DEPARTMENT OF THE INTERIOR
OCEAN ENERGY SAFETY ADVISORY COMMITTEE
HOUSTON, TEXAS
APRIL 26, 2012

MEETING MINUTES

The Ocean Energy Safety Advisory Committee (OESC) held its fourth meeting on April 26, 2012, at the DoubleTree by Hilton Houston Intercontinental Airport Hotel, 15747 John F. Kennedy Boulevard, Houston, Texas 77032.

The meeting agenda (Appendix I) focused on reports and interim recommendations from the four OESC subcommittees.

Thirteen of the fifteen Committee members were in attendance (Appendix II). The two Committee members who were not present during the meeting represented the academic community and the offshore energy industry, respectively.

In accordance with the provisions of the Federal Advisory Committee Act, Public Law 92-463, the meeting was open to the public from 8:00 a.m. to 5:30 p.m. on April 26. Approximately 60 members of the public and press were in attendance (Appendix III).

The meeting was called to order by Designated Federal Officer (DFO) Joseph R. Levine after establishing quorum. He then introduced DOI Bureau of Safety and Environmental Enforcement (BSEE) Director James R. Watson to offer remarks and OESC Chairman Thomas O. Hunter to lead meeting proceedings.

Director Watson (BSEE) discussed the status of BSEE's evolution since the reorganization; changes in policy focus, upcoming rulemaking, hiring and organizational structure; and BSEE's responses to internal and external reports since Deepwater Horizon (Appendix IV).

Subcommittee Reports and Interim Recommendations
Oil Spill Prevention Subcommittee

OESC Member Christopher A. Smith (Department of Energy – DOE) presented the Oil Spill Prevention Subcommittee's activities to date in Appendices V and VI. He highlighted the Subcommittee's three vectors and related focus areas:

1) Research and development (R&D) needs to occur within academia, government, and industry. R&D should be areas such as blowout preventer (BOP) interface standardization, acoustic-based trigger controls, and well management/BOP functionality.
2) Automated systems and instrumentation. Discussion of the usefulness of operators utilizing automated systems and instrumentation.
3) Use of regulation enforcement systems to improve BSEE's ability to prevent spills. This topic would include developing standards for best available and safest technology.

Focus areas: BOP design, operation, and certification; well control training; production requirements; balance between performance-based vs. prescriptive-based regulations; and enforcement strategies and resources.

Subcommittee Reports and Interim Recommendations
Oil Spill Containment Subcommittee

OESC Member Richard A. Sears (NGO) addressed the Oil Spill Containment Subcommittee's activities to date in Appendices VII and VIII. He highlighted the Subcommittee's three vectors:

1) Organizational and system readiness in efforts of containment/deployment of the containment capabilities.
2) Workshop on the subject if underground blowouts, surface migration of hydrocarbon and seafloor broaches. This effort would bring together academics and industry to identify research priorities and path forward.
3) Containment scenario planning. Focusing on containment of a subsea broach (i.e. underground blowout that has migrated to the sea floor).

Subcommittee Reports and Interim Recommendations
Oil Spill Response Subcommittee

OESC Member Patrick E. Little (U.S. Coast Guard-USCG) addressed the Oil Spill Containment Subcommittee's activities to date in Appendices IX, X and XI. He highlighted the Subcommittee's three vectors and related focus areas:

1) Oil spill risk assessment, preparedness and response in the Arctic outer continental shelf (OCS). Focus Areas: review existing OSRP regulations; determine their adequacy fir the U.S. offshore Arctic OCS; develop recommendations to DOI.
2) Facilitate R&D of oil spill response technology. Focus Areas: evaluate oil spill response equipment and tactics under realistic conditions; explore the use of performance-based standards for spill technology and utilization; maintain the Ohmsett facility and upgrade as needed to support testing; and play strong role in leading/supporting oil spill R&D.
3) Interagency coordination on oil spill response issues. Focus Areas: assess VSEE/DOI involvement with federal, state and industry oil spill planning, preparedness and response entities; and make recommendation on how BSEE should engage these entities

Subcommittee Reports and Interim Recommendations
Safety Management Systems Subcommittee (SMS)

OESC Members Joesph M. Gebara and Donald E. Jacobsen (Offshore Energy Industry) addressed the SMS's activities to date in Appendices XII, XIII and XIV. He highlighted the Subcommittee's three vectors and related focus areas:

1) Developing a safety culture (General attitude and approach to how the company/organization and its individuals approach safety and risk management). Focus Areas: development of an offshore leadership safety council (OLSC) to engage senior leadership of industry, regulators, and stakeholders to foster a safety culture for industry;

and develop leadership and communication safety training to ensure all parties understand the language, values, and direction.

2) Suspend any further work on the BSEE final rulemaking, Safety Environmental Management Systems II. The agency should instead focus different areas. Focus Areas: jurisdiction of multiple parties involved; responsible parties; performance-based regulatory approach vs. the current prescriptive rule; and Process safety management.
3) Develop leadership and communication safety training. The agency should work with the OLSC to ensure the proper environment exist to foster development of the right safety culture. Focus Areas: integrating safety concerns into operational decision making; commitment of safety is valued by leaders; and effective and open safety communication at all levels.

Committee Discussion on Arctic Issues

OESC Chairman Thomas O. Hunter reminded the Committee that Interior Secretary Salazar and former BSEE Director Bromwich asked the Committee at the November 2011 meeting to assist the Agency with Arctic issues. Based on the request, Chairman Hunter suggested there were three potential ways that the Committee could approach the issue:

1) Spill Response Subcommittee would deal primarily with the Arctic and have input from the other three subcommittees;
2) Each subcommittee would address an Artic dimension to their work moving forward and then report back on progress; or
3) Create a separate subcommittee focused on Arctic matters.

Committee members expressed interest in each of the suggested approaches. There was consensus that more expertise on Arctic-specific issues was needed regardless of the final direction.

The Committee agreed to have each subcommittee continue to support Arctic issues and help frame the work of a potential subcommittee. A decision to create a separate Arctic subcommittee at the end of 2012 would be contingent upon the Secretary's decision to extend or terminate the current OESC.

OESC Discussion on Proposed Ocean Energy Safety Institute (OESI)

OESC Member Walter D. Cruickshank (BOEM) led the discussion on a proposed OESI (Appendix XV). He reminded the Committee that the Secretary charged the group to develop recommendations to aide in the creation of an OESI. He stated that an OESI would be a collaborative initiative involving government agencies, industry, academia, and scientific experts. It would ideally facilitate R&D, training and operational improvements in the fields of offshore drilling safety, environmental protection, spill containment, and spill response.

He requested that the Committee members think about four particular areas to help frame the OESI: 1) structure of an institute; 2) governance of the institute; 3) scope of the institute's role; and 4) resources for an institute. The goal for the next meeting would be to put some options on the table for the Committee discussion and develop an actual recommendation on the topic.

Several members stressed concerns of overlap on missions with entities such as the Center for Offshore Safety, International Regulators Forum, Department of Energy's Research Partnership to Secure Energy for America Program, and other entities. Members also asked what the creation of an institute meant with respect to continuation of the OESC. Several members believed that the OESI should focus strongly on R&D.

OESC Discussion on Subcommittee Interim Recommendations and Path Forward

The Committee heard from all four subcommittees on their current status for continuing work on vectors and submitting recommendations. During the meeting, the Committee adopted five recommendations for DOI/BSEE considerations (Appendix XVI).

In regards to spill prevention, the Subcommittee requested approval to further develop its vectors into potential recommendations at a later date. The OESC approved.

In regards to spill containment, the Subcommittee proposed two recommendations based on the vectors presented during its report. During OESC deliberations, two recommendations were adopted: 1) develop workshop on organizational and systems readiness for containment response; and 2) assess and develop research priorities for containment of a non-capable blowout.

The Subcommittee agreed to continue developing the rest of its vectors presented during its report. The goal would be to submit each of these vectors as recommendations for the full Committee's consideration as appropriate.

In regards to spill response, the Subcommittee requested approval to further develop their vectors into potential recommendations at a later date. The OESC approved.

In regards to safety management systems, the Subcommittee proposed three recommendations based on the vectors presented during its report. After OESC deliberations, three recommendations were adopted: 1) safety management system enhancement; 2) safety culture; and 3) leadership and communication training.

The Subcommittee agreed to continue developing the rest of its vectors presented during its report. The goal would be to submit each of these vectors as recommendations for the full Committee considerations as appropriate.

Public Comment

The Committee received public comments from Steven Cutchin, Chemical Incident Investigator, U.S. Chemical Safety and Hazard Investigation Board (Appendix XVII); Donald W. Davis, Director Emeritus, Louisiana State University Sea Grant Program (Appendix XVIII); and Robin Pitblado, Det Norske Veritas (U.S.A) Inc. (Appendix XIX).

Steven Cutchen (U.S. Chemical Safety and Hazardous Investigation Board, CSB) spoke to the Committee about the ongoing investigation by the CSB on DWH. He mentioned a major focus of CSB's report would focus on the BOP and how it functioned during the incident. Release of the report would likely come sometime during the summer of 2012 and hearings would be held later in 2012.

Donald W. Davis (Louisiana State University Sea Grant Program) spoke about the lack of focus on the socioeconomic effects of DWH on the gulf coast residents. He suggested that the Committee discuss and highlight the need to document the effect of the oil spill on the residents as it tended to be lost over time. He suggested this was a key topic that would have a lasting effect on the affected society not often recognized.

Robin Pitblado (Det Norske Veritas, DNV) expressed DNV's view of establishing a safety-case approach in the U.S. performance-based standards, barrier definition, and functionality help; however, SEMS did not meet the standard of a safety case for DNV. A more robust safety culture program was needed on the OCS.

Next Meeting

Committee members recommended meeting two additional times in calendar year 2012. Proposed meetings would be held in August (Washington, D.C.) and in November/December (New Orleans, Louisiana).

OESC Chairman Thomas O. Hunter thanked everyone for their time and efforts to date and adjourned the meeting.

Dr. Thomas O. Hunter
Chairman, Ocean Energy Safety Advisory Committee

Appendices

Appendix I

MEETING OF THE
DEPARTMENT OF THE INTERIOR'S (DOI)
OCEAN ENERGY SAFETY ADVISORY COMMITTEE (OESC)
HOUSTON, TEXAS
APRIL 26, 2012

8:00 a.m. **Welcome and Introductions**
Joseph R. Levine, Designated Federal Officer, BSEE
Committee Members *in Attendance*

8:15 a.m. **DOI/Bureau of Safety and Environmental Enforcement (BSEE) Remarks**
James A. Watson, Director, BSEE

8:30 a.m. **Committee Remarks**
Thomas O. Hunter, Committee Chair

8:45 a.m. **Spill Prevention Subcommittee Report** Presentation White Paper
Christopher A. Smith, Member

9:30 a.m. **Spill Containment Subcommittee Report** Presentation White Paper
Richard A. Sears, Member

10:15 a.m. **Break**

10:30 a.m. **Spill Response Subcommittee Report** Presentation White Paper
Patrick E. Little, Member

11:15 a.m. **Lunch**

12:15 p.m. **Safety Management Subcommittee Report** Presentation White Paper
Joseph M. Gebara, Member

1:00 p.m. **OESC Discussion on Proposed Ocean Energy Institute**

1:45 p.m. **OESC Discussion on Subcommittee Interim Recommendations and Path Forward**

3:00 p.m. **Break**

3:15 p.m. **OESC Discussion on Subcommittee Interim Recommendations and Path Forward (Continued)**

4:00 p.m. **Public Comment**
- ***Steven Cutchen***, U.S. Chemical Safety Board
- ***Donald W. Davis***, Louisiana State University
- ***Robin Pitblado***, Det Norske Veritas (U.S.A.), Inc.

5:00 p.m. **Open Committee Discussion**
- **Next Meeting**
- **New Business**
- **Summarize Action Items**

5:30 p.m. **Meeting Adjourn**

REPRESENTATIVES IN ATTENDANCE AT THE OCEAN ENERGY SAFETY ADVISORY COMMITTEE MEETING HOUSTON, TEXAS APRIL 26, 2012

MEMBERS

Thomas O. Hunter	Chair
Tadeusz W. Patzek	Academia
Lois N. Epstein	Non-Governmental Organization
Richard A. Sears	Non-Governmental Organization
Joseph M. Gebara	Offshore Energy Industry
Donald E. Jacobsen	Offshore Energy Industry
Paul K. Siegele	Offshore Energy Industry
Walter D. Cruickshank	Bureau of Ocean Energy Management
Christopher A. Smith	Department of Energy
Mathy V. Stanislaus	Environmental Protection Agency
David G. Westerholm	National Oceanic & Atmospheric Administration
Patrick E. Little	U.S. Coast Guard
Stephen H. Hickman	U.S. Geological Survey

DEPARTMENT OF THE INTERIOR REPRESENTATIVES

James A. Watson	Director, Bureau of Safety & Environmental Enforcement

PUBLIC AND PRESS ATTENDEES
OCEAN ENERGY SAFETY ADVISORY COMMITTEE MEETING
HOUSTON, TEXAS
April 26, 2012

PUBLIC

Alan Spackman	International Assocation of Drilling Contractors
Gary LoPiccolo	Dynamic Energy Services International LLC
Julian Nunez	ExxonMobil
Ian S. Sutton	Sutton Technical Books
Robin Pitblado	Det Norske Veritas
Scott Doughty	Marathon Oil
Jeff Ostmeyer	Anadarko Petroleum Corporation
Jodie Conner	J. Conner Consulting
Steve Cutchen	U.S. Chemical Safety Board
Richardo Reynoso	Rowan Companies
Robert A. Jackson	Rowan Companies
Tim Sampson	Consultant
Ellen Thomson	Anadarko Petroleum Corporation
David Miller	American Petroleum Institute
Ian S. Laing	Offshore Petroleum Industry Training Organization
Albert Skiba	Offshore Petroleum Industry Training Organization
Debora Walsh	Chevron
Donald Davis	Louisiana State University Sea Grant Program
Moe Plaisance	Diamond Offshore
Laurie Knape	TAM International
Marc Montemerlo	U.S. Coast Guard
Tommy Lyles	Chevron
Mary Nguyen	Deep Gulf Energy
Ken Barker	Marathon Oil
Brad Smolen	British Petroleum
Eric Roan	Ensco International
Keith Dupuis	Hess Corporation
Ken Wells	PEC Safety
Allison King	PPI Tech
Mike DiGiglia	GLL
Christopher Freitas	Department of Energy
Bonnie Heiple	WilmerHale
Melissa Prior	Pew Environmental Group
Marilyn Heiman	Pew Environmental Group
Eric Pena	Hess Corporation
Lea Wilkes	Deep Gulf Energy
Lance Suvans	Lloyds Register
Margot Girouard	Apache Corporation
Wayne Hollingsworth	Aramco Services
Michelle Kyle	Omega Project Solutions
Margaret Laney	British Petroleum
George Wilcox	
Kyle Moorman	DOI - Bureau of Safety and Environmental Enforcement
Jeryne Bryant	DOI - Bureau of Safety and Environmental Enforcement
Dara Fennell	DOI - Bureau of Safety and Environmental Enforcement
Jarvis Outlaw	DOI - Bureau of Safety and Environmental Enforcement
Doug Morris	DOI - Bureau of Safety and Environmental Enforcement
Lars Herbst	DOI - Bureau of Safety and Environmental Enforcement

Eileen Angelico	DOI - Bureau of Safety and Environmental Enforcement
Kirk Sander	DOI - Bureau of Safety and Environmental Enforcement
Penny Bynum	On the Record Reporting & Transcription Inc

PRESS

Margaret Brown	F&F Films
Staffer 1	F&F Films
Staffer 2	F&F Films
Staffer 3	F&F Films
Staffer 4	F&F Films
Staffer 5	F&F Films
Emily Pickerell	Houston Chronicle

Ocean Energy Safety Advisory Committee

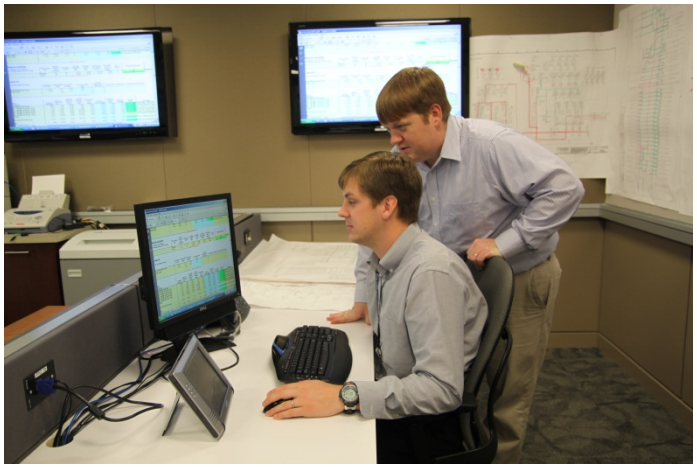
BSEE Director James A. Watson

April 26, 2012

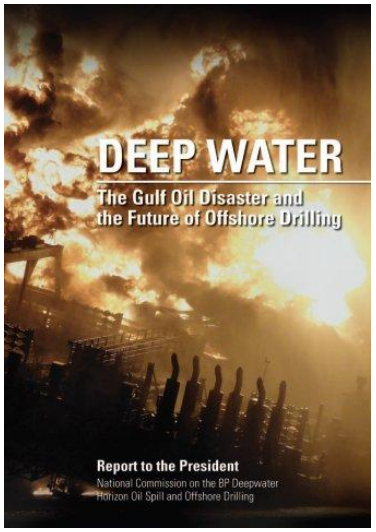
- **BSEE – Today**
  - Additional resources
    - Inspectors / Engineers
  - Environmental Enforcement Division
  - Oil Spill Response Division

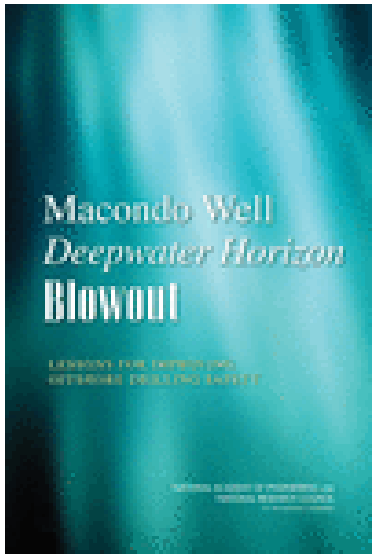
Our Work Continues

- Building the organization
  - Additional Hiring
  - Training
  - Retention
- Completing Final Rules
  - Final Drilling Safety Rule
  - SEMS 2



- **The Way Ahead**
  - Analyzing recommendations
  - Enhanced requirements for blowout preventers
  - Lifecycle approach for equipment





BSEE is working to instill safe practices at all levels, at all times

- BSEE is a team of highly skilled and experienced professionals dedicated to public service
- We are using our full toolbox of authorities and resources
  - Prescriptive and Performance-based Standards
- We are committed to preventing a tragedy like the *Deepwater Horizon* from ever happening again

BSEE
Bureau of Safety and Environmental Enforcement

Safety: All Levels, At All Times

DEPARTMENT OF THE INTERIOR (DOI)
OCEAN ENERGY SAFETY ADVISORY COMMITTEE MEETING
HOUSTON, TEXAS
APRIL 26, 2012

BUREAU OF SAFETY AND ENVIRONMENTAL ENFORCEMENT (BSEE)
DIRECTOR'S REMARKS

DIRECTOR JAMES A. WATSON (BSEE): Thank you very much, Joe. Thank you, Dr. Hunter, and thanks to the whole Advisory Committee. This is really a wonderful thing for BSEE to have such a distinguished committee that's worked so hard.

And I spent a little time with them yesterday and I can tell you firsthand, for those of you in the audience, that this is a very hard working Committee. They're completely dedicated to the mission of BSEE and to the Department of Interior's challenge to improve offshore safety and environmental protection.

So I think it's extremely important that we have this dialogue today and that the public share their comments and questions with this Committee. But I just wanted to explain what Joe mentioned. I'm not on the Committee -- and this is all about a public meeting for this Committee.

So I am happy to take any questions that you might have, but I'm going to not disrupt this event here by any dialogue that may be necessary directly with BSEE.

I would like to reserve some time after my remarks here -- and I have a few slides -- for a dialogue with the Committee itself in a public forum so that you can see the dynamics of this thing works. These people I know now are not shy and they will be happy to tell me that -- or ask questions that they need to have answered in a public forum. And I think that's very important for everyone to be able to see that.

So -- next slide. So BSEE today is, of course, a -- it didn't even exist this time last year. It stood up on October 1. I arrived on December 1 and it got its 2012 appropriation in late December of 2011.

And so we're kind of on a roll in 2012 here. We're adding resource because of the additional budgetary allowance that we have now in the 2012 budget. And we're focusing on our inspection staff and our engineering staff and building some new divisions that, quite frankly, had never existed in the old MMS or in BOEMRE.

And so just to give you a snapshot report, we've hired 28 new engineers, 46 new inspectors -- and this is -- my benchmark is late -- or mid-2010 -- year 2010.

Our Environmental Enforcement Division -- one of our new Divisions which is responsible for having dedicated people and exercising our authority with regard to environmental law -- those -- these things might actually come from the process that's conducted by the Bureau of Ocean Energy Management during the plan review phase for a particular in the outer continental

shelf, or they may assist other agencies in exercising authorities if it applies to these operations in the Outer Continental Shelf.

So right now they're at nine employees and they will ultimately go to about 38 employees. So we do have a new focus on environmental enforcement, and we take that part of our mission very, very seriously.

And then we have a division dedicated to oil spill response. And our role here is to do the plan review and the oversight on the contingency response that is necessary in order to have a permit to drill. You have to have an oil spill response plan and you have to have equipment or contracts and dedicated staff in place and do the exercises and participate in our inspection program in order to be doing activities in the Outer Continental Shelf.

So that staff is now at ten and it will ultimately grow to 22. So we're definitely in the growth mode.

Next slide. Our work continues, and, as I mentioned, we'll be doing additional hiring. We have a total of 97 petroleum engineers on staff right now. That's with those additional people that we've added. Our goal is 228. And we have 82 inspectors on board right now, and our goal there is 155.

So we have a lot of recruiting today, and, in fact, that's one of the missions I'm to participate down here in the Houston area later today is to go out and see another one of the local universities. And I really enjoy that. There's a lot of excitement amongst the student population of some of our engineering schools. And we have to obviously compete for the best talent. But I think we have a good mission and I think we're going to reach our goals.

We also have a mission to train these people. One of the concerns has been that we haven't had formal qualifications to the extent that some people would like to see. So we are focusing on that. And so we have a national offshore training and learning center in addition to some healthy use of the existing opportunities in the offshore industry to learn highly technical skills from the manufacturers sometimes, sometimes from the operators -- however we can get it. And then no inspector, no engineer is qualified until senior management of BSEE says that they're qualified to actually perform a permit approval themselves or an inspection -- complete an inspection.

So we have been recruiting a lot lately and we plan to run something we like to call a boot camp. I have a military background myself so -- many of you might know that. But obviously when you bring on a number of people in a short period of time the best way to orient them and get them started is to pull them together and put them in some concentrated training and then send them out to their various district or region to where they can finish their transition into the organization.

On the rules side -- and, really, right now you're looking at my main two priorities -- building the organization and completing certain final rules. And so shifting to our rulemaking agenda, we have had interim final rules, a notice of proposed rulemaking in the case of SEMS II, and these are our highest priorities as far as getting final rules out on the street this fiscal year. We hope to complete this by this October.

And not that we may not also have some new notice of proposed rulemakings during that period of

time, but we certainly are going to focus on having final rules in these two areas, largely because these are critical to our getting the highest risk areas and the best use of regulatory authority out to where its needed in accordance with a lot of the reports from the Deepwater Horizon Macondo incident.

Next slide. In addition to the President's Commission report, which has gotten reminded to us just lately because the Commissioners there recently did a report card, and I think that was given some publicity and we scored a B on that so we're -- we've got some distance to go there. But we see that they're fairly happy with the direction that we're going based on the assessment that was on there.

But we're continuing to analyze the recommendations in the President's Commission report. We also are now in receipt of the National Academy of Engineers report which came out in late December or early January -- late December I believe of just this past winter.

It is a wonderful report based on some really exceptional talent under the National Academy of Engineers with a lot of focus on the blowout preventer and on containment and also on safety management.

So we are certainly going to continue to focus on those recommendations. And, as I mentioned, we hope to see some notice of proposed rules that we'll start to implement in sort of a second phase of the recommendations.

Just to give you a little snapshot of where I'm focusing is that a lot of the recommendations I'm reading, and particularly from the National Academy, is that certain critical equipment -- we need to focus on its life cycle.

It's not acceptable for a regulatory oversight to only verify that something works when it's built and initially approved and then on intervals when you inspect it. We want to have confidence that this safety equipment is going to be designed right, it's going to have a maintenance plan that we can rely on, that it has been analyzed for a number of cycles, and if we can do remote monitoring we will do that. And then we need to have probably a pre-designed end of its life cycle based on good engineering practice and a safety factor for that as well. So this is going to be a change for this industry, but it's not new in other areas of engineering.

Next slide. So I'm getting near the end here. I just want to sort of summarize and say that we are -- we're focusing on a new sort of mantra for our Bureau, and that is safe practices at all levels and all times.

We want to have our BSEE team be skilled professionals. We're going to focus on their training competency and certification as professionals. And they will be dedicated to the people on the offshore.

I can tell you that there's no day that I come to work -- and I'm sure this is the same for all of the other BSEE employees -- where we don't think of those eleven people who were killed and we don't ever want to have that happen. And we think we've got a very important role to play in the safety culture and in implementing our standards across the industry to ensure that that doesn't happen

again.

And so we have a full toolbox of authorities. And I think there is certainly a time and a place for different levels of enforcement, and we won't hesitate to use those.

But there's also been a lot of discussion about prescriptive versus performance-based standards. And we think that there is a role for both of those, particularly in the U.S. Outer Continental Shelf industry. We think that there is a -- such a wide range of operators out there and challenging new areas to explore for oil and gas and to have production that we obviously can't be totally prescriptive based. And we, quite frankly, never have been.

But we need to I think have a set of standards that formalizes an approach that can look at performance based engineering proposals, performance based operations.

But we also believe strongly that prescriptive rules can be very useful in a regulatory activity like ours, and also I think that prescriptive rules make in some cases for better business across a wide variety of operators because I think it's important that everyone know that there is a certain minimum requirement in order to continue operations. And if you were to drop below a certain level of performance for a piece of equipment or a qualification of a person you need to be stopped right then and there and that needs to be corrected until it meets the prescriptive requirement.

So I think we -- you know, there's been a lot of comparison with our approach here in the United States with other approaches around the world. I plan to talk to the other counterparts in regulatory authorities around the world. There's several forms I can do that in. And I feel very confident that we have a system that is first class in the world. And we will pursue this and hopefully share our thoughts and practices with other authorities around the world, and certainly I'm very open to what they have to suggest to me.

And, you know, I think one of the things that we learn from is not just the Deepwater Horizon tragedy but there's other lessons to be learned from other incidents that occur around the world. And I'm happy to say that that sharing of what happened and what could have been done differently is going on at least during the period I've been here since December -- very satisfactorily in my opinion.

Next slide. So safety at all levels and all times. Sometimes as a director you kind of have to be a little repetitive, and I think that one of my roles is to be a leader. And this is part of what we feel is going to be able to allow us to read our goal as a motivation to transition people if they're not already thinking in terms of a safety culture, thinking in terms of how -- if they're a manager they need to support the employees out on the Outer Continental Shelf.

If they're an employee they need to support their fellow employee out there. And if they're an individual who's flying offshore to do a stint on a drill rig that they need to be able to make a promise to their wives and loved ones that they will come back safely. And that requires that they actually are a part of the safety system -- in fact, the most important part of that safety system.

So we're going to do everything we can to motivate that. We're going to find potentially that there's

things that we do or that companies do or that individuals do that are counterproductive. And these are sort of non-regulatory roles that our Bureau has and it does require a lot of leadership.

But I've already begun that internally to BSEE and I plan to get a little bit public and try to push my message right out to the industry itself.

So, with that, I'd like to open up to questions amongst the Committee.

OESC MEMBER DAVID G. WESTERHOLM (NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION, NOAA): This is Dave Westerholm with NOAA. And one of the things that I know BSEE has been talking about and really concentrating on besides all those points that you talked about is how to spur or drive innovation in the industry and the challenges of sort of being at the leading edge of technology, not just today but in the future. So if you could talk to that for a few minutes.

DIRECTOR JAMES A. WATSON (BSEE): Yeah. My remarks didn't include our R&D programs. We have two programs there, and actually they have gotten a little boost in funding as well so I'm very, very excited about that.

One has to do with engineering equipment -- safety equipment for the offshore operations. And we can look across the entire spectrum. We tend to focus on the safety equipment -- on things that can provide a barrier to an incident from occurring in the first place.

Some of you may be familiar with the bow tie picture where you have the incident in the middle and you have a lot of barriers that can prevent that from happening in the first place, and then you have things that can be done that would prevent the worst consequences of that event from occurring.

And so we have a program for the one side of the bow knot and then we have a program that focuses on our oil spill response and recovery containment -- all of those kinds of activities for the post-event consequence management.

So they're managed a little bit differently in the case of the oil spill response. We actually have a facility in New Jersey -- Ohmsett -- where we can actually test equipment. And that has been around for a long time and we are recently testing -- equipment that is going to have to operate in the Arctic. So we've put ice in that testing facility. And -- but it's being used on a regular basis for testing of the response equipment.

On the prevention side we typically put notices out and solicit academia and different testing facilities to use our funds where we can get the best return in terms of validating a new technology on the prevention side.

But this is an aggressive program and I'm glad you mentioned it, Dave.

OESC MEMBER PAUL K. SIEGELE (OFFSHORE ENERGY INDUSTRY): Paul Siegele with Chevron. Could you elaborate on your plans for training? You're bringing on a large number of new employees -- and maybe give us some thoughts on training. And are you intending to

formally certify them as well?

DIRECTOR JAMES A. WATSON (BSEE): Yes. Ultimately we do plan to have a certification process. Now, we will do that ourselves. Right now I don't have any plan to have any external certification authority do the certifying. But we feel like we ought to have a record that a person has jumped through all the hoops, say, in training, as well as a kind of a board approval that that person is certified to do the job that they're being asked to do.

That's not in place quite yet. We are focused -- I guess we're having to do everything in a risk-based priority fashion with all of the changes occurring. So my biggest concern right now is, quite, frankly, all these new people coming directly out of schools or directly out of other activities into BSEE and they've never even been a government employee before, must less a BSEE inspector or BSEE engineer.

So we've got to get them basic training, and that's what our national training and learning center is about -- getting them that training to be off to the races as far as developing competencies that then we can certify.

And I envision that there's going to still be even at the end stage of all of this a necessary amount of mentoring, of shadowing -- I mean, none of these functions are totally mechanical, especially the more you put into our daily activities a dose of this safety culture concept of safety management. We would prefer that people think on their feet and use their experience and knowledge and training to make judgments, decisions that are defendable and reliable and consistent across the entire bureau.

So we're focused right now on developing formal courses for the newcomers. And then we will set priorities on the different qualifications that we want to develop, and probably start with the inspectors and the engineers and develop a qualification process and sort of a certification process for those folks.

OESC MEMBER RICHARD A. SEARS (NON-GOVERMENTAL ORGANIZATION, NGO): Richard Sears from Stanford. I wanted to follow up on that. So in the course of their careers are you going to be encouraging them to become registered professional engineers and also to be very active within professional organizations and with universities in various roles of lecturing and contributing to courses? Because this is what industry does to maintain a vibrant, ongoing community.

DIRECTOR JAMES A. WATSON (BSEE): I'm not going to use the term require -- encourage, yes. And we are excited actually that there are universities that have asked us to assist with certain courses where we have particular expertise that may not be available anywhere else. We will try to do that. That's not our main mission so we've got to be very careful we don't get skewed off into that.

But I -- you know, I'm a professional engineer myself. I know the value of being connected to your profession either through a professional society or through academia to the extent that you can manage that as part of your career, and certainly we will encourage that.

It's been suggested -- you know, should we connect those kinds of activities with our promotion and, you know, rewarding system. Again, I don't know that I would make a direct connection there. I think there's lots of ways that people can show their dedication and their -- you know, their reasons to be rewarded and promoted other than just through their sort of academic background.

We encourage people to work in the local community, for example. We encourage people to do development -- personal development in a wide variety of ways. And, quite frankly, we are also looking to have people that have personal challenges that I think make us a more diverse organization. And so I think you want to look at the whole person, and it's not just going to be focused on their engineering degree per se.

OESC MEMBER TADUESZ W. PATZEK (ACADEMIA): Tad Patzek, UT Austin. With the drilling operations in the outer deep offshore there's a lot of complexity and a lot of data streaming from the rigs 24 hours a day, seven days a week.

Each company now has the real-time data transmission control centers staffed around the clock. Are there any plans for BSEE to have such a center or multiple instances of such centers to kind of watch what's happening in the Gulf?

DIRECTOR JAMES A. WATSON (BSEE): We have really been thinking a lot about that. We've been to the different centers that some of the companies have where they're receiving this real-time data, and we're very interested in what the potential is for that to be included into this process of life cycle standards for the critical equipment given that, you know, we're wanting to be confident that that equipment works well. We're not there to actually see it and test it and that when it's really needed it's going to work.

So the question that comes down is, well, how do we do that? One of the things that we have planned for this summer with the operations up in the Arctic where -- if the permits are finalized there is that part of Shell's plan is to send data back to their office in Anchorage. Our office in Anchorage is really close by.

And the regional manager there has a plan to utilize that data along with the presence of an inspector who's going to be on each of those drilling operations 24/7 from the beginning of the drilling season to the end.

So one of the things that we want to do first of all is to grow some confidence that -- about what this data is, and this the same information that is actually there on the rig. And if we are making an interpretation in an office down in Anchorage what does the inspector say who's standing right there on the drill floor.

And I am not too worried about that, but I think that there's a certain evolution that you have to have to building this into an oversight regime like what we have since we've never done this before.

I guess ultimately where does that lead? If you have operators, you know, all over the entire OCS that gets to be a large number of operators. And I think at that point you have to come up with a

new way of prioritizing information or of automating the monitoring of that information or perhaps of determining where a BSEE person goes at any given time, not unlike what we do for offshore inspections right now. We may have some planning that needs to be done for attending to those data centers.

So we certainly see that as a terrific potential and a very important part of our future. But I don't have all the answers as to how we're going to use it yet.

OESC MEMBER TADUESZ W. PATZEK (ACADEMIA): Academia is here to serve.

OESC MEMBER LOIS N. EPSTEIN (NGO): Lois Epstein of Wilderness Society. Thank you for your comments. I haven't known until this meeting that environmental enforcement -- the word -- the name was going to create a separate division. I thought safety enforcement was also going to be part of the Enforcement Division.

And so my confusion has led me to ask what is going to be done in terms of safety enforcement and why that's separated out from the environmental enforcement and what are your plans to do safety enforcement? What kind of changes are going to be implemented over time compared to how it might have been done pre-Macondo?

DIRECTOR JAMES A. WATSON (BSEE): Well, as per these regulations coming out and our training program and growing our number of inspectors and engineers, we're just going to do more of what we've always done. We've always had enforcement as one of the missions. And what I'm allowed to do now as a pure BSEE Director is I can really focus on that. I don't need to worry about the management of the leases and all of the other associated things.

But -- so we're bringing these things to light that always existed on the safety side. I think that on the environmental side in the past we relied on the engineers and the inspectors who are primarily experts in drilling operations, and that's a huge need for the United States to have those people focused on those critical operations out there.

But -- and so it was I think appropriate to create another specialty to do the environmental things because I think in the past the environmental things were not dealt with by the management at the same level as the safety things.

So it's really not a matter of needing to change a whole lot of the skill sets and the use of our authorities on the safety side. It's really a matter of bringing the environmental side on par and in an independently managed program.

We are interested in whether we are using every tool in the toolbox with regard to our authorities. And I think we also may have some rulemakings in the works to actually employ the authorities that we have a little better than they've been employed in the past.

But I still would like to say that the first role of BSEE is to ensure that the equipment is built and maintained to the right standards, that the people are trained and supported by the management, and that the -- and that there's a good monitoring of these activities. That's going to have the biggest

return.

Obviously when things go particularly bad or when there seems to be a systemic problem with a company's operation or even an individual's operation, you may need to use an enforcement type tool.

But we would like to see those numbers go down. I mean, our goal is not to run around and try to give out as many fines as we can. Our goal is to have the least number of uses of those tools. But we don't want to leave any tools with authorities on the table as we go about our business.

OESC MEMBER LOIS N. EPSTEIN (NGO): Well, a small follow-up question. Any thought of developing an enforcement strategy so the prioritizations of the resources could be attacking maybe the biggest issues using maybe some new data that are leading indicators of problems, which is --

DIRECTOR JAMES A. WATSON (BSEE): Sure.

OESC MEMBER LOIS N. EPSTEIN (NGO): -- one of the areas that we're discussing.

DIRECTOR JAMES A. WATSON (BSEE): Absolutely. I mean, that's what we're talking about with the use of real-time information. That's what we're talking about with the use of -- how do I decide when an inspector should actually go offshore. That's a huge expense is to actually put a guy in a helicopter and fly offshore. Obviously in the Arctic we made a decision to put somebody out there full time.

So we're doing things based on a risk analysis, based on what -- where we have confidence and where we have a need to gain confidence by having more exposure to the activities until we have a comfort zone. And then I think we also need to be able to be very responsive to reports.

And I think part of building a rapport, part of building the kind of safety culture I'm interested in is that I would hope we would get more dialogue -- more feedback directly from the people who are involved in these activities offshore.

One of the things that I'm looking at is that the experience of the Federal Aviation Administration in the last few years has been that it's the non-regulatory reporting of near misses or incidents that come almost in an anonymous way to the agency that have had the most benefit to safety in that industry.

And that's one of the areas I'm looking to mimic if I can. We're talking to them and to other agencies that are supporting them in that. And I'm excited about that because, to me, the goal is not to have to use the penalty but to actually encourage the person that's most going to benefit from safety to be the most involved in it. And sometimes they need to be able to tell us where things need to be changed.

DFO JOSEPH R. LEVINE (BSEE): I would like to due to time constraints limit it to two more questions. Pat, you had your hand up and Don, and then we'll move on with the meeting. Thanks. No? Joe? Okay.

OESC MEMBER DONALD E. JACOBSEN (OFFSHORE ENERGY INDUSTRY): I think when -- I go first, Joe? All right. Thank you. Don Jacobsen with Noble. Jim, I like your mantra -- safety all levels all time. I think that this Committee is -- supports that. I know the industry I represent is all over it. So we're behind that kind of story.

You mentioned a few time about new rulemaking. And I think the important part in just the last discussion was around dialogue with the -- with all the stakeholders, with the industry, with NGOs, with regulators.

And I like the approach you've taken since you've been onboard about getting out and speaking with the industry members, with your counterparts and really learning. So I encourage that.

And when we -- particular about rulemaking, I believe more transparency in the process would benefit all. And maybe that hasn't been as clear in the past about, you know, commenting -- you know, incorporating comments or not incorporating comments. So that's just less of a question and more of an urge from my standpoint.

DIRECTOR JAMES A. WATSON (BSEE): Okay. Thank you.

OESC MEMBER JOSEPH M. GEBARA (OFFSHORE ENERGY INDUSTRY): Mine is a lot easier than Don's. No, in terms of the training I really welcome the training program that you are putting together and this is very encouraging to see that.

A couple of thoughts that I would want you just leave you with -- is, one, have you considered cross-training with other international regulators that are using performance-based regulations in their countries and maybe having some rotations?

Or have you also considered cross-training with industry by having some new -- some of the newer members of BSEE spend some time working in the offshore industry working on the rigs that eventually they may be inspecting?

I know there may be a conflict of interest there, but I think that the appropriate level of guidance can be put in place. But I don't know if you've considered any of those two.

DIRECTOR JAMES A. WATSON (BSEE): I have to say I have not at this point, but I will consider them in the future. My experience in the Coast Guard is a little -- industry training, if it can be done right, is a beneficial thing to certain people in the middle of their career. I don't envision that we would do that for a brand-new employee.

A lot of our new employees actually come from industry, so sometimes we have to have an acclamation process to get them to understand they're working for the government now. And so we wouldn't want to do that too soon. Some other people I think that, you know, haven't had any experience at all in the industry may benefit from some kind of an industry training program.

As far as the international, right now we -- our approach is to be involved with the International Regulators Forum or the Arctic Council activities or other events that occur. And as far as having

exchanges with other regulators that wasn't something I experienced in the Coast Guard either so I'll have to take a look at that. But I guess it could be done.

You know, I think that there is a lot that needs to be shared I guess at the policy level. But sometimes you need to be different at the actual execution level just because, you know, the laws are different, the cultures are different, the actual drilling operations are different in different parts of the country.

So to the extent that we can get something back that's worth the expense of doing something like that we would -- you know, we would make that analysis and make a determination based on the cost benefit.

OESC MEMBER JOSEPH M. GEBARA (OFFSHORE ENERGY INDUSTRY): Sometimes it is worth trying it just to be able to open the mind to it, so it's something I would encourage you to consider.

DIRECTOR JAMES A. WATSON (BSEE): Okay. Thanks.

DFO JOSEPH R. LEVINE (BSEE): Okay. Thank you, Mr. Watson. Appreciate your time and the comments. Also appreciate the questions from the Committee.

Spill Prevention Subcommittee

Presentation to the
Ocean Energy Safety Advisory Committee

April 26, 2012

Spill Prevention Subcommittee Scope

- The OESC Subcommittee on Spill Prevention is reviewing risks of offshore oil and natural gas exploration and development (E&P) activities, and is reviewing how those risks may be mitigated through development of effective technology and regulatory policy. Specifically:
  - Technologies to prevent blowouts and spills
  - R&D being conducted by the:
    - Government and Academia
    - Industry
  - Regulation

Subcommittee Membership

Current Spill Prevention Subcommittee Membership

- Chris Smith – DOE
- Walter Cruickshank – BOEM
- Steve Hickman – USGS
- Paul Siegele – Chevron
- Charlie Williams – Shell
- Don Jacobsen – Noble Corp.
- Nancy Leveson – MIT
- Richard Sears –Stanford
- Lois Epstein – The Wilderness Society

SPS Identified Three Organizing Vectors

The SPS reassessed the proposed organizing vectors based on feedback received from the November 2011 OESC meeting. The result of this work was a confirmation of the original vectors:

- **Vector 1:** Recommendations to identify research for government, industry, and academia that would bolster research and development for spill prevention.
- **Vector 2:** Recommendations on development and implementation of automated systems to improve prevention of loss of primary well control including instrumentation systems.
- **Vector 3:** Recommendations on how regulations and enforcement systems can be used to improve BSEE's program in regards to spill prevention.

Progress Since November 2011

Accomplishments

- 4 subcommittee meetings
- Reviewed work done by the JITF and the Procedures & Equipment JIPT & the Containment JIPT.
- Identified 3 key actionable technology areas
  - Nonconventional shearing
  - Acoustic activation and release
  - Standardized ROV access
- Reviewed 309 total recommendations from 8 official post-Macondo reports
  - 241 recommendations on regulations, 62 recommendations on R&D, and 6 recommendations on automation

Next Steps

Analysis of Post-Macondo Reports

- **Reviewed 309 total recommendations from 8 official post-Macondo reports**
  - 241 recommendations on regulations, 62 recommendations on R&D, and 6 recommendations on automation.
  - Key Topics:
    - Well Management
    - Safety
    - BOP
    - MODU
    - Environment
- **Developed a summary of the issues**
- **Knowledge gaps, and the proposed research and actions for each vector are ongoing**

Vector 1 R&D Assessment for Government, Industry, & Academia

- **Well Management:** Needs associated with improving well control, design, diagnostics, cementing and other barriers to mitigate the risk of an oil spill.
- **Mobile Offshore Drilling Unit (MODU):** Needs associated with operations on the surface including systems design, safety alerts, and risk management to mitigate the risk of an oil spill.
- **Blowout Preventer (BOP):** Needs associated with the BOP including reliability, design, instrumentation and backup systems to mitigate the risk of an oil spill.

R&D Topic Prioritization Methodology

Area	Topic	Impact	Effort	Timing
Well Mgt	Meter accuracy/kick detection	High	Medium	Mid Term
Well Mgt	Effect of WD on kick detection	Medium	Medium	Mid Term
Well Mgt	Barrier use esp. w/ kill weight mud removal	Medium	Medium	Mid Term
Well Mgt	Better annuli seals incl cement design	Medium	High	Long Term
Well Mgt	Instrumentation/expert decision tools	High	High	Long Term
MODU	Risk assessment, safety culture	High	Medium	Mid Term
MODU	Mux line protection	Low	Medium	Mid Term
MODU	3rd party surveys of drilling equipment	Medium	Medium	Mid Term
MODU	Rig design, instrumentation, expert systems	High	Medium	Mid Term
MODU	Auto redirect HC flows overboard	Low	Low	Near Term
BOP	Improve ROV functional capability	Medium	Medium	Mid Term
BOP	Standardize ROV functions	Low	Medium	Mid Term
BOP	Shearing pipe under flowing well conditions	High	Medium	Mid Term
BOP	BOP design improvements	High	Medium	Mid Term
BOP	Automatic emergency shut in & disconnect	High	Low	Mid Term

Near-Term Actionable R&D

ROV-BOP Interface Standardization

- Challenge: Standardize the ROV/BOP interface so that all or most ROVs can service BOP stacks operating in the deepwater Gulf of Mexico. There is also a need to increase volume capacity of ROV functionality.
- Recommendation: Industry, through the API Standards Board, should develop a standard BOP interface system that would be considered in the design of regulations by the BSEE.

Acoustic Sensors/Actuators

- Challenge: Deploy the use of acoustic controls in the Gulf of Mexico as secondary redundancies.
- Recommendation: Research needs to be conducted on possible use of acoustic-based triggers in the deepwater Gulf of Mexico. With this technology widely used in the North Sea and in the Campos Basin, adapting to for use in the Gulf of Mexico would lead to improved system and operational reliability.

Near-Term Actionable R&D (cont.)

Nonconventional Shearing

- Challenge: Proprietary research is being conducted on enhanced shearing and sealing technologies by various operators and service companies. Foster collaboration among industries currently developing these technologies so pipe can be cut and wellbore sealed under adverse conditions.
- Recommendations: DOI work with other federal agencies and industry partners to encourage public/private partnership (e.g. RPSEA) or industry collaborative partnership (e.g. DeepStar).

Vector 1 (cont.): Instrumentation R&D Needs for Well Management and BOP Function

- **DOI should work with other agencies, industry partners and academia to facilitate development of :**
  - **Sensor position and placement for reliable kick detection.**
  - **Instrumentation to monitor pressure and temperature between the various casing strings.**
  - **Techniques for monitoring cement integrity behind casing (e.g., fiber optic temperature/pressure).**
  - **Instrumentation on ram position, status of locks and sealing elements, and hydraulic control systems (pressures and volumes pumped). Ideally, data should be stored in a black box attached to BOP.**

Vector 2: Automated Systems and Instrumentation

Challenge: Increasingly complex drilling environments, decreasing sensor and computing cost, and improved communications technology have led to massive amounts of real time data to be analyzed at the drilling console

Opportunity: To improve the human-machine interface by better data organization, prioritization of the display, alarm management, and automation of decision making

Instrumentation R&D recommendations support this opportunity

Vector 3: Regulatory Prioritization

- **Recommendations based on review of post-Macondo reports**
- **Near term, this Subcommittee will focus on the following regulatory areas:**
  - Blowout Preventer design, operations, and certification (NAE Report)
  - Instrumentation for existing and new wells
  - Data reporting including improved data on process safety, performance measures, releases, and near misses
  - Best Available and Safest Technology (BAST) – Changing the current regulation to a performance-based rule. Developing a process to ensure that ongoing identification and utilization of BAST.

Regulatory Issues Under Discussion

- Prevention standards for Arctic conditions
- Well control training requirements
- Production-related requirements
- Appropriate balance between performance-based and prescriptive regulation; industry self-regulation
- Enforcement strategies and resources

Conclusions: Open Issues

- **Regulatory**
  - Standards for Arctic conditions
  - Well control training requirements
  - Production-related requirements
  - Appropriate balance between performance-based and prescriptive regulation; industry self-regulation
  - Enforcement strategies and resources
- **R&D**
  - RPSEA, DOE
- **Funding Models**
- **American Petroleum Institute**
- **Ocean Energy Safety Institute**

Interim Report of the Prevention Subcommittee to the
Ocean Energy Safety Advisory Committee
26 April 2012

The Prevention Subcommittee (Subcommittee) had originally identified three organizing vectors that framed prevention issues and could be used to define areas for further study by the OESC, as well as research by industry and government. The three original vectors were:

- Recommendations to identify research for government, industry, and academia that would bolster research and development for spill prevention
- Recommendations on development and implementation of automated systems to improve prevention of loss of primary well control including instrumentation systems
- Recommendations to BSEE on how regulations and enforcement systems can be used to improve BSEE's program in regards to spill prevention: Include assessment of effectiveness

These vectors were presented to the full Ocean Energy Safety Advisory Committee at the November meeting, after which notional priorities were given to the vectors based on the importance of the vector to the Committee's work as well as the perception of the ability of the Committee to achieve some progress on the vector in a reasonable time frame. The vectors above are ranked by OESC priority.

The Subcommittee convened in January 2012 to reassess the proposed organizing vectors based on feedback received from the November 2011 Ocean Energy Safety Advisory Committee (Committee) meeting. The result of this work was a confirmation of the original vectors.

The Spill Prevention Subcommittee is reviewing work done by the JITF and the official post Macondo incident reports and other investigative commissions following the Macondo/Deepwater Horizon incident. While much has been done to discover, analyze, identify and define root-cause(s), mitigate future oil spill occurrences, and plan for better response, there are outstanding challenges.

In January of 2012, the subcommittee reviewed work done by Procedures & Equipment JIPT & the Containment JIPT. That review session included reviewing a complex list of technology research & development recommendations. The Subcommittee prioritized a list of potential key technology focus areas. From that list, SPS identified three key technologies that are currently both actionable now and would provide improved spill prevention response capabilities in the short term. The research areas are: Standardized ROV-BOP Interface, Acoustic Sensing, and Enhanced Shearing. SPS work remains to identify additional actionable ideas for near term action and identify some actions for longer term consideration. The subcommittee is continuing its work and has initiated a thorough review of recommendations

from the President's commission, the Chief Counsel's Report, Chemical Safety Board's report and the nine post Macondo official incident reports. SPS plans to address and act on the preliminary recommendations and conclusions from these reports. The goal is that this effort will outline recommendations for both research direction and regulation change. In addition, the review will be looking to identify projects appropriate for the work of OESC.

The subcommittee recommended an analysis of the official post Macondo incident reports to determine recommendations proposed by other organizations and actions taken to date on those recommendations.

Upon review of the comprehensive set of post-Macondo incident reports, 309 recommendations were identified including 241 occurrences of recommendations regarding regulation or best practices, 62 recommendations regarding R&D, and 6 recommendations regarding automation. To eliminate redundancy among these subsets of recommendations, Areas of Interest covering R&D, Automation and Regulation which capture all of the material aspects of the recommendations identified from the incident reports~~.~~

The three vectors are discussed below. For each there is a summary of the issue, knowledge gaps and proposed research, and proposed actions.

- **Recommendations to identify research for government, industry, and academia that would bolster research and development for spill prevention**

As the challenges grow increasingly more complex for ultra deepwater (UDW) drilling, Government, Industry, and Academia should provide new technological solutions to address these complexities and enhance spill prevention measures. These solutions can be either new tools or new operating models that when properly implemented mitigate the risks of an oil spill incident.

The R&D areas for spill prevention are Well Management, Mobile Offshore Drilling Unit (MODU), and Blowout Preventer (BOP). They are characterized in the following way:

- Well Management: Needs associated with improving well control, design, diagnostics, cementing and other barriers to mitigate the risk of an oil spill
- MODU: Needs associated with operations on the surface including systems design, safety alerts, and risk management to mitigate the risk of an oil spill
- BOP: Needs associated with the BOP including reliability, design, instrumentation and backup systems to mitigate the risk of an oil spill

The research performed and the discussions by the subcommittee have identified areas of interest that this subcommittee reviewed to determine the list of actions:

Well Management

- Need for R&D to develop better meter accuracy and better placement of flow meters for kick detection.
- Need to research the effect of water depth on Kick Detection
- Need for improved instrumentation to diagnose status and integrity of the engineered well system, including wellhead housing, casing, hanger seals and cement.
- Need to develop better barriers and ways to use them especially during kill weight removal
- Need to develop better materials such as insulated production tubing (Cement is being well researched)

MODU

- Systems integration, safety culture, design options on MODUs that could protect MUX lines during an explosion incident,
- Determining the need to require third party surveys of the drilling packages on OCS rigs
- Study of proper rig design to have highly reliable instrumentation, expert decision aids, and safety systems under extreme operating conditions.

BOP

- Research the standardization of Remote Operating Vehicle (ROV) intervention panels, ROV intervention capabilities, and maximum closing times when using an ROV.
- Research the effects of a flowing well on the ability to shear pipe
- Research on BOP design including improved pipe centering in the shear ram, stack configurations to reduce elastic buckling, independent acoustically controlled systems, and instrumentation for continuous and robust monitoring of BOP status and functionality.

The R&D areas recommended above are sufficiently complex such that each could comprise a separate research program. Many R&D topics warrant a coordinated research effort between industry, government and academia due to the complexity of the topic and the specialized capabilities that are needed to conduct the R&D. BSEE should handle R&D that advances current state of the art while the National Labs should focus on transformational areas of R&D (e.g. BSEE can advance the use of ROVs, but the Labs should look at AUVs, which could replace ROVs altogether). BSEE should be included in the National Lab R&D dialogue to formulate future regulatory requirements which will enforce the use of transformative technologies and practices. The appropriate role of academic research institutions in addressing these issues will be determined in consultation with university research groups and academic funding agencies.

The following is a list of actions the Spill Prevention Subcommittee recommends and will further investigate for the final report:

Well Management

- The Navy may have subsea control systems that could advance offshore drilling safety
- The USGS may leverage expertise in characterizing OCS geology for UDW drilling
- The Subcommittee may need to pursue research covering the following unmet needs:
    - Meter accuracy required for reliable kick detection (sensors, acceptable performance metrics, numbers and placement)
    - Non-cement barriers (materials, mechanisms, numbers, and placement)
    - Instrumentation to monitor pressure (and perhaps temperature) between the various casing strings landed and sealed in the wellhead housing.
    - Techniques for monitoring cement integrity behind casing, especially in proximity to the reservoir, perhaps using fiber optic temperature, pressure or acoustic sensors.

MODU (There are current RPSEA programs that may be modified to address some of the following unmet needs):

- Researching design options to protect control lines (MUX) to the subsurface equipment
- Research more highly reliable instrumentation including decision aids and safety systems
- General MODU safety and systems integration

BOP

- Research ROV standardization for intervention panels and other general ROV capability
- Develop a satisfactory emergency disconnect system with automated components
- Follow up on recommendation from the JITF to have LANL look into advancing acoustic control systems for subsurface equipment due to LANL's unique expertise
- Develop instrumentation to provide continuous data on ram position, status of mechanical components like locks and elastomeric sealing elements, and hydraulic control system pressures and volumes pumped (including by ROV's). Ideally, data should be stored in a "black-box" attached to the BOP and available for download when rig is not on location.

(Need SPS consensus and list of actions to be taken with recommendations for the OESAC)

- **Recommendations on development and implementation of automated systems to improve prevention of loss of primary well control including instrumentation systems**

As the challenges of drilling continue to grow in complexity the employment of automated safety systems and decision aids will empower rig operators to perform their work in ways that enhance spill risk mitigation.

The research performed and the discussions by the subcommittee have identified areas of interest that this subcommittee should take action on:

Well Management

- Need to develop and apply instrumentation and expert decision aids including automation to provide timely warning of loss of well control to drillers on the rig and operators onshore.

BOP

- Three step Emergency Disconnect System to shear, seal, and separate autonomously if warnings are not heeded by drillers in a timely manner.
- Automated instrumentation for expert decision aids to provide a timely warning of a loss of well control event.
- Three step Emergency Disconnect System to shear, seal, and separate autonomously if warnings are not heeded by drillers in a timely manner.

(Need SPS consensus and list of actions to be taken with recommendations for the OESAC)

- **Recommendations to BSEE on how regulations and enforcement systems can be used to improve BSEE's program in regards to spill prevention: Include assessment of effectiveness**

While Industry has significant incentives to prevent oil spill incidents, proper regulation and enforcement can further enhance Industry's ability to manage this risk. For example, there is a clear call for greater transparency of rig operations concerning information on near misses and other incidents. The general belief is that better sharing of information will develop a better knowledge base and promote safer UDW drilling practices.

There remains ambiguity on where regulation is necessary and how BSEE and Industry should best collaborate to identify proper scope and effectiveness of regulation and enforcement.

Better sharing of near miss information will develop a better knowledge base and promote safer UDW drilling practices. This database is supported by BSEE and the IADC. However, IADC stated that lack of progress against making information on incidents more available is a major obstacle to offshore safety improvement. There is also a fear that in expanding the scope of reporting incidents and near misses, companies will face fines and penalties. The question ahead for this subcommittee to discuss is who should own the database and how should it be used to enhance safety?

There is a lot of discussion about the extent to which Industry can be asked to self-regulate. Examples such as an INPO model have been recommended. If there is going to be a self-regulating entity, who would take on this responsibility? Can the Center for Offshore Safety be a logical entity?

Spill Prevention Subcommittee's list of references for Spill Prevention Recommendations:

National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling, 1/11/2011

http://www.oilspillcommission.gov/final-report

National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling, Chief Counsel's Report 2/17/2011

http://www.boemre.gov/pdfs/maps/dwhfinal.pdf

Report Regarding the Cause of the April 20, 2010 Macondo Well Blowout / (BOEMRE/ Coast Guard Joint Investigation Team), 9/14/2011

http://www.boemre.gov/pdfs/maps/dwhfinal.pdf

National Academy of Engineering and National Research Council of the National Academies Interim Report on Causes of the Deepwater Horizon Oil Rig Blowout and ways to prevent such events, 11/16/2010

http://www.nationalacademies.org/includes/DH_Interim_Report_final.pdf

Department of Interior, Increased Safety Measures for energy Development on the Outer Continental Shelf, 5/27/2012

http://www.doi.gov/deepwaterhorizon/loader.cfm?csModule=security/getfile&PageID=33598

BP, Deepwater Horizon Accident Investigation Report, 9/8/2010

http://www.bp.com/liveassets/bp_internet/globalbp/globalbp_uk_english/incident_response/STAGING/local_assets/downloads_pdfs/Deepwater_Horizon_Accident_Investigation_Report.pdf

Transocean Investigation Report, June 2011

http://www.deepwater.com/fw/main/Public-Report-1076.html

Det Norske Veritas, Forensic Examination of Deepwater Horizon Blowout Preventer, 3/20/2010

http://www.uscg.mil/hq/cg5/cg545/dw/exhib/DNV%20BOP%20report%20-%20Vol%202%20%282%29.pdf

Containment Subcommittee

Presentation to the Ocean Energy Safety Advisory Committee

April 26, 2012

Subcommittee Membership

- Walter Cruickshank, Government
- Stephen Hickman, Government
- Patrick Little, Government
- Richard Sears, Non-governmental Organization
- Christopher Smith, Government
- Mathy Stanislaus, Government
- Charlie Williams, Industry

Subcommittee Scope

- Characterize the state of existing capabilities and technologies for containing a blown-out well at its source.
- Review research and technology development in this area currently undertaken by government, industry and academia.
- Identify critical knowledge gaps that impact containment capabilities in the event of an accident.
- Build recommendations for OESC of critical areas in which input is most urgently needed and develop recommendations for future research.
- Consider potential overlap with issues identified by other subcommittees in developing recommendations.

Organizing Vectors: Nov. 2011 – Jan. 2012

- **Vector 1: Organizational and system readiness for containment response**
- **Vector 2: Instrumentation and data to diagnose mechanical condition of well after loss of control**
- **Vector3: Secondary capabilities and systems for back-up BOP operation**
- **Vector 4: Assessing and mitigating risks posed by underground blowouts**
- **Vector 5: Containment scenario planning**

Organizing Vectors: Evolution through April 2012

- Vector 1: Organizational and system readiness for containment response

- ~~Vector 2: Instrumentation and data to diagnose mechanical condition of well after loss of control~~ (instrumentation now included in Prevention SC, remote sensing of oil/gas leakage below the mud line has been merged with Vector 4)

- ~~Vector 3: Secondary capabilities and systems for back-up BOP operation~~ (Vector included in Prevention SC)

- Vector ~~4~~ 2: Assessing and mitigating risks posed by underground blowouts

- Vector ~~5~~ 3: Containment scenario planning focusing on containment of a sea floor broach

Organizing Vectors: April 2012

- **Vector 1: Organizational and system readiness for containment response**
- **Vector 2: Assessing and mitigating risks posed by underground blowouts**
- **Vector 3: Containment scenario planning focusing on containment of a sea floor broach**

Organizing Vectors, April 2012 - 1

Organizational and system readiness for containment response

Vector Status

- **Industry cooperative initiatives for subsea containment after DWH:**
  - Hardware and expertise issues are being addressed (e.g., Marine Well Containment Corporation), but sourcing skills and expertise still an issue
  - Significant industry and government skill pool needed for 24/7 operations
  - Need to improve industry and government capability for managing containment operations; including command, control and oversight of source control

Organizing Vectors, April 2012 - 1

Organizational and system readiness for containment response (cont.)

Proposed Actions for DOI with Partner Agencies

- **Synthesize reports assessing organizational and system readiness in the aftermath of the DWH incident.**
- **Conduct a facilitated workshop (government, industry and academia) on lessons learned from DWH source control and chart path forward:**
  - Managing infrastructure for effective command, control and oversight
  - Identifying resources and expertise needed ahead of time
  - Optimizing control center deployments, information flow and on-site interactions
  - Selection and management of external scientific and technical advisors

Organizing Vectors, April 2012 - 2

Assessing and mitigating risks posed by underground blowouts

Vector Status

- **Understanding required of**
  - Mechanical integrity of well below the mud line
  - Pathways and rates for fracture propagation and upward hydrocarbon migration, including effects of geologic containment and cross-flow
  - Detection and monitoring of subsurface flow
  - Geomechanical controls on formation, growth and “healing” of sea-floor broaches

- **Regulatory (BOEM/BSEE) requirements**
  - WCD calculation and flow modeling for broach scenario (for spill response planning and to ensure adequate time for relief well following shut in)

Organizing Vectors, April 2012 - 2

Assessing and mitigating risks posed by underground blowouts (cont.)

Proposed Actions

- **SC will prepare a White Paper on current understanding of underground blowouts and sea floor broaches**
  - Geomechanics of subsurface (two-phase) flow, fracture propagation and arrest
  - Geophysical methods to monitor leakage rates and upward migration
  - Reservoir response and cross-flow during underground blowouts, including impact on kill and cementing operations
  - Coordinate with Prevention SC on well bore instrumentation
- **BSEE should commission a study to examine industry data on underground blowouts and broaches**
- **SC will engage academic community to hold workshop, develop research priorities and establish research consortia.**
- **Possible role for Ocean Energy Safety Institute**
- **Workshop target date is early 2013**

Organizing Vectors, April 2012 - 3

Containment scenario planning focusing on containment of a sea floor broach

Vector Status

- Following DWH, industry containment efforts emphasizing capping systems and “cap and flow”
- Sea floor broach could result in more complex and widely dispersed flow scenario
- Shallow-water systems for capturing oil from a sea floor broach (e.g., containment dome or tent) are not adequate for deep water

Organizing Vectors, April 2012 - 3

Containment scenario planning focusing on containment of a sea floor broach (cont.)

Proposed Action

- **Recommend that DOI work with other agency partners to develop research mechanism to design containment system(s) for a deepwater broach**
  - Industry/Government joint research (e.g., RPSEA)
  - University led engineering consortium
  - Possible role for Ocean Energy Safety Institute

Other Containment Issues, April 2012

- **Other research topics for leadership by Ocean Energy Safety Institute**
  - Worst Case Discharge (WCD) calculations (Calculating WCD in the case of a sea-floor broach is in Containment SC Vector 2)
  - Flow rate estimation, building on work of DWH Flow Rate technical Group

- **Arctic well capping and containment**
  - Regulatory requirements
  - System capabilities and deployment
  - Coordination with Spill Response and Prevention Sub Committees

Specific Recommendations and Required Resources

- **Vector 1 – Recommendation that DOI and Partner Agencies take the lead in synthesizing experience and lessons learned from DWH containment response.**
  - Synthesis of DWH reports on organizational and system readiness
  - Industry/Government/Academia workshop

- **Vector 2 – Prepare White Paper, synthesize industry experience and hold workshop on underground blowouts and broaches.**
  - SC prepares white paper summarizing current state of research and understanding
  - BSEE commissions report on industry experience with underground blowouts and broaches
  - Academic colleagues convene workshop.

- **Vector 3 – DOI takes the lead on assessing and developing research priorities for containment of a seafloor broach and identify entities to carry out needed R&D.**

Interim Report of the Containment Subcommittee to the
Ocean Energy Safety Advisory Committee
26 April 2012

The Containment Subcommittee had originally identified five organizing vectors that framed containment issues and could be used to define areas for further study by the OESC, as well as research by industry and government. These five original vectors were:

1. Organizational and system readiness for containment response
2. Instrumentation and data to diagnose the mechanical condition of a well in the event of loss of control
3. Secondary capabilities and systems for back-up BOP operations
4. Assessing and mitigating the risks posed by underground blowouts
5. Containment scenario planning

These vectors were presented to the full OESC at the November 2011 meeting, after which notional priorities were given to the vectors based on the importance of the vector to the OESC's work as well as the perception of the ability of the OESC to achieve some progress on the vector in a reasonable time frame.

The Containment SC met in January 2012 to consider this feedback from the OESC and to agree on formal recommendations to the OESC for the vectors. Recommendations would consider each vector's importance and input from the full OESC, current industry capabilities and regulatory environment, ongoing research and future R&D needs, and the work and organizing vectors of the other OESC Subcommittees. The result of this work was a confirmation that the first and fourth vectors remain fully in the Containment SC. The fifth vector on scenario planning is also primarily a containment issue, but based on OESC feedback and Subcommittee discussion it was significantly limited in scope. The Containment SC determined that the second and third vectors had significant overlap with the Prevention Subcommittee. The result is that for the Containment SC the second vector on instrumentation is limited in scope to remote sensing and instrumentation to diagnose an underground blowout and merged with the underground blowout vector (other instrumentation systems should be covered by the work of the Prevention SC) and the third (back-up BOP operations) was eliminated.

As a result the Containment Subcommittee has the following three organizing vectors:

1. Organizational and system readiness for containment response
2. Assessing and mitigating the risks of an underground blowout
3. Containment scenario planning focusing on containment of a sea floor broach

These three vectors are discussed below. For each there is a summary of the issue, knowledge gaps and proposed research, and proposed actions.

<u>Organizational and systems readiness for containment response</u>

Following the Deepwater Horizon spill, there has been a significant effort by industry and government to improve the Nation's subsea containment capacity. Lease holders are now

required to address how they will conduct effective and early intervention in the event of a blowout as part of the permitting process. This requirement has spurred the establishment of industry cooperatives that provide the hardware and expertise needed to cap a subsea well.

In addition to the hardware, it is equally important that the industry and government maintain and exercise the capability and capacity necessary to effect containment operations. During the Deepwater Horizon spill response, it was apparent that a high degree of skill was needed to plan and execute source control operations. To sustain these complex operations that run 24/7, potentially for weeks on end, a significant pool of these skilled personnel is needed. Additionally, the complexity of the Deepwater Horizon source control operations underscored the need to bring together expertise from across government and industry to provide timely and effective command, control and oversight of source control operations. The skills and experience necessary to respond to a major incident offshore necessarily come from many companies, including the operator, other upstream operating companies, service companies, and consultants, as well as several government agencies. The number of organizations involved, and their relative contributions will depend to a great extent on the internal capabilities of the lease operator. As part of a preparedness regime, these capabilities and capacities need to be identified upfront and tested periodically to ensure they are effective when needed. A great deal of work was done assessing organizational and system readiness in the aftermath of the Deepwater Horizon incident and several reports were issued by industry, government and academia; a list of these reports is appended to this note for reference.

In order to review lessons learned from the Deepwater Horizon blowout and be better prepared in the event of a major offshore spill, it is recommended that a workshop be held to debrief government, industry and academic people involved in Macondo source control efforts, discuss lessons learned and chart a path forward. The focus of the workshop would be on source control only, since organizations responsible for response (e.g., USCG) are already well organized. Argonne National Lab would be effective facilitator for such a workshop, as they were for the 2011 Deepwater Galveston workshop. The main needs and issues to address at this workshop are:

- Managing infrastructure and capacity to ensure timely and effective command, control and oversight of source control operations,
- Identifying expertise needed and relevant people ahead of time
- Deployment of critical technical experts where decisions are being made with others engaged remotely to run models, provide advice, etc.
- Assigning leadership and responsibilities
- Facilitating information flow for timely and open exchange of data and ideas, allowing time for in-depth analysis and discussion of alternatives with minimum disruption to ongoing operations
- Facilitating and managing on-site interactions between scientists and engineers, both informally and through meetings
- Selection and management of external scientific and technical advisors

Ideally, this workshop would be held in September, 2012, with a report by the end of year. The cost of the workshop is estimated to be on the order of $100 K.

Assessing and mitigating risks posed by Underground Blowouts

When the mechanical integrity of a well has been compromised, shutting in (or capping) the well can lead to an underground blowout as fluids escape into surrounding geologic formations. Underground blowouts usually occur when low-pressure formations come into contact with oil or gas from the reservoir at pressures in excess of their fracture pressure. This can be due to poor well design or mechanical damage to the liner string, cement or other engineered barriers which can either lead to cross-flow between the high-pressure reservoir and lower-pressure (usually shallower) sands. Underground blowouts can also lead to upward migration of oil and gas along pre-existing faults or other structural discontinuities, or if these shallower sands are limited in storage capacity and vertical fracture growth is otherwise unimpeded, can result in a broach of hydrocarbons to the ocean.

Although underground blowouts represent a substantial fraction of oil and gas well blowouts reported worldwide, they are harder to detect than surface blowouts and thus pose a significant risk that is often unidentified until well control becomes difficult or a broach has occurred. This uncertainty can be exacerbated in a damaged well because downhole measurements typically used to diagnose underground blowouts cannot be employed due to internal blockage of the wellbore. In these cases, seismic profiling and oceanographic imaging techniques must be employed to look for signs of gas/oil charging or disruption of surrounding sediments, or for early signs of oil/gas emanation from the sea floor. If a broach does occur, flow rates to the ocean can increase substantially over a broad region, degrading sea-surface and sea-floor operating conditions and impeding oil containment and well-kill or cementing operations.

Two factors can exacerbate the risks posed by underground blowouts. First, a fracture can grow back into the well at shallower depth, leading to hydrocarbon flow and soft-sediment erosion (and possible cratering) alongside the cemented liner string. This can promote broaching and result in a loss of mechanical support for the wellhead. Second, an underground blowout – either as a fracture to the sea floor or as a washout around casing – would be particularly problematic if these vents were allowed to continue unabated for a long enough period of time that they would not heal (i.e., close up), even if a capping stack on the well was reopened to the ocean to relieve borehole pressure.

Improved understanding of and tools for modeling underground blowouts are important for improving regulatory oversight of blowout planning and containment activities. There are two key portions of the regulatory process that would benefit from additional work. First, worst-case discharge (WCD) analyses are required by BOEM's and BSEE's regulations. Both exploration plans (30 CFR 550.219) and development plans (30 CFR 550.250) require calculation of a WCD volume, and these volumes must be compared to the WCD scenarios required for oil spill response plans (30 CFR 254). The WCD analysis includes a broaching analysis, but it is currently a qualitative analysis. Quantifying this process requires a better understanding of the migration pathways and timing for the liquids to flow to the surface. The rate of migration needs to be modeled rigorously to determine the likelihood of hydrocarbons reaching the seafloor before a relief well can be successfully drilled.

Second, BSEE regulations at 30 CFR 254, as supplemented by NTL 2010 -N10 for instances of subsurface BOPs or surface BOPs on floating facilities, require each operator to submit

information demonstrating that it has access to and can deploy containment resources that would be adequate to promptly respond to a blowout or other loss of well control. To date, containment strategies have been based on capping stacks or cap and flow solutions; the scenarios and analyses have not identified the need for solutions to contain oil coming through the seafloor. However, as more is learned about the pathways for migration of oil to the surface, containment strategies may need to be developed to address broaching scenarios, particularly for deep water events, where the response to the Macondo blowout showed that traditional shallow water means for capturing oil seeping through the seafloor may not be effective at greater depths (see next Vector for additional detail).

To better assess and mitigate the hazards posed by underground blowouts, the Containment Subcommittee will address the state of the art in underground blowout and broach risk analyses and diagnosis, focusing on the following broad goals:

1) Better understanding the physical processes controlling upward propagation and arrest of two-phase (oil/gas) hydraulic fractures in poorly consolidated marine sediments.
2) Improving methods for remotely monitoring oil/gas leakage rates and upward migration below the mud line, using both remote geophysical/oceanographic sensing and improved wellbore instrumentation (e.g., annular pressure and continuous temperature monitoring).
3) Determining under what conditions hydrocarbon pathways to the sea floor can heal and after how much release.
4) Developing improved models for reservoir response and cross-flow during blowouts, to better assess the risks posed by underground blowouts (including total release) and help design and implement oil collection, well kill and cementing operations.

In addressing these goals, the Containment Subcommittee will conduct a literature search, carry out interviews with experts in industry, academia and government, and examine data and analyses from past underground blowouts in relation to geologic environment, well design, and whether or not (and under what conditions) those blowouts led to a broach. Most of this effort will focus on offshore operations, but data and analyses from onshore blowouts and broach incidents will be considered as appropriate. The Containment SC will also work with the Prevention SC to ensure that wellbore instrumentation needs most relevant to detection and analysis of underground blowouts are adequately addressed.

In addition, as a potential long-term research issue, this is an ideal place to engage the University community, probably through a thematic workshop. Such a workshop would help establish research priorities needed to better understand and prevent underground blowouts, and establish the case for new government funding and/or the establishment of industry research consortia. The Containment SC will identify current academic research programs and contact the faculty leading this research to gauge their interest in leading such a thematic workshop.

Containment scenario planning focusing on containment of a sea floor broach

In the wake of the Macondo blowout, a great deal of emphasis has been placed on the design and development of a well capping system and a “cap and flow” capture system for Macondo-like blowout scenarios, i.e., wells with subsea blowout preventers in deep water. The emphasis on this system raises the possibility of gaps in containment technology for other blowout scenarios.

The subcommittee has focused on one scenario, specifically a broaching scenario, where existing or planned equipment may be inadequate to contain a spill.

As discussed above, in a broaching scenario an underground blowout results in oil migrating to and broaching the seafloor at some distance from the well-bore. Oil and gas emanating from the sea floor in a broach could come from a single vent, or potentially from many points on the sea floor spread out over a very large area. In this scenario, or any other scenario where a capping stack cannot be successfully deployed, one means of capturing the oil flow is through a containment structure (e.g., a containment dome or tent). Although such structures have proven effective in shallow water, they have not been designed for deep-water containment. For example, in the case of the Macondo spill, attempts to use a cofferdam failed due to hydrate formation and the resulting buoyancy of the structure.

The subcommittee is concerned that this type of scenario has not received the same depth of analysis for containment planning as an event where a capping stack or cap-and-flow solution is appropriate. There should be no expectation that one single system or containment approach is appropriate or desirable in all circumstances. The subcommittee proposes to recommend a research mechanism to redesign containment domes/tents for use in deep water to help address this issue.

Organizational and systems readiness for containment response - Preliminary List of References for lessons learned, Revised 13 February 2012

The Incident Specific Preparedness Review, January 2011, (http://www.uscg.mil/foia/docs/DWH/BPDWH.pdf)

The National Incident Commander's Report: MC252 Deepwater Horizon, October 2010, (http://www.nrt.org/production/NRT/NRTWeb.nsf/AllAttachmentsByTitle/SA-1065NICReport/$File/Binder1.pdf?OpenElement)

On Scene Coordinator Report: Deepwater Horizon Oil Spill, September 2011, (http://www.uscg.mil/foia/docs/DWH/FOSC_DWH_Report.pdf)

"Deepwater: The Gulf Oil Disaster and the Future of Offshore Drilling", Report to the President, National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling, January 2011 (http://www.oilspillcommission.gov/sites/default/files/documents/DEEPWATER_ReporttothePresident_FINAL.pdf)

"Decision-Making within the Unified Command", Staff Working Paper No. 2, National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling, January 2011 (http://www.oilspillcommission.gov/sites/default/files/documents/Updated%20Unified%20Command%20Working%20Paper.pdf)

"Stopping the Spill: The Five-Month Effort to Kill the Macondo Well", Staff Working Paper No. 6, National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling, January 2011 (http://www.oilspillcommission.gov/sites/default/files/documents/Updated%20Containment%20Working%20Paper.pdf)

"Macondo: The Gulf Oil Disaster", Chief Counsel's Report, National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling, February 2011 (http://www.oilspillcommission.gov/sites/default/files/documents/C21462-407_CCR_for_print_0.pdf)

"Deepwater Horizon Containment and Response: Harnessing Capabilities and Lessons Learned", BP, September 2010 (http://www.bp.com/liveassets/bp_internet/globalbp/globalbp_uk_english/incident_response/STAGING/local_assets/downloads_pdfs/Deepwater_Horizon_Containment_Response.pdf)

The National Oil and Hazardous Substances Pollution Contingency Plan, 40 Code of Federal Regulations, Part 300 (http://www.gpo.gov/nara/cfr/waisidx_00/40cfr300_00.html)

Homeland Security Presidential Directive 5: Management of Domestic Incidents, February 2003 (http://www.dhs.gov/xabout/laws/gc_1214592333605.shtm#1)

The National Incident Management System, December 2008 (http://www.fema.gov/pdf/emergency/nims/NIMS_core.pdf)

The National Response Framework, January 2008 (http://www.fema.gov/pdf/emergency/nrf/nrf-core.pdf)

Spill Response Subcommittee

Presentation to the
Ocean Energy Safety Advisory Committee

April 26, 2012

Outline

- Introduction
- Subcommittee Membership
- Subcommittee Scope
- Recommended Organizing Vectors
- Action Requested of the Committee

Subcommittee Membership

Members

- Don Davis, Academia
- Lois Epstein, Non-Government
- Marilyn Heiman, Non-Government
- Stephen Hickman, Government
- Patrick Little, Government
- David M. Moore, Government
- Mathy Stanislaus, Government
- David Westerholm, Government
- Peter Velez, Industry

Contributors

- Craig Matthiessen, Government
- Melissa Prior, Non-government
- Greg Wilson, Government

Scope

- Look for gaps & inadequacies in BSEE's offshore spill response construct, especially with respect to planning, preparedness & cleanup effectiveness

- Look at the interface between BSEE and other federal agencies, and suggest opportunities for BSEE engagement with these agencies to improve offshore oil spill response capability and capacity

- Focus on the few critical areas in which input is most urgently needed

- Identify areas of commonality with other groups or initiatives and build on that work as appropriate

Recommended Organizing Vectors

Vectors

- Oil Spill Risk Assessment, Preparedness and Response in the Arctic OCS
- ~~Cascading of Oil Spill Response Equipment~~
- ~~Full-Scale Testing of Response Equipment~~

  Facilitate Research & Development of Oil Spill Response Technology
- Interagency Coordination on Oil Spill Response Issues

Proposed Action

- Review existing OSRP regulations
- Determine their adequacy for the U.S. offshore Arctic environments
- Develop recommendations to DOI to revise as appropriate

Additional Considerations

- Identify specific areas the regulations might address:
  - response techniques
  - detection
  - logistics
  - OSRO competency
  - adequacy of response equipment including seasonal limitations
  - near shore response

Facilitate R&D of Oil Spill Response Technology

Proposed Action

- Develop a recommendation to BSEE to work with other agencies, industry and academia to:
  - Evaluate oil spill response equipment & tactics under realistic conditions
  - Explore the use of performance based standards for spill technology & utilization
  - Maintain the Ohmsett facility & upgrade as needed to support testing
  - Play a strong role in leading/supporting oil spill R&D

Additional Considerations

- Identify possible ways to encourage R&D leading to best available technologies
- Identify possible ways to incentivize utilization of best available offshore oil spill clean-up technology
- Strengthen existing fora or possible role for Ocean Energy Safety Institute?

Interagency coordination on oil spill response issues

Proposed Action

- Assess BSEE/DOI involvement with the numerous federal, state and industry oil spill planning, preparedness and response entities
- Make recommendations on how BSEE should engage these entities

Additional Considerations

- Other DOI agencies could have different points of view
- Continue cooperation between BSEE and interagency partners on oil spill response planning & preparedness

Resource Considerations

❿ Sufficient resources to complete vectors as scoped

- May have to reconsider if scope changes or new info arises during work, especially on Arctic vector

- Would like to meet later in the spring or summer to continue progress on vector work

- Have not assessed impact of BSEE implementation of recommendations

- Have not yet considered longer term work items (e.g. beyond 2012)

Action Requested of the Committee

Approve further development of the following vectors :

- Oil Spill Risk Assessment, Preparedness and Response in the Arctic OCS
- Facilitate Research & Development of Oil Spill Response Technology
- Interagency Coordination on Oil Spill Response Issues

Interim Report of the Response Subcommittee to the
Ocean Energy Safety Advisory Committee
26 April 2012

The Response Subcommittee (Subcommittee) convened in January 2012 to reassess the proposed organizing vectors based on feedback received from the November 2011 Ocean Energy Safety Advisory Committee (Committee) meeting. After considering a number of factors, the Subcommittee decided that the organizing vector pertaining to cascading of oil response equipment should be deleted. This decision was based on a number of factors, including the low notional priority assigned by the Committee, the recognition that this is much more than a DOI issue (e.g. Environmental Protection Agency (EPA), U.S. Coast Guard (USCG) and that States have significant equities regarding equipment requirements and potential cascading decisions), and the realization that this issue has already been addressed in a number of reports (e.g. Incident Specific Preparedness Review, Presidential Commission, and Admiral Allen's report to the Department of Homeland Security) and needs to be resolved across the appropriate federal response agencies, states, and industry. Additionally, the Subcommittee made refinements to the focus and content of the remaining three vectors. The three revised organizing vectors are:

- Facilitate Research and Development of Oil Spill Response Technology
- Oil Spill Risk Assessment, Preparedness, and Response in the Arctic OCS
- Interagency Coordination on Oil Spill Response Issues

A revised prospectus for each of these topical areas is presented on the following pages - describing the problems to be addressed, identifying gaps in knowledge, capabilities or regulations (where known), and defining actions to be undertaken by the Subcommittee in addressing these issues.

A. Facilitate Research and Development of Oil Spill Response Technology

While research and development (R&D) into the enhancement of oil spill response occurs on an ongoing basis through a variety of mechanisms, it is important to have a robust process for supporting the creation of new ideas and the further development of those ideas that look the most promising. Areas that could benefit from additional research should be identified, prioritized, and funded; traditional and non-traditional approaches should be pursued to encourage invention, innovation, and implementation of new oil spill response methods. Approaches to oil spill response that are proven to work should be documented, shared widely through a consistent, stable clearinghouse of information, and their use encouraged or mandated. Lessons learned after actual spills should be communicated to the oil spill response community in as timely a fashion as possible. Continued support of innovation in oil spill response is in the best interest of all stakeholders, but there must be a clear and open process that allows new approaches to be critically evaluated and the resulting information rapidly disseminated to the spill response community.

Research on oil spills leads to a better understanding of the environmental conditions and oil discharge characteristics that determine the effectiveness of oil spill response methods (e.g., mechanical devices, chemical remediation, in-situ burning, herders, and other alternative techniques). This research relies upon a full spectrum of testing and validation ranging from bench- and meso-scale research in laboratories or purposely constructed wave tanks (e.g., Ohmsett – the National Oil Spill Response Research and Renewable Energy Test Facilty, EPA/Fisheries and Oceans Canada (DFO)) to larger-scale, open-water controlled field testing. Considerable research has already been done at the bench scale and wave tank levels. For example, Ohmsett plays an important role in testing, validating, and improving technology and supporting innovation, such as through the X Prize OSR Challenge. To determine whether conclusions drawn from smaller-scale research will hold true for larger-size oil discharges, testing in real-world conditions may provide important data on response equipment capacity and effectiveness, and may help drive innovation. To evaluate oil spill response equipment and tactics under realistic conditions, BSEE should work with its interagency partners to explore whether field testing is needed, as appropriate, and could be permitted by all applicable authorities, as has been useful in some nations (e.g. Norway and Canada). If so, tests should be performed with careful planning and approved plans and permits, and involve research institutions, academia, regulators, industry, public stakeholders and others.

The subcommittee will develop a paper recommending that BSEE should:

- Work with its interagency partners to evaluate oil spill response equipment and tactics under realistic conditions.

- Explore the use of periodically reviewed performance-based standards to spur innovation in oil spill response technology and ensure utilization of best available technology. BSEE should consult with interagency stakeholders during development to ensure consistency of such standards.

- Maintain the Ohmsett facility, and upgrade it as needed to support testing of new and improved oil spill response technology.

- Continue to play a strong role in leading and supporting oil spill response research and technology development.

The subcommittee will also investigate possible ways for BSEE to stimulate the offshore oil spill clean-up technology industry, and encourage research and development leading to best available technologies, and make recommendations, if appropriate.

B. Oil Spill Risk Assessment, Preparedness, and Response in the Arctic OCS

Oil and gas potential is significant in Arctic Alaska, with renewed interest in oil and gas exploration and production in the Beaufort and Chukchi seas of the Alaska Outer Continental Shelf (OCS). Beyond petroleum potential, this region also supports unique

fish and wildlife resources and ecosystems, with indigenous people who rely on these resources for subsistence, and who follow cultural traditions dating back thousands of years.

A key concern about development of oil and gas resources in the Arctic OCS is the need to ensure that scientific understanding and technological capability are sufficient for reliable oil-spill risk assessment, preparedness, and response under difficult environmental conditions with limited local infrastructure. Although there have been recent advances in oil-spill risk assessments in the Arctic OCS, scientific and technological challenges remain in a number of areas.

While developing this vector, the Subcommittee noted that there may be unique technological response and regulatory issues in the U.S. Arctic offshore. These include technologies for detecting, monitoring, and tracking oil around and under ice, and the efficacy of oil spill countermeasures such as mechanical recovery (e.g., skimmers), in-situ burning, bioremediation, and the use of chemical dispersants in Arctic waters.

This Subcommittee originally intended to assess the state-of-the-art in Arctic oil spill risk assessment, preparedness, and response. However, after further review and considering the evolving nature of oil spill response research and techniques relevant to Arctic waters, the Subcommittee agreed to narrow the scope and focus on the regulatory aspects.

The Subcommittee will develop a recommendation for BSEE to review existing Oil Spill Response Plan regulations, determine their adequacy for U.S. offshore Arctic environments, and revise as appropriate to ensure the availability of adequately trained personnel and equipment to respond effectively to a worst-case discharge.[1]

C. Interagency coordination on oil spill response issues

The National Contingency Plan outlines a framework for federal and state agencies to work with other organizations (e.g., industry committees) that are involved with oil spill planning, preparedness (including training and exercises), and response through the National Response Team (NRT), Regional Response Teams (RRT), and Area Committees. Other government and industry committees (e.g., Interagency Coordinating Committee for Oil Pollution Research - ICCOPR, American Petroleum Institute Spills Advisory Group, Interagency Arctic Research Policy Committee) provide additional avenues for public/private interactions. Although BSEE has primary responsibility for establishing and verifying compliance with offshore oil spill planning and preparedness requirements, they are not represented on some of the interagency and agency/industry committees. Additionally, there are other bureaus of the U.S. Department of the Interior (DOI), such as the U.S. Geological Survey, that demonstrated expertise during the

[1] Areas that these regulations might address include response techniques, detection, environmental monitoring, logistics, oil spill response organization competency, adequacy of response equipment (including seasonal limitations), and near-shore response.

Macondo spill that could be of value for future oil spill planning, preparedness, and response. Although DOI has multiple functions with respect to the interagency process, including trustee responsibilities, regulatory enforcement, licensing, scientific/applied research, and planning and preparedness for offshore response, these functions have not been fully represented in interagency deliberations.

The Subcommittee will specifically look at these existing committees, their originating authority and purpose, and how DOI bureaus are currently being engaged with these groups in spill planning, preparedness, and response. The Subcommittee will then make recommendations as to how DOI should engage with these groups in the future to best meet their needs in preparing for and responding to offshore releases, taking steps to ensure that the viewpoints of agencies such as BSEE, BOEM, USGS, and USFWS are adequately represented.

Additionally, the Subcommittee fully supports the increased coordination between BSEE, USCG, and NOAA on oil spill response planning and preparedness, and recommends this effort be maintained over time. The Subcommittee will outline the current status of this cooperation and outline potential improvements, if needed.

- DRAFT -

To: Ocean Energy Safety Advisory Committee (OESC), Spill Response Subcommittee

Re: Ocean Energy Safety Advisory Committee (OESC)
Subcommittee Recommendations for
Oil Spill Risk Assessment, Preparedness and Response in the Arctic OCS

In its Interim Report, the Spill Response Subcommittee determined that it would develop a recommendation for the Bureau of Safety and Environmental Enforcement (BSEE) to review existing OSRP regulations, determine their adequacy for U.S. offshore Arctic Environments and recommend as appropriate changes to ensure the availability of adequate trained personnel and equipment to respond to a worst case discharge.

We have prepared for the Subcommittee's consideration a list of standards that are not included in existing regulations but are necessary to ensure adequate response in the event of an oil spill in the Arctic Ocean. Most of these items have been addressed by BSEE in approving Shell's plans to drill in the U.S. Arctic Ocean in 2012-2013. The recommendations in this document in no way address the adequacy of those plans. However, we believe the regulations that are in place presently do not require many of these recommendations and they should be part of an overall regulatory framework as decisions are made for future exploration and development by any party planning operations in the U.S. Arctic Ocean.

In developing these draft recommendations for Arctic standards we relied on:

- U.S. Coast Guard's (USCG) Incident Specific Preparedness Review;
- National Oil Spill Commission's report;
- National Energy Board review for offshore drilling in the Canadian Arctic; and,
- Concerns raised by regulators and stakeholders regarding current U.S. Arctic projects.

We also consulted with experts in the field and reviewed other standards and approaches employed in other countries to identify new and innovative ways of improving Arctic oil spill response standards. We recommend that Arctic-specific regulations below be developed and adopted by BSEE. These regulations should require careful planning for all aspects of oil spill prevention, containment and response along with the availability of adequate equipment and trained personnel to respond to any spill including a Worst Case Discharge (WCD) in the U.S. Arctic Ocean.

ARCTIC SPILL RESPONSE

1. Ice Class Vessel Requirements

Proposal: Operators should be required to provide a sufficient number of icebreaking vessels in the U.S. Arctic Ocean region to support safe operation, source control and spill response and recovery. A sufficient number of shallow draft, ice capable vessels should be provided to allow oil spill responders to recover oil spilled into shallow marine waters and along remote shorelines.

Rationale: To be successful, arctic oil spill response operations need to be supported by ice class vessels, especially if spill response activities could continue into freeze-up conditions, and ice management support is necessary to cover well control operations such as containment and/or relief well drilling. To ensure that oil recovery can continue during these vital operations, Oil Spill Response Plans (OSRPs) should include ice-class vessels with the primary responsibility of supporting spill response efforts.

2. Mandatory Minimum Arctic Oil Spill Response Organization Standards

Proposal: BSEE should establish and be the authority for mandatory minimum Arctic marine Oil Spill Response Organization (OSRO) standards including requirements for ice class vessels, arctic grade skimmers, in situ burning equipment, and personnel qualifications and training. Arctic OSRO training and qualifications standards should be

established, with guidance from the USCG, to ensure sufficient ability to remove oil in a range of ice conditions. OSROs serving multiple members in separate geographic areas should be required to have equipment and personnel depots in each geographic area they serve. Unlike existing USCG voluntary OSRO standards, these standards would be mandatory and verified through inspections and field tests of equipment and tactics.

The OSRO must keep records of its equipment inventory, maintenance records, and drills and training exercises to demonstrate its capability to respond to a WCD, or a portion of a WCD.

Rationale: USCG regulations[1] establish OSRO standards and allow OSRP holders to list an OSRO if it has been classified by the USCG to meet the response planning requirement. DOI relies on the USCG OSRO classification scheme in its assessment of whether OSRP holders in the OCS meets its obligations under 30 CFR §254.

OSRO classification areas include rivers/canals, Great Lakes, inland, nearshore, offshore, and open ocean areas. The offshore classification scheme is focused on mechanical equipment for temperate regions. OSROs operating in Arctic regions can obtain OSRO certification without ice class vessels, arctic skimmers, ice capable boom, proper in situ burning equipment, and remote logistical support capabilities, all of which are critical response equipment for the Arctic marine environment.

3. In Situ Burning Equipment and Training Standards for the Arctic

Proposal: Arctic in situ burning (ISB) equipment and training standards should be established to ensure that there is sufficient in-region capability to respond to at least the first 30 days of an oil spill. The amount of ISB equipment required should be established using enhanced recovery calculation methods. Personnel must have training and qualifications in arctic ISB deployment and operation, and vessel captains and pilots must have experience navigating in the Arctic.

Arctic-grade ISB equipment should include, but not be limited to: ice-boom capable of thickening oil to the required 2-5mm thickness to sustain a burn; aircraft and helitorch system systems that are designed to operate in subzero temperatures; vessel-based ignition systems that are designed to operate in subzero temperatures; landing craft capable of accessing remote shores where docks are not present; equipment to recover burn residue; and cold weather personal protective equipment.

Rationale: ISB is an important oil spill response tool for the Arctic, but DOI and the USCG do not currently require a minimum amount of ISB equipment or training. Sufficient stock piles of ISB equipment are needed in the Arctic to ensure that equipment is available at the scene and that the ISB response will not be impeded by logistical delays.

4. Seasonal Drilling Limitations When Oil Spill Response is Not Possible in the Arctic

Proposal: Until there is proven technology to effectively remove oil from the full range of ice conditions, Arctic offshore drilling operations into hydrocarbon bearing zones should be limited to periods of time when the drilling rig and its associated oil spill response system is capable of working and cleaning up a spill in arctic conditions, minus the time required to drill a relief well before ice encroaches on the drill site.

Rationale: Drilling restrictions in the U.S. Arctic Ocean that limit offshore operations to summer only could ensure that there is sufficient time left in the operating season to cap a blown out well, drill a relief well and clean up spilled oil in open water, thereby providing a critical margin of safety into the proposed plan. Arctic environmental conditions – including sea ice and extreme cold –prohibit offshore exploratory drilling operations during most of the year and present unique challenges for oil spill cleanup operations. Routine drilling operations that extend to the very last day that it is safe to drill do not allow time to respond to a well control event before winter conditions set in and

[1] 33 CFR §154.1035 and 33 CFR §154.1035.

equipment must leave the Chukchi and Beaufort seas because it becomes unsafe to operate in ice, freezing conditions, and darkness. A spill in the Arctic not contained by freeze-up could continue unabated through the winter.

DOI effectively applied seasonal drilling limits to Shell's 2012 Chukchi Sea OCS Drilling Project, however, specific standards to the level of detail proposed here are not found in existing regulations. Winter drilling restrictions have also been effectively employed in the Beaufort Sea for decades to limit drilling and are currently codified in the North Slope Borough Municipal Code, Title 19 for all offshore drilling operations within 3 miles of the coastline.

5. **Arctic Offshore Field Tests to Verify Spill Response Tactics and Strategies Prior to OCS Operation**
Proposal: To verify that arctic spill response techniques, equipment, and methodologies will be effective and are the best available technology for use in the Arctic environment, OSRP holders must plan for, and conduct field demonstrations in the particular environments in which they will operate, or in which a spill from their operations could reach.

Rationale: Currently, there is no requirement for an OSRP holder, or the OSRO(s) it relies upon, to field-test and verify that it's proposed "on-paper" tactics and strategies are efficient and effective in the Arctic. Field tests will validate response technologies and strategies, and the training of oil spill responders. Increased Arctic field testing will aide in identifying system and equipment deficiencies and provide an incentive for continuous improvement. 30 CFR §254.41 requires field tests to be conducted during the OSRP term, but not ahead of receiving plan approval.

6. **Protection of Arctic Resources of Special Economic, Cultural or Environmental Importance**
Proposal: BSEE should ensure that, in addition to identifying these areas that OSRPs describe strategies for protecting resources of special economic, cultural or environmental importance. OSRPs planning to drill in the Arctic Ocean should be required to demonstrate that they have adequate response equipment and personnel dedicated to carrying out these protection strategies and that this equipment is located in the U.S. Arctic Ocean region.

Rationale: Because areas of the Arctic Ocean are so remote and fragile and have such cultural importance, it is critical to identify areas of economic, cultural or environmental importance and ensure there is adequate equipment, trained personnel and strategies dedicated to protecting those resources. This includes having adequate nearshore and shoreline capability to protect those resources located in the U.S. Arctic Ocean region. Current regulation requires OSRPs to include strategies for the protecting these special areas, but does not require that equipment and personnel be dedicated for this purpose.

7. **Public and Joint Agency Review Process for Arctic Oil Spill Response Plans**
Proposal: BSEE should ensure that there is a process, similar to the Exploration Plan, for joint-agency and public review, before approval, of Arctic oil spill response plans. In addition, oil spill response plans should be made available to the public after approved by BSEE.

Rationale: While not currently in regulation, there is a heightened, broad public interest in Arctic Ocean oil spill response by academics, non-governmental organizations, local government and other federal agencies. OSRPs are complex and extensive documents that can benefit from public and joint agency review. Unlike most federal plans and permits, there is no formal public review or inter-agency review and comment period established. The National Commission on the BP Deepwater Horizon recommended joint agency and public review of oil spill response plans and that the plans are made available to the public once they are approved.

8. **90 day and Time Series Arctic Oil Spill Trajectory Analyses and Maps**
Proposal: Arctic OSRPs should be required to examine a 90 day oil spill trajectory. Within the 90 day trajectory, the OSRP should provide a range of oil spill trajectories over the course of the 90 days to represent a breadth of recovery and weather conditions, as well as the extent of an oil-spill impacted area.

Rationale: Current OSRPs are required to examine only 30 day trajectories; however, as evidenced by the 2009 East Timor and 2010 Gulf of Mexico well blowouts, spills can persist for more than 90 days. Providing a range of oil spill trajectories over a range of recovery and weather conditions provides insight into the potential range of oil spill-impacted area.

9. Minimum Standards for Arctic Oil Recovery Storage

Proposal: BSEE should require a minimum amount of on-site ("in-region") recovered oil storage capacity. The planning standard should account for emulsification, free water collection, and remote logistical access and weather delays. Storage systems should also have the capability to heat and separate oil-water emulsions and decant water to maximize oil recovery and storage.

Rationale: There are currently no minimum storage standards. The remote location of drilling operations, limited logistical access and adverse weather delays can preclude arrival of additional storage. Finland's oil recovery systems include heating and winterization.

10. An Enhanced Method for Calculating Oil Removal and Oil Removal Benchmarks in the Arctic Ocean

Proposal: BSEE should develop and enhanced method for calculating oil removal based on encounter rate modeling that includes Arctic spill response operating parameters such as ice and adverse weather. OSRPs should establish benchmarks for oil spill removal, utilizing an enhanced method for calculating oil removal. Oil removal should be given the highest priority over other spill response methods (e.g. dispersant application) that merely move oil, thereby leaving it in the marine environment. Both mechanical and ISB oil removal estimates must be based on previous, actual oil spill removal estimates achieved during an actual oil spill.

Rationale: The current method for calculating oil removal efficiencies is inaccurate, as evidenced by the Deepwater Horizon spill. An enhanced method for calculating oil removal should be based on encounter rate modeling that includes spill response operating parameters such as ice and adverse weather. The USCG's Deepwater Horizon Incident Specific Preparedness Review recommended a review of Effective Daily Recovery Capacity calculations and planning standards, and that this review should ensure that adverse weather considerations are included as part of the planning standards.[2]

11. Arctic Dispersant Use Guidelines

Proposal: Dispersant use should be co-managed by the Environmental Protection Agency and BSEE. BSEE should establish limitations regarding the terms, conditions and circumstances in which dispersant use would be allowed in Arctic waters.

Rationale: Dispersants came under scrutiny in response to extensive surface and subsea application during the Gulf of Mexico oil spill response. Work is still needed to establish limits on dispersant use, to limit its application to periods of time when it is more environmentally beneficial than mechanical or ISB oil removal methods or allowing oil to persist in the environment. The National Oil Spill Commission recommended that dispersant testing protocols for product listing or pre-approval should be periodically reviewed and updated and that the pre-approval process should be modified "to include temporal duration, spatial reach, and volume of the spill."[3]

[2] U.S. Coast Guard. Deepwater Horizon ISPR Final Report (2011) p.30

[3] National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling. Deep Water: The Gulf Oil Disaster and the Future of Offshore Drilling (2011) p. 271

Appendix XII

Safety Management Systems Subcommittee

Presentation to the Ocean Energy Safety Advisory Committee (OESC)

26 April 2012

Ocean Energy Safety Advisory Committee

Safety Management Systems Subcommittee

Table of Contents

Subcommittee Members & Contributors

Subcommittee Members

- Walter Cruickshank, Government
- Lois N. Epstein, Non-Government
- Joe Gebara, Industry, Sub-Committee Chair
- Don Jacobsen, Industry
- Nancy Leveson, Academia
- Patrick Little, Government
- Tad Patzek, Academia
- Charlie Williams, Industry

Contributors

- Marc Montemerlo, Government
- Ken Arnold, Industry

Original Scope and Focus

Scope of Subcommittee

- Focus on the soft elements (people, procedures and processes) of safety management systems
- Pass along any recommendations for hardware/software enhancements applicable to other subcommittees as identified

Focus of the Subcommittee

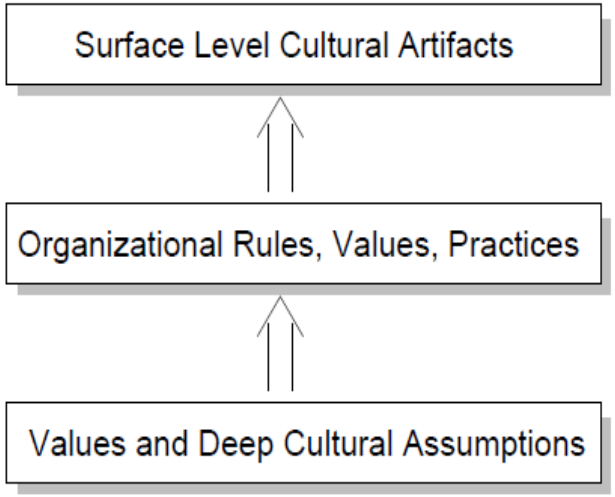
- Provide recommendations to ensure that exploration and production activities in the US OCS are performed
  - within a Safety Culture, that
  - supports continuous learning, and
  - utilizes a safety management system that lays the foundations for success.

Direction from 7 November OESC Meeting

- **OESC supported further development of recommendations on two of the vectors presented by the Safety Management Systems (SMS) subcommittee**
  - **Systems and processes to support and grow an effective safety culture in the offshore oil and gas industry**
  - **Requirements of an optimum safety management system to continuously improve system safety performance**

Vector 1 – Safety Culture Summary

- Safety culture can be defined as that subset of organizational culture that reflects the general attitude and approaches to safety and risk management.
- Trying to change safety outcomes by simply changing the organizational structures, including policies, goals, missions, job descriptions, and standard operating procedures,
  - may lower risk over the short term,
  - but superficial fixes that do not address the set of shared values and social norms are very likely to be undone over time.
- This is equivalent to having a strong Safety Management System, such as SEMS, without having the appropriate Safety Culture.



Vector 1 – Safety Culture
What it Takes

- Developing a safety culture starts at the top and then cascades down by action, leadership, communication, and personal example, not merely by words.

- Without extensive and repeated communication and collaboration across the industry and regulating agencies, safety culture will not take hold.
- The leadership of all organizations involved, including operators, contractors, regulators and in some cases stakeholders should be aligned on the safety culture, which underpins the safety objectives and safety values of the organizations involved.

Vector 1 – Safety Culture Recommendations

Based on the work conducted, the SMS Subcommittee has identified the following recommendations:

1. Establish an Offshore Leadership Safety Council (OSLC)
   - Engaging senior leadership of industry, regulators and stakeholders to foster a safety culture for the industry

2. Develop leadership and communications safety training
   - To ensure that the safety values and objectives are communicated, discussed and cascaded to the industry through the leadership

3. Better utilize safety data
   - Focus on leading indicators that measure behaviors and decisions

Vector 2 - Optimum SMS: Summary & Change in Direction

- **As proposed at the 7 November 2011 OESC meeting, the SMS subcommittee reviewed:**
  - current US OCS safety management system requirements (SEMS and proposed SEMS II)
  - performance-based regulatory regimes (UK, AU, and Norway) along with safety case structure and requirements

- **Based on these reviews and work performed, the SMS subcommittee revised its direction:**
  - to focus on enhancing the current SEMS regulations and enforcement methods rather than proposing a change to a new and different SMS
  - to build on the existing requirements of SEMS and API RP 75 instead of proposing regulatory changes mandating a Safety Case

Vector 2 – Towards Optimizing SMS: Critical Recommendation

The SMS Subcommittee has developed the following recommendation:

1. **BSEE should suspend any further work on SEMS II as proposed and concentrate its effort on addressing 4 critical issue areas with the current SEMS regulations:**
   - **Jurisdiction – i.e. BSEE, USCG, BOEM, DOT, etc.**
   - **Responsible party – Operator, Lessee or Contractor?**
   - **Performance-based approach – right balance**
   - **Process safety management – as compared to occupational**

BSEE should then implement those elements of SEMS II that are consistent with the views of this Subcommittee, as long as work on the four vital improvement areas listed above is not delayed

Vector 2 – Towards Optimizing SMS: Long Term Work Plan

The SMS subcommittee has identified other potential changes to the current SEMS regulations and/or implementation practices that would improve the effectiveness of SEMS and reinforce a performance based approach. These have been identified as needing more work/research:

1. SEMS plan submittal and review - discussion between regulator(s), operators and contractors

2. Audits, inspections and feedback – incorporate best practices

3. Process safety focus – potential revision of SEMS / RP75

Action Requested of the OESC Committee

Consider and take action on the recommendations presented by the subcommittee on Vector #1 and #2.

1. Establish an Offshore Leadership Safety Council (OSLC)

2. Develop leadership and communications safety training

3. Better utilize safety data

4. Suspend any further work on SEMS II as proposed

Conclusions

- The Subcommittee considers that the recommendations being made are essential elements of a robust safety management framework and implementation is strongly encouraged
- Subcommittee is also considering a meeting in June to discuss and plan for implementation of its recommendations.
  - Subcommittee is proposing to meet with Regulators, Operators, Contractors, Academia, NGOs, and Industry to provide assistance in the implementation of its recommendations.

Additional Consideration for OESC

- **One topic came up numerous times during the SMS SC deliberations that is not independent of the other subcommittees:**
  - Whether the US should revise its current offshore regulatory regime and regulate the industry through a single regulatory agency that combines all of the offshore safety related oil and gas authorities that currently split between BSEE and the USCG
  - Approach could be similar to that employed by the UK, Norway and Australia in their performance-based regulatory regimes
  - May alleviate further jurisdictional issues with SEMS and help the US move from prescriptive regulations to a more performance-based approach

Ocean Energy Safety Advisory Committee
Safety Management Subcommittee
Safety Culture Recommendation

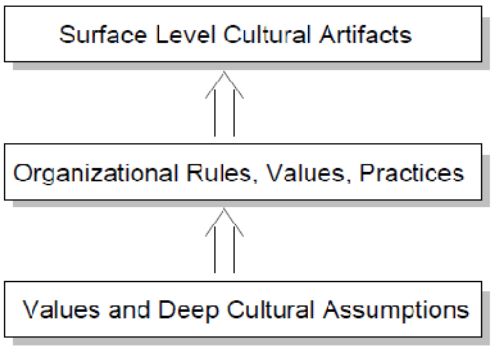
April 10th, 2012

Safety Culture

Organizational decision making always rests upon a set of industry or organizational values or assumptions. One of the best definitions of and treatises on culture can be found in Edgar Shein's *Organizational Culture and Leadership*[1] (Jossey-Bass Publishers, 2004). Shein defines *culture* (in general) as a set of shared values and norms, a way of looking at and interpreting the world and events around us and of taking action in a social context.

In the context of this recommendation, it is important to note that the word Safety is used to refer to Safety and Environmental Risks.

Shein divides organizational culture into three levels:
Safety culture can be defined as that subset of organizational culture that reflects the general attitude and approaches to safety and risk management.[2] At the top level are the surface-level organizational cultural artifacts or routine aspects of everyday practice including hazard analysis, operational procedures, and incident investigations. The second, middle level is the stated organizational rules, values, and practices that are used to create the top-level artifacts, such as safety policy, standards, and guidelines. At the lowest level is the often invisible but pervasive underlying deep organizational cultural assumptions upon which actions are taken and decisions are made and thus upon which the upper levels rest, also known or referred to as Safety Culture.



Trying to change safety outcomes by simply changing the organizational structures, including policies, goals, missions, job descriptions, and standard operating procedures, may lower risk over the short term, but superficial fixes that do not address the set of shared values and social norms are very likely to be undone over time. Changes are required in the organizational values that underlie people's behavior.

Safety culture is primarily set by the leaders of the organization as they establish the basic values upon which decisions will be based. In fact, management commitment to safety has been found to be the most important factor in distinguishing between organizations with high and low accident rates.[3]

Safety culture will affect communication, problem reporting, following procedures such as management of change, and just about every other aspect of an effective safety program. Therefore, improving the safety culture of an industry or organization is important in achieving process safety goals. But changing culture is very difficult. One important aspect of such change is providing appropriate incentives to change.

Participants in industries like commercial aviation understand the direct relationship between safety and their profits and future viability. The relationship is not consistently used in the off-shore oil industry, some operators and contractors do have the safety cultures that provide them the understanding of the direct relationship between safety and corporate profit and future viability.

The moratorium on GOM drilling[4] was a very strong signal to the industry that those companies with strong safety cultures and practices can be hurt by those without them and that companies

without strong safety culture need to participate in industry initiatives and cooperate in improving safety. There also need to be recognition and processes to recognize the need and take action to continuously develop technology required to enhance safety processes and safety outcomes along with the development of technologies that are normally developed by industry to enhance work efficiencies and to allow the exploration and production of more complex structure.
More drastic measures have also led to changes in safety culture, such as civil penalties to executives in a firm, but this type of change incentive should be used as a last resort. Major accidents have also led to changes, as in nuclear power after the Tree Mile Island incident.

BSEE and industry leaders need to update practices and technology as oil exploration and extraction conditions change. Recognition is normally a result of a safety culture that values proactive behaviors.

Safety culture goals for the regulators and industry participants in this industry include:

- Commitment to safety is valued by the leaders. Passionate, effective safety leadership exists at all levels of the organization (particularly the top of the industry companies and the associated regulatory bodies) and everyone is committed to safety as a value for the organization.
- Safety should always be considered a value and not a priority that is evaluated against cost or schedule.
- Safety concerns are surfaced without fear, and are communicated. Communication of not only lagging indicators but also leading indicators should be constructive and focused on building a strong safety culture.
- Incidents and accidents are investigated thoroughly, including management and systemic factors, and without blame. Deficiencies found during investigations, audits, and inspections are addressed properly and tracked to completion. In addition, there is follow through to ensure that the changes are effective in fixing the deficiencies. (A learning and improvement culture).
- Safety concerns are integrated into operational decision making and play important roles in advising management and operators at all levels of the organization on both long-term decisions during engineering and development of new platforms and on the safety implications of decisions during operations. Consistent long term behavior and decision making that clearly supports safety is a good indicator that an effective safety culture has developed in the organization.
- Early warning systems (leading indicators) of degradation in safety practices are established and effective. In a culture where safety is highly valued such warning systems are brought to the surface early and it does not take much debate when and to what cost should an organization go to before deciding on the remedy.
- Safety vision, values, and procedures are clearly articulated and shared among stakeholders. Executive management from regulators and industry companies should play an active role in portraying and supporting the values of the safety culture.
- All employees have full partnership roles and responsibilities regarding safety. Stakeholders are kept fully aware of industry developments related to safety and are invited to play an active role when and if necessary.
- There is effective and open communication about safety at all levels of the organization and between industry, regulator, and the public where appropriate or at the least within industry.
- High levels of visibility of the state of safety (that is, risk awareness) exist at all levels of the organization and industry through appropriate and effective feedback.

Is SEMS enough?

As described in the figure above, at the top level of the graph we can see what is required on a daily basis including hazard analysis, operational procedures, incident investigations and the list can go on to include all elements of SEMS and other Safety Management Systems.

All the elements of a Safety Management System are necessary but not sufficient to change the safety outcomes of an organization, it is important to note that even when combining the implementation of a safety management system with changes in the organizational structure, including policies and goals one may lower the risk but unless you are able to change the shared values that underlie people's behavior you are not able to create a sustainable positive change in the safety outcomes.

Changes in the organizational values that underlie people's behaviors require engagement and commitment from the leaders of the organization for which the safety outcomes need to be changed.

Safety As a Core Value

As individuals develop in their safety knowledge and safety beliefs they go through four stages which can be described as follows:

- Level 1 – Comply when it is convenient
- Level 2 – Comply when I have to
- Level 3 – Believe for me and my family
- Level 4 – Believe for me, my family and my teammates.

This progression of Individuals through the levels is effected by their organization leader's behavior and communication skills. To reach level 4, an individual would have reach a point where safety is a core value, that is not to be compromised, as more individuals reach this level within an organization, the organization would have reach a culture where safety is a core value and a deep safety culture.

Prescriptive vs. Behavior Based Culture

It can be reduced from the above that to reach a level where to reach a positive change to the safety outcomes in an organization it is important to:

1. Move from compliance to believe, an individual and an organization's behavior should be based on belief of doing the right thing, rather than compliance because it is required or convenient, and
2. Move from where we are relying solely on organizational rules and operational procedures, to a safety culture that is rooted in the organization through leadership and communication of safety values starting from the top leaders of the organization. These values should be implemented in the organizational rules and procedures.

Achieving this higher level of safety performance is better supported by an environment where behavior based criteria is developed and used to measure the belief and the level of commitment of the leaders in communicating the message. In contrast with a prescriptive regime where the driver is compliance when and because we have to.

What it takes

Developing a safety culture starts at the top of an organization and then cascades down the organization by action and personal example, not merely by words. There are examples of comprehensive approaches how to teach leaders to establish this culture. Each organization needs to be an owner of its safety culture and safety problems, not just comply with regulations.

It is key to observe that:

1- Without extensive and repeated communication and collaboration across the industry and regulating agencies, safety culture will not take hold.
2- The leadership of all organizations involved, including operators, contractors, regulators and in some cases stakeholders should be aligned on the safety culture, which underpins the safety objectives and safety values of the organizations involved.

The above highlights the importance of setting company behavioral norms and encouraging individual motivation, which raises the question as to what is the appropriate level for such norms and individual motivators to be established.

Recommended Path Forward

As a path forward the safety management subcommittee has developed the following recommendations.

1- Offshore Safety Leadership Council

Establishing an Offshore Leadership Safety Council (OSLC), as part of the Offshore Energy Safety Institute, that includes: key executive members of regulatory bodies involved in offshore drilling and operations; key executives from industry, operators and contractors; as well as key representatives from stakeholder organizations. The role of the OSLC is to focus on:

a. Developing, communicating and fostering a safety Culture for the industry which provides a common value and common set of objectives, which will evolve regularly.

b. Formulating a safety culture recognition program that motivates organizations to develop and foster their safety culture. Focusing on leadership behaviors and leadership communication of the safety values of their organization

c. Encouraging and incentivizing engineering schools to include elements of safety engineering in their programs. Focusing not only on process safety, or systems safety, but also on safety awareness and engraving safety mentality early in the engineering education process.

d. Ensuring that industry is developing a structure for conducting independent, consistently detailed accident and near accident investigations and reporting them to the industry and regulators.

The OSLC is meant to be the forum at which the leaders of all stakeholders and regulators will come together on a regular basis, quarterly, or yearly to check the pulse of the safety in the industry and to provide direction and leadership.

Key Regulator Role

The regulator can help establish a stronger safety culture in the industry, by a number of ways, including:

e. How it evaluates the effectiveness of SEMS and checks for compliance of the mechanisms (SEMS). Regulators can encourage change in culture by focusing more on a cooperative mentality (consultation and advice) and requiring audits, and moving away from a compliance mentality (punishment).

f. Reliance more on leading indicators appropriate use of processes and procedures, rather than lagging indicators, safety or environmental incidents for enforcement.

2- Leadership and Communication Training

Industry along with the support and guidance of the OSLC as well as the regulators develop leadership and communications safety training requirements that will ensure that the safety values and objectives that are agreed at the OSLC are communicated, discussed and cascaded to the industry workforce through the leadership of the industry starting from the Secretary of the Department of Interior, , the Director of BSEE, the top executives of the operating companies , the top executives of contractors, and all the way to the value members of the facility operating staff. The message should be carried and disseminated through all levels of the organization from managers by managers and supervisors to the workforce.
The focus of the OSLC should be on developing the requirements and ensuring a proper environment exists within industry to foster the development of the right safety culture.
The OSLC is encouraged to work closely with the Center for Offshore Safety (COS) which can support managers and supervisors with the required training for them to be able to properly communicate the changes in values and behaviors necessary to achieve a strong safety culture.

3- Data Management

Data is one of the essential management tools that is needed to ensure that trends can be analyzed and proper management decisions are made to reduce or eliminate certain unwanted consequences. The challenges so far in relations to data management in the management of offshore safety are many, and hence the flurry of initiatives that are ongoing on this subject.

This subcommittee's work in this area was mainly focused on emphasizing key recommendations as related to data management; these recommendations should not be considered comprehensive as they are not covering such areas as data needed for prevention. The focus in this section is on data as related to checking that the safety culture which is being developed and followed is leading to the desired safety outcomes. The subcommittee considers that the following items are important:

a. It is important that industry continues to work through the international initiatives and the center for offshore safety on the consolidation of the format of reporting leading and lagging indicators. The data collection process is the foundation of all future analysis and recommendations that are made and as such should be well structured and organized in an international guideline or standard that would allow the largest data set for the analysis of trends. Such data collection process provides important feedback to the OSLC to assist them in better understanding how behaviors and values are changing and to help drive to a stronger safety culture.

b. More emphasis should be made on Leading indicators rather that the historically required reporting of lagging indicators. As the subject of leading indicators has been discussed a number of clarification factors have come up that need to be taken into consideration.

i. The focus should be on leading indicators that can be measured weeks if not months prior to the potential hazard occurring and which are focused on measuring people's behavior and decisions early in the process that may lead to a hazard. These would be more effective than simply relying on indicators that occur immediately prior to an incident where intervention is limited, more reactive and usually less effective.

ii. Near miss reporting should be considered a lagging indicator

iii. Contractors and operators should be allowed to present their leading indicators in a neutral format and in a safe environment that would allow the development of more mature and a stronger safety culture and that would not be based on punishment of individuals or organization for sharing their data. The COS is a good example where such data can be analyzed and shared in a neutral environment.

c. Data should be gathered and analyzed in a consistent manner by all organizations using the same standard or guideline or maybe more appropriately analyzed by the COS or a similar organization and shared with regulators and stakeholders in a consistent format. This highlights the importance of an organization such as the COS, as well as its responsibility to provide unbiased analysis of the data.

Ocean Energy Safety Advisory Committee
Safety Management Subcommittee
Safety Management System Enhancement Recommendation

April 10th, 2012

Introduction

At the full OESC meeting in November 2011, the SMS Subcommittee recommended developing an informed recommendation on the optimum safety management system for the U.S. OCS and whether a Safety Case should be mandated as part of the safety management system.[1] The OESC supported further development of this recommendation (Vector #2) along with suggestions for improvement in safety culture being addressed in Vector #1. The subcommittee held an interim meeting in Houston, Texas on January 10-11, to review current Safety Management System requirements (SEMS and SEMS II) and look into the Safety Case regulatory approach. During this meeting, the subcommittee members took part in presentations on the performance-based regulatory regimes used in the United Kingdom (UK) and Norway, SEMS and safety culture. The following recommendations are based on the subcommittees work over the last six months.

Topic #1: Optimum Safety Management System

The SMS Subcommittee has revised its task statement to focus on enhancing the current SEMS regulations and enforcement methods rather than adopting a wholesale change to a different safety management system as recommended in November.

The SMS subcommittee proposes the following recommendation for consideration by the OESC committee. This recommendation should be considered now, rather than waiting until the final OESC report is issued in December 2012.

> **Recommendation:** Bureau of Safety and Environmental Enforcement (BSEE) should suspend any further work on the SEMS II as proposed and concentrate its effort on addressing four critical issues with the current SEMS regulations; jurisdiction, responsible party, performance-based approach and process safety management. If these four issues are not addressed first, they could have a negative impact on the overall safety of offshore personnel and the OCS environment.[2] We further recommend that BSEE then find a means to implement those elements of SEMS II that are consistent with the views of this Subcommittee on the optimal safety management system

The SMS subcommittee feels that this recommendation and its subparts will fortify and strengthen the current SEMS regulations to significantly improve safety on the OCS. Focusing on the current SEMS regulations first will allow BSEE to resolve the numerous jurisdictional,

[1] See the Safety Management Systems White Paper that was submitted to OESC on October 24, 2011.

[2] SEMS II was published on September 14, 2011 in the Federal Register. BSEE closed the public comment period for this pproposed regulations in November, 2011. BSEE is currently evaluating comments received on this proposal and plans to publish a SEMS II final rule in the near future.

applicability, terminological, implementation and enforcement issues with the SEMS regulations before they issue new regulations that may compound these problems. The subcommittee believes that BSEE needs to work with other regulatory agencies to ensure that SEMS covers all operations and activities, clearly identifies responsibilities and requirements, places more focus on process safety management, and makes the SEMS regulations less prescriptive.

The SMS subcommittee understands this recommendation will delay the proposed safety elements found in the SEMS II regulations. However, it is the opinion of the subcommittee that the SEMS II regulations, if published as proposed, would have to be overhauled to make them more performance based which would cause them to conflict with the original SEMS regulations and delay the critical work on improving the structure of SEMS. For any elements of SEMS II that are clearly performance based and fully aligned with the recommendations in this Vector summary, the subcommittee supports BSEE to implement these aspects of SEMS II in the near future, as long as work on the vital improvement areas recommended below is not delayed.

The SMS Subcommittee feels strongly that BSEE needs to focus on the key issue of how to improve the SEMS regulations and its implementation process. The subcommittee believes that BSEE can achieve this by better utilizing the American Petroleum Recommended Practice 75 (API RP 75), incorporated by reference in the SEMS regulations. API RP 75 is robust and if implemented properly it can be used as the baseline document to develop an optimum safety management system for the U.S. OCS. The Department of Interior should seriously consider this recommendation and begin to address the following four areas that have been identified by the SMS subcommittee as shortcoming and areas of confusion in the current BSEE SEMS regulations and the application of API RP 75;

1) Jurisdiction: The term "system", when used in conjunction with the term "safety management system" typically represents a complete structure such as vessel or a fixed facility, and therefore encompasses all operations, processes, activities and systems that make up each structure. As currently written, the BSEE SEMS regulations do not follow this logic because the SEMS regulations only apply to operators, and only cover operations and activities that fall under BSEE jurisdiction.

   An ideal safety management system for an offshore unit[3] should be a single document that analyzes, evaluates, and describes all operations and activities, not just ones that fall under the jurisdiction of one specific regulatory agency. Numerous daily and emergency operations, activities and systems onboard offshore units have the tendency to blur jurisdictional lines. Under the current SEMS regulations only a portion of the hazards associated with these operations and activities will be identified and addressed. For example; all of the areas where the USCG has jurisdiction onboard an offshore unit, as outlined in the USCG/MMS MOA OCS-01, do not have to be included in a SEMS plan and are therefore not evaluated.

[3] For the purposes of this paper, the term "offshore unit" means a vessel, installation, structure, or other apparatus engaged in OCS activities, including all fixed and floating facilities, MODUs, FPSO, FPS, and drillships.

The Department of Interior should review the jurisdictional limitations of each regulatory agency involved in the management of safety and environmental protection of the OCS (i.e. BSEE, USCG, BOEM, EPA, etc.). The Department of Interior should amend the current SEMS regulations to incorporate all operations and activities that take place on an operator's facility in addition to the ones only covered by BSEE's jurisdiction.

2) Responsible Party: As currently written the SEMS regulations state that only Operators are responsible for developing and implementing a SEMS program. In fact the preamble for the SEMS regulations specifically states, "This final rule does not require that a contractor have a SEMS program." This is very confusing.

   As currently written, SEMS requirements apply only to operators and cover all OCS oil and gas operations under BSEE jurisdiction. This includes drilling; production; well construction; well completion and/or servicing; and DOI pipeline activities; when they take place on production facilities as well as mobile offshore drilling units (MODUs).

   Depending on the operation, many of the activities that are supposed to be covered in a SEMS program are actually performed by contractors and not the operator. In particular, almost every MODU operating on the OCS and some floating production units are not owned by an operator, but rather owned and operated by a contractor. Under the current SEMS regulations, the operations and activities being conducted by these contractors, for example work being conducted on a MODU, are supposed to be addressed in an Operator's SEMS program. This means that each Operator is responsible for addressing safe work practices, job safety analysis, mechanical integrity and training on requirements onboard contracted MODU or production units. Further confusion as to who is ultimately responsible for each requirement under the current SEMS regulations is compounded by the fact that BSEE decided to use the term "you" instead of clearly defining who the "you" means in their regulations.

   The SMS subcommittee believes that the Operator should be ultimately responsible for operations and activities that take place in their own leased area. However, certain "major contractors"[4] should be responsible for developing and implementing a facility specific SEMS program since they are the ones performing the operations and activities on the OCS. The Department of Interior should consider amending the original SEMS regulations so that "major contractors", in addition to operator, are responsible for having a SEMS program that holistically covers operations and actives that take place on the OCS. In addition the SEMS should be amended so that it clearly states for what an "operator" and "major contractor" are responsible.

   In the interim, while these regulatory changes are being made, the Department of Interior should work with its regulatory partners to encourage and facilitate "major contractors" to voluntary SEMS compliance. By demonstrating compliance with SEMS, contractors can greatly enhance offshore safety and assist operators with compliance.

[4] For the purposes of this paper, the term "major contractor" means drilling contractors and production facility owners/operators when not considered to be the leaseholder.

3) Prescriptive regulations and requirements: The Department of Interior has claimed that the SEMS regulations are "performance-based standards similar to those used by regulators in the North Sea."[5] The SMS subcommittee disagrees, but feels that modifications to the existing SEMS regulations could help the Department of Interior reach their goal of having SEMS be a performance-based regulation.

   Practically speaking, the SEMS regulations are written in such a manner that operators are not given the freedom to develop a management system that best fits their specific operations. Unlike the performance based regulations found in Norway and in the UK, the Department of Interior elected to prescribe specific items to be addressed, list items that need to be verified, and even specify what records to keep in the current SEMS regulations. If SEMS was truly a performance-based regulation, the Department of Interior would not have needed to use the words "must" and "shall" throughout the regulation.

   The SMS subcommittee believes that the prescriptive approach found in the current SEMS regulations promotes the idea that operators only have to meet the minimal requirements in order to comply with the regulations. This is reinforced by the fact that BSEE recently published the Potential Incident of Noncompliance (PINC) list for SEMS audits that can be used by operators to help ensure that they do not receive any penalties. In addition, the PINC list focuses more on whether or not an operator has the correct documentation rather than the practical operation of safety measures.

   The SMS subcommittee has written a detailed discussion on performance-based regulations under "Topic #2" of this paper. Based on that discussion the SMS subcommittee believes that the Department of Interior should amend the current SEMS regulations so that they are more performance-based. In addition, the Department of Interior should work with industry to develop effective guidance document(s) on how to comply with the current and future amended SEMS regulations rather than create more prescriptive compliance requirements like those include in the SEMS II rule. For example, a leading practice for major risk analysis of typical operations would be useful to both the industry and the regulators.

4) Reinforcing process safety focus and responsibilities: The SMS subcommittee feels that the current SEMS regulations and API RP 75 on which they are based includes the necessary process safety controls and requirements to be a major barrier in preventing catastrophic events from occurring (e.g. hazard analyses, management of change, safe work practices, etc.), but strongly believes that reinforcement of process safety management is needed from the regulators and industry to create the necessary change in performance and effectiveness of process safety to assure the desired outcomes. As evident in recent catastrophic events, too much attention and effort by senior management and regulators was directed toward ensuring and recognizing good occupational health and personal safety performance. For example, BP senior management were on board the Deepwater Horizon on the day of the disaster to celebrate a personal safety milestone, yet did not inquire about the integrity and

[5] Stated by Director Bromwich at the last International Regulators Forum meeting in Stavanger, Norway and at the Ocean Energy Safety Advisory Committee meeting in Washington in November of 2011.

operational readiness of the risk management controls nor the robustness of decision-making on the rig.

A change to this management bias towards occupational health and safety requires a fundamental shift in approach, possibly utilizing a separate safety management system focused solely on process safety management. The SMS subcommittee has debated this idea vigorously, but could not agree whether different systems are essential for success. The argument for a separate process safety management system is that the processes and measurements are very different for this type of risk management. When combined, it is possible for process safety not to get the attention it deserves because occupational safety is so well defined and established while process safety is less so. The argument for the other side is that better definition of and focus on process safety in SEMS would overcome this bias.

Consistent with the approach to optimize SEMS rather than introduce a new safety management system, the SMS subcommittee recommends that industry work with the regulators to develop an assessment methodology and/or audit protocol along with appropriate performance measures that test the process safety focus and controls as part of a regular SEMS review. Currently, the SEMS Potential Incidence of Non-compliance List[6] used by BSEE is geared towards verification that the elements of SEMS are in place rather than assessing whether the process safety controls are effective. This performance assessment could be developed in conjunction with the Center for Offshore Safety and should be supported by appropriate leading indicators that are regularly reported. (See KPI discussion in Vector 1 recommendation.)

Topic #2: Use of performance-based regulations

Over the last eighteen months, the idea of using performance-based regulations to enhance the safety of the offshore oil/gas industry within the United States has been heavily debated, documented and researched. Specifically, there has been interest in using a more performance-based approach, similar to the ones used in the UK and Norway.[7] Opponents claim that performance-based regulations rely too heavily on the use of probabilistic risk analysis, inflict high costs onto small operators, and don't consider low frequency and high consequence events like the ones that led to the Deepwater Horizon incident. On the other hand, supporters claim that performance-based regimes allow for regulatory compliance adaptability, facilitate system and technological innovation and place safety responsibility onto those who create the risks.

Regardless of the arguments for or against performance-based regulations, countries interested in switching to this type of regulatory regime must first establish a suitable regulator structure, one that is sufficiently funded, well-resourced and skilled enough to handle the responsibilities that come with implementing and ensuring compliance with a performance-based regulatory regime. The SMS Subcommittee has identified three main characteristics that are vital to the

[6] See BSEE webpage: http://www.bsee.gov/Inspection-and-Enforcement/Inspection-Programs/Potential-Incident-of-Noncompliance---PINC.aspx

[7] Both regimes are considered performance based regimes because the regulator provides independent assurance that the operational and facility risks are properly controlled by challenging the operator's risk management system and verifying by audit/inspections that the operator has implemented its risk management commitments. The tool or vehicle for demonstrating that the risks are managed in the UK and AU regimes is via a Safety Case.

successful implementation of performance-based regulatory regimes in both the UK and Norway. These same three features also make the use to performance-based regulations very difficult to implement here in the United States:

1) *Well-resourced and competent regulator***.** The UK and Norway employ a large number of highly educated personnel and technical specialists to perform audits, inspections and review required documents. In Norway, the PSA has approximately 160 employees, of which, approximately 100 perform compliance and audit related tasks regulating 105 offshore units (MODUs, FPSOs, fixed faculties, etc.). Each of these 100 employees has a postgraduate (Masters Degree), or equivalent level of training, in one or more areas of expertise, including drilling, petroleum engineering, structural engineering, and reliability engineering. In contrast, BSEE and the USCG share approximately 60 offshore inspectors for over 3,500 offshore installations.

2) *A single regulatory agency, responsible for offshore safety.* Following the occurrence of major accidents and the adoption of performance-based regimes, both Norway and the UK established single offshore regulatory agencies (Offshore Division of the Health and Safety Executive in the UK, and the Petroleum Safety Administration in Norway). Each of these regulatory agencies were established with jurisdiction over all operations/activities and tasked exclusively with ensuring offshore safety in the oil and gas sector.[8] Partially driven by the need to split responsibilities of revenue collection and safety regulation, both countries decided that the "single regulator" approach would reduce industry confusion, condense the number of overlapping acts and regulations and ensure a consistent compliance/enforcement techniques. In the U.S., both the BSEE and the USCG have significant authorities and jurisdictions in regulating offshore oil and gas operations and activities. In addition, there are several agencies, such as the EPA, PHMSA, BOEM that play a smaller role in offshore oil and gas regulation.

3) *A single, well defined, responsible party for each offshore unit.* Under the UK approach, a single "duty holder"[9] is held responsible for all operations and activities that take place onboard each offshore unit, regardless of whether or not it is contracted or owned by a leaseholder. In Norway, the "operator"[10] is responsible for ensuring safety for all operations and activities that take place within their leased area. Whether this person is called the "duty holder" or "operator", performance-based regulations in the UK and Norway operate under the concept that there should be a single responsible party in charge. For example, if "Company X" was listed as the "Operator" on the oil/gas license in Norway, then they would be the single responsible party in charge of managing the safety of all operations that take place within their leased area, including those conducted on a contracted MODU and any third parties performing work on that MODU.

[8] In the UK the HSE is responsible for all operations related to offshore safety; this does not include environmental response or environmental safety.

[9] Under the UK regulations, a "duty holder" is person, whether the owner or the operator of an installation, on whom duties are placed by the regulations in respect of installations, particularly to prepare the safety case.

[10] In Norway, the "operator" is considered the lease holder. In cases, where more than one company invests in the lease, there will be a single designated operator listed that has the overall responsibility to ensure safety.

In the U.S., this is not as simple or clearly defined. Not only is there confusion regarding who is actually in charge on each offshore unit[11], but there is even greater uncertainty as to who is ultimately responsible.[12] For example, a contracted MODU performing work in a leased OCS area under the direction of operator (as defined by 30 CFR 250), must comply with both USCG and BSEE regulations. The MODU owner may be considered responsible since they are regulated by the USCG and must demonstrate compliance with regulations found in 33 CFR Subpart N (140-147) and 46 CFR Subpart I-A (107-109) regulations. The Operator, who BSEE regulates, contracted the MODU and could be considered responsible since they own the lease and developed the required drilling plan that the MODU must use. In addition, there are third party contractors who perform operations and activities onboard the MODU have responsibilities to report to both the leaseholder and the drilling company and could be held accountable for violations or accidents.

While these characteristics make it hard to fully implement a performance-based regulatory approach in the U.S., the SMS subcommittee recommends incorporating several essential elements from the UK and Norwegian regulatory regimes into an enhanced SEMS approach. In particular;

1) a holistic approach (health, safety, environment for all operations under one safety management system);
2) requirements for safety management system for both operators and rig owners;
3) requirements for qualitative risk assessments for Outer Continental Shelf (OCS) installations (vessels, facilities, MODUs);
4) use of mitigation strategies and barrier selection to reduce risk and hazards in safety management systems;
5) risk based approach/frequency inspections/audits;
6) accident/near miss investigation and reporting requirements;
7) productive dialogue between regulatory and regulated community (post inspection or audit) ; and
8) Inspector qualifications and knowledge regarding SMS.

Long Term Work-plan on Vector #2:

In addition to the recommendation mentioned under the Optimum Safety Management System topic, the SMS subcommittee has identified other potential enhancements to the current SEMS regulations that need to be further reviewed and defined for inclusion in the final OESC report due in December 2012. The SMS subcommittee members feel strongly that improvements can be made in the submittal and review process for a SEMS and in the inspection and feedback protocols. These changes would improve the effectiveness of the SEMS requirement and reinforce the performance-based approach that, together, would greatly reduce the likelihood of another catastrophic event in the US OCS.

[11] Issues with command and control onboard the DWH was one of the key findings in the USCG/BSEE Joint Investigation into the incident.

[12] Two recent rulings show how difficult it is to understand who has responsibility when it comes to the offshore oil/gas industry. A federal judge ruled that BP must indemnify Halliburton for damage claims under its drilling contract and another federal judge ruled that Transocean will not have to pay many of the pollution claims because it was shielded in a contract with well-owner BP.

1) Submittal and review: Current SEMS regulations require operators to develop, implement, and maintain a SEMS program consistent with the 13 elements described in API RP 75. However, the regulations do not require submittal of the SEMS plan to the regulators for review and comment. While this approach can be viewed as performance-based, the regulators miss opportunities to better understand the risks and controls of an operation and/or facility and generate a proactive dialogue with the industry. The SMS subcommittee plans to evaluate the pros and cons of requiring this step including the following factors: methodology/format for submittal, review requirements, and regulatory resources required along with funding. To accomplish this task, the SMS subcommittee proposes to further review the submittal and approval process used by the UK, Norwegian, and Australian regulators.

   A critical part of the SEMS regulations is the hazard analyses, particularly the facility level analysis that addresses process safety risks and controls. While the SMS subcommittee supports the requirement for qualitative evaluation of the risks rather than a quantitative approach, there is little definition as to how to conduct these evaluations. The SMS subcommittee recommends looking further into the facility risk assessment requirements in the UK, Norway and Australia, as well as other industries involved in technically challenging, high risk operations (e.g. nuclear Navy, civil aviation, etc.)

2) Audits, inspections and feedback: In other offshore oil and gas regulatory systems, facility inspections are carried out by 2-3 person teams over multiple days. Following the inspection, the regulators meet with the facility operator to review findings, agree immediate improvement actions, and discuss any gaps in the SEMS plan and actions to close those gaps. The SMS subcommittee recommends further study of the audit practices carried out by other countries as well as the team based approach in BSEE's Focus Facility Reviews and the California State Land facility evaluations. The subcommittee will need to evaluate the following factors: frequency and approach, regulatory agency resource needs and funding requirements including transportation needs. A critical part of this review would be to identify best practices around proactive feedback and improvement planning to move away from the current PINC list approach.

   The SMS subcommittee also recommends a further review of the requirement for independent third party audits instead of current requirements for independent internal audits. With improved facility inspections as proposed above, the subcommittee believes that independent internal audits to supplement the regulatory inspections would be adequate, but additional discussion and review on this subject is warranted.

3) Process safety focus: Further to the earlier discussion on improving process safety management, the SMS subcommittee will consider if revisions to API RP 75, and subsequently to the SEMS regulations, would help support a greater focus on and management of process safety risk in the oil and gas industry.

Additional item for full OESC Consideration:
While reviewing and researching these two topics (Safety Management Systems and performance-based regulations), one topic came up numerous times that has critical impact not only to the issues being addressed by the SMS Subcommittee, but also to the other work being

tackled by the fellow OESC subcommittees. That is, whether the U.S. should revise its current offshore safety regulatory regime and regulate through one independent regulatory agency that combines all of the offshore safety related oil and gas authorities that are currently split between BSEE and the USCG. A brief discussion on this issue, as it relates to performance-based regulations can be found under Topic #2.

The SMS subcommittee believes that this could have alleviated the four key issues that have been identified with the current SEMS regulations, and it is also a necessity as we begin to move from prescriptive regulations into a more performance-based approach. The SMS Subcommittee recommends that the full OESC committee further discuss the concept and if more action is needed, task an appropriate subcommittee, or create a new subcommittee to further develop a formal recommendation on this concept. It is important to note that Norway, the UK and Australia have created a single regulatory agency as they moved to performance based regulation.

Ocean Energy Safety Institute

Background for Committee Discussion

Ocean Energy Safety Advisory Committee
April 26, 2012

The Secretary's Charge

- Develop recommendations to aid in the creation of an Ocean Energy Safety Institute
- Independent institute to facilitate research and development, training, and implementation of operational improvements in the areas of offshore drilling safety and environmental protection, blowout containment and oil spill response
- Collaborative initiative involving government, industry, academia and scientific experts

Key Elements of Recommendation

- Structure of an Institute
  - Stand-alone
  - Linked to an existing organization (e.g. academic institution)
  - Umbrella organization to facilitate collaboration among existing organizations
  - Relationship with organizations with overlapping goals
    - Center for Offshore Safety
    - International Regulators Forum
    - Research Partnership to Secure Energy for America

Key Elements (cont.)

- Governance
  - Structure
  - Who would be represented in governance structure
- Scope of Institute's role
  - Subcommittee recommendations
  - Address concerns of multiple agencies

Key Elements (cont.)

- Resources
  - Magnitude of funding
  - How to acquire expertise

Next Steps

- Receive member input on these elements
  - Telecon with Subcommittee Chairs in late May

- Committee Meeting
  - Options for discussion – summer meeting
  - Final recommendation – November meeting

OCEAN ENERGY SAFETY ADVISORY COMMITTEE

May 17, 2012

Mr. James A. Watson
Director
Bureau of Safety and Environmental Enforcement
1849 C Street, N.W.
Washington, D.C. 20240

Dear Director Watson:

On behalf of the Ocean Energy Safety Advisory Committee (OESC), I would like to submit five recommendations to the Department of the Interior (DOI) and the Bureau of Safety and Environmental Enforcement (BSEE) for consideration and action. Over the course of the past year and a half, the four OESC subcommittees have been working hard to research and formulate several topics for full Committee consideration. At our recent April 26, 2012, meeting in Houston, Texas, Committee members determined these five recommendations listed below ready for submission to DOI and BSEE.

Please accept these submissions as the OESC's first formal recommendations to DOI/BSEE.

- **Safety Management System Enhancement:**
  DOI/BSEE should redirect further work on Safety and Environment Management Systems (SEMS) II as proposed and concentrate its effort on addressing four critical issues with the current SEMS regulations; jurisdiction, responsible party, performance-based approach and process safety management. If these four issues are not addressed, it could have a negative impact on overall safety of offshore personnel and OCS environment. We further recommend that BSEE find means to implement those elements of SEMS II that are consistent with the concerns expressed by this Committee in Vector #2, Topic #1 document, dated April 10, 2012. See Reference Document #1 for details on recommendation.

- **Safety Culture:**
  DOI/BSEE should establish an Offshore Leadership Safety Council (OLSC) that includes: key executives of regulatory bodies involved in offshore drilling and operations; key executives from industry, operators and contractors; as well as key representatives from stakeholder organizations. The role of the OLSC is to focus on:

  a) Developing, communicating and fostering a safety culture for the industry which provides a common value and common set of objectives, which will evolve regularly.

b) Formulating a safety culture recognition program that motivates organizations to develop and foster their safety culture. Focusing on leadership behaviors and leadership communication of the safety values of their organization.
c) Encouraging and incentivizing engineering schools to include elements of safety engineering programs. Focusing not only on process safety, or systems safety, but also on safety awareness and engraving safety mentality early in the engineering education process.
d) Encouraging industry to develop a structure for conducting independent, consistently detailed accident and near accident investigations and reporting them to the industry and regulators.

The OLSC is meant to be the forum at which the leaders of all stakeholders and regulators come together on a regular basis, quarterly, or yearly to check the pulse of the safety in the industry and to provide direction and leadership.

See Reference Document #2 for details on recommendation.

- **Leadership and Communication Training:** BSEE/DOI shall work with industry along with the support and guidance of the OLSC to develop leadership and communications safety training requirements that will ensure that the safety values and objectives that are agreed at the OLSC are communicated, discussed and cascaded to the industry workforce through the leadership of the industry starting from the Secretary of the DOI, the Director of BSEE, the top executives of the operating companies, the top executives of contractors, and all the way to the members of the facility operating staff. The message should be carried and disseminated through all levels of the organization from managers by managers and supervisors to the workforce. The focus of the OLSC should be on developing the requirements and ensuring a proper environment exists within industry to foster the development of the right safety culture.

  The OLSC is encouraged to work closely with the Center for Offshore Safety which can support managers and supervisors with the required training for them to be able to properly communicate the changes in values and behaviors necessary to achieve a strong safety culture. See Reference Document #2 for details on recommendation.

- **Workshop on Organizational and Systems Readiness for Containment Response:** DOI/BSEE, in consultation with other federal agencies, should immediately commission the development of a workshop to debrief government, industry, and academic resources involved in the Deepwater Horizon (DWH) source control efforts to discuss lesson learned and chart a path forward in responding to future oil spills.

- **<u>Assessment and Development of Research Priorities for Containment of an Non-Capable Blowout:</u>** DOI/BSEE would immediately begin synthesis of DWH reports on organizational and system readiness pertaining to source control.

In addition to our submission of these five recommendations, I would like to provide a brief update of two major areas highlighting our progress to date: Status of subcommittee work and Arctic issues discussions.

Each of the four subcommittees provided an update on the status of their work during this past Committee meeting. Although I cannot speculate on the outcome of future deliberations, I envision several more formal recommendations will be submitted to DOI and BSEE in 2012.

Committee members also engaged in a discussion on the role of the Arctic in the OESC's purview. Specifically, I requested that the Committee members deliberate and vote on these two topics for action:

- The Committee will make the decision to create a separate subcommittee within the OESC at the end of the year, together with decision to extend or terminate the current OESC
- Ask each subcommittee to continue and support Arctic issues to help frame work for a future Arctic subcommittee

We look forward to your response on the five formal recommendations and any other input you may have for the Committee at your earliest convenience.

Sincerely,

Thomas O. Hunter
Chairman
Ocean Energy Safety Advisory Committee

Enclosures

Recommendation Document #1

The Committee feels that this recommendation and its subparts will fortify and strengthen the current SEMS regulations to significantly improve safety on the OCS. Focusing on the current SEMS regulations first will allow BSEE to resolve the numerous jurisdictional, applicability, terminological, implementation and enforcement issues with the SEMS regulations before they issue new regulations that may compound these problems. The Committee believes that BSEE needs to work with other regulatory agencies to ensure that SEMS covers all operations and activities, clearly identifies responsibilities and requirements, places more focus on process safety management, and makes the SEMS regulations less prescriptive.

The Committee understands this recommendation will delay the proposed safety elements found in the SEMS II regulations. However, it is the opinion of the Committee that the SEMS II regulations, if published as proposed, would have to be overhauled to make them more performance based which would cause them to conflict with the original SEMS regulations and delay the critical work on improving the structure of SEMS. For any elements of SEMS II that are clearly performance based and fully aligned with the recommendations in this Vector summary, the subcommittee supports BSEE to implement these aspects of SEMS II in the near future, as long as work on the vital improvement areas recommended below is not delayed.

The Committee feels strongly that BSEE needs to focus on the key issue of how to improve the SEMS regulations and its implementation process. The Committee believes that BSEE can achieve this by better utilizing the American Petroleum Recommended Practice 75 (API RP 75), incorporated by reference in the SEMS regulations. API RP 75 is robust and if implemented properly it can be used as the baseline document to develop an optimum safety management system for the U.S. OCS. The Department of Interior should seriously consider this recommendation and begin to address the following four areas that have been identified by the Committee as shortcoming and areas of confusion in the current BSEE SEMS regulations and the application of API RP 75;

1) Jurisdiction: The term "system", when used in conjunction with the term "safety management system" typically represents a complete structure such as vessel or a fixed facility, and therefore encompasses all operations, processes, activities and systems that make up each structure. As currently written, the BSEE SEMS regulations do not follow this logic because the SEMS regulations only apply to operators, and only cover operations and activities that fall under BSEE jurisdiction.

   An ideal safety management system for an offshore unit[1] should be a single document that analyzes, evaluates, and describes all operations and activities, not just ones that fall under the jurisdiction of one specific regulatory agency. Numerous daily and emergency operations, activities and systems onboard offshore units have the tendency to blur jurisdictional lines. Under the current SEMS regulations only a portion of the hazards associated with these operations and activities will be identified and addressed. For example; all of the areas where the USCG has jurisdiction onboard an offshore unit, as outlined in the USCG/MMS MOA OCS-01, do not have to be included in a SEMS plan and are therefore not evaluated.

[1] For the purposes of this paper, the term "offshore unit" means a vessel, installation, structure, or other apparatus engaged in OCS activities, including all fixed and floating facilities, MODUs, FPSO, FPS, and drillships.

The Department of Interior should review the jurisdictional limitations of each regulatory agency involved in the management of safety and environmental protection of the OCS (i.e. BSEE, USCG, BOEM, EPA, etc.). The Department of Interior should amend the current SEMS regulations to incorporate all operations and activities that take place on an operator's facility in addition to the ones only covered by BSEE's jurisdiction.

2) Responsible Party: As currently written the SEMS regulations state that only Operators are responsible for developing and implementing a SEMS program. In fact the preamble for the SEMS regulations specifically states, "This final rule does not require that a contractor have a SEMS program." This is very confusing.

   As currently written, SEMS requirements apply only to operators and cover all OCS oil and gas operations under BSEE jurisdiction. This includes drilling; production; well construction; well completion and/or servicing; and DOI pipeline activities; when they take place on production facilities as well as mobile offshore drilling units (MODUs).

   Depending on the operation, many of the activities that are supposed to be covered in a SEMS program are actually performed by contractors and not the operator. In particular, almost every MODU operating on the OCS and some floating production units are not owned by an operator, but rather owned and operated by a contractor. Under the current SEMS regulations, the operations and activities being conducted by these contractors, for example work being conducted on a MODU, are supposed to be addressed in an Operator's SEMS program. This means that each Operator is responsible for addressing safe work practices, job safety analysis, mechanical integrity and training on requirements onboard contracted MODU or production units. Further confusion as to who is ultimately responsible for each requirement under the current SEMS regulations is compounded by the fact that BSEE decided to use the term "you" instead of clearly defining who the "you" means in their regulations.

   The Committee believes that the Operator should be ultimately responsible for operations and activities that take place in their own leased area. However, certain "major contractors"[2] should be responsible for developing and implementing a facility specific SEMS program since they are the ones performing the operations and activities on the OCS. The Department of Interior should consider amending the original SEMS regulations so that "major contractors", in addition to operator, are responsible for having a SEMS program that holistically covers operations and actives that take place on the OCS. In addition the SEMS should be amended so that it clearly states for what an "operator" and "major contractor" are responsible.

   In the interim, while these regulatory changes are being made, the Department of Interior should work with its regulatory partners to encourage and facilitate "major contractors" to voluntary SEMS compliance. By demonstrating compliance with SEMS, contractors can greatly enhance offshore safety and assist operators with compliance.

3) Prescriptive regulations and requirements: The Department of Interior has claimed that the SEMS regulations are "performance-based standards similar to those used by regulators in

[2] For the purposes of this paper, the term "major contractor" means drilling contractors and production facility owners/operators when not considered to be the leaseholder.

the North Sea."[3] The Committee disagrees, but feels that modifications to the existing SEMS regulations could help the Department of Interior reach their goal of having SEMS be a performance-based regulation.

Practically speaking, the SEMS regulations are written in such a manner that operators are not given the freedom to develop a management system that best fits their specific operations. Unlike the performance based regulations found in Norway and in the UK, the Department of Interior elected to prescribe specific items to be addressed, list items that need to be verified, and even specify what records to keep in the current SEMS regulations. If SEMS was truly a performance-based regulation, the Department of Interior would not have needed to use the words "must" and "shall" throughout the regulation.

The Committee believes that the prescriptive approach found in the current SEMS regulations promotes the idea that operators only have to meet the minimal requirements in order to comply with the regulations. This is reinforced by the fact that BSEE recently published the Potential Incident of Noncompliance (PINC) list for SEMS audits that can be used by operators to help ensure that they do not receive any penalties. In addition, the PINC list focuses more on whether or not an operator has the correct documentation rather than the practical operation of safety measures.

The Committee has written a detailed discussion on performance-based regulations under "Topic #2" of this paper. Based on that discussion the Committee believes that the Department of Interior should amend the current SEMS regulations so that they are more performance-based. In addition, the Department of Interior should work with industry to develop effective guidance document(s) on how to comply with the current and future amended SEMS regulations rather than create more prescriptive compliance requirements like those include in the SEMS II rule. For example, a leading practice for major risk analysis of typical operations would be useful to both the industry and the regulators.

4) Reinforcing process safety focus and responsibilities: The Committee feels that the current SEMS regulations and API RP 75 on which they are based includes the necessary process safety controls and requirements to be a major barrier in preventing catastrophic events from occurring (e.g. hazard analyses, management of change, safe work practices, etc.), but strongly believes that reinforcement of process safety management is needed from the regulators and industry to create the necessary change in performance and effectiveness of process safety to assure the desired outcomes. As evident in recent catastrophic events, too much attention and effort by senior management and regulators was directed toward ensuring and recognizing good occupational health and personal safety performance. For example, BP senior management were on board the Deepwater Horizon on the day of the disaster to celebrate a personal safety milestone, yet did not inquire about the integrity and operational readiness of the risk management controls nor the robustness of decision-making on the rig.

A change to this management bias towards occupational health and safety requires a fundamental shift in approach, possibly utilizing a separate safety management system focused solely on process safety management. The Committee has debated this idea vigorously, but could not agree whether different systems are essential for success. The

[3] Stated by Director Bromwich at the last International Regulators Forum meeting in Stavanger, Norway and at the Ocean Energy Safety Advisory Committee meeting in Washington in November of 2011.

argument for a separate process safety management system is that the processes and measurements are very different for this type of risk management. When combined, it is possible for process safety not to get the attention it deserves because occupational safety is so well defined and established while process safety is less so. The argument for the other side is that better definition of and focus on process safety in SEMS would overcome this bias.

Consistent with the approach to optimize SEMS rather than introduce a new safety management system, the Committee recommends that industry work with the regulators to develop an assessment methodology and/or audit protocol along with appropriate performance measures that test the process safety focus and controls as part of a regular SEMS review. Currently, the SEMS Potential Incidence of Non-compliance List[4] used by BSEE is geared towards verification that the elements of SEMS are in place rather than assessing whether the process safety controls are effective. This performance assessment could be developed in conjunction with the Center for Offshore Safety and should be supported by appropriate leading indicators that are regularly reported. (See KPI discussion in Vector 1 recommendation.)

[4] See BSEE webpage: http://www.bsee.gov/Inspection-and-Enforcement/Inspection-Programs/Potential-Incident-of-Noncompliance---PINC.aspx

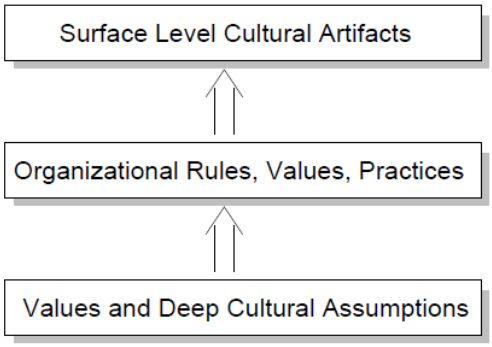
Recommendation Document #2

Safety Culture

Organizational decision making always rests upon a set of industry or organizational values or assumptions. One of the best definitions of and treatises on culture can be found in Edgar Shein's *Organizational Culture and Leadership*[1] (Jossey-Bass Publishers, 2004). Shein defines *culture* (in general) as a set of shared values and norms, a way of looking at and interpreting the world and events around us and of taking action in a social context.

In the context of this recommendation, it is important to note that the word Safety is used to refer to Safety and Environmental Risks.

Shein divides organizational culture into three levels:
Safety culture can be defined as that subset of organizational culture that reflects the general attitude and approaches to safety and risk management.[2] At the top level are the surface-level organizational cultural artifacts or routine aspects of everyday practice including hazard analysis, operational procedures, and incident investigations. The second, middle level is the stated organizational rules, values, and practices that are used to create the top-level artifacts, such as safety policy, standards, and guidelines. At the lowest level is the often invisible but pervasive underlying deep organizational cultural assumptions upon which actions are taken and decisions are made and thus upon which the upper levels rest, also known or referred to as Safety Culture.



Trying to change safety outcomes by simply changing the organizational structures, including policies, goals, missions, job descriptions, and standard operating procedures, may lower risk over the short term, but superficial fixes that do not address the set of shared values and social norms are very likely to be undone over time. Changes are required in the organizational values that underlie people's behavior.

Safety culture is primarily set by the leaders of the organization as they establish the basic values upon which decisions will be based. In fact, management commitment to safety has been found to be the most important factor in distinguishing between organizations with high and low accident rates.[3]

Safety culture will affect communication, problem reporting, following procedures such as management of change, and just about every other aspect of an effective safety program. Therefore, improving the safety culture of an industry or organization is important in achieving process safety goals. But changing culture is very difficult. One important aspect of such change is providing appropriate incentives to change.

Participants in industries like commercial aviation understand the direct relationship between safety and their profits and future viability. The relationship is not consistently used in the off-shore oil industry, some operators and contractors do have the safety cultures that provide them the understanding of the direct relationship between safety and corporate profit and future viability.

The moratorium on GOM drilling[4] was a very strong signal to the industry that those companies with strong safety cultures and practices can be hurt by those without them and that companies

without strong safety culture need to participate in industry initiatives and cooperate in improving safety. There also need to be recognition and processes to recognize the need and take action to continuously develop technology required to enhance safety processes and safety outcomes along with the development of technologies that are normally developed by industry to enhance work efficiencies and to allow the exploration and production of more complex structure.
More drastic measures have also led to changes in safety culture, such as civil penalties to executives in a firm, but this type of change incentive should be used as a last resort. Major accidents have also led to changes, as in nuclear power after the Tree Mile Island incident.

BSEE and industry leaders need to update practices and technology as oil exploration and extraction conditions change. Recognition is normally a result of a safety culture that values proactive behaviors.

Safety culture goals for the regulators and industry participants in this industry include:

- Commitment to safety is valued by the leaders. Passionate, effective safety leadership exists at all levels of the organization (particularly the top of the industry companies and the associated regulatory bodies) and everyone is committed to safety as a value for the organization.
- Safety should always be considered a value and not a priority that is evaluated against cost or schedule.
- Safety concerns are surfaced without fear, and are communicated. Communication of not only lagging indicators but also leading indicators should be constructive and focused on building a strong safety culture.
- Incidents and accidents are investigated thoroughly, including management and systemic factors, and without blame. Deficiencies found during investigations, audits, and inspections are addressed properly and tracked to completion. In addition, there is follow through to ensure that the changes are effective in fixing the deficiencies. (A learning and improvement culture).
- Safety concerns are integrated into operational decision making and play important roles in advising management and operators at all levels of the organization on both long-term decisions during engineering and development of new platforms and on the safety implications of decisions during operations. Consistent long term behavior and decision making that clearly supports safety is a good indicator that an effective safety culture has developed in the organization.
- Early warning systems (leading indicators) of degradation in safety practices are established and effective. In a culture where safety is highly valued such warning systems are brought to the surface early and it does not take much debate when and to what cost should an organization go to before deciding on the remedy.
- Safety vision, values, and procedures are clearly articulated and shared among stakeholders. Executive management from regulators and industry companies should play an active role in portraying and supporting the values of the safety culture.
- All employees have full partnership roles and responsibilities regarding safety. Stakeholders are kept fully aware of industry developments related to safety and are invited to play an active role when and if necessary.
- There is effective and open communication about safety at all levels of the organization and between industry, regulator, and the public where appropriate or at the least within industry.
- High levels of visibility of the state of safety (that is, risk awareness) exist at all levels of the organization and industry through appropriate and effective feedback

Is SEMS enough?

As described in the figure above, at the top level of the graph we can see what is required on a daily basis including hazard analysis, operational procedures, incident investigations and the list can go on to include all elements of SEMS and other Safety Management Systems.

All the elements of a Safety Management System are necessary but not sufficient to change the safety outcomes of an organization, it is important to note that even when combining the implementation of a safety management system with changes in the organizational structure, including policies and goals one may lower the risk but unless you are able to change the shared values that underlie people's behavior you are not able to create a sustainable positive change in the safety outcomes.

Changes in the organizational values that underlie people's behaviors require engagement and commitment from the leaders of the organization for which the safety outcomes need to be changed.

Safety As a Core Value

As individuals develop in their safety knowledge and safety beliefs they go through four stages which can be described as follows:

- Level 1 – Comply when it is convenient
- Level 2 – Comply when I have to
- Level 3 – Believe for me and my family
- Level 4 – Believe for me, my family and my teammates.

This progression of Individuals through the levels is effected by their organization leader's behavior and communication skills. To reach level 4, an individual would have reach a point where safety is a core value, that is not to be compromised, as more individuals reach this level within an organization, the organization would have reach a culture where safety is a core value and a deep safety culture.

Prescriptive vs. Behavior Based Culture

It can be reduced from the above that to reach a level where to reach a positive change to the safety outcomes in an organization it is important to:

1. Move from compliance to believe, an individual and an organization's behavior should be based on belief of doing the right thing, rather than compliance because it is required or convenient, and
2. Move from where we are relying solely on organizational rules and operational procedures, to a safety culture that is rooted in the organization through leadership and communication of safety values starting from the top leaders of the organization. These values should be implemented in the organizational rules and procedures.

Achieving this higher level of safety performance is better supported by an environment where behavior based criteria is developed and used to measure the belief and the level of commitment of the leaders in communicating the message. In contrast with a prescriptive regime where the driver is compliance when and because we have to.

What it takes

Developing a safety culture starts at the top of an organization and then cascades down the organization by action and personal example, not merely by words. There are examples of comprehensive approaches how to teach leaders to establish this culture. Each organization needs to be an owner of its safety culture and safety problems, not just comply with regulations.

It is key to observe that:

1- Without extensive and repeated communication and collaboration across the industry and regulating agencies, safety culture will not take hold.
2- The leadership of all organizations involved, including operators, contractors, regulators and in some cases stakeholders should be aligned on the safety culture, which underpins the safety objectives and safety values of the organizations involved.

The above highlights the importance of setting company behavioral norms and encouraging individual motivation, which raises the question as to what is the appropriate level for such norms and individual motivators to be established.

Appendix XVII

DEPARTMENT OF THE INTERIOR (DOI)
OCEAN ENERGY SAFETY ADVISORY COMMITTEE MEETING
HOUSTON, TEXAS
APRIL 26, 2012

PUBLIC COMMENTS BY
STEVE CUTCHEN
U.S. Chemical Safety Board

MR. CUTCHEN (U.S. Chemical Safety Board): Hi. My name is Steve Cutchen. I'm an investigator for the U.S. Chemical Safety Board, currently working on the Deepwater Horizon investigation.

First of all, thanks to the committee for the hard work you guys are doing. Watching the sausage get made really gives me an appreciation for the difficult tasks that you guys are dealing with.

What I wanted to do was to make you guys aware of some work that the CSB is about ready to publish. Specifically I think this will be of interest to the Spill Prevention subcommittee, but we're preparing to issue a safety bulletin based on what appears to be misunderstanding of what caused the drill pipe to bow within the blowout preventer.

So far there's been three of the major investigation reports that have issued their basis for how the pipe got bowed: the DNV report that was part of the joint investigation team, Transocean's report, and the NAE report.

All three of those reports tried to come up with some type of an explanation for generating enough axial compression to actually cause the pipe to bend.

It turns out that the issue is not axial compression; it's effective compression, and there's a major piece that they overlooked, which has to do with the differential pressure inside a pipe versus outside.

If you have high pressure inside a pipe, low pressure outside, even with no axial compression, you can still buckle that pipe. And in fact, inside the Deepwater Horizon BOP, our calculations show that the pipe could have buckled prior to the explosion, and it could have buckled even though the pipe was actually under tension -- axial tension at that time.

At that point there was so much -- when the pipe rams were closed at the bottom -- and I apologize for all the technical stuff, but I'm assuming you guys are up to speed.

When the pipe rams were closed and the drill pipe pressure took off, that caused the annulus pressure to drop so much and the pipe pressure to rise so much that the pipe buckled even though it was still under tension, and it buckled in the BOP, probably also buckled in the lower parts of the riser, which may be what pulled the annular -- I mean, the tool joint up against the upper annular preventer.

I think it's important that this be thought through when making recommendations on how to operate or design or regulate blowout preventers, because it's a different mechanism than what people have thought was the mechanism going in.

So I wanted to bring you guys aware of that. Also I think it can -- you know, there's going to be a period of time, I think, that it's going to take to get mechanical changes to blowout preventers actually on the sea floor. And with the idea of effective compression and this pressure difference, there may actually be some procedural type things that could be done.

For example, when the crew on the Deepwater Horizon closed the upper annular, had they closed the lower annular at the same time, then when they closed the pipe ram, the distance between those two would have been about five feet or so shorter, and it may -- the pipe may not have buckled.

So there's some very interesting consequences that may come about as a result as well.

CHAIRMAN HUNTER: Questions?

MEMBER HICKMAN (U.S. Geological Survey): Is there a report that you're working on you can send us?

MR. CUTCHEN (U.S. Chemical Safety Board): Right now we have a report that we're working, so I'm kind of maybe busting the story a little bit early, but the reason for doing so was because you guys are here, and we can let you know.

The status right now is the report's being circulated to outside experts for verification. It should be -- I mean, the work is essentially done at this point.

MEMBER HICKMAN (U.S. Geological Survey): It would be good to see that when it's ready.

MR. CUTCHEN (U.S. Chemical Safety Board): It will be issued as a safety bulletin by the agency.

CHAIRMAN HUNTER: Just a question, then, just for the terminology, to get it straight for the audience: This is differential pressure in the drill pipe and the central casing?

MR. CUTCHEN (U.S. Chemical Safety Board): Between the drill pipe and outside the drill pipe, in the annulus.

CHAIRMAN HUNTER: Well, just to get the terminology straight, the drill pipe's in the central casing; then the annulus it outside that?

MR. CUTCHEN (U.S. Chemical Safety Board): Okay. Maybe we are thinking --

CHAIRMAN HUNTER: There are two annuli.

MR. CUTCHEN (U.S. Chemical Safety Board): If you think about within the BOP, you had the drill pipe, and then you had an annulus, and then the body of the BOP.

CHAIRMAN HUNTER: Oh, within the BOP. Thank you.

MR. CUTCHEN (U.S. Chemical Safety Board): Yeah, when you get down subsea, then you've got another annulus before you get to --

CHAIRMAN HUNTER: Okay. Thank you. In the BOP there is the bore of the BOP plus the drill pipe.

MR. CUTCHEN (U.S. Chemical Safety Board): Yes.

CHAIRMAN HUNTER: Thank you for clarifying.

MR. CUTCHEN (U.S. Chemical Safety Board): And then I had one question having to do with the instrumentation work. It sounded like that most of the work that you guys talked about had to do with sensors and additional measuring devices, to be able to bring more information up to the drilling rig.

I guess what I'm wondering is, are you also looking at the man-machine interface, the driller console design, the design of the mudlogger console, the interface of instrumentation between in all of that work as well?

CHAIRMAN HUNTER: Chris, would you like to comment?

MEMBER SMITH (Department of Energy): Yeah. I mean, short answer is yes, we talked a little bit about gauging instrumentation, communication technology, so you can actually get the right volume of information from the sea floor up to the drilling platform, and that was in the R&D vector.

In the automation vector we talked a lot more about the interface between how people -- you know, the drillers who are managing the well are taking information, and can we get some more algorithms to help us make on-the-spot decisions. Does that characterize well, Don or Paul?

CHAIRMAN HUNTER: Any other comments on that topic? Tad?

MEMBER PATZEK (Academia): And likewise in process safety and better use of data; it's the same issue. So, yes, we are thinking about this.

MR. CUTCHEN (U.S. Chemical Safety Board): Okay.

CHAIRMAN HUNTER: On the first topic, could you tell us when the report might be available and maybe send us an email, maybe send Joe or Kyle an email saying how to get the report?

MR. CUTCHEN (U.S. Chemical Safety Board): Yeah. It will be issued and on our website whenever it finally gets approved, but we're going throughout own sausage making at the moment.

CHAIRMAN HUNTER: So it's this calendar year, you think?

MR. CUTCHEN (U.S. Chemical Safety Board): Oh, yeah.

CHAIRMAN HUNTER: Good. We'll be very interested. Any other comments on the comment and question, or any other comments and questions from the speaker?

MR. CUTCHEN (U.S. Chemical Safety Board): One other thing I would do, just in the guise of maybe advertising. We are also doing an awful lot of work with respect to leading indicators, and we're looking at leading indicators with respect to the Deepwater Horizon incident as well.

And I believe this date kind of fluctuates, but I'm sure it will be announced on the website when it's final. I believe July 24, 25 here in Houston we're planning to hold a public meeting to talk about leading indicators, so just to let folks know that that's coming up.

DESIGNATED FEDERAL OFFICER LEVINE: Will that be on your website?

MR. CUTCHEN (U.S. Chemical Safety Board): That will be on the website as well. Yes.

CHAIRMAN HUNTER: Very good. Will someone restate, then -- I think it was Joe. You said when the COS was -- what their plans were for leading indicators as well, so we can get the two dates.

MEMBER JACOBSEN (Offshore Energy Industry): Yeah, I was talking about that earlier.

CHAIRMAN HUNTER: I'm sorry, Donald.

MEMBER JACOBSEN (Offshore Energy Industry): So they held the initial workshop. Brad Smolen was here, and he's leading the effort. They had the initial workshop. They have a second workshop in May scheduled already.

VOICE: Mid-May.

MEMBER JACOBSEN (Offshore Energy Industry): Yeah.

CHAIRMAN HUNTER: So sounds like we've got two important organizations dealing with that very important topic.

MR. CUTCHEN (U.S. Chemical Safety Board): And I should give a disclaimer, too, that I'm speaking for myself here; not for the agency. So if whatever comes out in the way of a report sounds slightly different than what you heard today, that's my fault, not the agency's fault.

CHAIRMAN HUNTER: That puts you in the same camp with each of us.

MR. CUTCHEN (U.S. Chemical Safety Board): Exactly.

CHAIRMAN HUNTER: Any other questions or comments?
(No response.)

CHAIRMAN HUNTER: Thank you very much.

MR. CUTCHEN (U.S. Chemical Safety Board): Thank you.

CHAIRMAN HUNTER: That was very informative.

DESIGNATED FEDERAL OFFICER LEVINE: Thank you, Steve.

Appendix XVIII

DEPARTMENT OF THE INTERIOR (DOI)
OCEAN ENERGY SAFETY ADVISORY COMMITTEE MEETING
HOUSTON, TEXAS
APRIL 26, 2012

PUBLIC COMMENTS BY
DONALD W. DAVIS
Louisiana State University (LSU) Sea Grant Program

DR. DAVIS (LSU Sea Grant Program): In the interest of brevity, Richard Sears mentioned that it was necessary to capture the incident memory, which is certainly important. I would like to suggest that the committee use oral historians, only because you will get a very large holistic view; you will uncover information that is not in the popular and/or refereed literature; and if you push forward on a workshop, you will find themes that perhaps you hadn't thought about.

Second, in listening to all of the discussions today, I would hope somewhere we begin to at least consider socioeconomic issues. Certainly there's a great deal of blowback. I would hate to see that we end up with academic footnotes as opposed to at least some reference to the socioeconomic aspects of all the issues you're discussing. Enough said.

CHAIRMAN HUNTER: Any questions or comments for our speaker?

MEMBER PATZEK (Academia): I have one comment. Lois is missing, and in fact I don't want to make light of this, but I think that the socioeconomic factors are very much on her mind. I can only represent her. And it's also on our minds; you know, in fact, for better or worse, it was so much on my mind that I could write a book on this. So we're not taking it lightly.

CHAIRMAN HUNTER: I can comment on the first of your two points. I've experienced that, and I think that's a very valid comment, because oral historians or knowledge preservation is kind of an art, and you'd be surprised what comes out of conversations that you have with an experienced and trained person.

And what's really effective is to have two people having conversation with a trained, experienced person, because they reinforce and pull together topics. I appreciate your comment. It's a very valid way of knowledge preservation or knowledge establishment.

DR. DAVIS (LSU Sea Grant Program): And then finally as you begin to try to put together a compendium of what's out there, I suggest you use what we used to call library scientists. Now they're information specialists.

They may not know the corporate workings, but they know how to find the information. So with one of you standing beside them, you can generate the kinds of material you're looking for.

Before I became director emeritus, I managed Louisiana's Applied and Educational Oil Spill R&D Program. We put together the largest bibliography on oil spills available to the public, the largest ever run at LSU, and the most expensive ever run at LSU.

And we did not do it; it was library scientists that did it, and I think that that's an important part to keep in mind. We sometimes lose track of these professionals because we don't deal with them every day.

CHAIRMAN HUNTER: Comments or questions?

MEMBER STANISLAUS (Environmental Protection Agency): On your comment about socioeconomic impact, do you have any specific suggestions with respect to how we should consider them, in any particular --

DR. DAVIS (LSU Sea Grant Program): Well, it would be nice if the committee had a socioeconomic person on board; social anthropologist, cultural geographer, general social scientist. There's plenty evidence from -- I don't know it's politically correct, but the Prince William Sound incident.

Those of you from NOAA are familiar with the Unalaska event, which changed how some people looked at socioeconomic issues, particularly in Alaska.

I don't have a specific recommendation. I do sit as sort of an advisor; we can work that out later. But I do think it's important, and I don't want to see it as a footnote.

And clearly it hasn't been, but there was nothing that surfaced today that would give me any clue that it's been part of your agenda, or maybe subconscious part of your agenda.

CHAIRMAN HUNTER: It's a good reminder. Mathy, any other questions? No? Anyone on the Committee? (No response.)

DR. DAVIS (LSU Sea Grant Program): Thank you.

CHAIRMAN HUNTER: Thank you very much. Thanks for your comment.

DESIGNATED FEDERAL OFFICER LEVINE: Thanks, Don.

Appendix XIX

DEPARTMENT OF THE INTERIOR (DOI)
OCEAN ENERGY SAFETY ADVISORY COMMITTEE MEETING
HOUSTON, TEXAS
APRIL 26, 2012

PUBLIC COMMENTS BY
ROBIN PITBLADO
Det Norske Veritas USA, Inc (DNV)

MR. PITBLADO (DNV): My name is Robin Pitblado. I work for DNV here in Houston. I had a comment, I guess, regarding the fourth subcommittee, the one that was dealing with SEMS.

And the comment that we have -- and DNV has gone on record, we issued a position paper after Macondo, and we've spoken to a number of people in Washington and other places.

We regard SEMS as a necessary and valuable addition to the offshore regulations, but on their own they're not sufficient for complex deepwater developments.

DNV has advocated a safety-case approach, not because of the 500-page document. I think a 500-page document's sitting on the OIM's desk is not going to make your facility any safer, and I think we can all agree on that. But the process that the safety-case initiates leads to more safety than you get from SEMS.

And there's different kinds of safety-case. We've had safety-case in Europe that started with the Seveso directive, which is an onshore safety case, and that's had very little impact on safety. We still have major accidents in Europe.

We have almost the same here in the US with the EPA RMP document, the risk management plan, also a 500-page document. It has not made a significant difference to onshore safety, and that was an academic report from Wharton Business School, who assessed the RMP Star database.

But it seems the offshore safety case and a similar process in Norway has made a big difference to offshore safety in the North Sea, and that kicks into specifically things like holistic risk assessment, and that addresses the presidential panel recommendation for a detailed, site-specific risk assessment, which you don't get out of a qualitative assessment.

Performance standards, barrier definition, and then schemes to keep those barriers functioning, and then, as you go on, actual decision making based on the current barrier status at the time the decision is taken.

And when you put that all together, we think that you can get significantly more safety, and that process is not driven by SEMS, and SEMS won't get you there, in our view.

But then we also agree with many of the other comments you've made. It does need to be in a context of a robust safety culture program, but I would also add a penetrating verification scheme, to verify that all the commitments are actually happening.

So that's our main comment.

CHAIRMAN HUNTER: Could we ask Joe and Don and maybe others to respond? Thank you for your comments.

MEMBER JACOBSEN (Offshore Energy Industry): I'll chime in first. And clearly the longer-term work that we had identified and talked a lot less about addresses a lot of those elements.

You know, how do we take the structure in SEMS, if you look at the elements -- and it calls for risk assessment, but what does that look like? How effective is it? Is there a dialog between the operator of that facility and the regulator so they understand the risks.

So performance standards -- barrier definitions and -- you know, there's a lot that I think we think -- the subcommittee felt like we could enhance that, and it may come out in the end of the final recommendations more in line of what is required, say, in Australia, the safety-case requirements, but it comes with a different nomenclature, you know, a different -- it's a risk assessment tool or something.

So I think the discussions we had around the subcommittee had included a lot of points you made.

MEMBER GEBARA (Offshore Energy Industry): Yeah, I mean, we really appreciate you coming up and sharing that with us. Actually DNV was invited and did present at our subcommittee meeting in January on this topic, and we respect the viewpoint and the work you guys do.

At the same time, we also are looking at where is industry today, where is it going, what are the resources available, where are we going to be able to reach, given all the parameters included, and that's part of the data and the elements that we have to work with.

I don't think we're too far away; it's just we're using slightly different approach and a different nomenclature.

And, again, if you look through the rest of the presentation we gave today and the document that we've written, which should be public by the end of the day, you'll see some of the similarities.

MR. PITBLADO (DNV): Very good. Thank you very much.

CHAIRMAN HUNTER: Robin, thank you very much. It sounds like we're on a fairly consistent path. I would ask you to keep in touch with us.

DESIGNATED FEDERAL OFFICER LEVINE: Thank you, Robin.

As far as I know, that completes the public comments provided to OESC. Any others? (No response.)