"The funding for this initiative was provided to establish an institute that would operate independently of the Department of the Interior while also supporting and enhancing Departmental programs through collaborative research and development and training to help identify operational improvements in the areas of offshore drilling and production safety and spill prevention. This is an effort to establish an institute that can work with academia, the oil and gas industry, regulators and non-governmental organizations on the extremely important issues of increasing worker safety and environmental protection during the exploration, development and production of the nation’s valuable offshore oil and natural gas resources."
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A Message from the Principal Investigator

The recent global downturn in the energy market has placed considerable strain on the energy companies and associated businesses worldwide. Energy companies have been faced with decreasing revenues. This has led to an ever-increasing loss of production, shutdown of production operations, an increase in part-time and temporary work, outsourcing and subcontracting, especially for latent business functions. Pressure to cut jobs and business infrastructure costs has been considerable and many companies have “descalled” and reprioritized business functions. An important question is the effect of these external changes and pressures on the process safety performance. As we have learned from past events, the need to maintain the energy and focus on process safety programs and activities is even more important during these downturns. Often times, lack of focus on safety programs and activities directly result in undesired events or embedding of latent flaws that ultimately materialize as catastrophic events later. In addition, an organization that avoids unreasonable cutbacks, and keeps its operations functioning in a sustainable shape, is also able to take advantage of the upturn in the economy which is certain to occur in a reasonable timeframe.

Process safety programs become ever more important during an economic crisis because it can protect and promote better health and this can lead to increases in labor supply and productivity. While there may be universal agreement on this issue, the question is how to make this happen. In answering this question I am again reminded about the emphasis and importance of “core values” and the role of “leadership.” A company with good safety culture will hold on to the much needed process safety programs and activities as “core values” even during downturns. These organizations handle budget cuts and spending restrictions based on a well-thought risk-based approach, as opposed to across the board cuts.

I have written about the role of “leadership” in creating and maintaining a good safety culture (see MKOPSC newsletter, Centerline, Spring 2015). This leadership role is even more important in maintaining the focus on process safety programs during downturns. Leaders must realize and help others understand that successful process safety management is not a project but a long journey. Success and compliance with process safety programs requires continuous efforts, continuous assessments, and vigilance. Leaders must help empower and bring everyone together in the process safety journey. Leaders help create a positive safety culture, and one important characteristic of a positive safety culture is that, safety is viewed as core value, not as a priority. Safety can never be prioritized, because priority changes with time, particularly during economic downturns. In contrast, core values never change; instead, they only get strengthened over time. And finally, successful leaders realize and inculcate the culture in the organization that safety is a journey and will continue forever, that road is never ending, requiring the utmost vigilance at all times.

My hope is that the current downturn in the energy industry will be marked with increased awareness about hazards and safety programs, continued emphasis on safety values and standards, maintenance of safety-critical activities, transparent communication about the impact of cost cutting measures up and down the leadership, and the effective use of management of change to fully understand the impact of changes. I am sure adherence to core values and strong leadership will help us ride this energy downturn with a strong performance in process safety.

M. Sam Mannan
A Message from the Director of Operations

Howdy!

2015 has been a great year as we continue to move forward with maturing OESI and developing opportunities for involvement from all of our stakeholder communities. Our three Forums provided the opportunity for much needed dialogue on critical ocean energy topics; and will help inform the path forward for the industry and regulator. We also began new research efforts in areas identified as topics of interest by the stakeholders. These ongoing efforts will be shaped through further discussion with the ocean energy community. However, the biggest event from my perspective was the establishment of our Advisory Committee. We now have representation from all stakeholder communities; industry, academia, federal agencies, and non-governmental organizations. The Advisory Committee continues to develop its and OESI’s path into the future; a future that will help enable us to ‘further enable safe and environmentally responsible ocean energy operations.’ I look forward to building on the momentum of success in 2015, and carrying that into 2016 and beyond. I continue to be honored to be part of this critical industry for our nation’s secure future.

I remain, very respectfully yours,
2015 Efforts

2015 began with the establishment of our Advisory Committee. This was a foundational accomplishment in order for OESI to accomplish its mission of bringing together the many stakeholders of the ocean energy communities. We finished the year with 37 members on the AC, with representation from all communities; industry, academia, federal agencies, and non-governmental organizations. Additionally, the initial leadership of the AC was voted on, and Dwight Johnston, of Shell, was selected as the Chair; while Curtis Jones, of Schlumberger, was voted to be the Vice.

In early 2015, OESI received tasking from the Director of BSEE to undertake four additional efforts. The first effort is to conduct an ‘Analysis of Equivalency of International Practices’. Comparing the regulatory schemes of BSEE, UK HSE, and PSA; we are comparing and contrasting them as well as identifying the common underlying themes of these three primary offshore safety and environmental organizations. The second objective is to investigate the need for further research effort in the areas of material hardness of subsea bolts and fasteners; and design of shallow liners and sub mudline casing hangers. With participation in an industry JIP on bolt hardness and with new collaborative research on zonal isolation, OESI will address this topic. The third desire of the Director is to continue having Forums for Dialogue in 2015, of which we held three successful days of discussion. And the last topic is to develop an Offshore Safety focused Technology Challenge for Gulf Coast high schools. Members of the Advisory Committee will help judge these projects with a winner announced at OTC 2016.

With discussion in 2014 on the topic of ‘Data Sharing’, a task was developed for OESI to develop an inventory of safety databases. The “Ocean Energy Safety Database Inventory” was developed and published during the summer of 2015. This publication brings together many of the existing worldwide safety and reliability databases into one place, and discusses them from a perspective of content and industry use.
2015 Efforts, more

Throughout the year we continued to ensure that the efforts of OESI were coordinated and aligned among the team. We have taken the opportunity to conduct periodic leadership off-sites, where the core OESI team can meet and discuss plans and priorities. This year we have taken the opportunity to gather in Houston, Austin and College Station. During these offsite meetings we have learned more about each partner university’s research capabilities, and have laid out our initial areas of research. Based on discussions at the OESI Forums and with BSEE, three initial areas of research have begun: New Materials, Human Factors, and Well Integrity/Zonal Isolation. These three areas are being developed as collaborative research opportunities between the OESI partner universities. Additionally, we are working with Advisory Committee member Maersk Drilling to look at cognitive fatigue among their drill crews. This research is facilitated by OESI, in bringing together research expertise to answer an industry need.

As we continue to develop relationships with other industry organizations, OESI has joined many industry-led workgroups. Of note, we are participating on the Steering Committee of the jointly-led SPE/BSEE Safety Data Sharing Summit; and in the API group updating RP75 on Safety and Environmental Management Systems.

Additionally, we have begun efforts to develop training for the regulator, the third mission area for OESI. We are working with industry and academic experts to ensure the training delivered is focused on the latest efforts and capabilities. We expect to deliver this training capability early in 2016.

The outreach portion of our mission continues, with over 200 meetings of groups and organizations representing all stakeholder communities in the ocean energy safety realm. Each discussion is another opportunity to share lessons learned, best practices, and better understand areas for further future efforts of the OESI Team.
Forums for Dialogue

One of the primary missions of OESI is to provide an opportunity for ocean energy stakeholders to dialogue, share ideas, and identify areas of further investigation. In 2015 we successfully conducted three Forums and were able to host a presentation by BSEE.

Our first Forum of 2015 discussed Human Factors, “Decreasing Ocean Energy Safety Incidents through Greater Incorporation of Human Factors and Human-Systems Integration”.

The next Forum was on the subject of shallow-water operations and specifically looked at “Maintaining a High-level of Focus and Increasing the Safety Culture in the Shallow Water Operating Environment”.

The third Forum of 2015 addressed the Safety and Environmental Management System (SEMS) and what it could be in the future; “Taking Safety and Environmental Management Systems (SEMS) to the Next Level”.

Additionally, OESI had the opportunity to host BSEE in their presentation of the ‘Draft Best Available and Safest Technology (BAST) Determination Process’

Presentations from and summaries of these events can be found on the EOSI webpage.

We continue to work with our stakeholders to address areas of further investigation from these events; as well as developing topics for Forum dialogue in 2016.
Areas of Research

With ‘collaborative research’ as one of the three pillars of the OESI mission, we began three areas of research partnership this year. These three areas were determined by the OESI Leadership and are informed by Forum discussions and results, as well as stakeholder areas of concern. Future research efforts will build on the learnings of these initial efforts. The three areas of initial OESI collaborative research are:

- New Materials
  (University of Houston, and Texas A&M University)
- Human Factors
  (Texas A&M University and University of Texas)
- Well Integrity/Zonal Isolation
  (University of Texas and University of Houston)

New Materials in Support of Offshore Operations

Research Statement
To develop, test and validate new materials that support offshore operations and help improve the safety and reliability of exploration and production

- Research Challenge: New/Superior Materials: metal alloys, corrosion, HPHT materials, elastomers, structural health monitoring, integrated sensor, polymers
- Engineered materials offering improved properties allowing for new designs of offshore structures and operational components such as risers, etc. need to be developed. Serious barriers such as material and fabrication costs, needed design innovations, and the reliability, repair, and inspection of advanced engineered materials need to be addressed.

Research Plan
- R&D work will be coordinated between UH (R. Krishnamoorti, PI, 1.0 FTE) and TAMU (H. J. Sue, co-PI, 0.5 FTE), $80K total budget
- Developed a plan to develop, test and validate advanced polymeric materials for HPHT and Corrosive Environments
- Specifically focus on the development & testing of Polyaryletherketones (PAEK) based composites

 Desired Value to Stakeholders
Developing corrosion resistant materials that can be exposed to HPHT conditions remains a significant materials challenge for the industry and is a significant area where applied and realistic materials development along with basic scientific advances can make rapid progress. Both PI and co-PI are engaged in developing advanced materials for extreme environments and bring unique fundamental and applied expertise to address these challenges.

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...enabling safe and environmentally responsible offshore energy operations
Human Factors in Support of Offshore Operations

Research Statement
To conduct focused, applied research that inform a reengineering of the design lifecycle to include Human Systems Integration and Human Centered Design.
- Addresses possible Human Factors (HF) issues associated with:
  - Workplace and interface design: fatigue, situation awareness, human machine interface design (for both rig & control room operators), decision support, effective procedure design for comprehension/adherence, etc.
  - Organizational and culture: leadership, safety culture, training, hiring practices, etc.

Research Plan
- R&D work will be coordinated between TAMU (S. C. Peres & M.S. Mannan, PIs, 0.5 FTE each) and UT Austin (R. Bias, co-PI, 0.5 FTE), $80K total budget.
- Plan being developed for independent, applied research into possible Human Factors (HF) issues that are associated with increased risks for incidents. Research will be done in collaboration with industry partners to allow for directly applicable findings.

Desired Value to Stakeholders
- Estimates indicate that US on & offshore facilities have had a major catastrophic event every ~1.77 years for the last 40 years and that 95%+ of these had direct human involvement in the cause.
- TAMU and UT Austin intend to conduct applied research in conjunction with industry partners to identify what HF findings need to be incorporated into design and leadership practices to mitigate the likelihood of these incidents.

Drilling Safety – Zonal Isolation Overview

Research Statement
To conduct meaningful, applied research and technology development that helps to improve the integrity and reliability of casing and cement barriers in offshore wells
- Addresses BSEE Director Salerno's grand challenge on integrity of shallow liners and sub mudline casing hangers, and BSEE concerns about cementing
- Addresses issues associated with achieving, maintaining and verifying lasting zonal isolation (ZI) in offshore wells. Note that ZI problems are historically the leading cause of offshore blowouts, and were a lead cause of the Macondo/DW Horizon event

Research Plan
- R&D work will be coordinated between UT Austin (E. van Oort, PI, 1.0 FTE) and UoH (V. Cumaraswamy, co-PI, 0.5 FTE), $80K total budget
- Plan being developed for independent, applied basic R&D into hanger reliability and improving the quality of offshore cementations, addressing such issues as improved displacement & cement placement, minimizing cement contamination, etc.

Desired Value to Stakeholders
- Very little independent ZI R&D work is currently ongoing in the industry. UT Austin and UoH intend to execute original work with a strong applied focus to help deepwater operators improve their cementations, particularly across high-pressured / hydrocarbon-bearing zone, and be able to verify their barriers (cement, hangers, seals) better. This will help them improve drilling safety and reduce their exposure to uncontrolled well events.
Communications

We continue to communicate OESI’s message through a number of means.
Our primary method is our webpage at oesi.tamu.edu, which is updated to reflect information and products as they are available.
Our newsletter, OceaNews, is a periodic publication that provides a synopsis of recent events, research efforts, and stakeholder perspective and capabilities.
Our LinkedIn page provides the opportunity for ongoing virtual dialogue and idea sharing.
Leadership

Principal Investigator:
Dr. M. Sam Mannan
TAMU, Regents Professor
Executive Director,
Mary Kay O’Connor
Process Safety Center

Co-PI:
Dr. Ramanan
Krishnamoorti
University of Houston
Chief Energy Officer

Co-PI:
Dr. Eric Van Oort
University of Texas-Austin
Petroleum Engineering

Co-PI:
Dr. Rashid Hasan
Texas A&M University
Larry Cress Fellow

Director of Operations:
James Pettigrew,
CAPT, USN(Ret)

Program Manager:
Paul Robinson
Advisory Committee

**Chair**
Dwight Johnston
Shell

**Vice**
Curtis Jones
Schlumberger

Kevin Renfro
Anadarko

Mike Payne
BP

Sandi Fury
Chevron

Kevin Dillow
ExxonMobil

Will Pecue
Taylor Energy

Mike Andres
Maersk Drilling

Bob Blank
Noble Drilling

Mike Lawson
Rowan Comanies

Jose Guiterrez
Transocean
OESI by the Numbers
2015

1015 LinkedIn Membership (from 320 in January)

>400 attendees to OESI Forums and hosted events

$585K additional funding received for directed projects

>800 subscribers receiving OESI electronic media

>200 outreach meetings
OESI’s initial funding of ~$5M has been budgeted to support operations and research through 2018. Our obligations and expenditures continue to be within guidelines and milestones set out in our initial contract with the Department of Interior. Additional funds received to date are for the accomplishment of specific tasks from the Bureau of Safety and Environmental Enforcement.
Way Ahead

As OESI moves into 2016, our focus remains on our three primary mission areas; creating dialogue, collaborative research, and training. In addition to continuing and building on the successes of 2015, there are a number of topics that we must continue to address. Specifically, we look forward to continuing to mature the Advisory Committee process. It is very important that all stakeholder communities are involved in the decisions and priorities for OESI efforts. The ability to develop and execute Forums; develop, prioritize and identify funding for future collaborative research, that address Industry issues, can only be accomplished with the involvement of the AC.

Additionally, as we enter the mid-point of the five year contract with BSEE, it is imperative that we identify sustainment paths for the ‘future’ OESI. We look forward to working with the Advisory Committee on courses of action for the transition and sustainability of the Ocean Energy Safety Institute.
The Ocean Energy Safety Institute (OESI) is a collaborative initiative between the Texas A&M Engineering Experiment Station’s (TEES) Mary Kay O’Connor Process Safety Center, partnering with Texas A&M University, University of Texas and University of Houston. The institute provides a forum for dialogue, shared learning and cooperative research among academia, government, industry, and other non-governmental organizations, in offshore energy-related technologies and activities that ensure safe and environmentally responsible offshore operations. While there have been efforts to identify scientific and technological gaps and to recommend improvement of drilling and production equipment, practices and regulation, the OESI will strive to coordinate and focus these products. Initial funding of the Institute came from the Department of the Interior and the Bureau of Safety and Environmental Enforcement (BSEE).

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