Unconventional Resources Technology Advisory Committee

Advisory Committee to The Secretary of Energy

October 22, 2009

The Honorable Dr. Steven Chu
Secretary of Energy
Washington, DC 20585

Dear Mr. Secretary:

On behalf of the Unconventional Resources Technology Advisory Committee (URTAC), it is my pleasure to submit our findings and recommendations based on our review of the Unconventional Resources Technology and Small Producers' portion of the Draft *2010 Annual Plan* for the Ultra-Deepwater and Unconventional Natural Gas and Other Petroleum Resources Research Program.

The Committee finds that:

The program is an important part of the overall effort to develop a diverse portfolio of domestic energy sources which will provide for greater natural security and economic benefits. Significant progress has been made in the implementation of the Plan by both the Department of Energy (DOE) and the Research Partnership to Secure Energy for America (RPSEA).

The Advisory Committee also commends DOE and RPSEA for the actions taken in implementing prior Committee recommendations, especially in the critical areas of program implementation, technology transfer and the establishing of a Knowledge Management Database.

It is clearly evident that the program is striving to incorporate the environmental elements outlined in Subtitle J of the Energy Policy Act of 2005 legislation. Of note are the numbers of projects that focus on the reduction of environmental impacts and/or the increased production of natural gas (which will play such a vital role in a carbon constrained world).

The URTAC provides the following key recommendations:

- The program needs to be continued with adequate funding that is not affected by cutbacks or threat of elimination.
- The existing industry tax incentives must be retained for all producers in order to fully realize the benefit of the technologies developed through the program.

- The portfolio of projects and technology transfer aspects of the program should be extended to reach all producing regions of the country to the maximum extent possible.
- The Department should hold an annual industry symposium to showcase the program, thereby maximizing the exposure to end users and beneficiaries.
- The metrics and benefits assessment being undertaken by the Department is a significant accomplishment; recommendations are made on additional metrics that should be considered for implementation.

These key recommendations are addressed in the report along with other observations made by the Committee members. As experts and professionals in our areas of expertise, we believe that they are worthy of consideration and implementation.

The URTAC recommends proceeding with the continued implementation of the *2010 Annual Plan* consistent with the guidelines outlined in our report.

Respectfully submitted,

James C. (Chris) Hall, Chair
(310) 849-9726

Unconventional Resources Technology Advisory Committee

Comments and Recommendations 2010 Annual Plan

OCTOBER 2009

TABLE OF CONTENTS

1.0 INTRODUCTION....3

2.0 EXECUTIVE SUMMARY AND RECOMMENDATION HIGHLIGHTS....5

3.0 TOPICAL REPORTS....7

3.1 POLICY FINDINGS AND RECOMMENDATIONS....8

3.2 THE PROGRAM FINDINGS AND RECOMMENDATIONS....10

3.3 KNOWLEDGE MANAGEMENT AND TECHNOLOGY TRANSFER FINDINGS AND RECOMMENDATIONS....13

3.4 METRICS AND BENEFITS ASSESSMENT FINDINGS AND RECOMMENDATIONS....15

4.0 COMMITTEE MEMBERS....16

5.0 SUBGROUP TOPICS AND MEMBER ASSIGNMENTS....17

APPENDIX : KNOWLEDGE MANAGEMENT DATABASE....18

1.0 INTRODUCTION

The Unconventional Resources Technology Advisory Committee (URTAC) was formed in accordance with provisions of Section 999D(a) of the 2005 Energy Policy Act (EPACT).

The Committee consists of:

- A majority of members who are employees or representatives of Independent Producers of natural gas and other petroleum, including small producers;
- Individuals with extensive research experience, operational knowledge or unconventional natural gas and other petroleum resource exploration and production;
- Individuals broadly representative of the affected interests in unconventional natural gas and other petroleum resource exploration and production, including interests in environmental protection and safe operations;
- Individuals with expertise in the various geographic areas of potential supply of unconventional onshore natural gas and other petroleum in the United States.

The provisions of EPACT excluded from eligibility to participate in URTAC the following: Federal employees and board members, officers and employees of Research Partnership to Secure Energy for America (RPSEA).

The duties of the URTAC under EPACT Section 999 are to advise the Secretary of Energy on the development and implementation of programs related to unconventional natural gas and other petroleum resources and to review the draft annual research plan.

The Committee members were appointed by letters from the Secretary on August 19, 2008. Key milestones for the Committee included:

- Committee members received the Draft 2010 Annual Plan on August 5, 2009.

- Committee members met on September 15th and 16th, 2009 in San Antonio, Texas. The agenda included a brief status update and overview of the "Draft 2010 Annual Plan". Committee members provided initial comments regarding the plan at this meeting. The Chair appointed sub-groups to work on sections of the plan.

- During the period from September 16th through October 14th, the appointed sub-group members conducted several meetings by teleconference and E-mail to develop and consolidate recommendations regarding the draft annual plan.

- The Committee met on October 15, 2009 in Los Angeles, California to receive sub-group reports and to draft the final recommendations of the Committee.

- The Committee met via teleconference on October 22, 2009 in Washington, D.C. to complete final approval of the Committee report in accordance with the deadline set by the Secretary and conveyed through the Designated Federal Officer.

EPACT Subtitle J "Section 999" sets the funding for the overall program at a level of $50-million-per-year over 8 years, provided from Federal lease royalties, rents, and bonuses paid by oil and gas companies. Of this, $37.5 million is awarded for the consortium research and development program administered by RPSEA and $12.5 million for the Complementary Program administered by NETL. The RPSEA program is broken into the Ultra-Deepwater ($14.493 million), the Unconventional Gas ($13.854 million), the Small Producer Program ($3.562 million) and funding for administration and oversight ($5.437 million).

The URTAC Committee focused on the Unconventional Gas and the Small Producer Programs of the Consortium Program and the applicable portions of the NETL Complementary Program.

2.0 EXECUTIVE SUMMARY AND RECOMMENDATION HIGHLIGHTS

These findings and recommendations are at a strategic level and address the overall quality of the plan and provide general guidance regarding setting priorities and execution of the plan through the projected 10 year horizon.

The Committee reviewed and discussed the Draft 2010 Plan and identified major areas of concern. Sub-groups were formed to analyze and submit comments and recommendations for these areas. Sub-group reports were distributed to the entire Committee and each was discussed by the Committee as a whole. Following this discussion, the entire Committee agreed on and drafted the comments and recommendations included in this report.

The Committee also reviewed the recommendations of the previous URTAC Committee Reports (for the 2007, 2008 and 2009 Annual Plans) and concurs with those recommendations. Where it was useful, portions of those recommendations have been incorporated into this report.

The Committee wishes to note that steps have been taken by both NETL and RPSEA to implement many of the past recommendations of the URTAC, specifically in the areas of program, technology transfer, knowledge management database as well as metrics and benefit assessment.

For the Draft 2010 Annual Plan, the Committee has the following recommendations:

POLICY:
The Program has demonstrated significant value; it needs to be continued with adequate funding that is not affected by cutbacks or elimination.

To fully realize the benefit of the technologies developed through the program, existing industry tax incentives (including expensing of intangible drilling costs and percentage depletion) must be retained for all producers.

PROGRAM:
Research must be continued on the critical technologies such as improved use of water resources, techniques for evaluation of source potential, zonal isolation, re-stimulation and effective technologies for production of oil from shales.

The Committee again recommends the program expand its regional focus so that all producing regions of the country benefit from the program; this can be done by soliciting requests for proposals and dissemination of technology results to regions not yet benefitting from the program.

The Committee strongly recommends that an annual industry symposium sponsored by the DOE/NETL be held to showcase the program.

The Committee recommends that issues regarding Environmental Policy identified in APPENDIX A of their 2009 Annual Plan recommendations continue to be considered and implemented.

KNOWLEDGE MANAGEMENT AND TECHNOLOGY TRANSFER:
The DOE should take steps to widely publicize the recently developed Knowledge Management Database (KMD) website to all stakeholders, thereby increasing the awareness of the program and accelerating the transfer of technology as much as possible.

Likewise, the Committee recommends that the programs technology transfer efforts should continue to evolve over time, should include the dissemination of "Best Practices" to the producing community, should include producer problem identification workshops to catalogue issues of consequence for potential program research, and that the carrying out of all aspects of the technology transfer components of the program should be included as a measure of the success of the program.

METRICS AND BENEFITS ASSESSMENT:
The Benefits Assessment of the program needs to be expanded to include other methods and measures outlined in this report other than additional oil and gas production, including benefits to the overall economy, jobs, tax revenues, and reductions in petroleum imports to name a few.

3.0 TOPICAL REPORTS

The Advisory Committee developed their analysis of the Draft 2010 Annual Plan through a series of meetings and sub-groups (as outlined in Section 5.0: Sub-Group Topics and Member Assignments). There are four areas of findings and recommendations:

- Executive Summary and Policy
- Program
- Knowledge Management and Technology Transfer
- Metrics and Benefits Assessment

Treatment of Non-Consensus
In situations where members were divided on agreement with specific recommendations or statements in the report, the following categorization was used:

- ***Majority Agreement*** – 50% or greater of Committee members were in agreement with the statement.

- ***Minority Opinion*** – fewer than 50% of Committee members were in agreement with the statement.

In this report, there are no instances of Minority Opinion.

3.1 POLICY FINDINGS AND RECOMMENDATIONS

Energy independence is unlikely in the near-term; our increasing reliance on imported oil poses a real threat to the welfare of our country. The development of a diverse portfolio of domestic energy sources will provide national security and economic benefits. Domestic petroleum resources need to be part of this energy mix; furthermore, research specific to unconventional resources can help provide a more robust and stable energy portfolio. Much of the technology necessary to develop this energy supply has been enabled by research funded from the Energy Policy Act of 2005 (EPACT).

The Committee believes that there has been substantial return on research investment on the program currently being carried out. However, progress is often hampered by the failure of government to administer policies that are complimentary to the objectives of this program. For example, additional return on research funding could be realized if the federal regulatory process were more responsive to development of resources on public lands.

Finding #1:
It is the expert and professional opinion of the URTAC that the program as implemented has a measurable return on investment; it is well implemented and worth the nominal investment.

Secure funding of the Section 999 program continues to be a significant concern. The Administration's proposal to repeal funding is detrimental to the effectiveness of the program, the development of additional petroleum resources, and the energy security of the Nation.

The Committee recognizes President Obama's statement at a public meeting in New Orleans on October 15, 2009 regarding the need for additional domestic energy production:

"I am in favor of finding environmentally safe ways to tap our oil and our natural gas."

This suggests that there is an opportunity to reconsider the Administration's current position to eliminate funding for the program.

Recommendation #1:
Annual funding should be increased to a minimum of $150 million from royalties as provided for in EPACT Section 999 program and should be amended to extend the funding and "sunset" provisions to 2030.

Finding #2:
Successful implementation of the results and technologies developed from EPACT research requires the continuation of tax incentives such as expensing intangible drilling costs to all domestic producers and percentage depletion for small independent producers.

Recommendation #2:
Existing tax incentives must be retained for all producers.

Finding #3:
It is the opinion of the Committee that the program is carrying out its mandate to research and develop environmentally responsible technologies; examples include responsible and safe use of water resources and the minimization of the impact of drilling and production operations. At the same time, other government agencies are seeking elimination of some of these same technologies (such as hydraulic fracturing) which are critical to the development of unconventional resources. EPACT research has addressed improving the environmental impact of hydraulic fracturing technology with a number of program projects; the recent perception that hydraulic fracturing threatens drinking water supplies is unfounded, in light of 60 years of safe implementation of the technology.

Recommendation #3:
Research must be continued on these critical technologies to secure a robust and diverse domestic energy supply.

3.2 THE PROGRAM FINDINGS AND RECOMMENDATIONS

There has been significant effort by all parties (DOE/NETL and RPSEA) to implement many of the recommendations made by the URTAC reports for the previous draft annual plans (2007, 2008 and 2009). Thus the cumulative effect of the URTAC over the last few years is evident and has led to significant improvements in the plan. Specifically:

- The importance of Technology Transfer (TT) has been addressed by both RPSEA and DOE/NETL. DOE is to be commended for providing the additional program funding needed for an effective TT program through the Complimentary Program.

- NETL has implemented a Knowledge Management Database that is being rolled out to industry and is being exceptionally well received.

Finding #1:
The Committee finds that its previous recommendations have been addressed with responsive changes and incorporated into the plan. It is the opinion of the Committee that the program as implemented has a measureable returns, is well implemented, leveraged and will provide significant value for the nominal investment. The Committee does recommend some additional adjustments to the Program portfolio.

Recommendation #1:
The plan portfolio should be expanded to include: development of techniques for zonal isolation, re-stimulation, utilization of non-potable water for fracture stimulation, reuse of recovered waters, real-time downhole techniques for evaluation of source potential of oil and gas bearing shales, effective technologies for production of oil from shales and "other petroleum" resources.

Finding #2:
The research effort thus far appears to have has been focused primarily in the Rocky Mountain and Appalachian producing regions of the country.

Recommendation #2:
The Committee recommends the program expand its regional focus by soliciting requests for proposals and disseminating results to a more geographically diverse cross section of the petroleum producing regions of the country.

Finding #3:

The committee recognizes the need to conduct an annual review of the portfolio of projects as part of its responsibilities. There also needs to be better awareness of the program elements to the producing community and other potential beneficiaries.

Recommendation #3:
The Committee strongly recommends that an annual industry symposium sponsored by the DOE/NETL be held to showcase the program; this would provide greater exposure of the elements of the program to the producing community and other interested parties, serve as a technology transfer event of the knowledge learned from the program, as well as serve as a venue for the Advisory Committee to independently conduct its annual review of the large portfolio of projects and provide guidance as warranted.

The Committee should receive adequate notification and the invitation to all DOE/NETL activities related to the Section 999 program that pertains to their oversight so that they can attend and observe events. Past events that Committee members have been able to attend provided valuable insight into the program's operations.

Finding #4:
The EPACT statute requires addressing the technology challenges for independent producers' safe operations and environmental mitigation, specifically in the areas of reductions of greenhouse gas emissions and the sequestration of carbon. However, there are already significant research efforts supported by the federal government focused in these areas. The Committee recognizes that this program should not utilize already limited program funds to duplicate these efforts.

Recommendation 4:
The program should identify and facilitate communication of these other research efforts as they apply to the technological problems facing producers; where it is beneficial and not duplicative, research specific to oil and gas exploration and production should be considered.

Finding #5:
The Program has made considerable progress on taking action on environmentally related recommendations made by the Committee its previous reports.

Recommendation #5:
In its current review of program activities, the Committee recommends the following environmental topics for additional focus:

- Research on regulatory (Federal, state and local) barriers and/or issues to in order catalogue (identify, compile, and compare) impediments to unconventional hydrocarbon development in order to resolve how these resources can be developed with minimal environmental impact.

- Special emphasis should be placed on identifying "Best Practices" in critical areas such as environmental protection (including minimizing footprint and conserving or mitigating for biodiversity impacts) and reduction of wastes. These should be incorporated in the Knowledge Management Database and disseminated as key elements of the program as part of the Technology Transfer effort to producers.

Finding #6
The current portfolio has made good progress in addressing research to identify technologies, methods or applications to minimize environmental impact in areas such as water sources and reuse, surface use and surface reclamation. Additional work remains to be done in addressing other areas of mutual interest.

Recommendation #6
The Committee recommends that issues regarding Environmental Policy identified in "Appendix A" of the URTAC Recommendations on the 2009 Annual Plan continue to be considered, which focused on areas of overlapping interest for good environmental stewardship and resource development.

3.3 KNOWLEDGE MANAGEMENT AND TECHNOLOGY TRANSFER FINDINGS AND RECOMMENDATIONS

In previous reports, the Unconventional Resources Technical Advisory Committee recommendations addressed the need for a more modern and accessible knowledge management database and a robust Technology Transfer program as being critical to the success of the Unconventional Resources and Small Producer programs.

In the 2007 URTAC Committees' report, a web based system was identified as needed to disseminate research and development activities, lessons learned and knowledge management around Unconventional Resources and Small Producer Programs (Section 999) to those communities. The vision was such that after such a database was completed it could be extended to other oil and gas research programs. Such a knowledge repository has an almost limitless potential to the oil and gas and environmental interests around not only Unconventional Resources but other Department of Energy programs. Considering the savings and benefits realized by similar private industry databases, the payback could exceed the annual cost of the Unconventional Resources, Small Producer and Deepwater programs in 3-5 years.

Since the original recommendation was made in the 2007 plan, NETL has taken the responsibility to develop such a system called the Knowledge Management Database (KMD). All the committee's requirements have not only been met but exceeded by this new web enabled database. The KMD system is scheduled for public launch in October of 2009. By the time this report is submitted to the Secretary of Energy this database will be available at **www.netl.doe.gov/KMD**. The components of this new KMD are outlined in the appendix of this document.

Likewise, significant progress has been made in the Technology Transfer effort.

Finding #1:
The committee recognizes the effort involved in the development of the Knowledge Management Database. This undertaking not only involved a tremendous amount effort and commitment by DOE/NETL, but was achieved with very little budget allocation.

Recommendation #1:
The committee recommends that DOE to take steps to widely publicize the KMD website to all stakeholders so as to maximize the exposure of the producing community to the valuable information contained therein.

Finding #2: Technology Transfer
The committee recognizes the substantial progress made in the implementation of technology transfer recommendations made in the last three committee reports.

Recommendation #2:

The full success of the program can never be fully realized without a successful technology transfer effort, which should include the following additional elements:

- The committee recommends that the expeditious transfer of technology serve as a metric of the benefits of the program. Without the successful execution of this very critical element of the program, the full benefits of the program can never be fully realized.

- The program's tech transfer efforts should continue to evolve over time and include producer problem identification workshops to catalogue issues of consequence for potential program research.

3.4 METRICS AND BENEFITS ASSESSMENT FINDINGS AND RECOMMENDATIONS

The ultimate value of the DOE research is its significant contribution to the economic well being and the energy security of the nation. While the past and proposed research focuses are compelling and appropriate to advance these benefits, the metrics used to assess the projects essential to evaluating the benefits of the program need to be clearly identified. Significant effort has been undertaken by DOE/NETL to update and improve the methods used for program metrics and benefits assessment.

Finding #1:
In addition to providing incremental hydrocarbon production, the program also provides many resulting tangible economic benefits (tax revenue, royalties, jobs) as well as intangible benefits (including technical workforce enhancement, spin-off use of developed technologies, environmental footprint reduction, future impacts from contributions to the "body of knowledge").

Recommendation #1:
All of these tangible and intangible benefits should be recognized as part of the benefits assessment being conducted in conjunction with the program. Additional assessment methods that warrant consideration include:

- Construct a "backward-looking" model to assess how past technology successes using data from previous projects funded by DOE have resulted in increased reserves and/or production. This data can be used to help evaluate the expect benefits of the current program.
- Utilize Fuzzy Set Theory: the science of calculating with words, to turn words into numbers so that vague or uncertain concepts may be quantified.
- Benefits calculation should include risk and uncertainty components to the extent that they help provide better understanding and evaluation of the data being presented.
- Publish the NETL Benefits Analysis methods being developed in an archival peer-reviewed paper to add credibility to the analysis and to obtain feedback to improve the methodology.

Finding #2:
The committee recognizes that technology transfer is vital to the success of the Program as outlined in the Knowledge Management section of this document.

4.0 COMMITTEE MEMBERS

Title	Last Name	First Name	Employer	City	State
Mr.	Anderson	A. Scott	Environmental Defense Fund	Austin	TX
Dr.	Brown	Nancy J.	Lawrence Berkeley National Laboratory	Berkeley	CA
Ms.	Cavens	Jessica J.	EnCana Oil & Gas (USA)	Denver	CO
Mr.	Daugherty	William S.	NGAS Resources, Inc	Lexington	KY
Mr.	Dwyer	James P.	Baker Hughes	Houston	TX
Mr.	Hall	Jeffrey D.	Devon Energy Corporation	Oklahoma City	OK
Mr.	Hall	J. Chris	Drilling & Production Co.	Torrance	CA
Dr.	Hardage	Bob	University of Texas at Austin	Austin	TX
Mr.	Julander	Fred C.	Julander Energy Company	Englewood	CO
Dr.	Levey	Raymond A.	University of Utah	Salt Lake City	UT
Dr.	Mark	Sandra D.	Black Hills Exploration and Production	Evergreen	CO
Dr.	Mohaghegh	Shahab D.	West Virginia University	Morgantown	WV
Mr.	Sparks	Don L.	Discovery Operating, Inc.	Midland	TX
Dr.	Tew	Berry H. (Nick)	State Oil and Gas Board of Alabama	Tuscaloosa	AL
Ms.	Weiss	Janet	BP America, Inc.	Houston	TX
Ms.	Zinke	Sally G.	Ultra Petroleum	Englewood	CO

5.0 SUB-GROUP TOPICS AND MEMBER ASSIGNMENTS

At the September 15th and 16th, 2009 meeting in San Antonio, Texas the following Subgroups and Schedule were established for developing the Subgroup analyses and reports. At the Committee meeting in Los Angeles on October 15th, the "2010 Program", "2007, 2008, 2009 Portfolio Assessment" and "Environmental" sub-group topics were incorporated into the "Program" section of the report.

Schedule
9/16 – Recommendations to leaders
9/28-10/7 – Subgroup conference calls and E-mail correspondence
10/7- Subgroup reports to Chair
10/13- Subgroup reports distributed to Committee
10/15 – Meeting in Los Angeles
10/22- Teleconference and formal vote on final URTAC Report

Six Sub-Group Areas of Analysis and Member Assignments:

Executive Summary, Policy, Past Report Review
Lead – C. Hall
Members - J. Hall, Julander, Marks, Sparks

2010 Program:
Lead – J. Hall
Members - Cavens, Dwyer, Hardage, Sparks, Tew

2007, 2008, 2009 Portfolio Assessment:
Lead – Zinke
Members – Brown, Dwyer, C. Hall, Mohaghegh, Sparks, Weiss

Knowledge Management and Technology Transfer
Lead – Dwyer
Members – Daugherty, C. Hall, Hardage

Metrics and Benefit Assessment:
Lead – Mark
Members – Brown, Daugherty, C. Hall, Levey, Mohaghegh

Environmental:
Lead – Brown
Members- Anderson, Brown, C. Hall, Julander, Levey, Weiss

APPENDIX

Description of Information About the New DOE Knowledge Management Database (KMD)

- Program Status
  - A list of projects goals, objectives, status, accomplishments, reports and key personnel contact information
- The RPSEA Consortium R&D Program
  - 57 project summaries currently available on the NETL Internet
- NETL Complimentary R&D Program
  - Drilling under extreme conditions
  - Environmental impacts of oil and natural gas development
  - Enhanced and unconventional oil recovery
  - Resource assessment
- Ongoing DOE Oil And Gas Programs
- Other Related Research Products Generated by the Traditional Oil and Gas Research Program At The NETL SCNGO (e.g. Gas Shale Research)

In addition to these requested attributes. The system will also include:

- Search Tools for NETL's CD/DVD document and "historical archive" database
- GIS and ArcGIS functionality – mapping of US O&G information and geographical databases.
- Xcelsius models providing visualization of O&G information and more importantly access to Outer Continental Shelf Models that provide information on water resources and environmental data pertaining to drilling in the Allegheny National Forest.