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Click on Meeting Name to Add to Itinerary

Other Meetings

Time	Name	Description	Committee(s)	Location	Location Detail
Monday,12 a.m. to 5 p.m.	Regsitration Open			Houston Marriott Westchase	
Monday,3 p.m. to 3 :30p.m.	Aftertoon Break			Houston Marriott Westchase	
Tuesday,8 a.m. to 5 p.m.	Registration			Houston Marriott Westchase	
Tuesday,10 :30a.m. to 11 a.m.	Morning Break			Houston Marriott Westchase	
Tuesday,3 p.m. to 3 :30p.m.	Afternoon Break			Houston Marriott Westchase	
Wednesday,8 a.m. to 11 :30a.m.	Registration Open			Houston Marriott Westchase	
Wednesday,8 a.m. to 12 a.m.	Registration			Houston Marriott Westchase	
Wednesday,10 a.m. to 10 :30a.m.	Morning Break			Houston Marriott Westchase	

Technical Committee Meetings

Time	Name	Description	Committee(s)	Location	Location Detail
Monday,1 p.m. to 2 p.m.	Keynote - Digby Macdonald (UC Berkeley, USA)			Houston Marriott Westchase	

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Monday,2 p.m. to 2 :30p.m.	Determination of Internal Pitting Corrosion Rates Using Extreme Value Analysis - Pipelines Track	Presented by Carlos Melo Gonzales, University of Calgary. Most of the existing corrosion growth models provide estimates for general corrosion rates, while pipeline failures usually occur at locations subjected to corrosion rates due to pitting. Analysis of internal corrosion rates should include the effect of microbiologically influenced corrosion (MIC), which contributes to approximately 20 – 30 % of corrosion failures. The aim of the paper is to develop a model using extreme value analysis to predict localized internal corrosion considering MIC. The first step is to estimate general corrosion rates using advanced mechanistic flow and corrosion models. Extreme value modelling is then used to transform the general corrosion rates into localized corrosion rates. This transformation accounts for operational, monitoring and mitigation factors that are related to internal corrosion. The monitoring factors for MIC include DNA analysis and the identification of species that contribute to MIC. An example comparing the results obtained using the traditional pitting factor and the proposed framework is included. The use of the probabilistic approach supports the risk-based inspection and maintenance planning for pipelines subject to internal corrosion.	Houston Marriott Westchase

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Monday,2 p.m. to 2 :30p.m.	Corrosion Risk Management of Corrosion Resistant Alloys for Downhole Applications - Facilities Track	Presented by Nausha Asrar, Schlumberger Products Center. Corrosion Resistant Alloys (CRAs) are essential for providing long term resistance to corrosion for many components exposed to oil and gas production environments. Components include downhole tubing and safety critical elements, wellhead and Xmas tree components and valves, pipelines, piping, valves, vessels, heat exchangers and many other pieces of equipment in facilities. However, processing, welding and downhole operation conditions sometimes significantly influences their corrosion resistance, and thus it is important that the final product form and manufacturing route are considered in the assessment of the suitability of the alloy for the intended operating environment. There is a variety of ways individuals and companies select CRAs for anticipated well and flowline conditions. In this paper the following information will be shared with an intent to provide corrosion risk management of CRAs; · Different material selection procedures – pros and cons · Corrosion and cracking of CRAs - Case histories · Lessons learned · Specific selection criteria of CRAs for application in downhole conditions	Houston Marriott Westchase
Monday,2 :30p.m. to 3 p.m.	Pipeline Metal Loss Evaluations per API 579 Fitness-For-Service Rules - Pipelines Track	Presented by Kraig Shipley, Equity Engineering Analysis procedures from the current edition of API 579-1/ASME FFS-1, “Fitness-For-Service,” applicable to piping system and pipeline components subjected to local and general metal loss are	Houston Marriott Westchase

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presented. This paper is meant as an overview so that inspectors, engineers, and those maintaining aboveground and underground piping systems have a basic understanding of the available techniques in API 579-1/ASME FFS-1 for evaluation of thinning damage. The applicable sections of the API 579-1/ASME FFS-1 standard will be covered, including evaluation methodologies for local, general, and pitting metal loss (Part 4, Part 5, and Part 6, respectively). This paper will provide practical and basic background information on the data (inspection, design, and operating) required for each type of FFS assessments, any limitations on the particular methodology, the actual FFS methodology and FFS acceptance criteria, any remediation and/or repair procedures that may be used to mitigate the particular damage, and any future monitoring that may be needed. When performing FFS evaluations of pipeline components, it is of critical importance to adequately characterize the average thickness of pipeline components. Therefore, in this paper, special attention will be devoted to discussing the applicability, limitations, and common misconceptions of the two thickness averaging procedures (i.e., critical thickness profile approach and point thickness reading approach) documented in Part 4 of API-579/ASME FFS-1 as well as other techniques used in industry (e.g. the 3t x 3t block averaging technique). Finally a case study is considered in which the procedures discussed herein are used to perform an FFS evaluation of Slug Catcher piping components. The intent of the evaluation presented, which is based on the results of automated ultrasonic thickness (AUT) measurements, is to estimate

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		the remaining life of each component based on the Part 4 (GML) and P	
Monday,2 :30p.m. to 3 p.m.	Surface Prep Tipping Point: From Desperate Measures to Quality Assurance - Facilities Track	Presented by Robin Wright, Wirx Group, LLC. The common expectation of inevitable surface preparation difficulty and related coating failures in severe contamination environments reflects the tenacity of outdated technologies and assumptions within the industry to date. Regardless of the pervasive cognitive error, surface preparation technologies have continued to progress to a point where such failures are no longer inevitable, as proven through testing, pilot studies and actual field practice where new methods and products have proven to be a significant improvement across the board. Logic dictates that extremely beneficial new technologies should be readily adopted, but they are not. The disconnect between industry adoption of these beneficial new technologies may be attributed human factors, such as ignorance or fear, that lead to a conscious decision to avoid adopting new technologies, and instead repeat previously failed attempts using old methods and hope for a different, improved result. However, desperation causes a tipping point: after ineffective products and processes overrun budgets and deadlines while repeatedly failing pre-coating inspections, operations finally reach out, and are forced to acknowledge the benefits and vast superiority of new technologies in assuring consistent surface preparation quality and process improvement. This is the tipping point where organization-wide adoption of advanced surface preparation technologies occurs.	Houston Marriott Westchase

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		The author argues the case for shifting organizational culture to actively receive, rather than avoid, new technologies by presenting cases referring to specific advancements, tracing the progressive adoption of similar technologies, and drawing on projections based on benefits observed and noted by organizations making the shift.	
Monday,3 :30p.m. to 4 p.m.	Critical Requirements of Training Programs for Engineered Composite Repair Systems- Facilities Track	For more than 20 years, Engineered Composite Repair (ECR) systems have been analyzed and used in the oil and gas industry, and much of this work has fallen on the material testing and design aspects of the materials, while the training and education of site installation is typically only a secondary thought. The ASME PCC-2-2015 and ISO 24817 are the two most commonly used documents for ECR systems as they are highly detailed in all aspects of the process, which includes installation training and education. Material testing and design is an important aspect of all ECR systems and have had many years of expert analysis to develop and support the testing involved to ensure that the qualification testing is sufficient to perform successful repair designs. While this is important to properly design a repair, the most critical aspect of these materials is the proper installation by the field technicians. Although this is a major part of the process, it has been widely taken for granted. The amount of responsibility that the technicians take on with installing these highly engineered materials is great and it should be given proper attention to insure it works as designed. Without this, there will be a higher potential of failure and greater risk associated with the use of ECR	Houston Marriott Westchase

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		systems. This is highly unfortunate as ECR systems are a thoroughly tested and technically proven material which are widely used across many industries with great success. This paper will focus on the training and installation requirements as set forth within the ASME PCC-2-2015 Article 4.1 standard, and why they are critical to the successful implementation of an ECR system. In addition, a case study focusing on this aspect will be provided showing the need for complete and thorough training.	
Monday,3 :30p.m. to 4 p.m.	Near-Neutral pH Stress Corrosion Cracking Assessment Using Bayesian Network Modeling-Pipelines Track	Presented by Shan Guan, DNV GL Comprehensive modeling of the occurrence of stress corrosion cracking (SCC) at any given location on a pipeline has been elusive because the initiation of SCC depends on a myriad of interconnected factors. Unfortunately, a physics-based model encompassing tremendous number of factors affecting SCC is beyond the current state of modeling and computational capabilities, even if one has a qualitative understanding of all the sub-processes affecting SCC. In this paper, we report on a model based on Bayesian network (BN) methodology for assessing the SCC risk of buried pipeline. BN based model can quantify the uncertainties and identify where the reduction of these uncertainties has the greatest benefit in terms of the overall failure. It also possesses the ability to supplement physical understanding of some aspects of the system with other corroborative observations. The BN-based SCC model was tested using a 30-km gas pipeline segment located in Western China. Using this model, a 27-year SCC	Houston Marriott Westchase

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		risk assessment was conducted combining available pipeline information from various sources. Results show that the probability of failure (pof) due to near-neutral pH SCC is relatively low based on the data provided by the pipeline operator. However, some data provided by the pipeline operator was measured at one instance in time or space. Therefore, a sensitivity analysis was employed to determine the most effective strategy to reduce the uncertainties, and the results of which suggest that additional data should be gathered to account for the variability of the parameters. This risk assessment methodology of utilizing the Bayesian network modeling and sensitivity analysis is particular useful for those pipelines with limited available data or data with high uncertainties.	
Monday,4 p.m. to 4 :30p.m.	Dynamic Risk Assessment - A MacGyverism to Worksite Incidents - Pipeline Track	Presented by Ebuka Umeh The industry is in constant research with consistent efforts to ensure that no/less incidents occur during the course of operations. Notable and popular slogans/rules have been adopted among coys over recent years in the industry to intimate the need for safe activities to be performed among staff. Slogan and regulations like goal zero, golden rule dictum, yes we can, life saving rules, no wahala..take 5 and many others have been used in recent times to inculcate the culture of safety and situational awareness in the mind of the work force. Tools like check cards, posters, stickers and safety IDs are also quick reminders of the environment being operated on. However while all these tools are efficient, the need for proper risk assessment cannot be over-emphasized at all times before a job to be done can be certified to	Houston Marriott Westchase

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		be safe. Worksite hazard management tools like toolbox talk (TBT) and last minute risk assessment(LMRA) are veritable towards achieving this goal but while risk assessment before the job commences is important, of equivalent or even much importance, is the one conducted during the job. This is called dynamic risk assessment. This paper presents an approach and exposition of the risk assessment plan in the operations level in the industry. It also discussed the methods to be deployed for a successful risk assessment and buttress further on static and dynamic risk assessment as it concerns operations in a gas processing facility. A case study was treated from B-field which is a gas processing facility in the southern part of Nigeria and ways to mitigate incidents through dynamic risk assessment were firmly discussed. Keywords: risks; safety; industry; gas.	
Monday,4 p.m. to 4 :30p.m.	Best Practices Using New Technologies for Advanced Corrosion Control - Facilities Track	Presented by Douglas Foster, Intuitive Coatings Controlling variables leads to more predictable outcomes” is a truth applicable to virtually every industrial sector and scientific discipline. In the case of defense against corrosion of metal surfaces, the impact of variable control is multiplied since eliminating or reducing variables is the entire premise behind modern corrosion control. Variables to be managed in corrosion control operations include more than simply physical and chemical factors. Important considerations also include worker health and safety, waste management and environmental impact, site configurations, metal	Houston Marriott Westchase

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surface hygiene, system and process complexity, vulnerability to human error, capital investment feasibility and actualized service life.

By examining how new technologies for advanced corrosion control fit together in a whole “fabrication to in-service” system, organizations can equip themselves with the knowledge needed to craft strategies that significantly improved corrosion control outcomes in specific situations. Taking the time to review how, when and where to implement new technologies in a more holistic fashion allows organizations to better leverage the benefits of corrosion control advances while streamlining procedures and cutting costs.

This presentation examines interactions between technologies at the forefront of “new best practices” development, including wet abrasive vapor blast equipment, novel decontamination products and high-performance nanoceramic coatings formulated to meet specific environmental challenges and presents examples of "best practices" for planning a "cradle-to-grave" corrosion control system.

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Monday,4 :30p.m. to 5 p.m.	Inspection of Coated and Uncoated Pipelines with Next Generation MEC Technique - Pipelines Track	Presented by Andreas Boenisch, Innospection Americas Inc. Corrosion is a constant challenge especially in ageing and insulated pipelines. This presentation focuses on the use of the next generation MEC (Magnetic Eddy Current) technique which is a further development of the fast corrosion screening SLOFEC technique for the inspection and integrity support of coated and uncoated pipelines and pressure vessels. The MEC technique operates on a high frequency Eddy Current field with a controlled direct current magnetic field and specially developed sensors to achieve a high sensitivity in defect detection in the ferromagnetic and non-ferromagnetic materials including through the typical coatings. Internal and external defects such as individual pitting, microbiological and carbon dioxide corrosion and other defects are easily detected by the MEC technique. The differentiation between the different defect position and other occurrences like laminations or inclusions are also shown. Case studies and field experiences of the MEC technique for pipeline and pressure vessel inspection will be presented. In addition, the next generation Pulsed Eddy Current Testing (PECT) technique for the detection of corrosion under insulation of the coated pipes will also be presented. The PECT technique offers increased defection detection capability and operational speed and is capably of inspecting through 250mm coating thickness for the defects hidden under the insulation.	Houston Marriott Westchase

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Monday,4 :30p.m. to 5 p.m.	Novel Surface Prep & Coatings to Gain Efficiency in Cavitation Corrosion Control - Facilities Track	Presented by Douglas Foster, Intuitive Coatings Offshore equipment and facilities face multi-faceted attack from abrasion, cavitation, fouling and corrosion. For example, high-capacity water pumps inject seawater (and highly abrasive entrained sand particles) into offshore wells at high pressure, leading to significant levels of abrasion-erosion. Cavitation and contamination cause severe damage to offshore impellers and pumps, resulting in their failure in a short time (about one month). Fouling leaves turbines and compressors vulnerable to corrosion and deposit buildup that incrementally causes a loss of power and efficiency. Exposure to high chloride, sulfide and microbial contaminants in the environment of LNG and alternative energy facilities causes coating failure and ensuing corrosion damage in many different types of offshore components. Especially vulnerable to corrosion attack: heat affected zones (HAZ) adjacent to the weld regions. Comparing radical new decontamination and coating products used alone or in tandem to standard process illuminates the high potential of novel systems to decrease downtime and vulnerabilities while recovering operational and power efficiencies regularly lost through less effective, labor-intensive processes. Areas most likely to benefit from this strategy are: structural elements, waterline areas, pumps, pipes, valves, impellers and turbines, intakes, penstocks, isolation valves, scroll cases, wicket gates, turbine runners, draft tubes, spill ways,	Houston Marriott Westchase

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		radial gates, compressors, and upriver dam nosings.	
Tuesday,9 a.m. to 9 :30a.m.	Information on Technical Acitvities		Houston Marriott Westchase

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Tuesday,9 :30a.m. to 10 a.m.	Novel Approach, Better Outcome for Energy Infrastructure in Aggressive Environments-Facilities Track	Presented by Loren Hatle, Wirx Group, LLC Offshore equipment, vessels and pipelines face multi-faceted attacks: - Abrasion-Erosion. High-capacity pumps inject seawater and entrained sand particles at high pressure. - Cavitation Damage. Impellers, pumps and propellers cause cavitation that results in severe wear and rapid failure. - Fouling: Deposit buildup causes corrosion in turbines and compressors. - Contaminant Exposure: Atmospheric contaminants accelerate corrosion in LNG and alternative energy facilities. - Rapid Depressurization: Vapor from high CO2 levels used in tertiary recovery cause catastrophic failure to lining systems. High-profile efforts (such as ACORN) have spent considerable time, energy and capital developing novel high-performance coatings as solutions to the problem. In theory, the resulting products work well to protect against attacks. In practice however, the performance of any coating or lining relies on the level cleanliness, or hygiene, of the metal substrate to which it is applied. Contaminants prevent the complete contact with the substrate needed to create a consistent, strong bond across the entirety of the asset, leading to areas of weak adhesion or non-existent bonding. Although they may meet current standards for cleanliness, current methods such as abrasive blasting, salt removers, rust converters and inhibitors fail to reach necessary levels of hygiene needed to promote optimal, consistent coating adhesion.	Houston Marriott Westchase
Tuesday,9 :30a.m. to 10 p.m.	Degradation of America - 18	Presented by Binder Singh,	Houston Marriott Westchase

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Step Plan to 'Eliminate' Infrastructure Corrosion Issues - Infra. Track	PragmaticaGGS LLC Many institutions have strongly opined on the criticality of asset management, in particular the ASCE has repeatedly pointed out that the US Infrastructure is in bad shape. In reality at the front end of this are the thousands of assets, bridges, and pipelines (offshore and onshore); many on the verge of collapse due to ageing and corrosion, way past their original design life; and it is time for responsible action. One way to look at this is to deploy the concept of ALARP- whereupon the risk of degradation (effectively corrosion) failure can be maintained as 'low as reasonably practicable' by concerted design and operability effort. The proposals and plans presented herein equally apply to new designs and ageing assets. The ALARP criteria has evolved after many major accident events, and lessons learned, and the concept with its present day value is discussed in this paper. In that context the relevant mechanical, integrity, and corrosion management disciplines have evolved, and the offshore sector has to likely lead the way, since it would in all probability be the first of the 'dominoes' or casualties to fall. This paper argues that fortunately it is not necessary to invent any new techniques per se; perhaps all that is needed are motivations to better adapt existing techniques and methodologies, and that may in turn also foment further creativity. NACE International and other Societies around the world stipulate that corrosion costs most countries between 3-4% of the national GDP. For the USA, a significant portion of this is related to infrastructure,

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		and energy assets, although it is noted that progress has been made; due to needs and demands. One large country recently stipulated that the costs of corrosion may for them exceed the amount they spend on fighting terrorism.	
Tuesday,10 a.m. to 10 :30a.m.	Risk Management of Metal Structures using Adaptive Corrosion Protection System - Infra. Track	Presented by Yogiray Kachhela, Simon Fraser University NACE recommended practice SP0169-2013 (formerly RP0169) presents various methods to control external corrosion of underground and submerged metallic piping systems. Often it has been claimed that E log I criterion will provide a more accurate standard as this method is scientifically fundamental as well as on-site testing can be conducted that reflects specific environmental conditions. A simple current sourced adaptive corrosion protection system is proposed which extracts the protection current from the Tafel segment of the Britton curve and supply this current to target metal. This adaptive mechanism using a feedback loop will update the required protection current supplied to the target metal. This stand-alone, portable and modular system can offer reliability and cost-savings with short and long-term protection capabilities. These functionalities integrated into a system will effectively diagnose the corrosion status and update the protection parameters without any manual interaction. The system can further be integrated with a smart-grid communication network that can effectively link control-room to remotely access and regulate the process. The developed system can be powered using off-grid solar energy. This proposed technique was validated in the laboratory using various metal samples in the	Houston Marriott Westchase

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different corrosive medium. A36 metal coupons were effectively protected in the lab with corrosion protection efficiency of 80-100%. The corrosion protection efficiency by this proposed current-sourced system was compared with impressed current cathodic protection mechanism. It was concluded that Adaptive Corrosion Protection System (ACPS) is an effective corrosion protection system.

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Tuesday,10 a.m. to 10 :30a.m.	Underground Gas Storage - Past, Present, and Future - Facilities Track	Presented by Valerie Wilson What can we expect in 2018 for Underground Gas Storage? New regulations? Compliance with API 1170 and 1171? PHMSA to form an advisory team for Well Integrity? And how did we get here? Since the occurrence of Aliso Canyon Underground Gas Storage has been at the fore front of operators and regulators minds and agendas. PHMSA has now been given jurisdiction over Underground Gas Storage Facilities, which makes sense from the facility and pipeline point of view. But, what about the wells? Well require a different skill set and understanding. Two new API documents, API 1170 and 1171 have been incorporated into the CFR's but is that enough. Are they understood? Do the current UGS operators have employees with the competency's to manage all the Well Integrity requirements or the assistance needed to implement and meet all these new requirements. So many unanswered questions and such an interesting topic. This paper will explore the current status of UGS in the US. The new API requirements that are now part of the CFR's and how PHMSA is handling the implementation. It will also discuss Well Integrity and the current and past upstream industry progress and status in its development and popularity since other major upstream incidents.	Houston Marriott Westchase

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Tuesday,11 a.m. to 11 :30a.m.	Non-Intrusive Inspection (NII) of Assets with Advanced MEC and PECT Technology - Facilities Track	Presented by Andreas Boenisch, Innospection Americas Inc. This presentation focuses on the use of the next generation MEC (Magnetic Eddy Current) and PECT (Pulsed Eddy Current Testing) techniques for the inspection and integrity support of upstream and downstream assets such as coated and non-coated pipelines, pressure vessels and storage tanks	Houston Marriott Westchase
Tuesday,11 a.m. to 11 :30a.m.	Concrete Field Corrosion Testing Utilizing Multiple Tools - Infra. Track	Presented by I-Wen Huang, BASF To study the effectiveness of a surface applied corrosion inhibitor (SACI) applied parking garage, multiple field corrosion testing tools were utilized including half-cell, linear polarization, galvanostatic pulse, and connectionless electrical pulse response analysis (CEPRA). The SACI applied is a silane-based material with inhibitors to provide corrosion protection to concrete. The corrosion protection of the SACI was compared to a controlled surface treated area without SACI. Measurement was conducted for a year seasonally in order to obtain performance of the product as well as the tools under different weather. This presentation will also discuss the effectiveness of field corrosion testing tools and their limitations.	Houston Marriott Westchase

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Tuesday,11 :30a.m. to 12 a.m.	Microbiologically Influenced Corrosion of Submerged Steel Structures with Macrofouling - Infra. Track	Presented by Samanbar Permeh, Florida International University 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 has made identification of material degradation susceptibility of vital interest. Localized corrosion cells/pits were of up to 3" in diameter and penetrated through the steel thickness .Testing of water samples from the suspected bridge indicated the presence of bacteria associated with MIC. Water samples showed high sulfate and chloride concentration and sufficient nutrient level to support microbial activity. The steel piles also had heavy marine growth. Although the role of the macrofoulers on the corrosion of the steel piles is not clear, the presence of the macrofoulers could affect the corrosion process by supporting biofilm development and creating localized corrosion. The objective of this research was to identify if macrofouling conditions can facilitate MIC on submerged steel structures. An experimental set up including laboratory testing with simulated physical characteristics of crevice environments caused by macrofoulers and field testing with exposed steel coupons was created to identify the possible MIC.	Houston Marriott Westchase
Tuesday,11 :30a.m. to 12 a.m.	Surface Decontamination Significantly Reduces Vulnerability to CUI - Facilities Track	Presented by Loren Hatle, Wirx Group, LLC. CUI (corrosion under insulation) is a pervasive, difficult and high-	Houston Marriott Westchase

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liability issue for petrochemical, power, shipping, and other industries. Situational variations (meteorological, geographical, seasonal, etc.) can confound conventionally-specified surface preparation attempts to acheive perfect or near-perfect metal hygiene, thus reducing expected coating life by 30 to 75 percent. Because conventional surface preparation processes have historically been unable to adequately relieve microcontamination of metal surfaces, organizations have settled for an uneasy balance between economic and physical feasibilities that exclude the possibility of achieving ideal surface preparation outcomes and rely more heavily upon barrier coatings to supply needed corrosion control.

However, coatings cannot fill the gap; “surface-tolerance” does not extend to application over chloride or sulfate contaminated steel, as coating performance is highly dependent upon unimpeded bonding with the surface it is meant to protect. Consistent coating adhesion is impaired by microcontaminants present in metal surfaces during fabrication as well as those potentially embedded during surface preparation blast processes occurring in field maintenance. To ensure maximum bonding of protective coating to metal, surface preparation must include metal decontamination processes to fully eradicate the full array of microcontaminants that impede coating adhesion to ensure maximum asset resilience against problems such as stress corrosion cracking (SCC) and other CUI vulnerabilities. Case studies prove that early adoption of novel surface decontamination technologies

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confer complete permanent microcontaminant removal for improved protective coating bond strength to reduce economic investment in maintenance and increase long-term coating reliability, thus reducing vulnerability to CUI.

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Tuesday,2 p.m. to 2 :30p.m.	Pre-saturated CFRP Usage for Strengthening of Bridges - Infra. Track	Presented by Eri Vokshi, NRI Neptune Research Inc. For many civil engineering repair applications, carbon fiber-reinforced polymers (CFRP) have proven to be very effective as externally-bonded reinforcement. Investigations of these systems started in the late 1980s. It was shown through numerous experimental and analytical studies that externally-bonded FRP composites can be applied to improve and repair structural performance criteria such as stiffness, load-carrying capacity, ductility, and even durability of various structural members including columns, beams, slabs, and walls. Bridge strengthening projects have been carried out in almost every state in the US. As the technology is gaining ground, manufacturing companies are focusing on making the products cheaper, easier to use, and working with various organizations to make them more acceptable by building officials. A new externally-bonded-pre-saturated system in the market offers many advantages including shorter application time, less field resources, and high quality assurance with controlled fabric to resin ratio. A case study of the usage of these products for strengthening and protection of multiple bridge columns in New York City's RFK bridge is presented. In addition research performed at University of Central Florida (UCF) compares the flexural and shear behavior of these systems to epoxy systems and highlights their advantages.	Houston Marriott Westchase

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Tuesday,2 p.m. to 2 :30p.m.	Enhanced Hot Tap Modeling Analysis & Validation - Pipelines Track	Presented by Daniel Spring, The Equity Engineering Group (E2G), Inc. The two main concerns when performing a hot tap procedure are burn-through and weld/HAZ cracking caused by excessive cooling rates of the weld deposit and/or high carbon equivalent values. These risks can be reduced, but not necessarily eliminated, by careful control of the weld procedure heat input variables (i.e. weld amperage, voltage, and travel speed). A new axisymmetric FEA-based transient thermal solver has been developed with a volumetric heat source to account for the weld heat input and convective boundary conditions at the inner surface (process flow) and outer (ambient) surfaces to account for cooling effects. The welding heat source is distributed non-uniformly within a double-ellipsoidal region. The new approach improves upon the Battelle model including a new finite element solver with a finer mesh generation scheme. In addition, the heat transfer correlations were modified to appropriately model the heat transfer and account for the different boiling regimes at the steel/liquid product interface.	Houston Marriott Westchase
Tuesday,2 :30p.m. to 3 p.m.	Cathodic Protection of Subsea Systems: Lessons Learned - Pipelines Track	Presented by Colin Reid, Clarus Subsea Integrity Coatings and Cathodic Protection (CP) are the principal measures for external corrosion control of subsea equipment and pipelines. Each subsea structure or component of an offshore development has its own independent cathodic protection design generally performed by the	Houston Marriott Westchase

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equipment supplier. Once all subsea equipment is installed and connected, the cathodic protection systems function as one integrated unit providing corrosion control throughout the entire subsea field. To ensure the proper functioning of the CP system over the service life of the field, development and implementation of a planned inspection and CP monitoring program is required. This paper describes an approach to assuring compatibility between independent CP systems, and proper functioning of an integrated CP system over the subsea system service life, by presenting case studies of CP design, operation and inspection experiences. A key objective of this paper is to share experiences that will aid in optimizing cathodic protection designs and improving integrity management practices. Cathodic potential surveys are a key part of subsea inspections designed to confirm the effectiveness of the CP system in providing corrosion control for an asset. The proper management and interpretation of the data generated by these surveys is integral to an accurate assessment of the overall condition of the system, and to provide meaningful recommendations for further inspection and remediation. Accurate and relevant data collection is ensured through development of detailed inspection work packages and inspection procedures. Using this approach for inspection planning and integrity management results in cost effective use of inspection and remediation resources, as well as lowering risks related to external corrosion of subsea facilities. Furthermore, this allows an Operator sufficient lead time to budget and execute remedial measures such as anode retrofit o

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Tuesday,2 :30p.m. to 3 p.m.	Assessment of Long-term Durability of TDG & Zinc Metallized Steel in Atmospheric Environment - Infra	Presented by Md Ashan Sabbir, Florida International University, Civil and Environmental Engineering ating systems for corrosion mitigation of structural steel have been widely used. Thermal Diffusion Galvanizing (TDG) and zinc metallized steel have promising corrosion mitigation attributes but its durability in coastal environments can be of concern. TDG and zinc metallized samples were tested in both marine and inland outdoor exposures conditions. Other test parameters included local coating defects exposing the steel substrate. Initial salt fog and outdoor testing of both coatings generally indicated corrosion mitigation of the steel but some limitations including possible surface staining, iron consumption, and coating degradation required further assessment. Long-term outdoor exposures (48 months) continued for the TDG and metallized samples. Testing included electrochemical techniques such as linear polarization resistance and electrochemical impedance spectroscopy. Electrochemical characteristics such as open circuit potential, polarization resistance, and electrochemical impedance was made after the extended exposure for samples from both marine and inland test sites to compare corrosion performance. Furthermore, results were compared to laboratory control samples with and without NaCl.	Houston Marriott Westchase
Tuesday,3 :30p.m. to 4 p.m.	Corrosion Susceptibility of Nanoparticle Enriched Zinc Coating after Adverse Exposure during Repair	Presented by Saiada Faudi Fancy, Florida International University. Zinc-rich-primer-based three-coat	Houston Marriott Westchase

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systems have been one of the most widely used coating systems for highway steel bridges since the 1980's. However these coating systems have not been shown to provide maintenance-free durability for the service life of steel bridges in aggressive environments. Conventional repair materials and procedures also do not have long service life. Coating degradation can lead to exposure and enhanced corrosion of the steel substrate. In some Florida bridges, initial coating degradation has been reported within 15 years of initial application and repair coatings have failed in less than 10 years. It is understood that appropriate selection of compatible repair coating materials and appropriate surface preparation are critical parameters for extended corrosion protection.

Nanoparticles are being considered in the development of durable coating systems due to their beneficial physical, chemical and mechanical properties. Earlier research showed that the nanoparticle enriched primer provided similar corrosion resistance in aggressive chloride environments as conventional three-coat systems indicating that there wasn't a negative consequence of supplementing the zinc pigments with nanoparticles. Indeed, enhanced mechanical strength was observed for the nano-particle enriched coating. As repair coating failures are often associated with adhesion loss, and from the results of earlier findings, it was thought that the presence of the nano-particles may provide enhanced performance. The purpose of this study was to evaluate the effect of surface preparation with varying surface contaminants on the corrosion performance of a

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		nanoparticle enriched zinc rich epoxy primer.	
Tuesday,3 :30p.m. to 4 p.m.	Optimization and Scale-up Testing of Composite Repair Technologies - Pipelines Track	Presented by Matt Green, NRI Neptune Research Inc. For the past two decades, composite repair technology has significantly impacted the manner in which operating companies maintain the integrity of their high-pressure gas and liquid pipeline systems. In the early 1990s, the pipeline industry adopted the use of composite materials for reinforcing corrosion features; however, today's composite reinforcing systems have been tested and many are used to reinforcement multiple anomaly types. Manufacturers of composite materials and pipeline operators have contributed greatly to the validation and adoption of this technology through funding of extensive and comprehensive full-scale testing research and development programs. The contents of this paper will focus and provide details on the development of specialized composite technologies for reinforcing defect anomalies such as corrosion and dents subjected to aggressive operating conditions, and in taking the small-scale, coupon-level testing to characterize the effects of component change in order to take the next steps up to full-scale, burst testing and cyclic pressures. Information is included on the initial design process used by engineers to optimize reinforcements using constitutive properties and insights from previous testing and research programs to guide the advancements in understanding of the materials. Detailed test results will be included, including information on how both coupon-level and full-scale test results can	Houston Marriott Westchase

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		be used to assist operators in maintaining their pipeline systems using advanced composite reinforcing technologies.	
Tuesday,4 p.m. to 4 :30p.m.	Preventative Measures to Protect HDD Pipeline Coatings - Pipelines Track	Presented by Tammy Bomia, NRI Neptune Research Inc. PHMSA proposes to add a requirement that each coating be assessed to ensure the integrity of the coating using DCVG or ACVG technology and damage be remediated if damage is discovered. In addition, for HCA segments PHMSA proposes enhanced preventative and mitigative measures and repair criteria for repair of coating with voltage drop classified as moderate or severe. Trenchless technology is frequently used to install pipelines in HCA's when superstructure does not allow for a trench installation. With enhanced requirements to repair coating damage in HCAs choosing proper coating protection is the best preventative measure that can be taken in areas where repairs cannot be made. This presentation will discuss coating trends in the HDD industry and how we can proactively address coating damage caused by HDD and other trenchless technologies.	Houston Marriott Westchase
Tuesday,4 :30p.m. to 5 p.m.	Internal Corrosion Asset Preservation of Pipelines - Pipelines Track	Presented by Joe Pikes, Technical Toolboxes	Houston Marriott Westchase
Wednesday,8 a.m. to 9 a.m.	Keynote - Chris Bloomer (CEPA, Canada)		Houston Marriott Westchase

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Wednesday,9 a.m. to 9 :30a.m.	Urban Development Affecting Pipeline Integrity – Case Study - Pipelines Track	Presented by Joseph Pikas, Technical Toolboxes With more than 2.5 million miles of pipelines in the United States and an ever-growing population, the oil & gas pipeline infrastructure and urban development continue to collide in a battle to occupy the same land at the same time. Although there are many factors that can lead to pipeline failure, third party damage is still one of the leading causes of damage, or failure. This paper will discuss these issues but also propose practices of assessment and evaluation of these encroachments to meet regulatory and safety requirements. While urban development is inevitable, it brings a myriad of different types of encroachments. Operators must be ready for encroachment and integrity evaluation, as the responsibility for maintaining the pipeline in compliance with regulatory standards and long-term integrity is the Operator's responsibility. The case studies will include the process of evaluating the integrity of the pipeline before and after the encroachment, evaluation of superimposed loads combined with operating stresses, and evaluating the compliance of industry regulations and recommended practice.	Houston Marriott Westchase

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Wednesday,9 :30a.m. to 10 a.m.	Gas Pipeline Corrosion Condition and Risk Assessment during Commisioning: Case Study-Pipelines Trac	Presented by Maritza Lopez, IEnova Pipelines continue to be the most cost effective and safest way for the gas transmission and distribution. Their integrity is, however, challenged on a daily basis, with damage due to corrosion, third party activities, material and construction defects, and geotechnical factors now recognised as the primary threats. An understanding of pipeline integrity threats and their inherent risks, thus represents a critical element in the development and implementation of effective mitigation plans, and pipelines safe operation. As one of the gas pipelines operator in Mexico, we realize existence of such risks and account for it through pipelines' intelligent in-line inspections (ILI), condition assessments and threat (corrosion) diagnosis, which are then used to optimise and update our pipeline integrity and corrosion management strategy. For instance, we stress on the fact that whilst the primary purpose of in-line-inspections in the past was to locate pipeline defects and anomalies, and then repair them, today, such inspections provide for a continuous monitoring of pipelines' condition, i.e. repeated in-line inspections.	Houston Marriott Westchase

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Wednesday,10 :30a.m. to 11 a.m.	Manage Data, and You Manage Risks and Threats - Pipelines Track	Presented by Randy Vaughn. Because a pipeline is buried and out of sight, the only means of physically monitoring how well a pipeline is holding-up in its environment without digging it up, has always been data collected by the pipeline corrosion department. Since each reading taken is the product of many contributing mechanisms, (cathodic protection {CP} system design, coating, backfill environment, etc.) the readings usually have many meanings. The different meanings are the result of many variables involved, generally resulting in many different deliberations for each reading. Over time a lot of data is compiled within a corrosion prevention database for a single pipeline system. Considering there may be more than one pipeline facility, the amount of data begins to build-up considerably. The integrity management program (IMP) is a big user of all available data found within many databases like the one created by the corrosion department. Most data, if not all found within multiple databases will be essential information for use within all IMP internal processes (Risk Analysis, Assessment Method, Remediation, Prevention and Mitigation Measures, etc.). The IMP rule has been in place now for over almost 15 years, and many of the larger and more established pipeline operators have had similar programs in place for years prior to the rule. Probably not as structured as required by the rule today, but did produce a lot of data all the same.	Houston Marriott Westchase

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Wednesday,11 a.m. to 11 :30a.m.	Because a pipeline is buried and out of sight, the only means of physically monitoring how well a pi	Presented by Bengt Lydell, SIGMA-PHASE INC. Nuclear power plants have extensive piping systems. Some of these piping systems are located below ground and contained in pipe tunnels (culverts) or buried in soil or concrete. Cooling water (i.e. Circulating Water and Service Water) is the most common process medium transported in below ground piping. The cooling water is generally taken from a lake, river or the ocean and, except for a slight increase in temperature, is returned to the ultimate heat sink. An in-depth review of the international operating experience with below ground piping has been performed by the Nuclear Energy Agency (NEA) joint project on piping integrity and corrosion risk management. The review included evaluations of inspection and repair practices as well as the unexpected loadings and environmental degradation mechanisms affecting the piping base metal and weldments. This paper summarizes the insights gained from the operating experience data evaluations and draws conclusions regarding operational impacts, aging effects and the technical approaches to the risk characterization of flaed below ground piping.		Houston Marriott Westchase	

Exhibit Hall Meetings

Time	Name	Description	Committee(s)	Location	Location Detail
Monday,1 p.m. to 5 p.m.	Exhibit Hall Open			Houston Marriott Westchase	

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Tuesday,9 a.m. to 5 p.m.	Exhibit Hall Open	Houston Marriott Westchase
Tuesday,12 a.m. to 2 p.m.	Lunch - Exhibit Hall	Houston Marriott Westchase
Wednesday,8 a.m. to 11 :30a.m.	Exhibit Hall Open	Houston Marriott Westchase