SPE GCS Projects, Facilities and Construction Study Group

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Produced Water Treatment:

Yesterday, Today and Tomorrow

Leading oil and gas industry experts discuss the history, challenges, solutions and future of treating produced water.

October 26, 2011 • Norris Center, 803 Town and Country Ln., Suite 210, Houston Texas 77024

Tertiary Treatment of Produced Water
Ted Frankiewicz
SPEC Services, Inc.

The use of Tertiary Treatment for produced water cleaning is often required for matrix injection disposal. Commonly practiced tertiary treatment is limited to deep bed filtration. Other technologies such as disk stacked centrifuges and membrane filtration of oily produced water have been conceptually demonstrated. Discussion includes: centrifuge technology; the pilot scale test performance of membranes for treating raw produced water.

Selecting Gas Flotation Technology
John Walsh, Shell
Colin Tyrie, Consultant

Many refer to gas flotation technology as if it is just one technology. It is not. This presentation provides a review of existing gas flotation technologies and offers a correlation between performance and a characteristic dimensionless parameter referred to as the Flotation Flux Factor, which provides the operator with the tools required to make a judicious trade-off between cost, performance, weight and space.

Sub-sea Separation Systems
Chris Shaw
FMC Technologies

A brief history outlines the achievement of subsea oil-water separation in water continuous applications. More ambitious concepts challenge the boundary for separation of heavy oil, clean the produced water to a quality consistent with injection back in to the production reservoir and analyze the potential for being able to dispose of the produced water to sea. Discussion will include Marlim project, the proposed subsea design and the Technology Qualification Program undertaken to bring the concept to a technology readiness level TRL 4 through 5.

PWT: A Historical Account
Colin Tyrie, Consultant

A look back at the development of Produced Water Technology.

PWT Need and Development— An Industry Perspective
,Wally Georgie
Maxoil Solutions, Inc.

Discussion of the current as well as future produced water treatment issues facing operators and equipment suppliers. From acknowledging and defining the limits of "best available technology" to regulatory trends, this presentation will look at where this segment of our industry is headed and what will be required to successfully get it there.

Process Line-ups – Comparison of GoM and North Sea.
John Walsh, Shell

Water treating systems in the deepwater region of the Gulf of Mexico differ from those typically employed in the North sea. In both regions systems make use of both hydrocyclones and flotation. However, performance of hydrocyclones is emphasized in the North Sea whereas performance of flotation is emphasized in deep water.

Learn why the practice of water treating differs consistently from one platform to another depending on the region.

In-Line Water Extraction from Crude Oil Using Compact Separation Technology
Carl Wordsworth, Caltec

Conventional bulk oil-water separation commonly relies upon gravity separators. This presentation offers an alternative approach using a compact separator where high centrifugal forces are imposed on the two phases to bring about separation and, in doing so, reducing the residence time needed to separate the fluids. Discussion explores the advantages inherent in this approach.

Shale Gas Produced Water Treatment
George King, Apache

Reducing environmental impact during well development may take many forms. Apache is focusing their efforts in several areas including substituting brine source water and treated production water for fracturing to produce a closed-loop fracturing system. Initial production results will be presented from wells fractured with salt water and initial plans for produced water treating will be discussed.

Dispersed Oil and WSO Removal
Lance Rodeman, MyCelx

The latest data from onshore and offshore installations on removal of free, emulsified, soluble oils and WSOs illustrate that the Clean Water systems are a fail-safe and economically viable alternative for produced water tertiary treatment. Discussion of implementation, economic approach and configuration characteristics of a well-designed produced water treatment system.

Dr. Ted Frankiewicz, SPEC Services has over 30 years of experience in the oil industry, previously with Occidental Petroleum, Unocal Corp., and Natco Group. He has a Ph.D. in Physical Chemistry from the University of Chicago, holds 15 patents, and has authored over 25 professional publications.

His combined expertise in oilfield chemistry, in the design of process equipment, and in the development of process systems has provided him with unique insights into the issues that challenge operators as their water production and water treatment costs escalate over time.

Wally Georgie, Maxoil Solutions, Inc. has over 30 years of experience in the Oil and Gas industry, mainly in oil and gas processing and separation offshore and onshore, namely; operation trouble-shooting, de-bottlenecking, oil water separation and slugging problems, process verification, and all other fluid and gas handling issues, including fluid, production chemistry, flow assurance and integrity management.

George E. King, P.E., Apache, has 40 years oilfield experience. Technical background includes fracturing, production, acidizing, formation damage, well integrity and completions, complex formations, sand control and shales.

Technical accomplishments include 65 technical papers, a book on completions and workovers, and lectures for the SPE. He holds a BS in Chemistry, a BS in Chemical Engineering and an MS in Petroleum Engineering.

Lance Rodeman, MyCelx Technologies Corporation, earned his B.S. in Chemical and Biomolecular Engineering while conducting cutting edge research in the field of nanoparticle modification of polymers.

Lance's technical experience with polymers, statistical analysis and experimental development combined with hands-on familiarity of water treatment equipment has led Lance to be a valuable asset in the field with project installations. Lance manages new projects with global petrochemical and E&P companies.

Chris Shaw, FMC Technologies Houston is Field Development Manager, IOR System for working on subsea field development with subsea processing.

Chris has worked as a Facilities Engineer on the Operator side with Maersk Oil and Gas in Esbjerg, Denmark and with Conoco Specialty Products in Houston. When Conoco Specialty Products sold the Vortoil technology in 1997 to Baker Hughes, Chris relocated to the Baker Hughes Centrilift Division in Oklahoma to lead the Downhole Oil-Water Separator technology development program.

Colin Tyrie, Senior Consultant, Owner, Clean H_2O Services Inc. has been in the industry for 35 years specializing in solving problems found with the clean up of produced and allied oilfield waters for both reinjection and overboard discharge

He is Secretary of the Produced Water Society and organizer of the Produced Water Seminar which had its 21st Annual Meeting this year.

Colin is a past Distinguished Lecturer for the SPE, was educated in Wales and Scotland and has a degree in Mechanical & Production Engineering

Dr. John Walsh, Shell, has been with the company for 20 years: 10 years in the technology centers in Houston and Amsterdam, and about 10 years in operating units around the world.

His expertise is in Process Engineering as a Water Treating Specialist. In his career he has been a Flow Assurance Engineer and a Production Chemist. He has worked in, or supported operating units both offshore and onshore.

John has been active in SPE in the Projects, Facilities, and Construction discipline. He serves on the Board of Directors of SPE as the Technical Director.

Dr. Carl Wordsworth, Caltec Limited, has 14 years experience working in fluids research and development . The last seven years, he has been working on the use of cyclonic separators for use as in-line compact separators for the oil and gas industry.

Carl holds a BEng in Mineral Engineering and a PhD.

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AGENDA • Wednesday, October 26, 2011

7:00 a.m. – 7:45 a.m.	**Registration**
8:00 a.m. – 8:30 a.m.	**Key Note Address,** Norman MacLeod, *Chevron*
8:35 a.m. – 9:10 a.m.	**Tertiary Treatment of Produced Water,** Ted Frankiewicz, *Spec Services, Inc.*
9:15 a.m. – 9:50 a.m.	**Selecting Gas Flotation Technology,** John Walsh, *Shell*
9:55 a.m. – 10:30 a.m.	**Sub-Sea Separation Systems**, Chris Shaw, *FMC Technologies*
10:30 a.m. – 10:45 a.m.	**Coffee Break**
10:45 a.m. – 11:20 a.m.	**PWT, A Historical Account,** Colin Tyrie, Consultant
11:25 a.m. – 12:00 p.m.	**PWT Needs and Development – An Industry Perspective** Wally George, *Maxoil*
12:00 p.m. – 1:00 p.m.	**Lunch**
1:00 p.m. – 1:35 p.m.	**Process Line-ups for Produced Water Treating – Comparison of GoM vs North Sea,** John Walsh, *Shell*
1:40 p.m. – 2:15 p.m.	**In-Line Water Extraction from Crude Oil Using Compact Separation Technology,** Carl Wordsworth, *Caltec*
2:15 p.m. – 2:30 p.m.	**Afternoon Break**
2:30 p.m. – 3:05 p.m.	**Shale Gas Produced Water Treatment,** George King, *Apache*
3:10 p.m. – 3:45 p.m.	**Dispersed Oil & WSO Removal,** Lance Rodeman, *MyCelx*
4:00 p.m. – 5:00 p.m.	**Panel Discussion**
5:00 p.m. – 6:00 p.m.	**Networking/Happy Hour**

For more information or to register, visit www.spegcs.org.

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