

Wide-Ranging Conference Examines Critical HSE Issues

John Donnelly, *JPT* Editor

How well the oil and gas industry is doing in the critical areas of health management, safety, environmental stewardship, security, and social responsibility were thoroughly examined at the 9th SPE International Conference on Health, Safety, and the Environment (HSE) in Nice, France. More than 63 countries were represented at the conference, which included operators, service companies, academia, medical and health professionals, and nongovernmental organizations (NGOs).



Contie

Attendees acknowledged that just as producing oil and gas today is more challenging, so too is meeting HSE expectations in an age in which such issues as climate change are at the forefront of contemporary political debate and public discussion. "We have to be aware that the world is expecting more from us," said Michel Contie, the conference's General Chairperson and

Northern Europe E&P Vice President for Total. He opened the conference with an overview of the current landscape and the roadblocks to achieving "sustainable excellence."

Growing global demand for hydrocarbons, a graying talent pool, an aging infrastructure—these issues challenge the HSE sector just as they challenge industry profit centers such as drilling and other aspects of exploration and production. For the industry to create a truly excellent HSE culture, managers must make this a "part of the DNA of the company," Contie said, and must institute a zero-tolerance policy toward HSE transgressions. Setting the tone of company culture must come from the top.

Progress has been made in safety but the industry could use new technologies to improve processes and do a better job in training, he said. Health issues will likely play a more prominent role in the future because of the general aging of the workforce and the increase in operations in developing areas. But there are reasons to be optimistic, he said. In the past, when the industry has faced big challenges and held a common interest it has succeeded in overcoming difficulties. He predicted the industry would maintain, and even improve on, its high standards even in light of the current personnel challenges the industry confronts.

Behrooz Fattahi of Aera Energy, SPE's Vice President Finance and the nominee for 2010 SPE President, welcomed delegates to the conference. How the industry performs on HSE issues plays a critical role in forming its global image, he said. He noted how this international HSE conference had

grown in stature since its inception almost 2 decades ago. "Never have global expectations for the oil and gas industry been so great," Fattahi said.

Also speaking at the opening session, Chuck Taylor, Vice President of Health, Environment, and Safety for Chevron, agreed that rising energy demand is shaping all facets of the industry, including HSE. And with increased stakeholder expectations from host governments and the public, the industry must maintain high HSE standards even if it is more difficult. "To deliver sustainable excellence we have to make all three pillars of health, environment, and safety more stable," he said.

In the future, companies will need to strengthen workplace health and wellness programs and pay more attention to ensuring that employees can meet the physical and mental requirements of their jobs, he said. In regard to the environment, the industry "must be unrelenting" in pursuing excellence even as it tries to produce more hydrocarbons in more difficult areas. He noted that in a project in Angola that involved Chevron, Sonangal, BP, Eni, and Total, sensitive areas were identified early that might have an impact on the local community. Such projects must include stakeholder engagement in the earliest part of the development, he said.

In regard to safety, excellence strengthens the industry's image and makes for more efficient operations. In general, high safety standards lower costs, create value, protect assets, and protect people. "Safety must become an innate value," he said. "There is no room for compromise. It's not about statistics. It's about keeping our people safe."

Rounding out the opening session, Bernard Anne of Bureau Veritas emphasized that because the industry is cyclical, flush times like the present offer opportunities to make investments in people and processes that will pay dividends later. There is a public expectation now that the industry will pursue preservation of the environment, social responsibility, profitability, and long-term planning in a balanced way, benefiting all.



Garland

The opening plenary session examined these challenges and expectations in more detail. It was moderated by Emmanuel Garland of Total, SPE Director of Health, Safety, Security, Environment, and Social Responsibility, and Simon Mitchell of Schlumberger.

Charles Bowen, Executive Director of the International Association of Oil and



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Bowen

Gas Producers (OGP), said the three foremost challenges facing the world today are climate change, nuclear proliferation, and demand for energy. He gave an overview of OGP's latest annual report on safety performance, an industry standard. "The numbers continue to show improvement but are not what we or the world would call excellent," he said.

In 2007, 87 industry fatalities occurred—76 involving contractors—which was 28 fewer than 2006. There were 75 separate incidents. "Clearly as an industry we are still getting things wrong" because so many injuries and fatalities are taking place, he said. The primary cause of fatalities did not involve core activities but vehicle accidents.

Two issues on the horizon raise additional safety concerns, he said—the age of facilities and the rise of less experienced people in the industry. Going forward, the industry should aspire to excel through steps, ensuring competency and dependability at all levels in the organization. And the industry must not lose the benefits of lessons learned. The Piper Alpha disaster, which killed 167 people, was a watershed event, but how many remember or know the lessons learned from the incident 20 years later, he asked. The route to excellence must involve leadership, better training, simplicity and standardization in operations, and competence and dependability at all levels.



Naughton

Eamonn Naughton, Vice President of BP Exploration and Production, recalled how the 2005 accident at BP's Texas City refinery, which took 15 lives, was a "defining moment" for the company. From the disaster, BP learned the importance of:

- Ensuring that safe, reliable operations are the number one priority every hour of every day.
- Improving site capabilities to identify and mitigate risk, personal as well as technical.
- Reducing organizational complexity and driving greater standardization.
- Providing groupwide capability and competency programs.
- Providing clarity and help around expected leadership behavior.

BP is focusing on "getting the basics right," he said, which includes examining equipment integrity; ensuring that the correct systems and processes are in place; and emphasizing safety competence, culture, and leadership.

Carbon Capture Prospects

In a special panel session on "Carbon Capture and Storage (CCS): How to Make a Dream Come True," panelists concluded that CCS technology appears to be becoming routine but the regulation is uncertain, as are the potential costs.

Kai Bjarne Lima, Vice President with StatoilHydro, said several CCS projects are in operation around the world and several more are in the initial phases of operation. Storage capacity appears to be more than enough to take care of

current emissions, but more studies are needed, he added. StatoilHydro has been a pioneer in regard to CO₂ storage, starting with the Sleipner field project in 1996, where storage occurs in a saline aquifer above a natural gas reservoir. The "capture" part of CCS is the most expensive, he said, eating up 60 to 80% of the total cost. Transportation and storage each account for 10 to 15% of the cost.

John Kantorowicz, Appraisal Team Leader (Eastern Hemisphere), CO₂ Storage Team, BP, said that the transportation and subsurface injection of CO₂ is common today. BP established the Carbon Mitigation Initiative in 2000 at Princeton University to research the scientific, environmental, and technological issues that will determine how carbon is managed in the future and to examine the various policy impacts. Ford Motor Company also has joined the project.

The most common method of injection today occurs in enhanced oil recovery (EOR), in which CO₂ is injected to push oil to an existing well that can be produced. This provides an economic benefit in addition to addressing the problem of storage. EOR provides the first step toward a CCS business but it is limited by scale and geography. BP has a track record with this type of project, Kantorowicz said, injecting a significant amount in west Texas and also at the Salah project in Algeria. Saline formations show great potential for CCS as demonstrated in the Sleipner and Salah projects, he said.

Offering an overview of CCS regulation, David Williamson of ERM said the European Union breaks down the regulatory process into three areas: capture, transportation, and storage. A key decision will be if storage is defined as "waste." If it is, he said, regulation will become more complicated.

Current legislation regarding storage in landfills or for chemicals may not be applicable to CCS, Williamson said. New legislation may be the best option but there are questions about whether it will be publicly acceptable in all of the different EU member states. Lack of public acceptance could be a "deal breaker" regarding CCS technology development, he said. Part of the problem is that the public and some NGOs would rather see money spent on renewable energy rather than on CCS technology, which they view as prolonging a hydrocarbon-based economy.

The panel agreed that the two key industry sectors involved in CCS are the E&P and the power sectors, with the single largest source of CO₂ being coal-fired power stations. In the future, the E&P sector will likely focus on transportation and storage, particularly storage.

Climate Change Issues



Bennaceur

Another panel, on "The Future of Oil in a Carbon-Constrained World," examined how the issue of climate change will affect the oil and gas industry. Kamel Bennaceur of the International Energy Agency predicted that CCS is critical for a sustainable energy future. Although EOR represents an early opportunity to implement CCS, it probably will not dominate storage in the long run. Deep

saline formation injections below 1000 m will be the main type of storage in the future, he said.

Bennaceur said his organization theorizes that most of the world's energy will continue to come from fossil fuels in 2050 and that CO₂ emissions can remain at today's levels by 2050 with incentives. Power generation can be substantially decarbonized by 2050, he said.

Climate change concerns are affecting oil and gas operations, said David White, President of Carbon Services for Schlumberger, and the public policy trend appears to be moving toward cutting CO₂ emissions, improving energy efficiency in general, and seeking alternatives to fossil fuels. Many oil and gas technologies are applicable to CCS but the main challenges to CCS are not only technical, but economic, legislative, and winning public acceptance. The public perception of CCS is not encouraging, he said, agreeing with Williamson in the CCS panel that the public sees CCS as delaying the use of renewable energy sources. It also has concerns about storage leakage.

But the oil and gas industry should go forward with several steps now, including:

- Testing and improving CCS technologies
- Becoming engaged in the legislative process
- Engaging the public, NGOs, and academia in discussion about CCS potential
- Funding demonstration projects to prove CCS technology and its safety.

Raphael Vermeir of ConocoPhillips also advocated moving forward with CCS technology. "If we don't take action, we will be seen as part of the problem," he said, even though many may view oil industry action in reducing carbon emissions as just a public relations effort.

The industry, in fact, has a lot to offer on this subject, he said. It knows complex issues, it knows technology, and it knows how supply chains work. And if the industry does not get engaged in this discussion now then it may not have input on new policies and regulations. "In short, we need to take a seat at the table and this is something we have not done in the past," Vermeir said. The industry should begin building a bridge to 2050 that includes developing CCS, emerging technologies, alternative fuels, and more efficient operations. In 10 to 20 years, there will be new businesses created that are associated with climate change.

A separate panel on "The Challenges of Greenhouse Gas (GHG) Emissions in the Upstream Business" brought together several experts to discuss the challenges the industry faces in emissions from initial E&P to final product.

Bent Svensson, Program Manager at the World Bank Group, said gas flaring remains a major source of global emissions, with most flaring occurring in Nigeria, Russia, and Iran. An estimated 150 to 170 billion cubic meters of gas is flared annually. The flaring is partially explained by gas infrastructure limitations and, frequently, an undervalued market for gas. The World Bank has undertaken an initiative to reduce flared gas globally, he said, and many operators have signed on to the project. The Bank plans to establish a global standard for gas flaring reduction.

Garry Mann, General Manager of HSE for Nexen, described the GHG challenges associated with production of Canadian oil sands. Currently, oil sands are produced using steam-assisted gravity drainage or, less frequently, through a cyclic steam process. Other technologies are being piloted, includ-

ing toe-to-heel air injection. In the life cycle of an oil sands project, generally 10% of the emissions are associated with production, 20% with the upgrading process, 15% with refining, and the rest end use by the consumer.

Conference Summary



Arscott

At the end of the conference, program committee cochairpersons Emmanuel Garland and Simon Mitchell and members of the conference program committee reviewed the major themes and topics of the conference. Lyn Arscott, a past SPE president, former executive director of OGP, and retired director of HSE for Chevron, presented the results of a survey of members of the conference organizing committee on what they think has been the progress made in the industry over the past decade and where they think more effort should be made in the coming 10 years. Arscott, who has played a prominent role in SPE's international HSE conference since it debuted, also compared the survey results with surveys taken at previous HSE conferences.

Looking back, the decade of the 1960s was when the industry became more aware of many HSE issues, while the 1970s was a decade of environmental regulation and the 1980s a decade that saw the industry put many management systems in place to coordinate compliance and improvement in this area, said Arscott. The 1990s were marked by improved performance, better reporting and transparency, and dialogue on best practices. Currently, the industry is concerned with the issues of corporate social responsibility and sustainable development. Although definitions of sustainability vary, it generally means achieving a balance among social, economic, and environmental demands, he said.

According to the survey, the most progress that has been made is in compiling environmental impact statements, in safety and environmental performance, and in employing HSE management systems, among other areas. Ranking lower were progress on carbon capture, reducing GHG emissions, occupational health, and biodiversity programs. The survey recommended that a key area for regulators to employ future effort is in helping combat corruption and ensuring that regulations are based on solid science. For NGOs, top priorities should be helping achieve a balance between economics and environmental concerns and contributing to a constructive dialogue involving industry and government.

The oil and gas industry appears to be beginning a transition that could last several decades, bridging the hydrocarbon age to one in which alternative fuels play a prominent role, Arscott said. HSE professionals must ensure that the industry gets through this transition safely while protecting the environment, he said.

Technical Presentations

Technical papers covered a variety of issues critical to health, safety, the environment, security, and social responsibility. Among the highlights:

- Eni reported on the creation of its health impact assessment, which measures the potentials risks and benefits that

Key Themes Emerge From Conference

Members of the conference Program Committee identified several key themes and messages that emerged from the various conference sessions and discussions that occurred over the 3-day event. These areas of progress in addition to those needing attention are summarized below.

- **Management**—Visible leadership on HSE issues is critical to the industry. Discernible progress has been made in safety, environmental stewardship, and other areas but the industry cannot afford to get complacent. Integration of effective HSE practices remains a challenge but successful HSE performance is linked to good business practices.

- **Safety**—Among the critical challenges are the industry's aging workforce and infrastructure and ensuring competency in an era of rapid growth. Improvement in safety measures appears to have plateaued. The industry must ensure that it is using the right measures so that definitive progress can be tracked and made.

- **Environment**—The industry needs to take action regarding climate change and reduce its contribution to CO₂ emissions. It should develop CCS systems to mitigate emissions not only in E&P operations but also in operations outside the oil industry. Definite improvements have been made in the number of discharges and in oil spill response. The industry should move toward the use of more "green" chemicals.

- **Social responsibility**—Companies must increase their questioning of governments in countries where they operate, particularly in regard to human rights policies. Potential problems involving social responsibility should be identified at the beginning of any E&P process.

- **Health**—The industry needs to improve health reporting. Progress has been made in epidemiologic studies and those findings must now be implemented. Occupational hazards should not be underestimated. Worker stress and fatigue should be part of risk management.

Members of the conference Program Committee included: Emmanuel Garland, Total, and Simon Mitchell, Schlumberger, Program Committee Chairpersons; Alexander Barbey, Schlumberger, and Clarion Johnson, ExxonMobil, Health Subcommittee Chairpersons; Tom Knode, Halliburton, and Rod Ritchie, OMV, Safety Subcommittee Chairpersons; Claudia Gnecco, BP, and Luiz Molle Jr., Petrobras, Environment Subcommittee Chairpersons; Michael Denkl, WesternGeco, and Roland Moreau, ExxonMobil, HSE Management Subcommittee Chairpersons; Barnaby Briggs, Shell, Jean-Marc Fontaine, Total, Social Responsibility Subcommittee Chairpersons; Lyn Arscott and Terry L. Thoem, Thoem & Associates, Advisers; and Antoine Augustin, Gaz de France, and Lee Turner, M-I Swaco, Knowledge Sharing Subcommittee Chairpersons.

operations will have on local populations and communities. Projects are screened to determine whether an assessment should be undertaken. Several factors are considered in this process, including geographic location, historical precedents, known hazards of the project, and public health services. The company performs the assessment in steps, initially conducting a health baseline study, then assessing the likely impact of the project, setting priorities, making recommendations for mitigating health impact and health risk management, and reporting the results. Such assessments have been performed for projects in Kazakhstan, where the Kashagan field is being developed, and at the Eni Congo project, where a power plant and gas pipeline are being built. The company believes it has established a systematic approach to occupational health activities and medical support programs and has begun to create a fully integrated approach to strategic health management.

- With GHG emissions trading and reporting systems becoming commonplace, the industry must focus on the accuracy of the data being recorded and reported. Representatives from the American Petroleum Institute, BP, and the Levon Group note that the accuracy of calculating emissions is limited by the uncertainty of the estimates of the largest contributing sources. Several activities are currently taking place, including efforts by industry associations and the US Environmental Protection Agency, to examine the key sources of uncertainty in the data and consider how to lower data uncertainty.

- Halliburton undertook a study of employees and found a strong correlation between employee engagement and improved HSE, operational, and financial performance. Factors that influence employee engagement and whether workers feel valued by the company include career development, training, the company's direction, support from supervisors, and reward and recognition. Among the conclusions of the study were that employee engagement levels are predictors of business and HSE performance and improved employee retention, and that developing the right competencies provides a key link between employee development opportunities and operational results.

- ExxonMobil Production Company, through a better understanding of an operations integrity management system (OIMS), achieved more consistent and effective execution in business unit and field operating levels. Two dozen management systems were developed by the company that specify what needs to be accomplished to meet OIMS objectives. Several tools were then developed for each system to increase execution effectiveness, including a system summary communication, process/procedure road map, roles and responsibilities matrix, and a continuous improvement and stewardship plan.

- Companies often put great effort into investigating the cause of industrial accidents and trying to ensure that they do not happen again, but how well do companies embed learnings from such events into the company culture? Representatives from Shell International Exploration and Production reported on an investigation into the successes and failures of the learning from incident (LFI) process and offered several steps to improve the process. Among the recommendations: identify LFI coordinators at various



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Knowledge Sharing Winners Take Honors

For the first time, the international HSE conference introduced a new approach to poster presentations designed to promote discussion and interaction among authors and participants. These “Knowledge Sharing Sessions,” which included both classic posters and laptop presentations, allowed informal sharing of best practices and encouraged networking.

At the end of the conference, the conference Knowledge Sharing Subcommittee awarded trophies to the best presentations in each of five categories. Winners were:

- Health—*The Design and Value of a Medical Fitness-for-Duty Program* (SPE 111751) by S. Frangos, Chevron; T. Bardarson and R. Bunch, ISR Institute.

- Safety—*Health and Safety for Families, Youth, and Community* (SPE 111928) by T. McTague, S. Mitchell, M. Brice, and K. Costelloe, Schlumberger.

- Environment—*Microwave Treatment of Oil-Contaminated Drill Cuttings at Pilot Scale* (SPE 111637) by J. Robinson, S. Kingman, and C.E. Snape, University of Nottingham; M. Bradley, University of Greenwich; S. Bradshaw, University of Stellenbosch; P.W. Page, BP; and D.J. Thomas, BG Group.

- Social Responsibility—*Keeping the License To Operate Through Sustainable Community Environmental Education and Relationship Building Filings Within the Oil and Gas Industry* (SPE 112002) by K. Ragoonanan-Jalim and T.P. Kalpee, BP.

- HSE Management—*Measuring Return on Environment* (SPE 111982) by J.M. Marshall, M.A. Serwinowski, T.M. Duong, and G.R. George, MetaVü.

company levels to filter and distribute alert information; have an LFI review team regularly review incident trends and propose ways to capture learnings in existing systems and processes; issue action alerts to target audiences; issue leadership alerts to senior leaders to increase awareness of underlying causes; and develop interactive alerts for the “shop floor” target audience.

- Finding and using good data to mark and improve HSE performance is a common topic and valuable industry need. A paper coauthored by representatives of OMV and Syntex Management Systems concluded that combining a large global data set with appropriate statistical methods can determine factors that truly affect performance outcomes. Several companies are efficiently consolidating such data involving outcomes and work practice behavior to determine leading and lagging indicators. Noting leading indicators should be as important as incident rate compilation and should include management objectives and key performance indicators.

- Woodside described its attempt to implement a holistic and integrated behavior approach to improve its safety cul-

ture. It has developed a competency framework for safety behavior and provided a common language and understanding of safety culture to employees, but allowed flexible application of the standards across different units.

- International E&P projects must now include managing and appreciating stakeholder, community, and social concerns. Success hinges on the balance between international best practices and local leadership of stakeholder engagement programs. Although few host country social experts are aware of some of these developing practices, they remain in the best position to execute these programs because they are closer to the culture and community. International oil companies must make a better effort in educating best practices to local consultants. Using a series of case studies, authors from McGill University and Acorn International showed how the challenge of effectively managing stakeholder engagement programs can affect development projects and offered recommended approaches.

- OGP gathers industry data on several environmental issues including gaseous emissions, aqueous discharges, nonaqueous drilling fluids on drilling cuttings, oil and chemical spills, and energy consumption. Data have been collected over the past 8 years and includes information from more than half of its members, representing a robust system of data collection and reporting. Future challenges for further improving the system include expanding company participation, particularly from national oil companies, and developing a more authoritative statement of industry performance in these areas.

- Total E&P reports on environmental performance through an extensive set of quantitative and qualitative indicators at every site. The collection and management of the data is done in real time through a new integrated reporting system that is supported by web-based tools. Such a reliable reporting system is essential because of the evolution of regulations and complexity of operations.

- Several operators, service companies, and third-party providers have joined together to evaluate contractor HSE performance. In 2005, a project was launched to create a standardized HSE questionnaire under the American Petroleum Institute’s Petroleum Industry Data Exchange Committee. Authors representing OFS Portal, Halliburton, BJ Services, Baker Hughes, Chevron, Devon Energy, ExxonMobil, and Schlumberger reported on the project’s development and progress. In the first phase, companies reviewed current questionnaires often sent to contractors that attempt to evaluate their policies, management systems, and statistical performance. The questionnaires were edited and amended in an attempt to create a standardized one, a process that took one and half years. The second phase of the project created an electronic message capability that allows companies to exchange information efficiently and allows contractors to provide data and respond to requests for information.

Papers delivered at the conference can be found in the society’s eLibrary at www.spe.org. More industry and SPE information on the HSE discipline can be found at www.spe.org under Industry/Technical Resources.

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