

Unconventional Resources Technology

Advisory Committee (URTAC)

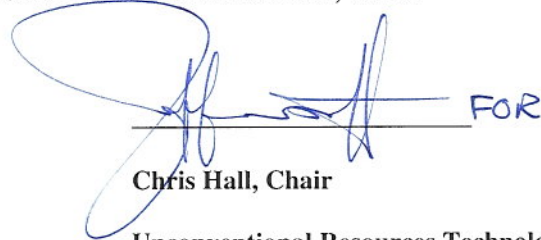
October 16, 2008

Seventh Meeting

Meeting Minutes

Unconventional Resources Technology Advisory Committee

I hereby certify that this transcript constitutes an accurate record of the Seventh Unconventional Resources Technology Advisory Committee Meeting held on October 16, 2008 at the Crowne Plaza Hotel in Houston, Texas.



FOR

Chris Hall, Chair

Unconventional Resources Technology
Advisory Committee

7-6-2009

Date

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

**Unconventional Resources Technology Advisory Committee (URTAC)
Seventh Committee Meeting
October 16, 2008
Crowne Plaza Hotel, Houston, Texas**

Welcome and Introductions

The URTAC (the Committee) meeting convened at 8:05 a.m. with the Chair, Chris Hall, welcoming all of the members to the meeting and acknowledging all of the hard work that had taken place since the last Committee meeting in Alexandria, Virginia in September.

The Chair then introduced the Designated Federal Officer, Mr. Guido DeHoratiis, and invited him to make some opening comments to the Committee which was followed by Ms. Elena Melchert, the Committee Manager, taking roll to confirm that a quorum was present. The attendees and dial-in participants are listed in Attachment 1. Mr. DeHoratiis advised the Committee that he had not received any public requests to make a statement, so it was not necessary to reserve time on the agenda for public comment. He also told the Committee that for reference, the approved agenda had been inserted into the meeting packet, and is shown in Attachment 2. Mr. DeHoratiis reminded the group that their objective is to produce recommendations on the Draft Annual Plan, but that the Committee was prohibited from making any comments on funding of specific projects or discussions that would impact funding decisions. He reminded the group that consensus on resolving issues is nice to have but not required. There is always room for minority opinions. Finally, Mr. DeHoratiis briefly reviewed the potential for conflicts of interest and asked Committee members to be mindful of those concerns, and to direct any questions promptly to his attention. The next meeting, which will be conducted as a teleconference, has been scheduled for October 23 to review and approve the final document which then can be delivered to the Secretary of Energy.

The Chair stated that in the last meeting, an interest was expressed in having the Petroleum Technology Transfer Council (PTTC) make a presentation to the Committee but this had been cancelled due to the potential for the appearance of a conflict of interest. He did suggest; however, that any interested Committee members could visit the PTTC Web site.

Subcommittee Introductory Comments

At 8:15 a.m., the Chair invited the subcommittee chairs to make brief introductory comments on the results of their deliberations since the last meeting in Alexandria, Virginia in mid-September. The purpose of this part of the program was to give each subcommittee an opportunity to give a brief and broad overview of their activity so that Committee members could note any possible

areas of duplication. The Chair suggested that each subcommittee chair review the subcommittee's recommendations. He also asked members to refrain from extended discussions at this stage. The individual subcommittee reports are shown in Attachment 3. Attachment 4 contains the full Committee endorsed recommendations resulting from discussions regarding subcommittee recommendations.

At 9:00 a.m., the Committee began the detailed reviews of each subcommittee, beginning with the recommendations of the Research Focus Subcommittee. At 10:55 a.m., the Committee took up the subject of Technology Transfer Subcommittee recommendations. Before the session started, the Chair reminded the group about conflicts of interest. Specifically, he cautioned anyone with a personal interest in a technology development area to avoid making recommendations in this area. Also, the Chair cautioned the group about making recommendations in support of specific groups for follow-on activities (e.g., the Interstate Oil and Gas Compact Commission [IOGCC]). Ideally, Committee recommendations should clearly identify a need that is not being fulfilled in the current plan and less on the specifics of how it should be resolved.

It was agreed that an opening statement regarding the importance of technology transfer is appropriate, to ensure that there are effective mechanisms to leverage the investment that is being made by the federal government to achieve maximum exposure to the entire oil and gas community. Furthermore, it should state that technology transfer should be well defined, implemented early in the life of a research program, and used often to ensure that the end users are aware of the benefits of the technology.

At 12:00 p.m., the Committee began their review of the Near Term Impacts Subcommittee recommendations. One member suggested that although everyone agreed that it is important for the visibility of the program to ensure that "early successes" are communicated promptly, caution should be taken to ensure that an adequate level of peer review is achieved. It was agreed that communications targeting "early successes" should contain appropriate cautionary advice that this is an interim status report and not a polished or peer reviewed final product.

The Committee broke for lunch at 12:05 p.m.

Discussion of Potential Committee Activities in Interim Period before the Fall 2010 Draft Annual Plan Review Meetings

At 1:00 p.m., the Committee meeting resumed. The Chair suggested that the group break into three groups to discuss options for continuing activities of the URTAC during the interim period while awaiting the next draft annual plan review in September 2009. The Chair sought feedback on Committee members' thoughts on how best to evaluate progress on the 50-plus research projects that have been selected to date. However, the Committee preferred to discuss the proposal in one group as opposed to breakout groups.

The options discussed involved either viewing each project in the field or arranging a coordinated meeting with the project researchers for status updates or findings. In any case, funding could be an issue as there are no funds set aside for this type of activity. This latter format would lend itself to being open to both the public and industry as an awareness mechanism and to generate some excitement and energy focused on the program. This type of process had been used by the Agricultural Extension Service and has proved to be very successful.

The Committee Manager noted that certain boundary conditions needed to be taken into account in implementing this type of Committee review process. One boundary condition, which is of particular concern to the General Counsel, is that there is a prohibition limiting the Committee in making recommendations on funding awards of any particular consortia or specific projects. So while the Committee can make general recommendations on the activities of a project, it cannot be construed as affecting the funding of a specific project. She stressed that the funding is the responsibility of the consortium and not the role of the Committee.

The Committee wanted to better understand how they could avoid pitfalls in this process and it was noted that specific questions would have to be put to the General Counsel for advice. The recusal process could also be used to avoid direct conflicts of interest on specific projects where Committee members might have some personal involvement. These limitations would have to be explored further by General Counsel as well. To avoid these issues, it was suggested that the Committee involvement in the project reviews be kept at the “30,000 foot level” and to focus on process issues as opposed to specific project performance. It is appropriate to talk about research areas and needs, but once the discussion turns to specific projects or specific performers; e.g., whether one project should be cancelled or another project is deserving of additional funding, then that creates problems and possibly conflicts of interest. Further, Section 999D(c) specifically prohibits members from making recommendations on funding awards and on specific projects.

The Chair noted that this review process would be very helpful to the technology transfer process by helping to kick start the activity.

Another Committee member related his experience in other DOE research projects and noted that the issue of peer reviews was gaining in importance. In those cases, the peer reviews were conducted in a manner that did not affect funding, but rather provided guidance to the researchers to help them make a more effective product. The Committee member suggested that possibly this process could be used as part of the solution to achieving the peer review objectives.

The Committee Manager restated that the objective in establishing the interim process was to shorten future meeting agendas when the number of projects will be large, and so that some of portfolio assessment and evaluation could be done with existing procedures, outside of the process of the reviewing and commenting on the next draft annual plan.

A Committee member asked for an explanation of the existing procedures for managing the R&D processes. In response, RPSEA detailed the process they use in monitoring and managing the progress of each ongoing project, including the direct involvement of the RPSEA project manager and the Program Advisory Committee (PAC). They use gate review processes and analysis of deliverables/milestones plan/actual analysis. Furthermore, mechanisms are in place to cut off projects that are not performing to expectations. The Committee Manager also reported that for NETL projects, independent subject matter experts conduct merit reviews.

One of the members asked that prior to any activity, the Committee members should be given copies of the R&D project summaries so that they could be prepared for the reviews. The Committee Manager noted that this type of information has already started to flow and that a synopsis of each project was included in the meeting packet for the last meeting and additional information is available on the RPSEA website.

Ideally, it would be desirable to involve the public in the symposium process. With industry participation, this could evolve into a technology transfer event and serve as a mechanism to advertise the program with many contingent benefits. The eight volunteer members of the activity (subsequently referred to as the Program Assessment Standing Subcommittee) included: Sally Zinke, Janet Weiss, Shahab Mogh, Jessica Cavens, Jim Dwyer, Nancy Brown, Jeff Cline, and Chris Hall. They will jointly establish the charter for the Subcommittee and thereafter the Chair would appoint the members of the final standing Subcommittee. Tentatively, the full Committee would meet to discuss the implementation of the Standing Subcommittee in mid-December. Most likely, this meeting would be a teleconference/webex meeting. Committee members are reminded to communicate directly with the Chair instead of the full Committee to avoid the appearance of a full Committee meeting by email.

The Chair retabled the discussion on the need for a Knowledge Management Database Subcommittee to oversee the development of this technology. The Committee did not support developing a subcommittee in this area at this time.

The Committee broke for coffee at 2:10 p.m. and returned at 2:20 p.m. to address the remaining subcommittee reports and recommendations. The Environmental Subcommittee prepared a number of recommendations, most of which were designed to be inserted in other sections of the report as opposed to having one environmental standalone section as many of the issues overlapped with other key focus areas. After discussion regarding a recommendation related to a policy position that was felt by many to be too pointed and possibly beyond the scope of the Committee's duties, it was agreed that an appendix would be redrafted by the Environmental Subcommittee and that a vote would be conducted on October 23 to adopt the revised wording suggested by the Committee and, if the vote to accept failed, it would be included as a minority opinion. The Environmental Subcommittee agreed to prepare the redraft by October 20 to allow time for review prior to the final teleconference.

At 3:40 p.m., the discussion turned to the Executive Summary and the Policy Section. It was decided that pertinent sections of the Subcommittee recommendations would be split between the Executive Summary and Policy sections. Following the items in the Policy Section would be a paragraph from the Environmental Subcommittee reflecting their high level input.

The other three environmental items noted in the Subcommittee's proposed appendix were dealt with as follows: the first one dealing with "no-go" areas was not used in the report and hence deleted; the permitting issues would be retained in the Policy Section, and the third item had already been covered and could be deleted.

The Committee discussed the need for a multi-departmental energy resources access study at great length. The need for this activity stems from the observation that, in order to have a chance at success, it is essential that all involved sectors of the government must adopt a unified position to help formulate a coherent and robust energy policy. Experience has indicated that leaving it only to the Energy Department is not sufficient to ensure success. A much more balanced view including (but not limited to) environmental issues, issues dealing with federal lands utilization, permitting matters, tribal lands issues, overlap with states regulatory frameworks, and endangered species interests, is deemed to be essential in formulating a robust energy policy. This initiative could help resolve some of the sensitive environmental issues facing the industry with a more balanced perspective. This initiative might initially involve the Departments of Energy, Commerce, and Interior. This program is somewhat modeled after the successful initiative to overturn the ban on export of Alaskan crude oil, which also focused on a multi-departmental approach to demonstrate to Congress the soundness of the plan.

Among other issues, this study would qualitatively and quantitatively identify some of the key impediments that limit the ability of the oil and gas industry to achieve the ultimate level of oil and gas resource utilization. It was argued that this study is intended to be an unbiased view of the oil and gas situation as only a government study could provide. If it were done by industry, then the bias issues would be obvious. That is a key point in the use of this concept.

It was recommended that the proposal focus on documenting the scientific and factual nature of the situation. Members suggested that this initiative should be used to dispel the baseless assertions that renewable energy resources can eliminate our dependence on oil and gas. It was also suggested that the proposal clearly state that over the next 20-30 years, the United States is going to need a broad approach to balance energy demand and supplies including renewable and coal, nuclear, wind, solar, and oil and gas and that the initiative is not seeking a one answer solution. Final Committee recommendations in developed during Committee discussion in response to the Subcommittee report are included in Attachment 4.

Editing Subcommittee Role and Instructions

At 4:25 p.m., the Chair reviewed the instructions for the Editing Subcommittee. The charge of the Editing Subcommittee involves only language format and style edits to make the points as succinctly and compelling as possible and in a professional readable format — without changes in context from the approved Committee recommendations. The Editing Committee was charged to create the Executive Summary write-ups based on the input from each subcommittee and the final cover letter to the Secretary of Energy. The product of the Editing Subcommittee work was to be distributed to all Committee members on October 20, except for the final feedback from the Environmental Committee's work on the appendix, which will be inserted into the final document and distributed to the full Committee as soon as available. Feedback to the Chair is requested by October 21 in preparation for the final teleconference on the October 23.

Plan for October 23 Teleconference

At 4:30 p.m., the Chair asked Ms. Melchert to provide the Committee with instructions for the teleconference on Oct 23. Her presentation slide is presented in Attachment 5.

Adjournment

The Committee adjourned at 4:50 p.m.

Attachments

	Presenter	Topic
1	For the Record	Unconventional Resources Technology Advisory Committee (URTAC) Attendees
2	For the Record	Meeting Agenda
3	For the Record	Subcommittee Recommendations
	Ray Levey	a. Program Focus
	James Dwyer	b. Technology Transfer
	Jeff Cline	c. Near Term Impacts
	Jessica Cavens	d. Environmental
	Chris Hall	e. Policy & Executive Summary
4	For the Record	DOE Oil and Natural Gas Research, Development, and Demonstration Program
	Ray Levey	a. Program Focus
	James Dwyer	b. Technology Transfer
	Jeff Cline	c. Near Term Impacts
	Jessica Cavens	d. Environmental
	Chris Hall	e. Policy & Executive Summary
5	Elena Melchert	Plan for October 23 Teleconference

Attachment 1

**Unconventional Resources Technology Advisory Committee Meeting
Sign-In Sheet - October 16, 2008**

Last Name	First Name	Organization	Sign
Anderson	A. Scott	Environmental Defense Fund	UNABLE TO ATTEND
Brown*	Nancy J.	Lawrence Berkeley National Laboratory	<i>Nancy J. Brown</i>
Cavens	Jessica J.	EnCana Oil & Gas (USA)	<i>Jessica Cavens</i>
Cline*	Jeffrey T.	Cline Energy Consulting	<i>Jeffrey T. Cline</i>
Daugherty	William S.	NGAS Resources, Inc.	PRESENT
Dwyer	James P.	Baker Hughes	<i>James P. Dwyer</i>
Falkner	Juliette A.	The Nature Conservancy	PRESENT
Hall	Jeffrey D.	Devon Energy Corporation	<i>Jeffrey D. Hall</i>
Hall	J. Chris	Drilling Production Co.	<i>J. Chris Hall</i>
Hardage*	Bob	University of Texas at Austin	<i>Bob Hardage</i>
Julander	Fred C.	Julander Energy Company	<i>Fred C. Julander</i>
Levey*	Raymond A.	University of Utah	<i>Raymond A. Levey</i>
Mark	Sandra D.	Black Hills Exploration and Production	<i>Sandra D. Mark</i>
Mohaghegh*	Shahab D.	West Virginia University	<i>Shahab D. Mohaghegh</i>
Sparks	Don L.	Discovery Operating, Inc.	<i>Don L. Sparks</i>
Tew	Berry H. "Nick"	State Oil and Gas Board of Alabama	PRESENT
Weiss	Janet	BP America, Inc.	<i>Janet Weiss</i>
Zinke	Sally G.	Ultra Petroleum	<i>Sally G. Zinke</i>

* Special Government Employee

Unconventional Resources Technology Advisory Committee Meeting

Public Walk-In List - October 16, 2008

Last Name	First Name	Organization
Castillo	Edgard	Petris Technology
Ming	Mike	RPSEA
Mozisek	Danette	RPSEA
Perry	Kent	RPSEA
Schroeder	Art	RPSEA

***Unconventional Resources Technology Advisory Committee Meeting
October 16, 2008***

Staff Roster

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

Guido DeHoratiis Acting Deputy Assistant Secretary	Designated Federal Officer
Elena Melchert	Committee Manager
Natenna Dobson	Office of Oil & Natural Gas, Section 999 Team

National Energy Technology Laboratory

Al Yost	Ultra-Deepwater & Unconventional Natural Gas and other Petroleum Resources Technology Manager (Acting)
Gary Covatch	Strategic Center for Natural Gas & Oil
Ginny Weyland	Strategic Center for Natural Gas & Oil

Technology & Management Services, Inc.

Mauri Lappinen	Committee Recorder
Karl Lang	Facilitator Support
Rob Matey	Committee General Support
Dominique Wells	Committee Registration Support
Jennifer Presley	Administrative Support

Attachment 2

Agenda
Unconventional Resources Technology Advisory Committee
Seventh Meeting, October 16, 2008
Crowne Plaza Houston North Greenspoint, 425 N. Sam Houston Parkway East, Houston, TX
Meeting Room: Veranda

- 8:00** **Welcome** [Chris Hall, Chair]
- 8:10 **Opening Remarks** [Guido DeHoratiis, Designated Federal Officer]
- 8:20 **Reporting on Subcommittee Activities*** [Chair]
- | | |
|----------------------------|----------------|
| Research Focus | Jeff Cline |
| Technology Transfer | James Dwyer |
| Environment | Janet Weiss |
| Process | Jessica Cavens |
| Executive Summary (Policy) | Chris Hall |
- *Each Subcommittee Lead presentation = 15 minutes plus 5 minutes for clarifying questions.*
- 10:00** **Break**
- 10:15 **Discussion of Recommendations** *30 min. per topic*
- 12:00** **Lunch**
- 1:00 *Special Topic:* Committee Calendar: November 2008 – August 2010
- 2:00 Continue Discussion of Recommendations
- 2:45** **Break**
- Continue Discussion of Recommendations
- 3:30 **Executive Summary and Cover Letter**
 Review content and key messages
- 4:00 **Instructions to the Editing Subcommittee**
- 4:15 **Next Steps** [Elena Melchert
Committee Manager]
 October 23, 2008 Meeting via conference call
- 5:00 **Adjourn**

APPROVED: _____
 Guido DeHoratiis, Designated Federal Officer

Date

Attachment 3a

RECOMMENDATIONS OF THE RESEARCH FOCUS SUBCOMMITTEE OF URTAC

October 2008

Research Focus Subcommittee Members

Mr. Scott Anderson, Dr. Nancy J Brown, Dr. Jeffrey T Cline, Mr. James P Dwyer, Mr. Bob Hardage, Mr. Fred C. Julander, Dr. Raymond A. Levey, Dr. Shahab D. Mohaghegh, Mr. Don Sparks, Dr. Berry (Nick) H. Tew

The Research Focus Subcommittee has identified the following findings and suggests the resulting recommendations be incorporated into the 2009 plan. A summary of the findings and recommendations follows, while more detailed program descriptions are provided in the appendix.

Findings

The development of shale gas is continuing to expand rapidly. However, the optimum drilling, stimulation and completion techniques, along with real time data evaluation, need development to optimize gas extraction from the shales. Some shales are difficult to fracture. And, for most the management of fracturing water is very costly or may even inhibit hole completion.

Coal gas development is also continuing to expand rapidly. However, unlike other hydrocarbon sources, gas has a biogenic origin in the soft coals of the Rockies, and therefore the potential exists for “regeneration” of more gas during long term field production. Produced water management still remains key to development of coal gas.

The URTAC Research Focus subcommittee reviewed the recommendations provided by the previous URTAC regarding other petroleum resources that may have a significant future benefit to the U. S. domestic energy supply and, in general, concur with those recommendations. Studies identify the potential for over 75 billion barrels of oil resources from heavy oil and tar sands that could be produced with minimal surface impact.

Heavy and unconventional oil resources might be developed sooner than shale oil because the deposits are shallow and production methods are not as technologically challenging. Recent announcements by small Independents regarding both heavy oil and fractured shale oil ventures support this premise. Accelerated and sustainable development of these resources is in the U.S. national interest.

With development of these unconventional resources, there will likely be the opportunity for significant greenhouse gas emissions and a need for improved controls.

Recommendations (additions or modifications to 2008 Plan)

- a. Exploration Geosciences as Applied to Exploration, Drilling/Stimulation
 - i. Develop surface-based and borehole-based technologies that:
 - Identify drilling sweet spots
 - Map fracture attributes (orientation, intensity, openness, and type of fluid)
 - Optimize the position and orientation of vertical and horizontal well bores
 - Determine horizontal stress fields
 - Improve the design and implementation of hydrofracs
- b. Basin Analysis and Real Time Resource Exploitation

- i. Characterize geological, geochemical, geophysical, and operational parameters that differentiate high-performing areas or fields
 - ii. Develop and demonstrate techniques to analyze large volumes of data in real time for application during unconventional resource development
 - iii. Develop real-time simulation and modeling of reservoirs
 - c. Stimulation and Completion – Develop and Demonstrate:
 - i. Stimulation methods that require less water and other fluids to be injected into the subsurface
 - ii. Stimulation methods that result in a lower volume of treatment fluids produced to the surface
 - iii. Approaches for improved treatment, handling, re-use, and disposal of fluids produced and/or used in field operations
 - iv. Improved fracturing and stimulation techniques in various gas shales
 - d. Water Management - Develop and Demonstrate:
 - i. Water management approaches that minimize the impact of drilling, completion, stimulation, and production operations on natural water resources
 - ii. Methods for the treatment of produced water at intermediate and high TDS
 - iii. Techniques to minimize the volume of water produced to the surface
 - e. Environmental – Develop and Demonstrate:
 - i. Methods for planning and site selection that minimize the surface footprint and impact of drilling and production operations
 - ii. Best practices to be applied during exploration, drilling and production
 - iii. Surface mitigation methods applicable to all environments
 - iv. A land-use map with a uniform set of criteria for identifying federal land of high conservation value.
 - v. Technologies to recycle water associated with E&P
 - vi. An inventory of greenhouse gas emissions and losses in E&P operations
- 2. Conduct early-stage research on novel concepts that may be applied to the development of unconventional gas resources.
 - a. Enhance coal gas production over time
 - i. Develop biological, reservoir engineering / hydrological methods.
 - ii. Inject CO₂ to enhance methane removal while sequestering the CO₂.
- 3. Other Petroleum Resources – Future Development
 - a. Heavy oil and tar sands production needs enhanced efficiency
 - b. Production of oil from unconventional resources (i.e. Bakken Shale), such as tight sands or shales, needs development to become more commercial to develop.

Attachment 3b

Technology Transfer

- The 2009 Plan for the Ultra-Deepwater and Unconventional Natural Gas and Other Petroleum Resources Research and Develop Program outlines a very comprehensive response by DOE, NETL and RPSEA to the need to develop a robust technology transfer program. The proposed five step plan shows significant progress towards a comprehensive and sustainable technology transfer and knowledge management system.

- It's not enough to have a robust knowledge management system. We are concerned about the effectiveness of any knowledge management or technology transfer system which is adopted. It is also considered imperative that technology is effectively transferred to all producers (especially small producers). The plan should be refined to specifically outline the steps necessary to communicate technology to the industry. The plan should include specifics about.
 - Communication to industry of the very existence of a Knowledge Management system.
 - Access protocol to support recommended metrics
 - Implementing supply chain improvements to reduce the technical costs for small producers.
 - Organize the communication plan and format by basin. Paying particular attention to the systems taxonomy.

- The database should be linked to others existing knowledge management resources as soon as possible to include Small Producers, Deepwater and others managed by DOE. The databases should have a similar taxonomy look and feel.

- As part of the above recommendations it was determined that a portion of every research project was to be dedicated to knowledge management and technology transfer. It was not the intent of the Advisory committee's recommendation that each individual project to undertake it's own knowledge management program. This spend should be consolidated into the existing knowledge management and technology system. Furthermore the knowledge management and technology transfer funds from the other programs should also be consolidated.

- Utilize the latest communication technologies to introduce the Knowledge Management System. Using electronic resources such as web based seminars and computer based education systems that are proven cost effective systems to deliver or push information to the communities that can best benefit.

- Now that a knowledge management has been developed, metrics will be needed to communicate successes. The program should consider those below:
 - Knowledge Management Entries
 - Readership or subscription trends and totals
 - Multiple user or access trends and totals
 - Transfer successes and testimonials

- The program should leverage organizations & conferences to introduce the knowledge management systems. The program should focus on early knowledge application or transfer successes. Communicating these successes through the system itself as well as organizations, industry publications and conferences. The database cannot replace the effectiveness of regionally focused workshops organized through local producer and small producer organizations and must be worked in tandem.

Attachment 3c

New Subcommittee name - Near Term Impacts

An emphasis needs to be placed on building credibility, demonstrating value and enhancing projects through feedback. Exposing early results will provide an opportunity for feedback to both current projects and stimulate ideas for further research.

- An emphasis needs to be placed on evaluating funded projects to document "early success" and those developments need to be rolled out to the industry as soon as possible (prior to completion of the research) to encourage industry support. This will also allow for early tests of the technology transfer process and identify area for improvement.
 - Encourage researchers to be knowledgeable of prior or ongoing research within the industry, academia and national labs. This includes placing emphasis on solicitations which leverages technologies developed by other industries.
 - The plan needs to ensure, that along with long term research, some short term projects with potential for early application are emphasized.
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Attachment 3d

URTAC Environmental Subcommittee 2009 Plan Draft Suggestions

October, 2008

THE ENVIRONMENTAL SUBCOMMITTEE RECOMMENDS THAT THE ENVIRONMENTAL INPUT TO THE 2009 PLAN RECOMMENDATIONS BE ADDED TO THE FOLLOWING PARTS OF THE REPORT INSTEAD OF INCORPORATING A SEPARATE ENVIRONMENTAL SECTION: 1) EXECUTIVE SUMMARY, 2) POLICY, 3) RESEARCH FOCUS, AND 4) PROCESS. BELOW ARE THE SUGGESTED CONCEPTS FOR EACH SECTION.

Recommendations:

1) Executive Summary:

- a) Environmental responsibility is a theme that runs throughout this committee's topical recommendations; specific concepts addressing environmental responsibility are proposed in the policy, research focus, and process sections of this report.
- b) This committee believes that environmental responsibility and resource development are important objectives that can be achieved together and must be addressed together; environmental responsibility is a fundamental aspect of resource development.

2) Policy:

- a) During the next several years, the services provided by our Nation's public lands will continue to see an unprecedented rise due to increased demands for energy development, national security (DoD expansions) infrastructure related needs (including transition lines and roads), energy security, recreation, agriculture (forestry and ranching), endangered species protection, and other ecological and cultural needs (e.g. water and historic preservation). The mandate of the BLM--to manage the public lands for multiple use, while protecting the long-term health of the land—is tough to manage and the BLM is stressed and no longer able to sustain itself under its current structure. More and more users want an answer to the question of “where” they can go to conduct the uses they seek. Answering this question requires a reasoned and scientific approach with participation of the users and federal, tribal, state and local governments,

to determine the highest and best use of these lands. Conservation of scarce or sensitive biological resources must occur in conjunction with land-use activities that meet the social and economic needs of people.

- b) Currently, there are several conservation mapping activities being created to address various issues, including wetlands, migration corridors, etc. However, there is not a unified process to address federal lands of high conservation value, nor are there agreed to criteria for these lands; there also is no landscape view to ensure an informed, holistic perspective. The multiple use agencies (USFS and BLM) should have access to a unified map clearly delineating areas of energy development activities, areas of high conservation value lands (limited access or avoidance), and areas of other activities. Criteria should be based on science and social need—reflecting consequences and trade-offs—with the input of users, and include federal, state, tribal and local governments. This map will provide a landscape view, enabling a more comprehensive understanding for decision-makers.
 - c) Once constructed, the map should be leveraged to drive efficiency into widespread multiple land use decision processes. The map should also be updated on a periodic basis. The map criteria validity should be reviewed every two years and updated based on that review.
 - d) To construct the map, there should be a sponsor group and a national advisory committee comprised of knowledgeable representation from the various viewpoints that can engage in a scientifically credible process. The Environmental subcommittee proposes the following alternatives for the sponsor group and national advisory committee to the full URTAC to debate in order to put forth a recommendation:
 - i. A national advisory committee comprised of scientists, environmental NGOs, developers and recreational users as well as federal, tribal, state and local governments should be created to establish the criteria based on science and social need. The sponsors of this advisory committee should be the Department of the Interior, Department of Energy, and Department of Agriculture. These criteria are then used by the BLM to create the map.
 - ii. The IOGCC serves as the sponsor group for the map, incorporating a national advisory committee comprised of scientists, environmental NGOs, developers, and recreational users as well as federal, tribal, state and local governments to inform the scientific criteria.
 - iii. A cross-departmental effort (per the “Policy” subcommittee’s recommendation for other products) is the sponsor group for the map; the map concept is added to the committee’s suggested work-slate for this inter-department piece of effort and utilizes a national advisory committee comprised of scientists, environmental NGOs, developers and recreational users as well as federal, tribal, state and local governments to establish the criteria based on science and social need.
- 3) Research Focus:
- a) This Environmental subcommittee just needs to verify that the Research Focus subcommittee considered the following environmental research focus input highlighted

during the feedback session on September 12th: produced water and reuse, air quality and climate, all environmental aspects of oil shale, and surface disturbance (including reclamation).

4) Process:

- a) During RPSEA solicitation process, research proposals should be encouraged to address linkages to pertinent environmental best practices in areas such as produced water and reuse, air quality and climate, and surface disturbance (including reclamation); how the proposals cover these linkages should be considered in the evaluation process.

Attachment 3e

Executive Summary and Policy Issues

SUMMARY AND POLICY ISSUE STATEMENTS

As an advisory committee, the URTAC's focus is on commenting on the Section 999 On-Shore 2009 Annual Plan. Nevertheless, numerous outside influences are evident which could adversely impact domestic oil and gas production which should be identified here with the hope that they can be addressed elsewhere or by the Department of Energy in carrying out their elements of the Section 999 program.

NATIONAL PETROLEUM RESOURCE RECOVERY GOAL/OBJECTIVE:

Oil and gas will continue to provide a significant amount of energy to the United States during the next 20 years, even if significant efforts are undertaken to increase alternative and renewable resources. Therefore, every effort should be made to ensure that petroleum resources are developed to the maximum extent possible. A national goal of recovering an additional 30% of the existing reserves is achievable and warranted.

RECOGNIZING THE IMPORTANCE OF THE DOE OIL AND GAS PROGRAMS:

The Federal Government oil and gas Research, Development and Technology Transfer programs are extremely important to maximizing domestic production for many reasons: (1) Federal programs serve to develop and transfer technologies that are not proprietary and thus are available to all producers, both large and small; and (2) as a major landowner and tax recipient, the government should actively manage its minerals and revenue streams; participating in Research and Development (R&D) and ensuring the effectiveness of Technology Transfer (TT) mechanisms is an important manner to fulfill this responsibility and to be effective steward.

NEED FOR MULTI-DEPARTMENT STUDY ON IMPORTANCE OF DOMESTIC PETROLEUM SUPPLIES:

Domestic oil and gas production are major sources of energy supply to the United States with national strategic importance. With the now popular focus on renewable energy sources, petroleum supplies are often overlooked and discounted as easily being easily replaced; nothing could be farther from the truth. Considerable information is available from many sources both from within the Federal Government and the private sector on the state of the domestic oil & gas industry and its importance as an energy supplier during the next 20 years. However, there is

no mechanism to gather this information into a unified report that would have credible standing in the eyes of the public and in Washington DC. The Committee believes that a multi-department study (Energy, Commerce, and Interior) to bring together existing information and to assess the capabilities of the industry to meet the nation's energy needs is warranted. (A similar study done in the early 1990's to evaluate the lifting of the Alaskan North Slope Export Ban provided valuable unbiased input to the Congress that ultimately led to the lifting of the ban.) Such a study could also be tasked to assess the impediments to resource development and the effects of changes in tax treatments.

NEED FOR DEPARTMENT OF ENERGY TO BE ACTIVELY INVOLVED IN LOCAL ENERGY RESOURCE ISSUES:

Many states are taking action to impose legislation and regulations that could adversely impact the ability to develop oil and gas natural resources. In most cases, the preservation of access to reserves is not a concern. For example, California has passed AB-32 to legislate implementation of green house gas reduction regulations; although the petroleum industry has been given the opportunity to comment, the objectives do not address the national strategic importance of continuing domestic energy production. Furthermore, states are developing local regulatory frameworks for the development of unconventional resources that conflict with what has been developed elsewhere. This adversely impacts the ultimate recovery of valuable oil and gas resources. The Federal Government needs to be more active involved as an advocate of domestic oil and gas production. This could be accomplished by the Department of Energy through their own outreach efforts or through entities such as the Interstate Oil and Gas Compact Commission (IOGCC). Failure to take action could result in the loss of access to reserves and production capability, off-setting any benefit provided by R&D and Technology Transfer efforts.

ELEMENTS TO BE CONSIDERED IN OTHER SECTIONS OF REPORT:

Environmental: The Committee felt that the term "no-go" should not be used. Furthermore, this topic should be contained within the Environmental section of the report, with a summary contained in the Executive Summary section.

Environmental: Normally, production has a negligible and easily mitigated impact on the environment. The drilling and development phase early in the life of any field has a more visible impact, but lasts only for a short time. All too often, the impact of oil and gas projects are judged solely on the highly visible early phase development, without taking the overall life cycle into account. As a result, many projects are defeated on the local and/or state level, resulting in loss of potentially valuable reserves.

Environmental: (Lead-in to overlay zone topic): There are significant impediments to oil and gas operations, many of which do not take into account the importance of environmentally responsible resource development.

SUMMARY OF MAIN TOPIC AREAS (To Be Inserted at Houston Meeting):

Research Focus:

Technology Transfer:

Environment:

Near Term Issues:

Attachment 4a

**RECOMMENDATIONS OF THE
RESEARCH FOCUS SUBCOMMITTEE
OF URTAC**

October 2008

Research Focus Subcommittee Members

Mr. Scott Anderson, Dr. Nancy J Brown, Dr. Jeffrey T Cline, Mr. James P Dwyer, Mr. Bob Hardage, Mr. Fred C. Julander, Dr. Raymond A. Levey, Dr. Shahab D. Mohaghegh, Mr. Don Sparks, Dr. Berry (Nick) H. Tew

The development of oil and gas from fractured shales is continuing to expand rapidly. However, the optimum drilling, stimulation/restimulation and completion techniques, along with real time data evaluation, need development to optimize hydrocarbon extraction from shales. Some shales are difficult to effectively fracture. And, for most the management of fracturing water is very costly or may even inhibit wellbore completion.

Coal gas development is also continuing to expand rapidly. However, unlike other hydrocarbon sources, gas from soft coals can have a significant biogenic component and therefore the potential exists for “regeneration” of additional gas during the producing life of a field. Produced water management still remains a key issue in the development of coal gas.

The Committee reviewed the recommendations provided by the previous URTAC regarding other petroleum resources that may have a significant future benefit to the U. S. domestic energy supply and, in general, concur with those recommendations. Studies identify the potential for over 75 billion barrels of oil resources from heavy oil and tar sands that could be produced with minimal surface impact.

Heavy and unconventional oil resources might be developed sooner than shale oil because the deposits are shallow and production methods are not as technologically challenging. Recent announcements by small Independents regarding both heavy oil and fractured shale oil ventures support this premise. Accelerated and sustainable development of these resources is in the U.S. national interest.

With development of these unconventional resources, there will likely be potential for significant emissions and a need for research into improved technologies for capture or reduction of these emissions.

Finding

The Committee finds that in order to be comprehensive, the following research related to shale gas and oil, coal gas, heavy oil and unconventional oil and environmental issues needs to be added or modified within the Draft Annual Plan. The following recommendations speak to this finding:

Recommendations

The Committee recommends the following additions and/or modifications to pages 46 and 47 of the 2009 Draft Annual Plan.

- a. Exploration Geosciences as Applied to Exploration, Drilling/Stimulation/Restimulation
 - i. Develop surface-based and borehole-based technologies that:
 - Identify drilling sweet spots
 - Map fracture attributes (orientation, intensity, openness, and type of fluid)
 - Optimize the position and orientation of vertical and horizontal well bores
 - Determine stress fields

- Improve the design and implementation of hydraulic fracs
- b. Basin Analysis and Real Time Resource Exploitation:
- i. Characterize geological, geochemical, geophysical, and operational parameters that differentiate high-performing areas or fields
 - ii. Develop and demonstrate techniques to analyze large volumes of data in real time for application during unconventional resource development
 - iii. Develop real-time simulation and modeling of reservoirs
- c. Stimulation and Completion – Develop and Demonstrate:
- i. Stimulation methods that require less water and other fluids to be injected into the subsurface
 - ii. Stimulation methods that result in a lower volume of treatment fluids produced to the surface
 - iii. Approaches for improved treatment, handling, re-use, and disposal of fluids produced and/or used in field operations
 - iv. Improved fracturing and stimulation techniques in various gas and oil shales
- d. Water Management - Develop and Demonstrate:
- i. Methods for the treatment of produced water at intermediate and high TDS and initial fracturing fluids for use during drilling, completion, stimulation, and production operations, in order to minimize the impact on natural water resources
 - ii. Techniques to minimize the volume of water produced to the surface
- e. Environmental – Develop and Demonstrate:
- i. Methods for planning and site selection that minimize the surface footprint and impact of drilling and production operations
 - ii. Best practices to be applied during exploration, drilling and production (move to Tech Transfer?)
 - iii. Surface mitigation methods applicable to all environments
 - iv. A land-use map with a uniform set of criteria for identifying federal land of high conservation value (move to Policy).
 - v. Technologies to recycle water associated with E&P
 - vi. Technologies for detection and capture of emissions and losses in unconventional oil and gas E&P operations.
 - vii. Research that assesses environmental impact and viability of oil shale production.
- f. The following needs to be considered in conducting early-stage research on novel concepts that may be applied to the development of unconventional gas resources.
- a. Enhance coal gas production over time
 - i. Develop biological, reservoir engineering / hydrological methods.
2. Other Petroleum Resources need to be included in the Annual Plans (heavy oil, tar sands, tight oil sands and oil shales)

Attachment 4b

Technology Transfer

The only way you can measure the benefits of an R&D Program is if you have transferred the technology. The mechanism of the technology transfer for this Program must be well defined, implemented early in the Program, and used often to leverage the benefit of the investment in this program.

Finding:

The Committee recognizes actions taken by DOE, NETL and RPSEA in implementing prior Committee recommendations demonstrate a very comprehensive response, through both the Consortium and Complementary Programs, to the need to develop a robust technology transfer program and knowledge management system.

It's not enough to have a robust knowledge management system. We are concerned about the effectiveness of any knowledge management or technology transfer system which is adopted. It is also considered imperative that technology is effectively transferred to all producers (especially small producers).

Recommendation 1:

The plan should be refined to specifically outline the steps necessary to communicate the results of the research and technologies developed to the industry. The plan should include specifics about:

- Communication to industry of the very existence of a Knowledge Management system.
- Access protocol to support recommended metrics
- Implementing supply chain improvements to reduce the technical costs for small producers.
- Organize the communication plan such that it has the widest possible dissemination yet leverages the networking ability around basins.

Recommendation 2:

The knowledge management system should be linked to other existing knowledge management resources as soon as possible to include Small Producers, Deepwater and others managed by DOE. The databases should have a similar taxonomy look and feel.

Recommendation 3:

As part of the above recommendations it was determined that a portion of every research project was to be dedicated to knowledge management and technology transfer. It was not the intent of the Advisory committee's recommendation that each individual project to undertake it's own knowledge management effort. This spend should be consolidated into the existing knowledge management and technology system. Furthermore the knowledge management and technology transfer funds from the other programs should also be consolidated.

The Committee recommends that when awards are made, RPSEA make clear that researchers know the expectations for their contribution. (EDIT OFFLINE)

Recommendation 4:

Utilize the latest and most appropriate-to-task communication technologies to introduce the Knowledge Management System. Using electronic resources such as web based seminars and computer based education systems that are proven cost effective systems to deliver or push information to the communities that can best benefit. EDITING COMMITTEE TO WORK ON NOTION OF FORMALIZING PROCESS SPECIFICS

Recommendation 5:

Now that a knowledge management has been developed, metrics will be needed to communicate successes. The program should consider those below:

- Knowledge Management Entries
- Readership or subscription trends and totals
- Multiple user or access trends and totals
- Transfer successes, case studies, and testimonials
- Peer review functionality

Recommendation 6:

The program should leverage organizations & conferences to introduce the knowledge management systems. The program should focus on early knowledge application or transfer successes, communicating these successes through the system itself as well as organizations, industry publications and conferences. The database can not replace the effectiveness of regionally focused workshops organized through local producer and small producer organizations and must be worked in tandem.

Attachment 4c

New Subcommittee name - Near Term Impacts

Finding:

An emphasis needs to be placed on building credibility, demonstrating value and enhancing projects through feedback. Exposing early results will provide an opportunity for feedback to both current projects and stimulate ideas for further research.

Recommendation 1:

An emphasis needs to be placed on evaluating funded projects to document “early success” and those developments need to be rolled out to the industry as soon as possible (prior to completion of the research) to encourage industry support. This will also allow for early tests of the technology transfer process and identify area for improvement.

Recommendation 2:

Encourage researchers to be knowledgeable of prior or on going research within the industry, academia and national labs. This includes placing emphasis on solicitations which leverages technologies developed by other industries.

Recommendation 3:

The plan needs to ensure, that along with long term research, some short term projects with potential for early application are emphasized.

Attachment 4d

URTAC Environmental Subcommittee 2009 Plan Draft Suggestions

October, 2008

THE ENVIRONMENTAL SUBCOMMITTEE RECOMMENDS THAT THE ENVIRONMENTAL INPUT TO THE 2009 PLAN RECOMMENDATIONS BE ADDED TO THE FOLLOWING PARTS OF THE REPORT INSTEAD OF INCORPORATING A SEPARATE ENVIRONMENTAL SECTION: 1) EXECUTIVE SUMMARY, 2) POLICY, 3) RESEARCH FOCUS, AND 4) PROCESS. BELOW ARE THE SUGGESTED CONCEPTS FOR EACH SECTION.

Recommendations:

5) Executive Summary:

This committee believes that environmental responsibility and resource development are important objectives that can be achieved together and must be addressed together; environmental responsibility is a fundamental aspect of resource development.

6) Policy:

Access to oil and gas resources is at times impeded by land use issues. We need to develop and implement technology in an environmentally benign way. DOE needs to work to balance these two concerns. This could be a national security issue. The Committee recommends that the DOE should work with various parties including industry, NGOs, state regulators, other federal agencies and others to explore mechanisms to resolve these conflicts.

**FOLLOWING TO BE REWORKED INTO APPENDIX; UP/DOWN VOTE ON OCT 23.
MINORITY OPINION POSSIBLE.**

- e) During the next several years, the services provided by our Nation's public lands will continue to see an unprecedented rise due to increased demands for energy development, national security (DoD expansions) infrastructure related needs (including transition lines and roads), energy security, recreation, agriculture (forestry and ranching) , endangered species protection, and other ecological and cultural needs (e.g.

water and historic preservation). The mandate of the BLM--to manage the public lands for multiple use, while protecting the long-term health of the land—is tough to manage and the BLM is stressed and no longer able to sustain itself under its current structure. More and more users want an answer to the question of “where” they can go to conduct the uses they seek. Answering this question requires a reasoned and scientific approach with participation of the users and federal, tribal, state and local governments, to determine the highest and best use of these lands. Conservation of scarce or sensitive biological resources must occur in conjunction with land-use activities that meet the social and economic needs of people.

- f) Currently, there are several conservation mapping activities being created to address various issues, including wetlands, migration corridors, etc. However, there is not a unified process to address federal lands of high conservation value, nor are there agreed to criteria for these lands; there also is no landscape view to ensure an informed, holistic perspective. The multiple use agencies (USFS and BLM) should have access to a unified map clearly delineating areas of energy development activities, areas of high conservation value lands (limited access or avoidance), and areas of other activities. Criteria should be based on science and social need—reflecting consequences and trade-offs--with the input of users, and include federal, state, tribal and local governments. This map will provide a landscape view, enabling a more comprehensive understanding for decision-makers.
- g) Once constructed, the map should be leveraged to drive efficiency into widespread multiple land use decision processes. The map should also be updated on a periodic basis. The map criteria validity should be reviewed every two years and updated based on that review.
- h) To construct the map, there should be a sponsor group and a national advisory committee comprised of knowledgeable representation from the various viewpoints that can engage in a scientifically credible process. The Environmental subcommittee proposes the following alternatives for the sponsor group and national advisory committee to the full URTAC to debate in order to put forth a recommendation:
 - i. A national advisory committee comprised of scientists, environmental NGOs, developers and recreational users as well as federal, tribal, state and local governments should be created to establish the criteria based on science and social need. The sponsors of this advisory committee should be the Department of the Interior, Department of Energy, and Department of Agriculture. These criteria are then used by the BLM to create the map.
 - ii. The IOGCC serves as the sponsor group for the map, incorporating a national advisory committee comprised of scientists, environmental NGOs, developers, and recreational users as well as federal, tribal, state and local governments to inform the scientific criteria.
 - iii. A cross-departmental effort (per the “Policy” subcommittee’s recommendation for other products) is the sponsor group for the map; the map concept is added to the committee’s suggested work-slate for this inter-department piece of effort and utilizes a national advisory committee comprised of scientists, environmental NGOs, developers and recreational users as well as federal, tribal, state and

local governments to establish the criteria based on science and social need. **END**
OF POLICY APPENDIX

Near Term Impacts:

- a) During RPSEA solicitation process, the research proposals should identify technologies, methods or applications to minimize environmental impact in areas such as produced water and reuse, air quality and climate, and surface disturbance (including reclamation); how well the proposals cover this should be considered in the evaluation process.
EDITING TO COME

Attachment 4e

Executive Summary and Policy Issues

NATIONAL PETROLEUM RESOURCE RECOVERY GOAL/OBJECTIVE:

Oil and gas will continue to provide a significant amount of energy to the United States during the next 20 years, even if significant efforts are undertaken to increase alternative and renewable resources. Therefore, every effort should be made to ensure that petroleum resources are developed to the maximum extent possible. A national goal of recovering an additional 30% of the existing reserves is achievable and warranted.

RECOGNIZING THE IMPORTANCE OF THE DOE OIL AND GAS PROGRAMS:

The Federal Government oil and gas Research, Development and Technology Transfer programs are extremely important to maximizing domestic production for many reasons: (1) Federal programs serve to develop and transfer technologies that are not proprietary and thus are available to all producers, both large and small; and (2) as a major landowner and tax recipient, the government should actively manage its minerals and revenue streams; participating in Research and Development (R&D) and ensuring the effectiveness of Technology Transfer (TT) mechanisms is an important manner to fulfill this responsibility and to be an effective steward.

POLICY ISSUE STATEMENTS

POLICY

As an advisory committee, the URTAC's focus is on commenting on the **Section 999 On-Shore** 2009 Draft Annual Plan. Nevertheless, numerous outside influences are evident which could adversely impact domestic oil and gas production which should be identified here with the hope that they can be addressed elsewhere or by the Department of Energy in carrying out their elements of the Section 999 program.

POLICY

NEED FOR MULTI-DEPARTMENT STUDY ON IMPORTANCE OF DOMESTIC PETROLEUM SUPPLIES:

Domestic oil and gas production are major sources of energy supply to the United States with national strategic importance. With the now popular focus on renewable energy sources, petroleum supplies are often overlooked and discounted as being easily replaced; nothing could be farther from the truth. Considerable information is available from many sources both from within the Federal Government and the private sector on the state of the domestic oil & gas industry and its importance as an energy supplier during the next 20 years. There needs to be a balance. However, there is no mechanism to gather this information into a unified report that

would have credible standing in the eyes of the public and in Washington DC. The Committee recommends that a multi-department study (e.g., Energy, Commerce, and Interior) to bring together existing information and to assess the potential of the oil and gas industry to meet the nation's energy needs under less restrictive scenarios, is warranted, so that oil and gas can make its contribution. Such a study could also be tasked to assess the impediments to resource development and the effects of changes in tax treatments. **EDITING COMMITTEE TO REVISE**

POLICY

NEED FOR DEPARTMENT OF ENERGY TO BE ACTIVELY INVOLVED IN LOCAL ENERGY RESOURCE ISSUES:

Many states are taking action to impose legislation and regulations that could adversely impact the ability to develop oil and gas natural resources. In most cases, the preservation of access to reserves is not a concern. For example, California has passed AB-32 to legislate implementation of green house gas reduction regulations; although the petroleum industry has been given the opportunity to comment, the objectives do not address the national strategic importance of continuing domestic energy production. Furthermore, states are developing local regulatory frameworks for the development of unconventional resources that conflict with what has been developed elsewhere. This adversely impacts the ultimate recovery of valuable oil and gas resources. The Federal Government needs to be more active involved as an advocate of domestic oil and gas production. This could be accomplished by the Department of Energy through their own outreach efforts or through entities such as the Interstate Oil and Gas Compact Commission (IOGCC). Failure to take action could result in the loss of access to reserves and production capability, off-setting any benefit provided by R&D and Technology Transfer efforts.

ENVIRONMENTAL POLICY BULLET HERE

POLICY BULLET

Normally, production has a negligible and easily mitigated impact on the environment. The drilling and development phase early in the life of any field has a more visible impact, but lasts only for a short time. All too often, the impact of oil and gas projects are judged solely on the highly visible early phase development, without taking the overall life cycle into account. As a result, many projects are defeated on the local and/or state level, resulting in loss of potentially valuable reserves.


SUMMARY OF MAIN TOPIC AREAS:

Research Focus:

Technology Transfer:

Near Term Issues:

Attachment 5



**Unconventional Resources
Technology Advisory Committee**

October 16, 2008

Elena Melchert
Office of Oil and Natural Gas
Committee Manager



**Unconventional Resources Technology
Advisory Committee**

- **8th Meeting of the UDAC**
- **October 23, 2008, 1 pm – 3 pm EDT**
 - Conference Call/WebEx
 - Participation Instructions
- **Draft Agenda**
 - Vote: final Committee Report of Recommendations
 - Committee Calendar: Nov. 2008 – Aug. 2010