers to several different copper containing alloys. Perhaps the most common brass alloys that are used in water and steam systems are copper alloys that contain varying amounts of zinc. One particular zinc containing brass alloy, which has excellent corrosion resistance in a wide variety of different water chemistries is inhibited admiralty brass. This alloy has been used with great success in water cooled industrial heat exchangers and power plant surface condensers for many years. Other brass alloys have been used to construct components in water and steam systems that do not have the same composition and microstructure as admiralty brass. Of particular concern is the use of brass alloys containing high concentrations of zinc. These alloys tend to experience premature failures in large part due to the	Ernest N. Morial Convention Center-New Orleans

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Tuesday,10 :15a.m. to 10 :40a.m.	Electrochemical Model of Sour Corrosion of Mild Steel - Validation at High H2S Partial Pressures	Saba Navabzadeh Esmaeely, Bruce Brown, Srdjan Nesic - Hydrogen Sulfide (H2S) corrosion of mild steel is a serious concern in the oil and gas industry. However, H2S corrosion mechanisms, specifically at high partial pressures of H2S, have not been extensively studied because of experimental difficulties and associated safety issues. The current study was conducted under well-controlled conditions at H2S partial pressures of 0.5 and 0.96 bar. The pH range used was from pH 3.0 to pH 5.0, at temperatures of 30 and 80˚C, and with rotating cylinder speeds of 100 and 1000 rpm in short-term exposures lasting between 1.0 and 1.5 hours. The experimental results were compared with a recent mechanistic model of sour corrosion developed by Zheng, et al. (2014). This model was based on corrosion experiments conducted at low partial pressures of H2S (10-6 – 10-1 bar) and is applicable only to conditions where protective iron sulfide layers do not form. The validity of the model at higher parti	Ernest N. Morial Convention Center-New Orleans

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Tuesday,10 :15a.m. to 10 :40a.m.	Effect of Strain Rate on the Crack Growth Rate of 718 Under Cathodic Potentials	Thodla Ramgopal, Brandon Rollins - Crack growth rate (CGR) behavior of 718 was investigated in two different environments under cathodic potentials, i.e. 3.5wt% NaCl and 0.5M H2SO4. The crack growth rate behavior was investigated as function of displacement rate in both environments. The CGR in 3.5wt% NaCl at -1050mV SCE exhibited a plateau at various K-rates. The crack growth rate in 3.5wt% NaCl was a strong function of K-rate with higher K-rate resulting in higher crack growth rate. CGR measurements in sulfuric acid exhibit K dependence. The CGR exhibits a dependence on K-rate in sulfuric acid. CGR measured under constant displacement did give sustained CGR, which was substantially lower than the values measured under rising displacement. Constant K tests were performed to understand the separate out the effect of dK/dt form the K effect. The results of the constant K tests suggest that the CGR under constant K is significantly lower than under a positive dK/dt. The a	Ernest N. Morial Convention Center-New Orleans

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Tuesday,10 :15a.m. to 10 :40a.m.	Life Assessments of Steam Chests and Valve Casings at Four Fossil Fuel Thermal Power Units	Charles Marks, James Roll, Amanda Jenks, Jeffrey Gorman - Duke Energy’s Marshall and Allen Steam Stations are 4- and 5-unit stations, respectively, with current lifetimes of over 50 years each. Periodic inspections of the stop valve and control valve steam chests and valve casings have identified numerous visible cracks on the inner surfaces of those components. Life assessments were performed on the steam chests and valve casings for four of the Marshall and Allen units (Marshall Units 1 and 2, and Allen Units 4 and 5). The assessments incorporated visual examinations, phased array ultrasonic test (PAUT) examinations, dimensional measurements, and FEA stress and crack growth analyses. It was determined that the sizes and growth rates of the cracks that were observed in all of the inspected units were such that there is substantial margin available before the valve casings would be expected to reach life-limiting levels of creep, cracking, or fatigue.	Ernest N. Morial Convention Center- New Orleans

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Tuesday,10 :15a.m. to 10 :40a.m.	Low-Cycle Mechanical Fatigue Endurance of Various Joint Configurations	Qizhong Sheng, Hannah Wright - A marine structure is often subjected to stress cycles of such large magnitude that small and significant parts of the structural component experience cyclic plasticity (low cycle fatigue). Welded joints are typically vulnerable to such low cycle fatigue. The same concern is also applicable to the joints in Glass-Fiber-Reinforced Thermosetting-Resin Pipe (RTRP) system installed in a marine structure as a corrosion-proof alternative to metallic piping systems. It is therefore the objective of this paper to present a preliminary evaluation of various bonded joints in RTRP system under low cycle fatigue loading. Low-cycle fatigue endurance of RTRP spools with adhesive-bonded Taper joint, overwrapped adhesive-bonded Taper joint, and Butt & Wrap joint was evaluated in accordance with Section X4.3.3 under Appendix X4 in ASTM F1173. Test results indicated satisfactory fatigue endurance of RTRP-11 (Type 1; Grade 1) test spools with adhesive-bonded Ta	Ernest N. Morial Convention Center-New Orleans

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Tuesday,10 :15a.m. to 10 :40a.m.

Effect of Solution pH on Corrosion Product Layer Formation in a Controlled Water Chemistry System

Supat IEAMSUPAPONG, Marc Singer, Bruce Brown, Srdjan Nesic
-
Most CO_2 corrosion experiments are conducted at high levels of supersaturation with respect to iron carbonate in a glass cell. This leads to more rapid attainment of steady state with respect to corrosion rate and corrosion product formation. However, most operating conditions in an upstream pipeline do not match with these 'easily tested' conditions. To better simulate internal pipeline environments found in field conditions, a flow-through system was used to control the water chemistry by maintaining saturation values with respect to iron carbonate for the entire testing time. All experiments were conducted on UNS G10180 mild steel at 80□C, pCO_2 of 0.53 bar, and velocity of 0.6 m/s in 1wt.% NaCl electrolyte within a pH range of 5.4-6.0. The evolution of the corrosion process was continuously monitored by electrochemical methods. Scanning electron microscopy (SEM/EDS) was used as the main characterization tool to stu

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Tuesday,10 :15a.m. to 10 :40a.m.	[In Defense of the Monolithic Isolation Joint]	Monica, Michael, Tim Hurley, John Stephenson, Wade Troutman - At an earlier NACE Symposium, an influential paper was presented characterizing the monolithic isolation joint as a weak link in pipeline integrity. We will examine the potential failure points identified in this earlier work and offer strategies, based on experience in the field, to ensure that monolithic isolation joints serve their purpose of eliminating the well-documented cathodic protection challenges historically presented by flanged connections. It is true that the monolithic isolation joint is a sealed system, which obscures the individual components inside. How do you do due diligence on a sealed, discrete system to ensure it will perform over the asset lifecycle? We will put forward a detailed specification including: Contractual requirements that monolithic isolation joints and their components are not just batch tested, but individually tested. We will set out a 17-point regimen including pneumatic and hy	Ernest N. Morial Convention Center- New Orleans

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Tuesday,10 :40a.m. to 11 :5a.m.	Evaluation of Degradation of a Fiberglass Pipe Exposed to Two Industrial Fluids	Jie He - Evaluation of Degradation of a Fiberglass Pipe Exposed to Two Industrial Fluids Fiber-reinforced plastics (FRP) composites are widely used in various civil engineering and aerospace applications. They exhibit superior mechanical properties than their metallic counterparts. However, they are susceptible to damage and degradation, especially in harsh industrial environments. Recently, degradation of a Fiber-reinforced plastic (FRP) pipe was evaluated in two air-saturated industrial fluids at 140°F. The FRP pipe, which is considered utilization in underground disposal facilities, was made of a high strength glass fiber filaments and an aromatic amine-cured epoxy resin through a filament winding approach. During the two 90-day exposure tests, the water penetration in the FRP was measured in terms of weight and volume gain as a function of exposure time. The dynamic of water penetration into the FRP was also investigated and based on experimental results, the service li	Ernest N. Morial Convention Center-New Orleans

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Tuesday,10 :40a.m. to 11 :5a.m.	Corrosion Resistance of Alloys in Calcium Bromide and Calcium Chloride Solutions	Brett Tossey, Barbara Padgett, John Shingledecker - Calcium bromide is used within the coal fire power plant industry to assist with controlling mercury emissions. A direct consequence of adding bromide ions to the flue gas is that the total halide ion content of the Wet Flue Gas Desulfurization (WFGD) slurry increases. The objective of this study was to determine the effect of bromide additions in chloride-rich WFDG slurries on the crevice corrosion resistance of commercially-available corrosion resistant alloys. A laboratory study employed cyclic potentiodynamic polarization (CPP) methods to compare the performance of three different alloys in model solutions with varying concentrations of calcium chloride, calcium bromide, and a mixture of calcium chloride and calcium bromide. The alloys had pitting resistance equivalent numbers of 35, 44, and 66. Three factors from the CPP tests were assessed: the open circuit potential, the breakdown potential, and the repassivation	Ernest N. Morial Convention Center- New Orleans

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Tuesday,10 :40a.m. to 11 :5a.m.	Effect of the Substitution of Ni by N and Mn in Lean Duplex Stainless Steels on SCC Assisted by H2S	Fiona Ruel, Sandra Le Manchet, Saghi Saedlou, Christophe Mendibide, Krzysztof Wolski - Over the last decade, new lean duplex stainless steels grades have appeared on the oil and gas markets. The substitution of Ni by N and Mn in these new grades influence their susceptibility to stress corrosion cracking (SCC) assisted by H2S. Specimens of S32304, S32202 and S32101 DSS have been tested by means of slow strain rate tensile test in solutions containing 50 g L-1 NaCl, 5 g L-1 NaCH3COO, under an atmospheric pressure of 100 % of H2S at pH 3.5 in order to compare their resistance to SCC assisted by H2S. Unlike the grade S32202 that remains ductile and does not show any trace of corrosion in that environment, S32101 and S32304 suffer from SCC coupled with selective dissolution of the austenitic phase along the cracking paths and are covered with a black corrosion products layer enriched in nickel sulfide. The importance of passive film stability and mechanical properties on these SCC	Ernest N. Morial Convention Center-New Orleans

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Tuesday,10 :40a.m. to 11 :5a.m.	In situ Electrochemical Evaluation of Pitting Corrosion of Carbon Steel Pipelines Exposed to Slightl	Ray Case, Jennifer Harris, Mohsen Achour, Jordan Daniels - Pitting corrosion susceptibility was studied in a slightly sour seawater transport piping system using electrochemical methods deployed in situ using a novel reference electrode system. The objective of the study is to identify the root cause and the evaluation of the mitigation strategies for the pitting attack observed on the pipeline network. To study the pitting susceptibility of the carbon steel in the slightly sour service environment is done by using direct current and electrochemical impedance (IES). The tests matrix for the study is designed considering the oxidizing potential of the seawater as the independent variable, and the stable pitting likelihood as the dependent parameter to assess pitting susceptibility. The results show that the reduction of thiosulfate / bisulfite produced within the environment to sulfur are the main cause for the presence of pitting on the carbon steel; hence the pitting resistanc	Ernest N. Morial Convention Center-New Orleans

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Tuesday,10 :40a.m. to 11 :5a.m.	The Case Against Galvanized Piping in Domestic Water Systems	Catherine Noble - Galvanized steel pipe is a very common material used in domestic water systems, primarily for larger pipe diameters (3-inch diameter and above) due to the expense of copper pipe. While galvanized pipe is allowed in most building codes, it has corrosion issues when used for hot, softened water service. The low mineral content in soft water is desirable for drinking water and reducing scale build-up, but detrimental to corrosion resistance. When the minerals are left in the water, they react with the galvanized layer to form a protective oxide on the internal pipe surface. Without that protective layer, the pipes are significantly more susceptible to corrosion. Presented in this paper are case studies of corrosion issues in galvanized water piping, one in a stadium and one in a hotel. Details of the corrosion mechanism and mitigation strategies are also discussed.	Ernest N. Morial Convention Center-New Orleans

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Tuesday,10 :40a.m. to 11 :5a.m.	Black Powder Formation by Dewing and Hygroscopic Corrosion Processes	Martin Colahan, ricardo nogueira, David Young, Marc Singer - The presence of black powder in natural gas pipelines can lead to equipment erosion, valve failure, instrumentation malfunction, and increased pressure drop. However, despite its impact on downstream and midstream operations, black powder production is poorly understood. In the present work, black powder formation as a result of corrosion was investigated by simulating sales gas conditions in a glass cell. Steel specimens were systematically exposed to a range of CO2, H2S, and O2 partial pressures at differing water condensation rates. The potential for hygroscopic material assisting black powder formation was also investigated. Friable corrosion products found in dewing conditions consisted of siderite, mackinawite, and hematite. The expected mass of corrosion products, as determined from experimental corrosion rates, are in line with the high levels of black powder in field production. The presence of hygroscopic NaC	Ernest N. Morial Convention Center-New Orleans

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Tuesday,11 :5a.m. to 11 :30a.m.	Modeling Lead and Copper Corrosion and Solubility in Municipal Water Distribution Systems	Robert Ferguson - Lead and copper in municipal water systems present a major health hazard in addition to the infrastructure loss associated with corrosion releasing them into the distribution system. Soluble lead and copper became a legal as well as economic concern with the implementation of the Lead and Copper rule in the United States in 1991and its subsequent expansion. Similar regulations where implemented in Canada during the same time period. The regulations set action limits for the metals at 15 ug/L for Pb and 1.3 mg/L for Cu. corrosion studies and control programs such as chemical treatment with phosphates and zinc are mandated when these levels are reached. In some cases these treatments can increase lead and copper solubility, rather decreasing it, while addressing the problem. Langelier Saturation Index and Calcium Carbonate Precipitation Potential adjustment are another control approach mandated by some states. This is done despite the tenuous relationship b	Ernest N. Morial Convention Center-New Orleans

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Tuesday,11 :5a.m. to 11 :30a.m.	Electrochemistry of Mackinawite Electrodes in Sour Aqueous Solutions	Morten Tjelta|, Jon Kvarekval - Iron sulphide, frequently found on carbon steel under sour conditions, is under certain conditions expected to act as a (large area) cathode thereby increasing the corrosion rate of the underlying steel through galvanic coupling. In this work electrochemical reactions taking place at mackinawite (the most common low temperature polymorph of iron sulphide) electrodes in sour aqueous solutions have been studied using electrochemical techniques and the effect of mass transport was obtained using a jet impingement setup. The main objective is to obtain current-potential relations for iron sulphides which can be taken into a modelling framework, thereby allowing the estimation of the galvanic coupling between carbon steel and iron sulphides under different environmental conditions.	Ernest N. Morial Convention Center-New Orleans

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Tuesday,11 :5a.m. to 11 :30a.m.

Elemental Sulfur and Speciation in High Pressure High Temperatures Oil and Gas Well Environments: Th

Yuhchae Yoon, Sridhar Srinivasan, Kwei Meng Yap, Russell Kane - Since the advent of deep sour gas wells (in 1970-80s), the effects of elemental sulfur on increased pitting and stress corrosion cracking (SCC) susceptibility of nickel-based alloys and Ti-alloys have been documented in the literature. At the same time,
methods for testing these materials for resistance to SCC have evolved in several forms that include under and over saturation of elemental sulfur in test environments over a range of temperatures usually in the range 150 to over 200 C. Today, qualification
of a variety of corrosion resistant alloys for inclusion into NACE MR0175/ISO 15156 Part 3 references these methods. However, there is little agreement as to the nature of the chemical environments (in terms of elemental sulfur and its speciation) in the test
environment and their role in defining severity with respect to SCC.

This paper reviews both available SCC data and test methodologies involving additi

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Tuesday,11 :5a.m. to 11 :30a.m.	Modern Electric Power Substation Failure Case Histories and Mitigating Strategies	Jose Santiago, Graig Cilluffo - Modern Electric Power Substation Failure Case Histories & Mitigating Strategies Exelon presents case histories of corrosion failures, impacts, and corrective actions for electric power substation and distribution components based on field inspections and restoration / response activities from its BGE Team operating its Maryland service areas. This paper will provide: • Overview of transmission substation structure component design / construction and corrosion risk factors • Details on failures, inspection findings, evaluations, and actions required • Recommended Actions for future integrity assessments and mitigating actions • Recommended structure design and surveillance practices to optimize lessons learned Results provide field perspectives of corrosion failures, consequences, and corrective actions from an operating utility’s perspective with recommended actions / strategies to be considered in future design, inspection, and maintenance.	Ernest N. Morial Convention Center- New Orleans

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Tuesday,11 :5a.m. to 11 :30a.m.	Evaluating Drying Time of Residual Hydrotest Water in Pipeline Crevices and Dead Legs	Xihua He, Laurie Perry - This work evaluated the effectiveness of the dewatering process after hydrotesting and examined the internal corrosion threat posed by residual water trapped in crevices and water pushed into a dead leg. A "time to dry" calculation for both cases was conducted based on pipeline operating conditions. Analysis of the evaporation of water trapped in crevices indicated that maintaining low pressures and high temperatures are the most effective measures for drying the trapped water. At the lowest pressure of 14.7 psi and at 100 oF, trapped water can be dried in days. At increased pressure or decreased temperature, a pipeline may become saturated with water vapor, completely stopping evaporation. Other factors such as crevice geometry, water content, and water type had insignificant effects on water drying from a crevice. The geometry considered for water drying in a dead leg included the entire dead leg, a section of the main line, and a section of the lateral	Ernest N. Morial Convention Center-New Orleans

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Tuesday,1 p.m. to 1 :25p.m.	Coastal Environmental Field Trial of an Overhead Power Transmission Conductor	Colin McCullough, Julio Ruiz, Chris Chris Schenian, Holly Maudsley, Stephen Gronseth - The coastal region of Lima, Peru, is an aggressive atmosphere classified by ISO 9223 as an S1P1 mixed atmosphere, having high deposition rates of Cl- ions and SO2. Lima has little rain, so the ions are not easily washed away, but instead concentrate with daily fogs. Overhead power transmission conductors in this region are required to be both of all-aluminum constructions (no steel), and to have grease between layers, in order to give longer environmental durability. This talk will report on an ongoing environmental field trial of a high-temperature low-sag ACCR conductor. The ACCR contains aluminum and aluminum matrix composite constituents, and for the first time uses a greased configuration. Samples were periodically harvested from the field, and characterized using microscopy and strength testing. A comparison in behavior is drawn between greased and ungreased conductors that shows	Ernest N. Morial Convention Center-New Orleans

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Tuesday,1 p.m. to 1 :25p.m.	Fracture Toughness Testing Methods in H2S Containing Environment for Metallic Materials	Arshad Bajvani Gavanluei, Erman Citirik - Fracture toughness test methodologies available in the literature are reviewed in this publication to compare the details of these test methods. Accurate characterization is crucial to obtain the material properties to be utilized in new technology development projects such as high pressure high temperature (HPHT) product developments in sour service in oil and gas industry. While fracture mechanics (FM) was utilized only for fitness for service activities in the industry, the new HPHT design guideline requires FM analysis for a pressure containing primary barrier (Category 1) equipment per BSEE definition. Therefore, fracture toughness (FT) becomes a critical parameter to be obtained and utilized in design verification. Several test methods and standards are available to measure the FT. The selection of the test method in sour service is based on the application of the equipment since each existing method has its own limitations. In	Ernest N. Morial Convention Center- New Orleans

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Tuesday,1 p.m. to 1 :25p.m.	Electrochemical Study of the Influence of Acetic Acid on Carbon Steel Corrosion in Sour Gas Environm	Suresh Divi, Killian Efird, Derek Spiller - The objective of this paper is to investigate the effects of acetic acid on the mechanistic corrosion behavior of carbon steel in sour gas environments using multiple electrochemical techniques. The investigation is conducted at a constant temperature and H2S concentration in 3.5%NaCl solution and 1.0 bar CO2 pressure. The concentration range of acetic acid is from 0-1000 ppm at a solution pH of 3.0 to 6.0. The effects of acetic acid on the time variation of uniform corrosion rate, localized corrosion behavior (pitting corrosion), and the detailed electrochemical behavior of the corrosion product will be presented. Keywords: Carbon steel, Acetic acid, electrochemical corrosion, Hydrogen sulfide	Ernest N. Morial Convention Center-New Orleans

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Tuesday,1 p.m. to 1 :25p.m.	New Yellow Metal Corrosion Inhibitors Targeting Surface Chemistry of Industrial Systems	Paul Frail, Gilad Zorn, Reza Sharghi-Moshtaghin, Martin Morra - Phosphate is the most common inhibitor used in industrial waters for iron surfaces. When it combines with the calcium, calcium phosphate colloids form in solution, and then form a cathodic passivation film on top of iron oxide layer. Surface analysis was used to exam chemical composition and the formation process. It was found that the dispersant polymer used to control scale inhibition plays a significant role in the calcium phosphate passivation mechanism for iron surfaces. Azoles have long been used in industry to protect yellow metal surfaces and are believed to form a metal-organic polymer on the surface. Recent results have shown that when calcium and phosphate are used in junction with an oxidizing agent that the two inhibiting mechanisms, calcium phosphate and azole, compete for the surface. By identifying the surface chemistry a new array of inhibitors was developed to target surface chemistry of the	Ernest N. Morial Convention Center-New Orleans

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Tuesday,1 p.m. to 1 :25p.m.	[Thiols as Volatile Corrosion Inhibitors for Top of the Line Corrosion]	Zineb Belarbi, Fernando Farelas, Marc Singer, David Young, Thanh Nam Vu, Srdjan Nesic - The effectiveness of hexanethiol, decanethiol and 11-mercaptoundecanoic acid for CO2 corrosion inhibition of carbon steel exposed to top of the line conditions has been investigated. Weight loss measurements were used to measure the corrosion rate in the absence and presence of these volatile inhibitor compounds. After experiments, steel surfaces were characterized by scanning electron microscopy (SEM) and energy-dispersive X-ray spectroscopy (EDS). In addition, surface characterization of adsorbed decanethiol molecules on carbon steel was performed using X-ray photoelectron spectroscopy (XPS). The obtained results suggest formation of an adsorbed inhibitor film on the steel surface, resulting in a decrease in the corrosion rate. Persistency experiments were also performed to evaluate the residence time for inhibitors adsorbed on carbon steel, high persistency was observed. Keywords: CO2 co	Ernest N. Morial Convention Center-New Orleans

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Tuesday,1 p.m. to 1 :25p.m.	A Study of Nonconventional Biocide Treatments of Barnett Shale Gathering Pipelines	Jared Hebert, Jeremy Ledgewood, Tommy Dupuis Jr, Mark Hague - Unconventional oil and natural gas shale plays in the Unites States have introduced unique challenges to all aspects of oil and gas production, including corrosion mitigation. Microbiologically influenced corrosion (MIC) has become a common cause of internal corrosion failures due to the increase of low velocity, wet gas pipeline gathering systems. The origin of such microbes into closed production environments can be traced back to the drilling stage of wells in which stagnant, dirty "frack pond" water is used to hydraulically fracture, or "frack", wells or by using untreated water for hydrostatic pressure testing of pipeline systems. Such gathering systems, particulalry those in densely populated metro areas (e.g., the Barnett Shale), have come to require a significant amount of attention in regards to asset integrity, as well as U.S. government compliance. This is a comprehensive field case study of the effectivene	Ernest N. Morial Convention Center-New Orleans	
Tuesday,1 p.m. to 5 p.m.	Top of Line Corrosion	This symposium includes technical papers on mechanism, modeling, field experience, monitoring, mitigation (design and inhibition). Sponsoring Committee: TEG 515X Chair: Yao Xiong Vice Chair: Fernando Farelas	Ernest N. Morial Convention Center-New Orleans	Room 228

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Tuesday,1 :25p.m. to 1 :50p.m.	Test Equipment for Sour TLC Testing	Gaute Svenningsen - Top of line corrosion has been recognised as a corrosion threat since the 1980ies. Although the first reported cases of TLC were for sour conditions (CO2 + H2S), the major focus has been on sweet TLC (CO2 only). The number of sour TLC failures is limited, indicating that this is less common problem than sweet TLC. This explains why sour TLC has been given relatively little attention during the last decades. However, several sour TLC failures have been reported in the literature and experimental testing is obviously needed to study the phenomenon. The toxicity and flammability of H2S makes sour corrosion experiments much more difficult to carry out than sweet corrosion experiments. Particularly flow loop experiments would be difficult for TLC testing since the amount of H2S (gas phase) would be large and therefore pose a serious HSE risk in case of leakage and it would also make disposal of the used gas/liquid difficult. Small scale testing in autoclaves is th	Ernest N. Morial Convention Center-New Orleans

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Tuesday,1 :25p.m. to 1 :50p.m.	Kinetic and Morphological Investigation of Calcium Sulfate Dihydrate (gypsum) Scale Formation on Hea	Zahid Amjad - The formation and adherence of calcium sulfate dihydrate ($CaSO_4 \cdot 2H_2O$, gypsum), hemihydrate ($CaSO_4 \cdot 1/2\ H_2O$, plaster of Paris), and anhydrite ($CaSO_4$) scales on heat exchanger and equipment surfaces poses serious challenge in the efficient operation of many industrial processes utilizing feed and/or recirculating waters containing high levels of calcium and sulfate ions. Industrial processes affected by the deposition of sulfate scales include boiler, cooling, desalination by evaporation and reverse osmosis methods, gas scrubbers, and oil recovery utilizing water flooding technique. In the present work the kinetics of gypsum scale formation on heat exchanger surfaces from aqueous solutions has been investigated by a highly reproducible technique. It has been found that gypsum scale formation takes place directly on the surface of heat exchanger without any bulk or spontaneous precipitation in the reaction cell. The kinetic data also suggest that the rate of scale fo	Ernest N. Morial Convention Center- New Orleans

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Tuesday,1 :25p.m. to 1 :50p.m.	Non-Ideal Gases and Solutions, Complexes and Ion Pairs in Corrosion	Stephen Smith, Peiming Wang, Andre Anderko - Ideal and non-ideal gases are a well recognized concept in the oil and gas industry with corrections for non-ideal behavior frequently made in the design and operation of hydrocarbon processing facilities. Application of the concepts of non-ideal gas and aqueous solution chemistry to corrosion testing and modeling for oilfield application has been limited until quite recently. However, with the advent of HPHT production with supercritical gas conditions and heavy brines require the consideration of non-ideality of the field applications are to be simulated accurately. When designing tests or evaluating production conditions that include supercritical fluids or gas/liquid phases that are near critical conditions, failure to use the fugacity of a gas rather than partial pressure can cause errors that exceed X%. For aqueous solutions, when dealing with brines that are more concentrated than 3 to 5%, assuming that reactions occur based	Ernest N. Morial Convention Center-New Orleans

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Tuesday,1 :25p.m. to 1 :50p.m.	Using Digital Image Correlation to Improve Stress-Corrosion Cracking Evaluation by NACE TM0177-B	Brandi Clark, Ross Rentz, Jeffrey Sowards, David McColskey - NACE TM0177 Method B is a standard method for evaluating stress-corrosion cracking (SCC) resistance. To conduct the test, a beam of material is loaded into a three-point bend fixture and exposed to the specified test solution, then inspected for cracking (failure) at predetermined time intervals. The three-point bending equation is used to calculate peak stress in the center; however, the bend equation is only valid for elastic deformation. In actuality, the specimens have a pair of holes drilled at the centerline to act as stress concentrators, resulting in stresses that are both inelastic and non-uniform near the holes. As a result, the reported critical stress (Sc) obtained from Method B is a “pseudo-stress” rather than a true stress. In this study, Digital Image Correlation (DIC) was used to determine the actual strain distributions over the surface of the bend samples and compare the corresponding peak stress	Ernest N. Morial Convention Center-New Orleans

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Tuesday,1 :25p.m. to 1 :50p.m.	Alignment of Reject/Ranking Criteria With Mitigation Methods and its Impact on O&M Funds	Neal Murray - Service life and design life estimates are quickly converging for many transmission and distribution assets. Replacement costs have escalated due to new constraints that were not considered in early days of developing the power grid. As a consequence the maintenance funds must be optimized to maximize results of the life extension methods. This may be achieved by modeling the margins between operating loads and the structure conditions to study the impact of the ranking criteria on population distributions. Aligning the mitigation methods efficacy and cost with the ranking criteria then provides an understanding of the balance between risk and cost. This report provides an approach to understanding the significance of reject and ranking criteria and how it may become a barrier to good asset management or a path to improving system reliability and grid resiliency. Keywords: Inspection and assessment, Reject and Ranking criteria, Asset Management, Operations and M	Ernest N. Morial Convention Center-New Orleans

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Tuesday,1 :25p.m. to 1 :50p.m.	Strategic NDE Results Collaboration Yields Industry Insights	Steve Biagiotti, Peter Wood, Timothy Eckert - In 2007, the U.S. nuclear power industry began experiencing buried and underground piping leaks. Nuclear power plants can have between 10 and 50 miles (16-80 km) of buried piping per generating unit. This piping is made from a variety of materials (e.g., carbon steels, cast irons, stainless steel and other alloy materials), some of which was installed with or without coatings, and some of which operates with or without cathodic protection (CP). Many of the pipes can contain tritium in the fluids, which is a radioactive isotope of hydrogen created during the nuclear fission process. The industry was quick to respond to this emerging issue and elected to leverage the recent integrity management experiences from the pipeline industry. The resulting processes were 100% adopted by U.S. nuclear operators for implementation with 5 years. As part of this effort, a standard database was developed and provided to all operators, as well as a proc	Ernest N. Morial Convention Center-New Orleans

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Tuesday,1 :50p.m. to 2 :15p.m.	Corrosion Detection Using Robotic Vehicles in Challenging Environments	Thaddeus Roppel - Several recent studies have indicated that dogs can be trained to detect corrosion. Based on our previous work with detection of drugs and explosives, it is likely that the dogs are actually cueing on some ancillary volatile vapors, dust, or powder associated with the target environment. In any case, the successful deployment of detection dogs and other animals has encouraged many researchers to attempt the design of electronic equipment that can mimic the sensory capability of the animal nose, while providing a less costly detection system with the capability to record quantitative data for real-time display and off-line analysis. Such a system is sometimes referred to as an “electronic nose” or simply an “e-nose”. While much research remains to be done to improve the sensitivity of electronic sensors to match the animal nose, our research focuses on developing autonomous mobile platforms that can drive themselves on rugged terrain while performing inspec	Ernest N. Morial Convention Center-New Orleans

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Tuesday,1 :50p.m. to 2 :15p.m.	Modeling and Experimental Insights of Sulfide Stress Cracking Corrosion Mechanism	Daniella Sales, Philipp Schwittek, Stéphane Barrez, Florian Thebault, Juan CREUS, Xavier FEAUGAS, Emmanuel Desdoit - Quenched and tempered martensitic steels for Oil Country Tubular Goods can be subject to Sulfide Stress Cracking when exposed to a sour environment. Basically, the failure mechanism of SSC includes an initiation step and a propagation step of a crack. Focusing on the latter, it is primary to model the conditions for crack propagation for avoiding crack growth or for promoting crack arrest. With this view, a hydrogen stress driven model has been built that describes stress field and hydrogen activity at the direct vicinity of a crack tip. Complementary, a second model based on the cohesive zone simulates the kinetic of a crack growth. In parallel, experimental works combining hydrogen permeation and static loads on notched tensile specimens brought experimental data that were compared to simulation outputs. The respective influence of diffusible and trapped hydrogen	Ernest N. Morial Convention Center- New Orleans

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Tuesday,1 :50p.m. to 2 :15p.m.	Dissolution of an Iron Sulfide Scale Formed on Carbon Steel	Omar Yepez, Jonathan Wylde, Nihal Obeyesekere - The corrosion protection due to iron sulfide scales has been and continues to be a controversial issue in corrosion science. These scales are very important to understand the mechanism of sour corrosion. For example, speculations about the type of iron sulfide formed and its role on localized corrosion has triggered a whole venue of investigations. However, the fundamental aspects of the scale formation, crystal growth and its protectiveness towards the metal are still not fully understood. Therefore, it is important to investigate and understand the fundamental key issues regarding the nature of iron sulfide scale formation and crystallization. The current paradigm states that Mackinawite is a protective form of iron sulfide. This, however, has not been proven. This paper describes the formation of a Mackinawite scale on carbon steel in a borate buffer pH = 8.4. Then, this scale was exposed to different buffers with lower pH. The	Ernest N. Morial Convention Center-New Orleans

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Tuesday,1 :50p.m. to 2 :15p.m.	Stressed Alkaline Cooling Water Deposit Control: High Temperature, Suspended Solids, and Iron Impact	Libardo Perez, Zahid Amjad, Robert Zuhl - Stressed Alkaline Cooling Water Deposit Control: High Temperature, Suspended Solids, and Iron Impacts Water scarcity and environmental issues have necessitated operating cooling systems using poor quality feedwaters or changing process temperature conditions. Safety concerns have driven cooling system users to implemented alkaline treatment programs to facilitate acid feed reduction or elimination. Inorganic and/or organic phosphorus components in alkaline cooling water treatment (CWT) programs help prevent corrosion and scale formation. Collectively, water conservation measures and alkaline CWT programs have increased potential metal-phosphate and/or phosphonate scale formation. Understanding deposit control polymers (DCP) perform under stressed conditions is essential for implementing alkaline CWT programs. This paper discusses CWT program metal-phosphate/phosphonate scale formation control efficacy when operating under stresse	Ernest N. Morial Convention Center- New Orleans

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Tuesday,1 :50p.m. to 2 :15p.m.	Enhanced Corrosion Prediction Model for Multiphase Oil and Gas Production Systems	Hui Li, Kwei Meng Yap, Sridhar Srinivasan - In oil and gas production, the potential damage to the oil and gas transportation lines caused by Top of the Line Corrosion (TLC) has become a key concern for pipeline operators given the inability of currently available prediction models to accurately capture the phase behavior and concomitant water condensation, a precursor to TLC. Another concern with TLC is that continuous corrosion inhibitor application is usually not effective as TLC occurs in stratified flows where corrosion inhibitors can hardly reach corroding locations. This paper details a TLC model integrated into a CO2/H2S corrosion prediction model developed by the authors' organization. The TLC model determines the Top of The Line corrosion rate of carbon steel based on iron concentration and film-wise condensation rate. The effect of various glycols, such as Monoethylene Glycol (MEG), Diethylene glycol (DEG) and Triethylene Glycol (TEG), are included. Experimental data	Ernest N. Morial Convention Center- New Orleans

Tuesday,1 :50p.m. to 2 :15p.m.	Fitness for Purpose of Low Temperature Cure Liquid-Applied Coating Systems for Pipeline Maintenance	Haralampos Tsaprailis, Jiajun Liang - In Canada, CSA Z245.30-14 covers the application of shop and field applied external coating systems for below ground steel pipelines. CSA Z245.30-14 was enacted in 2015 when CSA Z662 was published. Similar to ISO 28109-3, the CSA Z245.30-14 outlines the testing criteria that liquid and fusion bonded epoxy coatings shall satisfy (Table 1 in CSA Z245.30-14). Pipeline maintenance and repair work can occur during the winter season in certain northern regions in Canada due to the geographical restrictions placed by the local soil condition (r.g., permafrost). Subsequently, low temperature cure liquid epoxy coating systems are often used to reduce the cost associated with hording the excavation site. These coating systems allow advertised curing down to as low as -20 degrees Celcius. Unfortunately, mainly of the low temperature cure epoxy systems do not comply with the CSA Z245.30-14 standard. This paper will discuss the fitness for purpose	Ernest N. Morial Convention Center-New Orleans

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Tuesday,2 :15p.m. to 2 :40p.m.	Failure of a Vaned Diffuser in a Sour Gas Compressor	Vishwas Gadgil, Peter Martinius - Failure of a vaned diffuser in a sour gas compressor Dr.ir. V.J. Gadgil, Ing. P. Martinius Power and Gas Division, Siemens Netherlands N.V. Industrieplein 1, 7553 LL Hengelo, The Netherlands Oil and gas is a highly competitive industry. Maintenance and service play an important role in the operation of a gas field. Upstream equipment must be able to handle gas from a production well. In many cases along with hydrocarbons the gas contains other components such as CO2, H2S and water in liquid or vapor form. It is well known that the these are corrosive in nature and more so in combination with each other. There is extensive literature on the corrosivity of CO2 and H2S and their synergy (1,2). ISO 15156 (parts 1-3) have established guidelines which are accepted worldwide, in choosing material resistant to cracking in H2S environment. In this article a failure of a vaned diffuser in a gas compressor is investigated. The gas compressor was in	Ernest N. Morial Convention Center- New Orleans

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Tuesday,2 :15p.m. to 2 :40p.m.	Sustainable Corrosion Management for the Electric Power Industry	Gerhardus Koch, Oliver Moghissi - The global electric power industry is evolving at a rapid pace, using innovative technologies and tools to meet critical challenges involved in generating, transmitting, and distributing high-quality energy to an increasing number of consumers. These challenges include enhancing system reliability and performance, maximizing asset life, and reducing both operation and maintenance (O&M) as well as capital costs. Corrosion prevention is key to the power industry’s ability to achieve these goals and ensure safe and reliable performance while minimizing expenses. Whereas the technology exists to control corrosion, this may involve significant costs including expensive materials and designs, inspection programs, and proactively maintaining and/or repairing susceptible areas. This paper will describe a corrosion management system approach that delivers cost-effective corrosion controls by incorporating corrosion management into a company’s existin	Ernest N. Morial Convention Center-New Orleans

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Tuesday,2 :25p.m. to 2 :50p.m.	Inhibitory Activity of Biopolymers, Synthetic Polymers, and Phosphonates Against the Formation of Ca	George Nicolas, Amannie Kweik, Zahid Amjad - The precipitation of calcium phosphate is important in the fields of biology, dentistry, geology, and industries such as potable water production, waste water treatment, milk pasteurization, and automatic dishwashing. In addition, calcium phosphates are important in industrial water treatment (i.e., cooling, boiler, desalination of sea/brackish waters) where precipitation and deposition of calcium phosphates on heat exchanger and reverse osmosis membrane surfaces can lead to a loss of system efficiency, overheating, unscheduled shutdown, and ultimate expensive equipment failures. Effective control of calcium phosphate deposits continues to challenge the academic researchers and industrial technologists. Recently, the problem of calcium phosphate scaling in industrial water system has become increasingly important. Higher orthophosphate levels are being encountered in cooling waters due to increased water reuse, use of low quality make	Ernest N. Morial Convention Center-New Orleans

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Tuesday,2 :25p.m. to 2 :50p.m.	Design Challenges for Material Selection in Sour and High Salinity Gas and Oil Production Facilites	Pedro Rincon, Nasser Behlani, Magdy Girgis, Manoj Gonuguntla Suryanarayana, Cheng Ai Khoo, Ahmed Al Kendi, Zaher Al Hajri, Mohamed Ossama Abdel Moneim - Petroleum Development of Oman (PDO) is currently operating and developing number of high pressure sour gas projects with high salinity (exceeding 200,000 ppm of NaCl). This paper gives an insight into the challenges with these combinations of H2S, pressure and Chloride and provides cases of field history, explanation regarding material selection framework and technical challenges during the design, execution and operating phases of some sour service projects. Some of the main challenges are: a) Unconventional high chloride levels carry over into process equipment downstream of the inlet separator b) Additional requirements for materials specification. c) Defining proper operating envelope for material performance. This paper addresses the challenges to provide ultimate engineering solutions through the use of corrosion resistance	Ernest N. Morial Convention Center-New Orleans

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Tuesday,2 :25p.m. to 2 :50p.m.	Development of an Electrochemical Method to Study Top-Of-The-Line Corrosion	Md Mayeedul Islam, Thunyaluk Pojtanabuntoeng, Rolf Gubner - Top-of-the-line corrosion (TLC) is a concern for subsea wet-gas transportation pipelines operated in a stratified flow regime. Water vapour condensing at the top of the pipeline is corrosive due to the dissolution of the acid gases (CO2, H2S) present in the fluid. The insufficient volume of electrolyte at the top-of-the-line (condensation) combined with the low electrical conductivity of the condensed liquid has confined, to-date, TLC studies to the weight loss method which "only" provides averaged over a long period of time information. The onset of localised corrosion cannot be exactly determined, which makes it difficult to determine localised corrosion rates and mechanistic data. The instantaneous monitoring of TLC rates using electrochemical methods is still a challenge for researchers and in the field. To overcome this limitation, a novel TLC monitoring cell has been developed, which is capable of measuring in	Ernest N. Morial Convention Center-New Orleans

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Tuesday,2 :50p.m. to 3 :15p.m.	Assessing Corrosion Risk and Selection of Appropriate Testing Programs for Gas and Gas-Condensate Pi	Caroline Simpson, Dario Frigo, Gordon Graham - There has long been uncertainty about the best way to determine the corrosion risk for gas-condensate pipelines, and the effectiveness of chemical inhibitors as part of the mitigation strategy. This is because corrosion is so affected by flow and transport phenomena, which are typically complex. Many horizontal lines experience flow regimes that result in transient, periodic high wall shear stress (WSS), which is known to affect both inhibited and uninhibited corrosion rates. Where phases are stratified, condensation driven by temperature gradients can result in localized, top of the line (TOTL) corrosion in some locations, but with slugging occurring in others due to periodic liquid accumulation in topographical synclines, in turn leading to localized high WSS. To this must be added the effect of operational uncertainty in nominally dry lines (with respect to water dew point), where corrosion should not be expected under normal cond	Ernest N. Morial Convention Center-New Orleans

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Tuesday,2 :50p.m. to 3 :15p.m.	Corrosion of Nickel Alloys in Elevated Temperature Sour Gas Environments	Robert Rettew, Ramgopal Thodla - Alloys 625, 825, 316L and carbon steel were tested in sour gas with varying exposure to moisture, and at two different temperatures (280°C and 350°C). Corrosion rates for each alloy over a 30 day period are calculated based on measured weight loss of the coupons. Energy Dispersive Spectroscopy (EDS) was performed on exposed samples to determine sulfur concentration profiles below the interface of the metal and the corrosion product. The environments and temperatures tested represent service conditions for which little data exists on nickel alloy corrosion. These results will allow for more informed, higher-quality decision-making in materials selection and engineering design for sour gas service. The results show comparable performance for Alloys 625 and 825, with inferior performance from the 316L and carbon steel reference materials. Alloy 825 performed slightly better than Alloy 625 under certain conditions, but the difference was minimal.	Ernest N. Morial Convention Center- New Orleans

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Tuesday,2 :50p.m. to 3 :15p.m.

PBTC Revisited

Robert Ferguson -

PBTC (2-phosphonobutane 1,2,4-tricarboxylic acid) has become the work horse of calcium carbonate scale inhibition in cooling water, water reuse, and water treatment applications operating at the edge of control technology. Economically this stressed system inhibitor allows cooling tower operation at higher concentration ratios resulting in decreased water usage and discharge. The inhibitor also allows the reuse of water that would otherwise be discharged, possibly after costly treatment. It permits the use of less than desirable water in other applications. Performance and limits of this inhibitor were first characterized in a 1985 paper(1). This research report expands these findings based upon over thirty years of field application and recent laboratory studies to elucidate behavior and performance of this "go to" inhibitor over a broad range of conditions. Test Conditions simulated varied from easy to treat low concentration ratio HVAC towers, to water r

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Tuesday,2 :50p.m. to 3 :15p.m.	Evaluation of the Potential for Liquid Metal Embrittlement of 304L Stainless Steel by Galvanized Fas	Ramon Solo, Richard Colwell, Charles Patrick - Liquid Metal Embrittlement (LME) is a phenomenon that promotes a drastic loss of ductility in normally ductile materials in the presence of certain liquid metals. Zinc (Zn) is known to promote LME in austenitic stainless steels at temperatures above its melting point [752°F (400°C)]. Although LME of austenitic stainless steel (SS) is more likely when Zn is in the molten state, occurrences of Zn induced LME of SS have been reported at temperatures below 752° F. Industry has adopted a number of practices to prevent LME of SS pressure-retaining equipment by reducing the probability of contact with Zn. However, the use of mechanically galvanized low-alloy fasteners in SS flange joints is common. The potential risk for LME of 300-series SS flanges caused by galvanized fasteners during high temperature exposure (e.g. during an industrial fire scenario) has not been properly evaluated. This study examines the possibility of transfer	Ernest N. Morial Convention Center-New Orleans

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Tuesday,3 :15p.m. to 3 :40p.m.	Stress Corrosion Cracking of a Duplex Stainless Steel	Kasra Sotoudeh, Samuel Mishael, Briony Holmes - Duplex stainless steel is widely used in the oil and gas industry due to its inherent resistance to localised corrosion and stress corrosion cracking. However, duplex stainless steel can still be susceptible to stress corrosion cracking in H2S-containing environments. Thus, published limits exist in ISO 15156 (NACE MR0175) to constrain use of the material to safe environments. Testing under conditions outside of these published limits is permitted to assess whether a material may be suitable for use outside of the limits. Constant load tests were carried out on a wrought duplex stainless steel (UNS S31803) under conditions suggested to be a sour service limit for the material. All specimens cracked. Surface preparation and microstructural analyses were carried out to assess their influence on the SCC resistance of the material.	Ernest N. Morial Convention Center-New Orleans

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Tuesday,3 :15p.m. to 3 :40p.m.	DNA Based Diversity Analysis of Microorganisms in Industrial Cooling Towers	Linna Wang, Elizabeth Summer, Claudia Pierce, Dorothy Reynolds - Effective microbial control in cooling systems is necessary to ensure system cleanliness and avoid fouling that degrades cooling system performance, promotes corrosion and favors growth of pathogens. However, controlling organisms optimally involves an understanding of the identity of the population of microbes in a system due to the varying susceptibilities of organisms to biocides. This is a challenging task with standard culturing techniques which only allow for a small fraction of the total population to be cultured and identified. In this study, 16s rDNA was employed to maximize the population identification of 25+ different independent cooling tower samples. The analysis yielded over 165,000 sequences which corresponded to over 1,000 different organism species demonstrating extensive diversity not only from remote locations but also with locations in close proximity. This shows that a wide variety of biocide	Ernest N. Morial Convention Center- New Orleans

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Tuesday,3 :15p.m. to 3 :40p.m.	Factors Affecting Vapor Phase H2S Concentrations in Asphalt and Mitigation via Scavengers	Kyle Cattanach - Vapor phase hydrogen sulfide (H2S) concentrations in heavy oils such as asphalt and residuum vary based upon source and handling conditions. This work will examine and document the conditions that influence the phenomena of H2S generation—for example, the cracking of other indigenous sulfur compounds—and generate quantitative data on the H2S removal performance of metal-based H2S scavengers. The vapor phase presence of H2S presents a number of challenges for the industry that are exacerbated when dealing with hot oils such as asphalt. The primary concern is the personnel exposure risk presented by the toxicity of H2S. Heavy oils are a particular concern because of the inherently high concentration of H2S in the liquid phase of the oil and the tendency for the H2S to partition strongly to the vapor phase. From a mechanical integrity perspective, H2S is a weak acid that, when in the vapor phase, can readily combine with moisture in a storage tank and condense to	Ernest N. Morial Convention Center-New Orleans

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Tuesday,3 :40p.m. to 4 :5p.m.	Influence of Ultrasonic Nanocrystal Surface Modification on the Corrosion and Stress Corrosion Crack	Yong-Sang Kim, Jung Kim - The effect of ultrasonic nanocrystal surface modification (UNSM) on the corrosion and stress corrosion cracking behavior of welded joint in district heating pipe were investigated. After UNSM treatment, the microstructure of welded joint was transformed from the grain boundary ferrite, widmanstatten ferrite to polygoanl ferrite and refined the grain. In the electrochemical tests, the corrosion resistance of welded joint was increased after UNSM treatment due to the grain refinement and stability of oxide film. The stress corrosion cracking behavior was measured by slow-strain rate tests with accelerated anodic and cathodic reactions. The results indicated that the UNSM treatment has a significant effect on the corrosion condition, whereas no effect appeared on the hydrogen embrittlement.	Ernest N. Morial Convention Center-New Orleans

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Tuesday,3 :50p.m. to 4 :15p.m.

Mitigation of Sour Corrosion Using Novel Fast Acting Hydrogen Sulfide Scavengers

Sunder Ramachandran, Scott Lehrer, Laszlo Soos -

The choice of metallurgy resistant to hydrogen sulfide- (H2S) induced localized corrosion (sulfide corrosion cracking) is dependent on the concentration of hydrogen sulfide. As these concentrations increase one may need to use more expensive metallurgy.

Changes in reservoir conditions cause increase in hydrogen sulfide concentration that make it unsafe to transport production fluid in existing facilities. One method to reduce hydrogen sulfide concentrations is to use hydrogen sulfide scavengers.

Hydrogen sulfide scavengers such as triazines are basic and can cause scaling. Traditional scavengers like triazine exhibit low thermal stability, and often require large residence times to react. New fast-acting high temperature hydrogen sulfide scavengers

have been developed by the authors. This paper will describe new experimental apparatus to evaluate hydrogen sulfide scavenger candidates at high temperatures. The methodology enable

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Tuesday,3 :50p.m. to 4 :15p.m.	Extended Understanding of Inhibition Mechanism of New Corrosion Inhibitor via Electrochemical Measur	Mary Jane Felipe, Corina Sandu - Traditionally phosphorous based corrosion inhibitors are applied to prevent corrosion occurring in heat exchangers of cooling tower operations. It is well known that a protective coating rich in phosphate material with significant thickness in micrometer range is formed and protects the surface of being corroded. Although, efficient in corrosion prevention, there is detrimental environmental impact due to discharge of phosphorous downstream of application. Significant research is sustained to design and identify alternative chemistries to address these concerns. A novel corrosion inhibitor was designed and successfully applied in the field. Since this novel chemical approach was pursued an extended understanding of the inhibition mechanism was needed. In this paper, a combination of electrochemical and surface studies was used to shed light upon the mechanism through which the novel corrosion inhibitor reacts on the surface. X-ray Photoelectron	Ernest N. Morial Convention Center-New Orleans

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Tuesday,4 :5p.m. to 4 :30p.m.	Susceptibility of Plasma Nitrided 17-4 PH to Sulphide Stress Cracking in H2S-Containing Environments	Mario Coseglio, Brian Connolly, Christopher Fowler, Xiao-Ying Li, Philip Dent, Hanshan Dong - Context: The oil and gas industry is facing a major challenge as the processes are migrating to environmentally aggressive reserves found in ultra-deep water operations where significant amounts of hydrogen sulphide (H2S), carbon dioxide (CO2) and elemental sulphur can lead to premature failures. The selection of materials for oilfield components is one of the main concerns due to its complex interactions with the sour environment. Field failures have been frequently attributed to Sulphide Stress Cracking (SSC). It can occur due to the applied stress in the presence of hydrogen sulphide and its associated with the entry of atomic hydrogen into the metal substrate, although its mechanisms still unclear. Gap: The martensitic precipitation-hardening stainless steel 17-4 PH (or UNS S17400 - ASTM A564 Type 630 or DIN 14542) at the double-aged condition (H1150D) is one of the grades recommend	Ernest N. Morial Convention Center-New Orleans

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Tuesday,4 :15p.m. to 4 :40p.m.	A Phosphorous-Free Alternative for Corrosion Control	Eric Ward, Gregory Koniges, Emily Crane - Since the ban of chromates in the 1980s, the water treatment industry has extensively relied on phosphate based chemistries as its most widely used corrosion inhibitors for low carbon steel. While these chemistries have frequently proven effective, they have always come with the underlying concern of precipitation with soluble calcium in the water, causing fouling and loss of inhibitor within the system. To combat these fouling concerns, water treatment professionals typically are required to add costlier sulfonated polymers to prevent inhibitor precipitation, which drives the overall cost for an effective corrosion inhibitor program higher. Unfortunately, precipitation and fouling can still occur, either due to product overfeeding or upsets in water chemistry. As water regulations become more stringent, the challenge of preventing loss of phosphorous based chemistries to precipitation with calcium is likely to become even more diffic	Ernest N. Morial Convention Center- New Orleans

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Tuesday,4 :15p.m. to 4 :40p.m.	Sohic Resistance of SA516 Grade 70 Carbon-Manganese Steel for Oil and Gas Applications	Sandra Le Manchet, Patrick Toussaint, DEBORAH HERITIER - Oil & Gas treatment and petroleum refining involve aggressive environments containing aqueous hydrogen sulfide (H2S). Carbon-manganese steels used in these industrial sectors may be susceptible to various kinds of cracking phenomena namely Hydrogen Induced Cracking (HIC), Sulfide Stress Cracking (SSC) and Stress Oriented Hydrogen Induced Cracking (SOHIC). The HIC risk can be avoided by a strict control of the chemical composition of the steel (sulfur, phosphorus, oxygen) associated to a specially-adapted production route. SSC can be limited by a careful control of the hardness level of both the parent material and the heat affected zone as well as a low impurity level and appropriate PWHT. SOHIC is a critical problem in the Oil & Gas industry since it has been involved in many in-service failures. This phenomenon can be described as a combination of both SSC and HIC. Previous studies have shown that the measures tak	Ernest N. Morial Convention Center-New Orleans	
Wednesday,8 a.m. to 5 p.m.	Microbially Influenced Corrosion (Day 1)	This symposium includes technical papers regarding microbial corrosion research, case studies, control monitoring and treatment. Sponsoring Committee: TEG 187X Chair: Faisal Al-Abbas Vice Chair: Kenneth Wunch	Ernest N. Morial Convention Center-New Orleans	R-02

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Wednesday,8 a.m. to 5 p.m.	Marine Corrosion; Past, Present & Future (Day 1)	This symposium includes technical papers related to how historical events in marine corrosion have brought about the development of current technologies and practices. Sponsoring Committee: STG 44 Chair: Moavin Islam Vice Chair: Abdul Hameed Al-Hashem	Ernest N. Morial Convention Center-New Orleans	R-04
Wednesday,10 a.m. to 10 :25a.m.	Understanding and Addressing the Challenges of Assessing the Corrosion Fatigue of Metallic Materials	Christopher Engler, Georg Andersohn, Matthias Oechsner, Helmuth Sarmiento Klapper, John Stevens - During drilling operations the drillstring is subjected to a variety of loading conditions. Cyclical mechanical loads in combination with the corrosive effect of the used drilling fluid are particularly challenging for metallic materials used in load-bearing drillstring components. Drilling fluids often include large amounts of chloride ions. In addition, the temperature inside the drillstring approximates to the formation temperature, which can be significantly high depending upon the type of well. Field experience shows that when exposed to these harsh environments during service, structural materials used in drillstring components might undergo pitting corrosion and/or environmentally assisted cracking (EAC) e.g., stress corrosion cracking (SCC) and corrosion fatigue (CF). Therefore, metallic materials used in load-bearing drillstring components should be properly assessed with	Ernest N. Morial Convention Center-New Orleans	

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Wednesday,10 a.m. to 10 :25a.m.	Improving the Quality of ECDA Indirect Inspection Data	Sorin Segall, Robert Gummow, Daniel Fingas, John Shore - The quality of the indirect inspection data is a critical factor in conducting a successful ECDA. It is therefore essential to increase the accuracy of the field data collection, to improve the data processing and to effectively present the results. This paper describes several challenges faced during this continuous improvement process. Techniques for obtaining accurate field data for assessing the risk of AC corrosion are reviewed. Data processing considerations are presented in the context of a case of third-party damage. The implications for similar DCVG indications on the same line are discussed, and a mechanism for these “apparent” DCVG indications is presented. A new format for displaying the data is also presented, allowing a better visual co-ordination between the indications and the site features, as well as allowing immediate assessment of the proposed locations for direct examinations in terms of access and	Ernest N. Morial Convention Center- New Orleans

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Wednesday,10 a.m. to 10 :25a.m.	Sacrificial Protection Efficacy and Longevity of a Thermal Spray Non-skid Coating Under Sealants	Matthew Strom, James Tagert, Patrick Cassidy, Derek Horton - Thermal spray non-skid coatings (TSNS) are multifunctional coatings typically used on Navy flight decks to withstand extreme temperatures, a non-skid surface profile and serve as a barrier coating to the mild steel substrate. When the corrosion barrier coating is breached, TSNS must provide sacrificial corrosion protection to the substrate. TSNS coatings can have a high porosity and are susceptible to micro-cracking. As a result, there is a motivation to apply sealants to increase the barrier protection capability. The desire to have both an effective barrier coating and a sacrificial protection requires an intricate synergy between these types of protection. An effective barrier coating aims to minimize exposed surface area and, when damaged, to prevent damaged areas from spreading over time. Conversely, a sacrificial layer requires a large exposed surface area proximate to the damaged area in order to maintain long	Ernest N. Morial Convention Center-New Orleans

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Wednesday,10 a.m. to 10 :25a.m.	Case History on the Selection of Materials in a Bulk Handling Chemical Facility at Partitioned Zone	Tariq Kamshad, AbdulRahman AL-Ghamdi, Siriki Ravi Shankar, Manickavasagan Sabesan - This paper reviews corrosion issues encountered as a result of using incompatible construction materials with production chemicals, which eventually lead to multiple failures. The Wafra Oilfield bulk chemical handling facility was experiencing frequent leaks during storage and transfer of corrosion inhibitor, scale inhibitor and biocide chemical products. The initial design and construction of the bulk facility tanks, pumps and connected piping was completed using internally coated carbon steel components due to imposed cost reduction requirements. Upon a completion of an engineering review it has been determined that the basis of design for material selection should be more focused on the chemical incompatibilities and long term corrosion resistance of materials prior to construction of the facility. The improper selection of materials and components has caused increased maintenance activitie	Ernest N. Morial Convention Center-New Orleans

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Wednesday,10 a.m. to 10 :25a.m.	The Use of Ultrasound for Monitoring the Impact of Induced AC Corrosion on Underground Structures	Rob Leary, James Warner, Dominic King - The Use of Ultrasound for Monitoring the Impact of Induced AC Corrosion on Underground Structures It is generally accepted that Alternating Current (AC) corrosion on cathodically-protected underground structures is the result of the combined action of induced AC voltage, local cathodic protection conditions, chemical and physical conditions of the soil. Indeed, NACE standards and guidelines exist related to AC voltages and current density thresholds that are established to protect both personnel and underground structures, such as pipelines. As a result, the industry is developing an understanding of how to best mitigate and monitor such risks. One of the most widely accepted monitoring methods is tracking the current density rather than just AC voltages through the use of coupon test stations installed adjacent to the structures requiring protection. Coupons are typically installed to measure and monitor induced AC potentials and c	Ernest N. Morial Convention Center-New Orleans

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Wednesday,10 a.m. to 10 :25a.m.	Study of High Strength Low Alloy Steel OCTG with High Carbon Contents for Mildly Sour Service	Yuji Arai, Shinji Yoshida, Tomohiko Omura, Toshio Mochizuki, Keiichi Kondo - High strength OCTG is required for high pressure / high temperature (HPHT) well applications in order to withstand the expected extreme partial pressures and depths. For development of further high strength low alloy steel OCTG for sour service, effects of carbon content on strength, microstructure, and sulfide stress cracking (SSC) resistance of low alloy steel were investigated fundamentally. Modified AISI 4130 (1.0wt%Cr - 0.7wt%Mo) steel with varying carbon content from 0.25 to 0.60wt % quenched and tempered were analyzed with respect to martensite sub-structure (such as block size), precipitation of carbide, dislocation density and hydrogen absorption behavior. By increasing carbon content, the sizes of martensite blocks were refined (become smaller). It resulted in increasing strength of the steel even after tempering at high temperature. The tempering at high temperature led to reducing dislocation	Ernest N. Morial Convention Center- New Orleans

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Wednesday,10 a.m. to 10 :25a.m.	The Effect of Shot Peening on Steam Oxidation of Stainless Steel at 600°-650°C	Bruce Pint - Shot peening is an industry solution to scale exfoliation problems with conventional stainless steels in steam tubing in coal-fired power plants. However, relatively little data are publicly available regarding the performance of shot peened specimens in steam environments. This study exposed sections from two commercially shot peened tubes for up to 15,000 h at 600°, 625° and 650°C. The oxide thickness was measured at 2,500 h increments. Unpolished material formed thick Fe-rich oxides while the shot-peened inner diameter generally formed thin oxides with occasional Fe-rich oxide nodules. Interestingly, the machined outer diameter of the tube segment showed similar benefits as shot peening. The benefit of shot peening began to degrade after 5,000h at 650°C but was sustained past 10,000 h at the lower temperatures. Research sponsored by the U. S. Department of Energy, Office of Fossil Energy, Crosscutting R&D Program.	Ernest N. Morial Convention Center- New Orleans

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Wednesday,10 a.m. to 10 :25a.m.	Corrosion Management Planning Lessons for Seawater Conveyance in Mining	Zoe Coull, Brycklin Wilson - Mining is one of the few industries that can use low quality water for processing. Where mines are located in arid climates, such as the Atacama Desert in Chile, there have also been increasing regulatory pressures on the use of fresh and brackish groundwater sources. In the last decade, this has resulted in mines moving towards the use of seawater to supply their operations, which often has to be transported 100's km inland from the coast in conveyance lines. The corrosiveness of seawater introduces an increased corrosion risk for these projects, a risk which is currently not always managed in a proactive way from the design stage and therefore has severe implications for operation and maintenance performance over the life of mine. This paper will present a project case study, which will outline the challenges and lessons learned for a Mine project in Chile where the internal corrosion of the seawater conveyance line caused a number of technical, p	Ernest N. Morial Convention Center-New Orleans

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Wednesday,10 a.m. to 10 :25a.m.	Probabilistic Evaluation of Baffle-Former Bolt Cracking in PWRs	George Licina - A methodology for evaluating the probability of baffle-former bolt cracking was developed for applicability to PWRs. The methodology is based upon observed IASCC test results for the stainless steels most commonly used for baffle-former bolts (e.g., Type 304 SA, Type 347 SA, and Type 316 CW) and predictions of the representative stress patterns in those bolts that were developed as inputs to the model. The predictive methodology for IASCC develops a single parameter that incorporates dose and stress ratio (applied stress divided by yield strength, where the yield strength includes irradiation hardening), then defines the statistical distribution of that parameter using a Weibull distribution. Baffle-former bolt cracking has been observed in a number of PWRs, and these incidents have raised concerns about the likelihood of future cracking or failures. In this damage model, IASCC “failure” is defined when the component becomes fully susceptible to stress corrosi	Ernest N. Morial Convention Center-New Orleans

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Wednesday,10 a.m. to 10 :25a.m.	An Overlooked Corrosion Risk? The Incompatibility of Biocides and Oxygen Scavengers	Ben Folwell - Seawater injection is regularly used for pressure maintenance in oilfields during secondary oil recovery. Typically oxygen is removed from the seawater via a process of mechanical deaeration and oxygen scavenger is added to remove final traces. An oxidizing biocide such as hypochlorite is commonly added at the seawater lift pumps, to provide protection to the system from microbially influenced corrosion (MIC) up to the deaerator, after which sulphite based oxygen scavengers will react with residual oxidizing biocides. Therefore, the deaerator itself and the water injection pipelines downstream of the deaerator require protection from microbial contamination, which is normally achieved through dosing a non-oxidizing biocide. Despite potential incompatibility issues, non-oxidizing biocides and oxygen scavengers can be dosed simultaneously, due to unavoidable operational issues, with the operator having to choose between MIC and oxygen corrosion risks. John Crane ha	Ernest N. Morial Convention Center-New Orleans

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Wednesday,10 a.m. to 10 :25a.m.	Atmospheric Corrosion Resistance of Duplex Stainless Steels	Sandra Le Manchet - Duplex stainless steels have been actively developed by European companies since 1935. Their properties make them very attractive compared to equivalent austenitic grades. They indeed exhibit higher resistance to stress corrosion cracking, higher mechanical properties and lower alloy cost. They are today widely used in many industrial sectors for instance in the oil & gas, chemical, pulp & paper and water industries. Duplex stainless steels are also relevant candidate materials for architecture, building and construction projects especially when considering sustainability and Life Cycle Cost. This paper provides an overview of the main properties of duplex stainless steels in terms of chemical composition, mechanical and physical properties. Then, the results of an extensive atmospheric field test program are reported, confirming that duplex stainless steels can be interesting candidate materials for architecture, building and construction projects compa	Ernest N. Morial Convention Center- New Orleans

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Wednesday,10 a.m. to 10 :25a.m.	Performance of Next Generation CUI Mitigation Systems	Neil Wilds - Corrosion under Insulation (CUI) is one of the costliest problems facing the Oil & Gas and Process industries today. According to corrosion engineers, problems such as major equipment outages and unexpected maintenance costs stemming from CUI account for more unplanned downtime than all other causes. Thermal insulation of piping, valves, tanks or vessels is achieved by an INTEGRAL SYSTEM comprising corrosion mitigation coating, thermal insulation media, and external cladding. If there is a failure of any of the three components this will result in the failure of the entire system or loss of long-term purpose of the system. Corrosion under insulation (CUI) generally originates from water from various sources such as rainfall, cooling tower drift, steam discharge, wash downs and, because insulation is not vapour tight, condensation. This combined with the infiltration of contaminants into an insulated system which will vary in its water retention, permeability and we	Ernest N. Morial Convention Center- New Orleans

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Wednesday,10 a.m. to 10 :25a.m.	Reflections on 70 Years of Marine Corrosion Research and Testing Inspired by Francis L. LaQue	Robert Kain, Bopinder Phull - Those presently engaged in marine corrosion, as well as other aspects of corrosion, rely on their collective experiences and those shared by others in dealing with present day challenges. While certainly not the first to recognize or investigate materials performance in seawater and coastal environs, F. L. LaQue is perhaps the most respected for inspiring vast amounts of research and testing in this field, and equally as important the sharing results thereof. Commencing in 1935 with the support of the International Nickel Company (INCO), and the Ethly Dow Corporation, LaQue drew others into identifying critical areas of concern and establishing test programs to address the causes and prevention of corrosion, and other material degradation, in marine environments. In the ensuing years, expansion of seawater and marine atmospheric test facilities at Kure Beach and Wrightsville Beach, NC (USA) greatly enabled the exposure and subsequent assessment of t	Ernest N. Morial Convention Center-New Orleans	
Wednesday,10 a.m. to 3 p.m.	Corrosion Control for Aboveground Storage Tanks	This symposium includes technical papers from tank operators, researchers and suppliers of products and services related to corrosion mitigation and monitoring of aboveground storage tanks. Sponsoring Committee: TEG 132X Chair: Usama Jacir Vice Chair: Calvin Pynn	Ernest N. Morial Convention Center-New Orleans	Room 212

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Wednesday,10 a.m. to 5 p.m.	Corrosion Issues in Military Equipment and Facilities	This symposium includes technical papers that present advances in corrosion technology and research for military equipment and facilities. Focus is on new and improved materials, coatings, techniques, technologies, and applications. New corrosion technologies with applicability to military vehicles, weapon systems, ships, aircraft, support equipment, facilities, and infrastructure are welcome. Sponsoring Committee: STG 40 Chair: Robert Mason	Ernest N. Morial Convention Center- New Orleans	Room 213
Wednesday,10 a.m. to 5 p.m.	Direct Assessment	This symposium includes technical papers on external, internal, and SCC direct assessment activities. Sponsoring Committee: STG 35 Chair: Joe Pikas Vice Chair: Bob Winters	Ernest N. Morial Convention Center- New Orleans	Room 214
Wednesday,10 a.m. to 5 p.m.	AC Interference, AC Induced Corrosion, Induced AC Risk Assessment, Monitoring and Mitigation	This symposium includes technical papers on AC interferences, AC corrosion, risk assessment of induced AC, case studies on AC corrosion, fault currents and monitoring. Sponsoring Committee: STG 05 Chair: Dan Wagner Vice Chair: Meng Lopez-Garrity	Ernest N. Morial Convention Center- New Orleans	Room 220
Wednesday,10 a.m. to 5 p.m.	Advances in Corrosion Control in Combustion and Conversion	This symposium includes technical papers about corrosion and materials technology in combustion and conversion of fossil fuels, biomass, waste fuels, waste hear recovery and power production from concentrated solar power. Sponsoring Committee: TEG 183X Chair: Mathias Galetz Vice Chair: Joseph Meyer	Ernest N. Morial Convention Center- New Orleans	Room 223

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Wednesday,10 a.m. to 5 p.m.	Environmental Assisted Cracking (Day 2)	This symposium includes technical papers related to understanding of all kinds of EAC mechanisms including but not limited to hydrogen embrittlement, stress corrosion cracking, corrosion fatigue, liquid metal embrittlement, and so on. The papers can cover root cause failure analysis in service, lab testing methods, materials modeling, industry standards development, state of art EAC research reviews, and so on. Sponsoring Committee: TEG 186X Chair: Xi Shan Vice Chair: Fei Tang	Ernest N. Morial Convention Center-New Orleans	Room 228
Wednesday,10 a.m. to 5 p.m.	Inhibitors - Vapor Transported (VCI) and Surface Coating Rust Preventive (RP)	This symposium includes technical papers that discuss advances in rust preventatives & corrosion inhibitors, testing, method development, and performance testing. Sponsoring Committee: TEG 093X / TEG 145X Chair: Jennifer Clark Vice Chair: Jim Henderson	Ernest N. Morial Convention Center-New Orleans	Room 229
Wednesday,10 a.m. to 5 p.m.	Under Deposit Corrosion in Crude Oil Pipelines	This symposium includes technical papers about managing under-deposit corrosion (UDC) in crude oil pipeline systems, the physics of sediment accumulation, chemical and biological corrosion processes under deposits, UDC monitoring strategies, and mitigation activities that have been found effective at combating UDC. Sponsoring Committee: TEG 092X Chair: Trevor Place Vice Chair: Shoaib Nasin	Ernest N. Morial Convention Center-New Orleans	Room 230

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Wednesday,10 a.m. to 5 p.m.	Corrosion in Nuclear Systems (Day 1)	This symposium includes technical papers on the corrosion and degradation of materials in nuclear systems. Also, this includes technical papers on the understanding and mitigation of corrosion degradation in buried piping in Nuclear Power Plants taking into consideration the complexity and congestion in the plants. On buried piping issues, the symposium is specifically interested in Regulatory Requirements and issues related to grounding, bimetallic contacts, piping isolation, decoupling, materials selection, inspection of piping and coatings, and acceptance criteria for cathodic protection in such a congested environment. Sponsoring Committee: TEG 224x and TEG 465x Chair: Megan Dahl Vice Chair: Xihua He	Ernest N. Morial Convention Center-New Orleans	Room 232
Wednesday,10 a.m. to 5 p.m.	Recent Developments in Atmospheric Corrosion (Day 1)	This symposium includes technical papers that include technical details on atmospheric corrosion. Sponsoring Committee: TEG 189X Chair: James Dante Vice Chair: Eric Schindelholz	Ernest N. Morial Convention Center-New Orleans	R-08
Wednesday,10 a.m. to 5 p.m.	Localized Corrosion: Characterization and Control (Day 1)	This symposium includes technical papers focused on the characterization and control of localized corrosion using various approaches. Sponsoring Committee: TEG 407X Chair: Ajit Mishra Vice Chair: Marco Rapone	Ernest N. Morial Convention Center-New Orleans	R-06
Wednesday,10 a.m. to 5 p.m.	Advances in CUI Technologies	This symposium includes technical papers related to corrosion under insulation, coatings, insulation, metal jacketing corrosion, control technology. Sponsoring Committee: STG 03 Chair: Art Mackinnon Vice Chair: Ray Posgay	Ernest N. Morial Convention Center-New Orleans	Room 210

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Wednesday,10 a.m. to 5 p.m.	Corrosion Management, Planning, Development, Implementation & Success	This symposium includes technical papers relating to all aspects of corrosion management, across all industries (including oil & gas production and transportation, refineries, chemical, power generation, water & waste water, etc.). In particular, examples of the different challenges in the various industries and how they have been resolved successfully. Sponsoring Committee: STG 08 Chair: Gareth John Vice Chair: Carlos Palacios	Ernest N. Morial Convention Center-New Orleans	R-03
Wednesday,10 a.m. to 5 p.m.	Advances in Materials for Oil and Gas Production (Day 1)	This symposium includes technical papers that present advances in materials technology and research. Focus is on new and improved metallic materials and applications. This includes consideration and measurement of the material's performance in its envisaged exposure environment. Sponsoring Committee: STG 32 Chair: Julio Maldonado Vice Chair: Conchita Mendez	Ernest N. Morial Convention Center-New Orleans	R-01
Wednesday,10 :10a.m. to 10 :25a.m.	Localized Corrosion Behavior of Ferritic and Austenitic Passive Materials	Raul Rebak - Stainless steels are the workhorse alloys of aggressive industrial applications. Stainless steels may exist as ferritic, austenitic and duplex materials. Stainless steels are obtaining by adding chrome into iron alloys. Other elements such as molybdenum are also added to increase the resistance of these alloys to localized corrosion. Localized corrosion is generally caused by the concentration of chloride ions in localized spots of the metal. This paper will review the effect of the alloying elements on the microstructure and the resistance to localized corrosion both from the point of view of initiation and repassivation.	Ernest N. Morial Convention Center-New Orleans	

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Wednesday,10 :25a.m. to 10 :50a.m.	Development of Copper Alloys for Seawater Service from Traditional Application to State-Of-The Art E	James Michel, Carol Powell, Bopinder Phull, Ivan Richardson - Since antiquity both wrought and cast forms of copper alloys have exhibited significant corrosion resistance in marine environments. Their properties have been developed and modified over the years to meet today's exacting engineering challenges and continue to offer solutions to a range of industries requiring reliability in sea water including commercial and Naval shipbuilding, offshore seawater-handling and firewater systems, and thermal desalination plants. This paper will describe the range of copper alloys used from ships' cannon and hull sheathing in 18 and 19th century to condenser and sea water piping requirements which spurred concentrated investigations in the 20th century. These led to the development and introduction of copper-nickels and nickel aluminium bronzes (NABs), which are widely used today and are currently the most commonly used engineering copper alloys. The direction of future developments wil	Ernest N. Morial Convention Center-New Orleans

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Wednesday,10 :25a.m. to 10 :50a.m.	Cyclic CUI Testing of Insulation Materials	Soeren Rasmussen, Claudia Zwaag - Here we will talk about how stone wool insulation is made, raw material and evolvement in production technology. A systems approach to corrosion under insulation, causes and mitigating the risk of corrosion with non-contact insulation and non-metallic GRP jacketing system. A systems approach and solution based product approach from stonewool to cladding systems. Content will cover the following Critical Factors Surrounding Environment Cyclic or continuous operation Choice and installation of coating system Design Choice and Installation of the insulation system Tests done by end-user Actual Operation at live plant	Ernest N. Morial Convention Center-New Orleans

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Wednesday,10 :25a.m. to 10 :50a.m.	Infrastructure Corrosion Issues and Solutions on Military Bases	Vinod Agarwala - Many hangers, shelters and shilos used for storage of military weapons systems are several decades old and started to show signs of aging, corrosion assisted damage of support structures such as steel pipe stays, beams, joints, flashings, etc. in addition to roof. In particular, this paper will address the issues and solutions related with aging of a hanger which has corroded to a point that one has to address the sustainability of the structure as a major issue from atmospheric corrosion of roof and the cantilever support pipe stays under load and stress. In old infrastructures, there is a lack of redundancy in design of the support frames such as cantilever portion of the hanger roof, therefore, there is a concern that if one pipe-stay fails due to cross sectional metal loss from crevice/pitting corrosion, the adjacent stays would become potentially overloaded and cause the roof to fall.	Ernest N. Morial Convention Center-New Orleans

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Wednesday,10 :25a.m. to 10 :50a.m.	A Novel Peptide at a Very Low Concentration Enhanced Biocide Treatment of Corrosive Biofilms	Tingyue Gu, RU JIA, Dongqing Yang, Yingchao Li - Problematic biofilms cause biofouling and biocorrosion (also known as microbiologically influenced corrosion or MIC). Scrubbing (or pigging in the pipeline industry) and biocide dosing are often used to mitigate biofilms. Biofilm consortia deploy various mechanisms to resist biocide treatment. Overtime, biocide resistance occurs, leading to dosage escalation and eventually rendering a biocide unsuitable for a particular field operation. Biocide enhancers can help overcome or slowdown the trend. In this work, a novel peptide was used to enhance THPS (tetrakis hydroxymethyl phosphonium sulfate) biocide mitigation of a pure-strain biofilm and an oilfield biofilm consortium. In both biofilm prevention and biofilm removal tests, the peptide at a concentration below 1 ppm (w/w) showed excellent efficacies for the mitigation of the biofilms.	Ernest N. Morial Convention Center-New Orleans

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Wednesday,10 :25a.m. to 10 :50a.m.	Characterization of SCC Initiation Precursors in Cold-Worked Alloy 690	Karen Kruska, Ziqing Zhai, Stephen Bruemmer - Due to its superior resistance to corrosion and stress corrosion cracking (SCC), high Cr, Ni-base Alloy 690 is now commonly used in pressurized water reactors (PWRs). Even though highly cold-worked (CW) Alloy 690 has been shown to be susceptible to SCC crack growth in PWR primary water environments, an open question remains whether SCC initiation was possible for these materials under constant load test conditions. Testing has been performed on a series of CW alloy 690 CRDM tubing specimens at constant load for up to 15,000 hours in 360°C simulated PWR primary water. A companion paper will discuss the overall testing approach and describe results on different alloy 690 heats and cold work levels. The focus of the current paper is to illustrate the use of focused ion beam (FIB), scanning electron microscopy (SEM) and transmission electron microscopy (TEM) for the high-resolution investigation of precursor damage and intergranular (I	Ernest N. Morial Convention Center-New Orleans

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Wednesday,10 :25a.m. to 10 :50a.m.	Risk Based Approach to Integrated Asset Corrosion Management in the Oil and Gas Industry	Joseph Akanni, Edmund Oseahon, Oladipo Alonge - Oil and gas facilities are subject to degradation (corrosion) based on the fluid composition, operating conditions and environmental influence. As such, there is need to address the corrosion threats and mitigate their undesired consequences. This would entail developing a corrosion management strategy and system for the different types of equipment in the facility; the application of which would reduce the corrosion risks associated with operating the facility. Inspections activities are carried out to mitigate the inherent risk of degradation and possible failure of the equipment. Selection of inspection routines can be based on a fixed time interval or on the risk based inspection (RBI) interval. The risk based inspection approach is an optimal and fit for purpose inspection routine. This would require a detailed analysis of the risk of operating the facilities based on economic, health and safety consideration. An integrated co	Ernest N. Morial Convention Center-New Orleans

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Wednesday,10 :25a.m. to 10 :50a.m.	Long-Term Oxidation Performance of High-Temperature Alloys in the Presence of Water Vapor	Joseph Meyer - High-temperature alloys are susceptible to accelerated oxidation attack in the presence of water vapor, which can affect a components effective lifetime. The overall oxidation performance of the chromia-forming alloys is critically linked to the chromium reservoir as chromia scale is prone to vaporization when exposed to water vapor containing environments. This paper evaluates sheet and foil samples of two chromia- and two alumina-forming alloys, which were tested for 360 days in air + 10 vol. % H2O at 760oC and 871oC. The alloys were ranked based on weight change behavior as well as metal recession measurements, which includes metal loss, average internal penetration, and maximum internal penetration. The results showed that the Ni-based, chromia-scale forming alloy N06230 was more resistant than Fe-based N08120. An increased oxidation attack among the chromia-formers was observed in sheet samples compared to foil samples. Both alumina-scale forming alloys outper	Ernest N. Morial Convention Center-New Orleans

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Wednesday,10 :25a.m. to 10 :50a.m.	Sulfide Stress Cracking Fracture Toughness of 125 ksi Grade in Mild Sour Service Conditions	Florian Thebault, Stéphane Kemtchou, Julien Millet, Christelle Gomes, Jonathas Oliveira - NACE TM0177 Method D corrosion test is very frequently used for the determination of the fracture toughness of low alloyed steels in sour environments. The use of the standard NACE Solution A environment saturated by 1 bar H2S allows an efficient quality control of OCTG products for order release but does not provide KISSC values for well design in fit-for-purpose conditions. This is more especially true for 125 ksi grade which is essentially used in mild sour conditions. However, the definition of the most reliable test condition is still lacking consensus, more particularly regarding the appropriate test duration and pH buffering. Consequently, an extensive DCB testing program has been performed on 125 ksi grade sour service casing and coupling in 0.07 bar H2S gas for solving these issues and for providing meaningful KISSC values.	Ernest N. Morial Convention Center-New Orleans

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Wednesday,10 :25a.m. to 10 :50a.m.	Challenging AC Corrosion Mitigation System for 100-Mile Long Pipeline	Dale Lindemuth, Vera Kustova, Daniel Crabtree, Sergey Lisovoy - This paper details a comprehensive AC interference analysis and implementation of an extensive AC corrosion mitigation system for a 100-mile portion of a regulated pipeline in Texas and Louisiana. The pipeline is collocated with multiple high voltage overhead AC power lines and countless adjacent pipelines. It is routed through extensive swamplands and agricultural tracts in highly conductive soils. The field analyses, computer modeling to aid in designing the AC mitigation plan, challenges associated with the phased installation of the mitigation system, and operational performance data are discussed. The threat of AC corrosion was minimized through a combination of parallel mitigation conductors, deep vertical grounds, optimization of the pipeline cathodic protection level to reduce its effect on the AC interference, and remote surveillance of multiple electrical resistance type corrosion rate probes.	Ernest N. Morial Convention Center-New Orleans

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Wednesday,10 :25a.m. to 10 :50a.m.	[Failure Analysis on Underside (Soil) Corrosion of Above Ground Storage Tanks]()	Jayant Nair, Fahmi Al Mawali, Asad Al Ghafri, Naif Abri - The above ground storage tanks (AST's) in the refinery are facing an unprecedented form of bottom plate underside (soil) corrosion at the rate of 1mm/year. This has resulted in the failure of 4 tanks within a period of 9 years since commissioning (2006-2015). The corrosion morphology is of severe localized corrosion with large deep pits and corrosion lakes. The design of the underside corrosion protection for the AST's is by providing an impressed current cathodic protection (ICCP) system (MMO grid anode system). The grid anode is placed between the bottom plate and a HDPE (Release prevention barrier) sheet. Recent and past cathodic protection (CP) survey of the tanks clearly reveal a very low (electropositive) polarized potential across the tanks indicating the CP system has not been functioning since commissioning. From the failure analysis, it is concluded that the tanks are corroding at an unacceptably high rate and	Ernest N. Morial Convention Center-New Orleans

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Wednesday,10 :25a.m. to 10 :50a.m.	Characterization of Corrosion Behaviors on Additive Manufactured Alloy 625 and Ti-6Al-4V	Liu Cao - Additively manufactured metallic components are relatively novel and highly sought as final product for various applications across all manufacturing industrial sectors to replace cast or wrought alloy counterparts. However, there is a lack of qualification and certification protocols and liability data to evaluate the performance of materials produced by this method for service. The experience accumulated through welding process development indicates that the corrosion properties of additively manufactured metallic components result from the intrinsic heterogeneities and structural variation from manufacturing processes, which in principle are multi-pass welding overlays in a small scale. They both undergo liquification by injecting high thermal energy, fast solidification and subsequent reheat processes. This study is aiming to use microcell technique to characterize local corrosion characteristics of different regions on Ti-6Al-4V and Ni-based alloy 625 manufacture	Ernest N. Morial Convention Center-New Orleans

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Wednesday,10 :25a.m. to 10 :50a.m.	Interpretation and Selection of Direct Examination Locations with Respect to ECDA Methodology	Chukwuma Onuoha, Shamus McDonnell, Marc Wegner, Eric Pozniak, Greg Zinter, Vignesh Shankar - Interpretation of indirect inspection data and selection of direct examination locations are crucial steps in conducting successful external corrosion direct assessment (ECDA) process. This paper will show advances in interpretation of indirect inspection data and selection of ECDA direct examination location and how accurate selection of locations most susceptible to external corrosion would improve pipeline integrity. Comprehensive case studies from several ECDA digs, practical experience and lesson learnt from these case studies would be fully presented. Failure in oil and gas pipelines due to leaks has led regulators to require operators to implement ever more rigorous inspections. ANSI/NACE Standard Practice 0502 – Pipeline External Corrosion Direct Assessment Methodology has been developed to ensure safe operation of pipelines and prevention of external corrosion in non-piggable	Ernest N. Morial Convention Center-New Orleans

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Wednesday,10 :25a.m. to 10 :50a.m.	Role of Crack Tip Strain Rate on the Fatigue and Fracture Behavior of Line Pipe Steel in Sour Enviro	Thodla Ramgopal, Colum Holtam, Feng Gui - Fatigue crack growth rate (FCGR) behavior and fracture toughness of strained and aged line pipe steel was investigated in a sour inhibited environment. The effect of varying frequency and DK were investigated on the FCGR. The effect of wave form was investigated at a frequency of 0.1Hz to investigate the effect of crack tip strain rate. Tests were performed over a range of DK. The da/dN data was modelled based on the crack tip strain rate at each DK. Rising displacement fracture toughness tests were performed at a slow K-rate to determine initiation fracture toughness. The effect of loading mode was determined by comparing the crack growth rate (CGR) obtained under constant load versus constant displacement. The CGR from the rising displacement, and the FCGR at various DK and frequency were related to each other based on a crack tip strain rate model. The results appear to indicate that the CGR under rising displacement and the CG	Ernest N. Morial Convention Center-New Orleans

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Wednesday,10 :50a.m. to 11 :15a.m.	Electrochemical Crack Size Effect in Stress Corrosion Cracking and Corrosion Fatigue	Alan Turnbull - The chemical crack size effect on environmentally assisted crack growth was first demonstrated experimentally by Gangloff [1] and supported on a more robust theoretical framework by Turnbull et al. [2,3]. It is probably better dubbed the electrochemical crack size effect since the potential drop in the crack was a critical factor in determining the solution chemistry and the sensitivity to crack size. In recent experimental studies [4] we have focused on the growth rate of small and long stress corrosion and corrosion fatigue cracks in 12Cr steam turbine blade steels in low conductivity water containing 35 ppm Cl- (simulating upset steam condensate chemistry). A large effect of crack size on growth rate was observed for the same mechanical driving force. However, the crack-size effect disappeared in lower conductivity solution, 300 ppb Cl- and 300 ppb SO42- (corresponding to normal steam condensate chemistry). Furthermore, corrosion fatigue long crack growth	Ernest N. Morial Convention Center- New Orleans

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Wednesday,10 :50a.m. to 11 :15a.m.	How Many Excavations are Required to Confirm the Absence of SCC on a Pipeline Following SCCDA	Francois Ayello, Thomas Bubenik, Andrea Sanchez, Narasi Sridhar - How many excavations are required to confirm the absence of SCC on a pipeline following the SCCDA process? NACE’s Stress Corrosion Cracking Direct Assessment (SCCDA) is used by pipeline operators to infer the presence or absence of stress corrosion cracking (SCC) on a pipeline. Results from direct examinations of the pipeline are easy to interpret when SCC is found. It is more complicated when SCC is not found, how many digs are required to show that a pipeline is free from SCC? This paper examines the relationship between SCC modeling and the number of digs required to show that a pipeline is SCC free. Results show that when a reliable inspection prioritization model is used, few digs are required to infer that a pipe has a low probability of SCC. On the other hand, when a non-reliable SCC model is used the number of direct inspection required is high. Consequently the cost of the SCCDA process is directly lin	Ernest N. Morial Convention Center- New Orleans

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Wednesday,10 :50a.m. to 11 :15a.m.	Microstructural Influences of Corrosion Sensitization in Al 5XXX Series Aluminum Alloys	Erik Sundberg, Michael Free, Gaosong Yi, William Golumbfskie - Al 5XXX series aluminum alloys are being used in naval military applications, and being exposed to outdoor environments. With sufficient time and temperature exposure, these alloys undergo a process in which a secondary β phase forms at the grain boundary that sensitizes the alloy to stress corrosion cracking. The relationship between this sensitization and the microstructural features of Al 5083-H116, 5083-H131, 5083-H321, 5456-H116 aluminum alloys, such as grain boundary misorientation angle, dislocation densities, and β phase nucleation densities were examined and reviewed. Samples were aged for up to 30 months at varying temperatures (40°C, 50°C, 60°C, and 70°C), then analyzed using the ASTM G-67 mass loss test. Grain size and grain boundary information were collected via electron backscatter diffraction (EBSD). Geometrical dislocation density information was calculated from the EBSD data. SEM and AFM data were	Ernest N. Morial Convention Center-New Orleans

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Wednesday,10 :50a.m. to 11 :15a.m.	Corrosion Control for Above Ground Crude Oil Storage Tanks	Ajit Thakur - Corrosion Control for above ground crude oil storage tanks presents a real challenge due to the large and complex geometries involved, the proximity of anodes to the tank bottom, tank design etc. The issue is further complicated by the provisions such as leak detection system or specialised foundation design. Inadequate / inappropriate corrosion control may pose serious environmental and safety hazards if any leakage / seepage develop in the large crude oil storage tanks which handle enormous amounts of flammable hydrocarbons. Various solutions implemented to achieve effective corrosion control in Above Ground Crude Oil storage Tanks at various locations by energy major in India alongwith their effectiveness over a period of time is evaluated. The effectiveness of the implemented corrosion control methods has since been evaluated by periodic inspections during Maintenance and Inspections over a period of twenty years.	Ernest N. Morial Convention Center-New Orleans

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Wednesday,10 :50a.m. to 11 :15a.m.	Risk Analysis for Assessing AC Corrosion in Trasnmission Pipelines	Alfonso Garcia Rojas, Len Krissa, Jerry Dewitt - The development of transport systems fed with AC power has increased the risk of AC in transmission pipelines and awareness of pipeline integrity engineers. Several works have proved the detrimental effect of AC current on pipeline safety and corrosion of catholically protected pipelines. AC may be imposed on the pipelines through three different coupling mechanisms, resistive coupling, capacitive coupling and inductive coupling, but the resistive coupling and inductive coupling mechanisms promote AC corrosion during pipeline operation. In resistive coupling, the presence of a short circuit in the AC power due to a lighting strike or a steady state current leakage may discharge current on a nearby pipeline, increasing the pipe to soil voltage, coating stress, and likelihood of electric shock hazard at above grade pipeline appurtenance. In inductive coupling, the magnetic field produced around the power conductors generates an el	Ernest N. Morial Convention Center-New Orleans

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Wednesday,10 :50a.m. to 11 :15a.m.	Effect of Cold Deformation on Sulfide Stress Cracking of High Strength Steels	María José Cancio, Gustavo Kissner, Martin Valdez, Andres Anticevic - During pipe-ends dimensional modification prior to connections threading operation (pin swaging and box expansion), the material suffers from a cold deformation process. Hence the deformation process is followed by a post deformation heat treatment (PDHT) with the objective of recovering the material properties to its original condition (pipe body). If not correctly understood, designed and performed this process could have both mechanical and metallurgical effect on the pipe-end material and hence affecting the pipe performance in service. Therefore, it is not only a primary concern from the OCTG manufacturers, but also from Oil and Gas users. The evaluation of such process in actual connections is limited due to geometrical constrains and the interpretation results is difficult due to the scatter introduced by the properties gradient along the pipe end. This work intends to evaluate the effect of controlled	Ernest N. Morial Convention Center-New Orleans
Wednesday,10 :50a.m. to 11 :15a.m.	Differences in Fireside Corrosion Under Simulated Char and Lignite Conditions	Mathias Galetz, Mario Rudolphi, Michael Spiegel - Different alloys have been tested under char and lignite conditions to evaluate their resistance to type II hot corrosion.	Ernest N. Morial Convention Center-New Orleans

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Wednesday,10 :50a.m. to 11 :15a.m.	Corrosion Looping for Down Stream Petroleum Plants: An Enigma for RBI Engineers, A Perspective From	Muazu Mohammed, Wehib Adus, Mohamud Farah - Corrosion Looping for Down Stream Petroleum Plants: An enigma for RBI engineers, a perspective from the Mechanical Integrity II project of Saudi Petrochemical Company (SADAF) A SABIC Affiliate Adus Wehib, M. Mohammed, Mohamed M. Farah PhD, Piping failures represents the greatest risk to the integrity of metallic components in down-stream hydrocarbon sector. The implementation of Mechanical Integrity (MI) systems in the downstream petroleum sector differ based on the interpretation of various Industry standards, it is not uncommon to see numerous failures in refineries and petrochemical industries after the implementation of integrity management system. Generally, the down-stream industry currently adopts Mechanical Integrity (MI) systems with Risk Based Inspection (RBI) techniques. RBI implementation requires focused effort from many disciplines within the organization to ensure that it is fully integrated and reliable. Poorly designed	Ernest N. Morial Convention Center-New Orleans

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Wednesday,10 :50a.m. to 11 :15a.m.	Precursor Evolution and SCC Initiation of Cold-Worked Alloy 690 in Simulated PWR Primary Water	Ziqing Zhai, Mychailo Toloczko, Karen Kruska, Stephen Bruemmer - Stress corrosion crack (SCC) initiation of two thermally-treated alloy 690 CRDM tubing heats in 21% and 31% cold-worked (CW) conditions have been investigated using constant load tensile tests (CLT) and blunt notch compact tension tests (BNT) in 360oC simulated primary water. All specimens were constantly monitored by direct current potential drop (DCPD) to detect the onset of cracking. SCC initiation was not detected by DCPD for the CLT specimens loaded at their yield stress for ~9,220h, however intergranular (IG) precursor damage and isolated surface cracks were observed on two of the 31%CW specimens. Some evidence for IG precursors was also discovered on the 21%CW CLT specimens without any significant crack nucleation. On the other hand, crack initiation was detected by DCPD after ~11,700h in the BNT specimens from the same two 31%CW CRDM materials loaded at moderate stress intensity. Blunt notch testing includ	Ernest N. Morial Convention Center-New Orleans

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Wednesday,10 :50a.m. to 11 :15a.m.	Combined Effects of Microbes and Nitrate on SRB Growth, Souring and Corrosion	Bei Yin, Kenneth Wunch - Controlling reservoir souring is critical to successful production and asset protection in hydrocarbon recovery. Nitrate injection has been widely used in water flooding as a primary barrier for controlling biologically generated sulfide in oil reservoirs. Souring control via nitrate implementation is dynamically affected by the interactions between nitrate-reducing bacteria (NRB) and sulfate-reducing bacteria (SRB). Resultantly, it is important to understand how the community profile and the availability of electron acceptor/donor in the environment controls the effectiveness of nitrate on SRB growth, sulfide levels, and corrosion. In laboratory studies, the efficacy of nitrate treatments were evaluated on SRB (with or without nitrate-reducing capability) combined with various NRB including denitrifiers (reduce nitrate to N2), nitrite-producing NRB, and sulfide-oxidizing NRB, in the presence of different concentrations of electron acceptor/donor of t	Ernest N. Morial Convention Center-New Orleans

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Wednesday,10 :50a.m. to 11 :15a.m.	Corrosion Risk Assessment Through Dynamic Environmental Monitoring on Board a Naval Ship	Cosima Boswell-Koller, Victor Rodriguez-Santiago - Naval aviation and materiel are constantly exposed to environments conducive to corrosion and subsequent maintenance/repair of corrosion products remains a huge budgetary concern for the Naval Air Enterprise (NAE). As such, ongoing research into the prediction and prevention of corrosion within the fleet is necessary. Environmental exposure sites provide the closest correlation between corrosion degradation and damage experienced in-service; unfortunately, this type of testing is time-consuming, not widely accessible, and provides cumulative data only. Consequently, an in-depth understanding of the naval operating environment is crucial both in the prediction and mitigation of corrosion damage. In this work, we present results of dynamic environmental monitoring on-board a naval ship, and its correlation to corrosion degradation. A device measuring solution resistance across a gold interdigitated electrode, as well as surface t	Ernest N. Morial Convention Center-New Orleans

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Wednesday,10 :50a.m. to 11 :15a.m.	Comparison of Insulation Materials and Their Roles in Corrosion Under Insulation	Thunyaluk Pojtanabuntoeng, Brian Kinsella, Hoda Ehsani - Thermal insulation is used in petrochemical and refinery plants where pressure vessels and piping system are insulated to conserve energy. Over time, water enters into the insulation through various pathways and entraps at the steel surface leading to corrosion under insulation (CUI). Even though it is prone to absorbs water, mineral wool is one of the most used thermal insulation possibly due to its low cost and/or it has already been installed on the equipment. A water repellent insulation can be an alternative thermal insulation to prevent CUI. However, limited research has been done in the public domain. Therefore, the present study investigates and compares the roles and influences of mineral wool and aerogel insulations on CUI. Chemical analysis of aqueous extracts from both insulations is performed in accordance with ASTM C871. The susceptibility to CUI of carbon steel is investigated at 80 oC using a newly develo	Ernest N. Morial Convention Center- New Orleans

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Wednesday,10 :50a.m. to 11 :15a.m.	Estimating Metal Loss in a Marine Environment for Structural Integrity Analyses	James Ellor, Elisabeth Kuespert - The following paper discusses models and procedures for estimating the corrosion-related metal loss and loss patterns on carbon steel exposed in a marine environment. This includes immersion and atmospheric exposure and the impact of coatings. Critically, the discussion attempts to illustrate the fallacy of assuming uniform metal loss and distinguishes between average metal loss and maximum metal loss. The distinction between average metal loss and actual loss patterns can have significant impacts regarding the lifetime integrity of an engineered structure in a marine environment.	Ernest N. Morial Convention Center-New Orleans

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Wednesday,11 :5a.m. to 11 :30a.m.	Chemical Evaluation of Corrosion Product from Known Sources	Kimberly Steiner - Those working in corrosion consultation are often asked to opine on the source and timeframe of corrosion, and may only have the corroded samples to work with and a limited history of the service life, without access to reference samples of corrosion product produced from known exposure. Many literature sources present case studies of corrosion occurring in a variety of environments where the mechanism of corrosion is deduced based on prior experience and literature surveys, but the chemistry of the environment leading to the corrosion is either unknown or not discussed. The work to be presented involves laboratory exposure testing of carbon steel to waters originating from different regions throughout the United States with varying chemistries and chloride levels. The results of laboratory chemical analyses, including elemental analysis by SEM/EDS and analysis by x-ray diffraction will be correlated to the water chemistry.	Ernest N. Morial Convention Center- New Orleans

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Wednesday,11 :15a.m. to 11 :40a.m.

Marine Structural Integrity Subject to Mechano-Electrochemical Induced Corrosion

Yikun Wang, Julian Wharton, Jon Downes, R. Shenoi -

Marine structural integrity subject to mechano-electrochemical induced corrosion

Y. Wang(1,2*), J.A. Wharton(2), J. Downes(1), R.A. Shenoi(1)

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Abstract
Carbon steel marine platforms, including ships and offshore structures, are at high risk of corrosion due to the combination of aggressive seawater environment, corrosive cargoes and constantly changing loading conditions. In particular, the combined influence of mechanical and electrochemical effects (which is often termed mechano-electrochemistry) has gained increasing attention over the last decade. Although various experim

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Wednesday,11 :15a.m. to 11 :40a.m.	Performance of Three Types of Coatings in a Simulated Corrosion Under Insulation Condition	Junki Miyashita - Corrosion Under Insulation (CUI) has been recognized as a serious threat to safe plant operation. Severity of CUI varies depending on various factors such as operating conditions, materials selection of the facilities, coatings selection, and thermal insulation system selection and so on. Among them, selection of robust coating is one of the most effective methods to mitigate CUI. As typical examples of the coatings, epoxy type, inorganic copolymer type, and Thermal Sprayed Aluminum (TSA) coatings are being adopted in oil and gas facilities in accordance with corrosion management philosophy of owners. However, there are no reports which compare the performance (i.e., resistance against CUI) of these coatings under the same conditions. In this paper, coating performance of three types of coatings used in recent oil and gas facilities are compared in accordance with the widely applied testing method. Finally, based on the test results and recent experiences in de	Ernest N. Morial Convention Center-New Orleans

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Wednesday,11 :15a.m. to 11 :40a.m.	Multiplexed Sensor Array for Accurate Time-of-Wetness (TOW) Measurement	Nathaniel Sutton, Hongbo Cong, Shengxi Li, Xiaoliang Zhu, Jiang Zhe - A variety of factors influence atmospheric corrosion of metals, including time-of-wetness (TOW), relative humidity (%RH), structure geometry, and the presence contaminant particles, among others. Furthermore, different areas of the same structure may experience different wetting patterns, surface temperatures, and local relative humidity. However, current technology is limited, detecting the presence of water through conduction of an electrolyte by measuring galvanic current, resistance, or impedance. Wetness is determined by comparing the sensor output to a predefined threshold value. In many cases, such parameters correlate poorly to physical corrosion phenomena. In this work, we attempt to demonstrate the functionality of a miniature sensor array for accurate Time of Wetness (TOW) measurement. The array, consisting of 5 by 5 interdigital transducer (IDT) based sensors, aims to both (1) determine the ratio	Ernest N. Morial Convention Center-New Orleans

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Wednesday,11 :15a.m. to 11 :40a.m.	Atmospheric Microbiologically Influenced Corrosion	Xihua He, Pavan Shukla - In the United States, a large fraction of spent nuclear fuel is stored in dry cask storage systems (DCSS). Most DCSS designs use canisters fabricated with austenitic stainless steel. The canisters are placed either horizontally or vertically inside a metal or concrete shielding structure with vents to allow airflow for cooling. Canisters may be exposed to airborne species that enter through the vents and deposit on the surface. Brine could then form by the process of deliquescence in high-humidity conditions, and support microbial activity. Microbiologically influenced corrosion (MIC) is a process by which numerous types of microbes, ranging from iron-oxidizing, iron-reducing, sulfate-reducing, acid-producing and exopolymer-producing bacteria, deteriorate metals through their metabolic activities. Some types of MIC are dependent on the physical interaction between the metal surface and a microbial biofilm, where oxygen is depleted on the metal surfa	Ernest N. Morial Convention Center-New Orleans

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Wednesday,11 :15a.m. to 11 :40a.m.	Optimization of the DL-EPR Method for Detecting Sensitization in Alloy 690	Martin Rodriguez, Magalí Gonzalez, Mariano Kappes, Ricardo Carranza, Raul Rebak - Alloy 690 is one of the current choices for nuclear power plant steam generator tubing. However, several submodes of stress corrosion cracking have been identified for this alloy in the laboratory, which eventually could manifest as failures in service. The intensity of some stress corrosion cracking (SCC) submodes, in particular SCC in the presence of reduced sulfur species, increases with sensitization. Sensitization is produced in some alloys after exposure to temperatures in the order of 500 to 800°C, when chromium carbides precipitate at grain boundaries, causing a local depletion of chromium in the surrounding zone. Some process used in steam generator fabrication, like welding and stress relief treatment, can result in sensitization of grain boundaries. Sensitization can be detected electrochemically, as has been accomplished for austenitic stainless steels with the double loop electrochemi	Ernest N. Morial Convention Center-New Orleans

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Wednesday,11 :15a.m. to 11 :40a.m.	Understanding the Total Cost of a Corrosion Issue in the Oil and Gas Industry	Laura Cardenas, Alexander Williamson - The total cost of corrosion in the oil and gas industry is an often overlooked subject when evaluating the impact of an upset or failure due to corrosion. Costly issues can arise when as little as a single piece of equipment is not designed to properly mitigate corrosion. Not only is there a need to replace the failed piece of equipment but there are many other costs to consider, including, but not limited to: environmental and cleanup costs, safety related costs, unnecessary corrosion inhibition costs, and costs associated with potential future failures at other projects that have utilized similar designs and processes. In this case study, a SAGD facility in Northern Alberta is examined as it experienced two very similar failures in heat exchanger tubes within 2 years of each other due to a boiler feed water (BFW) tank being operated without a nitrogen blanket and a low flow condition. High amounts of oxygen were able to dissolve into th	Ernest N. Morial Convention Center-New Orleans

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Wednesday,11 :15a.m. to 11 :40a.m.	Hot Corrosion of Steels in Chloride Salts for Concentrated Solar Power Generation Environments	Jared Logier, Jason Wang, Obed Villalpando, David Gilmartin, Vilupanur Ravi - Molten salts have emerged as viable candidates for thermal energy storage Concentrated Solar Power (CSP) generation. Chloride salts are readily available and stable at high temperatures, thus opening up the possibility for increased power generation efficiency. However, molten chlorides are corrosive; therefore, proper materials selection for plant hardware is important. Current CSP plants use stainless steels as materials of construction because of the desirable combination of mechanical properties and corrosion resistance. In this research project, two different stainless steels (UNS S30400 and UNS S31600) and a carbon steel, i.e., UNS G10180, were tested at 450, 550, & 700°C under a NaCl-KCl-MgCl□ salt eutectic. DC electrochemical techniques were utilized to characterize the corrosion behavior of these steels. The morphology of attack was determined using optical and scanning electron microscopy c	Ernest N. Morial Convention Center-New Orleans

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Wednesday,11 :15a.m. to 11 :40a.m.	SSC Resistance of a Double Quench and Tempered T-95 Casing in Extremely Sour and High Pressure Envir	Weiji Huang, Kumar Amit, Chong Li, David Fischer - In the recent development of upstream oil and gas fields, we have extremely sour reservoir which contain high concentration of acid gases. The H2S and CO2 concentration can go up to 45% and 20%, respectively. In addition, the bottomhole pressure is over 10,000 psi. To design the wells for safe operation, the high SSC resistance of low alloy steel casing is demanded. In this study, a double quench and tempered T-95 casing was selected. The casing has average KISSC valued 33 ksi in1/2 tested in NACE Solution A. The test matrix of this study was carefully designed to evaluate the penalties of temperature, pH and pressure on KISSC of the T-95 casing. Also, the formation of hydrate under high pressure tests was avoided by employing the solubility model developed in-house to select right conditions. The test results showed that the temperature penalty on KISSC was substantial in extreme sour environment. The pH effect is al	Ernest N. Morial Convention Center- New Orleans

Wednesday,11 :15a.m. to 11 :40a.m.	Review of Recent Developments in Induced AC Current Corrosion Mitigation Design, Materials, Installa	Todd Sirola - The issue of induced AC current corrosion and its mitigation for buried pipelines has seen increased interest and rapid development of new technologies for mitigation and monitoring in the last 5 to 10 years. These include work on development of a NACE International Standard Practice for AC current corrosion on cathodically protected pipelines, updates to the AC corrosion mitigation design criteria, new materials and installation methods, and AC corrosion current density remote monitoring technologies. This paper presents a comparison of the design methods and mitigation technologies that were used in the past, and those that have been developed and continue to evolve, to meet the current challenges faced by the buried pipeline operators.	Ernest N. Morial Convention Center-New Orleans

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Wednesday,11 :15a.m. to 11 :40a.m.	Effects of Different Corrosion Control Systems and Fluid Services on AST Inspection Practices	Mohammed Lutfallah - Aboveground Storage Tanks (AST) degradation is mainly caused by bottoms corrosion, which occurs on bottoms product-side and soil-side as a result from the interaction between the steel and the surrounding environments . Different corrosion control and mitigation measures have been deployed to minimize the corrosion damage and subsequently increase tanks reliability and integrity. This paper evaluated the effectiveness of different applied AST bottoms corrosion control systems. The paper includes a case study, where historical inspection records of more than fifty (50) AST with different hydrocarbon fluid services and bottoms corrosion control systems are reviewed and analyzed. The study reveals that applied product-side corrosion control systems were effective, whereas, examined solid-side corrosion control systems shared similar shortcomings. In addition, the analysis results were discussed against inspection requirements of two internationally adopted AST	Ernest N. Morial Convention Center-New Orleans

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Wednesday,11 :15a.m. to 11 :40a.m.

Thin Film Water Based Coatings with Nano Vapor Phase Corrosion Inhibitors

Markus Bieber, Robert Kean, Boris Miksic, Rick Shannon, Ming Shen -

The use of single component water based coatings for protection of metal substrates continues to grow due to low odor, health and safety advantages, easy cleanup and environmental friendliness. The challenge continues to be finding alternatives to the traditional chromate, zinc or similar heavy metal type corrosion inhibitors which tend to rely on passivation or sacrificial cathodic protection. Additionally, ongoing regulatory developments continue to tighten the usage of products containing these heavy metals thus forcing the need for alternative technologies. The use of nano vapor phase corrosion inhibitors provide an attractive alternative by adsorbing onto the metal substrate and filling the voids or microcrevices of the substrate and preventing corrosion from starting or growing once the surface of the coating has been damaged. This technology has been proven effective in single component water based coati

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Wednesday,11 :15a.m. to 11 :40a.m.	ACVG or DCVG - Does it Matter?	Jim Walton - With the most recent NPRM that addresses pipeline integrity and indirect inspections, there is language that relates to DCVG and ACVG including certain criteria associated with what must be addressed after completing DCVG or ACVG surveys. While generally DCVG and ACVG are categorized as having the ability of finding coating defects, there can be a major difference in the success of the chosen technique depending on the pipeline conditions. There can be a major difference between the two techniques in certain conditions. This paper would point out when and why to use either technique including what the critieria of percent IR and decibal microvolt really mean when conducting these survey techniques.	Ernest N. Morial Convention Center-New Orleans

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Wednesday,11 :15a.m. to 11 :40a.m.	Corrosion-Fatigue of Steels in Sour Environments: Effects of Strain on the Electrochemical Behavior	Diego Leyser, Claude Duret-Thual, Sandra Leang, Nicolas Desamais, Virginie Querez, David Delafosse, Cédric Bosch - Corrosion-fatigue in sweet and sour corrosion was experimentally analyzed with a focus on the mutual interactions between mechanical solicitations and electrochemical reactions. The cyclic changes of corrosion current density were measured during corrosion-fatigue tests on a cold-worked grade of carbon steel in an artificial seawater solution (ASTM D1141), saturated with CO2 with and without the presence of H2S. The experiments were realized in potentiostatic conditions with an "imposed open circuit potential" approach e.g. the steady-state electrochemical potential value is acquired from the sample at unloaded condition and kept constant throughout the corrosion-fatigue test. Trapezoidal load waves were used in order to emulate the stress transitions with constant strain rate and the stabilization decays during constant levels of stress (in traction, compression and u	Ernest N. Morial Convention Center-New Orleans

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Wednesday,11 :15a.m. to 11 :40a.m.	Effect of Cold-work on Repassivation and Corrosion Behaviors of Carbon Steels and Stainless Steels	Gaoxiang Wu, Preet Singh - The strain-induced accelerated localized corrosion has been reported for many alloys in structural and functional applications. To understand the effect of cold-work on corrosion behavior of alloys, samples of carbon steel A569 and stainless steels, strained to different amounts by cold rolling were used to study on their corrosion behavior. The strain energy stored in cold-worked samples can increase the driving force for both types of reactions (i.e. active corrosion or repassivation), therefore enhancing the chemical reaction rates. As a result, cold-rolled carbon steel samples, in their active state, undergo a higher general corrosion rate than the equivalent annealed carbon steel samples, and the effect is enhanced at elevated temperatures. However, the cold-worked carbon steel samples form a passive film in the borate buffer solution at a faster rate than the annealed carbon steel samples. Pitting behavior was also found to accelerate on cold-wo	Ernest N. Morial Convention Center-New Orleans

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Wednesday,11 :30a.m. to 11 :30a.m.	Effect of Microstructure on the Corrosion Resistance of Super Duplex Stainless Steels: Materials Per	Mariano Iannuzzi, Mia Bernås, Ida Westermann, Christian Lauritsen, Roy Johnsen, Anders Jernberg - Although super duplex stainless steels (25Cr SDSS) are extensively used in oil and gas production due to their excellent combination of mechanical properties and corrosion resistance, they are susceptible to the precipitation of deleterious phases during heat treatment and manufacturing operations including welding. Deleterious phases, in turn, affect both localized corrosion resistance and mechanical properties. Despite the fact that current international standards such as ISO 21457, NORSOK M-001 and NORSOK M-630 treat most 25Cr SDSS grades as equivalent, debate still exists as to whether alloying elements such as tungsten (W) accelerate or retard the formation of detrimental phases. Understanding the effect of alloying elements on phase transformation kinetics can help streamline fabrication by optimizing, for example, welding procedures. In this work, the effect of W on the pre	Ernest N. Morial Convention Center-New Orleans

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Wednesday,11 :40a.m. to 12 :5a.m.	The Dilemma Found During Investigative Digs	Joseph Pikas - Due to great chemistry and metallurgical innovations of the steel industry, higher strength steels have made significant strides, in specified minimum yield strength (SMYS), wall thickness control, toughness, weight per foot, etc. However, one significant factor in these great improvements was no consideration for corrosion allowances. It has decreased with every incremental increase in the making of higher strength steels. Corrosion in carbon steel is the same whether it is a 35,000 yield pipe or an 80,000 yield pipe or 0.375" wall thickness versus 0.215" wall thickness. 25% wall loss on 35,000 yield pipe results in a 44% on the higher strength steel pipe. Lower strength steel direct assessment results in recoat type repair while higher strength steel results in a composite repair or replacement. Unfortunately, the US coating industry and pipeline operators have not kept up with these changes to offset or compliment the improvements in great improvements m	Ernest N. Morial Convention Center-New Orleans

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Wednesday,11 :40a.m. to 12 :5a.m.	The Influence of Scale Formation on the AC Corrosion of API Grade X65 Pipeline Steel Under Cathodic	Elmira Ghanbari, Robert Lillard - In a previous investigation we compared AC corrosion rate data generated from weight loss experiments with the results from a model for AC corrosion that was developed using a modified Butler-Volmer approach. The model considered the anodic and cathodic Tafel slopes, diffusion limited oxygen transport, interfacial capacitance and solution resistance. Both experimental and model results highlighted the importance of the interfacial capacitance on the rate of AC corrosion, especially at a frequency of 60Hz. In the present work, we extend this finding to investigate the influence of scale formation on AC corrosion rates. Scale formation at a holiday in a pipeline coating, such as calcium deposits, carbonate deposits or corrosion product, change the interfacial capacitance of the steel. Thus, steels in soils which are prone to the formation of these scales may have greatly different AC corrosion rates for equivalent AC current and pipe-to-soil po	Ernest N. Morial Convention Center-New Orleans

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Wednesday,11 :40a.m. to 12 :5a.m.	Optimization of Side-Groove Configuration On DCB Test	Jun Nakamura, Keiichi Kondo, Hisashi Amaya, Mutusmi Tanida - The Double Cantilever Beam (DCB) test method standardized in ANSI NACE TM0177 is increasingly applied as a quality assurance test to specify the performance of carbon and low alloy steels for sour service. The DCB test can contribute to the quantitative evaluation of fracture toughness in a specific environment via assessment of the crack arrest of a pre-cracked specimen. The test method has been modified and specified tightly from the view point of specimen geometry, test environment, and initial stress intensity factor controlled by arm displacement to obtain highly repeatable test results. In this paper, the influence of various side-groove root configurations on K1SSC and Finite Element Analysis (FEA) results were focused upon, because different types of V notched side-groove roots are considered to change the stress concentration at the bottom of the side-groove and therefore affect the incidence of edge crack oc	Ernest N. Morial Convention Center- New Orleans

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Wednesday,1 p.m. to 1 :25p.m.	Materials and Corrosion Risk Mitigation Associated with Flowback of Acid Stimulation Fluids	Sandra Hernandez, Mark Knobles, Lindsey Goodman, Ronald Schutz - Acid stimulation is a growing practice to improve well productivity in the deep water subsea environment. Acid “flowback”, in which the acid returns are transported through the subsea system and topside processing facilities, is not a routine activity and poses significant materials, corrosion and degradation risks. Live acid contains corrosion inhibitor to protect the metallurgy during treatment operations, however most; if not all of the corrosion inhibitor is spent once entering the reservoir. After the well is opened to production, the spent acid is flowed back containing little or no corrosion inhibitor to protect the wellbore equipment, flowlines/pipelines, risers, tapered stress joints, flexible lines, facility piping and pressure vessels. In addition to corrosion, Environmental cracking is a major threat in acid fluids especially for Titanium alloys. This presents a challenge for the diligent operator	Ernest N. Morial Convention Center- New Orleans

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Wednesday,1 p.m. to 1 :25p.m.	Corrosion Behavior of Selected Alloys in Kraft Recovery Boiler Superheater Environments	Kasey Hanson - Energy demands of the modern pulp and paper mill are satisfied, in part, from turbine engines powered by heating steam within superheater tubes located in the upper furnace of kraft recovery boilers. Thus, in order to improve the energy generation efficiency of the steam turbines, raising the operating temperatures of recovery boilers is one solution to achieve higher steam temperatures. However, elevating the recovery boiler operating temperature results in increased fireside corrosion of superheater tubes, which are exposed to molten salts and gaseous environments. Furthermore, corrosion rates drastically increase upon exceeding the first melting temperature of superheater tube deposits. This research aims to develop a fundamental understanding of the synergistic effect between molten salt and hot gaseous environments on corrosion mechanisms in kraft recovery boiler superheater tubes. Tests were done under simulated superheater gaseous conditions on bare alloy	Ernest N. Morial Convention Center- New Orleans

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Wednesday,1 p.m. to 1 :25p.m.	Combining CP System and Pressure Monitoring at Gas Storage Fields Using Wireless Networked Systems	Jamey Hilleary - Underground gas storage facilities provide unique challenges for monitoring and data acquisition. Cathodic protection (CP) data and internal corrosion rate data can be valuable for casing and pipeline integrity management, and frequent pressure measurements can alert system operators in the event of a potentially dangerous overpressure condition. Typically this data acquisition requires multiple systems providing the data to different departments and users within the operating organization. Timely access to comprehensive data from the storage field can help prioritize preventive maintenance and facilitate rapid response to system anomalies and failures that could be catastrophic. Recent incidents have greatly raised interest in the integrity management of underground gas storage facilities. The presentation discusses use of combined direct monitoring and wireless local networking technologies allowing multiple data types from several locations in the gas sto	Ernest N. Morial Convention Center-New Orleans

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Wednesday,1 p.m. to 1 :25p.m.	Prioritization of Potential HVAC Interference on a 6,000 Mile Transmission Pipeline System	Meng Lopez-Garrity, Phil Simon, Daniel Wagner - This paper describes the methodology used to identify and prioritize mitigation efforts of potential HVAC transmission line interference locations on a large transmission system in the United States. Satellite imagery with pipeline and HVAC transmission line GPS coordinates overlaid, was first used to develop a data base of potential locations. The data base included the geophysical relationship of the location (pipeline/HVAC line geometry), pipeline coating type, HVAC line voltage and tower/circuit geometry and site soil resistivity estimate. An algorithm was then developed using this data base to calculate and rank relative interference risk for each identified location. The algorithm included three primary risk factors; Steady state induced and fault personnel safety, induced AC assisted corrosion and fault arcing pipe wall/coating damage. Keywords; HVAC interference, pipelines, AC assisted corrosion, personnel safety, fa	Ernest N. Morial Convention Center-New Orleans

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Wednesday,1 p.m. to 1 :25p.m.	Necessity and Challenges of Using a Float Coat for Preservation of Ballast Tanks	John Wulterkens, Casey Heurung, Houssam El Din Ahmed - *Full Title - The Necessity and Challenges of Using a Float Coat for Preservation of Ballast Tanks and Similar Systems* Traditional water treatment methods pose several challenges to large-vessel preservation. The economics of continuous dosing and environmental restrictions concerning the disposal of treated water need to be considered. One solution to these challenges involves the application of an immiscible corrosion inhibiting oil partition on the water surface (henceforth referred to as a “float coat”). This paper will examine challenges unique to these systems, their method of application, evaluation techniques, and synergistic treatment systems (e.g. oxygen scavengers).	Ernest N. Morial Convention Center-New Orleans

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Wednesday,1 p.m. to 1 :25p.m.	Application of Electrochemical Noise Technique to Study Carbon Steel Corrosion Under Sand Deposit	Yang Hou, Chris Aldrich, Katerina Lepkova, Laura Machuca Suarez, Brian Kinsella - The corrosion process of carbon steel in the presence/absence of silica sand deposit in chloride-containing solution at room temperature was monitored by use of electrochemical noise (EN). General corrosion rate calculated from EN was compared with that obtained from conventional electrochemical techniques, such as linear polarisation resistance (LPR) and electrochemical impedance spectroscopy (EIS), and weight loss method. After tests, the corroded steel surfaces were analysed using a 3D profilometry to gather information about localized defects. The present paper explores the potential of electrochemical noise as a useful tool for the study of under deposit corrosion.	Ernest N. Morial Convention Center-New Orleans

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Wednesday,1 p.m. to 1 :25p.m.	Irradiation Accelerated Corrosion of 316L Stainless Steel, T91, and Zircaloy-4 in Primary Water	Stephen Raiman, Peng Wang - 316L stainless steel, T91, and Zircaloy-4 were irradiated with a proton beam while simultaneously exposed to simulated PWR primary water. Samples were exposed for 4-72 hr in 320°C water with 3 wppm hydrogen while simultaneously irradiated at surface dose rates from 400-4000 kGy/s (7E-7 to 7E-6 dpa/s). After exposure, samples were characterized with TEM, EDS, and Raman spectroscopy to determine the effects of radiation on the growth and stability of the oxide films. Radiolysis was found to alter the oxide morphology and composition of F-M and stainless steel, while having no discernable effect on Zircaloy corrosion. Direct irradiation, however, caused a large increase in oxide thickness in Zircaloy. Oxide films on stainless steel were found to be deficient in protective oxides, suggesting a loss of passivity. This paper reports new insights into the effects of radiolysis and radiation damage on corrosion behavior of several materials used in light wate	Ernest N. Morial Convention Center-New Orleans

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Wednesday,1 p.m. to 1 :25p.m.	Accelerated Corrosion of 2304 Duplex Stainless Steel by Marine Pseudomonas Aeruginosa Biofilm	Dake Xu - Accelerated Corrosion of 2304 Duplex Stainless Steel by Marine Pseudomonas Aeruginosa Biofilm Enze Zhou, Huabing Li, Dake Xu, Ke Yang Microbiologically Influenced Corrosion (MIC) in the marine environment has caused a serious threat to the safety of the materials. The MIC corrosion rate is usually much faster than the conventional corrosion process. 2304 duplex stainless steel (DSS) has been widely used in marine environment, which is one kind of economical and durable marine duplex stainless steel, however, the MIC investigation of 2304 duplex stainless steel (DSS) is barely known. In this work, surface analysis and electrochemical techniques were used to study the biocorrosion behavior of 2304 DSS in the presence of Pseudomonas aeruginosa. Compared with the abiotic control coupon, the measurement of the deepest pit depth showed that the Pseudomonas aeruginosa biofilm greatly accelerated the pitting corrosion of 2304 DSS (4.8 µm vs. 11.0 µm). The presence of Pseu	Ernest N. Morial Convention Center-New Orleans

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Wednesday,1 p.m. to 1 :25p.m.	Quantitative Comparison of Outdoor Sites and Accelerated Test Methods Using Optical Profilometry	David Jackson, Kristen Williams - Standardized accelerated corrosion testing is required to qualify new, environmentally-friendly coating systems, but analysis of accelerated test articles is often based on a qualitative visual inspection. A quantitative technique was developed to assess the extent of corrosion damage in two sets of coated lap coupons: one that was exposed at several outdoor test sites and another that underwent both neutral and acidified salt fog testing. The technique included imaging and analyzing the corroded surfaces with 3D optical profilometry. Scribes were imaged separately to obtain 2D and 3D surface profiles of corrosion morphology. Profilometry data was then analyzed to determine several surface parameters, including maximum scribe depth, average scribe depth, scribe volume, lateral surface area, and contour surface area. Additional comparisons were made between chromated and non-chromated coating systems, static and cyclic testing protocols, and dif	Ernest N. Morial Convention Center-New Orleans

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Wednesday,1 p.m. to 1 :25p.m.	Spread of Corrosion Assessment on Flexible Elastomeric Insulation Systems in a Continuous Salt-Water	Luis Mario Rodriguez - Full title: SPREAD OF CORROSION ASSESSMENT ON FLEXIBLE ELASTOMERIC INSULATION SYSTEMS IN A CONTINUOUS SALT-WATER SPRAY ENVIRONMENT Abstract Closed cell, flexible elastomeric foam (FEF) insulation materials have long been known to offer benefits with regards to mitigating corrosion under insulation (CUI). Despite a number of real-life case studies stretching back more than 30 years, it was not until very recently that the performance of FEF insulation materials with respect to CUI in offshore environments were properly assessed. This presentation sets out the details of a test procedure jointly developed by TNO/Endures, Netherlands to assess the long term performance of insulation systems when a damaged section of the system is subject to a continuous salt-water spray environment. While the onset of corrosion cannot be prevented, the tests demonstrate that closed cell, FEF materials do inhibit the spread of CUI. It is noted by TNO/Endures that the miti	Ernest N. Morial Convention Center-New Orleans

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Wednesday,1 p.m. to 1 :25p.m.	Comparing the Benefits of Environmentally Friendly Removable Coatings to Traditional Products	Eric Uutala, Cliff Cracauer, John Wulterkens - *Full Title - Comparing the Benefits of Environmentally Friendly Removable Coatings to Traditional Products for Protection of Assets Stored Outdoors* Historically, solvent based coatings have been used to provide protection of assets in a variety of applications, including outdoor storage. These types of coatings present a number of challenges, including: application and removal costs, disposal and storage costs (VOC permit cost), material cost, and others. Environmentally friendly products have been developed and implemented to alleviate these concerns. The scope of this paper is to explore environmentally desirable alternatives to traditional coatings.	Ernest N. Morial Convention Center-New Orleans

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Wednesday,1 p.m. to 1 :25p.m.	Specifying Corrosion Protection for the Offshore Wind Turbine Industry	David Francis, Birit Buhr Jensen - The first offshore wind turbine farm in the world Vindeby was constructed and commissioned back in 1991. The turbines have a capacity of 0.45 MW. Now 25 years later Vindeby will be decommissioned. As new turbines have much larger capacity than the existing one, replacing the turbines does not represent a good business case. Since the early 90´es rapid development has taken place with Europe being the epicenter of development. Now wind turbines with 8 MW capacity are being designed and installed and offshore wind gains ground worldwide. Offshore wind turbine projects have a relatively short design service life of 20-30 years compared to infrastructure projects designed with 50-80-100 years of design service life. The offshore marine environment and special operational conditions under the influence of fatigue from the turbine however, makes durability of offshore wind turbine farms a good challenge. The service life is considered using a combin	Ernest N. Morial Convention Center-New Orleans

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Wednesday,1 p.m. to 1 :50p.m.	Ammonium Chloride Corrosion in the Refining Industry	Sudhakar Mahajanam, Fred Addington, Natalia Cuenca, Bruce Copple, Joanna Folse, Yuting Mao, Amanda Barba, Jarrod White, Kate Williamson - Ammonium Bisulfide (NH4HS) corrosion is an aggressive form of localized corrosion commonly found in hydroprocessing units throughout the reactor effluent air cooler (REAC) and associated piping. This happens when sulfur and nitrogen in the feed get converted to ammonia (NH3) and hydrogen sulfide (H2S) which react to form NH4HS. Depending on the NH4HS concentration, it can also affect FCC, SWS, amine or delayed coker units. When liquid water is absent, NH4HS deposits can form leading to fouling and under-deposit corrosion. Wash water is typically added upstream of the REAC to prevent this problem, which can lead to the formation of a corrosive NH4HS solution. Currently there are no effective chemicals or inhibitors available to control this localized corrosion phenomenon. NH4HS corrosion prevention depends on the following critical factors: NH	Ernest N. Morial Convention Center-New Orleans

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Wednesday,1 :25p.m. to 1 :25p.m.	Comparison of Pitting and Crevice Corrosion - The Effect of Alloying Elements	Brian DeForce - The localized corrosion resistance of stainless steels and nickel alloys is primarily due to alloying elements. The most important elements, as indicated by the Pitting Resistant Equivalent (PRE) are Cr, Mo, and N. This paper compares the effect of these elements in pitting and crevice corrosion. Using ASTM G48 Methods C and D, the critical pitting temperature and critical crevice temperature are determined for several superaustenitic stainless steels (UNS N08367, N08830, N08031) and a nickel alloy (UNS N06625). The varying effect of the elements on the two forms of corrosion and its relation to localized corrosion mechanisms are discussed.	Ernest N. Morial Convention Center- New Orleans
Wednesday,1 :25p.m. to 1 :50p.m.	Retrofit Strategy Using Aluminium Anodes for the Internal Sections of Windturbine Monopiles	Alex Delwiche - This paper discusses the corrosion mitigation strategy for protecting the submerged sections of a monopile windturbine structure off the east coast of England in UK waters. The choice of the CP system was based on a remotely monitored trial, to minimise the retrofit installation works and thereby keeping costs and offshore work activity down, minimising the safety risk, yet provide an effective working system. The details and results of the initial trial are presented, as is the planning and preparation details to install aluminium anode strings inside of the supposed sealed internal sections of the windturbine monopiles.	Ernest N. Morial Convention Center- New Orleans

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Wednesday,1 :25p.m. to 1 :50p.m.	Biodegradable Method of Corrosion Management for All Industries	Larry Mudd - The annual cost of metallic corrosion worldwide is staggering when you take into account the cost of maintenance, prevention, replacement of parts and interruption of services due to corrosion caused failures. This paper focuses on the most effective and latest technology in corrosion prevention for protection of boiler systems, turbines, pumps, storage tanks, HRSG systems, and piping systems. In technical terms, protection of the system is based on “temporary” corrosion inhibitors -- inhibitors that can easily be removed while providing extended protection for interior void spaces of equipment or entire systems for predetermined time intervals. VpCI solutions allow for quick application, minimum maintenance during equipment storage, and minimal work in removal: critical to start up time and cost when returning equipment to service.	Ernest N. Morial Convention Center- New Orleans

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Wednesday,1 :25p.m. to 1 :50p.m.	Understanding Insulation Chemistry Proven to Inhibit Corrosion Under Insulation (CUI)	David Shong - Since 2002, the chemical package XOX has been an integral part of two specific industrial insulations to actively and continuously inhibit corrosion under insulation (CUI). The package relies on liquid water infiltration as a catalyst to provide a layer of corrosion protection for the life of the insulation. This paper explains, at a molecular level, how this time-tested package, which is integral to domestic calcium silicate and expanded perlite insulations, engages a two-pronged defense (physical coating and pH buffering) against CUI. Included are recent, third-party test results that compare the corrosion performance of several common industrial insulations using mass loss corrosion rates (MLCR) when tested in accordance with the latest ASTM consensus method adopted in 2005.	Ernest N. Morial Convention Center-New Orleans

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Wednesday,1 :25p.m. to 1 :50p.m.	Intergranular Corrosion in Al-Mg 5XXX Alloys Under Atmospheric Exposures	Piyush Khullar, Jose Badilla, Robert Kelly - Al-Mg 5XXX alloys are widely used for marine applications due to their low cost, high strength-to-weight ratio and good weldability. Alloys containing more than 3 wt% Mg, when exposed to standard service temperatures for extended periods of time, can become sensitized and susceptible to localized corrosion; particularly intergranular corrosion (IGC). Many studies have investigated this IGC phenomenon in AA5XXX and attribute it to precipitation of a more anodic β-phase (Al_3Mg_2) along grain boundaries after exposure to hot environments during service. Previous studies have investigated the role of metallurgical and electrochemical factors on IGC and indicate that degree of sensitization (DoS), orientation and time of exposure have a strong influence on grain boundary precipitation of β-phase and hence IGC in AA5XXX. The majority of IGC studies have been conducted in full immersion while much of the marine infrastructure is exposed to	Ernest N. Morial Convention Center-New Orleans

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Wednesday,1 :25p.m. to 1 :50p.m.	Assessment of Microbially Influenced Corrosion Threats Using Molecular Microbiological Method	Tesfaalem Gebremedhin Haile, Tamer Crosby, Danielle Kiesman, John Wolodko, Trevor Place, Jennifer Sargent - The presence of solids with soluble products and nutrients which can support the growth of microbial communities may lead to microbially influenced corrosion (MIC) in carbon steel pipelines. Many factors affect MIC rates; for example biofilms may secrete enzymes and corrosive chemicals that attack metal, alter local acidity, and create differential aeration and galvanic cells. Biofilm metabolisms and enzymatic reactions are constantly in flux, altering the impact of microorganisms on degradation of metallic materials. Recent research demonstrates that some anaerobic microorganisms catalyse the oxidation of metallic iron and directly consume the electrons, with serious consequences in pipeline corrosion. This paper examines the influence of water chemistry, pipeline operating conditions, and microbiology on the corrosion mechanisms, specifically MIC, of carbon steel transmi	Ernest N. Morial Convention Center-New Orleans

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Wednesday,1 :25p.m. to 1 :50p.m.	Hydrogen Cracks in Belgian Nuclear Reactor Pressure Vessels: Five Years After Their Discovery	Walter Bogaerts, Digby Macdonald, J.H. Zheng, A. Jovanovic - Hydrogen Cracks in Belgian Nuclear Reactor Pressure Vessels: Five years after their discovery – An update In June-July 2012 "thousands" of fissures were discovered in the Reactor Pressure Vessel (RPV) of the Belgian nuclear reactor Doel 3 during an ultrasonic inspection (UST). In September 2012 similar defects, but fewer in number, were also found in the reactor Tihange 2. Both RPV forgings were produced by the same fabricator which also delivered some 10 vessels to US nuclear plants. "Hydrogen flakes" originating from the processing of the original RPV ingots were identified as the root cause of the problem. After an initial series of investigations, the reactors were authorized to re-operate, until a number of anomalous embrittlement results were found in irradiation experiments on similar materials. After the stop of the reactors, new UST inspections in 2014 indicated the presence of a total of 13,047 "hydrogen fl	Ernest N. Morial Convention Center-New Orleans

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Wednesday,1 :25p.m. to 1 :50p.m.	Can We Expand ATP Assay and Molecular Techniques to Measure Microbes on Surfaces and Under Deposits?	Kim Dockens - Microbiologically influenced corrosion (MIC) is a term used to describe corrosive damage to metals caused by microbes including bacteria, archaea and fungi. MIC affects many industries, such as power generation, oil production, transportation and water storage and distribution. The costs inferred by corrosion across all industrial sectors are staggering. Annual corrosion damage is estimated at 3% of gross domestic product (GDP), rendering corrosion a 1 trillion-dollar problem for the U.S. alone. MIC is implicated at least 20% of corrosion cases. As such, monitoring for, and diagnosing MIC as part of a complete corrosion mitigation strategy is of paramount importance. Traditional MIC diagnostic techniques employ culture-based methods aimed at detecting and enumerating specific groups of bacteria presumed to be associated with MIC. Culture-based diagnostics are slow and incapable of producing a truly representative environmental community associated with corrosi	Ernest N. Morial Convention Center-New Orleans

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Wednesday,1 :25p.m. to 1 :50p.m.	Compatibility & Interactions Between Cathodic Protection and Vapor Phase Corrosion Inhibitors	Calvin Pynn - There is a growing industrial practice of using vapor phase corrosion inhibitor to supplement the performance of impressed current cathodic protection system in protection of aboveground storage tank bottoms against soil-side corrosion. This work aims to evaluate the compatibility of amine carboxylate vapor phase corrosion inhibitor on cathodic protection system performance & components. The work is composed of a series of lab experiments where differing concentrations of vapor phase corrosion inhibitor is added to 3.5% NaCl & freshwater solutions while monitoring the cathodic protection current requirement & polarization characteristics. The effects of the inhibitor's chemistry on MMO anode performance, cable insulation, and reference electrodes will also be assessed. Keywords: Tank bottom, Inhibitors, cathodic polarization	Ernest N. Morial Convention Center-New Orleans

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Wednesday,1 :25p.m. to 1 :50p.m.	[The Evolution of AC Predictive and Mitigation Software]	John Dabkowski - Approximately 20 years ago , the PRCI AC computer software program was developed for the pipeline industry. The primary objective of the program was to provide the pipeline engineer with an inductive AC assessment tool, albeit with considerable limitations, having a simple interface and a "short learning curve". In the ensuing years, the state-of-the-art has advanced considerably. Academic studies, extensive field experience, and enhanced computer power allows for an increase in the accuracy of predictive calculations and software program capabilities, while still maintaining simplicity of use. This paper discusses and illustrates, using an example user interface, the range of new features that can be incorporated into an updated AC interference analysis software program. As a compelling example, the ability to provide corrosion current density calculations combined with a mitigation methodology optimized for transmission line current unbalance would provid	Ernest N. Morial Convention Center-New Orleans

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Wednesday,1 :25p.m. to 1 :50p.m.	Assessing and Sharing Success: Comparing Program-wide Corrosion Engineering Service benefits	Jeffry Giddings, Graham Bell, Joe Weaver, Matt Gaughan, Ed Weaver - Assessing and Sharing Success: Comparing Program-wide Corrosion Engineering Service benefits against individual project design packages. The Tarrant Regional Water District (TRWD) with the City of Dallas Water Utilities (DWU), are currently engaged in the planning, design and implementation of a 350 MGD raw water transmission system, which will run across north central Texas from Lake Palestine to Lake Benbrook, with connections to Cedar Creek Reservoir, Richland Chambers Reservoir and a Dallas delivery point. Collectively, the system consists of approximately 145 miles of 84-inch to 108-inch pipeline, a 5-mile 120-inch diameter tunnel, six 100-350 MGD pump stations, one 450 MG balancing reservoir and ancillary facilities. The program developed by TRWD to accomplish these improvements is called the Integrated Pipeline Project (IPL). To increase consistency in the project approach to corrosion control,	Ernest N. Morial Convention Center-New Orleans

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Wednesday,1 :25p.m. to 1 :50p.m.	Oxidation and Carburization of Alloys Exposed to Supercritical CO2 Conditions	Steven Kung, John Shingledecker - A laboratory study was performed by exposing seven candidate materials to simulated conditions of the heat exchangers in advanced sCO2 power cycles. The alloys, consisting of ferritic steels, austenitic stainless steels, and nickel-base alloys, were exposed to impure CO2 containing 3.6% O2 and 5.3% H2O at a constant pressure of 200 bar but different temperatures ranging from 650 to 750C. The total exposure times varied from 300 to 1000 hours. After the exposures, extensive analyses were performed on the samples using optical microscopy, SEM/EDS, and an automated micro-hardness tester to characterize the scale morphologies and determine the extent of carburization. Results indicate that the oxidation kinetics were significantly influenced by the test temperature and alloy composition. In general, a change of 50C in test temperature led to a change of oxide thickness by a factor of 4. By comparison, the ferritic steels suffered the highest oxidat	Ernest N. Morial Convention Center-New Orleans

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Wednesday,1 :25p.m. to 1 :50p.m.	Effective Inorganic Salt Corrosion Inhibitors for Titanium Components Exposed to Dilute Hydrofluoric	Ronald Schutz, Sandra Hernandez, Heath Walker - Increasing interest in utilizing hydrofluoric acid (HF) for acid stimulation of wells in the Gulf of Mexico to improve hydrocarbon productivity raised the question of acid chemical compatibility with existing offshore production system components, particularly riser titanium alloy stress joints (TSJs). A notable concern is the known potential for elevated etch rates and consequent hydrogen absorption on titanium components when exposed to even relatively dilute, cold or warm HF-containing solutions. Unfortunately, conventional film-forming/adsorption type organic inhibitors offer little inhibitive benefits for titanium alloys exposed to inorganic reducing acid media. This laboratory corrosion test screening program specifically aimed at identifying practical, common inorganic salts which, when added to warm dilute HF solutions, provide effective corrosion inhibition for UNS R56404 (ASTM Grade 29 Titanium). The study revealed that	Ernest N. Morial Convention Center- New Orleans

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Wednesday,1 :50p.m. to 2 :15p.m.	Fitness-for-Purpose HIC Testing of Heavy Wall Large-Diameter Pipes for Mildly Sour Applications in t	Thomas Haase, Christoph Kalwa, Christoph Bosch, Jens Schröder - Resistance testing of low alloyed steel pipes to Hydrogen Induced Cracking (HIC) is performed according to NACE standard TM0284. Within the latest revision of this standard Fitness-for-Purpose testing, where the test environment and partial pressures of gases appropriate to the intended application are selected, have been included. Mildly sour service conditions may require testing under less severe conditions. Compared to the standard test duration of 4 days longer test durations up to 90 days can be required in the newly added test solution C. HIC tests have been performed for several SAWL large diameter pipes of grade X65 designated for mildly sour environments at partial pressures between 100 kPa and 1 kPa at different pH values between 3.5 and 5.8 in NACE TM0284 standard test solutions. For evaluation the new ultrasonic procedure of NACE TM0284-2016 has been used as well as standard metallographic evaluation	Ernest N. Morial Convention Center-New Orleans

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Wednesday,1 :50p.m. to 2 :15p.m.	Corrosion of Superalloys in 200 Bar, 750°C Supercritical Carbon Dioxide	James Keiser, Michael McDowell, Donovan Leonard - Corrosion Of Superalloys In 200 Bar, 750°C Supercritical Carbon Dioxide James R Keiser, Donovan N Leonard and Michael McDowell Supercritical carbon dioxide offers the potential for significant efficiency increases in power generation systems. However, limited information is available on the compatibility of supercritical carbon dioxide with highly alloyed iron-base alloys and nickel-base alloys. These alloys are designed to have good strength at elevated temperature and would likely find use in a range of power generating systems including concentrating solar power, nuclear and fossil systems. Selected alloys have been exposed in 99.995% supercritical carbon dioxide for 500 hours at 750°C and 200 bar. Post exposure examination provided information on corrosion rates, microstructural evolution and the carbon concentration in the exposed materials. Studies show relatively low corrosion rates in almost all alloys studied but a	Ernest N. Morial Convention Center-New Orleans

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Wednesday,1 :50p.m. to 2 :15p.m.	Developing a Life-Cycle Cost Analysis Framework to Evaluate the Cost-Effectiveness of Hydroelectric	Bobbi Jo Merten, Todd Gaston, Allen Skaja, Jessica Torrey - The Bureau of Reclamation utilizes corrosion protection to maximize the reliability and useful life of its water infrastructure. Facilities received extremely long-lasting coatings on steel hydroelectric penstock pipe interiors at the time of construction. However, these coatings are now reaching the end of their useful life, and recoating is required. Environmental regulations and worker safety concerns have shifted coating selection to less harmful systems, but a consequence is much shorter service lives. The current selection of protective coatings include competing systems that vary in initial coating costs, periodic maintenance costs, and total service life between recoating. This presents the challenge of determining the most cost-effective protective coating system for a penstock recoating project. To address this challenge, a life-cycle cost (LCC) analysis framework was developed for evaluating and comparin	Ernest N. Morial Convention Center-New Orleans

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Wednesday,1 :50p.m. to 2 :15p.m.	Effect of Chemical Environment and pH on AC Corrosion of Cathodically Protected Structures	Andreas Junker-Holst, Lars Nielsen, Per Møller - AC corrosion of cathodically protected structures is a major concern for pipelines in case of even minor AC perturbations. There are indications that the specific chemical environment has a large influence on the AC mitigation current density criteria outlined in EN 15280:2013. This work investigates the effect of soil constituents, the earth alkali elements Ca and Mg, traditionally believed to have a large influence on the formation of hydroxides and carbonates and the so-called 'stone hard soil'-phase in front of a coating damage. Recent findings from excavations imply that the alkalization from cathode reactions can affect the stability of quartz sand, SiO_2, and induce the formation of iron containing neso-silicates, hence also the influence of Si and Fe is investigated. Corrosion rate measurements in different environments, and at different cathodic overpotentials is measured using ER-coupons, and the chemistry and phase anal	Ernest N. Morial Convention Center-New Orleans

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Wednesday,1 :50p.m. to 2 :15p.m.	External Corrosion Protection of Aboveground Storage Tanks Using Vaporized Corrosion Inhibitors	Tunde Kingsley Adelakin, Sujay Math, Dale Lindemuth - External soil side corrosion protection of aboveground storage tank bottom is most commonly achieved through the application of cathodic protection (CP) current. However, in certain cases using CP may not be possible, particularly if the tank has a liner. In such cases Vapor Corrosion Inhibitor (VCI) is being used as an alternative solution to protect existing tank bottoms. In this study, application of VCI as an alternative for corrosion control of underside tank bottoms with liners has been investigated. Ten electric resistance (ER) probes were installed in-between the underside of tank bottom and the liner. These probes were grouped into 3 groups; probes in group 3 were placed 5 feet away from the edge of the tank, group 2 probes were placed 15 feet away from the edge of the tank and group 1 probes were placed at 5 feet, 15 feet and 35 feet away from the edge of the tank bottom towards the center. Specified volume of VC	Ernest N. Morial Convention Center-New Orleans

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Wednesday,1 :50p.m. to 2 :15p.m.	Inhibited Under-Deposit CO_2 Corrosion: Small Particle Silica Sand and Eicosane Paraffin Deposits	Shokrollah Hassani, Jing Huang, Ana Victor, Bruce Brown, Marc Singer - Chemical inhibition in the presence of silica sand deposit has been reported as a cause of severe localized corrosion attack in CO_2-saturated brine environments. This paper suggests a new mechanism for explaining physics behind the localized corrosion attack based on experimental evidences. The effect of sand size and deposit type on localized corrosion attack in the presence of imidazoline type inhibitor is also experimentally investigated in CO_2 saturated brine solution. Smaller silica sand particles are found to cause less localized attack in compare with larger sand particles. Localized corrosion attack in the presence of paraffin deposit is also negligible compared to silica sand deposit.	Ernest N. Morial Convention Center- New Orleans

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Wednesday,1 :50p.m. to 2 :15p.m.	The Viscosity of H2O-B(OH)3 -LiOH Solutions	Robert Hendricks, Alison Carney - The primary coolant for the pressurized water (PWR) design of the majority of America's fleet of light water power reactors (LWRs) is a solution of deionized water, boric acid, and lithium hydroxide. The boric acid is used to control the reactivity of the reactor and is present in up to 3500 ppm B while the lithium hydroxide is used to maintain the pH of the solution near 7.4 and is present at about 25 ppm Li. The coolant is pumped at Reynolds numbers (Re) in the vicinity of 10^6 to 10^7 and temperatures of 275 to 315 C through the primary cooling loop at 15.5 MPa. The water remains liquid because of the high pressure of the loop. Research and development aimed at understanding and mitigating the effects of corrosion of reactor components such as primary cooling lines, fuel element cladding and heat exchanger tubes under such extreme operating conditions is a critical component of the Materials Aging and Degradation Pathway component of the L	Ernest N. Morial Convention Center-New Orleans

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Wednesday,1 :50p.m. to 2 :15p.m.	Cathodic Protection and MIC - Effects of local electrochemistry	Stefan Jansen - Uncertainties are present about the mechanisms of cathodic protection (CP) and its effectiveness to limit or completely stop microbiologically influenced corrosion (MIC). An uncertain, but probably crucial factor is the role of environmental conditions and the ensuing electrochemical and microbiological reactions. The goal of this research was to improve the understanding of the mechanisms of CP by determining the interactions between corrosion and local chemical parameters such as pH and Fe2+ under varying CP conditions, both in the absence and presence of MIC. Electrical resistance (ER) probes covered with a biofilm of sulphate-reducing microorganisms were exposed to anaerobic groundwater and subjected to a series of CP potentials both in the laboratory as well as in the field. We observed that MIC could in some cases not be stopped by CP, even using very high applied potentials. Detailed measurements with microsensors were used to obtain information on small	Ernest N. Morial Convention Center-New Orleans

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Wednesday,1 :50p.m. to 2 :15p.m.	Chloride Induced Atmospheric Corrosion of Aluminum Under Varying Salt Loading Densities	Rebecca Schaller, Jason Taylor, Eric Schindelholz - The relationship between one specific environmental severity factor, NaCl loading density, and the corrosion rate of aluminum in humid conditions is explored to provide a better understanding of the impact of salt loading on atmospheric corrosion in field service environments. Studies on aluminum outdoor atmospheric corrosion have elucidated the relative influences of various environmental severity factors that may enhance corrosion rates, such as salt deposition. The positive correlation between salt deposition and corrosion rates reported in field exposures has been demonstrated in a small number of laboratory findings. Some studies have also shown that the corrosion rate of Al diminishes with increased exposure time under fixed NaCl loading conditions. Hypotheses for stifling include the stability or passivation of the surface that shuts down the cathodic region, which is pH and, in turn, CO_2 dependent or the gettering	Ernest N. Morial Convention Center- New Orleans

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Wednesday,1 :50p.m. to 2 :15p.m.	Polymer and Nanomaterial Based Inhibitors: Stimuli-Responsive	Rigoberto Advincula - The use of polymer based chemical inhibitors have the advantage of utilizing chemical, macromolecular, and compositional (blends or block copolymers) towards chemical inhibitors whether it is for corrosion or scaling issues. it is important to understand the multi-phase condition of production fluids whether it is extraction or circulation (oil and gas vs geothermal brine). It is also important to understand the mechanism and the long-term action of inhibition from the fluid to the surface that is being protected. This talk will highlight the various principles and work of the author in investigating various corrosion and scaling inhibitor for the production industries. In particular, the use of block-copolymers and hyperbranched oligomeric design in inhibitors is of a high interest because of the multi-dentate and stability (or predictability) of their solubility in various phase conditions. While a number of these examples are highlighted in the design of	Ernest N. Morial Convention Center-New Orleans

Wednesday,1 :50p.m. to 2 :15p.m.	Concerns Over Utilizing Aluminium Anodes in Sealed Environments	Alex Delwiche, Patrick Lydon, Isaac tavares - In 2012, a cathodic protection trial was undertaken to establish the current requirements to protect the submerged internal section of monopiled windturbine structures. Aluminium anodes were utilized and a monitoring system was installed to measure the anode current, potential of the structure but also to measure hydrogen, which was the projects main concern when installing anodes in an enclosed environment. Through the course of the trail, within a few weeks, the seawater pH inside the monopile, had shifted from neutral pH7.5 to less than pH5. pH of these values had never been found or reported before when using aluminium alloy anodes. This paper discusses a theory why the pH dropped and solutions to overcome the low pH with the use of aluminium anodes.	Ernest N. Morial Convention Center- New Orleans

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Wednesday,1 :50p.m. to 2 :15p.m.	In-situ CPT of Austenitic and Duplex Stainless Steels on Chloride Containing Environments	Luis GARFIAS-MESIAS - This paper demonstrates a novel methodology based on the Electrochemical Noise that can be used to determine the Critical Pitting Temperature (CPT) of Austenitic and DSS in chloride containing environments. The work presented here shows, for the first time, simultaneous in-situ micro-visualization and CPT of two small electrodes made of austenitic and Duplex Stainless Steel (DSS) while immersed in artificial seawater. A real time video of the surface of the two etched electrodes was recorded while the CPT was obtained. This methodology allowed the observation of metastable pitting below the CPT of the alloy and stable pitting above the CPT.	Ernest N. Morial Convention Center-New Orleans

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Wednesday,2 :15p.m. to 2 :40p.m.	The Virginia Tech High Turbulence Corrosion Loop	Robert Hendricks, Peter Todoroff, Erik Cothron, Ryan Taylor - A critical aspect of the field of corrosion research is that of corrosion under conditions of turbulent flow. †This is an area that is commonly known in the literature as flow accelerated corrosion (FAC). It has been studied in a number of applications such as the nuclear industry, oil pipelines, household plumbing devices, and maritime components to mention but a few. There is only poor, if any, quantitative information concerning the degree of turbulence for most FAC studies. Corrosion studies performed in the laboratory use either stirred fluids, jet impingement, or rotating disks to achieve low levels of turbulence. There are only a few studies designed to correlate the results from these tests. The difficulty of obtaining good quantitative measures of the turbulence of the fluid explains the lack of quantitative correlations of FAC and the fluid flow. This paper describes a unique apparatus, known as the Virg	Ernest N. Morial Convention Center-New Orleans

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Wednesday,2 :15p.m. to 2 :40p.m.	Mitigation of Soil-Side Bottom Corrosion of Aboveground Storage Tanks Utilizing Volatile Corrosion	Kelly Baker, Terry Natale, Alexander Roytman - Abstract Aboveground storage tanks are mission critical assets in the chemical and petrochemical industries. Corrosion of the tanks bottom plates poses a significant challenge to maintaining the integrity of those assets. Coatings have been shown to be effective in mitigating corrosion on the product side of the bottom plates, but aren't viable for providing corrosion protection to the soil-side of the bottom plates. Volatile corrosion inhibitors have gained industry acceptance as an effective means in mitigating corrosion for the soil-side of the bottom plates and have been utilized across a wide variety of tank foundation designs, including a concrete ring wall, double bottom and hard pad, such as concrete or asphalt. Volatile corrosion inhibitors can also mitigate corrosion for soil-side bottoms in areas where traditional cathodic protection systems are not effective, such as double bottoms, hard pads or when the cathodic pro	Ernest N. Morial Convention Center-New Orleans

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Wednesday,2 :15p.m. to 2 :40p.m.	UNS S31400 Stainless Steel as Reactor Material in a Thermal Cracking Process	Alexander Schmid, Gregor Mori - UNS S31400 stainless steel was tested as a reactor material for a thermal cracking process of post-consumer plastics containing PVC. In a first step a bench scale pilot plant has been established and subsequently test runs have been performed. Cross sections of reactor pipes of the bench scale pilot plant were investigated after 30 h test runs by metallography, SEM / EDX and STEM / EDX. In addition an independent experimental laboratory setup for corrosion tests was designed consisting of an inert quartz glass tube, which was heated by use of a tube furnace. Sheet material of S31400 was tested between 450 – 650°C, for 24 to 240 h, in most aggressive conditions, including 5 wt.% HCl, 3 wt.% CO_2, 0.3 wt.% CO, 0.2 wt.% H_2, 0.02 wt.% H_2S, bal. N_2. The oxygen and chlorine partial pressures of this artificial gas mixture corresponded to the gas atmosphere in the reactor zone of the pilot plant. While the gas composition was evaluated with the software	Ernest N. Morial Convention Center-New Orleans

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Wednesday,2 :15p.m. to 2 :50p.m.	Comparing in-situ Methods for Monitoring Effectiveness of Biocide Treatment	Sabine Doddema, Elsemiek Croese - Microbial Influenced Corrosion (MIC) is difficult to control. Therefore, biocides are often added as a preventive measure to exterminate all microbial activity and with that also MIC. The effectiveness of the biocide treatment is often measured by culturing methods, however, one of the disadvantages of these methods is that the biocide is not separated from the test sample, therefore influencing the biocide effectiveness test since the biocide has an extended contact time in these tests. DNA technology such as QPCR is a good alternative, however, this gives an over-estimation of the surviving microorganisms since not all DNA from dead microorganisms will be destroyed. Another approach is the measurement of RNA to screen for the effectiveness of biocide treatment, however, RNA is unstable, which makes the interpretation difficult. Here we compare traditional methods such as culturing and cATP methods with DNA and RNA based methods, including v	Ernest N. Morial Convention Center-New Orleans

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Wednesday,2 :15p.m. to 2 :50p.m.	Effect of Thiosulfate on the Pitting Corrosion of Nickel Base Alloys in Chloride Solutions	Martin Rodriguez, abraham araneda, Mariano Kappes, Ricardo Carranza - Nickel base alloys 600, 690 and 800 are used in steam generator tubing of nuclear reactors. These alloys can suffer pitting corrosion problems in chloride solutions in the presence of thiosulfate, in a similar manner to what was studied in more detail in stainless steels. Thiosulfate may be present in the environment to which these alloys are exposed in service, as it is a product of the reaction of sulfate impurities with the hydrazine used in the steam generator secondary water chemical treatment. In this paper the pitting corrosion susceptibility of alloys 600, 690 and 800 in deaerated 0.1 M and 1 M chloride solutions at room temperature was studied. The effect of thiosulfate additions was studied in molar ratios of thiosulfate:chloride between 10^-3 and 1. Pitting potential (EP) and repassivation potential (ERP) were measured by cyclic potentiodynamic tests. The pitting potential measured potentiodynamical	Ernest N. Morial Convention Center-New Orleans

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Wednesday,2 :25p.m. to 2 :50p.m.	AA5083 and AA6082 Exposed to Seawater – Effect of Temperature and Potential on Corrosion Behaviour	Roy Johnsen, Ove Nese - Due to its low weight the interest for using aluminum in subsea structures has increased in the oil & gas industry during the last years. So called corrosion resistant aluminium alloys belonging to the 5000- and 6000 series have been used for many years in ship hulls. Good experiences have been achieved even if some corrosion failures have been observed. The main problem is connection to more noble metals like e.g. carbon steel, stainless steel and copper alloys that will give galvanic corrosion on aluminium. Used for subsea structures, aluminium will normally be in metallic contact with carbon steel (and even with more noble alloys). Carbon steel is always connected to a cathodic protection system in seawater, which means that the aluminium alloy also will be connected to the cathodic protection system. AA5083 and AA6082 are the most frequently used aluminium alloys for seawater applications. In the literature limited information is published about	Ernest N. Morial Convention Center-New Orleans

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Wednesday,2 :25p.m. to 2 :50p.m.	Influence of Powder Size of the Vapor Corrosion Inhibitor on Inhibiting Effectiveness	Behzad Bavarian, Lisa Reiner, Babak Samimi, Boris Miksic - Abstract The protection effectiveness of commercially available vapor corrosion inhibitors powders) with different particle size was evaluated. Conventional powder size of and nano-particle powder inhibiting effectiveness was compared using the vapor-inhibiting ability (VIA) NACE TM 208. Optical microscopy post VIA corrosion tests revealed that the particle size of inhibitor powder has a significant influence on the degree of protection. The nano-particle inhibitor showed a corrosion rating grade 4 and more than 41% decrease on the corrosion rate compared with the inhibitor with coarse particle size inhibitor. Surface coverage also showed improvement mainly due to increase of effective surface area and the partial pressure of vapor inhibitors as powder particle size decreased. Adsorption energy was roughly -16,740 J/mol for the nano-particle size inhibitor, while, adsorption energy is roughly -13,660 J/mol for the c	Ernest N. Morial Convention Center-New Orleans

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Wednesday,2 :25p.m. to 2 :50p.m.	A Combined Numerical and Experimental Approach to Study the Effect of Water Layer Thickness on the E	Chao Liu - Connections between dissimilar metal alloys (e.g., aluminum (Al) alloy components and stainless steel (SS) fasteners) are frequently encountered in airframes exposed to an atmospheric marine environment. This exposure usually leads to the formation of thin film electrolyte which contains chloride species which functions as an ionic path. As a result, a localized electrochemical cell is formed due to the galvanic coupling. This galvanic-coupling-induced localized corrosion could serve as a preferential site for fatigue crack formation, which is detrimental to the structural integrity of the airframe. Water layer thickness (WL) is an important environmental variable which significantly impacts the degree of atmospheric corrosion. There have been many experimental studies regarding the influence of WL on an individual material surface[1–5] in the literature. Nevertheless there is a limited number of studies of the effect of WL on the galvanic coupling, especially mode	Ernest N. Morial Convention Center- New Orleans

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Wednesday,2 :25p.m. to 2 :50p.m.	[The Importance of Deposit Characterization in Mitigating UDC and MIC in Dead Legs]	Christopher Kagarise, Richard Eckert, Jose Vera - Under deposit corrosion (UDC) and microbiologically influenced corrosion (MIC) are recognized threats to dead legs and low flow/intermittent flow pipelines, particularly in facilities. A number of internal corrosion pipeline failures across the industry due to UDC and MIC have occurred due to the accumulation of solids in the piping, coupled with the inability to detect the deposits and effectively remove them. While the need to mitigate UDC and MIC is recognized, the appropriate actions to address the problem and prevent its recurrence may take significant effort to determine and will likely differ from location to location due to the unique operating conditions, history, and deposit characteristics at each site. In addition, there is the potential for multiple corrosion mechanisms (i.e., MIC and UDC) to occur separately or concurrently, and the presence of organic and inorganic solids/deposits on the pipe surface can have invo	Ernest N. Morial Convention Center-New Orleans

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Wednesday,2 :25p.m. to 2 :50p.m.	CFD-based Prediction of Flow Induced Corrosion	Ashwini Chandra, Jose Vera, Mazdak Parsi, Partha Sharma - A valid Computational Fluid Dynamics (CFD) based approach for corrosion rate calculation can be a strong tool in identifying erosion-corrosion or flow-induced corrosion hot spots. Damage tends to occur in geometries such as chokes, elbows and jumpers that are typically encountered in oil and gas production systems. A large number of parameters can impact the metal-loss mechanism: flow conditions, solution chemistry, temperature, pressure and material of the component. Experiments to realistically evaluate the complex conditions encountered during oil and gas production are difficult to design and control. However, a CFD based approach provides a powerful tool to link electrochemical and chemical information, required for corrosion rate calculations, with the mechanical action of the fluid flow. The current study focuses on developing an approach for using CFD in combination with standard corrosion software to calculate co	Ernest N. Morial Convention Center-New Orleans

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Wednesday,2 :25p.m. to 2 :50p.m.	Long-Term Performance of HLP Solution for Mildly Sour HIC Testing	Daisuke Mizuno, Tomoyuki Yokota, Kyono Yasuda, Nobuyuki Ishikawa, Eiji Tada, Mitsuo Kimura, Taishi Fujishiro, Takuya Hara - Hydrogen Induced Cracking (HIC) is a major issue of line pipes exposed to sour environments. High Strength Line Pipe (HLP) Committee of The Iron and Steel Institute of Japan (ISIJ) has investigated Fitness for Purpose (FFP) HIC evaluation method and proposed the 0.93N (CH3COOH +CH3COONa) solution. It was reported that the proposed test solution provided excellent pH stability during HIC test in comparison with the conventional EFC16 solution (0.05N CH3COONa) in our previous papers. In this study, long-term performance of the HLP solution was investigated. One month HIC test using the HLP solution and conventional test solution was employed to compare pH stability. Frequent pH readjustment during HIC test is not required when the proposed 0.93N acetate solution is used. Corrosion rate and corrosion morphology were investigated to clarify the influence of high a	Ernest N. Morial Convention Center-New Orleans

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Wednesday,2 :25p.m. to 2 :50p.m.	The AC Close Interval Survey and Other Common AC Measurement Errors	Wolfgang Fieltsch, Rob Wakelin - With an increase in the use of shared corridors between powerlines and pipelines, AC interference risks to pipelines have become a more prominent concern. AC interference can result in pipeline integrity risks such as AC corrosion, coating damage and arcing, and safety risks to pipeline personnel and the public due to elevated touch or step potentials. The measurement of induced AC voltages along the pipeline is the primary indicator of the safety and AC corrosion risk under steady state operation of influencing powerlines. This paper addresses several fallacies, misconceptions and common errors related to the measurement of these AC induced voltages. Many operators monitor AC voltage levels at test posts on an annual basis as part of their cathodic protection survey. However, the test stations are often not located at or close to the AC voltage peaks on the pipeline. In an attempt to determine the AC voltage profile along the pipeline, some o	Ernest N. Morial Convention Center-New Orleans

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Wednesday,2 :50p.m. to 3 :15p.m.	AC Interference and Mitigation: Heartland Case Study	Matthew Lechelt, Kelly Fletcher - Alternating Current (AC) Interference and Mitigation (ACIM) is becoming an increasingly common occurrence in the pipeline industry. This paper describes the challenges associated with coordinating the modelling, design, and installation of ACIM systems for a complex ACIM project located in Edmonton, Alberta, Canada, with a final total installed cost in excess of $40,000,000 CAD. The project consisted of a 65 kilometer long double circuit 500 kilovolt (kV) overhead transmission line being installed in a heavily congested right-of-way corridor with more than 80 pipelines owned by variety of operators. Also included were several other overhead transmission lines (138 kV to 500 kV) throughout the project area. The transmission line was built in a very heavily congested pipeline corridor in a government controlled transportation and utilities corridor. As an added challenge, substantial road work was being completed in the area concurrently. The mod	Ernest N. Morial Convention Center- New Orleans

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Wednesday,2 :50p.m. to 3 :15p.m.	New Axially Loaded Full Ring Test Method for Assessment of Susceptibility of Girth Welds and Parent	Philip Dent, Christopher Fowler, Stuart Bond, Samuel Mishael - Susceptibility to cracking in sour service is usually determined by testing in laboratory or simulated service environments, in compliance with NACE MR0175 / ISO15156. Typically small scale specimens are extracted from sampled material to facilitate uniaxial tensile, C-ring or 4-point bend testing to determine resistance to Sulphide Stress Cracking (SSC) or Stress Corrosion Cracking (SCC). Sampling relaxes residual stress and in many cases the specimen is not representative of the material surface condition and microstructure, and clearly may not represent material with inhomogeneous properties. This is particularly true for subsea lines installed by reeling as strain history varies around the entire circumference. A full ring test method was developed in the 1980s/1990s, which is better able to assess behaviour with hoop stress and is still favoured today (BS 8701), but it does not load the entire specimen. This pa	Ernest N. Morial Convention Center-New Orleans

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Wednesday,2 :50p.m. to 3 :15p.m.	Hydrogen in Steels: A Critical Review and Recommended Practices	Mark Sadowski, Valer Zapirtan-Lainer, Stuart Guest, Afolabi Egbewande, RICHARD TCHORZEWSKI - Hydrogen, the smallest element on the periodic table, can produce extensive damage to welded steel structures if its deleterious effects are not mitigated. In steels, hydrogen damage may manifest as hydrogen induced cracking, blistering, stress oriented hydrogen cracking, welding cracking etc. While the exact mechanisms of hydrogen damage are not well understood, its effects are pronounced and often a contributing factor in cracking or failure of the component. Hydrogen can be introduced to the component during fabrication welding, operational service, and welded repairs. Repair welds are often the most susceptible to hydrogen-related damage due to pre-existing hydrogen in the component from service. To reduce the ruinous effects of hydrogen during welding, a common industry practice is to drive as much hydrogen as possible out of steel prior to welding. This process is commonly called “	Ernest N. Morial Convention Center-New Orleans

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Wednesday,2 :50p.m. to 3 :15p.m.	Under-Deposit Corrosion in a Sub-Sea Water Injection Pipeline—A Case Study	Pavan Shukla, Dr Sandeep Narain - Under-deposit corrosion, commonly called cell corrosion represents one of the most damaging forms of corrosion, to the piping system. It is one of the most critical phenomenon leading to pipeline failures. It is largely found in sub-sea water injection pipelines, well-fluid pipelines and at times in large diameter, long distance trunk lines. Under-deposit corrosion is typically very aggressive and localized, causing deep penetration of the metal surface with lesser general corrosion in the surrounding areas, due to surface deposits, electrical imbalances or some other initiating mechanisms. Normally all corrosion factors attract a select number of individual sites. In some cases pitting is extended throughout the entire metal surface giving it an irregular or very rough surface profile. In other instances pits are concentrated in specific areas leaving the majority or the metal surface in new like condition. Microbial induced corrosion is a	Ernest N. Morial Convention Center-New Orleans

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Wednesday,2 :50p.m. to 3 :15p.m.	Atmospheric Corrosion in the Laboratory and the Role of Mass Loss Coupons in Test Monitoring	Sean Fowler, Jeffrey Quill - Recent developments in salt spray corrosion test methods have created automotive OEM standards with stringent requirements beyond the capabilities of yesterday’s test chamber technology. The essential elements for accurately replicating atmospheric corrosion as experienced in cars and trucks were incorporated into the first generation of automotive cyclic corrosion test methods in the early 1990’s. The impact of these methods was somewhat diminished due to significant challenges with repeatability and reproducibility. Dueling results between suppliers and customers created distrust of all laboratory corrosion testing, a distrust which persists to this day. These problems mirrored those experienced by users of the original neutral salt spray standards generations earlier. Those earlier generations of salt spray test users performed numerous round robin studies using painted scribed panels and corrosion coupons to determine which test parameters requir	Ernest N. Morial Convention Center-New Orleans

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Wednesday,2 :50p.m. to 3 :15p.m.	Novel Synthesis, Characterization and Testing of Vegetable Oil Derived Corrosion Inhibitors	Paul Rostron, Hiba Aoudi, sonia kasshanna - the synthesis of amide modified fatty acid corrosion inhibitors is reported. the synthetic route uses a novel, one pot strategy, drastically reducing the synthesis cost. the reaction was shown to work using TLC spotting and FTIR analysis. the product, without clean up - again achieving significant cost reductions, was able to reduce corrosion in aerated stirred seawater by a factor of over 85, corrosion rate reduction from over 100 mpy to less than 1 mpy is reported.several different vegetable oils were converted into amides using a range of amines.	Ernest N. Morial Convention Center-New Orleans

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Wednesday,2 :50p.m. to 3 :15p.m.	Ageing Subsea Pipelines External Corrosion Management	James Britton - According to Offshore Data Services there are approximately 17,000 kilometers of offshore pipelines globally installed before 1981 (35 Years Ago) and before 1991 (25 Years Ago) the number is close to 55,000 Kms. While a good number of these lines have been abandoned, others are still in service and are now at or 10 years or more beyond their original design life. This paper reviews proven strategy for cost effective, reliable handling of life extension on these old pipelines from preliminary assessment, through repair execution and post repair surveillance. Useful tips for avoiding common pitfalls are also presented. KEYWORDS: Offshore Cathodic Protection, Retrofit, Life Extension, Offshore Pipeline, Pipeline Inspection, Seawater Corrosion, IMR, Pipeline Clamp, Pipeline ROV Survey	Ernest N. Morial Convention Center- New Orleans

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Wednesday,2 :50p.m. to 3 :15p.m.	Corrosion of Copper in Anoxic Groundwater Inoculated with Sulfate Reducing Bacteria and Methanogens	Leena Carpen, Pauliina Rajala, Elina Huttunen-Saarivirta, Malin Bomberg - In Finland, the high level nuclear waste will be disposed in copper canisters to a geological repository, at the depth of approximately 400 m below the sea level. The solid rods of spent fuel are first stored in cast iron containers, which are then placed inside copper canisters with 50 mm wall thickness. The canisters are enclosed by a bentonite clay buffer. The surrounding rock will provide the last barrier in this Finnish multi-barrier concept. Copper has been chosen for the canister material due to its good corrosion resistance in anoxic water. However, the colonization and activity of microbes on the surface or in the vicinity of the copper canister may initiate and accelerate several corrosion mechanisms. Bentonite buffer is supposed to inhibit the migration of bacteria into the vicinity of the canister. Nevertheless, in the case of uneven saturation and swelling of the bentonite or due to formation	Ernest N. Morial Convention Center-New Orleans

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Wednesday,2 :50p.m. to 3 :15p.m.	Thermal Shock Resistance of Fecral Alloys for Accident Tolerant Fuel Cladding Application	Raul Rebak, Michael Schuster - Since the Fukushima disaster of March 2011, nuclear fuel vendors are engaged in finding a fuel system that would be more resistant to accidents such as the loss of coolant. One option is to replace the current zirconium alloys cladding for FeCrAl alloys. Among other properties, the proposed cladding should be resistant to thermal shock or quenching, which may occur when the reactor is flooded with fresh cool water. The current study compares the thermal shock resistance of several nuclear engineering alloys.	Ernest N. Morial Convention Center-New Orleans

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Wednesday,2 :50p.m. to 4 :40p.m.	Qualification of Acid Systems for Wellbore Damage Removal: Case Histories from the Norwegian Contine	Yogesh Choudhary, Sten Axelsen - Acid systems are commonly used to improve productivity through either near-wellbore damage removal or through dissolving scale accumulation inside the wellbore during production. This paper describes a methodology for qualification of the acid system's material compatibility adopted by an operator on the Norwegian continental shelf. As part of the acid treatment qualification, corrosion is a key parameter that should be addressed carefully, particularly for high-temperature wells. This paper discusses two acid qualification programs: Case 1: API 5CT grade 13% Cr-80 and UNS S41426 martensitic stainless steel well construction materials and a reservoir temperature of 135°C Case 2: API 5CT grade 13% Cr-80 tubing material and a reservoir temperature of 98°C For Case 1, the challenge was to qualify an acid system, while for Case 2, the objective was to optimize the acid formula. Static corrosion tests were conducted; general corrosion rates were	Ernest N. Morial Convention Center-New Orleans

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Wednesday,3 :15p.m. to 3 :15p.m.	Stochastic Modeling of Non-Uniform Corrosion of Carbon and Low Alloy Steel during Chemical Cleaning	Charles Marks, Robert Varrin, Michael Little, Abby Pellman - Chemical cleaning of industrial process equipment can result in corrosion of carbon and low alloy components. Whether in the power generation or chemical process industry, predicting and monitoring of such corrosion is a critical aspect of the overall chemical cleaning project. Normally, laboratory qualification testing is performed to establish the expected corrosiveness of the process. Electrochemical techniques such as LPR, ER, ZRA, or ECN are then used in the field during the cleaning to follow the corrosion on-line. Corrosion coupons can also be installed prior to the cleaning and examined upon completion. However, both on-line monitoring and examination of coupons often involves judgment in extrapolating/interpreting the results and estimating the corrosion of the surfaces actually being cleaned. In this work, a stochastic model of the overall cleaning process and consequent corrosion was developed for EDT	Ernest N. Morial Convention Center-New Orleans

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Wednesday,3 :15p.m. to 3 :40p.m.	Corrosion of Ni-Based Alloys and Stainless Steels in Molten Fluoride Salts for Gen IV Reactors	Kevin Chan, Julie Luong, Preet Singh - Corrosion of Ni-Based Alloys and Stainless Steels in Molten Fluoride Salts for Gen IV Nuclear Reactors Kevin J. Chan, Julie Luong, and Preet M. Singh School of Materials Science and Engineering Georgia Institute of Technology, Atlanta, GA Several Generation IV nuclear reactor concepts feature molten fluoride salt coolants. However, corrosion of structural alloys in molten fluorides remains a challenge. Due to the solubility of oxides in the molten fluoride, oxide films cannot be relied-upon to retard corrosion of structural alloys. Therefore, corrosion is most dependent on the alloy composition and salt chemistry, as found by previous studies. To better understand these factors, static exposure tests and electrochemical tests were conducted in the molten fluoride salt known as FLiNaK. Potentiodynamic polarization experiments were conducted for several candidate alloys, including Ni based alloys and stainless steels. Moisture and metal-ion	Ernest N. Morial Convention Center-New Orleans

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Wednesday,3 :15p.m. to 3 :40p.m.	Determining Biocide Selection and Dosage Recommendation via Planktonic and Sessile Kill Studies and	Zach Broussard, Timothy Tidwell, Renato De Paula, Vic Keasler - A three phase production system in the North Sea was experiencing multiple leaks in the topside separation facilities. A root cause analysis, using a combination of ATP photometry and DNA-based techniques, was performed and the underlying source responsible for the failures was determined to be microbially influenced corrosion. To control the microbial contamination in the system, an initial planktonic kill study was performed to select for the best possible biocides to provide immediate microbial mitigation to the field. Upon implementation, resulting field data indicated effective initial control. Treatment efficiency was further corroborated by follow up laboratory sessile studies to confirm the biocide selection and to determine the frequency of biocide injection needed to maintain control over the sessile population. For these experiments, representative biofilms were cultivated in two separate CDC biofilm rea	Ernest N. Morial Convention Center-New Orleans

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Wednesday,3 :15p.m. to 3 :40p.m.	UNS S32707 Combined to UNS S31266; An Alternative to Titanium for Seawater-Cooled Heat Exchangers	Josefin Eidhagen, Nicolas Larché, Herve Marchebois, Sandra Le Manchet, Ulf Kivisakk - In the process industry, seawater is commonly used when available to cool process fluids. However chlorination of the seawater is widely used to limit any microbial activity; that makes the environment quite aggressive. Chlorination oxidizes and increases the corrosion potential to approximately +600mVSCE for stainless steels and leads to higher susceptibility to localized corrosion. Super duplex stainless steels, PRENw* >40, in seawater-cooled heat exchangers can be used at limited temperatures otherwise Ti Gr.2 shall be used for equipment integrity over the service life. Recent results with combination of hyper duplex UNS S32707 tubes and super austenite UNS S31266 plate, with PRENw* of 49 resp. 53, for seawater-cooled heat exchangers are presented. Testing is performed in seawater cooled scale model heat exchangers with 0.5 ppm residual chlorine during a period of 18 months. Thus, it shows	Ernest N. Morial Convention Center-New Orleans

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Wednesday,3 :15p.m. to 3 :40p.m.	Protection of Equipment for Storage and Transport with VCI	Ivan Rogan, Boris Miksic, Vesna Alar - Authors: B. Mikšić Corte Corporation, Vesna Alar FSB Zagreb, Ivan Rogan CorteCros Ltd. Zagreb PROTECTION OF EQUIPMENT FOR STORAGE AND TRANSPORT WITH VAPOR PHASE CORROSION INHIBITORS Application of Vapor phase Corrosion Inhibitors (VCI) for protection of various industrial and military equipment from corrosion during storage and overseas transport provides numerous advantages. When VCI inhibitors are being applied during the process of corrosion protection they will enable strong protection of the equipment during storage and transport without additional time and money needed prior to putting equipment in operation. During transport the equipment travels through various climate zones experiencing changes in temperature and humidity that are favorable to corrosion. Changes in humidity and temperature levels during transport even at very short distances can create moisture that condenses into water. Properly chosen combination of Vapor	Ernest N. Morial Convention Center-New Orleans

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Wednesday,3 :15p.m. to 3 :40p.m.	Accelerated Field Exposure using Seawater Spray: A Comparison to Traditional Atmospheric Test Method	Derek Horton, Christine Sanders, Edward Lemieux - Often the most severe maritime environmental degradation for ships occurs just above the waterline within the splash zone where periodic wet-dry cycles accelerate corrosion. Similarly, increased corrosion also occurs at coastal areas where nearby wave action generates more sea-spray aerosols. These areas are subjected to typical degradation through atmospheric deposition and stressors such as UV light but also have an increased time of wetness (ToW) and higher chloride deposition rate compared to atmospheric exposure alone. It has been seen previously that elevated ToW and chloride loading are correlated to higher corrosion rates of various materials. The objective of this series of testing was to compare the effect of different field exposure conditions on corrosion performance: atmospheric exposure in a medium chloride environment, atmospheric exposure with periodic seawater spray, cyclic alternate immersion, and a typical ac	Ernest N. Morial Convention Center-New Orleans

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Wednesday,3 :15p.m. to 3 :40p.m.	Fatigue Crack Growth Rate Behavior of Welded Line Pipe Steel in Sour Environments	Thodla Ramgopal, Colum Holtam, Brandon Gerst, YU weiwei, Jonathan bowman, Apurva batra - Sour fatigue crack growth rate (FCGR) behavior of welded line pipe steel was investigated in a range of conditions. Frequency scan FCGR tests were performed at a fixed stress intensity factor range (DK) to determine the effect of frequency in two different sour environments. Both sour environments had the same partial pressure of H2S but with different pH values and inhibitor concentration. A limited number of frequency scan experiments were also performed to evaluate the influence of two different H2S levels (0psia and 0.21psia) on the FCGR performance. The FCGR increased with decreasing frequency and in most cases a plateau value was reached at low frequency. The maximum FCGR (i.e. at the plateau frequency) was higher at lower pH (with high inhibitor concentration) when compared to the higher pH environment (with lower inhibitor concentration). The plateau FCGR in the absence of H2S w	Ernest N. Morial Convention Center- New Orleans

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Wednesday,3 :15p.m. to 3 :40p.m.	Researches on AC Corrosion Risk Assessment Criteria for Cathodically Protected Carbon Steel	Yanxia Du, Dezhi Tang, Yi Liang, Zitao Jiang - AC interference experiments were carried out to study the effects of AC interference on cathodic protection(CP) parameters and AC corrosion rate in different conditions. The effects of AC interference on CP current requirement and CP potentials were obtained for two different controlling modes of CP system, such as constant potential mode and constant current mode. Based on weight loss experiments results of different AC current densities and CP levels, AC corrosion risk assessment criteria graph considering both AC interference and CP parameters was established. Besides, the AC corrosion mechanism for different levels of CP was studied and discussed.	Ernest N. Morial Convention Center- New Orleans

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Wednesday,3 :40p.m. to 3 :40p.m.	[Characterization and Control of the Intergranular Corrosion Defects in a 2024 T351 Aluminium Alloy]	Marie-Laetitia de BONFILS-LAHOVARY, Jérôme DELFOSSE, Manon Lafouresse, Lydia LAFFONT, Christine BLANC - The corrosion susceptibility of aluminium alloys, in particular the propagation kinetics of intergranular corrosion, remains not only a problem of fundamental interest but is also a key point for aircraft structures. The present work aims to understand and characterize local corrosion phenomena in order to develop and optimise an engineering test to determine the propagation kinetics of intergranular corrosion defects in a 2024-T351 aluminium alloy exposed to an aggressive environment with various exposure conditions (continuous immersion in a 1M NaCl solution during times ranging from 6h to 3000h, cyclic corrosion tests, natural environment exposure and industrial corrosion tests). Firstly, in order to understand this local corrosion mechanism, morphological and chemical characterizations of corrosion defects were done using several techniques such as TEM (Transmission Electr	Ernest N. Morial Convention Center-New Orleans

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Wednesday,3 :40p.m. to 4 :5p.m.	Choice of Buffer Solution for Stainless Steel OCTG at Laboratory Corrosion Test to Carry Out SSC and	Yasuhide Ishiguro, Kazuki Fujimura - Corrosion environment in real oil/gas well is very stable and can be regarded as equilibrium state. Therefore pH is very stable at each depth level of well from wellhead to bottomhole. The pH tends to stay the same in formation water and in condensed water as well. Buffer solution should be used to evaluate corrosion resistance for OCTG materials, and the stability of buffer solution, which corresponds to the capability to keep targeting pH throughout test duration, is important to carry out laboratory corrosion tests This paper reviews a theoretical background of buffer solution for stainless steel OCTG materials at laboratory corrosion test, and then the concept is applied to NACE-TM0177-based three kinds of solution: (1)solution-A-based buffer solution (0.5%CH_3COOH with CH_3COONa), (2)solution-B-based buffer solution (2.5%CH_3COOH + 0.41%CH_3COONa with CH_3COOH or CH_3COONa) and (3)solution-C-based non-buffer solution (0.4g/L CH_3COONa with HC	Ernest N. Morial Convention Center-New Orleans

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Wednesday,3 :40p.m. to 4 :5p.m.	Corrosion Evaluation of Alloys For High Temperature Service in Molten Fluoride Salt Cooled Reactors	Govindarajan Muralidharan, JAMES KEISER, Dane Wilson - Fluoride-salt cooled reactors are a class of reactors that have attractive performance and safety attributes. The defining features of these flouride salt cooled high temperature reactors (FHR's) are high-temperature heat production and the use of low-pressure fluoride salt cooling. Although fluoride salts have attractive heat-transfer characteristics, materials in contact with these salts are subject to corrosive attack. Oxide scales that are traditionally used for high temperature protection are removed when the material is in contact with fluoride salts and hence the composition of the alloy has a significant effect on the corrosion behavior in molten salts. This paper will present the techniques used for the laboratory-scale corrosion evaluation of alloys for service at high temperatures in molten fluoride salt environments. A brief overview of the effect of alloying elements on the fluoride salt corrosion will be pro	Ernest N. Morial Convention Center-New Orleans

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Wednesday,3 :50p.m. to 4 :15p.m.	Effect of Biocides and Corrosion Inhibitors On SRB-Mediated MIC Under Flow Conditions	Gerrit Voordouw, Tijan Pinnock - Biocides and corrosion inhibitors are used to prevent corrosion in stagnant and flowing systems, like storage tanks and pipelines, respectively. We have used 1 ml syringe columns packed with 60 carbon steel beads (55 mg each), which were continuously injected with the effluent of an SRB continuous culture chemostat, to monitor corrosion under flow conditions. A constant flow rate of 0.5 ml/hr was maintained throughout. General corrosion rates (CRs) were determined after 45 days of flow by measuring the weight loss of acid-treated beads. Medium entering the chemostat contained sulfate (10 mM) as electron acceptor and either formate (20 mM) or lactate (10 mM) as electron donor for the growth of SRB. Medium with formate and sulfate also contained 1 mM acetate as a carbon source. Effluent of the chemostat with 5 mM sulfate, 5 mM sulfide and high numbers of SRB in both cases was then continuously injected into the syringe columns. CRs of beads in the	Ernest N. Morial Convention Center-New Orleans

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Wednesday,3 :50p.m. to 4 :15p.m.	Understanding the Discrepancies in Wet Bottom and Dry Bottom MASTMAASIS Testing Results of AA2060	Mary Parker - Aluminum-lithium (Al-Li) alloys are attractive for aerospace applications because of their improved strength-to-weight and stiffness-to-weight ratios, fracture toughness, and corrosion resistance compared to legacy alloys. These alloys can suffer from various forms of localized corrosion when exposed to corrosive atmospheric conditions during service. Localized corrosion susceptibility and attack rates are difficult to predict, so accelerated laboratory testing is used for lot acceptance, new alloy and temper development, and material lifetime predictions. Many standardized accelerated tests are currently used for high-strength aluminum alloys (ASTM standards G34, G85, G110, and B117), but these tests can produce drastically different results for the same alloy. This disagreement among tests, which are all aimed at assessing localized corrosion resistance, limits their utility and hampers alloy and temper development. Understanding the testing variables that contr	Ernest N. Morial Convention Center- New Orleans

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Wednesday,3 :50p.m. to 4 :15p.m.	Corrosion Properties of Ni-Al Bronze and it’s Main Alloying Elements - Effect of pH	Hedda Krogstad, Roy Johnsen, Ellen Synnøve Skilbred - Heavy corrosion of Ni-Al Bronze in an industrial construction operating in seawater has given reason to further investigate the corrosion-properties of this alloy in marine environments, including the effect of pH. A study on the microstructure and phase-composition of the alloy was followed by electrochemical tests and surface- and cross section characterization of both the alloy and it's main alloying elements; copper, aluminium, nickel and iron. All experiments were conducted at pH≈8 and pH≈3-4 in synthetic seawater at room temperature. The electrochemical tests included recording of the corrosion potential and polarization curves for all the materials included in the work, and additional potensiostatic polarization to anodic potentials of Ni-Al Bronze. The results of this work give clear indications of a strong pH dependency on the corrosion mechanism for Ni-Al Bronze, and that nickel and aluminium are the main elements	Ernest N. Morial Convention Center-New Orleans

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Wednesday,3 :50p.m. to 4 :15p.m.	Calculating and Tracking Soil Resistivity Change in High AC Corridors	Jamey Hilleary - Over the last decade increased attention has been directed toward the corrosion effects of high AC current density on pipeline structures collocated in high voltage power line right of ways. Efforts directed at identifying areas of concern, evaluating the magnitude of the problem in those areas, and applying mitigation systems to reduce high AC levels have flourished. Subsequent monitoring of AC voltage and AC current density has also increased dramatically as organizations seek to protect buried pipelines from this relatively new threat. Historically, AC current density has been calculated using measured AC voltage, soil resistivity, and holiday size (diameter). Soil resistivity is generally measured at the area or areas of concern using the Wenner 4-point or similar method and expressed in ohms per centimeter or ohms per meter. Very often the soil resistivity testing is done primarily for sizing the electrode grounding system for draining AC from the pipeline.	Ernest N. Morial Convention Center-New Orleans

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Wednesday,4 :5p.m. to 4 :30p.m.	Development of a Corrosion Control Program for Liquid Radioactive Wastes Stored in Carbon Steel Wast	Bruce Wiersma, Richard Wyrwas, Kayle Boomer, Amie Feero, Stuart Arm - Large underground, carbon steel tanks are used for interim storage of liquid radioactive waste at the Hanford site. The Hanford Waste Treatment and Immobilization Plant (WTP) is being constructed to treat the high-level waste (HLW) and low-activity waste (LAW) in the tank. The WTP LAW recycle stream will be generated by condensation and scrubbing of the LAW melter off-gas stream. A portion of this stream, which will contain substantial amounts of chloride, fluoride, ammonia, and sulfate ions, may be returned to the tank farms for storage and evaporation. Presently, there are no restrictions on the halide or sulfate concentrations of this return stream prior to transferring to the carbon steel waste tanks. Prior to initiating the process, the susceptibility to pitting corrosion of waste tanks due to the halide contents of the return stream was investigated. Cyclic potentiodynamic polarization tests were util	Ernest N. Morial Convention Center-New Orleans

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Wednesday,4 :5p.m. to 4 :30p.m.	Evaluation of Simulated Corrosion Pits in X65 Steel	Farnoosh Farhad, David Smyth-Boyle, Kashif Khan, Xiang Zhang - Pitting corrosion is an insidious form of localized damage that may lead to through-wall failure and loss of containment in vessels and pipelines, either directly through corrosion or indirectly following a pit-to-crack transitional stage. As such, pitting corrosion is a safety, environmental and economic concern for many industries. Within the oil and gas sector, X65 steel is commonly used for the conveyance of production fluids. While it is known that this material grade is susceptible to pitting and cracking in several media, a fundamental understanding of the pit-to-crack evolution is still not available. The growth of pits is known to be a non-linear stage in the fatigue lifetime and the developing plastic deformation can be an important factor in the pit growth regime. Consequently, there is a need to study the relationship of the plastic zone size and pit geometry/size. This work aims to evaluate the stress and strai	Ernest N. Morial Convention Center-New Orleans

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Wednesday,4 :15p.m. to 4 :40p.m.	Interfacial and Corrosion Characterization of Zinc Rich-Epoxy Primers with Carbon Nanotubes Exposed	Homero Castaneda-Lopez, Marisela Aguirre, Violeta valencia, Monica Galicia - Electrochemical and corrosion characterization of different inorganic coated-steel under influence of marine biofilm formation M. Galicia1, V. Valencia1, M. Aguirre, H. Castaneda2* 1Departamento de Química, Universidad Autónoma de Ciudad Juárez, Instituto de Ciencias Biomédicas, Juárez CH, 32300 México. 2Department of Materials Science and Engineering, Dwight Look College of Engineering, Texas A&M University, College Station, TX 77843-3003 *Corresponding author. E-mail address: hcastaneda@tamu.edu Abstract Nowadays, it is generally accepted that, in aerobic conditions, marine electroactive biofilms induce faster oxygen reduction on active passive alloys immersed in seawater. Besides, in natural seawater, this alloys undergo a shift of open circuit potentials (OCP) towards noble direction after biofilm settlement, OCP can be shifted up to □350 mV vs. SCE. This latter is common for bare st	Ernest N. Morial Convention Center-New Orleans

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Wednesday,4 :15p.m. to 4 :40p.m.	Corrosion of Ni-Al Bronze and it's Main Alloying Elements - Effect of Magnetic Field	Hedda Krogstad, Roy Johnsen, Michael Coey - A magnetic field exert forces on both moving electrochemical charges and ions with unpaired spin in an electrolyte. The strength of these forces are related to the current density, the nature and strength of the magnetic field, and the magnetic properties of the ions. To study how the electrochemical rates involved in the corrosion of Ni-Al Bronze are influenced by these forces, electrochemical experiments with the alloy and it's main alloying elements (copper, aluminium, nickel and iron) have been conducted in a cell with a 3.5 wt% NaCl electrolyte at room temperature positioned between the poles of an electromagnet that generates a uniform magnetic field of 0.3-1.0 Tesla. The motivation for the work are reports on corrosion of Ni-Al Bronze in industrial permanent-magnet motors operating in seawater, where the corrosion appears to follow patterns coinciding with the pole-configuration of the motors.	Ernest N. Morial Convention Center-New Orleans

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Wednesday,4 :15p.m. to 4 :40p.m.	Atmospheric Stress Corrosion Crack Growth Rate Analyses of Austenitic Stainless Steel	Brian Somerday, James Dante, Jim Feiger, Erica Macha, Todd Mintz - Chloride induced stress corrosion cracking (CISCC) is a significant problem that has been observed to lead to premature failure of components at various facilities. CISCC can occur when airborne salts deposit and deliquesce on the surface of equipment. The deliquescence of these salts in a humid environment creates a chloride-rich brine. The presence of this brine along with a residual tensile stress could lead to CISCC. There has been much work demonstrating conditions where CISCC can initiate, but there is very little information on the actual SCC crack growth rate (CGR) under an atmospheric environment. The limited amount of atmospheric SCC CGR measurements have been obtained either from operating experience or by a few labs. The objective of the work described in this paper was to further the understanding of atmospheric CGR of stainless steel in a chloride-rich environment. Simulated sea salt was depo	Ernest N. Morial Convention Center- New Orleans

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Wednesday,4 :15p.m. to 4 :40p.m.	Case Study of AC interference on an Urban Gas Pipeline: Field Test, AC Mitigation Design and Assessm	Xiaxi Li, Yi Liang, Yanxia Du, Dezhi Tang, Linlin Xing, Ziping Che - The development of urban gas, transportation and electricity deteriorated AC interference from powerline to urban gas pipeline. Due to the limited space at urban, the widely used AC mitigation methods suffered from great challenge when they were applied to urban gas pipeline. AC mitigation of urban gas pipeline became a hot potato. This paper was an attempt to example AC mitigation design of an interfered urban gas pipeline by numerical calculation, including AC interference risk evaluation, AC mitigation design and mitigation efficiency assessment. Prior to AC mitigation design, field tests were conducted to evaluate AC interference risk of pipeline. Based on the collected information, computing model was established. Then cost-saving and environment-acceptable mitigation methods were reached with the help of numerical calculations. Besides, AC mitigation efficiency was assessed by field test.	Ernest N. Morial Convention Center-New Orleans

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Wednesday,4 :15p.m. to 4 :40p.m.

Study on Effect of Buffer Capacity on Corrosion Performance of CRAs in Simulated Well Condition

Masayuki Sagara, Akiko Tomio, Daisuke Matsuo, Hisashi Amaya - The methodology how to simulate or realize an actual oil and gas field condition in laboratory tests is important to evaluate the actual corrosion performances of materials. The environmental factors such as partial pressure of H2S and CO2, temperature, concentration of chloride ion and pH of the solution are essential to define the severity of corrosion condition. To consider the initiation of localized corrosion such as pitting or cracking in Corrosion Resistant Alloys (CRAs), it is important to research the stability of the passive film such as depassivation pH of the materials. The one of most important environmental factor which may have an impact on the stability of the passive film is pH of the solution. The local pH in the vicinity of surface of metals might fluctuate due to the result by the hydrolysis reaction of H2O combined with metallic cation which are released from the metal surface. It could be diffic

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Wednesday,4 :40p.m. to 5 :5p.m.	Assessment of the Operating Window of 13Cr- 1Mo 110 ksi Well Tubulars in a Mild Sour Gas Environment	Pedro Rincon, Manoj Gonuguntla Suryanarayana, Cheng Khoo, Nasser Behlani, Janardhan Saithala, Marc Wilms, William Grimes, Mohammed Hubaishi, Johan Smit, Michiel vanKuppevelt - Stainless steel alloys with 13 % Chromium are used in the oil and gas industry as wells tubular material. Typical alloys are 13Cr, 13Cr4Ni1Mo and 13Cr5Ni2Mo, in strength ranging from 80 to 125 ksi (550 to 860 Mpa). This work concerns identification of the operating window of a 13Cr4Ni1Mo alloy, 110 ksi SMYS (758 Mpa). There is unclarity on the suitability and safe operating envelope of this alloy in mildly sour gas environments. The H2S limits of 13Cr4Ni1Mo are assessed in order to evaluate future use, and to assess suitable operating limits for current applications with increasing H2S due to well souring. A comprehensive test program with artificial brine showed susceptibility of SSC is limiting the application window of the material more than SCC and pitting. SCC was found at as low as 2.5 mbar ppH2S wi	Ernest N. Morial Convention Center-New Orleans

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Wednesday,4 :40p.m. to 5 :5p.m.	Challenges in Mitigating AC Interference in Remote Areas	Malvin Luk, Ernesto Gudino, Chad Khattar, Daniel Hebb - Challenges in Mitigating AC Interference in Remote Areas M. Luk, P. Eng. D. Hebb, EIT Corrosion Service Company Limited 9-280 Hillmount Rd. Markham, ON, Canada L6C 3A1 E. Gudino, P. Eng. Chad Khattar, P.Eng. TransCanada Pipelines Limited 450 – 1st Street SW, Calgary AB, Canada, T2P 5H1 An AC interference study was conducted in 2015 following the installation of a new 240 kV powerline in a remote area of Alberta, Canada. The calculations indicated severe risk of AC corrosion for paralleling pipelines and safety hazards for pipeline personnel, especially under fault conditions. A mitigation system was designed, consisting of more than 10 km of bare copper mitigation wire; however due to site conditions (i.e. winter access only) it was not practical to install the system prior to the scheduled powerline energization. The paper describes both the challenges and the solutions in this project, including the design	Ernest N. Morial Convention Center-New Orleans

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Wednesday,4 :40p.m. to 5 :5p.m.	Combined Mechanical Stress and Environmental Exposure Accelerated Coating Testing	Patrick Kramer, Fritz Friedersdorf, Christina Grumbach, Sean Pennell, Kristen Williams, Karen Schultz, Stuart Croll, Aaron Feickert - Repair and replacement of exterior coating systems that no longer meet aesthetic or protective requirements generate a significant volume of environmentally hazardous waste, which includes the coating material combined with solvents and/or media used to remove the coatings, as well as the waste materials generated in surface preparation and reapplication the coating system. There are strong economic and environmental drivers to extend the service life of aerospace coatings. However, development, selection, and use of the most durable coatings systems have often been limited by the ability to predict service performance in accelerated tests. Current accelerated test methods do not adequately employ the chemical, thermal, mechanical, or radiative stressors that produce relevant damage mechanisms in coated structures that can be used for accurate qu	Ernest N. Morial Convention Center-New Orleans

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Wednesday,4 :40p.m. to 5 :5p.m.	Service Performance of Ni-Al Bronze in Marine Environments	Moavin Islam - Influence of Metallurgical Structure on the Service Performance of Ni-Al Bronze Process Equipment in Marine Environments Nickel-Aluminum Bronzes often referred to as NAB are a group of Cu-based alloys containing about 3-6% Ni, 8-11% Al, 3-5% Fe and 1-3% Mn. These alloys have excellent physical properties such as fatigue, creep and wear as well as excellent resistance to different forms of corrosion such as general corrosion, cavitation, erosion and de-alloying. Hence, they find widespread use in marine environments as components of ships and industrial process equipment handling seawater. However, the corrosion resistance of these alloys can be adversely effected by their metallurgical structure which in turn depends uponhe exact composition of the material and their manufacturing history - especially the thermal treatment to which they have been subjected. This paper will present two case studies of pre-mature failure of process equipment in seawater service w	Ernest N. Morial Convention Center-New Orleans

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Wednesday,4 :40p.m. to 5 :5p.m.	Enhanced Biocide Mitigation of Microbiologically Influenced Corrosion In Enhanced Oil Recovery	RU JIA, HASRIZAL ABD RAHMAN, Dongqing Yang, PAUZIYAH A HAMID, INTAN KHALIDA SALLEH, JAMAL MOHAMAD M IBRAHIM, Tingyue Gu - Due to the common practice of seawater injection in enhanced oil recovery (EOR), microbiologically influenced corrosion (MIC) is currently a prevalent problem in the oil and gas industry. Seawater brings in nutrients and microbes downhole. Sulfate combined with other nutrients in the seawater result in biogenic souring and MIC pitting against downhole tubing. EOR polymers may be utilized by microbes as organic carbon that promotes biofilm growth downhole under certain conditions. Periodical biocide dosing is often used to mitigate souring and MIC. Unfortunately, prolonged biocide dosing leads to biocide resistance by the microbes that escalates biocide dosage over time. In this work, naturally occurring D-amino acids were used to help disperse biofilms and thus reducing the tetrakis (hydroxymethyl) phosphonium sulfate (THPS) biocide dosage through synergy. T	Ernest N. Morial Convention Center- New Orleans

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Wednesday,5 :5p.m. to 5 :30p.m.	Sulfide Stress Cracking (SSC) Resistance of AISI 420 Modified (13Cr) Martensitic Stainless Steel Bar	Karthik Krishnan - Sulfide Stress Cracking (SSC) Resistance of AISI 420 Modified (13Cr) Martensitic Stainless Steel Bar Stock Karthik Krishnan*, Halliburton AISI 420 modified (13Cr) martensitic stainless steels are widely used in the manufacture of downhole completion equipment for oil and gas production environment. 13Cr is primarily used in CO2 rich production environments in which carbon/low alloy steels are subject to high corrosion rates. The material is available as both bar stock and tubing. Bar stock is predominantly used for manufacturing thick walled completion tool components. 13Cr material that has been quenched and tempered to 22 HRC maximum hardness provides resistance to sulfide stress cracking (SSC) in environments with low hydrogen sulfide (H2S); it is typically used to a maximum H2S limit of 10 kPa (1.5 psi) in accordance with the NACE MR0175/ISO 15156-3 guidelines. For H2S levels that exceed 10 kPa (1.5 psi), the primary option for completion tools is the use	Ernest N. Morial Convention Center-New Orleans

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Thursday,8 a.m. to 8 :25a.m.	Role of H2S In Localized Corrosion and Cracking of CRAs in Upstream Oil and Gas Applications	Gareth Hinds, James Hesketh - The more aggressive environments encountered in upstream oil and gas applications due to exploitation of deeper oilfields at elevated temperature and higher partial pressures of hydrogen sulphide (H2S) and carbon dioxide (CO2) have meant that corrosion resistant alloys (CRAs) are increasingly the containment material of choice. Selection of the appropriate alloy is determined primarily by the trade-off between cost and performance, which is typically assessed via standard laboratory test methods such as the four-point bend and proof ring tests. Localized corrosion is often the precursor to cracking and there is ongoing debate within the industry regarding the critical pit size that can be tolerated in such tests in the absence of any cracks. This generates considerable uncertainty in the validity of extrapolating the results of relatively short term laboratory tests to predict service performance over a period of several decades. Here we present a	Ernest N. Morial Convention Center- New Orleans

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Thursday,8 a.m. to 8 :25a.m.	Identification of Compounds that Effectively Block Microbial H2S Production	Brett Geissler - Microbial reduction of sulfur compounds is a concern in many industries due to the toxicity and corrosivity of the chief metabolic waste product, hydrogen sulfide (H2S). In the oil and gas industry, production of H2S by microbes within the petroleum reservoir is extremely detrimental to production and often leads to complete shut-in of wells and entire assets due to these concerns. Hundreds of different genera of bacteria and archaea are capable of generating H2S from an array of sulfur-containing compounds, although the key enzymes involved are relatively well conserved. We have identified a class of inhibitory molecules that abrogate sulfidogenesis by numerous diverse microbial populations found within oilfield produced fluids. Using bottle tests and laboratory-scale bioreactors designed to more closely mimic field conditions, very low doses of two different versions of this class of compounds were found to effectively prevent H2S generation and decrease the	Ernest N. Morial Convention Center-New Orleans

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Thursday,8 a.m. to 8 :25a.m.	Inhibition of Pitting Corrosion in Simulated Liquid Radioactive Waste	Bruce Wiersma, Roderick Fuentes, Kayle Boomer, Amie Feero - The Hanford Site in Richland, WA stores liquid radioactive waste in underground, carbon steel, double shell tanks (DSTs). The DSTs have a well-defined chemistry control program for the prevention of stress corrosion cracking, general corrosion and pitting of the steel that is exposed to the waste. The primary aggressive species active in the localized mechanism is nitrate, while hydroxide and nitrite are utilized to inhibit these mechanisms. Recent tests suggested that the corrosion control program requirements may be optimized so that the total amount of inhibitor necessary may be reduced. Secondly, future waste streams that will be transferred into the tanks may include other aggressive species (e.g., chloride and sulfate) at higher than previously experienced concentrations. Electrochemical corrosion testing was performed to determine new limits that optimize the chemistry control, yet are robust enough to inhibit	Ernest N. Morial Convention Center-New Orleans

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Thursday,8 a.m. to 8 :25a.m.

[Marine Corrosion Performance of Copper Alloy UNS C69100]

mengyan Nie, John Zbihlyj, Julian Wharton -

Marine Corrosion Performance of Copper Alloy UNS C69100

Mengyan Nie a，Julian A. Wharton a and John Zbihlyj b
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ABSTRACT

Tungum alloy (UNS C69100) is an aluminium-nickel-silicon brass (chemical composition: 81-84% Cu, 0.70-1.20 Al, 0.8-1.40 Ni, 0.80-1.30 Si, with the remainder Zn) and is reported to have a good corrosion performance in marine environments (fully wetted, splash zone and atmospheric conditions). In order to gain an in-depth understanding of the marine corrosion performance of this alloy, electrochemical test methods including open-circuit potential, electrochemical impedance spectroscopy, potentiodynamic polarization, and zero-resistance ammetry we

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Thursday,8 a.m. to 8 :25a.m.	Assessing the Corrosivity of Field Produced Water in in-situ Oil Sands Water Treatment Systems	Tesfaalem Gebremedhin Haile, Lisa Sopkow, Tamer Crosby - In-situ oil sands water treatment systems (WTS) used to treat and recycle produced water to ultimately supply steam to the steam assisted gravity drainage (SAGD) and cyclic steam stimulation (CSS) processes have noted failures associated with corrosion including erosion-corrosion, under deposit corrosion (UDC), fouling, scaling, and localized corrosion among others. Oil sands operators employ corrosion monitoring tools, chemical treatment, and/or material selections to resolve integrity related issues. However, the unpredictable occurrences of serious corrosion issues related to the complex and constantly changing water chemistries make it difficult to choose the appropriate preventative and mitigation strategies. This is further complicated by the effects of operating conditions; such as temperature, pressure, and flow geometry. This paper presents the corrosivity of field produced water obtained from in-situ oil sa	Ernest N. Morial Convention Center-New Orleans

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Thursday,8 a.m. to 8 :25a.m.	Lab Performance Testing on Corrosion Inhibitors Under Supercritical Carbon Dioxide Conditions	Larry Chen, Nihal Obeyesekere - Larry Chen, Nihal Obeyesekere, Jonathan Wylde Clariant Corporation Oil and Mining Services 2750 Technology Forest Blvd. The Woodlands, TX 77381 For the foreseeable future, fossil fuels will continue to be the dominant source of the world's primary energy production. There has been growing concern that the use of the carbon-based fuels produces greenhouse gases, principally carbon dioxide (CO2), which may adversely affect the global climate and environment. One way to mitigate the problem is to use carbon capture, transportation, and storage (CCTS) techniques and systems. As such, there is an increasing demand on corrosion inhibitors for CCTS application and also a need to understand the corrosion inhibitor performance under CCTS operating conditions. In general, the CO2 is required to be transported above its critical point (30.98 oC, 73.77 bar) as single phase in the system which is a pre-condition for continuous operation at the so-	Ernest N. Morial Convention Center-New Orleans

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Thursday,8 a.m. to 8 :25a.m.	Review on the Heat-Resistant Stainless Steel Alloys Used for the Steam Methane Reformer Outlet Syste	Shankar Venkataraman, Dietlinde Jakobi - The outlet system of a steam methane reforming unit, depending on design, normally consists of a combination of wrought components and cast components used in a welded construction. Proper functioning of the outlet unit is dependent on the in-service performance of these components. Both cast (UNS N08151) and wrought (UNS N08810/N08811) metallurgies have been used for outlet components. The microstructural features responsible for material performance, the various microstructural alterations occurring in service and its impact on serviceability as well as repair weldability are reviewed.	Ernest N. Morial Convention Center-New Orleans
Thursday,8 a.m. to 8 :25a.m.	Pipeline Casings - Management of Pipeline Casing Issues	Jeffrey Didas - Pipeline casings are an issue whether clear or shorted. This paper will discuss the various issues with casings and what if anything can be done to remediate these issues. Discussion will be about CP - Cathodic Protection, Casing Filling, Casing Removal and some general topics.	Ernest N. Morial Convention Center-New Orleans

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Thursday,8 a.m. to 8 :25a.m.	Assessment of Anticorrosion/Antifouling Performances of a Novel Hybrid Epoxy-Siliconized Coating	Rami Suleiman - Preventing of material loss due to corrosion and fouling of steel surfaces is a serious challenge for oil and gas industries. The use of protective polymeric coatings containing active biocides is an interesting approach to address this problem. The development of active anticorrosion/antifouling coatings via this approach requires the careful design and optimization of the coating matrix, selecting the proper biocide, and ultimately achieving the synergy between the two components. In this study, a novel hybrid epoxy-siliconized coating was synthesized through a sol-gel technique, and subsequently doped with different organic and inorganic antibacterial agents. The undoped and doped-coatings were applied on mild steel sheets and their corrosion protection performances in lab were evaluated using Electrochemical Impedance Spectroscopy (EIS) and DC polarization techniques and visual observations. The field testing of the anticorrosion and antifouling properties o	Ernest N. Morial Convention Center-New Orleans

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Thursday,8 a.m. to 8 :25a.m.

The Use of Nanostructured Materials Loaded with pH Indicating Molecules for Corrosion Sensing

Joao Tedim - Detection and mitigating actions are inter-related parts of the tackling of corrosion in a cost-effective way. Previous works available in the literature have shown the potential for using pH indicators as a simple and user-friendly approach for detection of corrosion activity [1-3]. In fact, the correlation between the electro (chemical) processes occurring at the metal/solution interface, transduction into a measurable signal and correlation with level of degradation constitute an ever actual problem and challenge in the field of corrosion science and engineering.
In this work, we revisit the use of pH indicating molecules as active components of novel hosting structures for detection of corrosion [4]. The designed systems encompass materials at micro and nanoscale with capacity for controlled release of substances, to be used as functional additives into polymeric coatings and thus impart self-sensing properties.

References:
[1] J. Zhang and G. S. Frankel,
Corrosi

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Thursday,8 a.m. to 8 :25a.m.	Electrochemical Characterization of Metstable Austenitic Stainless Steels to Illustrate the Influenc	Arnulf Hörtnagl, Paul Guempel - The electrochemical behaviour of three metastable austenitic stainless steels with different parameters of industrial surface preparations has been investigated. For investigation of the influence from deformation induced martensite, the specimens where cold rolled. As abrasive material SiC and Al2O3 are confronted. Their resistance against localized corrosion has been determined by critical pitting potential (CPP), critical pitting temperature (CPT) and electrochemical noise (ECN). For the characterisation of the topography and the morphology of the surface, scanning electron microscopy (SEM) and tactile measurements were employed. The influence of surface roughness on the corrosion resistance can be confirmed with these results. The number and characteristic of small crevices on the surface are correlating to the corrosion resistance. This are strongly affected by abrasive material and grinding parameters. The electrochemical noise measuremen	Ernest N. Morial Convention Center- New Orleans

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Thursday,8 a.m. to 8 :25a.m.	Principles and Issues in Structural Health Monitoring Using Corrosion Sensors	YongJun Tan - Principles and issues in structural health monitoring using corrosion sensors M. YJ Tan* Institute for Frontier Materials and School of Engineering Deakin University, Victoria 3220, Australia *Presenting author mike.tan@deakin.edu.au SUMMARY: An approach to achieving the ambitious goal of cost effectively extending the safe operation life of critical infrastructures such as buried pipelines to, for instance, 100 years is the application of structural health monitoring sensors and life prediction tools. Various corrosion monitoring sensors and life prediction tools have been developed and reported in the literature; however their ability of providing in-situ condition monitoring, and their performance and limitation in detecting localised forms of corrosion are often not sufficiently evaluated. This paper discuss basic principles of structural health monitoring using sensors and critical issues related to the suitability, advantages and limitations of major t	Ernest N. Morial Convention Center-New Orleans	
Thursday,8 a.m. to 11 a.m.	Pipeline Crossings: Steel-Cased, Thrust-Bored, and HDD	This symposium includes technical papers about road, railroad, river, wetland, etc., crossings by directional drilling, thrust boring, casing, and HDD-type pipeline crossings. Sponsoring Committee: TEG 208X Chair: William Snyder Vice Chair: Cay Strother	Ernest N. Morial Convention Center-New Orleans	Room 227

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Thursday,8 a.m. to 12 a.m.	Novel Use of Multielectrode Systems on Corrosion Monitoring and Studies	This symposium includes technical papers on novel use of multielectrode systems for corrosion studies in laboratories and corrosion monitoring in the fields. Sponsoring Committee: TEG 316X Chair: Haitao Fang Vice Chair: Yang Yang	Ernest N. Morial Convention Center-New Orleans	Room 230
Thursday,8 a.m. to 12 a.m.	High Temperature Issues and Materials for the Process Industry	This symposium includes technical papers on high temperature corrosion (<538 C / 1000 F) issues. Sponsoring Committee: TEG 123X, TEG 126X, TEG 128X, TEG 270X Chair: Hendrik Debruyn Vice Chair: Stephanie Britton	Ernest N. Morial Convention Center-New Orleans	Room 231
Thursday,8 a.m. to 12 a.m.	Corrosion in Nuclear Systems (Day 2)	This symposium includes technical papers on the corrosion and degradation of materials in nuclear systems. Also, this includes technical papers on the understanding and mitigation of corrosion degradation in buried piping in Nuclear Power Plants taking into consideration the complexity and congestion in the plants. On buried piping issues, the symposium is specifically interested in Regulatory Requirements and issues related to grounding, bimetallic contacts, piping isolation, decoupling, materials selection, inspection of piping and coatings, and acceptance criteria for cathodic protection in such a congested environment. Sponsoring Committee: TEG 224x and TEG 465x Chair: Megan Dahl Vice Chair: Xihua He	Ernest N. Morial Convention Center-New Orleans	Room 232

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Thursday,8 a.m. to 12 a.m.	Marine Corrosion; Past, Present & Future (Day 2)	This symposium includes technical papers related to how historical events in marine corrosion have brought about the development of current technologies and practices. Sponsoring Committee: STG 44 Chair: Moavin Islam Vice Chair: Abdul Hameed Al-Hashem	Ernest N. Morial Convention Center-New Orleans	R-04
Thursday,8 a.m. to 12 a.m.	Corrosion in Oil Sands	This symposium includes technical papers related to corrosion in oil sands facilities including mining and terminal operations. Sponsoring Committee: TEG 341X Chair: Wes McKinnon Vice Chair: Tesfaalem Haile	Ernest N. Morial Convention Center-New Orleans	Room 212
Thursday,8 a.m. to 2 p.m.	Corrosion in Supercritical Systems	This symposium includes technical papers on corrosion in supercritical fluids and mitigation methods. Sponsoring Committee: TEG 121X Chair: Shiladitya Paul Vice Chair: Yimin Zeng	Ernest N. Morial Convention Center-New Orleans	Room 213
Thursday,8 a.m. to 2 p.m.	Advances in Materials for Oil and Gas Production (Day 2)	This symposium includes technical papers that present advances in materials technology and research. Focus is on new and improved metallic materials and applications. This includes consideration and measurement of the material's performance in its envisaged exposure environment. Sponsoring Committee: STG 32 Chair: Julio Maldonado Vice Chair: Conchita Mendez	Ernest N. Morial Convention Center-New Orleans	R-01
Thursday,8 a.m. to 2 :30p.m.	Non Metallic Materials for Oil and Gas	This symposium includes technical papers in the areas of organic coatings, liners, seal (elastomers and thermoplastics), insulation and structural applications of polymers (composites and thermoplastics) with emphasis in oil &gas field services. Sponsoring Committee: STG 33 Chair: Ricardo Pardey Vice Chair: Osmay Oharriz	Ernest N. Morial Convention Center-New Orleans	R-03

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Thursday,8 a.m. to 5 p.m.	Recent Experience with Austenitic and Duplex Stainless Steel	This symposium includes technical papers related to experiments with corrosion resistant alloys such as nickel, titanium and zirconium alloys in both aqueous and high temperature environments. Sponsoring Committee: 114X Chair: James Fritz Vice Chair: Nicole Kinsman	Ernest N. Morial Convention Center-New Orleans	Room 214
Thursday,8 a.m. to 5 p.m.	Microbially Influenced Corrosion (Day 2)	This symposium includes technical papers regarding microbial corrosion research, case studies, control monitoring and treatment. Sponsoring Committee: TEG 187X Chair: Faisal Al-Abbas Vice Chair: Kenneth Wunch	Ernest N. Morial Convention Center-New Orleans	R-02
Thursday,8 a.m. to 5 p.m.	Localized Corrosion: Chracterization and Control (Day 2)	This symposium includes technical papers focused on the characterization and control of localized corrosion using various approaches. Sponsoring Committee: TEG 407X Chair: Ajit Mishra Vice Chair: Marco Rapone	Ernest N. Morial Convention Center-New Orleans	R-06
Thursday,8 a.m. to 5 p.m.	Recent Developments in Atmopsheric Corrosion (Day 2)	This symposium includes technical papers that include technical details on atmospheric corrosion. Sponsoring Committee: TEG 189X Chair: James Dante Vice Chair: Eric Schindelholz	Ernest N. Morial Convention Center-New Orleans	R-08
Thursday,8 a.m. to 5 p.m.	Nanotechnology and Corrosion	This symposium includes technical papers related to corrosion prevention and mitigation using nanotechnology. Sponsoring Committee: TEG 474X Chair: Igor Kosacki Vice Chair: Richard Pollard	Ernest N. Morial Convention Center-New Orleans	R-09

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Thursday,8 :10a.m. to 8 :35a.m.	Localized Corrosion of Aluminum Alloy 5052 for Desalination Service	Mariano Kappes, Dannisa Chalfoun, mauricio chocron, Raul Rebak - Aluminum alloys in the 3000, 5000 and 6000 series present good corrosion resistance in seawater at temperatures up to 125ºC. In particular, aluminum alloy AA 5052 (UNS A95052) results very attractive for desalination applications since its initial and maintenance costs are low. From an operational point of view, crevice corrosion is a concern for the integrity of the aluminum evaporators due to the presence of rubber gaskets. The repassivation pitting potential, ERP, and the corrosion potential, ECORR, of AA 5052 were measured in deaerated 50000 ppm sodium chloride solutions at room temperature and at 90ºC. ERP was higher that ECORR at both temperatures, in accord with results available in the literature. While those results predict absence of pitting corrosion in service, no systematic studies of crevice corrosion at high temperature are available in the literature. Experience with other alloys predicts that the c	Ernest N. Morial Convention Center-New Orleans

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Thursday,8 :25a.m. to 8 :50a.m.	Crevice Corrosion of Stainless Steel in Tropical Seas	Dominique Thierry, Nicolas Larché - Stainless steels are widely used for different applications in seawater in the oil and gas and desalination industry. In natural seawater, surfaces will be rapidly covered by microorganisms which form a thin film called biofilm, inducing a significant shift of the corrosion potential for stainless steel to the noble direction. The other significant effect of the biofilm on metallic surfaces is a dramatic increase of the cathodic efficiency (e. g. cathodic reduction of dissolved oxygen), promoting the corrosion reactions and increasing the rate of corrosion propagation. Although this phenomenon has been widely studied in natural seawater from temperate locations, very little is known on natural tropical sites in which bioactivity is expected to be different. Electrochemical potential measurements and measurements with homemade biofilm sensors have been performed at different temperatures in temperate and in tropical seawaters. The study aimed at	Ernest N. Morial Convention Center-New Orleans

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Thursday,8 :25a.m. to 8 :50a.m.	Electrochemical Studies of Open-Circuit Potential Drift of Carbon Steel in Nuclear Waste Simulants	Sandeep Chawla, Narasi Sridhar, John Beavers, Kenneth Evans, Katie Sherer, Kayle Boomer - Nuclear wastes are stored in large, underground carbon-steel storage tanks at the Hanford site. Most of the liquid wastes are highly alkaline in nature, typically with pH values between 12 and 14. Under alkaline conditions, carbon steels tend to be passive and undergo relatively slow, uniform corrosion. However, carbon steels can become susceptible to localized corrosion (e.g., pitting) and stress corrosion cracking (SCC) in the presence of certain aggressive constituents, such as chloride and nitrate, even in these passive conditions. Susceptibility to pitting and SCC can also be enhanced under conditions of elevated open circuit potential (OCP). In this work, long-term coupon immersion testing was conducted on carbon steel in a set of alkaline waste simulants. Large OCP drifts ranging from about +250 mV to +350 mV were observed in several simulants. This paper will present the res	Ernest N. Morial Convention Center-New Orleans

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Thursday,8 :25a.m. to 8 :50a.m.

[Interpreting Omic Data for Microbially Influenced Corrosion: Lessons from a Case Study]

Kate Kucharzyk, Craig Bartling, Larry Mullins, Jennifer Harris - Interpreting Omic Data for Microbially Influenced Corrosion: Lessons from a Case Study Involving a North Slope Production System

Microbiologically influenced corrosion (MIC) is a significant source of pitting corrosion affecting oil and gas pipelines, wells, and a variety of surface facilities. Understanding of MIC is greatly enhanced through DNA and protein sequencing technologies.
Both shotgun and targeted investigations can provide useful information regarding the presence and type of MIC occurring. However, the methods used to generate the data, the data quality and the limitations associated with data interpretation should not be underestimated. In this presentation, listed topics are highlighted through a case study involving the metagenomics and proteomic analysis of pig envelope debris and seawater samples from various locations within a North Slope production system suspected to be suffering from MIC.
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Thursday,8 :25a.m. to 8 :50a.m.	Problems Related to the Slow Strain Rate Test Performance and the Specimen Characterization in Auste	Pilar Esteban, Raul Caracena, Jorcin Jean-Baptiste, Amaia Iza-Mendia, Beatriz Calleja, Alejandra Lopez - The slow strain rate test (SSRT) is a method of screening corrosion resistant alloys (CRAs) for resistance to stress corrosion cracking at elevated temperatures in sour oilfield production environments. Moreover, it is used as a quality control test included as a part of the material specification requirements because of the short time to obtain results. However, there are some issues related to the performance of the testing and the characterization of the tested specimens, which have a direct impact on the final result of the test. The purpose of this paper is to highlight some of these difficulties encountered during the testing of different CRAs grades, such as N08028, N08535 and N08825. One of these issues is the influence of the final grinding of the specimen (grit paper number, longitudinal or transversal grinding, lubrication…) to have a proper surface finish which	Ernest N. Morial Convention Center- New Orleans

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Thursday,8 :25a.m. to 8 :50a.m.	How Deep is too Deep for Indirect Inspections?	Jim Walton - With the most recent NPRM that addresses pipeline integrity and indirect inspections, there is language that relates to HDD installed pipelines. It is known that the deeper the pipeline is the less sensitive indirection inspections such as Close Interval Surveys, Current Attentuation Surveys, Direct Current Volta\ge Gradient Surveys and Alternating Current Voltage Gradient surveys can be. The question becomes how deep is too deep to run a successful indirection inspection and still have valid results? This paper will address this issue with real world examples of indirection inspections of HDD installed pipelines at various depths including a discussion of potential alternate methods for inspection. Suggested indirect inspection critieria of these deep pipelines will also be addressed.	Ernest N. Morial Convention Center-New Orleans

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Thursday,8 :25a.m. to 8 :50a.m.	Investigation on Metal Dusting Corrosion Phenomena Over Incoloy 800	Xiaoyang Guo, Daham Gunawardana, Estelle Vanhaecke, De Chen, John Walmsley, Hilde Venvik - Metal dusting corrosion is a catastrophic degradation phenomenon that initiates on metallic surfaces under carburizing atmospheres, and proceeds by a gradual breakdown of the metallic matrix into fine particles composed of metals and/or carbon. This process was investigated under laboratory conditions over commercial Incoloy Alloy 800 coupons. Alloy samples were pre-oxidized in 10% steam in Ar at 540 ˚C for 6 h, followed by exposure to reducing, highly carburizing atmosphere for 20 h. Several carburizing parameters were studied, such as the temperature (550, 650, or 750 ˚C) and the pressure (1 or 20 bar). Two carburizing gas mixtures were used; a CO+Ar mixture with 10/90 (mol %) composition ratio, and a CO/H2O/CO2/H2/Ar mixture with 20/10/15/25/30 (mol %) composition ratio to mimic industrially relevant synthesis gas. The resulting surfaces were examined by using scanning electron microsc	Ernest N. Morial Convention Center-New Orleans

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Thursday,8 :25a.m. to 8 :50a.m.	Preliminary Results from the NIST Supercritical Carbon Dioxide Corrosion Test Facility	Brandi Clark, David McColskey, Ross Rentz, Jeffrey Sowards - Carbon dioxide (CO2) capture and sequestration has been hailed by some as the “critical enabling technology” needed to reconcile climate-change-driven reductions in CO2 emissions with the use of fossil fuels to meet increasing energy demands. However, transporting large quantities of CO2 would require a pipeline network the size of the existing natural gas network and a similar level of regulation. Unlike CO2 currently transported for EOR, anthropogenic CO2 is expected to contain corrosive contaminants associated with energy production (e.g., H2O, SOx, NOx, H2S). In order to successfully transport large volumes of anthropogenic CO2, the level of contaminant removal needed for pipeline safety and integrity will need to be balanced against the cost of CO2 purification. Gaps in the existing literature demonstrate a need for systematic investigation (through improved metrology) of the effect of expected contaminants	Ernest N. Morial Convention Center-New Orleans

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Thursday,8 :25a.m. to 8 :50a.m.	Optimizing Composition, Fabrication, and Inspection of Chromium Carbide Overlay (CCO) for Oil Sands	Haifeng Liu - Chromium Carbide Overlay (CCO) has long been used in Canadian oil sands mining industry to protect process equipment and piping from severe abrasion, erosion, and erosion/corrosion. However, CCO with poor quality had led to many premature failures in the field service, and resulted in high production/maintenance loss for oil sands operators. Most of the failures were due to the spallation of CCO under sliding/impact wear. Shell Wear Technology Team had conducted extensive lab tests (ASTM G65, Rotary Impact Test, and metallography) and studies on most commercial CCO products in the market. This research sought to understand the effects of overlay composition and welding parameters on underbead cracking, impact resistance and abrasion resistance of CCO. The study revealed that the extent of underbead cracking is related to the welding heat input, and consequently affects the spallation resistance of CCO. The paper concludes with a general guideline on how to improve	Ernest N. Morial Convention Center-New Orleans

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Thursday,8 :25a.m. to 8 :50a.m.	Monitoring Dynamic Corrosion and Coating Failure Events on Buried Steel Using Electrode Arrays	YongJun Tan - Monitoring dynamic corrosion and coating failure on buried steel using an multi-electrode array M. YJ Tan*, F. Varela, Y. Huo, F. Mahdavi, M. Forsyth and B. Hinton Institute for Frontier Materials and School of Engineering Deakin University, Victoria 3220, Australia *Presenting author mike.tan@deakin.edu.au Dynamic events that may cause the breakdown of passivity and the initiation of localized corrosion remain the subject of much debate, and are probably the least understood aspects of corrosion science. It is well known that passivity and localized corrosion are affected by various critical factors such as a changing electrode potential and surface pH [1]; however the effects of dynamically fluctuating electrode potential and environmental conditions on passivity and localised corrosion of critical infrastructure such as buried energy pipelines are not well understood. A reason is probably that current techniques have limited temporal and spatial resolutio	Ernest N. Morial Convention Center-New Orleans

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Thursday,8 :25a.m. to 8 :50a.m.	Optimizing Wallpaper Cladding Repair of WFGD Air Pollution Control Systems in the Power Industry	Debajyoti Maitra, Lewis Shoemaker, James Crum, Ronald Gollihue - Materials in wet flue gas desulfurization (WFGD) air pollution control systems are exposed to aggressive corrosive conditions. In the past many of these systems were constructed of low grade stainless steel which has suffered significant attack. As a result these systems require repair and upgrade. This can be accomplished by overlay cladding with super-austenitic stainless steel and nickel-base corrosion-resistant alloy sheet. This process is sometimes referred to as “wallpapering”. This is a well-tested and established process and has been widely used for both new construction and repair of existing systems. However isolated lining leaks have occurred which are difficult to locate and repair. Established procedures are reviewed with emphasis on production of leak free welds with optimum corrosion resistance. Alternative repair methods such as coatings and ceramic overlays are sometimes used but require routin	Ernest N. Morial Convention Center-New Orleans

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Thursday,8 :25a.m. to 8 :50a.m.	Study of Adsorption of Corrosion Inhibitor on Carbon Steel Under Co2 Environment by Using AFM	Zineb Belarbi, Bruce Brown, Marc Singer, Srdjan Nesic - The most common corrosion inhibitors used to minimize corrosion of carbon steel in the oil and gas industry contain imidazoline molecules. However, the behavior of imidazoline molecules at the interface remains poorly understood, especially for the adhesive and cohesive forces of inhibitor films. The objective of this work is to understand the adsorption/desorption process of talloil diethylenetriamine imidazoline (TOFA/DETA imidazoline) on carbon steel. In order to study adsorption of TOFA/DETA imidazoline on carbon steel, insitu AFM measurements were performed on mild steel in air, then mild steel in deoxygenated 1 wt% NaCl solution at pH around 7, then with imidazoline in 1 wt% NaCl solution purged with CO2 at pH 4. For comparison to the aggressive CO2 environment, the inhibition behavior of TOFA/DETA imidazoline was monitored in less corrosive N2-saturated solutions. In-situ AFM visualization confirmed the formation of	Ernest N. Morial Convention Center-New Orleans

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Thursday,8 :25a.m. to 8 :50a.m.	Case Study: Engineered Polyamide 12 (PA12) Pipeline Liner for Management of Sour Gas Corrosion at El	James Mason, Akshay Ponda, Mark Stanley, Daniel Demicoli - Field-inserted thermoplastic liners are often the preferred corrosion management option in crude oil and gas gathering lines. Performance limitations of conventional HDPE liners in sour, multiphase, crude gathering lines are well established. A PA12 material has been specifically engineered for use in a much broader range of conditions with longer design lifetimes. After extensive laboratory testing and analysis including chemical resistance testing, mechanical durability studies, and installation method compatibility testing, a significant project was developed to install PA12 in the Lone Pine Creek field near Calgary, Alberta, Canada. The sour, multiphase, pipeline operates at 40-50C with H2S concentration of 21 mol%. The material qualification program is discussed, followed by the liner design and installation process. Performance of the liner in service will be described as well as the results of inspection of	Ernest N. Morial Convention Center-New Orleans

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Thursday,8 :35a.m. to 9 a.m.	Effect of Crevice Former on the Crevice Corrosion of 316L Stainless Steel in Synthetic Tap Water	Seon-hong Kim, Jung Kim - To restrain the failure of plate heat exchanger (PHE) in customer boiler working fluid, the effect of crevice former type on the corrosion behavior of 316L Stainless steel was investigated using electrochemical methods and surface analysis in chloride-containing synthetic tap water. Although the localized corrosion under metal-metal crevice condition was easily initiated than that under metal-gasket crevice specimen, the anodic current under metal-metal crevice condition was less than that under metal-gasket crevice condition in high anodic potential. Narrow crevice gap which was formed under gasket concentrated the anodic dissolution at the mouth of crevice, and then caused the perforation of PHE in the field condition. Moreover, the anodic dissolution depth of metal-gasket crevice specimen was deeper than those of metal-metal crevice specimen. Therefore, the metal-gasket crevice leadingly affects to PHE failure.	Ernest N. Morial Convention Center-New Orleans

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Thursday,8 :50a.m. to 9 :15a.m.	Additive Manufacturing for Sour Service: an Experimental Investigation	William Kovacs, Jennifer Silva, Zachary Berg, Byron Mohr, Liu Cao, Christopher Taylor, Kenneth Evans, Steven Waters - Additive manufacturing (AM), commonly referred to as 3D printing, offers advantages compared to more traditional production methods including quick prototyping, short production runs and intricate, thin section, microfluidic, variable composition and low-waste designs. These exciting features are accompanied by new challenges including higher costs, variable quality and inherently anisotropic properties, etc. To utilize the benefits of AM in sour service environments, new qualification and materials testing requirements will be required. There are possible corollaries envisioned for the application of AM to sour service with the (additive) technique of welding. In this work, the relative SSC resistance of 17-4PH stainless steel produced by AM (powder bed fusion) was compared with welded and wrought parts of the same alloy utilizing NACE TM0177-2005 Method A.	Ernest N. Morial Convention Center-New Orleans

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Thursday,8 :50a.m. to 9 :15a.m.	Investigation of Amorphous Deposits and Potential Corrosion Mechanisms in Offshore Water Injection S	Violette Eroini, Brit Kathrine Graver, Kari Lønvik, Anthony Mitchell, Mike Christian Oehler, Torben Lund Skovhus - An increasing incidence of amorphous deposits in both production and water injection systems has caused considerable problems for offshore fields. Amorphous deposits, which are a widely recognized, but often poorly explained phenomenon, are typically comprised of both organic (biological or hydrocarbon) and inorganic material but with compositions that vary considerably. One recurrent form of deposit, found in offshore water injection flowlines and wells, consisting mainly of magnetite as the corrosion product, was further investigated with the objective of explaining its formation and assisting in prevention or remediation. It is proposed that the deposit formation, observed in offshore water injection systems treated with nitrate, is initiated by formation of a nitrate reducing biofilm promoting under deposit corrosion by activity of sulphate reducing and methanog	Ernest N. Morial Convention Center-New Orleans

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Thursday,8 :50a.m. to 9 :15a.m.	Assessment of Aging Mechanisms for Zirconium-Based High Burnup Fuel Cladding in Dry Storage Systems	Pavan Shukla, Yiming Pan, Tae Ahn, John Wise, ricardo torres, Patrick Raynaud - At independent spent fuel storage installations (ISFSIs) in the United States, spent nuclear fuel (SNF) is stored in welded- or bolted-sealed dry storage systems (DSS). The safety analyses for the DSS rely on the fuel assemblies having a known configuration during the period of operation (e.g., geometric form, cladding integrity). Sufficient experimental data has provided adequate confirmation that low burnup SNF (≤45 GWd/MTU) will remain in its analyzed configuration during dry storage, without deleterious effect on the cladding. This work expands to define credible degradation mechanisms for high burnup fuel cladding to support the technical bases for dry storage beyond 20 years. For burnups exceeding 45 GWd/MTU, the fuel pellets and the zirconium-based cladding undergo distinct changes during reactor service, including increased hydrogen absorption by the cladding, swelling of the fuel pellet	Ernest N. Morial Convention Center- New Orleans

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Thursday,8 :50a.m. to 9 :15a.m.	The Ultrasonically Induced Cavitation Corrosion of UNS N010665 Alloy in Seawater	Abdul Hameed Al-Hashem - A cavitation facility was used to study the erosion corrosion behavior of UNS N010665 cast alloy in seawater. The cavitation tests were made at a frequency of 20 KHz and at temperatures of 250C. Cavitation conditions caused an active shift in the free corrosion potential for UNS N010665 alloy. The work included measurements of free corrosion potentials, and mass loss in the presence and absence of erosion. Cavitation also increased the rate of mass loss of this alloy by several orders of magnitude with respect to stagnant conditions. Another set of cavitation experiments was also carried out for this alloy in ditilled medium in order to distinguish between the mechanical and electrochemical factors that contribute to metal loss. Results indicated that the mechanical factor has an over riding role in metal loss of this alloy. Cavitation made the surface of this alloy very rough, exhibiting large cavity pits in the middle region of the attacked area as	Ernest N. Morial Convention Center- New Orleans

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Thursday,8 :50a.m. to 9 :15a.m.	Qualitative Assessment of Corrosion Rate in Oilsands Slurry Pipeline	Kofi Freeman Adane, Aaron Fuhr, Ben Fotty - Slurry pipeline systems are used for the extraction of bitumen from mined ore in the oil sands industry. The handling and processing of slurry results in significant pipe wall material losses. These losses are attributed to the combined effects of erosion and corrosion due to the exposure of pipe wall materials to an aerated mixture of solids (mostly silica), bitumen, and water containing a high concentration of chlorides. Therefore, understanding the synergistic effects of corrosion and erosion will help in developing mitigation strategies and aid in process-based maintenance schedules. This will lead to an informed design decision thereby reducing capital expenditure (CAPEX) and operation and maintenance (OPEX) cost. To contribute to the understanding of the above-mentioned challenge, corrosion rates from a slurry flow loop were collected at several slurry flow conditions. The corrosion rates were estimated from linear polarization	Ernest N. Morial Convention Center-New Orleans

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Thursday,8 :50a.m. to 9 :15a.m.	Corrosion Inhibition of Pipeline Steels Under Supercritical CO2 Environment	Yoon-Seok Choi, Shokrollah Hassani, Thanh Nam Vu, Srdjan Nesic, Ahmad Zaki Abas, Muhammad Firdaus Suhor, Azmi Nor - It has been reported that aqueous corrosion rate of carbon steel is very high under supercritical CO2 condition. In the present study, the performance of imidazoline-based corrosion inhibitors was evaluated by examining environmental effects on the corrosion rate and corrosion behavior of materials. The tested parameters include material (X65, 1Cr steel and 3Cr steel), temperature and type/concentration of inhibitors. The corrosion rate of samples was determined by electrochemical and weight loss measurements. The surface morphology and the composition of the corrosion product layers were analyzed by using surface analytical techniques (SEM and EDS). Results showed that the addition of corrosion inhibitor decreased corrosion rate significantly from 90 mm/y to below 0.1 mm/y at supercritical CO2 condition (12 MPa CO2, 80oC). Corrosion rate of carbon steel in the CO	Ernest N. Morial Convention Center-New Orleans

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Thursday,8 :50a.m. to 9 :15a.m.	High Temperature Coking Resistance of an Alumina Forming Alloy	Benjamin Church, Lizeth Ortiz Reyes, Elmer Prenzlow, Jim Myers - Coking is the process of carbon deposition from a gas phase that is encountered in many reforming, cracking and other high temperature processes. Coking in certain petrochemical processes can lead to carbon build up causing reduced process efficiency, corrosive attack and degradation of the alloy. Components used in these processes are fabricated from HP alloys that form a chromia-based oxide layer or more recent alloys that form an alumina-based oxide layer to help protect against coking. An experimental high temperature coking atmosphere was constructed and used to evaluate the effects of temperature, time and metal surface roughness on the carbon deposition of an alumina forming alloy. Coking conditions were simulated with multiple atmospheres including CO-H2 mixtures at moderate temperatures (e.g. 650 °C) and ethane at higher temperatures (e.g. 900 °C). Carbon deposition was tracked using specific mass chang	Ernest N. Morial Convention Center-New Orleans

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Thursday,8 :50a.m. to 9 :15a.m.	Improved Methodology in Identification of Buried Casings Using Indirect Inspection Method	Chukwuma Onuoha, Shamus McDonnell, Eric Pozniak, Peter Paulson, Marc Wegner, Greg Zinter, Vignesh Shankar, William Sim, Jerrell Jerell Tolentino, Tim Ross - Even though casings protect the carrier pipe from mechanical damage and external loads, the disadvantage or downsides of these installations are higher than the advantages. In recent years even though there has been great improvements in installation and monitoring of these casings, there are still disadvantages of casings such as corrosion, shielding of CP current, additional maintenance and monitoring cost and increased load of CP current. There are several instances where accurate details on casing location is not available. Identifying the unknown locations of the casings to replace, remove or perform maintenance is a major cost for the pipeline operators. These challenges could be a concern for pipeline integrity. For pipelines that cannot be pressure tested or prohibit the use of ILI tools, completing DA at an unknown	Ernest N. Morial Convention Center-New Orleans

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Thursday,8 :50a.m. to 9 :15a.m.	Cryogenic Spillage Protection (CSP) on FLNG: Improving Safety Through Standardization	sebastien Viale - The steel decks and structures of an FLNG must be protected against brittle fracture that can follow accidental LNG spillage. The resultant structural failures put at risk lives and assets, yet LNG spill mechanisms are barely understood and the epoxy materials used so far for CSP are expensive and can be improved. For the first FLNG projects CSP materials were derived from passive fire protection (PFP) with increased thicknesses to extend the domain of application. A need for improvement was identified both in CSP material performance testing and product design. In this paper, we will present the outcome of a Technip led Joint Industry Project as well as ISO activity on CSP. During the test campaign, many products were evaluated for their ability to improve structural design and decrease the need for IMR (Inspection Maintenance and Repair). Initial screening was followed by physical tests to assess performance. In parallel, we participated to the creation of a	Ernest N. Morial Convention Center-New Orleans

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Thursday,8 :50a.m. to 9 :15a.m.	Nanostructured and Superhydrophobic Coatings Against Corrosion	Rigoberto Advincula - The use of nanostructured materials enable the utilization of nanomaterials and their ordering in order to achieve a desired property or a synergistic effect in which the percolation threshold is met with the right ordering or orientation of the nanomaterials. In the case of nanoclays, nanotubes, and graphene, this can be achieved by forming a highly networked structure or by flat orientation of the platelets. In our work, nanostructuring can be achieved by a heirarchy of roughness or the mimicking of lotus leaf structure. This involves the use of conducting polymers and stimuli-responsive polymers that result in a superhydrophobic wetting behavior. This in turn results in a high corrosion resistance as evidenced by salt immersion tests, polarization curves, and EIS measurements. This talk will summarize our results and describe the principles of nanostructuring and the right materials to achieve superior properties.	Ernest N. Morial Convention Center-New Orleans

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Thursday,8 :50a.m. to 9 :15a.m.	Laboratory Test to Evaluate Lean Duplex UNS S32101 and UNS S32304 Flexible Pipe Carcass at Sour Serv	Merlin Bandeira, Flávio Sousa, Fabricio Santos, Carlos Joia, Oscar Mattos - The systematic studies to evaluate the corrosion resistance to Sulfide Stress Cracking (SSC) and crevice susceptibility of AISI 304 and 316L carcass material showed that serviceability limits to these materials can be extended to: 60oC, 1%H2S/CO2, pH>4.0, 60,000ppm Cl-. Notwithstanding, the present field conditions at Campus Basin is still less aggressive than the new serviceability limits just mentioned, but the oil production scenarios may change to more aggressive environments in a near future. Therefore, the test program was extended to more resistant materials, such as UNS S32101 and UNS S32304. These two materials present higher corrosion resistance (PREN 26) than austenitic stainless steel 304 (PREN 18) and 316L (PREN 24). They are classified as lean duplex grade and are less expensive than Duplex Stainless Steel. Herein we are going to present the results of SSC, U-bend tests, and crevice suscept	Ernest N. Morial Convention Center-New Orleans

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Thursday,8 :50a.m. to 9 :15a.m.	Investigation of Under-Deposit Corrosion on X-60 Using Multielectrode System	Nayef Alanazi - This paper represents the effect of sand deposit on the corrosion mechanism of X-60 in sour environments. Under-deposit corrosion (UDC) of X-60 was studied underneath sand deposit and field-collected sludge deposit in a simulated sour environment by means of linear polarization resistance (LPR), coupled multi-electrode array system (CMAS) and weight loss coupons. The results showed that when actual field sludge was deposited on carbon steel surface, significant general and localized corrosion rates were observed. While in sand deposit test, the general and localized corrosion rates were found to be very low even lower than no deposit test. No UDC was observed on coupons tested under sand deposit, meaning that sand inhibits corrosion of carbon steel in sour environment.	Ernest N. Morial Convention Center-New Orleans

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Thursday,9 a.m. to 9 :25a.m.	Uniform and Localized Corrosion Study of Base Material and Welds of Ni-Cr-Mo (W) Alloys	Ajit Mishra - Corrosion resistant nickel-based alloys are extensively used in industries where other metallic system experiences high uniform and localized corrosion attack. The corrosion behavior of mill-annealed nickel-based alloys are widely studied in aggressive environments but there is not much information available for the corrosion performance of their welded region even though welds are relatively susceptible to corrosion attack compared to the base material. In the present study, corrosion behavior of base metal (BM), all-weld-metal (AWM) and heat-affected-zone (HAZ) samples of C-276 (UNS N10276), C-22 (UNS N06022) and C-2000 (UNS N06200) alloys was evaluated in concentrated hydrochloric (HCl), sulfuric (H_2SO_4) and nitric acid (HNO_3). Also, the critical pitting temperature (CPT) and critical crevice temperature (CCT) of AWM specimens was obtained and compared with the BM. The results were analyzed using weight change measurements, electrochemical techniques and a ran	Ernest N. Morial Convention Center-New Orleans

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Thursday,9 :15a.m. to 9 :40a.m.	Case Study for MIC Evaluation and Mitigation in Two Argentinian Oilfields	Emerentiana Sianawati, Paschoalino Matheus, Van der Kraan Geert, Brandon Morris, Dominguez Juan, Cardena Nelson, Bonifacio Pablo, Karina Mackenzie, Santiago Almada, Ulloa Fernanda - Microbially Influenced Corrosion (MIC) was suspected to be the root cause of corrosion problems in Pan American Energy (PAE) oilfields in the San Jorge Gulf area. An integrated and innovative program was proposed consisting of microbial audits with advanced diagnostics analyses, and biocide evaluations under field conditions. qPCR and next generation sequencing results indicated the increased abundance of Bacteria and Archaea from production wells to oil storage tanks strongly suggesting that microorganisms played a major role in the corrosion failures. Consequently, a biocide efficacy study was conducted using field water samples and associated indigenous microorganisms as the test inocula. Thirteen biocide systems, including non-traditional products to oil and gas market, at three different concentr	Ernest N. Morial Convention Center- New Orleans

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Thursday,9 :15a.m. to 9 :40a.m.	Critical Factors Affecting the Pitting Corrosion Resistance of Additively Manufactured Ni-based Allo	Helmuth Sarmiento Klapper, Christoph Wangenheim, Madison Burns, Nikolay Molodtsov - Precipitation-hardened nickel-based alloys have a long tradition in oilfield applications. Due to their high strength, good ductility and excellent environmentally assisted cracking resistance they have been successfully used for wellhead components, artificial lift applications and directional drilling tools particularly in demanding environments where superior corrosion resistance is necessary. Additive manufacturing is breaking into the oil and gas industry with current research efforts focused on demonstrating suitability for manufacturing components that were previously impossible to produce with conventional subtractive manufacturing processes without compromising material properties such as strength, ductility and corrosion resistance. The pitting corrosion resistance of a direct metal laser melted Ni-based alloy having a similar chemical composition to alloy UNS N07718 in chloride-contai	Ernest N. Morial Convention Center-New Orleans

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Thursday,9 :15a.m. to 9 :40a.m.	Oxidation Kinetics of Cast Alumina-Forming Austenitic Alloys in Steam	Benjamin Church, Elmer Prenzlow, Lizeth Ortiz Reyes, Jim Myers - Alloy tubes used in petrochemical processing reactor systems are often subjected to oxidizing conditions in high temperature steam such as during de-coking cycles. The ability of the alloy to form an adherent and continuous oxide layer is critical to ensure the material resists coking and other high-temperature attack during operation. A new class of heat resistant austenitic cast alloys are being developed that are designed to form protective oxides of alumina. Experimental compositions based on a 25Cr 35Ni base composition with aluminum contents ranging from 2.6 to 3.9 wt % were fabricated via centrifugal casting. An environment of pure steam was constructed in which samples were exposed at temperatures up to 1,000 °C. Oxide layers were characterized by surface and cross-sectional electron microscopy and x-ray diffraction. Oxidation charts for determining the thickness of the oxide layer were constructed bas	Ernest N. Morial Convention Center-New Orleans

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Thursday,9 :15a.m. to 9 :40a.m.	Remote Monitoring of the Mechanical Integrity of Oil Sands Facility High Wear Components	Rob Leary - The following paper discusses the implementation of an on-line mechanical integrity system at Devon Energy’s Jackfish 2 SAGD (Steam Assisted Gravity Drainage) Project located in Alberta, Canada. SAGD wells are used to recover oil that is released from the sands by the injection of steam underground. The recovered bitumen-steam mixture is typically characterized by relatively high concentrations of solids that can create unusual amounts of sand production due to abnormal well operating conditions. The bitumen-solids mixture creates erosion damage that threatens safe well operations and production objectives. The erosion-corrosion mechanism is complicated. Wear rates are uneven and are dependent on product size and density, sand and fluid impingement velocities and angles, and component geometry’s. Especially affected components include pipe intersections, injection points, elbows and reducers. These last two components were the targets of the installation of a	Ernest N. Morial Convention Center- New Orleans

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Thursday,9 :15a.m. to 9 :40a.m.	The Validity of Using ASTM A923 Practice for Weld Procedure Qualification of 2507 Duplex SSs	Richard Colwell - ASTM A923 provides three methods/practices to determine the extent of intermetallic precipitation in Duplex Stainless Steels. While Practice A (electrolytic NaOH) etch can be used, it is sometimes not permitted for this purpose by user speciifations. THis leaves practice B (CVN testing @ -40 ┌C) and practice C Ferric Chloride exposure/corrosion rate testing) to qualify the welding procedure for corrosive environments. The practice C test is difficult to pass, and is entirely non repeatable. While it is an effective test in dtermining the microstructural state of the base metal, it is not appropriate for weldments, especially the root pass. Date presented in this paper will illustrate the problems using ASTM A923 practice C for WPQR development.	Ernest N. Morial Convention Center-New Orleans

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Thursday,9 :15a.m. to 9 :40a.m.	Economically Mitigating Downhole Corrosion and Wear Failures with Thermoplastic Liners	Robert Davis - The recent NACE IMPACT study on the role of corrosion management in controlling the cost of asset corrosion refocused industry on the high cost of operational failures. This paper narrows that focus to a cost versus performance study on the role of thermoplastic liners in controlling costs associated with the protection of downhole oil and gas production tubulars from internal wear and corrosion. While it is accepted that many different types of wear and corrosion mechanisms can contribute to downhole failures, it is not uncommon for oilfield subsurface engineers to discuss the absolute corrosion or wear resistance of a material or product based on unrelated applications. Material properties and test procedures are reviewed for their practicality in helping to identify nonmetallic solutions that address the common causes of downhole tubing failures. Several field studies are presented with accompanying financial data that compare available commercial products	Ernest N. Morial Convention Center-New Orleans

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Thursday,9 :25a.m. to 9 :50a.m.

Assessment of Aging Mechanisms for Steels in Spent Nuclear Fuel Dry Storage Systems

Xihua He, Yi-Ming Pan, Greg Oberson, Darrell Dunn, Matt Hiser - Assessment of Aging Mechanisms for Carbon Steel, Low-Alloy Steel, and Stainless Steel Components Exposed to Outdoor and Sheltered Environments in Spent Nuclear Fuel Dry Storage Systems

Xihua He,1 Yi-Ming Pan,1 John Wise,2 Darrell Dunn,2 Greg Oberson,2 and M. Hiser2
1Center for Nuclear Waste Regulatory Analyses (CNWRA®)
Southwest Research Institute®
San Antonio, Texas 78238
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Washington, DC 20555-0001

ABSTRACT
Dry storage systems (DSSs) store spent nuclear fuel at many operating and decommissioned power reactor sites in the United States. Carbon steel, low-alloy steel, and stainless steel components are commonly used to construct DSSs. These components are exposed
 to outdoor and sheltered environments in which the materials may be susceptible to degradation. Potential environmental, thermal, mechanical, and irradiation-induced aging mechanisms include general corrosion, p

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Thursday,9 :25a.m. to 9 :50a.m.	Galvanic Protection Coatings for 5xxx Series Aluminum Alloys	Adam Goff, Fritz Friedersdorf, Charles Sprinkle - The Navy uses 5xxx series aluminum alloys in ship structures for improved strength-to-weight ratios and enhanced corrosion resistance. Specifically, AA5456 is the primary material of construction of the Ticonderoga (CG-47) class cruiser superstructures. The superstructure of the LCS Freedom class and the hull and superstructure of the LCS Independence class are constructed from AA5083. Magnesium is a primary alloying element of these alloys (>3.5% Mg) which renders them susceptible to sensitization. Sensitization occurs when precipitates of β-phase magnesium aluminide form at grain boundaries when 5xxx alloys are exposed to elevated temperatures for prolonged periods. These β-phase precipitates are anodic relative to the aluminum matrix and corrode rapidly in the presence of an aggressive electrolyte. Sensitization of 5xxx alloys thus promotes pitting, intergranular corrosion (IGC) and intergranular stress corrosion cracking	Ernest N. Morial Convention Center-New Orleans

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Thursday,9 :25a.m. to 9 :50a.m.	Experimental Study on Effect of Voltage Between Electrodes of Coupled Multielectrode Array Sensors	Lietai Yang, Trevor Place - Zero-voltage ammeters (ZVA) are required to measure the coupling currents from each electrode of the coupled multielectrode array sensor (CMAS) probe to the coupling joint to derive the corrosion current. All ZVAs, including the zero-resistance ammeter (ZRA) or the shunt-resistance ammeter, impose a small voltage between each of the electrodes and the coupling joint. An experiment was conducted to vary the voltage imposed by the ZVA and measure the effect. This paper presents the results on the effect of the voltage on the measurement of the corrosion rate with a CMAS probe.	Ernest N. Morial Convention Center-New Orleans

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Thursday,9 :25a.m. to 9 :50a.m.	Performance of Thermally Sprayed Corrosion Resistant Alloy (CRA) Coatings in 50MPa Supercritical CO2	Shiladitya Paul - This paper reports the performance of HVOF-sprayed corrosion resistant alloy (CRA) coatings in an aqueous solution bubbled with 50MPa supercritical CO2. 316L stainless steel, alloy C-276 and alloy 625 were procured in power form and sprayed onto carbon steel with a JP500 HVOF system and 8 mm holidays were drilled in the coating to expose the steel substrate. These were then exposed to 3.5 wt. % NaCl solution for 30 days, bubbled with 50MPa CO2. Tests were conducted at 40°C. Post-test microstructural characterization revealed that the coatings protected the steel substrate from CO2 corrosion when intact. The bare steel in the exposed region formed a siderite scale, while no such scale was seen in the undamaged regions. The substrate close to the coating showed accelerated corrosion due to galvanic effects. It can be concluded that thermally sprayed CRA coatings are a candidate to provide cost-effective corrosion mitigation in wet supercritical CO2. However, care	Ernest N. Morial Convention Center-New Orleans

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Thursday,9 :25a.m. to 9 :50a.m.	HDD Alternative Testing	Levi Blumhagen - NACE Corrosion-2017 Conference New Orleans, LA March 26-30, 2017 Symposium: Pipeline Crossings: Steel-Cased, Thrust-Bored, and HDD Title: Alternative method for recording data on Thrust-Bored pipe Abstract: An alternative method to record the potential shift when performing a coating conductance test outlined in NACE TM0102-02 is proposed. This method utilizes an oscilloscope rather than a digital multimeter to capture the potential shift when performing the applied current method. This procedure was developed for short sections of bored pipeline where it was found that the potential shift and subsequent polarization decay occurred in a timeframe less than the digital multimeter could display. Results obtained for reported coating conductance values are compared with those recorded using a digital multimeter. Utilizing the oscilloscope proved to be an effective method for determining the potential shift of a short bored section of pipe	Ernest N. Morial Convention Center-New Orleans

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Thursday,9 :25a.m. to 10 :15a.m.

A Promising Coating of Nanostructured Graphene-Ceria Nanofillers in Polyurethane for Corrosion Prote

Mohammad Mizanur Rahman -
A proper combination of graphene and metal oxide nanoparticles has been considered as an efficient reinforcement material in developing next-generation multifunctional coatings. In this study a simple method has been applied to fabricate graphene nanocomposite
 with the inclusion of CeO2 nanoparticles which can be effectively implemented as a reinforcement material in polyurethane (PU) coatings for corrosion protection. The corrosion resistance of mild steel coated with a PU coating containing graphene/CeO2 was pointedly
 higher than with a pure PU coating and a PU coating with graphene alone. The obtained result suggests a new prospect for solving the corrosion issues encountered on mild steel structures in industrial applications by using multifunctional hybrid coatings with
 nanostructured reinforcements.

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Thursday,9 :35a.m. to 10 a.m.	[Investigation the Pitting Resistance of SS304 and SS316L in Neat Chemical Products Using EIS]	Yolanda De Abreu - Corrosion behaviour of austenitic 304 stainless steel (SS304) and 316L stainless steel (SS316L) in the presence of neat chemical products was investigated. The electrochemical properties of 304 and 316L stainless steel were assessed using potentiodynamic polarization and electrochemical impedance spectroscopy (EIS) for different immersion time and different potential applied. It was corroborated that the criteria used to determine the chemical compatibility for SS316L could be also implemented to evaluate the compatibility with SS304: A pitting potential greater than 200 mV (vs. OCP) and current density less than 5 mA/cm-2 at 150 mV. Both criteria need to be met in order to deem a chemical product as compatible with the metallurgy. A polarization resistance (Rp) determined from the impedance diagram higher than 8500 Ωž.cm2, obtained at 200 mV above the open circuit potential, suggested high resistance of the passive film. Flags about the presence of pits	Ernest N. Morial Convention Center-New Orleans

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Thursday,9 :40a.m. to 10 :5a.m.	The Effect of Hydrogen on Plain and Notched Test Specimens of PH Nickel Alloys	Stephen McCoy, James Crum, Debajyoti Maitra, Steve Tassen - High strength Nickel alloys are widely used in subsea and downhole O&G applications for their excellent combination of mechanical properties, toughness and corrosion resistance in sour environments. The trend in the O&G industry is for using higher strength materials for high pressure – high temperature service, however as strength increases materials may also become more susceptible to ambient temperature failure mechanisms associated with hydrogen absorption. In recent years resistance to Hydrogen Stress Cracking (HSC) and Hydrogen Embrittlement as well as sour corrosion resistance have become of increasing interest to the industry due to a number of reported failures of high strength precipitation hardened Nickel alloy grades used in completion tools. The failures of the materials have been attributed to unfavourable microstructures increasing their susceptibility to HSC. A number of factors are known to influence	Ernest N. Morial Convention Center-New Orleans

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Thursday,9 :50a.m. to 10 :15a.m.	Coatings Cracking in Water Ballast Tanks: A Different Look	Carl Reed, Johnny Eliasson - The cracking and subsequent corrosion in water ballast tanks has long been a problem for the maritime industry. The potential damage to ships' hulls from this type of corrosion can be devastating and catastrophic. Consequently, there has been much study into the root causes of coatings cracking over the years. These studies have primarily centered on the mechanical considerations of crack initiation and propagation. It has generally been agreed that cracking is due to stress in the film caused by film shrinkage, loss of low molecular weight components, strain within in the steel substrate, and impact from environmental forces such as thermal expansion/contraction and hygroscopical volume changes. One facet of the cracking problem which has not been studied, to any great degree, is what happens after the crack has formed and corrosion commences. Worth considering is the extent corrosion and cathodic delamination progresses under the film at the crack	Ernest N. Morial Convention Center-New Orleans

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Thursday,9 :50a.m. to 10 :15a.m.	Crevice Crrosion of Copper as an Engineering Barrier of High-level Radioactive Waste Containers	Maite Ochoa, Martin Rodriguez, Silvia Farina - This work is aimed at determining the viability of oxygen-free copper as an engineering barrier of high-level radioactive waste containers. This material stands out because of its excellent resistance to generalized and localized corrosion in aqueous electrolytes; particularly in reducing environments as the ones expected in repository sites located below the water table. As the first part of a more general analysis, the corrosive effects of chloride, sulfate and bicarbonate and that of temperature were studied, analyzing each anion separately as well as in different combinations of them. These anions are generally present in groundwaters such as those potentially in contact with the engineered barriers of a nuclear repository. The concentrations of chloride, sulfate and bicarbonate were between 0.001 and 1 M and the temperatures were between 30 and 90 °C. An electrochemical characterization was carried out, through the measurement	Ernest N. Morial Convention Center-New Orleans

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Thursday,9 :50a.m. to 10 :15a.m.	MIC Prevention in Oxidizer Treated Water Systems: A Study on Relative Reaction Rates	Ramakrishnan Balasubramanian, Vic Keasler, Brian Epps - The use of oxidizers as in the oil and gas industry has been increasing in recent years. Peracetic acid, in particular, has been gaining acceptance as a very cost effective and superior biocide for water treatment applications. Though primarily used as biocides; oxidizers, in general, are multi-functional chemistries. Some of the other functionalities include iron sulfide and H2S control as well as water clarification. Although very effective in controlling MIC, If not properly dosed, the acid and/ or oxygen from oxidizers can cause corrosion. In this paper, we will present a study that is aimed at understanding the relative rates of reactions between oxidizers and bacteria, iron sulfide, H2S, other oxidizable compounds present in produced waters and the overall impact on metal corrosion. The results will aide in defining a corrosion control program for water treatment systems where oxidizers are used for preventing micr	Ernest N. Morial Convention Center-New Orleans

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Thursday,9 :50a.m. to 10 :15a.m.	Practical Approach to Verifying Coating Quality of Bored Pipe	Anthony Martus - Millions of dollars are being spent by pipeline operators to install brand new pipelines. A lot of focus has been spent by operators to ensure a good coating is installed including high specifications for coatings applied to mill applied coatings along with quality control measures for pipes being installed in a trench. These coating quality control measures included visual inspections and electronic coating holiday detectors. For pipe installed through bore methods, inspecting coating quality using these typical methods becomes impractical. This paper/presentation will discuss the steps we took as a pipeline operator to find a practical approach to performing a coating quality test on bored pipe.	Ernest N. Morial Convention Center-New Orleans

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Thursday,9 :50a.m. to 10 :15a.m.	The Microstructure Effect on Fracture Toughness of Ferritic Ni-alloyed Steels for CO2 Reinjection	Carlos Kwietniewski, Adriano Scheid, Mariana dos Reis Tagliari, Tiago Renck - Production of oil and gas in the Brazilian pre-salt faces several technical challenges and one of them that is a major concern is the presence of CO2 in high concentration. After separation, this gas is used for re-injection increasing the reservoir productivity, which is known as Enhanced Oil Recovering (EOR). This operation involves the transportation of CO2 at pressures up to 500bars. The pipelines used for re-injection must operate safely even at low temperatures, which, in case of leakage, can reach temperatures down to -60°C. The aim of this work is to evaluate the fracture toughness of two nickel-containing steels as an alternative material to manufacture low-temperature toughness improved CO2 transporting pipelines for EOR. Optical and scanning electron microscopies were employed to characterize the steels microstructures. Electron backscattered diffraction was used to estimate the effective g	Ernest N. Morial Convention Center-New Orleans

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Thursday,9 :50a.m. to 10 :15a.m.	High Temperature and High Chemical Resistant Ambient Cure Tank Liner	Yong Zhang - Epoxy resin based coatings have been used for many years to line the inside of chemical storage tanks and process vessels due to their good thermal and chemical resistant properties in Oil & Gas industry. They are particularly suited for services that require resistance to hydrocarbons, water immersion, caustics and acids. A lot of paint manufacturers and coating formulators are working on this area to develop new product to meet the more and more challenging requirements. Olin Epoxy has designed a unique low VOC and high solids epoxy system, which offers superior performance in tank liner application. The formulation of these novel materials in high temperature and high chemical resistant ambient cure tank liner will be described. Various performance aspects of experimental and commercial benchmark will be compared, including multiple chemicals immersion tests at high temperature, electrochemical impedance spectroscopy, cathodic disbondment test at elevated tempera	Ernest N. Morial Convention Center-New Orleans

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Thursday,9 :50a.m. to 10 :15a.m.	Assessment of CMEAS Technique for Monitoring Corrosion Performance of a Martensitic Steel	Guru Prasad Sundararajan, Rebecca Hefner, Dayananda Narayana, Vijaya Narasaiah - Coupled Multi-electrode Array Sensor (CMEAS) have been used for monitoring performance of 17-4PH stainless steel under Salt-fog conditions. Temperature, pH and Salt-concentrations were varied at 2 levels for understanding the effects of these parameters on localized corrosion performance. Specific sets of experiments were done with also two levels of electrode diameters. Average localized corrosion rates and maximum pit-depths were monitored as a function of time. Coupons of 17-4PH and GTD450 stainless steels were also placed in the same environment to compare the results with that of CMEAS probes. A transfer function was developed between the pit-depths as provided by the instrument and the experimental variables. It was also noted that the correction factors for calculating maximum pit-depth needs to be further modified in order to correlate the same measured by the probe and to that of the expos	Ernest N. Morial Convention Center-New Orleans

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Thursday,9 :50a.m. to 10 :15a.m.	Temperature Sensitivity of the Corrosion Performance of 316L in Concentrated Sweet Brines	Robert Conder, Peter Felton, philippe loubat - There is little data available in the public domain on the performance of 316L in concentrated anoxic brines saturated with CO2 in the absence of H2S. Where limits of use are stated in the literature, the origin of these limits may be obscure and unreliable for validation of materials selection undertaken during engineering design. Given the limited ‘good quality’ data available, a series of laboratory tests was performed, aimed at assessing the suitability of 316L for downhole sand screens and as a potential cladding material for a gas production separator, where the chloride concentration of the produced water was up to 200,000mg/l. The following text describes the tests performed and the results obtained. This work involved autoclave pitting corrosion tests conducted with 316L sand screen wire mesh (30-day duration) and 316L sheet samples (7-day and 30-day duration). The pitting exposure tests were supplemented by electrochemic	Ernest N. Morial Convention Center-New Orleans

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Thursday,9 :50a.m. to 10 :40a.m.	Ni-W-B and Ni-W-B-Nanodiamond Metal Matrix Nanocomposite Protective Coatings	Sankaran Murugesan, Othon Monteiro, Valery Khabashesku - Protective coatings in the oil and gas industry perform an important role in the reduction of maintenance and repair costs for equipment and tools. Though hard chrome plating protective coatings seem to be a viable solution, the related environmental drawback of Chromium (Cr) (VI) ions in the water supply leads the industry to find alternative solutions. Based on research, Nickel (Ni) and Ni-based alloy systems are being recognized as substitutes for this application, with no environmental impacts. The addition of Tungsten (W) to Ni has shown better mechanical and corrosion properties, while the addition of Boron (B) to these systems increases the hardness. However, the addition of B to Ni coatings usually results in diminishing corrosion resistance. In this paper, we introduce electroplating of Ni-W-B and Ni-W-B-nanodiamond metal matrix nanocomposite coatings and present detailed characterization of their corrosion respo	Ernest N. Morial Convention Center-New Orleans

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Thursday,10 a.m. to 10 :25a.m.	Compatibility Analysis of Regional CP System and Electrical Grounding System in Oil/Gas Stations	Liang Dong, Wei Cui, Xiuyun Wang, Yang Yang - Regional cathodic protection (CP) system is used to protect buried facilities in oil/gas stations from corrosion caused by soil and electrical grounding system with electropositive materials. However, the required current may increase tens to hundreds of times due to the existing electrical grounding materials, and extremely heterogeneous protected potential distribution on buried facilities may occur. Electrical isolation from grounding system with direct current decoupler is theoretically feasible but not practical because of excessive connection points. To analyze and improve the compatibility of regional cathodic protection system and electrical grounding system in oil/gas stations, numerical simulation was used to calculate the potential and current distribution based on different cases with: (1) near/remote anode beds; (2) different electrical grounding materials; (3) local insulation. The results showed that the lower spacing	Ernest N. Morial Convention Center-New Orleans

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Thursday,10 a.m. to 10 :25a.m.	Effects of Annealing Temperature on Pitting Corrosion of LDX 2003 and LDX 2404 Duplex Stainless Stee	Liang He, Preet Singh - Annealing at different temperature can alter the phase ratio as well as chemical composition of ferrite and austenite phases in duplex stainless steels (DSSs) and thus can also change the pitting corrosion resistance of DSSs. Pitting behavior was evaluated for the selected lean DSS grades, LDX 2003 and LDX 2404, annealed at different temperatures between 1000 ºC to 1200 ºC. Pit morphology was characterized using SEM and EDS to see if there was a preferential dissolution of a particular phase during pit propagation. Differently heat-treated samples of the selected DSS alloys were tested in both chloride solution and thiosulfate containing chloride solutions to understand how the differences in microstructures affect the pit initiation and/or propagation in different environments. Electrochemical methods were used to evaluate the pitting susceptibility of differently heat-treated DSS samples in given test environment. Results from this study provide furth	Ernest N. Morial Convention Center-New Orleans	
Thursday,10 a.m. to 5 p.m.	Oil and Gas Production - Cathodic Protection	This symposium includes technical papers on the application and evaluation of cathodic protection of all types of equipment used for oil and gas production. Sponsoring Committee: STG 30 Chair: Jin Huang Vice Chair: Xuanping Tang	Ernest N. Morial Convention Center-New Orleans	R-05

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Thursday,10 :15a.m. to 10 :40a.m.	Corrosion of Stainless Steels AISI 304 and AISI 316 Induced by Sulfare Reducing Bacteria in Anoxic G	Pauliina Rajala, Malin Bomberg, Leena Carpen - A laboratory system for studying the microbiological corrosion of decommissioning waste was designed and developed. Microbially induced corrosion in deep bedrock is important when evaluating long-term safety of disposal of radioactive waste. In oxygen-free water, corrosion of metals is low. Microorganisms however, are able to accelerate several types of corrosion. The groundwater at the repository depth contains up to 105 microbial cells/mL with considerable diversity. Microbiological corrosion of carbon steel in natural anoxic groundwater was studied over a one-year experimental period, using electrochemical technologies, and molecular biology methods. The material in this laboratory experiment was carbon steel (AISI 1005). Electrochemical methods enabling real-time survey of corrosion, such as multi-electrode arrays sensors and LPR were used in combination with molecular biological methods, qPCR and HTP sequencing, to detect micro	Ernest N. Morial Convention Center-New Orleans

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Thursday,10 :15a.m. to 10 :40a.m.	Durability of Nano-Coating for Marine Highway Bridge Application	Saiada Fuadi Fancy, Md Ahsan Sabbir, Kingsley Lau, Dale Deford - Coatings for structural steel have developed over the years to extend the service life of highway bridge structures by improving its corrosion durability and minimizing maintenance. Nanoparticles are being considered in the development of durable coating systems due to their beneficial physical, chemical and mechanical properties. Interest lies particularly on the mechanical and electrical properties of carbon nanotubes (CNTs). The present research aims to investigate the effect of the carbon nanotubes in the zinc rich primer on corrosion durability. To study the influence of nanoparticles a commercially available of zinc-rich epoxy nano-coating was compared to a conventional zinc rich coating system. Test parameters included introduction of local coating defects to coating panels subjected to chloride environments. To evaluate the coating performance, cyclic testing in wet and dry exposure as well as outdoor and sa	Ernest N. Morial Convention Center-New Orleans

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Thursday,10 :15a.m. to 10 :40a.m.	Effect of Microstructural Particularities on the Corrosion Resistance of Nickel Alloy UNS N07718 – W	Jutta Kloewer, Zahra Tarzimoghadam, Helmuth Sarmiento Klapper, Olesya Gosheva, Oriana Tassa - The precipitation hardenable alloy 718 (UNS N07718) is the most commonly used Nickel alloy in upstream oilfield technology. However, it has been determined that alloy 718 can be susceptible to localised corrosion and environmentally assisted cracking under certain service conditions. This susceptibility is affected by its complex microstructure containing several intermetallic phases, nitrides, carbides and carbo-nitrides. In addition, the size and amount of these precipitates depend sensitively upon ageing time and temperature selected for the heat treatment. However, a complete understanding of the influence of microstructural particulatries on the corrosion resistance of alloy 718 has not been reached to date. To address this a large research program dealing with the effect of precipitates on the susceptibility of alloy 718 to localised corrosion and hydrogen embrittlement was condu	Ernest N. Morial Convention Center-New Orleans

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Thursday,10 :15a.m. to 10 :40a.m.	A Simplified Model to Simulate Electrolytic Coupling in Cased Crossings	Pavan Shukla, Andrew Nordquist - To protect an oil or gas pipeline from external damage or stresses that can occur when a segment of the pipeline crosses or goes under a highway, railroad, or river, a casing pipe is typically installed that surrounds the carrier pipeline. Each cased crossing consists of carrier pipe, casing pipe, separators and end caps. The casing pipe has centralizers designed to maintain an equal radial distance between the carrier pipe and the casing pipe throughout the casing length using the separators. The casing pipe ends may be sealed, filled with wax, or left open to the atmosphere. Cased pipeline segments can range from ~20- to >300-ft long. The U.S. Department of Transportation’s Pipeline and Hazardous Materials Safety Administration estimates there are thousands of cased crossings nationwide and hundreds if not thousands located in high consequence areas. Overtime, the end seals degrade and annular space between the casing and the carrier pipe	Ernest N. Morial Convention Center-New Orleans

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Thursday,10 :15a.m. to 10 :40a.m.	Segmented Multi Electrode Sensor for Investigation of Environment-Assisted Cracking Under Dynamic At	Patrick Kramer, Fritz Friedersdorf, Matthew Merrill - Environment-assisted cracking (EAC) of aluminum alloys in corrosive atmospheres is a significant maintenance and safety issue for aerospace and naval structures. EAC is influenced by the interaction of stress, environment, and alloy microstructure. Atmospheric environmental conditions and corrosion kinetics are dynamic due to diurnal cycles and changing operating conditions, where temperature, relative humidity, and surface contaminants interact to control thin film electrolyte properties. In the case of EAC and other localized corrosion processes, such as crevice corrosion, separation of the anode and cathode may occur due to variation of chemical composition, oxygen availability, and pH differences between the crack tip, mouth, and boldly exposed surfaces. Conventional electrochemical immersion testing is not well suited to study factors and interactions leading to EAC in corrosive atmospheres. The bulk electrolyte co	Ernest N. Morial Convention Center- New Orleans

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Thursday,10 :15a.m. to 10 :40a.m.	Effect on Corrosion Behavior of the Heat Treatment Temperature of 30408 Stainless Steel	Bo Zhao, Jing Guo, Binan SHOU - The heating, air cooling and water cooling technology were used on the 30408 stainless steel to simulate the microstructure of the different location in the heat affected zone (HAZ), meanwhile, the electrochemical method and the immersion test were used to compare the pitting corrosion behavior of the different microstructure. The result showed that the grain growth tendency was obvious in both of the air and water cooling treatment with the heat treatment temperature increasing. The minimum of the anti-corrosion capacity, especially the resistance to pitting of air cooling microstructure was at the temperature of 1300 □, and the water cooling microstructure was at the 1100 □.	Ernest N. Morial Convention Center-New Orleans

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Thursday,10 :15a.m. to 10 :40a.m.	Silicon-Based CVD Nanocoatings for Corrosion Resistance and Advanced Surface Properties	Min Yuan, Luke Patterson - Faced with growing demand to increase performance and lower costs, the petrochemical and refining industry is long overdue for new corrosion resistant coating technology that is more easily integrated into production. This paper will discuss silicon-based chemical vapor deposition (CVD) nanocoatings that, when applied to stainless steel and other alloys, are proven to cut maintenance costs by offering corrosion protection equivalent to exotic metals while also easing design, fabrication, and installation of coated parts. By using a gas-phase CVD process, components with complex geometries or narrow passageways such as valves and filters can be thoroughly treated both internally and externally. The coating is molecularly bound to the base substrate, giving durability and flexibility without flaking, while the thin profile (approximately 1µm thickness) has no impact on design tolerances. The silicon-based CVD coating's performance is not directly rel	Ernest N. Morial Convention Center-New Orleans

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Thursday,10 :15a.m. to 10 :40a.m.	Internal Lining Damage Investigation of 24inch Jet Fuel Pipelines	Mushaid Nauman, David Eyre - This paper represents the analysis and investigation of two pack epoxy internal lining damage on two new build 24” Fuel Hydrant System pipelines. A leak in a nearby 36” irrigation line occurred during construction of the fuel hydrant system (FHS) and caused water flooding in the open trench containing the FHS pipelines. As a result mud and water went into the FHS pipes placed in the trench. Drainage and cleaning operations were done after which the robotic inspection revealed internal lining damages such as detachment of top coat, blisters and bubbles. The cause of the lining damage was at first blamed on the water and mud ingress followed by cleaning operations (water flushing, air blowing & drying) however after detailed testing, inspection and analysis, it was confirmed that the lining was itself of poor quality. The cause of blistering and delamination in flooded and flushed FHS lines was osmotic blistering due to presence of water soluble mate	Ernest N. Morial Convention Center-New Orleans

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Thursday,10 :25a.m. to 10 :50a.m.	Distributed Sacrificial Cathodic Protection – A New Cost Effective Solution to Prevent Corrosion on	Roy Johnsen, Mariano Iannuzzi, Geir Quale, Lars Aartun - Sacrificial anodes combined with organic coatings are the main corrosion protection strategy used to prevent corrosion on equipment submerged in seawater. Depending on the lifetime of the subsea system, the complexity of the structure to be protected, and the environmental conditions, the total anode mass can be substantial. For subsea structures, the anode mass not only increases fabrication costs but also affects the total structure weight in a way that puts special requirements on lifting vessels and cranes. Thermal Spray Aluminum (TSA) has occasionally been used to replace organic coating on subsea structures, especially to reduce current demand at elevated temperatures or to extend anode life on projects with long design lives (i.e. 40 to 50 years). However, TSA has not been used subsea as an anode replacement to protect subsea structures. In conventional CP design, TSA remains connected to the CP system, draining	Ernest N. Morial Convention Center-New Orleans

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Thursday,10 :25a.m. to 10 :50a.m.	Pitting Corrosion in AZ31 Magnesium Alloy in Potassium-Based Electrolytes	Somi Doja, Lukas Bichler, Simon Fan - AZ31 is a popular wrought magnesium alloy used in many aerospace and automotive applications. However, its use is hindered by the lack of information regarding its corrosion. Of particular interest is pitting corrosion, which was seen to cause localized corrosion in aqueous environments. In this work, KOH-based electrolytes were used to study the corrosion behavior of AZ31 alloy. The effect of dopants and exposure time on the initiation of pitting was studied via SEM and optical microscopy. Long-time exposure immersion tests and electrochemical impedance spectroscopy were carried out to study the stability of the corrosion products and progression of degradation. The results suggest that the presence of trace amounts of elements (e.g., silicates) resulted in a change of pitting mechanism of AZ31.	Ernest N. Morial Convention Center-New Orleans

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Thursday,10 :40a.m. to 11 :5a.m.	Corrosion Risk Evaluation of Duplex Stainless Steel UNS S82551 in Treated Seawater Injection Well Se	Perry Nice, Hisashi Amaya, Nicolas Larché, Lucrezia Scoppio, Matteo Fiocchi, Dominique Thierry - In seawater handling systems, the available well tubing materials are GRE lined low alloy steel or the so-called Corrosion Resistant Alloys (CRA's) such as super duplex stainless steel. However, in treated seawater (e. g. with dissolved oxygen removed), the corrosion risk can be controlled and lower grade alloys can be considered. Past experience has shown that treated seawater injection systems if not correctly operated, can lead to high dissolved oxygen concentrations (DOC) in the seawater injected into the wells resulting in corrosion failures. Recent efforts have focused attention on better DOC controls which permits the investigation and possible use of more cost effective materials such as the duplex stainless steel UNS S82551. Full scale testing of tubes joined together with a proprietary premium threaded connection was performed in controlled seawater loops simulating service co	Ernest N. Morial Convention Center-New Orleans

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Thursday,10 :40a.m. to 11 :5a.m.	Update on Corrosion Performance of CBPC Coatings in Aggressive Bridge Environment	Md Ahsan Sabbir, Saiada Fuadi Fancy, Kingsley Lau, Dale Deford - Coatings are widely used to mitigate corrosion of structural steel in aggressive humid environments. However, the service life is often diminished in aggressive environments. Repair of coatings can be costly due to materials, labor and environmental controls. Novel coating systems are commercially available for steel bridge aplication. As a part of research to assess novel coatings, Chemically Bonded Phosphate Ceramic (CBPC) coating was investigated. Research in progress on CBPC coating considered various exposure environments such as inland, beach and salt-fog exposure. Long term testing included up to 24 months in outdoor environments and up to 14600 hours in salt-fog exposure. To assess the corrosion damage due to exposure, the coating was evaluated by visual inspection, coating thickness and adhesion measurement as well as electrochemical testing of corrosion behavior and coating quality. Preliminary results af	Ernest N. Morial Convention Center- New Orleans

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Thursday,10 :40a.m. to 11 :5a.m.	Microbiological Influenced Corrosion (MIC) in Florida Marine Environment	Mayrén Echeverría Boan, Carla Reid, Berrin Tansel, Kingsley Lau, Samanbar Permeh, Matthew Duncan, Ivan Lasa - Microbiologically Influenced Corrosion (MIC) is an important degradation mechanism for materials in a wide variety of industries. Although MIC has not traditionally been a major durability concern for Florida coastal and inland bridges, a recent finding of severe corrosion of steel bridge piles associated with microbial activity, compounded by greater service life performance expectations for transportation infrastructure, has made identification of material degradation susceptibility of vital interest. Testing of metal samples and water from the bridge indicated strong presence of microbial growth that can be associated with MIC. Anaerobic sulfate reducing bacteria, acid producing bacteria and slime producing bacteria were recovered. Additional sampling and testing of steel coupons and water at varying depth were made to verify environmental conditions in Florida marin	Ernest N. Morial Convention Center- New Orleans

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Thursday,10 :40a.m. to 11 :5a.m.	A Multielectrode Array Sensor for Coating and Pretreatment Evaluation on Carbon Steels	Yugo Ashida, Isao Sumiyoshi - In the production of suspension coil springs and stabilizer bars of automotive vehicles, surface pretreatment, such as zinc phosphate pretreatment, and subsequent resin powder coating are critical processes to prevent the carbon steel substrate from corrosion and cracking. To retain the effectiveness of corrosion resistance and to reduce production cost and avoid overdesign of coating thickness, it is very important to understand the correlation between localized corrosion and the protectiveness of coating and pretreatment. In this study, a coupled multielectrode array sensor (CMAS) is used for coating and pretreatment evaluation on carbon steels. The preliminary testing results are summarized and discussed for further application.	Ernest N. Morial Convention Center-New Orleans

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Thursday,10 :40a.m. to 11 :5a.m.	A Comparison of Corrosion Resistant, High N Austenitic Stainless Steels	Samuel Kernion - A study of the corrosion resistance of multiple austenitic stainless steels is presented with a focus on high N alloys. The alloys principally vary by the amount of Mo, Ni, Mn, Cr and N. High Mn and Cr content increase the solubility of N, which acts to stabilize the austenitic matrix, improve pitting resistance, and increase strength. The high N alloys were tested in the work hardened condition, with yield strengths ranging from 850-1020 MPa. Pitting resistance was measured by multiple methods. Electrochemical testing was used to determine the pitting potential and critical pitting temperature (ASTM standard G150) in chloride solutions. Ferric chloride pitting tests (ASTM standard G48) were run to compare pitting mass loss and to confirm the critical pitting temperature. Results generally followed expected trends with the pitting resistance equivalent number, however exceptions were found. Susceptibility to intergranular attack and stress corrosion cracki	Ernest N. Morial Convention Center-New Orleans

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Thursday,10 :40a.m. to 11 :5a.m.	Non-Metallic Liners for Dense Slurry (Oil Sands) Applications	Haifeng Liu, DUANE SERATE - Non-metallic liners such as polyurethane and neoprene are currently extensively used in oil sands operations in Canada to protect the dense slurry pipeline. Not only do these liners provide corrosion-protection from the aqueous slurry, these also offer very good wear performance comparable to, if not, better than metallic pipeline materials. However, there is limited information available in the industry on what physical properties of non-metallic liners impart improved wear performance. The effects of water and hydrocarbon (bitumen) in the oil sands slurry on the wear performance of the non-metallic liners are also unknown. Shell Wear Technology Team had recently conducted the comprehensive immersion testing of at least 9 polyurethane and neoprene liner materials in the bitumen slurry, and investigated the changes in the physical properties (i.e. hardness, rebound resilience, scratch resilience, etc) and the wear performance (i.e. Slurry Jet Erosion	Ernest N. Morial Convention Center-New Orleans

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Thursday,10 :50a.m. to 11 :15a.m.	Strategy and Results of an Impressed Current Cathodic Protecton Retrofit in the North Sea	Alex Delwiche, Timothy Queen, Edgar Rodrigues - An oil drilling and producing jacket was installed in the North Sea in 1980, 100 miles off the coast of Scotland in 160 m depth seawater. The jacket has 8 legs and was installed with traditional standoff galvanic anodes. Surveys from 2010 to 2013 indicated a reduction in corrosioin protection from the cathodic protection system, and plans were implemented to upgrade the cathodic protection system. In 2015, a remote anode sled impressed current cathodic protection system was installed and commissioned in early 2016. This paper discusses the design process in choosing what is at the time, the largest ever cathodic protection retrofit in terms of delivered current capacity offshore, and the actual current the structure required.	Ernest N. Morial Convention Center- New Orleans

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Thursday,10 :50a.m. to 11 :15a.m.	Localized Corrosion on Coating Damaged Surface of Automotive Suspension Coil Springs	Yugo Ashida - This study focuses on a better understanding of pitting and crevice corrosion on coating surface damaged carbon steels for automotive applications. Cyclic polarization and immersion tests were conducted on unprotected surfaces in NaCl solutions. The morphology of pitting and crevice corrosion was characterized after the exposure to the corrosive environment. To simulate the coating damage of automotive suspension coil springs and stabilizer bars under road running conditions, a hardness indenter was used to generate bottom crashed indent damage on ZnP pretreated and resin powder coated shopeened surfaces. Localized corrosion on the ZnP pretreated surface and damaged coating surface was investigated in both immersion testing and salt spray testing. The correlation between localized corrosion and the way of metal substrate exposure is studied. A corrosion model is discussed for carbon steels with damaged coating.	Ernest N. Morial Convention Center-New Orleans

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Thursday,10 :50a.m. to 11 :40a.m.	Electrochemical Performance of Nano Engineered-Coatings Based on ANA in Corrosive Environment	Tse-Ming Chiu, Homero Castaneda-Lopez, Emily Hunt, Benton Allen - ABSTRACT This work describes the use of electrochemical impedance spectroscopy as a characterization tool for nano-scale additive (ANA) as corrosion barriers in different corrosive environments. Steel panels with three different coating formulations having in common an ANA component were tested. The formulations included Al2O3, fusion bonded epoxy, and marine coatings with different ANA percentages and were applied onto a steel panel by one horizontal and one vertical arc-spraying layer. The panels were exposed in 3.5% NaCl and characterized by using electrochemical impedance spectroscopy (EIS) and surface analysis. EIS shows the interfacial mechanism when the ANA concentration is modified, and the barrier effect demonstrates the water uptake process while the charge transfer process demonstrates the dominant mechanism with time. The increase in the ANA percentage influences the impedance and the mechanisms in th	Ernest N. Morial Convention Center-New Orleans

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Thursday,11 :5a.m. to 11 :30a.m.	Mitigation of Severe Pitting Corrosion Caused by MIC in a CDC Biofilm Reactor	Timothy Tidwell, Zach Broussard, Renato De Paula, Vic Keasler - Microbially influenced corrosion (MIC) of metallic iron surfaces can be attributed to two different mechanisms. Chemical MIC (cMIC) occurs when biological activities modify the local microenvironment by generating acid or excreting H2S which induces a corrosive process on the metal surface. Electrochemical MIC (eMIC), however, occurs when corrosion is propagated via direct electron uptake from a metallic surface. In this study, we used a once-through biofilm reactor to generate corrosive biofilms from an oilfield produced water sample from West Texas. Initially, we screened two biocidal products on coupons from the biofilm reactor to determine which chemistry would best kill and remove the biofilm from the surface. Then we used the best performing biocide to batch treat the biofilm reactor every week for eight weeks to determine how quickly the biofilms would recover and if biocide treatment would mitigate the	Ernest N. Morial Convention Center- New Orleans

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Thursday,11 :5a.m. to 11 :30a.m.	Zinc-Nickel Nanolaminate – Advanced Coating for Bolt Corrosion Control	Michael Joosten, Christa Zaharias, Christina Lomasney, Samuel Lomasney - The majority of steel fastener systems are protected from corrosion using one or more of hot dip galvanizing, electrogalvanizing, poly-tetra fluoroethylene (PTFE), and cadmium (being phased out). Nanolaminated Zn-Ni has improved corrosion performance as compared to these conventional systems. In addition to fastener corrosion protection, the Zn-Ni nanolaminate also provides a high level of adhesion to the steel substrate, a paint adherent surface, and a compatible galvanic couple between the coated steel fasteners and other metallic materials, including stainless steel components, low carbon steel flanges, and structural steel. This paper will present both laboratory and field trial results for Zn-Ni nanolaminated fasteners.	Ernest N. Morial Convention Center- New Orleans

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Thursday,11 :5a.m. to 11 :30a.m.	Evaluation of Alloys for Marine Exhaust Scrubbers	Brian DeForce - New environmental regulations reduce the permissible level of sulfur emissions from ocean vessels. Frequently, the most economical means of meeting the regulations is through the use of a diesel exhaust scrubber. The scrubber environment includes chlorides, high temperatures, and acidic conditions and requires the use of corrosion resistance alloys. This study compares several alloys (Alloy 316L (UNS S31603), AL-6XN® Alloy (UNS N08367), Alloy 31 (UNS N08031), Alloy 276 (UNS N10276), Alloy 59 (UNS N06059), Grade 2 Ti (UNS R50400) and ATI 425® Alloy, Grade 38 Ti (UNS R54250)) in several simulated scrubber environments. These comparisons are essential for proper material selection as the demand for marine exhaust scrubbers grows to meet the new regulations.	Ernest N. Morial Convention Center-New Orleans

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Thursday,11 :15a.m. to 11 :40a.m.	Impact of Foam Trench Breakers and Ditch Pads on Pipeline Cathodic Protection	James Ellor, J. Peter Ault, Rich Gianforcaro, Mark Linville - Structural polyurethane foam (SPF) materials are being used to provide physical support (“ditch pads”) and erosion control (“trench breakers”) with pipeline installations. These SPF materials are either sprayed with the pipeline in place or pre-sprayed into a cured shape to support a pipeline. As an organic material that comes into contact with a coated-steel pipeline, concerns have been raised about the potential, if any, for a SPF to create “electrical shielding” and limit or prohibit cathodic protection current from reaching a coating holiday or defect in a coated steel line. The subject paper summarizes the results of research sponsored by the Pipeline Research Council International concerning the subject of shielding. The testing covers the impacts of various commercial SPF materials on cathodic protection current distribution on coated pipelines based on laboratory testing of key performance parameters.	Ernest N. Morial Convention Center-New Orleans

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Thursday,11 :15a.m. to 11 :40a.m.	Structural Performance of FRP Materials After Subsea Long Term Immersion	Simon Eves, Hannah Wright - The potential benefits of structural FRP Composite Materials over conventional metals for offshore oil and gas subsea projects can be very significant, with substantial weight reduction and corrosion benefits (no cathodic protection required). However, while FRP does not corrode when immersed subsea, it does absorb water and it is well known that mechanical properties can change over time. To meet customer demands, it is critical that justified design assurance can be provided to prove that any FRP structure remains "fit for purpose" for a typical subsea project design life of 20 years or more. To be able to provide such assurance, any changes in relevant mechanical properties must be understood and quantified, so appropriate safety factors can be allowed for in the original FRP design to offset any such changes. Structural FRP specialist FGS/Pipex has addressed this issue through extensive accelerated laboratory testing of their FRP materials, uniquel	Ernest N. Morial Convention Center-New Orleans

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Thursday,11 :15a.m. to 12 :5a.m.	Corrosion Resistance of Metal Matrix Composite Coatings - Effect of Microstructure	Othon Monteiro, Valery Khabashesku, Sankaran Murugesan, Radhika Suresh - Metal matrix composite (MMC) and nanocomposite coatings are being proposed as alternatives to their monolithic counterparts to improve protection against wear in chemically-aggressive environments. Corrosion resistance of MMC coatings is strongly dependent on its microstructure, which is affected by the physical and chemical nature of the dispersed particles, as well as the particle concentration. In this paper, we will present the results of our tests on the corrosion response of Ni-P MMC coatings with micro-crystalline and nano-crystalline diamond as the dispersed phase. Potentiodynamic and electrochemical impedance spectroscopy tests were performed to compare the corrosion of Ni-P composites and nanocomposites, and the results are analyzed in terms of their microstructure. The corrosion potential is primarily determined by the P content and the heat treatment carried out after deposition, and seems to	Ernest N. Morial Convention Center-New Orleans

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Thursday,11 :25a.m. to 11 :50a.m.	Online Continuous Corrosion Monitoring for Detection, Monitoring and Control of Localized Corrosion	Ruth Wardman, Attila Gajdacsi - Title: Recent advances in best practice for deployment of online continuous corrosion monitoring systems for the detection and monitoring of localized corrosion, providing insights to aid in its control Non-intrusive continuous wall thickness monitoring systems are fast becoming industry best practice for online detection and monitoring of corrosion and erosion. Traditional challenges with localised corrosion have been knowing where to deploy online monitoring sensors and also being able to quickly and easily interpret the data that is delivered. Operators have been deploying these wall-thickness monitoring sensors in arrays in areas of elevated corrosion risk. The author will demonstrate that deploying only a modest number of point measurement devices in an area of elevated localized corrosion risk will provide the best possible combination of probability of detection (POD) and ongoing wall thickness monitoring for localized corrosion attack. A	Ernest N. Morial Convention Center-New Orleans

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Thursday,11 :30a.m. to 11 :55a.m.	Development of Sucker Rods for Aggressive Environments	Teresa Perez, Martin Buhler, Edgardo Lopez, Matias Pereyra - Operating conditions for sucker-rods are becoming more aggressive as the water production and the CO2 and H2S presence increase. Additionally, due to the increase of the fatigue loads, higher mechanical properties are required. Under the combined effect of all those conditions, sucker rod failures can take place due to the synergist effect of localized corrosion, fatigue corrosion and, in some cases, the embrittling effect of H2S. Taking this scenario into account, the development of a sucker rod with adequate performance in those environments was addressed. The steel composition and the heat treatment conditions are key parameters to optimize the obtained microstructure and the performance in aggressive environments. The first steps of the development were the steel design and the evaluation of the material corrosion fatigue resistance in CO2 y H2S environments, at lab scale. Corrosion fatigue machines coupled to autocla	Ernest N. Morial Convention Center-New Orleans

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Thursday,11 :40a.m. to 12 :5a.m.	Testing and Design of Nonmetallic Composite Repair Systems for Pipeline Intergity	Davie Peguero - The specific repair design of nonmetallic composite systems is a critical component to the successful usage of this relatively new and advanced material group when applied as a repair of pipeline defects. Various design methodologies are currently available within the existing composite repair design documents, ASME PCC-2 Article 4.1 and the ISO/TS 24817, based on the level of testing and understanding of the specific composite system being used. The purpose of this paper is to discuss a testing program to validate the effectiveness of a composite repair system when designed according to formulas using a strain based approach rather than a stress based approach. SImulated corrosion defects manufactured into steel pipe test spools were severe in nature, including high percentage wall losses with large dimensions and also large wall losses into the weld seams of the pipe specimens representing a very severely damaged pipeline. Pressure cycling and ultimate fai	Ernest N. Morial Convention Center-New Orleans

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Thursday,11 :50a.m. to 12 :15a.m.	Localized Corrosion Managing Clamp in a Crevice Between Clamp and CRAs Pipe/Tube Line	Byoung Young Yoon - Fluid flowing CRA pipe/tube line systems are usually subjected to repeated impulse and vibration. To support installed pipe/tube line, plastic clamp systems have been widely used for various industries such as oil and gas industries, ship building and power plants. However, the plastic clamp system has high risk of corrosion failure on the pipe and tube underneath plastic clamp bodies which are supporting component for the clamp. Local failure (crevice corrosion) is initiated and propagated by changes in local chemistry within the crevice (between plastic clamp body and metal pipe and tube line). The localized corrosion in crevice is not predictable and once it is initiated, the corrosion is extremely accelerated. As a result it can develop leakages that may lead to abrupt failure of CRA tubing/piping system. To prevent localized corrosion on the metal pipe/tube line underneath the clamp body, the galvanic effect is used. In this paper, the effect of insert	Ernest N. Morial Convention Center-New Orleans

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Thursday,12 :5a.m. to 12 :30a.m.	Thin Sol-Gel Coatings for Fouling Mitigation in Heat Exchangers	Seth Taylor, Ricardo Losada, Thomas Poulsen, Claus Bischoff, Tina Swangphol, Les Jackowski, Ed Curran - Fouling of heat exchangers poses a significant challenge for Oil and Gas operators, requiring regular maintenance and cleaning procedures to ensure efficient and safe operation of equipment. Polymeric coatings have been used by industry to alleviate fouling in shell-and-tube (S&T) exchangers, but these coatings have historically suffered from poor reliability and compromised heat transfer efficiency owing to their thick, insulating nature. Alternative approaches to maintaining clean heat-transfer surfaces that are cost-effective, and do not disrupt equipment availability, are sorely needed by industry. This paper describes recent efforts to develop thin, sol-gel-derived coatings to mitigate fouling and promote continuous operation of process-critical exchangers without compromising heat transfer efficiency. The hybrid organic/inorganic sol-gel coatings exhibit repellency to	Ernest N. Morial Convention Center-New Orleans

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Thursday,12 :15a.m. to 12 :40a.m.	Monitoring of Stagnant and Low-flow Lines in Petroleum Refineries	Mohab Kseibati - With new advancements in the petroleum refining processes, the need for monitoring of corrosion on the new and old systems is also transforming. This paper describes the experience gained in monitoring of stagnant and low flow lines of a refinery in Kuwait. After witnessing a failure in one of the de-salter relief lines of the crude distillation unit, a comprehensive plan was prepared to identify and address similar cases in the entire refinery which was a major challenge. This paper describes the probable causes and the adopted remedies for the corrosion observed in the insulated de-salter relief line which was of highly localized in nature. Circumstantial evidence and failure morphology were studied in arriving at the root cause for this failure. Although, samples of the pipe showed signs of aggravated external corrosion at the failure location after removal of insulation, the reason assigned for the failure was due to under-deposit corrosion mainly on the pipe	Ernest N. Morial Convention Center-New Orleans

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Thursday,1 p.m. to 1 :25p.m.	Corrosion Resistance of Large Components Produced rfom AF932N High Nitrogen Stainless Steel Ingots	Carlo Malara, Luca Foroni, Louis Lherbier - The availability of large components with high corrosion resistance and mechanical strength combined with high toughness is becoming an increasing need in oil and gas industry as well as for power and petrochemical applications. Duplex and super-duplex stainless steels provide a good combination of such properties but they are limited in thickness because of strong toughness reduction and possible presence of sigma phase on large sections. Because of the well-known beneficial effect of nitrogen on austenite stabilization, corrosion resistance, strength and toughness, high nitrogen austenitic stainless steels containing nitrogen above 0.5 % can provide an excellent alternative to duplex and super-duplex stainless steels, especially for a product thickness as large as 350 mm and greater. In this context, a high nitrogen steel designated as AF932N has been manufactured in large section sizes at Foroni. Details of manufacturing process an	Ernest N. Morial Convention Center-New Orleans

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Thursday,1 p.m. to 1 :25p.m.	Molecular MIC Diagnoses from ATP Field Test: Streamlined Workflow from Field to 16S Results	Marc Demeter, Shawna Johnston, Kim Dockens, Ray Turner - Microbiologically influenced corrosion (MIC) is a term used to describe corrosive damage to metals caused by microbes including bacteria, archaea and fungi. MIC affects many industries, such as power generation, oil production, transportation and water storage and distribution. The costs inferred by corrosion across all industrial sectors are staggering. As such, monitoring for, and diagnosing MIC as part of a complete corrosion mitigation strategy is of paramount importance. While culture based growth tests are the traditional means of assessing MIC, their accuracy and reliability suffers greatly as a result of the inability to culture most microbes. Numerous culture-independent biochemical and genetics-based assays have been developed; one of which is the adenosine triphosphate (ATP)-based assay. Since ATP is present in all living cells, extraction and quantification of ATP directly from an environmental sample allows	Ernest N. Morial Convention Center-New Orleans

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Thursday,1 p.m. to 1 :25p.m.	UNS N08830 – New Ni-Fe-Cr-Mo-N Super-Austenitic Alloy	Brian DeForce, Njall Stefansson, George Smith, John Goetz - ATI 830TM alloy (UNS N08830) is a new Ni-Fe-Cr-Mo-N super-austenitic alloy. It is a non-magnetic, high strength alloy with exceptional pitting and crevice corrosion resistance, while maintaining excellent toughness and wear resistance. This solid solution strengthened alloy has additions of Cu, W, Co and Mn resulting in improved microstructural stability as compared to other alloys with similar corrosion resistance, allowing for manufacturing productivity in a greater number of sizes and product forms. This paper will introduce the alloy with a microstructural evaluation as well as corrosion and mechanical test results. Corrosion testing includes requirements to NACE MR0175 / ISO 15156 sour service testing, slow strain rate testing in sodium chloride, stress corrosion cracking testing in boiling sodium chloride, and pitting and crevice corrosion in ferric chloride. Mechanical testing covers through-thickness profiles	Ernest N. Morial Convention Center-New Orleans

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Thursday,1 :25p.m. to 1 :50p.m.	Quantification of Microbiologically Influenced Corrosion in Injection Water Pipelines	Uffe Thomsen - Pipelines for transferring pressurized seawater constitute a significant part of the network for enhancing oil recovery in many offshore oilfields. To maintain the integrity of the system it is important to mitigate corrosion in the pipeline, which consequently may cause the operational pressure to be lowered, or a worst case scenario, a pipeline failure. Hence, water treatment is essential to mitigate corrosion, though, the potential for microbiologically influenced corrosion (MIC) in injection water pipelines is assumed to be lower compared to oil or multiphase pipelines where nutrients are abundant and a higher temperature facilitates microbiological growth. Presence and activity of MIC-causing microorganisms were investigated in a 16” diameter and 9.6 km long injection water pipeline from the Dan FF to Halfdan DA platforms. Sampling of pigging debris from the pipeline showed that both sulfate-reducing bacteria and methanogens were present in significant numb	Ernest N. Morial Convention Center-New Orleans

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Thursday,1 :25p.m. to 1 :50p.m.	Alignment of Critical Experimental Parameters of Well Stimulation and Scale Dissolver Chemicals Corr	Luciana Intiso, Lucrezia Scoppio, Perry Nice, Giuseppe Mortali, Javier Alejandro Carreno, Flávia Guedes, Ilson Palmieri Baptista, Sandra Berry - High pressure (HP) and high pressure high temperature (HPHT) wells present the most challenging conditions for drilling and well completion operations. During the completion operations of these wells the perforated pay zone may require acid stimulation to remove and clean up debris and therefore permit unrestricted hydrocarbon flow. Also later in the well life, carbonate scale may deposit which needs to be removed with a scale dissolver treatment. These chemical treatments are mostly corrosive to steel and can potentially cause significant corrosion damage. Hence there is a need to assess these chemicals prior to application in the well to prevent severe corrosion damage to the wells tubing, equipment and liner sections. For this reason, laboratory testing of these chemical packages plays an important role in determining their suitabili	Ernest N. Morial Convention Center-New Orleans

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Thursday,1 :25p.m. to 1 :50p.m.	Determining the Dissolved Oxygen (DO) Concentration Limit for Safe Operation of CRAs in Saline Solut	Qing Lu - It is well established that the corrosion rate of carbon/low alloy steels in aqueous solutions (e.g. seawater) is affected by the concentration of dissolved oxygen (DO), along with other environmental factors including temperature, chloride ion concentration, pH, etc. Several models have been developed and used to predict the corrosion rate of carbon steels at different DO levels. However, carbon/low alloy steels cannot offer sufficient corrosion resistance in saline solutions at high temperatures (e.g. produced water systems in the oil field), leading to excessive metal loss due to the high corrosion rates. In such cases, corrosion resistant alloys (CRAs) may offer a more cost effective/long-term solution. However, there have been cases that CRAs were used with the premise that they were immune to corrosion, whereas CRAs suffer from localised corrosion in oxygen-containing saline solutions. Depending on the grade of CRAs employed, the tolerance level of the DO ma	Ernest N. Morial Convention Center-New Orleans

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Thursday,1 :50p.m. to 2 :15p.m.	Sustainable Biocide Formulations to Deliver Controlled Post Fracture Souring Management	Stephanie Edmunds, Chris Jones, Kevin Janak, Jean Molina - Hydraulic fracturing, used in unconventional shale gas and oil extraction, uses large amounts of water which needs to be treated with biocides to prevent microbial degradation of the fracturing fluids and subsequent microbial contamination of the reservoir. Biocide selection for treatment of the fracturing fluids ‘on the fly’ is normally based upon rapid speed of kill in the source water and compatibility with the fluid system. However, a growing requirement is to deliver an holistic biocide package that can also provide protection, post fracturing, in the reservoir where the newly opened fracture faces, introduction of nutrients and degradable carbon sources provide a favourable environment for microbial growth. Many of the commonly used fracturing biocides are inactive in the reservoir, either due to adsorption onto surfaces, deactivation by the reservoir temperature or presence of hydrogen sulfide (in the case of s	Ernest N. Morial Convention Center-New Orleans

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Thursday,1 :50p.m. to 2 :15p.m.	Lack-of-Fusion-like Root Flaws in Stainless Steel Welds	Kasra Sotoudeh, Michael Gittos - The corrosion performance of welds in duplex stainless steels is crucial to qualification of weld procedures. This paper describes lack-of-fusion-like flaws, which can be formed at weld toes, particularly in pipe butt welds in duplex grades of stainless steel. It is suggested that because the way the features appear to be related to deformation of the root during the deposition of fill passes, they would be more accurately described as 'folds'. The features were also re-produced in a series of trial welds and found to be influenced by the weld shape and the number of weld passes in a joint. It was also shown that welds containing these flaws suffered enhanced corrosion in ASTM G48A pitting corrosion tests. Because of their effects on environmental performance, it is considered important to gain a better understanding of the factors which influence their formation. The corrosion performance of welds in duplex stainless steels is crucial to qualif	Ernest N. Morial Convention Center-New Orleans

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Thursday,2 :15p.m. to 2 :40p.m.	Use of a Methodological Panel for Microbial Diagnostics, Biocide Selection, and Application in an Oi	Jennifer Fichter, Elizabeth Summer, Geddy Hamblen, Stanley Richardson, Chris Janes - An oil shale field was found to exhibit classic signs of a heavy microbial burden, including incidences of hydrogen sulfide production, down hole and surface microbially influenced corrosion, downhole pump and surface equipment fouling and fracturing fluid and drilling mud degradation. Over 130 samples, including formation core material, drilling muds, fracturing fluid source waters, production well samples, samples collected from failed pipe surfaces and samples from salt water disposal facilities, were collected in a comprehensive survey. Microbial activity was measured in parallel using four different bacterial quantification methods: 1. Traditional MPN culture-based assay for SRB, APB, GHB (aka "bug bottles), 2. Direct visualization and counting bacterial cells utilizing live/dead staining coupled to flow cytometry, 3. An ATP-based assay for metabolically active cells, and 4. A hydrolase-base	Ernest N. Morial Convention Center-New Orleans

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Thursday,2 :15p.m. to 2 :40p.m.	Study on Ferrite Content and Hardness of Thick-Wall 22% Cr Duplex Stainless Steel Welded Joints	Mikihiro Sakata, Usani Ofem, Tomoaki Kiso, Nozomi Satake - In petroleum refineries and Oil & Gas plants, air-cooled heat exchangers, so-called fin fan coolers exposed to corrosive environments containing chloride and hydrogen sulfide are in some cases fabricated from 22% Cr duplex stainless steels (DSS). Depending on application, limits are often specified for ferrite content and hardness (typically 35-65% for ferrite content and 320 HV maximum) during welding procedure qualification of 22% Cr DSS due to concerns that these may increase susceptibility to cracking. On the other hand, there is little published information about key controlling parameters that affect weld cracking observed in air-cooled heat exchangers in service. In this study, in order to evaluate the effect of material thickness, weld heat input, and restraint condition during welding fabrication on ferrite content and hardness of 22% Cr DSS welds, welding trials were performed on different wall thick 22% Cr DS	Ernest N. Morial Convention Center-New Orleans

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Thursday,2 :50p.m. to 3 :15p.m.	Recent Failures of 2205 Duplex Stainless Steel in FGD Scrubbers - Could They Have Been Avoided?	Bud Ross, Eldon Dille, Bopinder Phull - Over the past 5 years, more than 80 FGD scrubber units have reportedly exhibited serious corrosion problems. In the United States alone many of these problems were encountered after only a few months of service. The primary materials of construction in the affected units were duplex stainless steels. This paper will provide an overview of readily available technical information in the published literature and past experience that could have been used to minimize corrosion problems in these FGD units. The materials selection process will be discussed as it relates to specific FGD scrubber components and include, defining the FGD environment(s), candidate alloys, fabrication and welding requirements, mechanical and physical factors, testing and inspection, and other features such as safety, compatibility, availability, and cost.	Ernest N. Morial Convention Center- New Orleans

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Thursday,3 :15p.m. to 3 :40p.m.	The Pitting Behavior of Austenitic and Duplex Stainless Steels Under SO2 Environments with Cl- And F	Zhu Wang, Lei Zhang, Minxu Lu, Xian Tang, Ting Li, Junpeng Xue - With increasing concerns of air pollution, the gaseous emission of sulfur from industries in the forms of SOx has been closely monitored and regulated by many countries to meet the requirement of at least 99.8% sulfur recovery. Technological and industrial efforts have been put up in the past several decades and many clean-up processes have been developed, in which sulfur containing tail gases are typically contacted with absorbing solvent(s) to remove SO2 from power plants and refineries. However, corrosion, especially pitting and stress corrosion cracking risks, has been reported previously under the condition with both SO2 and Cl- / F- contamination in the solvent. In this paper, pitting risk of the austenitic stainless steels and duplex stainless steels under wet SO2 environments with Cl- and F- under high temperature and high pressure was investigated. Corrosion behavior of stainless steels was tested under SO2	Ernest N. Morial Convention Center- New Orleans

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Thursday,3 :40p.m. to 4 :5p.m.	Atmospheric Corrosion Resistance of Stainless Steel in Middle East: Result of Field Exposure Program	Sukanya Mameng - The environmental condition and the alloying composition of the stainless steel are the most importance factors that affect the atmospheric corrosion resistance of stainless steel. The environment in Middle East is characterized by high temperature and very little rain fall which together with the distance to the sea will have a huge effect on the corrosiveness. The closer the distance is to the sea the higher the corrosivity of the environment has. Selecting suitable stainless steel in different locations in Middle East require knowledge of the actual atmospheric condition at the location of the application. The aim of this paper is to present information about the effect of various environments in Middle East on the atmospheric corrosion of stainless steels after four years exposure. Three different test sites are selected in this study: marine site, semi-marine site in Dubai and rural site in Saudi Arabian. The results obtained are used for comparing the atm	Ernest N. Morial Convention Center-New Orleans

RIP Meetings

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Time	Name	Description	Committee(s)	Location	Location Detail
Monday,9 a.m. to 9 :25a.m.	Environmentally Assisted Stress Corrosion Cracking of 5xxx Al Alloys in Atmospheric Environments	James Burns, Patrick Steiner - Intergranular stress corrosion cracking (IG-SCC) testing has typically been performed with specimens fully immersed in electrolytic solution due to experimental convenience. However, true atmospheric environments are often typified by salt-spray, rain, or a deliquesced thin-film electrolyte. These environments differ in the pertinent mass-transport distances and/or local ionic resistance influencing the cathodic/anodic reaction kinetics that control the crack tip hydrogen production. In this study the effect of atmospheric environments on the IG-SCC behavior of AA5083-H131 and AA5456-H116 tensile samples is studied using slow-rising displacement testing and high-fidelity monitoring of crack growth kinetics. These results are analyzed in the context of a coupled anodic dissolution and hydrogen-embrittlement mechanism, in which the observed reduction in the IG-SCC susceptibility of the atmospheric environments is cathodically limited. This would indic		Ernest N. Morial Convention Center-New Orleans	

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Monday,9 a.m. to 9 :25a.m.	Assessment of Corrosion De-Adhesion of Marine Paints on Steel Using Scanning Kelvin Probe	Nathalie Lebozec, Andrej Nazarov, Dominique Thierry - Marine paints are complex polymeric systems containing various layers of coatings. They are heavily pigmented that leads to perfect barrier properties relatively to diffusion of water oxygen and corrosion activating ions. When paint systems including Zn rich primer are used, a sacrificial protection of the steel substrate is provided by zinc. In total, the thickness of paints is more than 300 -350 mm that significantly delays the degradation and visual observation of corrosion failures. In this study, three industrial marine paints were studied. One systems was a one-layer barrier epoxy mastic while the others were full marine paint systems consisting of multi-layers of epoxy paint on one side and a system with Zn rich primer on the other side. A scanning Kelvin probe (SKP) instrument was used to study the mechanism of paint failure. This technique is sensitive to metal-polymer interface and gives a rather quick response on th	Ernest N. Morial Convention Center-New Orleans

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Monday,9 a.m. to 12 a.m.	Coatings and Inhibitors (Day 1)	This Research in Progress session will focus on presentations related to the performance and evolution mechanisms of coatings/inhibitors through chemical or electrochemical (corrosion) aspects, and the interrelationship between composition, processing/technique, microstructural/nanostructural features, and the test environment and coating/inhibitor performance. Approaches to design of improved coating materials and inhibitors and processes based on scientific and experimental data applied to harsh or aggressive environments. Latest development of test methods considering the interplay between mechanical, chemical, and electrochemical interactions and the ability to predict performance in aggressive environments. Emphasis on valid, accelerated performance tests and relation between test technique and field performance data. High performance coatings characterization in oxidizing and corrosive environments while exposed in corrosive applications. Current modeling aspects to predict properties, performance, durability and reliability of coatings and/or inhibitors in aggressive environments. Chair: Homero Castaneda-Lopez Vice Chair: Kristen Williams	Ernest N. Morial Convention Center-New Orleans	Room 229

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Monday,9 a.m. to 5 p.m.	Environmental Assisted Cracking - Research in Progress	This Research in Progress session includes papers that focus on all aspects of environment assisted cracking, with a specific focus on, but not limited to, cracking of stainless steels, magnesium, aluminum and nickel alloys. Studies related to the resistance of materials to the initiation and growth of cracks during stress corrosion cracking and corrosion fatigue are encouraged. In addition, studies related to the development of novel techniques to monitor crack initiation and growth, including pit-to-crack transition, testing protocols/environments and life prediction models are welcomed. Focus should be on the most current results and research in progress. Chair: Jenifer Locke Vice Chair: Brendy Rincon Troconis	Ernest N. Morial Convention Center-New Orleans	Room 230

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Monday,9 :25a.m. to 9 :50a.m.	Mitigation of Intergranular Stress Corrosion Cracking in Al-Mg by Electrochemical Potential Control	Matthew McMahon, John Scully, James Burns - The AA5xxx-series is a lightweight family of aluminum alloys utilized in marine vehicles in place of heavier steel components for increased speed and fuel efficiency [1]. Specifically, AA5456 is solid solution strengthened by a supersaturation of the Al-matrix with 5 wt. % Mg. However, mildly elevated temperatures can lead to precipitation of the β phase (Al3Mg2) on the grain boundaries. This process is termed sensitization and is often quantified by the ASTM G-67 Nitric Acid Mass Loss Test (NAMLT)). The β phase is highly anodic to the matrix and in the presence of aggressive environments can lead to severe intergranular stress corrosion cracking (IG-SCC) [2]. This behavior is governed by a coupled anodic dissolution process (of the β phase and under certain conditions the Al matrix), which by the hydrolytic acidification mechanism catalyzes an aggressive local crack tip chemistry. This acidic environment lowers the crack pH, which	Ernest N. Morial Convention Center-New Orleans

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Monday,9 :25a.m. to 9 :50a.m.	Hot Corrosion and Microstructural Characterization of HVOF Deposited Ni-based Supper-alloy Coating	Sahar Abualigaledari, Mehdi Salimi Jazi, Fardad Azarmi - High Velocity Oxygen Fuel (HVOF) technique is capable of providing the coatings with high density and low porosity that allow the material to function under extreme condition. Thus, in the current study, this technique was utilized to deposit Inconel 718 that is the most widely used supper-alloy in petroleum industry due to its superior mechanical and electrochemical properties especially at high temperature. One of the crucial challenges with the components functioning at high temperature in petroleum industry is hot corrosion. Majority of the published works on corrosion behavior at high temperature were based on weight-loss estimation that is engaged with high inaccuracy. In this work, High Temperature Corrosion Measurement Device (HTCMD) was introduced for corrosion assessment at high temperature. HTCMD is able to elevate temperature and pressure, as desired, and conduct the Electrochemical Impedance Spectroscopy (EIS	Ernest N. Morial Convention Center-New Orleans

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Monday,9 :50a.m. to 10 :15a.m.	Assessment of Commercially Available Non-Chromate Conversion Coatings	Kimberly Martinez, David Enos - Industry is being driven to adopt non-chromate conversion coatings (non-CCCs) as a replacement for chromate conversion coatings (CCCs) due to increasing regulation of hexavalent chromium. For example, Europe's directive on the Restriction of Hazardous Substances (RoHS) is driving the elimination of hexavalent chromium worldwide and, as a result, industrial processes that rely on chromate will soon become obsolete. As CCCs have been the standard for the corrosion protection of aluminum for decades, finding suitable replacement chemistries is of high importance. While a wide variety of solutions are now commercially available, long term performance data for these materials is typically lacking. Furthermore, the impact of secondary processing steps, such as thermal treatments associated with curing encapsulants and powder coatings, is poorly understood. In this work, a series of commercially available non-CCCs were evaluated in terms of their co	Ernest N. Morial Convention Center-New Orleans

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Monday,9 :50a.m. to 10 :15a.m.	The Effect of Sensitization and Fatigue Loading Frequency on Corrosion Fatigue of AA5083-H131 used f	Rebecca Bay, Jenifer Locke - AA5xxx series Al-Mg alloys with greater than ~3.5% Mg experience an acceleration in fatigue crack growth rate as the level of sensitization increases and fatigue loading frequency decreases when loaded in 3.5 wt% NaCl. AA5xxx series alloys, commonly used in naval applications, are known to exhibit decreased resistance to intergranular corrosion and intergranular stress corrosion cracking due to the formation of the active Al3Mg2-β phase on grain boundaries. β phase is metallurgically undesirable and forms on grain boundaries when slightly elevated in-service temperatures are experienced for prolonged periods of time, a phenomenon known as sensitization. Previous studies on AA5083-H131 corrosion fatigue show that fatigue crack growth rate is accelerated by an order of magnitude for Degrees of Sensitization greater than or equal to 30 mg/cm2 at a fatigue loading frequency of 10 Hz, however, practical in-service naval ship fatigue loading occurs at	Ernest N. Morial Convention Center-New Orleans

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Monday,10 :25a.m. to 10 :50a.m.	New Insights into Environment Assisted Cracking of Pre-Exposed and Sensitized 5000 Series Aluminum	Tim Burnett, Henry Holroyd, John Lewandowski, Mohsen Selfi - Investigation into the environmentally assisted cracking behaviour of AA5083-H131 has revealed two mechanistically different modes of crack propagation. Using a combination of high-resolution X-ray computed tomography and scanning electron microscopy (SEM) it has been possible to distinguish these distinct fracture modes from samples taken to failure in slow strain rate tests (SSRT) and also repeated tests that were halted just before failure. A range of sensitized AA5083-H131 round bar tensile specimens prepared in the short transverse direction were pre-exposed to 0.6M NaCl prior to testing. SSRT were conducted in laboratory air (50% RH) and very dry air. Intergranular stress corrosion cracking (IGSCC) was the crack propagation mechanism when the stress intensity factors remained in the range of 4 to 12-15 MNm-3/2. A second mode of cracking, identified presently as Type-2 cracking, is associated with sudden load-dro	Ernest N. Morial Convention Center-New Orleans

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Monday,10 :25a.m. to 10 :50a.m.	Characterization of Corrosion Inhibition of a Novel Cerium-based Coating Additive	Joshua James - The objective of the research is to provide insight to the implicit corrosion inhibition provided by a novel development in coating additives developed at Battelle. The program under which this cerium-based sulfonated dichloro-diphenyl sulfone (SDCDPS) additive was developed originally targeted solutions for polymer electrolyte-based fuel cell membranes. It has since shown promise in effectively reducing the corrosion susceptibility of carbon steel substrates when added to urethane topcoats. Calcium salt of fatty acid sulfonates are commonly used corrosion inhibitors. However, to gain effective inhibition levels, it requires higher concentration (more than 10 %) and is often challenging to formulate. This is due to its inadequate compatibility with synthetic polymers such as epoxy and polyurethane. In the case of cerium-based SDCDPS, ceria was complexed onto the sulfonic acid back bone to provide a novel option for additive based corrosion inhibition for solven	Ernest N. Morial Convention Center-New Orleans

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Monday,10 :50a.m. to 11 :15a.m.	[Corrosion Behavior of Zn And Zn-Al-Mg Coated Steel in Different Environments]	Shei Sia Su - Corrosion performance of Zn and Zn alloyed coated steel has attracted much attention due to their excellent corrosion protection. Although there has been numerous of studies focusing on understanding the corrosion behavior of the galvanized steel and Zn-Al-Mg steel, the corrosion protection mechanisms of these coatings remain unclear. In this study, Zn and Zn-Al-Mg were exposed to artificial rainwater, artificial seawater and compared with the 5% NaCl solution. The corrosion behavior of Zn and Zn-Al-Mg steel in different environments were investigated by immersion test, electrochemical measurements, SEM, EDS and XRD. The nature of the corrosion products and its protective ability in different environment are also investigated in details.	Ernest N. Morial Convention Center-New Orleans

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Monday,10 :50a.m. to 11 :15a.m.	Pre-Exposure Embrittlement of Aluminum and Magnesium Alloys	Henry Holroyd, Tim Burnett - Despite pre-exposure embrittlement of aluminum alloys having been studied for around 40 years, mechanistic questions remain unresolved. Results reported here will embellish a recent revelation, verified by images obtained from high resolution 3D high-resolution X-ray computed tomography, that sensitized AA5083-H131 can suffer two distinct forms of environment-induced crack growth. Additional experimental results will be presented to facilitate further discussion on whether more than one type of environment-induced cracking may occur in other commercial aluminum alloy systems, (e.g. 2xxx, 7xxx and aluminum-lithium alloys) and possibly in some wrought magnesium alloys. Mechanistic implications and influence the two forms of environment-induced crack growth may have on the average crack growth rate dependence on the applied stress intensity factor will be discussed.	Ernest N. Morial Convention Center-New Orleans

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Monday,11 :15a.m. to 11 :40a.m.	Modeling the Localized Corrosion and Cracking of Lightweight Alloys: A Multiphysics Approach	Christopher Taylor - The localized corrosion and cracking of lightweight alloys is a complex, non-linear and stochastic function of the variables concerning materials composition, thermal and mechanical processing, and environmental parameters such as solution chemistry, temperature, electrochemical potential and mechanical stress. Integrating these variables into a coherent model poses a ‘grand challenge’ in corrosion science and engineering. In this presentation, a Bayesian network approach that integrates these variables into a single model is presented based upon pre-existing models taken from the literature[1,2,3] as well as data-sets that provide electrochemical ‘fingerprints’ for the cathodic and anodic behavior of intermetallic particles[4,5,6]. References: [1] D. G. Harlow and R. P. Wei, Probability Modeling and Material Microstructure Applied to Corrosion and Fatigue of Aluminum and Steel Alloys, Eng. Fract. Mech. 76 (2009), p.695. [2] M. K. Cavanaugh, N. Birbilis	Ernest N. Morial Convention Center-New Orleans

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Monday,11 :15a.m. to 11 :40a.m.	Computational Design of Functional Coatings: Molecular Searching for Corrosion Inhibitor Development	Erik Sapper, Fiona Chen, Michael Breedon, White Paul, Clement Chu, David Jackson, Ivan Cole - Motivated by the increasing demand for next-generation toxic-free corrosion inhibitors from the aerospace and aluminium industries, our research aims to address a key challenge in functional coating and material design, particularly the elucidation of how molecular structure influences material properties and end-product engineering performance. We have developed a computational design framework to predict in-service performance of corrosion-protective coating systems in order to accelerate the development cycle of new corrosion inhibitors. The framework converts multi-scale computational methods into functional materials design tools that can be linked through the molecular properties of chemical compositions to the engineering performance of the produced material system. The design tools can be tuned to solve both forward and inverse prediction problems in designing functional coa	Ernest N. Morial Convention Center-New Orleans

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Monday,1 p.m. to 1 :40p.m.	Accelerated Dynamic Corrosion Test Method Development	James Dante - It is becoming more widely recognized that current accelerated corrosion test exposures are insufficient for predicting corrosion behavior observed in operational environments. The result has been that promising technologies are rejected based on unrealistic failure modes and some material combinations that have been approved undergo critical failures during service. These challenges are proving to be a critical deficiency as new materials are sought to meet extreme operational needs and more stringent environmental requirements. To resolve these issues, this project seeks to develop a next generation accelerated corrosion test methodology that can be used to assess novel corrosion prevention technologies and quantify the performance of material systems. The method will incorporate representative environmental conditions, sample designs, and mechanical loading that replicate operational failure modes.	Ernest N. Morial Convention Center-New Orleans

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Monday,1 p.m. to 5 p.m.	Passivity and Localized Corrosion - Atmospheric (Day 1)	This Research in Progress session includes papers concerning recent research involving passivity and localized corrosion in all forms (including mechanisms of passivation, breakdown, pitting, crevice corrosion, intergranular attack and any applications thereof) are solicited. Contributions highlighting alloys and treatments to improve passivity and resistance to localized corrosion as well as papers describing novel and innovative approaches for studying these areas are welcome. This two-day session will include papers that emphasize atmospheric corrosion as well as those that emphasize aqueous corrosion. Chair: David Enos Vice Chair: David Kolman	Ernest N. Morial Convention Center-New Orleans	Room 229

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Monday,1 :15p.m. to 1 :40p.m.	Corrosion Fatigue Cracking Assessment of Creep-Resist. Mg Alloys Using Corrosion Potential Responses	Martin Klein - Due to their low density, beneficial strength to weight ratio and good castability, magnesium alloys are very attractive for lightweight applications, e.g. in automotive industry. However, their application range is strongly limited due to their low corrosion resistance, especially in chloride containing electrolytes, which also impairs the fatigue properties under combined corrosive and fatigue load. For automotive applications, such as gearboxes and crankcases, materials have to withstand loadings at temperatures up to 200 °C, which additionally requires a good creep resistance. Currently available alloys for application temperatures up to 300 °C often contain rare earth elements as alloying elements and are therefore relatively expensive. As a result, extensive research has been carried out over the last years to develop creep-resistant magnesium alloys free from rare earth elements. In the present study, the influence of corrosion on the microstructure and the	Ernest N. Morial Convention Center-New Orleans

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Monday,1 :40p.m. to 2 :5p.m.	Mitigating Stress Corrosion Cracking of Austenitic Alloys by Laser Shock Peening	Bai Cui, Xiaoxing Qiu, Fei Wang, Chenfei Zhang, Michael Nastasi, Yongfeng Lu - Fe- and Ni-based austenitic alloys, which are widely used in petroleum, chemical, and nuclear industries, are susceptible to stress corrosion cracking (SCC) in corrosive water environments. Laser shock peening (LSP) is a new approach that can effectively mitigate SCC of austenitic alloys, but the fundamental mechanisms by which this occurs remain poorly understood. In the LSP process, laser-driven shock waves are generated which can penetrate into the material, inducing significant compressive residual stresses and plastic deformation in a depth of more than 1 mm from the surface. In this study, LSP has been performed on 304 steels and oxide-dispersion-strengthened 304 steels. The microstructural evolution of austenitic alloys during the LSP process has been investigated by transmission electron microscopy, the effect of LSP conditions on residual stress distribution and SCC crack growth rate has been determ	Ernest N. Morial Convention Center-New Orleans

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Monday,1 :40p.m. to 2 :5p.m.	Apparent Electrical Conductivity Measurement Revisited: Real-Time Recording of the Intergranular Dam	Roland Oltra - Summary Eddy current probing has been tested to follow in real-time the intergranular damage of AA2024 thin foils in chloride containing media. In immersion conditions, it was demonstrated that the intergranular damage can be monitored on real-time during a corrosion test in potentiostatic conditions. The same approach was applied to corrosion in atmospheric conditions simulated by controlled salt spray experiments. The originality of this work is based on the use of very thin foils of AA2024 (30µm in thickness) combined with a commercial system (Z-Scope*7 from Sciensoria- France) which is a conventional EC nondestructive testing instrument covering a very wide frequency range (10 kHz-40MHz) developed for determining thickness and conductivity of thin foils. The conductivity measurements were performed on the opposite face exposed to the corrosive solution at the center of the target positioning the EC probe in gentle contact with the back side of the foil. As	Ernest N. Morial Convention Center- New Orleans

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Monday,2 :5p.m. to 2 :30p.m.	Corrosion Behavior of Decorative Chromium Layer Systems in Concentrated Aqueous Electrolytes	Christof Langer, Michael Dornbusch - Based on the optical appearance and the good corrosion protection in the case of conventional corrosive stress, the industrial field of application for chromium-plated plastics is large. The multilayer system for corrosion protection consists of up to four nickel- and one chromium layer on the top, in which each nickel layer has a defined different electrochemical potential. This can be realized by an adjustment of the chemical composition of the electrolyte for galvanic deposition. Adding Sulphur containing brightening additives leads e.g. to a reduction of the electrochemical potential. Thereby, a defined difference in electrochemical potential of each layer can be generated. In state of the art systems, the bright nickel layer is the most ignoble layer. This leads to a corrosive attack in deeper layers, without changing the optical properties of the plating system. Another aspect in corrosion protection of CuNiCr systems is the creation o	Ernest N. Morial Convention Center-New Orleans

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Monday,2 :5p.m. to 2 :30p.m.	Effect of Nickel in Solid Solution on the Hydrogen Embrittlement Susceptibility of Low Alloy Steels	Hans Husby, Roy Johnsen, Mariano Iannuzzi, Afrooz Barnoush, Mariano Kappes, Raul Rebak - Low alloy steels (LAS) are widely used in the oil and gas industry due to their excellent combination of mechanical and technological properties and cost. ISO 15156-2 governs the use of LAS in H2S containing environments, limiting the nickel (Ni) content to a maximum of 1 wt%. The effect of Ni on sulfide stress cracking (SSC) resistance was extensively investigated in the mid-1960's to late 1980's. Although most researchers suggested that Ni did not play a direct role in sour service performance, part of the engineering community has yet to reach consensus as to whether the cap on nickel was scientifically justified. Because Ni improves LAS hardenability and lowers the ductile to brittle transition temperature with a moderate penalty on weldability, qualifying LAS with Ni contents above 1 wt% would be a technology enabler in developing sour reservoirs with severe temperature and pressure conditions	Ernest N. Morial Convention Center-New Orleans

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Monday,2 :40p.m. to 3 :5p.m.	Stress Corrosion Cracking and Surface Oxidation of Alloy 600 and Alloy 690 Exposed to PWR Primary Wa	Yun Soo Lim - Ni-based Alloy 600 (16wt%Cr-8wt%Fe), which has been used extensively for structural components in nuclear power plants, is well known to be highly susceptible to primary water stress corrosion cracking (PWSCC) in the primary side environments of a PWR. Another Ni-based Alloy 690 (Ni–30wt%Cr–10wt%Fe) has become a substitute for Alloy 600 owing to its excellent mechanical and corrosion properties. The predominant failure mode of Alloy 600 by PWSCC is known to be mostly intergranular SCC (IGSCC). Although the exact failure mechanism involved is still not well understood, there is currently rising evidence to support intergranular oxidation, in which oxygen diffusion into the grain boundaries can increase the degree of susceptibility to PWSCC. As a result, intergranular oxidation is responsible for grain boundary embrittlement, and therefore has a major contribution to IGSCC. The aim of the present study is to investigate the resistance of Alloy 600 and Alloy 690 to PWS	Ernest N. Morial Convention Center-New Orleans

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Monday,2 :40p.m. to 3 :5p.m.	Study of High Temperature Corrosion Under Hot Salts Exposure	Karl Vidic, Gregor Mori - Automotive exhaust components have to ensure reliable performance under aggressive environmental conditions. Operating temperatures up to 900 °C, wetness and the attack of chloride containing de-icing salts make extensive requirements to the service life of the parts. The corrosion resistance of one ferritic stainless steel against the attack by dry, chloride containing alkali salt, which is deposited on the metal substrate, has been investigated by means of isothermal exposure tests in different atmospheres. Under field conditions dynamic and simultaneous variations of environmental factors influencing corrosion occur and the detailed examination of particular factors is hindered. To guarantee separate quantification of those factors an experimental plan has been established. Two layered samples, consisting of an inner steel sheet and an adjacent, salt contaminate insulation mat have been tested. To quantify the corrosive effect of dry salt deposits,	Ernest N. Morial Convention Center-New Orleans

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Monday,3 :5p.m. to 3 :30p.m.	Atmospheric Corrosion of Brass Under Sodium Chloride-Containing Water Droplets Studied Using a Scann	Geraint Williams, Alex Nielsen, Nathan Cooze, Hamilton McMurray - Title: Atmospheric corrosion of brass under sodium chloride-containing water droplets studied using a scanning Kelvin probe Abstract: It is well known that during the atmospheric corrosion of certain metals such as iron and zinc, a differential aeration cell becomes established within a salt-water droplet [1 - 3], giving rise to the evolution of a secondary spreading phenomenon beyond the physical confines of the original droplet. The secondary zone is produced by cathodic oxygen reduction originating at the perimeter of the droplet, which in turn draws sodium ions and associated water from the droplet bulk. Thus, a thin electrolyte layer composed of dilute aqueous sodium hydroxide surrounds the primary droplet and grows radially with time. In this work a combination of in-situ, height-regulated Scanning Kelvin probe (SKP) potentiometry and time-lapse photography is used to characterise the evolution of localise	Ernest N. Morial Convention Center-New Orleans

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Monday,3 :5p.m. to 3 :30p.m.	Role of Oxide Film Stability on the Hydrogen Embrittlement Tendency of Active Metals	V S Raja, Mangesh Pustode, Anup Panindre, Ajay Krishnan - Film damage to induce and propagate stress corrosion cracking of metallic alloys has been widely reported in the published literature, though there is still disagreement on how the film damage leads to stress corrosion cracking and brittle fracture. Thus, the crack growth mechanism due to the slip assisted dissolution differs from that of the film induced cleavage. Interestingly, in our study we have found that the stability of the oxide films greatly influences hydrogen embrittlement of the alloys of two very reactive metals namely magnesium and titanium. As they form thick oxide films, hydrogen entry into these two alloys is significantly lowered. Our studies show that there is a need to damage the oxide films of these alloys through chemical species such as chlorides for rendering these alloys susceptible to hydrogen embrittlement. In near alpha IMI 834 alloy (Ti-5.97 wt.% Al-3.37 wt.% Zr-3.68wt.% Sn-1.31wt.% Nb-0.44	Ernest N. Morial Convention Center-New Orleans

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Monday,3 :30p.m. to 3 :55p.m.

Sulfur and Lead Effects on Nickel and its Alloys in High-Temperature Aqueous Solutions

Amirhossein Foroozan Ebrahimy, Anatolie Anatolie Carcea, Roger Newman -
Passive alloys in the NiCrFe system are normally protected by a Cr-rich oxide film. Exposure to environments containing reduced S species can result in rapid corrosion or cracking, mediated by adsorption of S on (mainly) the Ni component. This catalyzes
the dissolution of Ni, removing whatever inhibiting effect it had on the dissolution, and undercutting the Cr-rich oxide. Dissolution of Fe is also catalyzed [1-4].
First-principles calculations confirm that adsorbed S in hollow sites on Ni surfaces reduces the electron density between surface Ni atoms, providing a transparent explanation for the catalysis of anodic dissolution [5, 6]. In high-temperature, high-pressure
aqueous solutions, reduced forms of sulfur continue to act aggressively towards NiCrFe alloys, but additional possibilities arise –

Sulfate reduction, on metal surfaces and/or catalyzed by specific minerals, perhaps involving hydrazine in b

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Monday,3 :30p.m. to 3 :55p.m.	Corrosion of Copper Coated Nuclear Waste Containers by Nitric Acid Droplets	Joseph Turnbull, Ryan Szukalo, Mehran Behazin, Dmitrij Zagidulin, Sridhar Ramamurthy, Clara Wren, David Shoesmith - The present Canadian plan for the permanent disposal of high level nuclear waste is to seal it in metallic containers and bury it in a deep, stable geologic repository. For thick-walled containers, radiation fields on the outside of the container would have a negligible influence on container corrosion. However, to overcome fabrication issues and to reduce costs, steel containers with a thin outer copper coating are being contemplated making a reassessment of the influence of gamma radiation on container corrosion a potential licensing requirement. A combination of radiolysis calculations and electrochemical/corrosion experiments are underway in the key environments anticipated in the early stages of disposal when radiation fields are significant; aerated vapour conditions and anoxic saturated conditions. The ultimate goal is to develop a model to integrate the da	Ernest N. Morial Convention Center-New Orleans

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Monday,3 :55p.m. to 4 :20p.m.	Review of Standardized Atmospheric Corrosion Test Methodologies for Microelectronics and Other Appli	David Enos - The selection of appropriate test conditions for accelerated atmospheric corrosion testing is critical if relevant assessments of long term performance are to me made. While a variety of environments are available, selection is typically done out of convenience, rather than following a detailed assessment of available solutions. An example is the use of an environment such as the Battelle Class 2 mixed flowing gas environment to capture the behavior of complex electronic assemblies, even though it's target materials set differs from that of the overall component. In this presentation, a variety of industry standard test methodologies will be reviewed, assessing how they probe the atmospheric corrosion response of different material sets.	Ernest N. Morial Convention Center-New Orleans

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Tuesday,8 a.m. to 8 :25a.m.	Development of Self-healing Coating Based on Microcapsules for Corrosion Protection	Sinuo Lang - Self-healing coatings have been promising due to its automatic recovering functions, which can extend the coating lifetime with lower maintenance costs. One of the most effective strategies to achieve the self-healing property is to encapsulate healing agents inside microcapsules and integrate the microcapsules into the coating matrix. In this study, linseed oil was successfully encapsulated in poly (urea-formaldehyde) (PUF) shell via in-situ polymerization. Fourier transform infrared spectroscopy (FTIR) and thermogravimetric analysis (TGA) were used to characterize the chemical composition of the synthesized microcapsules. The size and morphology of the synthesized microcapsules were observed with both optical microscope and scanning electron microscope (SEM). The effects of the molecular weight of poly(vinyl alcohol) (PVA) stabilizers, stir rates, and reaction temperatures on the property of microcapsules were investigated. The microcapsules were integrated into e	Ernest N. Morial Convention Center-New Orleans

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Tuesday,8 a.m. to 5 p.m.	Corrosion and Reliability of Infrastructure, Honoring the 50 Year Career of Dr. Joe H. Payer	Corrosion of our infrastructure occurs on a daily basis and its costs have been well documented in the joint NACE International / US Federal Highway Administration "Cost of Corrosion" study. This symposium will discuss the fundamental science and engineering at the core of infrastructure reliability including: SCC of ductile materials, crevice corrosion, corrosion modeling and damage evolution, lifetime prediction, and the extension of these principles to risk management in oil and gas, bridges, pipelines, nuclear waste disposal, aging aircraft and ships and marine infrastructure. Chair: Scott Lillard Vice Chair: Kevin Garrity	Ernest N. Morial Convention Center-New Orleans	Room 229
Tuesday,8 a.m. to 5 p.m.	Passivity and Localized Corrosion - Aqueous (Day 2)	This Research in Progress session includes papers concerning recent research involving passivity and localized corrosion in all forms (including mechanisms of passivation, breakdown, pitting, crevice corrosion, intergranular attack and any applications thereof) are solicited. Contributions highlighting alloys and treatments to improve passivity and resistance to localized corrosion as well as papers describing novel and innovative approaches for studying these areas are welcome. This two-day session will include papers that emphasize atmospheric corrosion as well as those that emphasize aqueous corrosion. Chair: David Enos Vice Chair: David Kolman	Ernest N. Morial Convention Center-New Orleans	Room 230

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Tuesday,8 a.m. to 5 p.m.	Emergent Materials	This Research in Progress session includes papers that provide fundamental insight into the processing-structure-corrosion performance relationships of emergent materials are sought. Emergent materials of interest include nanocrystalline, amorphous and high entropy alloys, nanolaminates, nanostructured coatings, additively manufactured metals and composites. Contributions highlighting materials-by-design concepts and approaches for corrosion resistance are encouraged. Chair: Rajeev Gupta Vice Chair: Eric Schindelholz	Ernest N. Morial Convention Center-New Orleans	Room 231

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Tuesday,8 a.m. to 5 p.m.	Coatings and Inhibitors (Day 2)	This Research in Progress session will focus on presentations related to the performance and evolution mechanisms of coatings/inhibitors through chemical or electrochemical (corrosion) aspects, and the interrelationship between composition, processing/technique, microstructural/nanostructural features, and the test environment and coating/inhibitor performance. Approaches to design of improved coating materials and inhibitors and processes based on scientific and experimental data applied to harsh or aggressive environments. Latest development of test methods considering the interplay between mechanical, chemical, and electrochemical interactions and the ability to predict performance in aggressive environments. Emphasis on valid, accelerated performance tests and relation between test technique and field performance data. High performance coatings characterization in oxidizing and corrosive environments while exposed in corrosive applications. Current modeling aspects to predict properties, performance, durability and reliability of coatings and/or inhibitors in aggressive environments. Chair: Homero Castaneda-Lopez Vice Chair: Kristen Williams	Ernest N. Morial Convention Center-New Orleans	Room 232

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Tuesday,8 :15a.m. to 8 :40a.m.	Application of EQCM to the Study of FeCO3 Precipitation Kinetics	Zheng Ma - Electrochemical Quartz Crystal Microbalance (EQCM) is a very accurate in-situ mass change measurement device. Besides the ability of monitoring the in-situ mass change in high resolution (on the scale of nanograms), the EQCM also allows to conduct electrochemical measurement simultaneously. In this work, the EQCM has been used to investigate the kinetics of FeCO3 precipitation in an aqueous CO2 corrosion environment. Three different substrates were used to conduct the FeCO3 precipitation experiments: gold-coated quartz crystal with cathodic polarization, iron-coated quartz crystal with and without cathodic protection, at varied system temperatures (60°C-80°C). Precipitation rates of FeCO3 obtained by using EQCM were compared with calculations using a model developed by Sun and Nesic in 2008 and a good agreement was obtained.	Ernest N. Morial Convention Center-New Orleans

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Tuesday,8 :25a.m. to 8 :50a.m.	Direct Write Electrodes for In-Situ Electrochemical Monitoring of Coatings in Accelerated Testing	Christina Grumbach, Kristen Williams, Sean Pennell - Electrochemical sensors fabricated with direct write techniques were employed to monitor coating degradation and interfacial corrosion rates of coated aluminum coupons during accelerated environmental testing. The electrochemical sensors were utilized within a cyclic corrosion chamber and probed using electrochemical impedance spectroscopy (EIS) in order to monitor coating barrier properties during testing. A variety of electrode materials and direct write methods were explored to fabricate robust electrodes that could be deposited on both chromated and non-chromated paint systems. Accelerated salt spray testing (ASTM B117) was performed with both post–manufacture and simultaneous-manufacture direct write electrodes. The simultaneous-manufacture electrodes were applied during the coating process and enabled continuous monitoring of barrier properties within individual coating layers. During accelerated testing, the post manuf	Ernest N. Morial Convention Center-New Orleans

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Tuesday,8 :40a.m. to 9 :5a.m.	Effect of Chloride and H2S on Localized Dissolution of S13Cr in 1D Pit at Elevated Temperature	Jiheon Jun, Gerald Frankel, Narasi Sridhar - The initiation, growth and repassivation of localized dissolution on Super 13Cr stainless steel (S13Cr) was studied using one-dimensional (1D) pit electrode in 0.3 and 3 M NaCl solutions for 10% H2S + 90% N2 or 100% N2 gaseous condition at 85 °C. The breakdown potential for the initiation of localized dissolution on S13Cr decreased by increasing NaCl concentration and adding 10% H2S. For the 10% H2S condition, a current increase associated with H2S oxidation was observed around -0.3 VSCE prior to passivity breakdown in both 0.3 and 3 M NaCl. The dissolution current of S13Cr 1D pit under potentiostatic polarization was comparable to transport-limited current after achieving pit depth larger than 300 um. The 1D pit dissolution current was higher in 0.3 M than 3 M NaCl, but it was not influenced by 10% H2S. A backward potentiodynamic scanning was then applied on a growing 1D pit to monitor current decay associated with deactivation/repa	Ernest N. Morial Convention Center-New Orleans

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Tuesday,8 :50a.m. to 9 :15a.m.	The Use of Coatings to Improve the Corrosion Behavior of Aluminum Foam	Stefano Rossi, Michele Fedel - The metallic foams, in particular based on aluminum and aluminum alloys, produced by foaming in a sponge shape, show very interesting engineering properties in particular connected with the very low density. Mechanical cutting or working could open the closed cell increasing the reactive area and producing a very complex geometry. Then, In some aggressive environments, the corrosion behavior of this material could be critical. A suitable method to increase the corrosion resistance is desirable. The use of organic or inorganic coatings could be a possible solution. The cataphoretic deposition is an interesting method to obtain a very protective and homogenous paint layer also with complex geometry. The deposition of a vitreous layer could improve the corrosion behavior maintaining the fire resistance properties. Considering the particular geometry of foam it is not easy to obtain a very performed coatings. It is necessary to individuate the optimize	Ernest N. Morial Convention Center- New Orleans

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Tuesday,9 :5a.m. to 9 :30a.m.	Investigating Pitting Corrosion of X65 Carbon Steel in Sweet Environment	Sikiru Mohammed - INVESTIGATING PITTING CORROSION OF X65 CARBON STEEL IN SWEET ENVIRONMENT Sikiru A. Mohammed1* Richard Barker2 and Anne Neville3 1-3 Institute of Functional Surfaces, School of Mechanical Engineering, University of Leeds * mnsam@leeds.ac.uk abstract Oil and gas applications largely involve use of low carbon steel due to its low cost, available technology, ability to form protective film amongst others. Protective films could however become compromised due to a number of reasons such as mechanical, chemical or a combination of factors [1], therefore leading to localised corrosion. This takes toll on operations, economy as well as Health and Safety concerns. Pitting corrosion ranks among the highest level of corrosion defects while pitting in sweet (CO_2 environment) remains the most dangerous form of localised corrosion [2, 3]. Carbon steel pitting as well occurs in sweet environment where protective film is not formed. Pitting is hard to predict [2] and could	Ernest N. Morial Convention Center- New Orleans

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Tuesday,9 :25a.m. to 9 :50a.m.	Effect of Inhibitor and Slag Blended with Cement on Corrosion of Reinforcement	ANITA BORADE - In this paper, the effect of the cathodic inhibitor against reinforcement corrosion in concrete exposed to chlorides is investigated. The inhibitor used in this investigation is added during the cement manufacturing process, named as Corrosion Resistant Cement (CRC). The effectiveness of the inhibitor in reinforced concrete can be evaluated by measuring its compressive strength, chloride penetration resistance, half-cell potential and corrosion rate by linear polarization technique. For this purpose, Portland Slag Cement (PSC) and CRC were used as binders for varying water to binder (w/b) ratios and two types of steel. The specimens were exposed to four different levels of Sodium Chloride (NaCl) solutions and tested at the wide range of curing ages. Improved performance is exhibited in the case of CRC concrete for all the tests including compressive strength, chloride penetration resistance, half-cell potential and corrosion rate as compared to PSC concrete.	Ernest N. Morial Convention Center-New Orleans

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Tuesday,9 :30a.m. to 9 :55a.m.	General and Localized Corrosio of Carbon Steel in a CO2 Saturated Oilfield Brine	Ting Chen, Saadedine Tebbal - In this work, general corrosion and localized corrosion behavior of 1018 carbon steel were studied in a simulated CO2-saturated oilfield brine in autoclaves by weight loss method and electrochemical measurement techniques, including linear polarization resistance (LPR) and electrochemical impedance spectroscopy (EIS). The morphology and distribution of the corrosion pits after weight loss test were investigated by profilometer and scanning electron microscope (SEM). Both weight loss and electrochemnical measurement results showed that the general corrosion rate was initially increased, and then decreased, and finally stabilized to a relative low value due to the formation of iron carbonate scale on the surface. The stability of the corrosion scale was increased with time. Localized corrosion was initiated and detected after 3 weeks weight loss test. Surface analysis showed the degradation of initially formed iron carbonate occurred concurrently with	Ernest N. Morial Convention Center-New Orleans

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Tuesday,9 :50a.m. to 10 :15a.m.	Effect of pH on Layered Double Hydroxide Formation on Electrogalvanized Steel Sheets	Katsuya Hoshino, Shinichi Furuya, Rudolph Buchheit - Layered double hydroxides (LDHs) are chemical compounds with the general formula M2+(1-X)M3+X (OH)2(An-)x/n·mH2O, where M2+ is a divalent cation, M3+ is a trivalent cation and An- is an anion. LDH compounds have layered crystal structures consisting of a mixed M2+/M3+ hydroxide layer , and a layer containing hydrated anions An- exists. It is well known that interlayer anions are exchangeable with anions present in a contacting solution. Anion exchange is the basis for the storage-and-release inhibitor concept that underlies LDH-based corrosion inhibiting pigment development. Hydrothermal synthesis of LDHs occurs readily, and LDH-based conversion coatings have been demonstrated on aluminum alloys and galvanized steel. It was shown previously that a corrosion-resistant LDH coating can be made to form on hot-dip galvanized steel sheets by immersion in a sodium aluminate solution [1]. In this study, an LDH conversion coating was a	Ernest N. Morial Convention Center-New Orleans

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Tuesday,10 :5a.m. to 10 :30a.m.	[Inquiry into the Origin of Crevice Corrosion of Magnesium]	Shengxi Li, Paul Krell, Nick Birbilis, Hongbo Cong - Crevice corrosion is one of the most destructive forms of corrosion since it is a localized form of attack that occurs in occluded regions. It is generally accepted that crevice corrosion is the result of a differential aeration cell. The subsequent development of critical crevice solutions and/or critical Ohmic potential drop leads to the depassivation of otherwise passivated material within the crevice and corrosion is therefore accelerated locally. Magnesium (Mg) alloys as engineering materials have many distinctive properties and are subject to extensive research recently. However, the possible susceptibility of Mg alloys to crevice corrosion is rarely studied because the dominant cathodic reaction is generally regarded as hydrogen evolution reaction (HER) and the necessary condition of differential aeration cell is not met. Moreover, local alkalization rather than acidification occurs for Mg alloys. Lastly, active-passive	Ernest N. Morial Convention Center-New Orleans

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Tuesday,10 :15a.m. to 10 :40a.m.	Investigation of Mg and MgO Primer on 2024: Assessment and Characterization of Protection Mechanism	Raymond Santucci, Jr, John Scully, Balaji Kannan, BILL ABBOTT - Keywords: 2024-T351, sacrificial anode-based cathodic protection, magnesium-rich primer, magnesium oxide-rich primer, x-ray diffraction, electrochemical impedance spectroscopy, solution chemistry Due to its high strength-to-weight ratio aluminum alloy 2024-T351 is commonly employed in the design of aircraft airframes for commercial and military application. The heterogeneous nature of this alloy's microstructure makes it highly susceptible to localized corrosion primarily in the form of pitting1. These pits (and corrosion damage more broadly) are detrimental to aluminum alloy structural integrity2. Corrosion induced damage must be prevented through the design of a protective coating system which also incorporates active corrosion protection. Chromium based coating systems are commonly used for aerospace aluminum alloy corrosion protection. However, Cr (VI) is a carcinogen4 and hexavalent Cr-based coatings are manda	Ernest N. Morial Convention Center-New Orleans

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Tuesday,10 :30a.m. to 10 :55a.m.	Electrochemical Corrosion Behavior of a Ferritic/Martensitic Stainless Steel/Ceramic Composite	Xin Chen, William Ebert, J Indacochea - We are evaluating the corrosion resistance of composite materials representing waste forms made with mixed metallic and ceramic waste streams from the electrochemical reprocessing of used nuclear fuel. The effects of Zr, Mo, Ru, and Pd (representing metallic fuel wastes) and a mixture of lanthanum oxides (representing oxide fuel wastes) on the microstructure and corrosion of a composite made by melting those reagents with 410 stainless steel (representing HT9 cladding) were assessed. The effects of waste constituents were evaluated by using SEM, AFM, XRD, and electrochemical methods. Essentially all of the added Zr metal reacted with the lanthanide compounds to generate durable lanthanide zirconates and the added Mo alloyed with the steel to form a FeCrMo intermetallic at ferrite/martensite grain boundaries. Both Ru and Pd alloyed with the martensite and ferrite in the metal matrix. This inhibited carbide and nitride formation and increa	Ernest N. Morial Convention Center- New Orleans

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Tuesday,10 :40a.m. to 11 :5a.m.	MEA as a Steamline Corrosion Inhibitor for HCl Acid-dewpoint Corrosion	John Farison - This presentation is a case study of using neutralizing amines (monoethanolamine, MEA) as a once through steamline corrosion inhibitor to protect ASTM A53 GrB carbon steel steam piping against low levels of HCl acid-dewpoint corrosion in steam lines at The Geysers geothermal field. The MEA inhibitor treatment was successfully pilot tested in October 2010 to treat superheated steam with volatile chlorides to protect against HCl acid-dewpoint corrosion and continues to date. The talk will cover methods and lessons learned. MonoEthanolAmine (aka MEA or ETA) is injected as 85% MEA (85% MEA + 15% water) into superheated steam without any dilution water. MEA is a relatively inexpensive commodity neutralizing amine and is an organic liquid that will vaporize in superheated steam and travel along the steam path. The MEA vaporizes upon injection and condenses out along with HCl wherever trace initial condensation forms at heat fins along the pipeline. The MEA neutraliz	Ernest N. Morial Convention Center-New Orleans

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Tuesday,10 :55a.m. to 11 :20a.m.	Dissolution Of Cu-Zn Alloys in Tap Water: Effect of Metallurgical Phase on the Elemental Release, Sc	PENG ZHOU, Michael Hutchison, Johann Erning, John Scully, Kevin Ogle - Brass is widely used in pipelines, ships, and marine infrastructure due to its excellent corrosion resistance. However, the selevtive leaching of Zn from brass, i.e. the dezincification, is a major problem in these fields. The dezincification mechanism of Cu-Zn alloys has been a hot issue during the last decades, with many theories being proposed to explain this phenomenon. However, a consensus has not yet been reached, and further few attempts have been made to distinguish the different dezincification mechanisms among the different phases such as α-brass; α+β-brass; and β-brass. Connecting the dezincification process to the specific metallurgical structure, is not only of great mechanistic importance, but may permit improving alloy fabrication to obtain an optimum microstructure. In this work, the anodic dissolution of Cu-Zn alloys with various metallurgical structures (α, $\alpha + \beta$ and β) were investigated	Ernest N. Morial Convention Center-New Orleans

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Tuesday,1 :15p.m. to 1 :40p.m.	Using Intermittent Contact (ic) SECM for Localized Corrosion Investigation	Nicolas Murer, Samantha Catarelli, Daniel Lonsdale, John Griffiths - ic-SECM (intermittent contact Scanning Electrochemical Micrscopy) is an operation mode of SECM that was first developed by the University of Warwick. In this mode of operation, the topography of the sample during an SECM or ac-SECM measurement can be tracked, hence removing any contribution of the topography to the electrochemical response measured at the probe tip. This means that highly non-planar or rough sample can be studied, and the response measured at the probe will only contain electrochemical information. Furthermore, the response dynamics will be maximized. In this presentation, we will show a few examples of results for corrosion applications. The various benefits of using SECM and/or ac-SECM in ic mode will be demonstrated as well as the unique type of information that can be obtained using SECM. New knowledge about corrosion mechanisms in metals become available.	Ernest N. Morial Convention Center-New Orleans

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Tuesday,1 :15p.m. to 1 :40p.m.	Molecular Modeling of Aluminum/Coating Interfaces	Shane Polen, Christopher Taylor - Aluminum, due its high strength-weight ratio, has shown great promise in naval and other maritime applications. However, due to the corrosive nature of the ocean coatings must be used to protect the aluminum surface. Siloxane coatings are becoming increasingly popular alternatives to epoxy based systems. The goal of this work is to understand the difference in properties between the two coating systems from a fundamental point of view. The nature of adhesion to the metal surface and the mechanisms of deterioration are being explored using density functional theory and molecular modeling. By improving molecular understanding of coatings based on siloxane vs epoxy systems, more informed lifetime predictions and materials selection decisions can be made. As a first step towards this goal, the bonding of several siloxane coatings to aluminum model systems were assessed via first principle methods. We studied the hydrolysis of Si-O-Al bonds for bot	Ernest N. Morial Convention Center-New Orleans

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Tuesday,1 :40p.m. to 2 :5p.m.	Performance and Corrosion Inhibition Mechanisms of Non-Chromated Coating Systems on Aluminum Alloys	Greg Swain - Multilayer coating systems (conversion coating + primer + topcoat) are required to protect aluminum alloys from corrosion in service. Hexavalent chromium (Cr (VI)) is an effective corrosion inhibitor and is a widely used component of pretreatment conversion coatings and primers employed to protect aluminum alloys from corrosion. There is a need to identify suitable replacement coating systems that are either non-chromated or zero-chromium because of the toxicity and carcinogenicity of Cr(VI). Innovative technologies need to be developed and demonstrated that would enable a reduction or eliminatation of hazardous chromated coating systems in production and maintenance processes and reduce hazardous waste streams. The trivalent chromium process (TCP) conversion coating is considered the most viable replacement for chromate conversion coatings. While TCP coatings perform as well as chromate conversion coatings in multi-component systems using chromated primers, sys	Ernest N. Morial Convention Center- New Orleans

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Tuesday,1 :40p.m. to 2 :5p.m.	Atom Probe Tomography of Nanoporous Gold	Ayman El-Zoka, Roger Newman, Brian Langelier - The interest in nanoporous metals, formed by controlled dealloying of noble metal alloys, has been increasing due to the promising capabilities of such materials. High resolution characterization of nanoporous metals facilitates better understanding of the dealloying phenomenon and the material's structure and functionality [1]. The use of Atom Probe Tomography (APT), a leading edge characterization technique considering resolution and chemical detectability, is demonstrated on nanoporous gold (NPG). Due to the high porosity, APT on NPG was deemed as difficult. An efficient, relatively simple method (compared to notable previous attempts) of pore infiltration for the purpose of APT is presented. The main challenge facing a successful APT of nanoporous gold is the mechanical failure of the highly porous structure during the analysis [2]. To provide structural support to the porous layer, elimination of porosity was achieved through i	Ernest N. Morial Convention Center- New Orleans

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Tuesday,2 :5p.m. to 2 :30p.m.	Connection Between Atomic Scale Characterization and Electrochemical Behavior During Passivation of	Kateryna Gusieva, Katie Lutton, Gopalakrishnan Ramalingam, William Blades, Xiao-Xiang Yu, Ahmet Gulec, Evan Zeitchick, John Perepezko, Noemie Ott, Nick Birbilis, Petra Reinke, John Scully - Ni-Cr and Ni-Cr-Mo alloys owe their outstanding corrosion resistance to the surface enrichment of passivating Cr(III) oxides and synergistic effect of Cr and Mo. However, the specific roles of minor elements are not well understood, especially with regards to the precise location of Mo relative to the oxide/metal interface and the atomistic processes responsible for protective-oxide layer growth and breakdown. The composition, structure, and thickness of the passivating oxide films are challenging to characterize considering their nanoscale dimensions and the high electric field imposed during growth in solution. Key processes that take place within the oxide and regulate passivation are controlled by defect interactions that are atomic, ionic, and electronic in nature and currently poorly u	Ernest N. Morial Convention Center-New Orleans

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Tuesday,2 :5p.m. to 2 :30p.m.	Evaluation of Surface Treatment Effectiveness on Reinforced Concrete Structures Based on Electrochem	YENNY CUBIDES GONZALEZ, Homero Castaneda, Ahmad Karayan, Fred Goodwin, Qindan Huang - Evaluation of surface treatment effectiveness on reinforced concrete structures based on electrochemical techniques vs. standard testing The goal of this work is to evaluate the effectiveness of various surface treatments on corrosion of reinforced steel concrete structural components by using two different testing methods. The first method refers to the standard method following ASTM G109, while the second method refers to an electrochemical testing technique. Both techniques are used to characterize the performance of surface treatments applied to reinforced concrete samples exposed to wet/dry cycling under corrosive environments and different preparation conditions. Eighteen reinforced concrete samples were constructed following ASTM G109. Five different surface treatments were applied in triplicate and one set of triplicate specimens was used as a control with no treatment applied. Follow	Ernest N. Morial Convention Center-New Orleans

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Tuesday,2 :30p.m. to 2 :55p.m.	[Polyethylene Glycol-Zinc Oxide Nanocomposites as Corrosion Inhibitors for Mild Steel in Acid]()	Taiwo Quadri, Lukman Olasunkanmi, Omolola Fayemi, Eno Ebenso - Mild steel is an important engineering material with wide applications in chemical, construction and oil industries due to its easy availability, low cost and excellent mechanical properties. However, it is prone to corrosion on exposure to acid environment in these industries. Therefore, corrosion leads to major damage of metals and alloys causing grave economic concerns in terms of repair, replacement and product losses. Chemical inhibitors are applied in the mitigation of corrosion in the industries because they are effective and economical [1,2]. Polymers have offered alternatives to organic corrosion inhibitors and have been exploited as suitable inhibitors of metallic corrosion to overcome the challenge of toxicity and high cost. Nanocomposites formed by incorporating nanoparticles into the matrix of polymers have shown to improve the corrosion protection of mild steel by their excellent flexibility, high comp	Ernest N. Morial Convention Center-New Orleans

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Tuesday,2 :30p.m. to 2 :55p.m.	Competitive Adsorption Effects Involving Chloride on Metal Surfaces: First-Principles Investigation	Christopher Taylor - Chloride ion is known to accelerate corrosion in numerous metallic systems, although it is not well understood why. Using first-principles methods, such as density functional theory, it is possible to directly analyze the energy of adsorption for chloride, and using a thermodynamic framework based on statistical mechanics, to predict the environmental conditions under which it may be anticipated that chloride could displace other ions (such as hydroxide, incipient oxide, inibiting species) from the bare metal and/or oxide surface. By reviewing the literature, as well as performing some original density functional theory calculations, the authors will present and interpret surface Pourbaix diagrams for a number of metallic systems, including nickel, iron, magnesium and aluminum, to illustrate the fundamental surface processes that underlie the role of chloride in potentially interfering with processes such as repassivation and accelerated metal dissolution.	Ernest N. Morial Convention Center-New Orleans

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Tuesday,2 :55p.m. to 3 :20p.m.	Characterization of an Al-Based Corrosion Product After the Anodic Polarization of an Al-Cu-Li Alloy	Oumaima Gharbi, Nick Birbilis, Kevin Ogle, Armelle Ringuedé - The corrosion protection of Al Alloys is an essential step before their use in most applications. Different ways of protecting Al alloy have been developed, and they generally involve a surface preparation (which is a chemical treatment often called a 'pretreatment') and chemical conversion coating. As a consequence, understanding the dissolution of Al alloys during pretreatment steps is important, as is the understanding of surface films that form from polarization processes. The aim of this study was to perform an unambiguous characterization of the corrosion product formed in a contemporary Al-Cu-Li alloy, in order to determine its chemical nature, and to contribute to clarifying the circumstances of its formation. The chemical nature of an Al-based corrosion product was investigated using several characterization methods; following film formation under anodic polarization after a pretreatment sequence. GDOES analy	Ernest N. Morial Convention Center-New Orleans

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Tuesday,3 :30p.m. to 3 :55p.m.	Intergranular Corrosion Susceptibility of the Dissimilar Alloys 2024-T3 and 7475-T651 Joined by Fric	Isolda Costa, Caio de Abreu, Nadine Pébère, Vincent Vivier, Hercilio de Melo - Aluminum alloys are susceptible to various forms of localized corrosion, such as pitting, intergranular corrosion and stress corrosion cracking, which are highly dependent on the alloy microstructure and the thermomechanical processing conditions the alloy is exposed to. The friction stir welding (FSW) is as solid state welding processing that was initially developed in the early 90's and then it has aroused great interest from the aeronautic industry. This is mainly due to their advantageous properties comparatively to the conventional welding processes, such as the fewer amounts of defects generated and the better mechanical properties of the zones affected by welding. This is particularly important for Al alloys since these are very difficult to weld. However, FSW causes microstructure modifications in the Al alloys and these affect the corrosion resistance of the alloy. This is a main cause of	Ernest N. Morial Convention Center-New Orleans

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Tuesday,3 :55p.m. to 4 :20p.m.	Effect of Abrasion-Induced Surface Layer on the Corrosion Behavior of Al Alloys	Shan-Shan Wang, Gerald Frankel - Surface preparation by abrading with grinding paper is often used prior to corrosion testing of metals and alloys in an attempt to standardize the surface condition and improve the reproducibility of the test results. However, previous work has shown that abrasion and mechanical polishing can produce an altered surface layer (ASL) with microstructures containing ultrafine subgrains and the redistribution of solute elements. This ASL usually has a different susceptibility to corrosion than the underlying substrate. Depending on the Al alloy and aging treatment, this ASL can be either more or less susceptible to corrosion than the underlying substrate. In the present work, coarse θ and AlCu phases were found to precipitate both at the subgrain boundaries in the ASL and at the grain boundaries in the underlying substrate adjacent to the ASL in an Al-Zn-Mg-Cu alloy. A Zn phase was also observed in the ASL. Furthermore, these phases grew and coarsene	Ernest N. Morial Convention Center-New Orleans

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Tuesday,4 :20p.m. to 4 :45p.m.	Towards Advanced Characterization of Pitting Corrosion Using Electrochemical Noise	Axel Homborg, Patrick Oonincx, Arjan Mol - The nonlinear nature of many localized corrosion phenomena makes it a challenging task to model and, if possible, predict their occurrence. This emphasizes the need for robust corrosion monitoring, of which techniques based on electrochemical noise provide a potentially interesting, non-intrusive alternative. Although electrochemical noise signals are typically nonstationary, for decades traditional techniques operating in the frequency domain were used for their analysis. Recently, the Hilbert-Huang transform was successfully introduced for this purpose [1]. Furthermore, it was shown that pitting and corrosion inhibition could be characterized by the investigation of transients using this technique [2,3]. The present work focuses on the investigation of transient information in the time-frequency spectrum calculated by continuous wavelet transform, using modulus maxima. Modulus maxima describe the evolution of information present in e	Ernest N. Morial Convention Center-New Orleans

Forum Meetings

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Time	Name	Description	Committee(s)	Location	Location Detail
Monday,9 a.m. to 12 a.m.	Future of Regulations and Standards-Performance Based Measures VS. Prescriptive Measures	Presented by: Oliver Moghissi, DNV GL North America Oil & Gas Over the past several years, standard-developing organizations and regulators have seen a powerful conversation on the use of performance-based measures versus prescriptive measures. Join policy makers and industry leaders as they discuss future direction of regulations and standards.		Ernest N. Morial Convention Center-New Orleans	R-02

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Monday,9 a.m. to 12 a.m.	Corrosion in the Water/Wastewater Infrastructure	Presented by: Robert Boswell, Boswell consulting and testing services Ltd., Dr. Graham Bell, HDR, Brenden Sheehan & Steven Fox, City of San Diego, Gwen Wood Chabane, Allen Cox, Ian McFatridge, and Doug Kanis This Forum will discuss the challenges successes and obstacles that face cities municipalities and water utilities in there efforts to continue providing safe clean water post the Flint Michigan crises, the subjects the speakers will talk about are the following: • Comparison and Contrast of Corrosion Control in the Water and Wastewater Industries with the Rest of the Corrosion Control World • Corrosion Control Case Studies from the City of San Diego • Review of the Contributions of Corrosion to Chromium in Drinking Water • Corrosion and Its Control, Polyethylene Encasement (V-Bio™), for Cast and Ductile Iron Pipelines • Case Studies of the Use and Abuse of Polyurethane Coatings in Water and Wastewater Environments • The use of engineered software tool for surveying asset conditions • Interior and exterior corrosion, prevention and mitigation, project specifications and plans for rehabilitation, and reducing negative impact on the environment during tank re-coating projects.	Ernest N. Morial Convention Center-New Orleans	Room 223

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Monday,1 p.m. to 5 p.m.	PHMSA Pipeline Safety Forum	Presented by: Kevin Garrity, Mears Group, Inc., Alan Mayberry, PHMSA NACE members play a critical role in protecting the public from potential catastrophic failures of liquid/gas pipelines. Join policymakers, regulators, and industry experts for a discussion on how PHMSA and other agencies address corrosion in pipeline safety. The forum will provide both a regulator and industry perspective on best pipeline safety practices and latest developments.	Ernest N. Morial Convention Center-New Orleans	R-02

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Monday,1 p.m. to 5 p.m.	Corrosion Knowledge Management (CKM): The Role of Company's Strategic Management in the Management	Presented by: Reza Javaherdashti, Parscorrosion Consultants, Gerhardus Koch, DNV GL, and Melissa Gould, DNV GL Corrosion management (CM) has been so far taken as the best way of dealing with corrosion. CM mainly consists of, but not limited to, applying methodologies such as CP, coating, materials selection and the like to control the risk of corrosion. However, what these methods all by default are lacking is overlooking the important factor of humans, as reflected in strategy management, economical-ecological models for corrosion and the organic bond between the management resources and the necessity to programme them to control corrosion. The "human factor" in dealing with corrosion is not only limited to recognizing issues such as human errors- such as those applied in, say, application of coating or design and implication of CP. It is much more important than that. It can be thought as to cover issues from the interaction between corrosionists and non-corrosionists (including managers with little or no background in corrosion as well as professional engineers with backgrounds other than corrosion) to the choice of selecting the best model of two existing models for corrosion consulting departments ("consultant –based" and "out-sourcing" models) to handle CM more effectively. In other words, "Human Factor" and its vast importance in both design and application of corrosion management strategy and tactics cannot be ignored.	Ernest N. Morial Convention Center-New Orleans	Room 220

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Tuesday,8 a.m. to 12 a.m.	Maritime Corrosion Management & Prevention Solutions	Presented by: Elaine Bowman, NACE International, Project Manager, Pierre Crevolin, HDIM Protective Coatings Since the 2016 launch of the benchmark IMPACT study, new information has been gathered and analyzed for several geographic areas of the world. This new information will be shared. Additionally, new tools that will help owners of assets direct their corrosion management programs will be demonstrated and shared with forum participants.	Ernest N. Morial Convention Center- New Orleans	R-06
Tuesday,8 a.m. to 12 a.m.	Corrosion Knowledge Management of Microbiologically Influenced Corrosion: New Frontiers	Corrosion Knowledge Management of Microbiologically Influenced Corrosion: New Frontiers for Old Problems Presented by: Reza Javaherdashti, Parscorrosion Consultants, Brenda Little, US Naval Research Laboratory, Pierangela Cristiani, Ricerca sul Sistema Energetico – RSE S.p.A. While there are a lot of advances in both understanding and treatment of Microbiologically influenced corrosion (MIC), many in industry are still applying the old-fashioned way of recognition (mostly, culture-based filed tests) and treatment. Also some routine industrial practices such as Hydrotesting and application of MFL during intelligent pigging may lead into MIC. This forum will focus on new findings for recognition and treatment of MIC.	Ernest N. Morial Convention Center- New Orleans	Room 222

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Tuesday,1 p.m. to 4 p.m.	A Taste of Middle East Culture and Our Battle Against Corrosion in the Desert	Presented by: Gasem Fallatah, NACE, Fatima Saeed Al Mazrouei, ADCO, Abdullah Al Ghamdi, Saudi Aramco Middle East is facing a lot of challenges, from the extreme conditions in the desert up to the misconceptions towards the area. How is it like to be in countries that some people think are ""not safe"" to live in? This forum aims to break the negative misconception and give everyone a taste of culture in the Middle East. In the first part of the forum, representatives from one of the embassies in GCC and US Commercial Services in the region will clarify all the issues associated to Middle East, including conflict and safety. Let's verify the cultural stereotype towards the the Middle East. After the forum, we will be able to answer the question: ""Is Middle East a place to go to?"" The second part of the forum will provide a general overview and a series of case-study presentations on corrosion challenges we have in the area. Corrosion issues from Saudi Arabia, United Arab Emirates and Kuwait and the technologies used to fight corrosion will be presented. These presentations will also include the companies from different industries working in the Middle East, giving more knowledge for companies that have not explored Middle East yet. In addition, NACE West Asia & Africa Area Office will present the statistics of NACE members (both individual and corporate), the technical groups formed, the courses and conferences held in the region, and the upcoming conferences that can serve as the window of opportunity for a lot of companies.	Ernest N. Morial Convention Center-New Orleans	R-08

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Tuesday,1 p.m. to 5 p.m.	How to Avoid Premature Coatings Failures	Presented by: Mike O'Brien, MARK 10 Group This practical, informative and lively tutorial, loaded with many pictures from actual coating failures, provides practical tips on how to prevent premature coating failures. Contractors, facility owners, shipbuilders, paint manufacturers, and government organizations continue to spend substantial sums of money each year in unanticipated additional labor and materials, legal fees, and in opportunity costs to investigate, settle, and resolve premature coating failures. These out-of-pocket costs are non-budgetary items; therefore, they come from bottom-line profits. However, more importantly premature coating failures often result in irreparable damage to customer relationships and negatively impact future business opportunities with existing clients. This tutorial is filled with many real life coating failures, investigated by the presenter during his thirty-seven year involvement in the coatings industry. It contains examples from approximately thirty different coating failure investigations with pictures of actual coating failures on steel, hot-dip galvanizing, and concrete. It provides participants with practical knowledge based on how to avoid coating failures, based on sound principles of physics and chemistry. It addresses common errors made by others, who disregarded these principles, often with expensive consequences.	Ernest N. Morial Convention Center-New Orleans	R-06
Wednesday,10 :30a.m. to 12 a.m.	Thermal Spray Coatings Forum	Presented by: James K. Weber, James K Weber Consulting	Ernest N. Morial Convention Center-New Orleans	D-3

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Wednesday,1 p.m. to 5 p.m.	Best Practices in Pre-Job Determinations for the Decontamination of Refinery and Pipeline Equipment	Presented by: Thomas McCartney, Clean Harbors Energy & Industrial Services, Roxanne Shank, Clean Harbors Energy & Industrial Services, Spencer Rex What is the best way to determine when, how and if you should clean your equipment? Should there be a standardized method for pre-job determination? What is the best way to clean your equipment? These are all questions which have been brought up within the STG 06 :Chemical and Mechanical Cleaning group for the past several years, and the time has come to address the issue. Here we will begin the discussion as to the development and introduction of a new task group charged with developing a standard for best practice in pre-job deposit characterization. The scope of the group will focus on Refinery and Pipeline pre-job determination, deposit characterization and chemical/mechanical cleaning recommendations. The group will begin with the intention of generating a State-of-the-Art report, with the possibility of the future development of industry standards for deposit characterization and treatment. The purpose of this forum is to brainstorm ideas on what "Best Practice" means for the industry. We encourage other NACE members from various STGs to join us and provide their input regarding the topic.	Ernest N. Morial Convention Center-New Orleans	Room 221
Wednesday,1 p.m. to 5 p.m.	Deepwater Horizon and the Impact on Industry Regulations	Presented by: Shane Finneran and Brandon Rollins, DNV GL On the evening of April 20, 2010, control of an exploratory well at the Macando Prospect in the Gulf of Mexico was lost, allowing hydrocarbons to enter the drilling riser and reach the Deepwater	Ernest N. Morial Convention Center-New Orleans	Room 222

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Horizon (DWH) drilling rig. The subsequent explosions and fires onboard resulted in the rig sinking on April 22, 2010 and the loss of eleven lives. The failure of the Deepwater Horizon's blowout preventer to seal following the uncontrolled hydrocarbon release resulted in one of the largest oil spills in U.S. history. The subsequent incident investigation, performed in New Orleans, indicated the blind shear ram was not able to close due to the presence of a buckled drill pipe, preventing the blowout preventer (BOP) from sealing the well. In addition to reviewing the incident investigation this forum will explore, the implications to the industry, with respect to regulations, operation, and design requirements. The following areas will be the focus of this forum:

• Regulators (BSEE/ BOEMRE)
  o Regulatory changes in response to major incidents
  o Input from ranking local (NOLA) officials
• Operators (Cameron / Transocean)
  o Design and testing changes post-Macando
• Industry
  o DNV GL - background to Macando failure, and BOP Forensic investigation
  o (Tentative) Gary Kenny - Historical primer on major incidents, and industry response (Dr. Kenney has lead investigations for Piper Alpha; DWH; etc.)

Wednesday,1 :30p.m. to 3 :30p.m.	Corrosion Problems in the Water/Stream System in the Paper Industry Forum	Presented by: Catherine Noble, M&M Engineering Associates, Inc.	Ernest N. Morial Convention Center-New Orleans	D-3

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Wednesday,3 :30p.m. to 5 :30p.m.	Installation of Cathodic Protection Anodes for Underground Propane Tanks	Presented by:Hans Schmoldt, Anode Systems Co.		Ernest N. Morial Convention Center- New Orleans	D-3

Exhibit Hall Meetings

Time	Name	Description	Committee(s)	Location	Location Detail
Monday,5 p.m. to 7 p.m.	Expo Grand Opening Reception			Ernest N. Morial Convention Center- New Orleans	Exhibit Hall
Tuesday,9 :30a.m. to 11 a.m.	Coatings 101: an Introduction to Coatings & Coating Technology Part 1	Presented by: Rae Marie Mattis, GPU This presentation will discuss the following topics: • Why do we paint? • What is this thing, paint anyway? • How does paint work? • How can I make it stick properly? • What often goes wrong! • When to paint • What is the value statement, including risk management?		Ernest N. Morial Convention Center- New Orleans	D-3
Tuesday,11 a.m. to 12 a.m.	Contractor Awards Program	Corrosive Chronicles (Green Theater) / Booth 2011 CoatingsPro Magazine is presenting its inaugural Contractor Awards at CORROSION 2017! The new program is for commercial and industrial coatings contractors, with project categories including commercial concrete, commercial roof, industrial concrete, industrial steel, specialty project, and contractor/crew MVP. Award winners will be announced in a special ceremony for the contractors.		Ernest N. Morial Convention Center- New Orleans	Exhibit Hall
Tuesday,11 :45a.m. to 1 p.m.	Tuesday Lunch			Ernest N. Morial Convention Center- New Orleans	Exhibit Hall

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Tuesday,1 :30p.m. to 2 :30p.m.	Corrosion of Mild Steel in Recirculated Cooling and Single-Pass Natural Waters	Corrosive Chronicles (Green Theater) / Booth 2011 Presented by: Vladimir Plashnitsa, Lester M. Dobosz, and Ty V. Tran, ERCO Worldwide The chemical plant heat exchangers are often manufactured of mild steel and operate under the recirculated cooling and/or single-pass natural waters. Both types of waters could affect the corrosion of mild steel in different ways: while the recirculated cooling water could be aggressive because of accumulation of chemical impurities, microbiologically influenced corrosion would be one of the primary reasons for natural water. Under some circumstances, both types of water could be mixed together, making corrosion issues more complex. The condition and treatment of different types of water become of high importance to prevent accelerated corrosion of mild steel and premature failure of the heat exchanger. The discussion will be focused on assessment of the corrosion rate of mild steel in recirculated cooling and natural waters by monitoring and controlling such factors as water quality, water velocity, pH, chloride concentrations, addition of corrosion inhibitors and strong oxidizers, etc. The effect of surface preparation, pretreatment, and condition during operation on corrosion characteristics of mild steel as well as challenges and options of dealing with water treatment when the surface temperature is very high will be also discussed. In addition, economical and environmental limitations and challenges for once-through systems are considered.	Ernest N. Morial Convention Center-New Orleans	Exhibit Hall

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Tuesday,1 :30p.m. to 3 p.m.	Coatings 101: an Introduction to Coatings & Coating Technology Part 2	Presented by: Rae Marie Mattis, GPU This presentation will discuss the following topics: • Why do we paint? • What is this thing, paint anyway? • How does paint work? • How can I make it stick properly? • What often goes wrong! • When to paint • What is the value statement, including risk management?	Ernest N. Morial Convention Center- New Orleans	D-3

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Tuesday,2 :30p.m. to 4 :30p.m.	Basic Workshop—Proper Use of Coatings Inspection Instruments and Standards	Presented by: Matthew Fajit, KTA-Tator Proper use of coatings inspection instruments, as well as knowledge of industry standards, is vital for all parties involved in corrosion protection using protective coating and lining systems. Lack of knowledge of industry requirements and/or improper use of coatings inspection equipment can result in catastrophic premature coating failure and, if undetected, can cause product contamination and/or loss of structural steel. Painting contractors, who are ultimately responsible for quality control on painting projects, must have knowledge of instrument use to prove compliance with the governing project specification. Facility owners who perform quality assurance during painting operations must have knowledge to help ensure the protection they are paying for is being performed according to the requirements of their specification. Finally, coating manufacturers need to ensure their materials are being applied properly to well-prepared surfaces. Without knowledge of inspection equipment use and an understanding of industry standards, the contractor, facility owner, and the coating manufacturer have little way of determining whether the coating system will perform. The hands-on workshop will cover: • Measuring ambient conditions • Measuring surface profile • Assessing surface cleanliness • Measuring coating thickness • Performing coating adhesion testing	Ernest N. Morial Convention Center-New Orleans	D-3

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Tuesday,3 p.m. to 4 :30p.m.	Contamination of Stainless Steels	Corrosive Chronicles (Green Theater) / Booth 2011 Presented by: Jeffrey Vatne, S&B Engineers and Constructors There are many potential sources and types of contamination of stainless steel equipment and piping components. And when the problem does happen, schedules get held up, valuable resources are brought to bear, money is spent, and company reputations suffer. Most often, it is iron contamination that is seen. The heat tint from welding may be considered another. In industrial-strength hydrogen peroxide services, even tungsten contamination from the arc strike of a gas tungsten arc weld (GTAW) electrode can spell disaster. So, what is it about not-so-stainless, stainless steel equipment and piping that causes its outright rejection? What are the real corrosion issues? What is the technical basis for rejection? And what are the options to treat it? Attendees are invited to bring both their views and practical experiences to this open forum. We can discuss how to identify the types of contamination, how to assess their risk, how to remove them, and how to specify against them. This will be a great opportunity to network with those like yourself who are likely to contend with this problem.	Ernest N. Morial Convention Center-New Orleans	Exhibit Hall
Wednesday,10 :30a.m. to 11 :30a.m.	Test Method for Monitoring Atmospheric Corrosion Rate by Electrochemical Measurements	Corrosive Chronicles (Green Theater) / Booth 2011 Presented by: Fritz Friefersdorf, Luna Innovations and James Dante, Southwest Research Institute This presentation will focus on the new standard test method for the specification, selection, and use of	Ernest N. Morial Convention Center-New Orleans	Exhibit Hall

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sensors for monitoring atmospheric corrosion that are based on electrochemical techniques. The sensors may be used like more traditional mass loss coupons or painted test panels, but these sensors provide continuous records of contaminants, corrosion rates, or coating condition over time as opposed to singular cumulative measurements of mass loss or coating degradation. This method permits instantaneous evaluation of corrosion rates so that situations where changes in environmental conditions cause changes in the corrosion rate can be detected in real time. This is considered a substantive benefit as compared with mass loss methods. These continuous records of material condition are broadly applicable to studying atmospheric corrosion, evaluating materials, or managing assets.

The method addresses the use of electrochemical sensors in a bare metal condition or with protective coatings. It encompasses sensor elements for measurement of free corrosion, galvanic corrosion, and conductance for assessing atmospheric corrosion. Atmospheric corrosivity measurements, using electrochemical-based sensors, provide a means to obtain instantaneous corrosion rate, surface contaminant, and method for the specification, selection, and use of sensors for monitoring atmospheric corrosion that are based on electrochemical techniques. The sensors may be used like more traditional mass loss coupons or painted test panels, but these sensors provide continuous records of contaminants, corrosion rates, or coating condition over time as opposed to singular cumulative measurements of mass loss or

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coating degradation.

Wednesday,10 :30a.m. to 12 a.m.	Thermal Spray Coatings	Presented by: James K. Weber, James K Weber Consulting Jim Weber presents answers about thermal spray coatings, processes, equipment, applications and industry usage—highlighting several case studies both in and out of the corrosion industry. With over 30 years' experience, Weber is able to respond to all questions. • Processes covered will include oxy-fuel flame spraying (powder, wire, and rod), high-velocity oxy-fuel spraying (HVOF), cold spraying, plasma spraying, and twin-wire electric arc spraying. • Thermal spray equipment will be illustrated and discussed. • Application examples will be presented for a variety of requirements from several different industries. • Examples of how thermal spray coating combat corrosion in various industries will be discussed. This forum is for those who enjoy lively sharing of ideas! Please be ready to ask many questions.	Ernest N. Morial Convention Center-New Orleans	D-3

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Wednesday,1 :30p.m. to 2 :30p.m.	Power Alternatives Available for Remote Cathodic Protection Impressed Current Applications	Corrosive Chronicles (Green Theater) / Booth 2011 Presented by: Mike Brennan, Mike Gagnon, and Norman Jones, Atrex Energy, Inc. This presentation will focus on issues and challenges for providing reliable electrical power for impressed current cathodic protection applications in remote off-grid areas. It will include discussion of the following topics: • Remote power alternatives: • Solar systems • Genset systems • Thermoelectric generators • Solid oxide fuel cells • The technology of SOFC fuel cells • How SOFCs compare against other methods of remote power • System reliability and maintainability • Examples of cathodic protection projects	Ernest N. Morial Convention Center-New Orleans	Exhibit Hall

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Wednesday,1 :30p.m. to 3 :30p.m.	Corrosion Problems in the Water/Steam System in the Pulp and Paper Industry	Presented by: Catherine Noble, M&M Engineering Associates, Inc. This presentation consists of water/steam corrosion experts capable of addressing current corrosion problems in the industry. It includes members from STG 11 and STG 38. It will begin with introductory presentation followed by Q&A. The second part will include additional experts to field questions and enhance discussion on specific topics such as: • Underdeposit corrosion • FAC cause and effect • Process of paper making corrosion/failures and corrective action • Additional panel discussion experts include: •Mel Esmacher, principal engineer, G.E. • Catherine Noble, M&M Engineering • Michael Lykins, Packaging Corp., chair of STG 38	Ernest N. Morial Convention Center-New Orleans	D-3
Wednesday,2 :45p.m. to 3 :45p.m.	International Pipeline Operators Council	Corrosive Chronicles (Green Theater) / Booth 2011 Presented by: Drew Hevle, Kinder Morgan and James Hart, NACE staff Members of the NACE International Pipeline Operators Council take questions from the audience and discuss the hottest issues and challenges facing the industry.	Ernest N. Morial Convention Center-New Orleans	Exhibit Hall

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Wednesday,3 :30p.m. to 5 :30p.m.	Installation and Testing of Cathodic Protection Anodes for Underground Propane Tanks	Presented by: Hans Schmoldt, Anode Systems Co. This presentation is designed to teach attendees how to install anodes on buried propane tanks and to check the cathodic protection installation to confirm that it is working properly. Topics to be covered include: o Fifteen reasons to protect a buried propane tank from corrosion o Cathodic protection basics o Number and size of anodes to install on a buried tank o How to install anodes o The importance of dielectric unions on metal pipes o Taking tank potential readings with a voltmeter and copper sulfate electrode o Nine reasons cathodic protection of underground tanks is good business o Question & answer session	Ernest N. Morial Convention Center-New Orleans	D-3

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Wednesday,4 p.m. to 5 p.m.	How to Be an Author	Corrosive Chronicles (Green Theater) / Booth 2011 Presented by: NACE International Publications Division Want to understand the steps to getting your work published? Then join the editors from NACE International's Publications Division during CORROSION 2017 to learn about content needs, proposal writing, author guidelines, and submission processes. Topics will include the requirements for publishing in: o NACE-published books and compilations. o CORROSION journal—the technical research journal devoted to furthering the knowledge of corrosion science and engineering. o Materials Performance magazine—the NACE membership magazine featuring articles concerning practical, field-oriented applications of corrosion technology. In addition, information will be provided on how to submit article leads to CoatingsPro Magazine.	Ernest N. Morial Convention Center-New Orleans	Exhibit Hall

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RTS Meetings

Time	Name	Description	Committee(s)	Location	Location Detail
Wednesday,10 a.m. to 5 p.m.	Corrosion of Drinking Water Distribution Systems	Degradation issues involving drinking water distribution systems (DWDS) have been pushed to the forefront of infrastructure issues because of the recent drinking water crisis in Flint, Michigan. DWDS are complex environments that involve multiple metals and alloys; water sources with differing chemistries and microorganisms; and site-specific water treatment strategies. Papers on the following topics related to DWDS are featured: corrosion mechanisms for low alloy steels, copper, lead, and plastics; impact of water treatment chemistries on material degradation; and physiochemical properties of corrosion products and their relationship to water quality, microbiologically influenced corrosion, and corrosion mitigation. A panel discussion with all speakers will conclude the session. Chair: Jason Lee Vice Chair: Torben Lund Skovhus		Ernest N. Morial Convention Center-New Orleans	Room 231