

ERM at SPE

SPE HSSE Conference
Denver, Colorado March 14-18, 2015



Training Course: ERM offers a two-day sustainability course in partnership with SPE and BSR.

Linda Brewer, ERM, Denver, CO, USA; Roland Moreau, SPE; and Eric Olson, BSR

The Sustainability Imperative: Making the Case and Driving Change

*Saturday and Sunday, March 14-15
8 AM - 5 PM*

ERM Partner Linda Brewer will team with SPE sustainability colleagues to lead “The Sustainability Imperative: Making the Case and Driving Change.” Geared toward senior management, field management, and corporate and field sustainability practitioners, this course will provide insight into improving risk and reputation management and enhancing the prospects for success of oil and gas projects by improving the industry’s social and environmental performance. The objective of this course is to promote conversations between the expert practitioners and operations decision-makers to deepen the knowledge of practitioners and raise awareness among non-practitioners.

Technical Sessions: ERM will present eight papers at the 2015 SPE Annual Meeting.

Andrew Woerner, Philadelphia, PA, and Lisa Campbell, Raleigh, NC, USA

Strategies for Managing Greenhouse Gas Issues in an Ever-growing Oil and Gas Industry

*Monday, 16 March
4:07-4:29 PM*

For each new major capital project or development activity, issues related to greenhouse gas (GHG) emissions quantification, reporting and controls seem to gain a greater amount of attention and scrutiny. Being prepared for and addressing this scrutiny in a robust manner can help ensure project timelines are met, adding value by accelerating product delivery to market, and minimize the potential for adverse public perception of a project or the sponsoring company. Navigating the current landscape of GHG issues is not a small challenge. The evolving environment of scientific, socioeconomic, political, and media inputs to regulatory development is resulting in a patchwork of mandatory and voluntary programs and legal requirements. From the investor perspective - there is an increasing prevalence of shareholder proxy votes that are calling for increased transparency on environmental issues - specifically issues related to GHG emissions.

During the development of major capital projects - environmental non-governmental organizations (eNGOs) are using permit challenges as a means to delay major projects to which they are opposed. From a regulatory perspective - the challenges range from reliably and accurately accounting for emissions where required to preparing for emerging legislation. In particular, the move towards low carbon fuel standards (LCFS) must be watched closely. If implemented, such standards would have a significant impact on the O&G industry - at a minimum, by increasing compliance obligations; but potentially leading to new crude valuation issues or a “crude source differentiation” trend. This talk will provide an overview of recent developments and trends in GHG laws and regulations in the areas of emission inventories, reporting, investor community driven voluntary reporting, and emission control technologies.

The key focus of the paper will be on approaches that can be taken to increase the resiliency of assets in the current public arena and future regulatory compliance regimes, by incorporating a sustainability risk-based valuation approach early in the asset planning and design phase.

Yasmeen Sultana, Bakersfield, CA and Kevin Madry, Denver, CO, USA

Reasonable Assurance of Accuracy of GHG Data under Mandatory Reporting for the Upstream and Midstream Oil and Gas Industry: Fuel Samples

*Monday, 16 March
4:51-5:13 PM*

EPA and CARB’s GHG Reporting Programs for oil and gas industry specify rigorous fuel sampling requirements. Efficient resolution of fuel sample data management issues requires an understanding of life cycle within GHG universe. This paper explores different issues associated with fuel sampling data and best methods for proactive sample data management. Lifecycle of sample data encompasses the stages described below. Issues can arise at any stage and affect data accuracy.

Stage 1: Identification of representative fuel sample point
This process is needed to identify correct, reliable, verifiable, and cost-effective source. When identifying the correct sample point, companies should consider: 1) Costs associated with duplicate sampling; and 2) Compliance issues with multiple sample points.

Stage 2: Sampling Process
This stage involves defining the sampling process. When deciding a sampling method, companies must consider accuracy, level of effort/costs of scheduling/ training/ maintenance, and associated risks. We observed that GCs are more representative of the fuel stream and have lower risk of missing data.

Stage 3: Data Generation
This stage involves lab/GC analyses and resultant reports. Companies must be very diligent in selecting external labs and/or undertake GC calibration requirements. Using statistical analyses to identify exceptions to “normal” data is the observed best practice.

Stage 4: Data Capture
This stage involves the process around how the generated lab or GC data is captured by the company. Greater the extent of human intervention, greater the error rates observed.

Stage 5: Data Transfer
This stage involves movement of data from the data management system to the GHG calculations system. Maintenance of data integrity is the biggest issue during data transfer.

Stage 6: Data Consumption
This stage involves fuel sample data usage in GHG reporting. Accurate reporting of the fuel sample data requires understanding the data flow as well as the breadth and depth of data modifications. Efficient compliance with GHG programs requires efficient management of fuel sample data. Life cycle assessment of fuel sample data and proactive identification of potential pitfalls enables a company to develop appropriate controls and performance indicators.

Glenn Pettitt and Shana Westfall, London, United Kingdom

A Holistic Approach to Environment and Safety in ESIA's

Tuesday, 17 March

10:30-10:52 AM

Environmental and Social Impact Assessments (ESIA's) are a critical project tool in identifying potential impacts to the environment, and appropriate risk reduction options to manage these impacts and associated risks. Concurrent to the ESIA process, safety studies must also be undertaken for safety risks. Many of these safety risks are associated with unplanned events, and can also have environmental and social consequences. Most environmental impacts, including unplanned events, can be either prevented or mitigated through their early consideration during project design. If ESIA considerations and safety studies are evaluated in parallel at the concept and feasibility stages, a project will have more options available to avoid or mitigate impacts. This has a critical financial benefit, as early changes to project design are generally less expensive.

A holistic approach during the early stages of the project's concept design requires collaboration between safety professionals and environmental specialists to identify the various hazards, their consequences, and potential risk reduction mechanisms. The inclusion of safety techniques in an ESIA can also have significant cost benefits as the project develops. For example, a bowtie analysis may collectively identify hazards that have safety, environmental and social risks that could result in significant costs if not properly managed. A bowtie diagram would highlight potential measures to manage the risks.

This paper will advocate holistic team organization, which will have the following key aspects:

- An outcome-focused, well organized and front-loaded approach.
- Collaboration to carry out project definition, ESIA and Safety Studies in parallel.
- Embed the risk reduction measures within the project definition in collaboration with stakeholders.

- Satisfy the regulatory requirements and prevent environmental and safety impacts from the outset.
- Facilitate a positive outcome that results in sustainable development.

The integration of environmental and safety considerations at the early concept and feasibility stages of a project represents a holistic approach to the EHS issues that will result in significant cost savings and reduced risk to schedule delays as the project progresses.

Richard Rowe, London, United Kingdom, and Mark Taylor, Aberdeen, Scotland

Practical Barrier Strength Assessment for Bowtie Diagrams

Tuesday, 17 March

10:30-10:52 AM

Bowtie diagrams are increasingly used throughout the oil and gas industry to represent and communicate the measures in place to prevent or mitigate hazardous events. They are used to identify safety critical equipment, define process safety metrics and highlight safety critical competencies. At their simplest they are used to provide an overview of arrangements for a safety case or for senior management briefings. More complex bowties may be used as a route map to information about accountabilities, performance standards, procedures etc. They are primarily a descriptive tool but may also be used to convey information about the effectiveness of safety measures represented. Assessment of barrier strength is often either subjective - relying on individual judgment - or complex, requiring detailed assessment of the failure modes of the barrier. This paper presents a methodology for undertaking a structured, qualitative barrier effectiveness assessment that allows a 'first-pass' screening process. The method considers such factors as; whether the safety measure is fail-safe, the complexity of the system, whether overrides are possible.

For existing facilities, operating history and condition may be taken into account. Once strength has been determined for all barriers on a bowtie, this information may be used to assess the adequacy of protection and the need for further barriers. It further allows the key assurance processes and

metrics to be identified that collectively provide a view of the current condition of critical barriers and consequently a “quasi real time” view of the risk level of a facility, compared to that calculated in static risk assessment. This supports operational managers make risk based decisions about where to focus resources and facilitates the development of meaningful dashboards that can be rolled up or down depending on the viewer’s position in an organization.

Nigel Wright, Aberdeen, Scotland

Factoring in Ecosystem Services and Values in Decision Making, Risk Management, Loss and Environmental Damage: Over the Lifecycle of Energy Development

Tuesday, 17 March

1:45-2:07 PM

New dimensions of environmental loss and escalating liabilities following Macondo have catapulted environmental risk to a key feature on the corporate balance sheet. Forecasting expected losses of critical environmental functions, which underpin society, is setting new challenges insurance underwriters and scientists.

A critique of recent case histories will be presented to illustrate the latest dimensions of future risk future needs. International operators wrestle with the dollar value of reputational risks of uncharted frontier areas with sensitive marine ecosystems which affect both stakeholder confidence and the stock price. Governments now recognize the criticality of managing environmental capital and services when dealing with new energy concessions in sensitive coastal zones. International efforts to develop “state of the art” techniques to quantify the spectrum of ecosystem services will be presented together with a critique of how readily these can be factored into decision making. Advances in global geographic information systems and satellite imagery illustrate the unprecedented future opportunities to measure ecosystem functions and changes.

A series of case histories will illustrate cutting edge approaches to dealing with oil spill risk for offshore assets revealing environmental resource risk exposure, risk reduction, consequences and future liabilities. The criteria

used to determine “environmental damage or loss” are fundamental to our approaches to corporate risk management. Our understanding of the role of factors such as: biodiversity; ecosystem robustness; recoverability; habitat uniqueness; species population status and life cycles in the sustainability of ecosystem services will be reviewed and reveals fundamental gaps in knowledge. The global efforts being made to place \$ values on the world’s natural capital and ecosystem life support services will be summarized. A pioneering approach to due diligence of investments, planning, new concessions and oil spill risk assessments will be presented.

Insights will be given on the latest techniques for mapping environmental resources and services in integrated GIS systems on the web, which will provide an “ecosystem health thermometer” making damage to ecosystem services visible to stakeholders. Operators’ future “license to operate” will depend in part on utilizing ecosystem service approaches and values to address stakeholder sustainability and values concerns.

Fred Jones and Susan Rankin, Houston, TX, USA

The Integral Role of Waste Management into Successful Capital Project Design and Implementation

Tuesday, 17 March

2:29-2:51 PM

A successful capital project requires appropriate and timely planning and execution of Health, Safety, Environmental and Social (HSES) considerations. Inadequate and/or poorly timed inclusion of HSES considerations can result in O&G capital project delay, overhaul, cost escalation and cancellation. One such aspect of HSES is waste management. The following paper outlines a process whereby waste management can be integrated into a capital project in such a way as to reduce risk, manage costs and maintain schedule. The process is a project life cycle approach, taking the process from project scoping and early design through startup, operations and decommissioning. The process utilizes concepts and techniques which can be easily transferred to other industrial capital projects such as mining or construction. Waste management plans have been

developed for decades now to manage the sampling, storage, transport, treatment and finally disposal of waste. Waste minimization programs have also been in vogue for a while and both plans/programs have played a major role in controlling waste risks.

Each stage of a capital project can contribute to an understanding of what kind and how much waste will be generated. This paper discusses techniques on how to integrate these waste plans and programs during project definition, FEED design, Greenfield site preparations, EPC construction, startup, operation and decommissioning of an upstream oil and gas development project. Each project phase as its own unique waste issues that need to be developed and carried over to subsequent project phases. Each phase will be discussed with regard to steps that need to be taken to accomplish the present phase goals and objectives, while developing a path forward to plan for upcoming project phase waste considerations.

Caleb Wall, Calgary, Alberta, Canada

Reducing Project Risks through Enhanced Evaluation of Societal Risks

Tuesday, 17 March

4:51-5:13 PM

Risk Management – reducing a Project’s exposure to a range of internal and external risks – is often thought of as a purely “technical” issue. This paper presents evidence and examples of how Project Risks can also be managed through a thorough evaluation of Societal Risks. These Societal – or non-technical - risks are important. Research suggests that the majority of project delays in large Oil & Gas Projects are caused by non-technical risks, a higher percentage than purely ‘technical’ causes of delays.

In managing adverse social impacts, and in maximizing social benefits, a Project can look to map and engage with surrounding stakeholders. In doing this, Projects are better able to understand their impacts to surrounding communities and to understand which mitigations can increase societal acceptability and thus decrease societal risks. This could be by better siting of project facilities,

smarter mapping of receptors in designing discharge points, or through adaptive planning. By reducing a project’s “social impact” it is possible to help a project reduce its risk exposure, thus to better manage the non-technical risks such as permitting delays.

Drawing on specific examples, this paper examines the way in which projects can adopt a more informed approach to understanding and managing societal risks for oil and gas developments. Using social impact assessment as an up-front planning tool – rather than a permitting process after key planning, design and siting decisions have been made – is essential to this approach. While reducing the physical footprint of a project is not always possible the “social footprint” (the effect of a project on surrounding communities and stakeholders) can be an important form of mitigation.

By looking at social impact assessment as a risk management tool, rather than a response to regulatory requirements, this allows projects to be more in control of the decisions they are making. Although development impacts may be unavoidable, the risks these impacts pose to surrounding communities – and thus the risks to the project - can be managed and mitigated in a way that allows for more constructive community relationships and better management of external project risks.

Nigel Wright, Aberdeen, Scotland

Marine Mammals and Ocean Sound: Sources, Impacts, Uncertainties, Controls, and Future Decision Making

Tuesday, 17 March

4:51-5:13 PM

Marine mammal’s sustainability depends on their phenomenal abilities to transmit process and receive marine sound information. Sound is fundamental to their global navigation, breeding feeding and ultimate survival. The relentless increase in anthropogenic marine noise levels (from shipping, oil and gas, renewables, marine construction, military) and penetration to remote areas will be reviewed , and current discussions on “biologically significant effects” of cumulative noise on marine mammals populations will be

considered as part of the current threats and concerns of scientists and stakeholders.

Our knowledge of the effects on noise on the ecology of marine mammals will be summarized and critique given of current regulatory regimes which are inadequate to deal with the plethora of future sound issues , especially cumulative effects of multiple sources, or chronic stress effects on survivorship and reproductive success .

Recognizing the range of sound detection of species, sound budgets with limits on energy inputs in a geographic region with multiple sound sources may be considered as future control mechanisms. Underwater acoustic modelling has developed and is a key elements in building a risk exposure profile of marine mammals, and satellite linked tracking devices now allow wider insights into sound impacts on migratory species.

Ultimately, GIS mapped sensitivity and species distribution data needs to be fully integrated with sound reception capacity of species from research data in order to understand the 3D sound risk-scape of the marine environment. Key gaps in sound data and research will be presented which need to be closed through industry cooperation, data sharing and ecosystem based management in order to decrease the uncertainty of potential threats to populations. If data is not forthcoming to aid responsible decision making, regulators may have no option other than a precautionary approach to safeguard species.

DO NOT INCLUDE

Matt Skific, New Orleans, LA, USA

Successful SEMS Auditing - Verifying Compliance and Driving Continuous Improvement

Tuesday, 17 March

2:51-3:13 PM

Historically, HSE audits have fallen into one of two categories - a compliance audit or a management system audit. The two of them exist separately because they seek to deliver distinct outcomes, as follows:

- A compliance audit verifies compliance against a defined set of requirements and is used to identify gaps in compliance.
- A management system audit verifies the effectiveness of the management system as a whole and is used to drive continuous improvement for the entire organization.

Interestingly, the Workplace Safety Rule (commonly referred to as the Safety and Environmental Management System (SEMS) regulation) promulgated by BOEMRE (now BSEE) in the wake of the Macondo incident requires the implementation of a management system, which includes an audit component. As this audit is a compliance-driven management system audit, whether the audit should take the form of a compliance audit or of a management system audit was discussed in the offshore community. All operators regulated by BSEE are required to complete their initial SEMS Audits by November 15, 2013 and submit their audit report to BSEE. Following the receipt of early SEMS Audit reports which, according to a letter issued by BSEE to operators in April 2013, were "extremely limited in scope and only list deficiencies (if any)," BSEE provided additional guidance on their expectations of what a SEMS Audit Report must include - as the reports are used to determine both "compliance with the auditing requirements and serve as a measure of effectiveness of SEMS." As such, BSEE clearly indicated their expectation that the SEMS Audit is both a compliance audit AND a management system audit. This paper reviews the differences between compliance audits and management system audits, including the auditor skillsets required, the interactions between auditors and auditees expected, and the final reports delivered. In

addition, this paper discusses best practices from completed SEMS Audits which seek to most effectively combine the two types of audits into a single successful and efficient audit event.