The Ultra-Deepwater Advisory Committee

Advisory Committee to The Secretary of Energy

March 08, 2012

The Honorable Steven Chu
Secretary of Energy
Washington, D.C. 20585

Dear Mr. Secretary:

On behalf of the Ultra-Deepwater Advisory Committee (UDAC) I am pleased to offer our insights on proposed elements within the 2012 Draft Annual Plan. Our offshore industry is emerging from a long and difficult regulator, safety and environmental review while recovering from negative public impressions. We are anticipating a renewed sense of intergovernmental agency and industry cooperation focused upon, simply "doing the right thing", aided by results from and technologies enabled through the UDW Program.

The UDW Program to date has 47 projects to its credit. The UDW Program is slated to have 68% of those projects completed at or by the end of 2012, outpacing both the Unconventional and Small Producer portfolio programs. This is a reflection upon increased Program efficiency and cooperation between the National Energy Technology Laboratory (NETL) and the Research Partnership to Secure Energy for America (RPSEA).

The UDAC placed emphasis on research related to human aspects of safety. Also the UDAC is very concerned and has provided recommendations regarding the "sunset" provision of the Program. And finally, UDAC recommends strongly, while "outside" the Ultra-Deepwater committee directives, that the Department consider of critical concerns human health and safety, and environmental sustainability in sensitive and remote offshore operating locations. A gap-analysis and unique technology needs of harsh and challenging operating conditions, outside the Gulf of Mexico, are important components of responsible oil and gas development.

In conclusion, the UDAC is pleased to see further commitment to collaboration and communication between agencies and the industry to better address areas of risk analysis, technology application and safety of offshore operations. This is demonstrated by recent appointment of Chris Smith, to Chair newly established subcommittee on Spill Prevention and Containment within the Department of Interior - Ocean Energy Safety Advisory Committee.

Respectfully submitted,

Dan Daulton
Ultra-Deepwater Advisory Committee Chair

Ultra-Deepwater Advisory Committee

2012 Annual Plan

Comments, Findings and Recommendations

March, 2012

An Advisory Committee to the Secretary of Energy

TABLE OF CONTENTS

1.0 INTRODUCTION....3
2.0 EXECUTIVE SUMMARY....5
3.0 SUBCOMMITTEE REPORT....5
3.1 R&D PROGRAM PORTFOLIO FINDINGS AND RECOMMENDATIONS....5
4.0 ULTRA-DEEPWATER ADVISORY COMMITTEE – 2011-2013....11
5.0 SUBCOMMITTEE TOPICS AND MEMBERS....12

1.0 INTRODUCTION

The Ultra-Deepwater Advisory Committee (UDAC or Committee) was formed pursuant to the provisions of Title IX, Subtitle J, Section 999D(a) of the 2005 Energy Policy Act (EPAct).

The Committee consists of:

- Individuals with extensive research experience or operational knowledge of offshore natural gas and other petroleum exploration and production; and
- Individuals broadly representative of the affected interests in ultra-deepwater natural gas and other petroleum production, including interests in environmental protection and safe operations.

The provisions of EPAct excluded Federal employees and board members, officers or employees of the Program consortium, known as Research Partnership to Secure Energy for America (RPSEA; or the Consortium).

The duties of the UDAC under EPAct Title IX, Subtitle J, Section 999D(a) are to advise the Secretary of Energy (Secretary) on the development and implementation of programs under Title IX, Subtitle J, related to ultra-deepwater (UDW) natural gas and other petroleum resources and to carry out section 999B(e)(2)(B) which is to comment on the draft annual plan.

See Section 4.0 for a list of Committee members.

The Department of Energy (DOE) Designated Federal Officer, Secretary, representatives from NETL and RPSEA provided additional guidance and input for the *2012 Annual Plan* (the Plan.

The schedule of work for the review of the *2012 Annual Plan* included the following key milestones:

01-19-12 17th UDAC Meeting, Houston, TX: Convened UDAC, began initial review of the Program Consortium 2012-2014 Draft Annual Plan (November 2011) and Department of Energy *2012 Annual Plan* (January 2012), voted to maintain one Standing Subcommittee: the UDAC R&D Portfolio Subcommittee assigned membership to standing Subcommittee

02-2011 Meetings of the UDAC R&D Program Portfolio Subcommittee: reviewed charter, identified R&D gaps, findings and recommendations, and created Subcommittee report.

3-01-2012 18th UDAC Meeting, Houston, TX: reviewed the R&D Program Portfolio Subcommittee report; developed final comments, findings and recommendations.

3-02-2012 Meeting of the UDAC Editing Subcommittee, Houston TX: assembled comments, findings and recommendations of UDAC Final Report on the *2012 Annual Plan*

3-05-2012 UDAC Editing Subcommittee delivered draft of UDAC Final Report and Cover Letter to the UDAC Committee Manager for distribution to members prior to final vote.

3-08-2012 19th UDAC Conference Call Meeting: members voted to accept final UDAC report of comments, findings and recommendations on the *2012 Annual Plan*

2.0 EXECUTIVE SUMMARY

The UDAC extends appreciation to the teams responsible for planning and executing the Ultra-Deepwater (UDW) Program: the DOE, National Energy Technology Laboratory (NETL) and Research Partnership to Secure Energy for America (RPSEA; or the Consortium). The UDAC found that the UDW Program has reached a broad level exposure to interested stakeholders and much improved air of cooperation between the above mentioned groups sufficient that the UDAC agreed to suspend the standing Subcommittee on Program Process. In addition, the UDAC agreed to stay formation of a standing Subcommittee for risk assessment. This stay avoids duplication of effort between DOE and Department of Interior (DOI) programs. It is suggested that the Secretary gather risk information through Los Alamos National Laboratory (LANL) and advice from the Ocean Energy Safety Advisory Committee (DOI-OESAC) on oil spill prevention and containment initiatives which are coordinated under UDAC Designated Federal Officer Christopher Smith.

The UDAC recognizes the "sunset" subtitle terminating authority on September 30, 2014 within Title IX, Subtitle J, Section 999F of the 2005 Energy Policy Act (EPAct). The UDAC is concerned that sufficient coordination, foresight and planning be given to ensure the Ultra-Deepwater Program manages current, pending and future projects with consideration of priority, impact and benefit as required under Section 999B(a).

3.0 SUBCOMMITTEE REPORT

The UDAC maintained one standing subcommittee (R&D Program Portfolio) to further review focus areas of the *2012 Annual Plan* and offer recommendations. The following are highlights the Committee wishes to report.

3.1 R&D PROGRAM PORTFOLIO FINDINGS AND RECOMMENDATIONS

General Comments:

The R&D Program Portfolio Subcommittee of the UDAC notes that the *2012 Annual Plan* has taken safety into account in several aspects of the proposed program. The Portfolio Subcommittee is largely in agreement with the suggestions for research topics contained in the *2012 Annual Plan*. The R&D Program Portfolio Subcommittee commends all parties in reorienting the program to reflect a greater emphasis on matters concerning safety and accident prevention. The Subcommittee notes, however, that while there is a strong emphasis on the engineering aspects of increasing safety, little attention is given to the aspects of human behavior regarding safety.

Emphasis on engineering aspects of safety is natural for a technology-centered program of funding for university engineering laboratories and industrial R&D entities. However, given the causal factors in the *Macondo* incident, research into how to conduct the human aspect of operations safety (Appendix 3.1) and to use advanced decision support and backup systems seems not only prudent but mandatory. Appendix 3.2 contains a reference to one such commercially available system which is in use by major operators.

Relevant Prior Findings and Recommendations:

In the UDAC's letter of 11 April 2011 to the Energy Secretary, our finding number 4 (p. 9) mentions " …research aimed at discovering the fundamental attitudes of rig personnel to health and safety issues…(and) to determine the acceptance of new safety regulations by the people affected…". Our recommendation 4B was to "Conduct a review of published and unpublished information which analyzes the attitudes and knowledge of personnel and other peer groups towards health, environment, safety and operational issues through the entire drilling and completion process to determine if training is effective and if safety procedures are carried out effectively".

The committee findings and recommendations discussed a number of data and expert systems analysis recommendations (1A, 2A, 2B, 4A). (Please see current findings below at paragraph 2.0).

Overall, there is evidence to believe that the Secretary listened to our advice and the *2012 Annual Plan* includes some of those recommendations.

We find particularly commendable, in view of the history of drilling and completion activities in UDW Gulf of Mexico, the projects dealing with reservoir characterization, simulation and recovery and those dealing with dry trees and direct well intervention and risers.

The R&D Program Portfolio subcommittee offers the following finding and recommendations:

Findings and Recommendations:

Finding 1

There is considerable work being done elsewhere related to Managed Pressure Drilling and, in particular, Dual Gradient Drilling (DGD) (see Appendix 3.3) that will take considerable risk out of ultra-deepwater drilling regardless of water depth. These technologies will improve safety during well construction.

Recommendation 1

UDAC recommend that DOE consider the priority of additional funding for further research on these methods of Managed Pressure Drilling and, in particular, Dual Gradient Drilling.

Finding 2

The *2012 Annual Plan* does not adequately address the human factors related to accident prevention. The following recommendation will enhance the program.

Recommendation 2
Increase the emphasis in the areas of human interaction. Models can be found in training or simulators programs utilized by the nuclear and aviation industries. Effective implementation will require that the *2012 Annual Plan* be modified to give this area higher priority. Possible areas of focus might include:

- continued work on instruments and data analysis (expert systems) to improve decision making capability, and
- continued work on hazards and risk analysis from a human perspective.

Finding 3
The UDAC is aware of resources and capabilities within the DOE network that should be used to support the goals of the Ocean Energy Safety Advisory Committee (OESAC).

Recommendation 3a
The UDAC recommends that the Secretary make those resources available to the OESAC.

Recommendation 3b
The UDAC recommends that the DOE formally present updates to UDAC with respect to OESAC accident prevention progress.

Finding 4
Information is limited regarding methods to prevent and respond to catastrophic events, and mitigate the negative impacts of spills in remote, harsh and sensitive environments. Environmental protection and personnel health and safety working in harsh, unique and sensitive marine habitats, such as arctic waters and tropical coral reef areas, requires additional focus.

Recommendation 4
Identify funds to undertake a gap analysis to catalog and characterize the salient differences between operations in the GOM environment and those to be encountered in drilling and completion in unique and sensitive marine habitats, such as arctic waters and tropical coral reef areas to assess the risks that demand more research.

Finding 5
The *2012 Annual Plan* lacks content regarding expert (case-based) systems that alert operating personnel to potential drilling hazards before they occur which provide recommendations to mitigate potential risk (Appendix 3.2).

Recommendation 5
Determine the present scope of expert (case-based) systems, and then identify benefits and limitations as well as other applications (such as cementing, completions, wellbore design, etc.) that would reduce the risk when operating in deepwater.

Finding 6
Due to the nature of provisions of Title IX, Subtitle J, Section 999F, the UDAC recognizes the need to advise current and future directions of draft plans and research projects with respect to prioritization.

Recommendation 6A
Technology Transfer Recommendations

1. Recommend the appointment of a technology transfer officer at NETL.
2. Publicize portfolio of projects. Make sure complete project summaries are widely available for each project (i.e., what was done, why it was done, the significance of the findings, etc).
3. Foster collaborations with broad stakeholder groups.
4. Capture recommendations regarding appropriate future research with consideration for alternative sources of funding.
5. Establish a scholarship program to encourage graduate students in the research mission in order to facilitate the technology transfer mechanism.

Recommendation 6B
Create documentation demonstrating benefits, value, and application of UDW program. For examples:

- Demonstrate depth of penetration of these research results in the marketplace and application in the field.
- Gather testimonials of benefits.
- Document project(s) commercialized by industry.

Recommendation 6C
Further engagement in activities (seminars, work groups, conferences) that attract participation of user groups associated with discussion of problems facing offshore industry and deepwater development.

Recommendation 6D
Efforts should be made to retain and foster the unique structure of the program for collaborative research.

Recommendation 6E
Be sure all resources are in place for proper disposition of funding. Continue to include RPSEA and NETL in the management of the program post-2014.

Recommendation 6F
DOE should articulate, recognize, and explore the synergies that exist between UDW and UCR research programs towards the purpose of maximizing the value of the research dollar.

Recommendation 6G
In view of Finding 2, it is further recommended that a high proportion of the remaining, uncommitted funds be committed to projects that deal specifically with safety and environmental concerns.

Appendices Comments:
The information in these appendices is collateral information to support, by reference, findings and recommendations contained in the report, proper. *They are not, in themselves, findings and are not specifically recommended as subjects for research expenditure* but are chosen to illustrate the existence of parallel research or operational analysis and technology which may be

incorporated into, extended by or augmented by RPSEA, NETL or LANL programs. The referenced information was adduced through the knowhow of the members of the R&D Program Portfolio Subcommittee, which was presumably the basis for their selection to UDAC. The information is consonant with the topics and findings of the DAP of RPSEA for 2012 and beyond.

Appendix

3.1 Management Walk-Arounds: Lessons from the Gulf of Mexico Oil Well Blowout-Professor Andrew Hopkins, Australian National University [Reference 1]

The paraphrases abstracted below illustrate our finding 2.0, above.

i. *States or conditions are easier to audit, because they are relatively unchanging. They await the arrival of the auditor and can be assessed at a time of the auditor's choosing. On the other hand, compliance with procedures, especially where the behavior is intermittent, is much harder to audit. The auditor needs to catch the behavior at the time it is occurring. If the auditor does not make a special effort to be present at relevant times the behavior will be missed.*

ii. *The senior health and safety manager for BP drilling operations in the Gulf of Mexico… told the (Joint) Inquiry that his focus was on occupational safety, not process safety - that was a matter for engineering authorities*…

3.2 Commercially available Expert (Case-Based) systems for Driller Alerts and Recommendations: A commercially available expert system already tested by Shell and being tested by Baker-Hughes is depicted in Reference 2. A white paper is available at the web site identified in Reference 2.

3.3 Recent publications on risk assessment, training and testing of Dual Gradient Drilling Systems: There are two references. 3 & 4, which promote this technology to enable safer drilling and completion in ultra deep water by the use of seawater pressure gradients above the seafloor or mudline and heavy drilling mud below the sea floor. The technologies involved are quite different from the single gradient methods now employed and there is considerable uncertainty as to whether the testing of the components of the DGD has been sufficient. Considerable expense initially, at least, is incurred in deployment of the DGD technologies. There is little question, however, that the physical principles behind these systems are potentially safer and more efficient than current deep water systems.

References:

Reference 1- Management Walk-Arounds: Lessons from the Gulf of Mexico Oil Well Blowout Professor Andrew Hopkins, Australian National University February 2011
(contact Andrew.Hopkins@anu.edu.au)
Reference 2-DrillEdge White Paper http://www.verdandetechnology.com/verdande-energy-as/products-a-services/drilledge.html
Reference 3-Dual Gradient Drilling: Has Its Time Finally Come? Chevron publication at the AADE Emerging Technologies Forum, Ken Smith, April 22, 2009.

Reference 4 – "Risk Profile of Dual Gradient Drilling", Bureau of Ocean Energy Management, Regulation and Enforcement, Contract M09PC00016, Final Report, May 02, 2011, http://www.boemre.gov/tarprojects/631/aa.pdf

4.0 ULTRA-DEEPWATER ADVISORY COMMITTEE – 2011-2013

Dr. George A. Cooper* Professor University of California, Berkeley	Mr. Elmer P. Danenberger, III* Offshore Consultant	Mr. Daniel J. Daulton Director of Environmental Conformity and Marketing Baker Hughes Inc.
Dr. Quenton R. Dokken Executive Director Gulf of Mexico Foundation	Dr. Hartley H. Downs Technology Fellow Baker Hughes Inc.	Dr. Douglas J. Foster Senior Scientist ConocoPhillips
Mr. Lars Havardsholm Vice President, Field Development Statoil	Dr. Luc T. Ikelle* Robert R. Berg Professor Texas A&M University	Mr. James D. Litton* President and CEO Litton Consulting Group, Inc.
Mr. William C. New President and CEO New Industries, Inc.	Mr. D. Stephen Pye* Consultant	Dr. Nagan Srinivasan Executive Consultant Deepwater Structures, Inc.
Ms. Mary Jane Wilson President and CEO WZI, Inc.	Dr. Lesli J. Wood* Senior Research Scientist Bureau of Economic Geology University of Texas, Austin	

**Special Government Employee*

5.0 SUBCOMMITTEE TOPICS AND MEMBERS

The Plan review and preparation of the final Committee Report involved the following:

R&D Program Portfolio

Subcommittee Roster

- **Mr. James D. Linton, Chair**
- **Dr. Nagan Srinivasan, Vice Chair**
- **Dr. George A. Cooper**
- **Mr. Elmer P. Danenberger, III**
- **Dr. Hartley H. Downs**
- **Mr. D. Stephen Pye**

Editing

Subcommittee Roster

- **Mr. Daniel J. Daulton, Chair**
- **Dr. Quenton R. Dokken**
- **Mr. Douglas Foster**
- **Dr. Luc T. Ikelle**
- **Dr. Leslie J. Wood**