Ultra-Deepwater Advisory Committee (UDAC)

April 6-7, 2011

Fifteenth Meeting

Meeting Minutes

A Federal Advisory Committee to the U.S. Secretary of Energy

Ultra-Deepwater Advisory Committee

I hereby certify that this transcript constitutes an accurate record of the Ultra-Deepwater Advisory Committee meeting held on April 6-7, 2011.

Dan Daulton, Chair
Ultra-Deepwater Advisory Committee

Oct. 14, 2011
Date

Ultra-Deepwater Advisory Committee (UDAC) Meeting
April 6-7, 2011, Houston, Texas

April 6, 2011

The meeting was called to order at 8:00 am; Chair Dan Daulton reviewed the approved agenda. (Attachment 1) The presence of quorum of members was verified by the Committee Manager, Elena Melchert (Attachment 2).

Opening remarks were presented by Deputy Assistant Secretary for Oil and Natural Gas, Christopher A. Smith, the Designated Federal Officer (DFO) for the UDAC.

Report by the Portfolio Subcommittee, Dr. George Cooper, Chair (Attachment 3)
Dr. Cooper described key points of the Subcommittee report. He discussed the approach, inputs, and procedures the Subcommittee used to generate their findings and recommendations. He demonstrated how projects focusing on "prevention" would be better than a "cure" for the current problems facing the industry.

Discussion by the UDAC.

Report by the Process Subcommittee, Dr. Lesli Wood, Chair (Attachment 4)
Dr. Wood described key points of the Subcommittee report. She opened by discussing the goals and specific tasks of the Subcommittee. She next discussed the issues the Subcommittee dealt with before providing a quick overview of their findings and recommendations.

Discussion by the UDAC.

General Discussion Between the Committee and the DFO
The discussion focused on clarification regarding the degree of specificity and the type of advice requested by Secretary of Energy Chu. The DFO clarified that the direction the Secretary wants for the program is to change from a program focused on maximizing production which the industry is already highly motivated to do, to a program that focuses on research focused on assessment and quantification of risk. The research could also underpin improved regulation that is based on sound scientific analysis.

He also clarified that the research should not include oil spill cleanup which is conducted by other agencies, but should focus on prevention of spills through an improvement in current drilling and operating technologies, and methodologies. He emphasized that increasing production, while important to energy security, should take on a role that is secondary to safe and environmentally sustainable production. In the long run, preventing another accident like the *Macondo* is in everyone's best interest. Resource development and safety are not incompatible goals.

The group continued with general discussion regarding specific points made during the two subcommittee reports.

Discussion and Development of Findings and Recommendations

Portfolio Subcommittee

The Committee discussed each finding and recommendation presented in the Subcommittee report (Attachment 5). Discussion continued until the UDAC reached consensus on a final set of findings and recommendations.

Discussion Regarding the Path Forward

Deputy Assistant Secretary Smith reported on his recent visit to Los Alamos National Laboratory (LANL), and described some of the unique capabilities of this national laboratory. He emphasized Secretary Chu's request for the Committee to look outside traditional areas of interest/expertise such as weapons stockpiles, nuclear Navy, nuclear reactors, and the lessons learned from past disasters outside the oil and gas sector.

He asked the Committee to consider accessing the capabilities of LANL to support the Committee's efforts to advise the Secretary of Energy. He proposed that the UDAC consider establishing a new subcommittee that could focus on the question of risk assessment and risk quantification –questions that LANL has addressed for other industry sectors.

After discussion about the role, responsibility, and composition of the new subcommittee, the members of the UDAC unanimously agreed to establish the UDAC Risk Assessment Subcommittee. The UDAC Committee Manager was then charged with advising the UDAC Chair and the DFO on the specific path forward for the new subcommittee.

The DFO then appointed Elena Melchert, Senior Program Manager, DOE, to act as the DFO for the remainder of the meeting.

As there were no members of the public wishing to offer public comments, the proceedings were suspended for the day.

April 7, 2011

The meeting was called to order, and discussions with the subcommittees continued.

Process Subcommittee

The Committee discussed each finding and recommendation presented in the Subcommittee report (Attachment 6). Discussion continued until the UDAC reached consensus on a final set of findings and recommendations.

Discussion of the Executive Summary and the Cover Letter

The UDAC then turned to discussion about key points that should be included in the cover letter transmitting the UDAC report on findings and recommendations to the Secretary of Energy.

Instructions to the Editing Subcommittee
The Chair reminded the Committee that the role of the Editing Subcommittee was simply to smooth the report, and make changes to improve the readability of the report. The Editing Subcommittee has no authority to change the agreed to findings and recommendations.

Committee Calendar and Next Steps – Elena Melchert (Attachment 7)
Ms. Melchert reminded the UDAC of the process and procedure leading to its next meeting. The focus of the next meeting will be on the Committee's acceptance of the final report after preparation by the Editing Subcommittee.

After brief discussion, the meeting was adjourned.

Attachments

	Presenter	Topic
1	For the Record	Meeting Agenda
2	For the Record	Committee Members and Meeting Participant Attendance
3	Dr. George Cooper	Report by the Portfolio Subcommittee
4	Dr. Lesli Wood	Report by the Process Subcommittee
5	Portfolio Subcommittee	Findings and Recommendations
6	Process Subcommittee	Findings and Recommendations
7	Ms. Elena Melchert	UDAC Committee Calendar and Next Steps

Attachment 1

Department of Energy

Washington, DC 20585

Ultra-Deepwater Advisory Committee
15th Meeting, April 6 – 7, 2011
Crowne Plaza Houston North Greenspoint
425 N. Sam Houston Parkway East
Houston,TX

AGENDA

April 6, 2011 [Day 1]

7:30 a.m. CDT	*Continental Breakfast/Check-In*	*Members & Public*
8:00	**Call to Order** / Welcome / Meeting objectives Overview of the approved agenda Opening Remarks	Dan Daulton, Chair
8:15	**Committee Business** Confirmation of quorum	Elena Melchert Committee Manager (CM)
8:20	**Opening Remarks**	Christopher Smith Designated Federal Officer (DFO)
8:45	**Subcommittee Reports** --Portfolio Subcommittee Dr. George Cooper --Process Subcommittee Dr. Lesli Wood	Chair
10:00	**BREAK**	
10:15	**General Committee Discussion**	Chair
11:00	**Discussion and Development of Recommendations** -Begin Portfolio	Chair Rob Matey, Logistics
Noon	**WORKING LUNCH**	
1:00	Continue Discussion and Development of Findings and Recommendations for Portfolio	Chair
2:30	**BREAK**	
2:45	Complete Discussion and Development of Findings and Recommendations for Portfolio	Chair
4: 45	Public Comments, if any	DFO
5:00	Adjourn for the day	DFO

Ultra-Deepwater Advisory Committee
15th Meeting, April 6 – 7, 2011
Crowne Plaza Houston North Greenspoint
425 N. Sam Houston Parkway East
Houston,TX

AGENDA

April 7, 2011 [Day 2]

7:30 a.m. CDT	*Continental Breakfast/Check-In*	*Members & Public*
8:00	**Call to Order** / Session objectives Discussion and Development of Findings and Recommendations for Process	Dan Daulton, Chair
Noon	**WORKING LUNCH**	
1:00 p	**Executive Summary and Cover Letter**	Chair
2:00	**BREAK**	
2:15	**Instructions to the Editing Subcommittee**	Chair
3:15	**Committee Calendar and Next Steps**	CM
4:00	**Adjourn**	Chair

Approved: _____ 3-8-11
Christopher A. Smith, Designated Federal Officer — Date

Attachment 2

Ultra-Deepwater Advisory Committee Meeting
Sign-In Sheet - April 6-7, 2011

Last Name	First Name	Organization	Initial
Cooper*	George A.	University of California, Berkeley	GAC
Danenberger*	Elmer P.	Offshore Consultant	**UNABLE TO ATTEND**
Daulton	Daniel J.	~~BJ Services Company~~ Baker Hughes	Dan Daulton
Dokken	Quenton R.	Gulf of Mexico Foundation	UNABLE TO ATTEND
Downs	Hartley H.	Baker Hughes Incorporated	Hartley Downs
Foster	Douglas J.	ConocoPhillips	
Håvardsholm	Lars	Statoil	
Ikelle*	Luc T.	Texas A&M University	
Litton*	James D.	Litton Consulting Group, Inc.	**UNABLE TO ATTEND**
New	William C.	New Industries, Inc.	
Pye	D. Stephen	Consultant	**UNABLE TO ATTEND**
Srinivasan	Nagan	Deepwater Structures, Inc.	
Wilson*	Mary Jane	WZI Inc.	
Wood*	Lesli J.	Bureau of Economic Geology	

Total Members = 14

QUORUM = 8

Confirmed attendees = 11
Regrets = 3

* Special Government Employee

Ultra-Deepwater Advisory Committee Meeting
April 6-7, 2011

DOE Staff Roster

U.S. Department of Energy – Office of Oil and Natural Gas

Christopher Smith Deputy Assistant Secretary	Designated Federal Officer
Elena Melchert Program Manager for Section 999	Committee Manager

National Energy Technology Laboratory

Roy Long	Ultra-Deepwater & Unconventional Natural Gas and other Petroleum Resources Technology Manager
Gary Covatch	Strategic Center for Natural Gas & Oil
Ginny Weyland	Strategic Center for Natural Gas & Oil
Chandra Nautiyal	Strategic Center for Natural Gas & Oil

IBM

Rob Matey	Meeting General Support
Jennifer Presley	Registration Support

Ultra-Deepwater Advisory Committee Meeting
Public Sign-In Sheet - April 6-7, 2011

Name	Organization	Phone	E-mail
[illegible]	RPSEA	281-690-5111	[illegible]
Hani Sadek	Chevron	832-247-8823	Sadekha@chevron.com
Bob Siegfried	RPSEA	281-690-5502	rsiegfried@rpsea.org

Attachment 3

Portfolio Subcommittee Report

Approach:

- A wish list, without pre-judging feasibility or cost

Inputs

- Draft Annual Plan
- Views of Secretary Chu
- “Deepwater” Report
- Personal Views – Ideas from other industries

Procedure

- Collect topic ideas --> 42 topics
- Merge --> 16 topics
- Group
  - Before
  - During
  - After
  - Organizational
- Assign importance

Importance

- Before
  - Prevention better than cure

Importance

- Before
  - Prevention better than cure
- During
  - Smart systems, not new hardware ?

Importance

- Before
  - Prevention better than cure
- During
  - Smart systems, not new hardware ?
- After
  - Psychology of prevention rather than cure ?

Importance

- Before
  - Prevention better than cure
- During
  - Smart systems, not new hardware ?
- After
  - Psychology of prevention rather than cure ?
- Organizational
  - Everyone knows what to do, but somehow it doesn't get done

Attachment 4

Project Goals

Ultra-deepwater Advisory Committee's Subcommittee on Process

is charged with examining and investigating the effectiveness and efficiency of the processes utilized by the program consortium in the solicitation, evaluation, selection and award of ultra-deepwater research and development projects pursuant to Subtitle J of EPAct 2005.

Process Sub-Committee Tasks

1. **Scorecard(s) illustrating the process flow of research and development activities undertaken pursuant to the referenced subtitle;**
2. **Identification of barriers and/or areas of improvement that would yield greater effectiveness and/or efficiencies of the program consortium;**
3. **Recommendations of process improvements that would enhance the effectiveness and/or efficiency of the programs under the referenced subtitle;**
4. **Benchmark comparisons with other research & development programs to address the perspective of relative program and/or program consortium performance; and**
5. **Such other matters directed by the UDAC within the defined scope of this subcommittee**

Issues

Which way do we go?

Previous program has focused on resource additions and is established to address success in that arena.

Shift in Priorities

Recent events in deep water drilling indicate a need to focus our attention on other areas of the process.

The Subcommittee believes the existing process is very applicable for any additional directional changes the program may take as a result of the Macondo disaster.

Process Sub-Committee Tasks

1. Scorecard(s) illustrating the process flow of research and development activities undertaken pursuant to the referenced subtitle;
2. **Identification of barriers and/or areas of improvement that would yield greater effectiveness and/or efficiencies of the program consortium;**
3. **Recommendations of process improvements that would enhance the effectiveness and/or efficiency of the programs under the referenced subtitle;**
4. Benchmark comparisons with other research & development programs to address the perspective of relative program and/or program consortium performance; and
5. **Such other matters directed by the UDAC within the defined scope of this subcommittee**

Finding #1 – Cycle Time

Finding #1

While there have been **significant improvements in the cycle time,** which is defined as the time from approving the Annual Plan to the time when a project award has been approved, the 2010 process **still** took **nearly 2 years. The long time involved in the process is not a motivation factor** for either the groups coming forward with the Research and Development (R&D)proposals nor the different TAC's and PAC involved.

Recommendation #1A

Continue to try and **improve cycle time with a goal of achieving a 12 month time frame** from Annual Plan approval to project award**, within the scope of those variables in RPSEA's control.** Immediately advise Department of Energy (DOE) of any slippage and propose methods to get back on schedule. This will benefit all parties involved.

Recommendation #1B: Place **more focus on fewer and more comprehensive R&D programs.** We recommend the program award **5-10 projects each year** that are more focused. Fewer and more comprehensive R&D programs each year should speed up the process.

Finding #2 – Solicitation Process Part 1 Lessons and Best Practices

Finding #2

The current solicitation process is **not reaching a broad enough audience to assure that the program addresses ways of capturing lessons learned, and prepares the best practices and guidelines**

Recommendation #2A

The solicitation **should be expanded to groups like the Society of Professional Engineers, American Petroleum Institute and others. This will also encourage industry to adopt higher standards**

Recommendation #2B

RPSEA & NETL should reach out to establish relationships with international regulator forums as possible locations for additional solicitation.

Finding #2 – Stakeholder identification and access

Recommendation #2C

RPSEA should consider solicitation and **a possible forum specific to spill prevention/response** including contacts such as marine well containment companies, Helix Energy, as well as international companies/locations.

Recommendation #2D

RPSEA should **include pipeline/umbilical, FPSO industries in the solicitation process** to address issues of mitigation**.**

Recommendation #2E

RPSEA should **establish an Environmental and Safety Analysis Forum and consider inviting organizations such as DNV.** Additional potential organizational contacts can be found at http://www.offshore-environment.com/organizations.html.

Finding #3 – Solicitation Process Part 2 Risk and Accountability

Finding #3

The current solicitation process is not reaching a broad enough audience to assure that the program addresses the development of an understanding of risk-based management and executive accountability for environmental and safety issues.

Recommendation #3A:

RPSEA should **consider solicitation/forum for environmental leadership and accountability management in their R&D Projects[1].**

Recommendation #3B:

RPSEA should **consider adding a "Risk Management" process specialist to Strategic Advisory Committee (SAC)** to help with "risk-based" performance direction of RPSEA R&D project evaluation process.

Recommendation #3C:

RPSEA should **encourage participation of the National Academy of Engineering** to identify high-risk human and environment considerations in the R&D project award process

1 *For example, American Petroleum Institute is working with SMU Cox Business School (Frank Lloyd) to incorporate in oil and gas professional development Education program fostering executive environmental accountability.*

Finding #4 – Stakeholder identification and access

Finding #4

The members of the Program Consortium have well-defined skill sets and passions around their technical competencies. The change in program direction may have projects that are outside these existing technical competencies and passions. This creates a challenge for the Program Consortium to adjust its membership.

Recommendaton #4A

Limit the project recommendations for this program to those that fall within the technical competencies and passions of the Program Consortium. Simultaneously, assure that those projects that fall outside the technical competencies and passions of the Program Consortium are addressed in another program and not abandoned.

Recommendation #4B

Encourage the Program Consortium to re-structure its membership and particularly the membership of its TAC and PAC, in a way that ensures the technical competencies and passion are available for projects in the revised program.

Questions? Clarifications?

Ultra-deepwater Advisory Committee's Subcommittee on Process

Attachment 5

R & D PORTFOLIO FINDINGS AND RECOMMENDATIONS

Overview

As stated in the Draft Annual Plan for 2011 for the Ultra-Deepwater and Unconventional Natural Gas and Other Petroleum Resources Research and Development Program, the proposed Ultra-Deepwater Program Element concentrates on the following primary focus (2011 Draft Annual Plan, p. 11): "… to fill in identified technology and/or knowledge gaps related specifically to ultra-deepwater safety, environmental impact assessment and environmental impact mitigation which are not currently addressed by the portfolio of projects and outstanding solicitations resulting from past Annual Plans". The Proposed areas for investigation include the following (summarized):

1. Gather and analyze data, develop and test models to identify and quantify environmental and safety risks associated with all aspects of ultra-deepwater drilling.

2. Focus on overburden formations and reservoir characterization, evaluation and surveillance to minimize drilling and production risks.

3. Gather and analyze data, develop and test models with the objective of reducing environmental and safety risks while extending tieback distances and eliminating surface host installations.

4. Improve environmental sustainability and safety of enhanced technology for direct intervention in wells in ultra-deep water.

5. Propose continuous improvement and innovation in the areas of environment and safety.

Committee members are also cognizant of the following note from Secretary Chu appended to the statement of program areas: "The Secretary is requesting recommendations from UDAC on ways in which these or other R&D projects can assist in the identification of environmental and safety risks and ways in which technology gaps can be identified and addressed". Many of the same issues were raised by the Secretary during his visit to the meeting of the committee on 23 February 2011, and also appear in the Report to the President by the National Commission on the BP Deepwater Horizon Accident ("Deepwater; the Gulf Oil Disaster and the Future of Offshore Drilling") - hereafter referred to as the Deepwater Report

In view of the extraordinary events of 2010, it is clear that the future R&D portfolio of the UDW will have a major focus on health, safety and environmental issues. This refocusing activity will be common to all of the agencies, governmental and other, that are associated with the offshore petroleum industry. However, the emphasis will vary from agency to agency. The Deepwater Report makes the point that there is a distinction to be made between ensuring the safety of personnel and the safety of the processes that

are being operated. (See the box on p. 218 which discusses the difference between "Occupational Safety" and "Process Safety"). This is not a new distinction; the Deepwater Report also states that the Baker Panel Report on the Texas City refinery accident of 2005) (p 221) had made the same point. In the case of the UDAC it seems clear that the Committee should address issues in the area of process safety as a priority.

In addition, having a view to obtaining the best result from limited funds, the Committee has taken the view that an ounce of prevention is worth a pound of cure. In principle, an accident can be prevented entirely, whereas once it has occurred, the effects can only be limited. The ability to prevent or to control an accident is greatly dependent upon the quality and latency of the information available to the decision makers. In such complex systems as we are considering, the disparate experiences of individuals provide inadequate guidance and frequently dangerous analogies. Therefore giving greater weight to research programs that provide augmentation and constraints to execute designs and operations as nearly failure-free as possible is recommended. Some general research programs are identified in our recommended portfolio.

Within the work areas designated above as being within the scope of the 2011 Draft Annual Plan, the Committee offers the following suggestions:

Finding #1 Projects aimed at preventing accidents

It is clear that the probability of the Deepwater Horizon accident occurring would have been much reduced if more information had been available from the well and the region of the wellhead in the period before the accident. The process could have started with a more thorough appreciation of the risk potential of the reservoir. During drilling, important information would have included the reporting of pressures, fluid types, flow rates and possibly temperatures as the flow of reservoir fluids was developing. Effective interpretation of this data, possibly by an automated system with appropriate alarms, might have emphasized the danger of the situation to rig personnel in sufficient time for them to have taken action to avoid a catastrophic event.

Recommendations

1. Develop an approach to assessing likely reservoir behavior before drilling starts, with a view to integrating well design, drilling and completion activities. This topic may also include the use of measurement while drilling (MWD) to assess reservoir conditions ahead of the bit while drilling but before a formation is penetrated. Expert systems can be of value for assimilating different data types.

2. Support projects aimed at placing additional measuring instruments in the well and/or at the wellhead to determine the nature of the well fluids and their flow status. This work should be combined with developing secure methods for transmitting the data to surface and providing timely interpretation thereof. Special emphasis should be placed on identifying and resolving ambiguous or single source measurements.

3. Develop Corrosion monitoring and prevention programs.

4. Develop standardized tests, possibly to failure, for subsea equipment, including *inter alia* BOP shear capability tests, time to actuate BOP rams and leakage tests. This activity may also include work to improve the design and monitoring of other subsea equipment , e.g. riser shutdown valves and mooring system components.

5. Develop standardized well test procedures, including negative pressure and other integrity tests. See also 6, below, concerning cement integrity. This may be more a subject for industry collaboration than research.

6. All aspects of cement design, placement and testing should be revisited, including cement design and placement and verifying the quality of the job by logging or pressure tests (see 5 above).

Finding #2 Projects aimed at controlling accident situations

Again, it is clear from the history of the accident that over the entire period from the initial blowout to the final capping of the well, efforts were hampered by an inability to determine exactly what was going on. This included difficulty in measuring flow from the well, knowing the status of the hardware (valves open or closed ?) and measurement of pressures and other data at different points.

Recommendations

7. Providing additional instrumentation at the wellhead and in the well (as for recommendation 2), including the measurement of temperatures and pressures, presence of hydrocarbons, BOP functions (valves or rams open or closed) accumulator pressure, battery status etc. and developing interpretation capabilities (Expert Systems ?) aimed at understanding the nature of an accident. BOP instrumentation that is replaceable by ROVs or AUVs should be considered.

8. Development of autonomous underwater vehicles (AUVs) that can independently access seafloor information and transmit it to surface, whether the original surface equipment is still there or not, and allowing for situations in which all forms of surface equipment might have to leave the site because of bad weather or for other reasons. Such equipment may be combined with devices to detect hydrocarbon leaks from the sea floor and other subsea equipment (pipelines, separation facilities etc.). Also, subsea acoustic measurements may be able to detect the magnitude and location of hydrocarbon flows from the sea floor.

9. Redesign equipment so that it can be modified or repaired at the sea floor, and/or to allow collection facilities to be attached in the event of a leak.

10. Develop rig features designed to improve crew survivability in the event of an accident or storm, including "bunkers" in which crew members can take refuge, and/or improved disconnect and drive-off procedures.

Finding #3 Projects aimed at collecting or otherwise dealing with spilled hydrocarbons.

Experience in dealing with the Deepwater Horizon accident showed that, although exceptional efforts were exerted during and after the event to collect, disperse or otherwise deal with spilled hydrocarbons, there was little in place before the accident occurred to deal with a spill. The Deepwater Report (p.135) mentions that "In 1969, following the Santa Barbara Channel spill, the Nixon administration had issued a report recommending, in part, that 'underwater methods to collect oil from subsea leaks should be developed' For deepwater wells, however, such development had never occurred". It is clearly appropriate to revisit this requirement today.

Recommendations

11. To support the development of a range of hydrocarbon capture and/or dispersal technologies with particular emphasis on techniques that allow subsea capture independent of surface facilities. Such techniques might include, for example, the provision of rapidly-deployable storage facilities, or a capability to divert hydrocarbons to existing subsea pipelines (recognizing the difficulty of feeding unseparated hydrocarbon flows into current pipelines). This latter emphasis might be combined with objective three in the Draft Annual Plan for 2011 "... reducing environmental and safety risk while extending tieback distances and eliminating surface host installations."

12. Develop a methodology for determining the best capture or clean-up action for any given conditions, paying particular attention to the special conditions in deep water (e.g. risk of hydrate formation).

Organizational issues

During discussions, it became apparent that members of the UDW Committee had strong views on many organizational matters, including how the industry might adopt a more proactive attitude to health and safety, how accidents should be reported and dealt with and the respective roles of government and industry in regulating the industry. Among others, it was suggested that accident investigation should be handled by an authority analogous to the National Transportation Safety Board, that deals with aviation accidents, and that regulation of the safety of installations and processes should be subject to a "Safety Case" approach rather than by prescriptive regulation. The essence of the Safety Case approach is that the onus is placed on industry to identify risks and to demonstrate their capabilities to manage those risks. The Deepwater Report further describes the Safety Case approach. Overall, it is believed that the industry may learn much from other industries that have to live with high-risk activities. These include, for example, the (conventional) military, aviation, and both civil and military use of nuclear materials.

These topics have been dealt with at great length in the Deepwater Report, notably in chapters eight "Safety is not proprietary" and nine "Developing options ... ". Here it is noted that a potential problem with prescriptive regulation is that it generates a mindset that if all the prescriptions have been obeyed, then nothing can go wrong, and this leads to complacency. The Safety Case approach, being open-ended, tends to lead to a desirable attitude of "chronic uneasiness" (as described for the nuclear navy, p 230). There should be a continual sense of safety awareness. The majority of blowouts occur when wells are not being drilled. On the rig, there is a heightened awareness towards safety while drilling but there is a let down when drilling is halted or completed. In view of the attention given to these matters in the Deepwater Report, it seems unnecessary to revisit them here. On the other hand, Committee members have asked themselves if they can suggest areas of research that may inform decision making in these subjects.

Finding #4 Research aimed at discovering attitudes to safety issues in various peer groups.

Several factors contributing to the immediate cause of the accident have been attributed to actions of rig personnel. These include poor maintenance (non-replacement of weak batteries in the BOP Control Pods) incorrect maintenance (replacement of a defective valve by one of a different type, incorrectly wired) and other errors and omissions. The Committee feels it would be appropriate to carry out research aimed at discovering the fundamental attitudes of rig personnel and other groups to health and safety issues. Discovering these attitudes is notoriously difficult, but it may be critical to determine the acceptance of new safety regulations by the people affected. For example, one might ask how rig personnel react to being told to become "whistle-blowers", to being encouraged to suggest (or to implement) changes that improve safety while reducing the speed of activities, or to being told to report co-workers who are seen to be "cutting corners".

Recommendations

13. Develop Expert Systems or other decision making procedures for well management, accident detection and response based on "best practice" in other industries. Several of the committee’s recommendations call for the measurement of more data in a variety of environments. As the amount of data increases there is an increase of the occurrence of human misinterpretation, confusion and error. Expert Systems can assist in the assimilation of the data and reduce human error.

14. Analysis of failures (design, process and human), with a view to developing comprehensive risk assessment and reaction protocols, spanning a range of activities from reservoir management through well drilling, riser safety and vessel safety and station keeping. Emphasis should be based on known approaches in Operations Research used to identify factors that cause bad decision making.

15. Analyzing the attitudes of rig personnel and other peer groups to health and safety issues through the entire drilling and completion process to determine if training is effective, and if safety procedures are carried out conscientiously.

16. Improve safety training, by encouraging certification procedures for all levels of personnel and particularly by encouraging the "Safety Case" approach.

Finding # 5 Project Strategy Considerations

While it is clear that the 2011 Plan must have a major new emphasis towards health and safety issues, the committee feels that the current portfolio of ongoing projects is of continuing value, and thus the ongoing projects should continue to receive support until termination.

Ranking

The reader may conclude, having read the above list of topics suitable for research funding, that with a sufficiently broad interpretation, almost any topic in the field of accident prevention and mitigation is a legitimate subject for research. To provide further guidance, Committee members were asked to award "merit points" to each of the sixteen topics listed above, awarding sixteen points to the most important, fifteen to the next, and so on, down to one point for the least important. The points were summed and used to develop the following priority list. In this list, the most important topic is at the top of the list.

1. (topic 2) Place additional instruments in well or on the wellhead, with secure transmission and interpretation on rig and onshore before an accident.

2. (topic 7) As above, but with data collection and transmission during and after an accident.

3. (topic 6) Revise cement design, placement and testing.

4. (topic 1) Improve subsurface (reservoir and overburden) assessment before and during drilling.

5. (topic 5) Develop Standardized well test procedures.

6. (topic 8) Develop seafloor sensing instruments (AUVs, acoustic methods etc.) to detect leaks including from the seafloor away from the well.

7. (topic 14) Develop risk assessment and reaction protocols

8. (topic 13) Develop Expert or other systems based on Best Practice in other industries.

9 = (topic 10) Expand crew survivability features.

9 = (topic 16) Adopt training certification using a Safety Case approach.

11. (topic 4) Develop standardized tests for subsea equipment.

12. (topic 9) Redesign seafloor equipment for subsea repair and/or leak collection.

13. (topic 15) Analyze personnel attitudes to determine if safety training is effective

14. (topic 11) Develop methods for hydrocarbon capture or dispersal with emphasis on subsea.

15. (topic 12) Develop methodology to determine best containment or clean-up.

16. (topic 3) Develop corrosion reduction and monitoring procedures.

Comment

Reading the list in order of priority conveys a definite impression that the events of the Macondo accident were very much in the minds of the Committee members, although we were consciously aware that we should not be like "generals fighting the previous war". Taking a broader view, it is evident that there is no great enthusiasm for building new items of large hardware, but rather a concern to gather and use information at all stages - before, during and after an accident. This seems to parallel developments in other sectors of industry, where the most striking developments of the last few years have been in instrumentation and control, in short the development of "Smart" machinery and processes of all sorts.

The UDAC R & D Program Portfolio Subcommittee met in person after the full meeting of the UDAC in Washington on 23 February 2011 and thereafter by telephone conference call on 7th and 14th March 2011.

R & D Program Portfolio Subcommittee members: Bud Danenberger, Quenton Dokken, Hartley Downs, Doug Foster, Jim Litton, Bill New, George Cooper (lead)

Attachment 6

Ultra-deepwater Advisory Committee Subcommittee on Process
Members of the Sub-committee

- **Dr. Lesli J. Wood, Chair**
- **Mr. Daniel J. Daulton**
- **Mr. Lars Håvardsholm**
- **Dr. Luc T. Ikelle**
- **Mr. D. Stephen Pye**
- **Dr. Nagan Srinivasan**
- **Ms. Mary Jane Wilson**

April 6, 2011 Report of the Process Sub-committee

The *Ultra-deepwater Advisory Committee's Subcommittee on Process* is charged with examining and investigating the effectiveness and efficiency of the processes utilized by the program consortium in the solicitation, evaluation, selection and award of ultradeepwater research and development projects pursuant to Subtitle J of EPAct 2005.

Specifically, the subcommittee has been tasked with reporting to the *Ultra-deepwater Advisory Committee* (*UDAC*) the following matters:

- Scorecard(s) illustrating the process flow of research and development activities undertaken pursuant to the referenced subtitle;
- Identification of barriers and/or areas of improvement that would yield greater effectiveness and/or efficiencies of the program consortium;
- Recommendations of process improvements that would enhance the effectiveness and/or efficiency of the programs under the referenced subtitle;
- Benchmark comparisons with other research & development programs to address the perspective of relative program and/or program consortium performance; and
- Such other matters directed by the UDAC within the defined scope of this subcommittee

It was decided that two of the Sub-Committee's tasks; "*Scorecard illustrating the process flow of research and development activities undertaken pursuant to the referenced subtitle" and " Benchmark comparisons with other research and development programs…..*" were not to be addressed in this round of Sub-Committee work. However, it was agreed that the Sub-committee would address "*Identification of barriers and/or areas of improvement that would yield greater effectiveness and/or efficiencies of the program consortium." And "recommendations of process improvements…"* . The entire Sub-Committee felt that the desires of the Secretary were clear and we could establish Findings within the context of the existing program's ability to meet the Secretary's stated goals.

Therefore, the Subcommittee Chair Dr. Lesli J. Wood gave charge to the sub-committee to provide the following:

- **Identification of barriers and/or areas of improvement that would yield greater effectiveness and/or efficiencies of the program consortium;**
- **Recommendations of process improvements that would enhance the effectiveness and/or efficiency of the programs under the referenced subtitle**;

Sub-Committee Synopsis
The Subcommittee believes the existing process is very applicable for any additional directional changes the program may take as a result of the Macondo disaster. The Subcommittee provides the following findings and recommendations relative to the process:

Finding #1
While there have been significant improvements in the cycle time, which is defined as the time from approving the Annual Plan to the time when a project award has been approved, the 2010 process still took nearly 2 years. The long time involved in the process is not a motivation factor for either the groups coming forward with the Research and Development (R&D) proposals nor the different TAC's and PAC involved.

Recommendation #1A
Continue to try and improve cycle time with a goal of achieving a 12 month time frame from Annual Plan approval to project award, within the scope of those variables in RPSEA's control. Immediately advise Department of Energy (DOE) of any slippage and propose methods to get back on schedule. This will benefit all parties involved.

Recommendation #1B: Place more focus on fewer and more comprehensive R&D programs. We recommend the program award 5-10 projects each year that are more focused. Fewer and more comprehensive R&D programs each year should speed up the process.

Finding #2
The current solicitation process is not reaching a broad enough audience to assure that the program addresses ways of capturing lessons learned, and prepares the best practices and guidelines

Recommendation #2A
The solicitation should be expanded to groups like the Society of Professional Engineers, American Petroleum Institute and others. This will also encourage industry to adopt higher standards

Recommendation #2B
RPSEA & NETL should reach out to establish relationships with international regulator forums as possible locations for additional solicitation.

Recommendation #2C
RPSEA should consider solicitation and a possible forum specific to spill prevention/response including contacts such as marine well containment companies, Helix Energy, as well as international companies/locations.

Recommendation #2D
RPSEA should include pipeline/umbilical, FPSO industries in the solicitation process to address issues of mitigation.

Recommendation #2E
RPSEA should establish an Environmental and Safety Analysis Forum and consider inviting organizations such as DNV. Additional potential organizational contacts can be found at http://www.offshore-environment.com/organizations.html.

Finding #3
The current solicitation process is not reaching a broad enough audience to assure that the program addresses the development of an understanding of risk-based management and executive accountability for environmental and safety issues.

Recommendation #3A:
RPSEA should consider solicitation/forum for environmental leadership and accountability management in their R&D Projects[1].

Recommendation #3B:
RPSEA should consider adding a "Risk Management" process specialist to Strategic Advisory Committee (SAC) to help with "risk-based" performance direction of RPSEA R&D project evaluation process.

Recommendation #3C:
RPSEA should encourage participation of the National Academy of Engineering to identify high-risk human and environment considerations in the R&D project award process

[1] *For example, American Petroleum Institute is working with SMU Cox Business School (Frank Lloyd) to incorporate in oil and gas professional development Education program fostering executive environmental accountability.*

Finding #4
The members of the Program Consortium have well-defined skill sets and passions around their technical competencies. The change in program direction may have projects that are outside these existing technical competencies and passions. This creates a challenge for the Program Consortium to adjust its membership.

Recommendaton #4A
Limit the project recommendations for this program to those that fall within the technical competencies and passions of the Program Consortium. Simultaneously, assure that those projects that fall outside the technical competencies and passions of the Program Consortium are addressed in another program and not abandoned.

Recommendation #4B
Encourage the Program Consortium to re-structure its membership and particularly the membership of its TAC and PAC, in a way that ensures the technical competencies and passion are available for projects in the revised program.

Attachment 7

UDAC Calendar and Next Steps

Elena Melchert
Committee Manager
Ultra-Deepwater Advisory Committee

April 6-7, 2011

U.S. DEPARTMENT OF ENERGY
Oil and Natural Gas

Ultra-Deepwater Advisory Committee

- **Committee Calendar**
  - **April 8, 2011: Editing Subcommittee meets to prepare final report of UDAC comments and recommendations**
  - **April 16, 2011, Editing Subcommittee sends final report to the Committee Manager for distribution to the UDAC members**
  - **April 19, 2011, 11:00 am EASTERN , 16th UDAC Meeting, conference call in Washington, DC to vote on Editing Subcommittee report**
  - **April 26, 2011 Chair sends UDAC final report of comments & recommendations to the Designated Federal Officer for delivery to the Secretary of Energy**

2

Ultra-Deepwater Advisory Committee

- **Action Steps by April 16, 2011**
  - **Editing Subcommittee prepares final report and sends report to Committee Manager via email**
  - **Committee Manager forwards final report to members for review prior to conference call.**

3

Ultra-Deepwater Advisory Committee

- **Action Steps: April 19, 2011, 11:00 am EDT**
  - **Conference call in Washington, DC**
  - **UDAC votes to accept Editing Subcommittee report**
- **Action Steps: April 26, 2011**
  - **UDAC Chair sends final report to the Designated Federal Officer for delivery to the Secretary of Energy**

4