

The Ultra-Deepwater Advisory Committee
Advisory Committee to The Secretary of Energy

November 02, 2012

The Honorable Steven Chu
Secretary of Energy
U.S. Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585

***RE: 2013 Draft Annual Plan
Findings and Recommendations***

Dear Mr. Secretary:

On behalf of the Ultra-Deepwater Advisory Committee (UDAC), I am pleased to offer our insights on proposed elements within the 2013 Draft Annual Plan. As our country is moving towards energy independence, we are encouraged by the intergovernmental agency and industry cooperation focused upon health and safety. This success is aided by results from and technologies enabled through the Ultra Deep Water (UDW) Program.

The UDW Program to date has conducted important research projects that would not have been accomplished without the Section 999 funding. The public/private partnership cooperation between the National Energy Technology Laboratory (NETL) and the Research Partnership to Secure Energy for America (RPSEA) has been successful in identification of those research projects. The RPSEA ability to establish and bring together the industry/stakeholder working groups has been instrumental in the success of the program. The ability of these working groups to advise on the direction of the research could not have been accomplished by any one group (i.e. industry, government, public) individually. This is a model to be fostered in future efforts.

The momentum built to date should be continued. The volunteer working groups have unique expertise which has been invaluable to the Department of Energy in these efforts. These working groups should be maintained. They have provided the champions of the topics and will provide the road maps to commercialization of the research. Much of this research while applicable to UDW is also now available to other harsh and sensitive environments.

As this program sunsets, the UDAC recommends that the human aspects of operations in hazardous environments be an area of focus. Reducing risk of contamination through design, monitoring, and containment during all aspects of exploration, production, and abandonment in UDW will require further work. In addition, the UDAC recommends that a concerted effort to commercialize the research be made for the benefit of the public.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Mary Jane Wilson".

Mary Jane Wilson
Ultra-Deepwater Advisory Committee Chair

ULTRA-DEEP WATER ADVISORY COMMITTEE

FINDINGS AND RECOMMENDATIONS

November 2012

TABLE OF CONTENTS

| | <u>Page No.</u> |
|--|-----------------|
| RESEARCH AND DEVELOPMENT PROGRAM SUBCOMMITTEE | 1 |
| SUNSET SUBCOMMITTEE | 3 |
| ADVISORY COMMITTEE MEMBERS..... | 5 |

RESEARCH AND DEVELOPMENT FINDINGS AND RECOMMENDATIONS

The R&D Program Subcommittee of the UDAC notes that the *2013 Annual Plan* has continued to take into account safety and environment in several aspects of the proposed program. The Program Subcommittee is largely in agreement with the suggestions for research topics contained in the *2013 Annual Plan*. In the UDAC report on the *2012 Annual Plan*, there was acknowledgement that there has been an overall, redirection of research topics towards safety and accident prevention. To date, the emphasis on safety is almost solely focused on the engineering solutions, which while important, will not provide the total solution.

Finding #1 It was stated in the UDAC report to the 2012 Annual Plan that the human factor is important in safety.

However, the *2013 Annual Plan* does not adequately consider this significant topic. Only one solicitation involving human factors was closed in September 2012 (2011 TA 5101).¹

The research program has focused on technical issues and the expert advice helping guide the program has come from physical scientists and engineers. The Macondo incident as well as research² at Los Alamos National Lab sponsored by DOE on risk assessment highlights the importance of the human factor in safety and the prevention of oil spills in deep water. The President's National Oil Spill Commission³ Report to the President found:

" ... As a result of our investigation, we conclude:

- The explosive loss of the Macondo well could have been prevented; and
- The immediate causes of the Macondo well blowout can be traced to a series of identifiable mistakes made by BP, Halliburton, and Transocean that reveal such systematic failures in risk management that they place in doubt the safety culture of the entire industry."

The findings of this work support the need for a greater emphasis on the "human factor" by the research program.

Recommendation #1

We recommend further input from experts on human behavior in hazardous operating conditions to increase the emphasis in areas of human interaction. Models can be found

¹ 2011 UDW001 RFP, "Human Factors Evaluation of Deepwater Drilling, Including Literature Review"

²Minutes of UDAC September 26, 2012, "Gulf of Mexico ultra Deep Water Drilling Risk Management Study: Integrated Risk and Technology Assessment for Spill Prevention"
<http://www.fossil.energy.gov/programs/oilgas/advisorycommittees/ultradeepwater.html>

³ National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling p.vii
www.oilspillcommission.gov

in training or simulator programs utilized by nuclear and aviation industries. Effective implementation will require that the 2013 Annual Plan be modified to give this area higher priority. Possible areas of focus might include:

- *Engage an expert to prepare a survey of studies on human behavior in hazardous operating environments, (while this may be included in the 2011 solicitation 5101, there is no follow on in the 2012 or 2013 plans);*
- *Continued work on instruments and data analysis (expert systems) to improve decision making capability; and*
- *Initiate work on hazards and risk analysis from a human perspective: training methods such as those used in the nuclear submarine and nuclear materials handling activities in the USN and DOE National Labs might be adaptable for UDW operations.*

Finding #2 *The 2013 Annual Plan lacks content regarding expert (case based) systems that alert operating personnel to potential hazards before they occur, which provide recommendations to mitigate potential risk.*

Recommendation #2

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 #3 *The safe and environmentally responsible operation of oil and gas production throughout the entire life cycle of a field requires the containment of hydrocarbons to the reservoir, production casing, flow lines, and surface facilities.*

Not only hydrocarbon flow should be controlled, but also that of any injected fluids or gas. Barriers in both the wellbore vicinity and the subsurface should be identified and facilities should be designed accordingly. Adequate monitoring systems to detect out of zone flow are lacking.

There is funded research on the metallurgy of pipes and on cements in the Complementary Research program but no research topic areas exist in the *2013 Annual Plan* for addressing containment. There is funded research in reservoir characterization but little to no attention paid to borehole stability and characterizing the overburden for potential paths of leakage and areas of abnormal pressure. Technology is lacking for adequate monitoring of hydrocarbon production and this is particularly true in UDW environments.

Recommendation #3

Consideration should be given to issues related to the containment of hydrocarbons throughout the entire lifecycle of an oil or gas field. Redirect funds to emphasize fluid control issues. Possible areas of focus might include:

- *Mitigate leakage in and around the boreholes from reservoir fluids and gas as well as any injected liquids and materials;*
- *Long term borehole stability;*
- *Establish plugging and abandoning technology for long term containment of hydrocarbons; and*
- *Long term monitoring systems (i.e. down hole and well head pressure sensors, time lapse seismic surveying, sea bed monitoring, etc.).*

Expand the research on reservoir characterization to include overburden characterization as well. Technology and methods for geological and geomechanical characterization of the subsurface from sea bed to the reservoir should be emphasized.

Finding #4 Recent storms in the GOM have shown the design criteria for UDW drilling and production, and storage vessels may be inadequate in large wave conditions.

Mitigating the impacts of severe weather is needed for safe UDW operations. Damage from unexpected storms poses a risk for vessel damage, human safety, and oil spills.

Recommendation #4

Continued research associated with identifying suitable vessel designs for drilling and production, including FPSOs, will enable development in harsh weather environments.

SUNSET FINDINGS AND RECOMMENDATIONS

As Section 999 comes to a close, the meaningful accomplishments should not be taken for granted. It is recommended that the research be made public through DOE conferences and reports and to the extent possible, the research, which has been fruitful, be commercialized.

Finding #1 While the period of research was short, the progress was meaningful to date, and much can still be accomplished.

Recommendation #1

The research should continue to be archived, searchable, and freely accessible to the general public. The files should include the original numerical data in usable formats.

Finding # 2 Research, particularly when it is centered around technologies as was the case in this program, must be implemented quickly to maximize the benefit due to the dynamic nature of technology development.

Recommendation #2

DOE continue to champion the marketing effort, as exemplified by the annual Ultra-Deepwater Technology Conference, toward potential commercialization to provide maximum opportunity for the results of the research to be utilized for the benefit of the public.

Finding # 3 The structure, management, and selection of research [organization?] that was developed by RPSEA and NETL of industry, NGO, and government participation was a robust methodology.

Recommendation #3

Working groups and methodologies developed by RPSEA continue after sunset to facilitate technology transfer.

Finding # 4 While not all the topics proffered in the RPSEA setting resulted in RFP's for the program, the ideas of over 900 participants are represented in the records.

Recommendation #4

A compendium of the research ideas proffered by RPSEA should be distributed to a wide variety of universities and made available to industry and to the public. This will provide a springboard for creative people to launch additional research programs.

Finding # 5 High priority projects have been, and will continue to be, identified by RPSEA through project awards.

The procedure that has been developed by RPSEA and NETL has proven to be solid. However, the procurement process is slow.

Recommendation #5

The Secretary should continue the program as currently designed through project completion. DOE works with RPSEA to ensure that high-priority projects are fully allocated.

Finding # 6 The intention of the Program has been to invest in areas where industry would not, perhaps resulting in “islands of knowledge.”

In funded projects aimed at reducing risks in the UDW, there lacks a comprehensive understanding of how the individual components fit together. The risk and the consequences are addressed in the individual components of drilling and engineering design but not of the overall system.

Recommendation #6

We recommend that the Department of Energy review the research results produced by the Program and how the results advance the state-of-the-art into the overall system of drilling and production. The final report should address progress made and gaps remaining for safe and reliable UDW development.

Finding # 7 There is no reported measure of the effectiveness of the UDAC recommendations.

Recommendation

It is recommended that the Department of Energy include a brief summary in the last meeting of the UDAC on the impact of actions that have taken place based on any recommendations made by the UDAC so that the UDAC can better assess its effectiveness.

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