



Society of Petroleum Engineers



# SPE/NACE Workshop: Corrosion Management for Upstream Oil & Gas Production Assets

30 – 31 October 2017 | Kuala Lumpur, Malaysia

Group Registrations Available: Contact us at [spekl@spe.org](mailto:spekl@spe.org) to arrange your group

## TECHNICAL PROGRAMME COMMITTEE

### SPE/NACE CHAIRPERSONS

Gary Ong Swee Hong  
Subject Matter Expert (SME) - OCTG  
**PETRONAS Carigali Sdn Bhd**

Dr. Carlos A. Palacios T.  
President  
**CIMA-TQ, LLC**

### SPE/NACE MEMBERS

Fouzi Yunus  
Managing Director  
**Acme Chemicals (Malaysia) Sdn Bhd**

Ahmed Khalifa Al Owaid  
Senior Plant Inspection Engineer  
**ADGAS**

Ashish Khera, P.Eng.  
Director  
**Allied Engineers**

Mark O'Sullivan  
Coating & Insulation Lead -  
Wheatstone Upstream  
**Chevron Australia Pty Ltd**

Mohamed Abou Zour, PhD.  
Upstream Oil and Gas Chemicals &  
Monitoring Solutions  
**GE Water and Process Technologies**

Dr. Khlefa A. Esakul  
Corrosion and Materials Advisor  
**Occidental Oil & Gas Corporation**

Pedro R. Rincon  
Head Materials & Corrosion Engineering  
**Petroleum Development Oman**

Michelle Lau  
General Manager  
**Mach3 Engineering Sdn Bhd**

M Faizatulizuddin Ishak  
Staff Completion Engineer  
**PETRONAS Carigali Sdn Bhd**

Anas Mohamad Sofian  
Staff Well Engineer  
**PETRONAS**

Nurul Asyikin Mohd Radzuan  
Production Technologist  
**PETRONAS**

Daniel Sandana  
Principle Corrosion Engineer  
**Rosen Europe BV**

Dr Nor Roslina Rosli  
Senior Lecturer - Oil & Gas Engineering  
Department  
**Universiti Teknologi MARA**

Assoc. Prof. Ir. Dr. Mokhtar Che Ismail  
Head of Centre for Corrosion Research  
**Universiti Teknologi PETRONAS (UTP)**

Suchada Punpruk  
Senior Engineer - Corrosion  
**PTTEP**



## Who Should Attend



- Well Integrity Engineer
- Completion Engineer
- Drilling Engineer
- Production Engineer/Technologist
- Well Intervention Engineer
- Petroleum Engineer
- Corrosion Engineer
- Material Engineer
- Metallurgical Engineer
- Project Manager
- Wellhead/Well Services Companies
- Service Companies providing Corrosion Management and Assessment/Monitoring techniques/tools
- Steel Mills producing materials for downhole application

Corrosion management is a key concern in all oil and gas assets due to the nature of fluids produced and injected throughout their life cycle. This is applicable for all asset types, regardless of their age and the level of corrosive agents present in the flow stream, be it CO<sub>2</sub>, H<sub>2</sub>S, water, chloride and others. **Every operator in the world today is facing the challenge of extending the life of their aging assets which are often degraded by corrosion and pose well integrity risks.** In the meanwhile, new green field development tapping hydrocarbons are confronted by highly corrosive contaminants as low lying, easy wells have been mostly exploited.

In the current low oil price environment where budget has been slashed substantially and CAPEX/OPEX is limited, the industry is facing uphill challenges on how to keep the cost reasonably low in order to execute projects. More activities are being performed to conserve the integrity of production assets in lieu of replacements. Idling wells are resurrected to extract the last remaining hydrocarbons via Enhanced Oil Recovery (EOR), while the cost pressure to give the go-ahead for new project development with limited budget to ensure long-term well integrity remains obvious. Corrosion assessment, its management, the use of mitigation and monitoring techniques, non-conservative material selection, and the availability of new, cost-effective materials to substitute exotic, expensive materials play a vital role in keeping operational costs at an optimum level.

## Session Highlights

This inaugural joint-workshop combines the strength and networking prowess of both SPE and NACE, and is targeted at the following focal areas to explore new practices, find new materials to solve corrosion related problems and to put more cost-effective solutions across the table by sharing best practices and lessons learnt across the industry.

- Upstream corrosion assessment (Production/Injection wells and surface production assets)
- Wells downhole causes of corrosion and mitigation practices
- Performance of Corrosion Resistant Alloy (CRA) tubulars
- Internal coatings for upstream assets
- Corrosion inhibitors for downhole applications
- Downhole corrosion monitoring and assessment tools
- Water injectors material selection while keeping the cost low
- Corrosion management – Risk-based assessment



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### Why You Should Attend



**30** expert-led technical discussion topics



**20+** hours of knowledge sharing and technical discussions



**10+** hours of peer-to-peer networking opportunities



### Workshop Objectives

This is a first and unique opportunity to leverage the strength and networks of both associations. This workshop serves as an avenue for attendees of diverse backgrounds to meet and discuss wide-ranging subjects related to corrosion management, focusing on wells downhole applications and upstream production assets. This is your opportunity to have face-to-face discussions using the workshop format provided by SPE/NACE with experts from both of these internationally recognised organisations.

### Preliminary Workshop Schedule

#### MONDAY, 30 OCTOBER 2017

0800 - 0850  
0850 - 0900  
0900 - 1000

Arrival of Delegates and Registration  
Safety Announcement by Hotel  
**Session 1: Welcome, Introduction and Keynote Address**  
*Co-Chairpersons: Gary Ong Swee Hong, PETRONAS Carigali Sdn Bhd; Dr. Carlos A. Palacios T., CIMA-TQ, LLC*  
Group Photo/ Coffee Break

1000 - 1030  
1030 - 1230

**Session 2: Integrity Assessment of Surface Facilities: Well Lines, Flow Lines, Gathering Lines (Multiphase Flow Lines)**  
*Session Managers: Ashish Khera, Allied Engineers; Dr Mokhtar Che Ismail, Universiti Teknologi PETRONAS*  
Upstream pipeline operations (multiphase flow lines) are susceptible for internal corrosion attacks due to several reasons such as solids deposition, water accumulation, bacterial activities and improper operational practices, flow regime and flow related corrosion. To enhance integrity assessment for these lines, NACE International has published the Standard Practices for the Internal Corrosion Direct Assessment (ICDA) protocols to predict time-dependent internal corrosion threats for multiphase and wet gas lines. The non-intrusive technique of ICDA is applicable for piggable/non-piggable, offshore/onshore and sweet/sour service pipelines. This session will focus on:  
• How ICDA has been used as an integrity validation technique  
• Mandatory requirement of ICDA to provide the root cause and a go forward plan  
• Effectiveness criteria for proving the prediction modelling  
• Why ICDA is complimentary to ILI  
• Key ingredients for a "successful" ICDA programme  
Networking Luncheon

1230 - 1330  
1330 - 1530

**Session 3: Integrity Assessment For Wells - Considerations based on the Injection & Production System (Gas/Water Injector, CCS, EOR, Producers with High Contaminants)**  
*Session Chairs: Nurul Asyikin Mohd Radzuan, PETRONAS; Khlefa A. Esaklul, Occidental Oil and Gas Corporation*  
The threat to corrosion integrity rises without the proper understanding of wells behaviour especially when dealing with high contaminants (e.g.: CO<sub>2</sub>, H<sub>2</sub>S, O<sub>2</sub>, sand)/reservoir souring as a consequence of untreated water injection fluids affecting both producers and injectors. As technology evolves, from the application of normal water injection to various type of EOR and Carbon Capture Sequestration (CCS), increasing challenges are anticipated in ensuring the integrity, visibility and efficiency of the well life.

1530 - 1545  
1545 - 1745

This session will focus on well corrosion assessment methodologies and experiences in corrosion prediction and mitigation during production stage. In increasing the confidence level for corrosion assessment, the advancement of reliable prediction methods and mitigation are important to enhance the life of the asset and the decision-making process for future cost-effective investment.  
Coffee and Tea Break

**Session 4: Experiences in the use of Corrosion Monitoring Techniques/New Advances**

*Session Managers: Mohamed Abou Zour, GE Water and Process Technologies; Daniel Sandana, Rosen Europe BV*  
Corrosion monitoring is a key element to assess internal corrosion severity, and evaluate and optimise corrosion inhibition (chemicals) programmes. The industry has a wide range of technologies and tools that are used to achieve representative monitoring. The existing tools however, have their own strengths and limitations. This session will share experiences and enlighten participants with:

- Novel corrosion monitoring technologies
- Where to monitor? What is the importance of data generated?
- Experiences in monitoring sour production streams
- Optimising organisation and human resources within a collaborative framework
- Overcoming current safety challenges and technology limitations
- Digital data management
- Automating monitoring to drive productivity and lower production cost

1745 - 1845

**Session 5: Open Discussion Forum of the Day**  
*Session Managers: Michelle Lau, Mach3 Engineering Sdn Bhd; Ahmed Khalifa Al Owaid, ADGAS*

This is an open session that includes a panel of subject matter experts that will be available to answer questions from the day's topics.  
Welcome Dinner

1845 onwards

#### TUESDAY, 31 OCTOBER 2017

0830 - 1030

**Session 6: Experiences in the use of Internal Coatings/Linings for Corrosion Control**

*Session Chairs: Mark O'Sullivan, Chevron Australia Pty Ltd; Suchada Punpruk, PTTEP*



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### Preliminary Workshop Schedule

Most project managers and corrosion professionals are aware that very few flow lines and transfer pipelines are operating in identical environments. However, we often use a standard checklist and approved coatings system expecting that it will all "be fine". There is definitely a gap between everybody's understanding of "being fine". This ranges from construction personnel having a cosmetic view and saying it's all good to competent QA inspectors undertaking all the appropriate tests fully supported by the project manager. There is also a considerable knowledge gap as to how the product really performed over years of service. The paint companies and contractors are inherently unlikely to publicise bad news. This session is about how a newly built project (no name) undertakes all the right processes and still reach monumental failure – a situation which was only identified when someone started asking the right questions. We will also discuss flow assurance coatings, their original design criteria and expectations that many companies have. Needless to say, there are some considerable gaps:

- Well tubing
- Flow lines
- Gathering lines
- Innovative coating systems for internal coating of well tubing, flow lines and gathering lines
- Advanced techniques for internal coating inspection
- Lessons learnt from application of internal coating for corrosion control of well tubing, flow lines and gathering lines

1030 – 1045  
1045 – 1245

Coffee and Tea Break

#### Session 7: Fit for Purpose Material Selection – Advances and Experiences in the use of Corrosion Resistance Alloys

Session Chairs: Pedro Rincon, **Petroleum Development Oman**; M Faizatulizuddin Ishak, **PETRONAS Carigali Sdn Bhd**

This session will cover the application of various grades of CRAs used for wells completion, flow lines and gathering lines, and the challenges of selecting and using CRAs to ensure long-term asset integrity. Corrosion management by using CRAs is defined during design stage and thus affects CAPEX. Every CRA has a specific Integrity Operating Window (IOW) within which they perform very well against the hardships of corrosion. However when CRAs are not properly specified or operated outside IOW they susceptible to degradation mechanisms that are non-age related and the failures can be rapid. This session will address field experiences, lessons learnt and advances in the applications of CRA to meet the objective of long-term asset integrity, including:

- Role of design input/uncertainties/assumptions – boundary conditions for the selection of cost-effective CRAs
- Material selection/standards – extension of CRAs application limits and requirements
- Fit-for-purpose selection of CRAs
- Key role of quality and fabrication
- Current limit/experiences of using 13Cr, Super13CR, 15CR, 17CR, 22Cr-25CR Duplex, Ni-based alloys
- Variation/severity of testing methods for CRA Material Qualification (C-Ring, 4 Point Bent Beam, NACE Method A and etc.)

1245 – 1345  
1345 – 1500

SPE Luncheon

#### Session 8: Fit for Purpose Material Selection – Experiences in the use of Carbon & Low Alloy Steels

Session Managers: Khlefa A. Esaklul, **Occidental Oil and Gas Corporation**; Anas Mohamad Sofian, **PETRONAS Carigali Sdn Bhd**

1500 – 1515  
1515 – 1630

This session covers the use of the various grades of carbon and alloy steel tubing and casing, their characteristics and history in oil and gas production. This will include a review of the various grades in use both seamless and electric resistance welded (ERW) types, their properties, performance in corrosive environments in CO<sub>2</sub> and/or H<sub>2</sub>S and the effect of operating condition such as gas rate, water cut, type of production, etc. Chemical composition, metallurgical condition and manufacturing process play a role in the performance of the tubing and casing. Including:

- Tubing and casing grades evolution and where they have been used
- Effect of corrosion and factors that contribute to increase in corrosion tendency
- Common mitigation measures
- Material selection of tubing and casing and the factors that impact their selection
- Development in casing and tubing materials
- Case histories and past performance of the various grades

#### Session 9: Corrosion Inhibitors Testing/Qualification

Session Managers: Fouzi Yunus, **Acme Chemicals (Malaysia) Sdn Bhd**; Mohamed Abou Zour, **GE Water and Process Technologies**

Chemical corrosion inhibitors have been used extensively in the oil and gas production industry. In the current downturn, the industry sees the need to reduce CAPEX investments and improve in measures to allow the use of more cost-effective materials and extend the facilities' lives. The use of effective corrosion inhibitors have been identified as one of the areas where OCTG materials could be used and asset's lives could be extended while maintaining integrity. The session will:

- Share experiences and lessons learnt in the use of special corrosion inhibitors for single and/or multiphase flow tubing/pipelines/gathering lines
- Share recent or current development works on improvement of corrosion inhibition effectiveness for upstream assets
- Share existing methods of laboratory tests to screen corrosion inhibitors and experiences on their representativeness
- Discuss flow lines' top of line corrosion and the laboratory testing method to effectively determine suitable corrosion inhibitors

1630 – 1745

#### Session 10: Corrosion and Integrity Management

Session Managers: Nor Roslina Rosli, **Universiti Teknologi MARA**; Ashish Khera, **Allied Engineers**

This session will describe the processes and practices related to prevention of integrity failure (loss on containment, loss of design purpose). These include activities related to the asset itself (hard activities) such as inspections, monitoring, design practices, etc. and to the organisation (soft activities) such as roles, responsibilities, corrosion/integrity awareness, training, etc. Methodologies for development, implementation and evaluation of such processes and practices will be presented in this session.

1745 – 1845

#### Session 11: Workshop Summary and Closing Remarks – Open Forum

Co-Chairpersons: Gary Ong Swee Hong, **PETRONAS Carigali Sdn Bhd**; Dr. Carlos A. Palacios T., **CIMA-TQ, LLC**

Review of session summaries.

1845

Workshop Ends

### Poster Solicitation & Information

All participants are encouraged to prepare a poster for the Workshop. Presentations on both research and field experience are welcomed. Posters, including unconfirmed/partial results, are to be presented at an assigned time and are open for discussion. Posters will be on display for the entire Workshop period.

When preparing your poster:

- Avoid commercialism. No mention of trademarks/product name
- Poster size should be approximately 0.8m x 1.2m (W x H) or size A0 in portrait layout
- Identify topic by title, affiliation, address, and phone number
- Include a brief abstract that summarises the technology to be addressed
- Make the display as self-explanatory as possible
- Place the information in sequence: beginning with the main idea or problem, method used, results, etc. (Draw a plan keeping the size and number of illustrations in mind)
- Keep illustrations simple by using charts, graphs, drawings, and pictures to create interest and visually explain a point
- Use contrasting colours
- Use large print for narrative materials. (We suggest a minimum of 24 points or 3" high letters for the title)

Note that the Workshop Programme Committee will review all poster abstracts/materials prior to display, and reserves the right to refuse permission to display any poster considered to be commercial in nature.

If you are interested to participate, please email your proposed topic with a short abstract (between 200-300 words) to SPE Assistant Event Manager, **Hanna-Rose Abdul Jalil** at [hajalil@spe.org](mailto:hajalil@spe.org) by **25 August 2017**.

The Society of Petroleum Engineers (SPE) is a not-for-profit organisation. Income from this event will be invested back into SPE to support many other Society programmes. When you attend an SPE event, you help provide even more opportunities for industry professionals to enhance their technical and professional competence. Scholarships, certification, the Distinguished Lecturer programmes, and SPE's energy education programmes Energy4me are just a few examples of programmes that are supported by SPE



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### GENERAL INFORMATION

#### Documentation:

- Proceedings will not be published; therefore, formal papers and handouts are not expected from speakers.
- Work in progress, new ideas, and interesting projects are sought.
- Note-taking by attendees is encouraged. However, to ensure free and open discussions, no formal records will be kept.

#### Workshop Deliverables:

- The committee will prepare a full report containing highlights of the Workshop and the report will be circulated to all attendees.
- PowerPoint presentations will be posted online and provided to attendees after the Workshop. Provision of the materials by Discussion Leaders will signify their permission for SPE to do so.

#### Commercialism:

In keeping with the Workshop objectives and the SPE mission, excessive commercialism in posters or presentations is not permitted. Company logos must be limited to the title slide and used only to indicate the affiliation of the presenter.

#### Attendance Certificate:

All attendees will receive a Workshop attendance certificate. This certificate will be provided in exchange for a completed Attendee Survey Form.

#### Continuing Education Units:

This Workshop qualifies for SPE Continuing Education Units (CEU) at the rate of 0.1 CEU per hour of the Workshop.

#### Travel/Visa:

Attendees are advised to book their airline tickets early. All travellers must be in possession of passports valid for at least six (6) months with proof of onward passage. Contact your local travel agent for information on visa requirements.

#### Dress Code:

Business casual clothing is recommended. The Workshop atmosphere is informal.

#### Registration Fee:

- Registration fee ONLY includes all workshop sessions, coffee breaks and luncheons for the registrant. Accommodation is NOT included.
- SPE will provide details of recommended hotels upon receipt of your registration.

#### Registration Policy:

- Registration fee MUST be paid in advance for attending the Workshop.
- Full fixed fee is charged regardless of the length of time the registrant attends the Workshop, and cannot be prorated or reduced for anyone.

#### Attention Nonmembers

##### Join Our Worldwide Membership!

Nonmember full workshop attendees can join SPE at no additional cost.  
Look for your exclusive offer by email shortly after the event.

### SPONSORSHIP SUPPORT INFORMATION

Sponsorship support of the event helps offset the cost of producing workshops and allows SPE to keep the attendance price within reach of operation-level individuals, those who benefit most from these technical workshops.

Supporters benefit both directly and indirectly by having their names associated with a specific workshop. While SPE prohibits any type of commercialism within the workshop room itself, the Society recognises that supporting companies offer valuable information to attendees outside the technical sessions.

#### SPONSORSHIP CATEGORIES

Sponsorship categories are offered on a first-come basis. Please contact SPE to enquire and verify the availability of categories. Existing supporters have the opportunity to renew the same level of support for annual workshops.

#### SPONSORSHIP BENEFITS

In addition to onsite recognition, SPE will recognise sponsors on the SPE website and in all printed materials for the workshop. Based on the category selected, supporting companies also receive logo visibility on promotional workshop items.

#### FOR MORE INFORMATION

For a detailed list of available sponsorship opportunities, including benefits and pricing, contact **Hanna-Rose Abdul Jalil** at [hajalil@spe.org](mailto:hajalil@spe.org).

