Ultra-Deepwater Advisory Committee

July 24, 2007

I hereby certify that this transcript constitutes an accurate record of the Ultra Deepwater Advisory Committee meeting held on June 21, 2007 at the Crystal City Marriott at Reagan National Airport, Arlington, VA.

Phillip J. Grossweiler, Chair
Ultra-Deepwater Advisory Committee

24 JULY 2007
(Date)

Ultra-Deepwater Advisory Committee

Minutes of Meeting of June 21, 2007
Crystal City Marriott, Arlington, VA

Executive Session

Bill Hochheiser, the Committee Management Officer (CMO), welcomed the Ultra-Deepwater Advisory Committee (hereafter referred to as the Committee) at 8:35 a.m. on June 21, 2007. Bill noted that he shared the CMO responsibilities with Elena Melchert but, although she was not able to attend the meeting, she sent her regards to the Committee members. The Agenda for the meeting and Committee Member Sign-in sheet are provided as Appendix 1 and Appendix 2, respectively.

After appointment and administration of Oath of Office for special Government employees, the Committee was briefed on conflict of interest statutes and the regulations related to ethical conduct for executive branch employees, specifically, special Government employee (SGE) participation in Advisory Committee activities. Tina Hymer of the Department of Energy, Office of the General Council provided the briefing to the group. The legal briefing concluded at 8:50 a.m.

[Ms. Hymer's talking points are in Appendix 3.]

Welcome & Introductions

Bill Hochheiser then introduced Deputy Assistant Secretary, James Slutz, the Committee Designated Federal Officer (DFO), who convened the meeting at 9:00 a.m.

[See Appendix 4 for Mr. Slutz's slide presentation.]

Mr. Slutz's comments set the stage for the Committee's duties as mandated by the Energy Policy Act of 2005 (EPAct). The legislation specifically required that the Committee review and develop recommendations on the Ultra-Deepwater Sections of the Draft Annual Plan (hereafter referred to as the Plan) for the Ultra-Deepwater and Unconventional Resources Technology Research Program as advice to the Secretary of Energy in his development of the final Annual Plan.

Mr. Slutz then explained the urgency associated with the Committee's responsibilities, and the requirement for adherence to a very tight time schedule. Specifically, the Committee must complete its comments and recommendations on the Plan by the conclusion of the second meeting, scheduled for July 24, 2007 in Houston, Texas. He recognized the formidability of accomplishing this task in such a short period of time, and, accordingly, he thanked the members in advance for the dedication and hard work that is going to be required on their part to achieve this goal.

He stated that the purpose of the meeting was to establish a course of action that will ultimately lead to the production of the Committee's comments and recommendations

on the Plan. Each member must review the Plan and compile findings and recommendations, and the group must produce a final document encompassing all member's views. A consensus of opinion is desired but not required. Minority viewpoints will be accommodated. It is the responsibility of the DOE to take appropriate action on the Committee's recommendations, and strong weight will be given to the Committee's considered opinions in light of the fact that the Committee represents a unique group of experienced and distinguished experts in oil and natural gas resources and pertinent related areas of interest.

The Committee was urged to be mindful of the fact that the Plan must be viewed in the context of a 10 year timeframe, although many of the specific project areas identified in the current Plan will apply only in the coming year or two. The EPAct requires Advisory Committee review of each year's progress and Annual Plan, therefore this review is not a one-time effort but rather an ongoing responsibility. Also, the Committee is instructed to distinguish the two major, and significantly different, elements of the Plan: the consortium administered plan, and the NETL complementary research plan. There is to be no duplication of effort.

Some general guidance was also provided to the Committee: focus on the big picture, do not attempt to rewrite the Plan but rather advise on its strengths and weaknesses; consensus is good but not required.

The agenda for the meeting had been carefully structured to maximize the efficient use of time. He explained that the morning would be dedicated to reviewing the background of EPAct Section 999, and to review the details of the Plan. Then, the afternoon would be dedicated to a facilitated discussion designed to seek out the views and opinions of the Committee members and to identify strengths and weaknesses of the Plan. Mr. Slutz explained that the expected deliverable from the afternoon session should be an action plan for achieving the ultimate goal of developing the final Committee recommendations. He reminded the Committee that their comments and final recommendations to be approved at the end of the next meeting are specifically required by the EPAct, and will be published in the Federal Register with the Annual Plan.

The Committee was also asked to address some strategic questions about the Plan including:

- Does the Plan as a whole represent the best approach for utilizing the R&D funds available?
- Are the Plan's goals and objectives appropriate? Specifically, do they comply with the intent of EPAct 2005, Section 999? Are they achievable yet challenging? Do the annual activities work toward long-term goals?
- Are the proposed R&D themes appropriate? Are they within the constraints of the expected budget? Is there sufficient flexibility in the Plan?
- Is the solicitation process appropriate? Is it fair, competitive, and transparent?

The introductory comments and discussion concluded at 9:40 a.m. Brad Tomer, Director, Strategic Center for Natural Gas and Oil, with DOE's National Energy Technology Laboratory (NETL) was introduced for the next presentation.

Overview of Draft Annual Plan

[See Appendix 5 for Mr. Tomer's slide presentation.]

An overview of the NETL organization was presented, highlighting the structure and reporting lines within the DOE followed by a summary of its scope of responsibilities, employees, and operating locations. A brief history of the Strategic Center for Natural Gas and Oil was reviewed noting that its focus was on supporting the oil and gas industry featuring a collaborative approach involving cost shared partners with industry, other federal agencies, national labs, and universities. This very successful program has generated significant benefits to the nation's economy, environment, and national security.

The provisions of EPAct and its broad oil and gas implications were presented, including the three major elements of:

- Funding for the traditional oil and gas program as stipulated in Section 865;
- Providing funds to the Methane Hydrate program under Section 968; and
- Subtitle J, Section 999 which deals with Ultra-Deepwater (UDW) and Unconventional Natural Gas and Other Petroleum Resources

Section 999 provides for annual funding of $50 million for a period of 10 years through the Ultra-Deepwater and Unconventional Natural Gas and Other Petroleum Research Fund (Fund), and directs two major activities:

1. a consortium managed research, development, demonstration, and commercialization program associated with UDW, unconventional resources, and small producers; and
2. an NETL-managed complementary oil and gas research program

Major current activities within NETL were reviewed, which included the Stripper Well Consortium and Resource Assessment Programs directed by NETL for the benefit of stripper well producers. Specific NETL achievements presented included novel developments in drilling completion and stimulation operations, enhanced oil recovery programs, and advanced geological diagnostics and imaging systems. Other programs presented included: the Deep Trek program, Microhole Technologies Program, the Oil & Gas Environmental Program, and the Methane Hydrate Program.

Mr. Tomer then shifted to the provisions to Section 999 regarding the award of a competitive contract to a qualified program consortium, and the mandated distributions from the Fund.

In January 2007, NETL awarded the contract to the Research Partnership to Secure Energy for America (RPSEA). Accordingly, RPSEA will carry out research pursuant to

the Secretary's Annual Plan. It will issue research project solicitations, propose project awards to NETL, and disburse research funds to the project performers. Ultimately, however, the Secretary of Energy is accountable for the overall execution of the Annual Plan.

The RPSEA Plan was submitted to NETL in April 2007. This Plan was based on inputs from numerous sources featuring RPSEA-coordinated member forums and numerous meetings with NETL.

NETL finalized the Plan incorporating RPSEA's recommendations, established priorities, and integrated NETL's complementary plan. The Plan was submitted to the DOE in May 2007, and distributed to the Committee on June 12, 2007.

Next, Mr. Tomer presented the NETL complementary R&D program. The NETL program will concentrate on unique high-value, non-duplicative work within the scope of EPAct Section 999. The broad focus will be on long-term fundamental research applicable to oil and gas, featuring sound environmental principles. The specific technical areas under consideration include drilling under extreme conditions, the broad environmental impacts of oil and gas development, enhanced and unconventional oil recovery, and resource and technology assessments. As with all NETL programs this too is subject to annual merit review by an independent technical advisory group.

NETL will also provide planning and analysis support for the Section 999 program including coordination of benefits and impact analysis of the programs. Ultimately, NETL will finalize a methodology for determining the value of domestically produced gas/oil and royalty collections and other benefits based on these EPAct-driven investments.

The presentation concluded at 10:30 with a break in the proceedings, and reconvened at 10:45 a.m.

RPSEA Ultra-Deep Water Plan

Mr. Slutz introduced Mike Ming, RPSEA president, who presented an overview of the RPSEA organization and the scope of its activities. After this introduction, Mr. Slutz, the DFO, announced that he was called away from the meeting on business and that Bill Hochheiser would act on his behalf as the Designated Federal Officer until his return.

[See Appendix 6 for Mr. Ming's slide presentation.]

The presentation began with a brief review of RPSEA's structure. RPSEA is a 501(C)(3), nonprofit organization having been competitively selected by the DOE as the Section 999 Consortium Manager. RPSEA is currently made up of 108 members, and growing. Its members include oil and gas producers, service companies, leading universities involved in oil and gas exploration and production, associations, and local and state governmental representatives.

RPSEA is structured in line with the financing structure mandated in Section 999. The key groups include the offshore and onshore groups with small producers being a

subset of the onshore group. Additionally, there are support groups that encompass the administrative functions and overall guidance is given through the President's office who answers to the Board of Directors. The Board is made up of representatives from private industry, leading universities, trade associations, non-profit research organizations and Native American organizations.

RPSEA has internal committees to manage mid-term and longer-term R&D program management. RPSEA's Strategic Advisory Committee is at the Board and president level, while the next level, the Onshore and Offshore RPSEA operating divisions each have Technical and Program Advisory Committees. Finally, there is an environmental advisory group that advises both the onshore and offshore divisions.

The RPSEA is structured to accommodate the advice of a broad range of members and subject matter experts. Much of the planning work in RPSEA is derived from the direct input of their members through numerous forums that are conducted to openly discuss issues and fruitful areas for RPSEA endeavors. Since October 2006, 12 forums have been conducted, each one being hosted by a university and focused on specific promising areas for R&D consideration.

Subjects for the forums included diverse areas such as wellbore integrity and environmental topics, seismic E&P, autonomous intervention for deepwater operations, tight gas, shale gas, CBM, problem identification, produced water, small producers, vortex induced vibrations, flow assurance, unconventional plays, research needs for Appalachian basin small producers, and seafloor engineering.

The Plan submitted to NETL was unanimously adopted by the RPSEA board and reflects inputs from several hundred experts that participated in various RPSEA activities involving RPSEA Advisory Committees, member forums, DOE road mapping workshops, and ongoing and frequent NETL consultations.

The general attributes of the Plan focus on three broad overarching areas of emphasis including: enhancing themes, enabling/cross cutting themes and science themes. But the Plan also recognizes future "grand challenge" opportunities that may offer groundbreaking, innovative technologies, and procedures have been developed to continually prioritize and rebalance the Plan's objectives as needed.

The Draft Annual Plan has a 10 year planning horizon, and the annually updated draft will be the primary tool used to communicate the reassessed strategic program direction in the near-term.

The RPSEA Plan has eight major exploration- and production-related themes, including four UDW field types, three unconventional onshore resource types, and one small producer challenge area. Each major theme is further detailed with component themes within its scope of operation.

The general objectives of the Plan outline the need for leverage on funding, personnel, equipment operations, and other resources with emphasis on integrated approach across all activities. RPSEA believes that research should be cumulative to mitigate risk and build upon itself. They plan a short- to mid-term timescale while carefully

coordinating with the NETL program to avoid duplication. They will emphasize constant assessment of industry initiatives to avoid duplication and to focus on those projects that industry cannot or should not address. RPSEA also intends to avoid awarding many small scale projects which tend to dilute the potential for high impact results.

At 11:10 a.m., Mr. Ming introduced Chris Haver, RPSEA's Ultra-Deepwater (UDW) Manager previously associated with Chevron's *DeepStar* Program.

[See Appendix 7 for Mr. Haver's slide presentation.]

Mr. Ming explained that *DeepStar* has been subcontracted by RPSEA to manage all aspects of its UDW Program. *DeepStar* was formed as a collaborative industry-led forum in 1992 to: enhance existing deepwater technologies; develop new enabling deepwater technologies; gain the acceptance of deepwater technologies by regulators and industry; and provide a forum and a process for discussion, guidance, and feedback with contractors, vendors, operators, regulators, and academia.

RPSEA activities are focused consistent with the terms of the EPAct which stipulates that awards from allocations under section 999(H)(d)(1) shall focus on the development and demonstration of individual exploration and production technologies as well as integrated systems technologies including new architectures for production in UDW.

Mr. Haver reviewed the definition of the terms "deepwater" and "ultra-deepwater" as provided in the EPAct, and presented the technology focus of the UDW program. He explained that the overarching goals of the UDW were established based on recent studies by the Department of Interior – Minerals Management Services (MMS).

The Plan presented by RPSEA was based on a comprehensive outreach program involving various industry and academia group meetings.

To organize the management process of this complicated subject matter and to ensure effective utilization of the over 700 volunteer subject matter experts from industry, academia, and government, RPSEA established a number of Technical Advisory Committees, broken down into nine key activities: Regulatory, Subsea systems, Drilling and Completions, Meteorological – Ocean, Flow Assurance, Floating Systems, Reservoir Engineering, Systems Engineering, and Geosciences.

In turn, these RPSEA Technical Advisory Committees were coordinated through a high level RPSEA Program Advisory Committee. Each RPSEA Committee met from two to four times during the development of the Plan.

Also during these meetings it was recommended that the scope of activity concentrate on the Gulf of Mexico.

A detailed set of themes was developed and reviewed with the RPSEA Advisory Committee to define the bounds of the Plan. In total, the RPSEA Technical Advisory Committees developed a list of approximately $200 million worth of projects, and the RPSEA Program Advisory Committee is in its final stages of paring down that list to

match the available funds for the next 2 years amounting to approximately $40–$45 million dollars.

Following the RPSEA presentation the floor was opened for questions and comments at 11:35 a.m.

Discussion

1. Some Committee members questioned the potential for fast tracking promising new discoveries to the production phase suggesting that specific objectives in this area should be established. This comment was in followup to an earlier point that had been made regarding the six to nine years delay after resource discovery to commence production.

2. Several members sought clarification on the process for recommending R&D project awards and specifically what criteria would be used. In response, RPSEA indicated that a systematic process had been developed that involved assessing program alignment with RPSEA objectives considering the fundamental objectives of science, enabling and enhancing technology themes. Ultimately, the RPSEA Program Advisory Committee would recommend award subject to NETL approval. Additionally, consideration would be given to possible duplicative effort with other projects and other ongoing industry programs at the time. Currently, RPSEA is in the process of evaluating a total of over $200 million of potential R&D projects with the objective of identifying approximately $40 to $45 million for award within the next year out of 2007 and 2008 available funds. Also RPSEA has adopted contingency plans in the event of changing priorities/circumstances.

3. The scope of the Committee's role in evaluating the process details was questioned and Jim Slutz indicated that the law prohibits the Committee from making "recommendations on funding awards to particular consortia or other entities, or for specific projects". However, the Committee is entitled to make recommendations to the Secretary on the merits of R&D topics, themes or programs. The proper communications channel is the annual plan review. It was also reiterated that the Committee should, as a first priority, make recommendations regarding the process of managing the R&D program.

4. In response to questions about how many R&D projects actually culminate to the implementation phase, RPSEA responded that based on DeepStar experience, a large percentage of their innovations get to the implementation phase. The most recent example involved the utilization of synthetic mooring line for platform mooring instead of the metal chains. This led to a significant reduction in weight and improved efficiencies. Other examples included vortex induced vibration controllers and new hydrate inhibitors.

5. When asked for an example of a possible “grand challenge” R&D opportunity, RPSEA responded that a good theoretical example might be the development of new groundbreaking technologies to lead to cost effective techniques for drilling up to 20 miles in a horizontal orientation.

At 11:45 a.m. Bill Hochheiser brought the discussion to a close, and, then, introduced himself as the next speaker.

Overview of Section 999D

[See Appendix 8 for Mr. Hochheiser's slide presentation.]

Bill Hochheiser outlined the Committee Section 999 obligations which set the stage for the afternoon session and reviewed the statutory obligations of the Committee as legislated in Section 999.

Mr. Hochheiser noted that the Committee membership was carefully designed to achieve the goals of the program. It is comprised of representatives from many diverse activities associated with the oil and gas exploration and production industry to represent various points of view, such as:

- Individuals with extensive research experience or offshore operational knowledge; and
- Individuals broadly representative of affected interests in ultra-deepwater oil and gas, including environmental and safety;

He noted that: prohibited from participating were federal employees, RPSEA officers, and RPSEA Board members; aside from special Governmental employees, each member is expected to represent his or her particular interests in a biased manner; special Government employees have special requirements to recuse themselves from any discussion that will impact their personal finances; the Committee is prohibited against any involvement at the project level, and that the Committee should focus on higher level management process procedures, not specific projects or proposals.

Jim Slutz returned at 11:57 a.m. and resumed the Designated Federal Officer responsibilities.

Bill Hochheiser repeated Jim Slutz's earlier comments that July 24 has been set as the date for submission of the Committee's comments and recommendations, which in turn is set by the budget schedule. This requires that the annual report be released in a timely manner and published in the Federal Register as a prerequisite to having the budget's R&D funds released to allow initiation of the R&D projects.

Accordingly, it was clarified that at the next meeting in Houston, the Committee must produce a final set of written recommendations that eventually will become an appendix to the Annual Plan and will be published in the Federal Register.

The Committee broke for lunch at 12:15 p.m.

UDW Advisory Committee — Afternoon Session
Facilitated Discussions

At 1:00 p.m. Jim Slutz reconvened the meeting and announced his appointment of Phil Grossweiler to the position of Committee Chair, and Dan Seamont to the position of Committee Vice Chair.

Rich Scheer was introduced as Facilitator for the afternoon discussions. After introducing Rich, Jim Slutz excused himself from the meeting at 1:05 p.m. and announced that Bill Hochheiser would act as the Designated Federal Officer for the remainder of the meeting.

The objective of the facilitated discussions was to establish a path forward and specifically to determine how the Committee should proceed to achieve its objectives. The Committee was reminded that its primary objective is to develop comments and recommendations on the Plan for the Secretary of Energy. These recommendations are to be produced and delivered at the next Committee meeting, scheduled for July 24 in Houston. Thereafter, this group of Committee member obligations would be concluded. In 2008, and annually thereafter until 2016, the biannually appointed Committee members would be called on to review and comment on the next annual plan.

The Committee's afternoon agenda was refined to focus on: identification of areas of concern, the development of an action plan for follow-up, and an outline of areas for specific recommendations.

The following four discussion themes were designed to solicit specific, biased feedback from the Committee members:

1) General reaction to the Plan including strengths and weaknesses
2) Assessment of the program goals and the ability of the Plan to achieve the stated goals
3) Observations on the technology challenges and R&D themes presented in the Plan
4) Comments on the solicitation plans

The Committee devoted approximately two hours for discussion aimed at scoping out the reaction to the plan and identifying areas of concern, and one hour of planning how best to design a working plan for making specific recommendations to the Secretary addressing those concerns.

Most participants were complimentary of the overall Plan and felt it provided a comprehensive and balanced approach. Specific concerns and comments were discussed, and highlights of that discussion are presented below.

General reaction to the Plan including its strengths and weaknesses	• The annual plan did not address access restrictions that limit the geographies available for exploration and production. If progress could be made on access restrictions then it could have a larger impact than any R&D program in terms of bringing resources to the public. On the other hand, it was felt by some that access restrictions moratoria was not the purview of the Committee and that recommendations in this area should be avoided. Also, related to access restrictions, another area that required attention was securing approvals from the relevant authorities (local, state, and federal EPA, MMS etc.) on implementing the technologies that result from the R&D program results. These efforts should also be geographically broadened, and not just focused on the Gulf of Mexico. • Develop a risk management process to enhance the project award decision making process. • In order to expedite implementation of new technologies, consideration should be given to what incentives or exemptions might be appropriate for the government to consider. • Several of the members commented that the amount of funds available for the work plan seemed to be limited and therefore the plan needed to have strong focus to use the available funds in the most efficient manner. • The Plan would help develop the human resource base of exploration and production professionals by providing continuity for aspiring technologists. • The 2 ½ percent of funding allocated to technology transfer was judged by many not to be sufficient based on experience in other areas. Bill Hochheiser commented that a minimum of 2 ½ percent was mandated by Congress in the enabling legislation, but it has to be applied to each individual project. It was agreed that this will be one of the major follow-up activities from the discussion topics. • Managing intellectual property rights is a complex issue and was not clearly spelled out in the document and needed definition in order to allow for meaningful participation of cost sharing partners. Intellectual property rights issues could lead to leaking technology to foreign competitors thus diluting the impact of U.S. investments. • One of the more promising areas for development involved the meteorological and oceanographic R&D items because they had significant impact on all operators in the Gulf of Mexico and it was an area that lends itself well to government involvement. The focus on this area would likely be welcomed by industry and it is not fraught with competitive issues. Be careful to avoid duplication with other R&D programs. • Consideration should be given to a high-level government-enabling task force to expedite project development and implementation of new R&D results. • Some questioned why the government was funding the 999 initiative in light of the perception by some that industry had programs already underway in many areas. • In helping to establish priorities, the technologies should be linked to the resource base.

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Assessment of the Plan's goals and the ability of the Plan to achieve the stated goals	• It was felt that the goal of 1 percent conversion from technically recoverable oil to proven reserves was too low. A minimum of 5 percent should be considered. On the other hand, the 200:1 return on investment appeared to be very high to several members. • The program needed to produce near term results to maintain a high level of visibility for the program and to lay the groundwork for possible higher levels of funding in the future (in line with Section 999(H)(e) which suggests possibility of additional funding). • Aside from the results oriented goals, thought should be given to adopting objectives in terms of impact on industry. Although it may be difficult to quantify, this area it can be a significant indicator of progress. The focus should be on how quickly and efficiently new technologies are communicated to industry. • Doubt was expressed over the ability to measure the results of the program in subsequent years; experience indicated that this was a very complicated academic exercise and results are rarely clear cut. This can be a very time consuming effort.
Observations on the technology challenges and R&D themes presented in the Plan	• Consideration should be given to the need to conduct R&D on multiphase flow in light of the fact that the pipeline lengths are substantial in the offshore systems. • It was felt by several participants that the Plan was weak on drilling-related R&D activities. This area deserves more attention in the Plan if only because it is represents a major cost element. Several participants noted that the cost of drilling alone could involve an investment in the range of $100 million or more for a typical well. • Several participants observed that the attention to environmental issues was not adequate and that more effort had to be made to give environmental issues a higher priority in the management process for both onshore and offshore areas. It seemed to some that the treatment of geologically produced water appeared to be the only environmental issue that the Plan identified. • It was suggested that a holistic approach should be considered in developing the Plan to avoid "stovepipe" processes where insufficient thought is given to crosscutting issues. • After some concern having been voiced regarding the prioritization process, RPSEA committed that by the end of July the priority would be better defined and that the current summary reflects a snapshot of the overall process at this point in time and not the final end product. • Application of nanotechnology should be more actively considered in the Plan, i.e. the use of smaller scale exploration and production sensors and devices. • In response to a question about R&D cost sharing, RPSEA responded that the solicitation process is designed to give weight to the level of cost share funding proposed by the research organization, recognizing that 20% cost share is the mandated minimum.

Comments on the solicitation plans	• A concern was expressed with the proposed three-phase (S1, S2, S3) solicitation process in that it could overly complicate the management process and lead to confusion on the part of the research groups. Some members further questioned the S1, S2, S3 theme designation and the granularity of the themes as presented; RPSEA clarified that it was not indicative of priority but rather a staging of solicitations to allow for more effective project management. Nonetheless, it was recommended that a priority list should be adopted to guide the solicitation process. • Also a clear process was not communicated for how to evaluate the success [or failure] of specific projects. A disciplined assessment process for canceling failed projects quickly needs to be adequately defined at the solicitation phase to avoid misunderstanding/confusion. RPSEA commented that a detailed staged gate evaluation process has been defined that was designed to allow for timely reassessment of projects and possible cancellations. • Members felt that it might be prudent to streamline the focus of the 33 themes to fewer, higher priority elements and to concentrate on the longer-term and higher risk R&D items and to leave the nearer term items for the operators to address. • Environmental factors and implications of proposed R&D projects should be required as part of the solicitation process. • To enhance the solicitation process, the document should clearly spell out the definitions of goals, objectives, visions, and strategies. • The focus on small businesses was questioned in the Plan because there are very few small operators in the UDW arena, rather they concentrate in the lower cost onshore areas. In response, it was noted that federal procurement guidelines require special provisions for small businesses. • Timing of solicitations should also take into account industry budget cycles to enhance program efficiencies.

Schedules and Path Forward

At the conclusion of the afternoon session, the Committee established the following four Subcommittees and schedule:

<u>Environmental</u>
Lead – Dokken
Members – McKinney, Wilson, Modiano, Grossweiler, Shoham

<u>Solicitation Process</u> (includes: Success Measures, Technology Transfer)
Lead – Ikelle
Members – Idelchik, Abadie, Totten

<u>R&D Theme Content</u> (includes: Prioritization, Timing Near-/Long-Term, Grand Challenges, and Drilling)
Lead – Slatt

Members – Charles, Fowler, Bland, Judzis, Ikelle, Morrison, Grossweiler, Shoham, Tranter

Access Restrictions
Lead – Wilson
Members – Charles, Seamount

All members for the Committee were encouraged to submit their suggestions to the appropriate Subcommittee lead, irrespective of whether or not they were participants in the Subcommittee.

Schedule:

7/6	Recommendations due to Subcommittee leaders
7/11	Compilation of recommendations received by the Subcommittee
7/13	Subcommittee conference call
7/17	Consolidated list of all recommendations received to be sent to all Committee members
7/24	Meeting in Houston

The Committee discussions concluded at 4:35 p.m.

Public Comments and Adjournment

At 4:37 p.m. Bill Hochheiser, Acting Designated Federal Officer, opened the meeting to public questions or comment. As none were offered, the meeting adjourned at 4:40 p.m.

Appendix 1
Agenda
Ultra-Deepwater Advisory Committee
June 21, 2007
Crystal City Marriot, Arlington, VA
Potomac Ballroom

7:00 – 8:00	Committee breakfast	
8:00 – 8:30	Processing of Special Government Employees (SGEs)	
8:30 – 9:00	Registration	
8:30 – 9:00	Executive Session: Swearing-in of SGEs Ethics Briefing	DOE HR DOE General Counsel
9:00 – 9:15	Open Session: Welcome & Introductions	Jim Slutz Deputy Assistant Secretary
9:15 – 9:45	Opening Remarks Review of Agenda Objectives of the Meeting Responsibilities of Members under FACA	Jim Slutz
9:45 – 10:30	Overview of Draft Annual Plan DOE Traditional Oil and Gas Program EPACT Subtitle J Section 999 Planning Process EPACT Subtitle J Section 999 Plan Including NETL Complementary Plan Q/A	Brad Tomer
10:30 – 10:45	Break	
10:45– 11:45	RPSEA Ultra-Deep Water Plan Q/A	Mike Ming Chris Haver
11:45 – 12:00	Overview of Section 999D Duties (review) Section 999B(e)(2)(B) and (e)(3) Q/A	Bill Hochheiser

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12:00 – 1:00	Executive Session: [Lunch] Appoint Committee Chairperson and Vice-chair	
1:00 – 4:00	Open Session: Facilitated Discussions	Rich Scheer & Sabine Brueske, Energetics
4:00 – 4:30	Establish schedule and path forward	Jim Slutz Committee Chair
4:30 -5:00	Public Comments (prior request required)	
5:00	Adjourn	

Appendix 2

Ultra-Deepwater Advisory Committee Attendees June 21, 2007

Mr. Kent F. Abadie	Manager, Development and Production	Shell Exploration & Production Company	New Orleans, LA
Mr. Ronald G. Bland	Shared Technologies Manager	Baker Hughes Drilling Fluids	Houston, TX
Mr. Raymond G. Charles	Area Exploration & Geoscience Manager	ExxonMobil Exploration Company	Houston, TX
Mr. Quenton R.Dokken	Executive Director	Gulf of Mexico Foundation	Corpus Christi, TX
Dr. Joe R. Fowler*	President	Stress Engineering Services, Inc.	Houston, TX
Mr. Phil Grossweiler*	Energy Industry Consultant	M&H Energy Services	Houston, TX
Mr. Michael Idelchik	Vice President Advanced Technologies	General Electric Company	Niskayuna, NY
Dr. Luc T. Ikelle*	Robert R. Berg Professor	Texas A&M University	College Station, TX
Mr. Arnis Judzis	Vice President	Schlumberger, Inc.	Salt Lake City, UT
Dr. Larry D. McKinney	Director of Coastal Fisheries	Texas Parks & Wildlife Department	Aransas Pass, TX
Mr. Albert Modiano	Vice President	U.S. Oil & Gas Association	Washington, DC
Mr. Richard L. Morrison	Vice President Safety & Technology – GoM Deepwater	BP America Inc.	Houston, TX
Mr. Daniel T. Seamount, Jr.	Commissioner	Alaska Oil & Gas Conservation Commission	Anchorage, AK
Dr. Yoram Shoham*	Geophysicist	Society of Exploration Geophysicists	Bellaire, TX
Dr. Roger M. Slatt*	Gungoll Chair Professor of Petroleum Geology & Geophysics	University of Oklahoma Sarkeys Energy Center	Norman, OK
Mr. Thomas N. Totten	Manager – Marine Strategic Planning	J. Ray McDermott	Houston, TX
Mr. Paul H. Tranter	Vice President Performance & Operations	Transocean, Inc.	Houston, TX
Mr. Paul M. Wiencke	Director	Research Council of Norway	Oslo, Norway
Ms. Mary Jane Wilson*	President and CEO	WZI Inc.	Bakersfield, CA

* Special Government Employee

Appendix 3

Ethics Briefing

Presenter: Tina Hymer

DEPARTMENT OF ENERGY

Advisory Committee Ethics Law Summary

As a "special" Government employee (SGE), most Federal ethics laws and regulations apply to you. Given they apply to all Federal employees carrying out a wide variety of Government tasks some rules will inevitably be less relevant to your duties than others. Even so, your careful adherence to the rules should foster public confidence that DOE's decision-making processes are not tainted by improper influences. That is why Executive Order 12674 further cautions all employees to "endeavor to avoid any action creating the appearance that they are violating the law or the ethical standards." Some SGEs may have conflicts of interests; however, in most instances a waiver can be issued to cure the conflict and permit participation on the advisory committee.

I. DISQUALIFICATIONS

A. Absent a specific written waiver or a regulatory exemption, a criminal statute bars your participation, in your Government capacity, in any particular matter, if you or any of the following individuals or entities whose interests are imputed to you, have financial interests in the outcome:

- Your spouse or minor child
- A business partner
- An organization with which you are employed or affiliated as an officer, director, trustee, or general partner.
- An organization with which you are negotiating for employment or have an arrangement for future employment.

B. Regulations also restrict your participation in matters affecting specific identified parties involving:

- Relatives or members of your household
- Individuals or entities with whom you have (or seek) business or financial relationships
- Entities your spouse, parents, or dependent children work for (or seek to work for) as employees, officers, directors, trustees, consultants, etc.
- Entities you have served as an employee, officer, director, trustee, consultant, etc. within the past 12 months
- Organizations in which you are an active participant -- *e.g.*, committee chair or spokesperson.

C. Your financial disclosure report will be reviewed and you will be given specific guidance and a waiver, if appropriate. Questions about potential waivers of the criminal restrictions should be addressed to the Office of the Assistant General Counsel for General Law.

II. MISUSE OF POSITION

A. Do not use or disclose non-public Government information.

B. Do not use your public office for private gain (whether your own or another's).

C. Do not use your official position or advisory committee title for any purpose other than in connection with your advisory duties.

III. REPRESENTATION

A. A criminal statute provides that:

- You must not represent someone else before the Government, including DOE, on any specific party matter in which you have participated as a Government employee. This law also bars you from accepting fees from such representation done by others.

- Additional restrictions apply if an SGE works for more than 60 days during a 365-day period. The Department does not anticipate that any advisory committee members will approach this 60-day limit.

B. Another law bars you from serving as an agent of a foreign principal, as defined in the Foreign Agents Registration Act.

IV. RECEIPT OF GIFTS

A. Basic Rule: Do not solicit or accept gifts and favors from any "prohibited source" or if the gift is given because of your official DOE position. A “prohibited source” is any individual or organization who:

- Seeks official action from DOE;
- Does, or seeks to do, business with DOE;
- Conducts activities regulated by DOE;
- Has interests that may be substantially affected by the performance of your official duties; or
- Is an organization the majority of whose members are described above

B. Commonly invoked exceptions include permission to accept:

- Benefits resulting from your non-DOE business or employment activities (or those of your spouse), when it is clear that the benefits have not been offered or enhanced because of your Government status
- Gifts clearly motivated by family relationship or personal friendship
- Items worth $20 or less per occasion -- up to $50 a year from anyone source.

Exceptions should not be abused.

Please call your Designated Federal Officer at _____ or Susan Beard or Sue Wadel, Office of the Assistant General Counsel for General Law at 202-586-1522.

THE WHITE HOUSE

WASHINGTON

January 20, 2001

MEMORANDUM FOR THE HEADS OF EXECUTIVE DEPARTMENTS AND AGENCIES

SUBJECT: Standards of Official Conduct

Everyone who enters into public service for the United States has a duty to the American people to maintain the highest standards of integrity in Government. I ask you to ensure that all personnel within your departments and agencies are familiar with, and faithfully observe, applicable ethics laws and regulations, including the following general principles from the Standards of Ethical Conduct for Employees of the Executive Branch:

(1) Public service is a public trust, requiring employees to place loyalty to the Constitution, the laws, and ethical principles above private gain.

(2) Employees shall not hold financial interests that conflict with the conscientious performance of duty.

(3) Employees shall not engage in financial transactions using nonpublic Government information or allow the improper use of such information to further any private interest.

(4) An employee shall not, except as permitted by applicable law or regulation, solicit or accept any gift or other item of monetary value from any person or entity seeking official action from, doing business with, or conducting activities regulated by the employee's agency, or whose interests may be substantially affected by the performance or nonperformance of the employee's duties.

(5) Employees shall put forth honest effort in the performance of their duties.

(6) Employees shall not knowingly make unauthorized commitments or promises of any kind purporting to bind the Government.

(7) Employees shall not use public office for private gain.

(8) Employees shall act impartially and not give preferential treatment to any private organization or individual.

(9) Employees shall protect and conserve Federal property and shall not use it for other than authorized activities.

(10) Employees shall not engage in outside employment or activities, including seeking or negotiating for employment, that conflict with official Government duties and responsibilities.

(11) Employees shall disclose waste, fraud, abuse, and corruption to appropriate authorities.

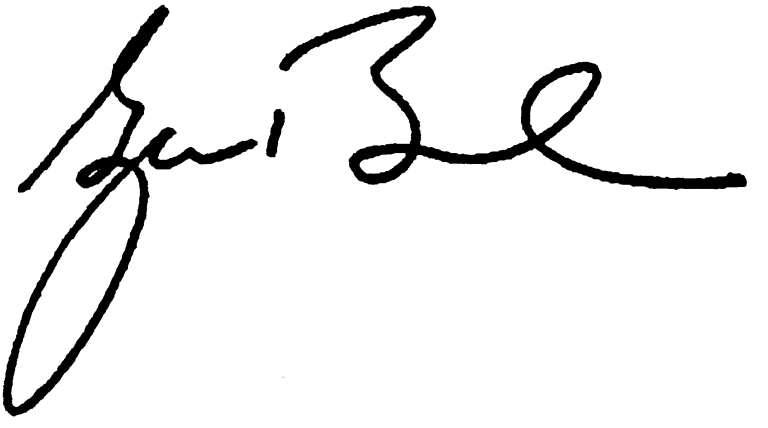
(12) Employees shall satisfy in good faith their obligations as citizens, including all just financial obligations, especially those -- such as Federal, State, or local taxes -- that are imposed by law.

(13) Employees shall adhere to all laws and regulations that provide equal opportunity for all Americans regardless of race, color, religion, sex, national origin, age, or handicap.

(14) Employees shall endeavor to avoid any actions creating the appearance that they are violating applicable law or the ethical standards in applicable regulations.

Executive branch employees should also be fully aware that their post-employment activities with respect to lobbying and other forms of representation will be bound by the restrictions of 18 U.S.C. 207.

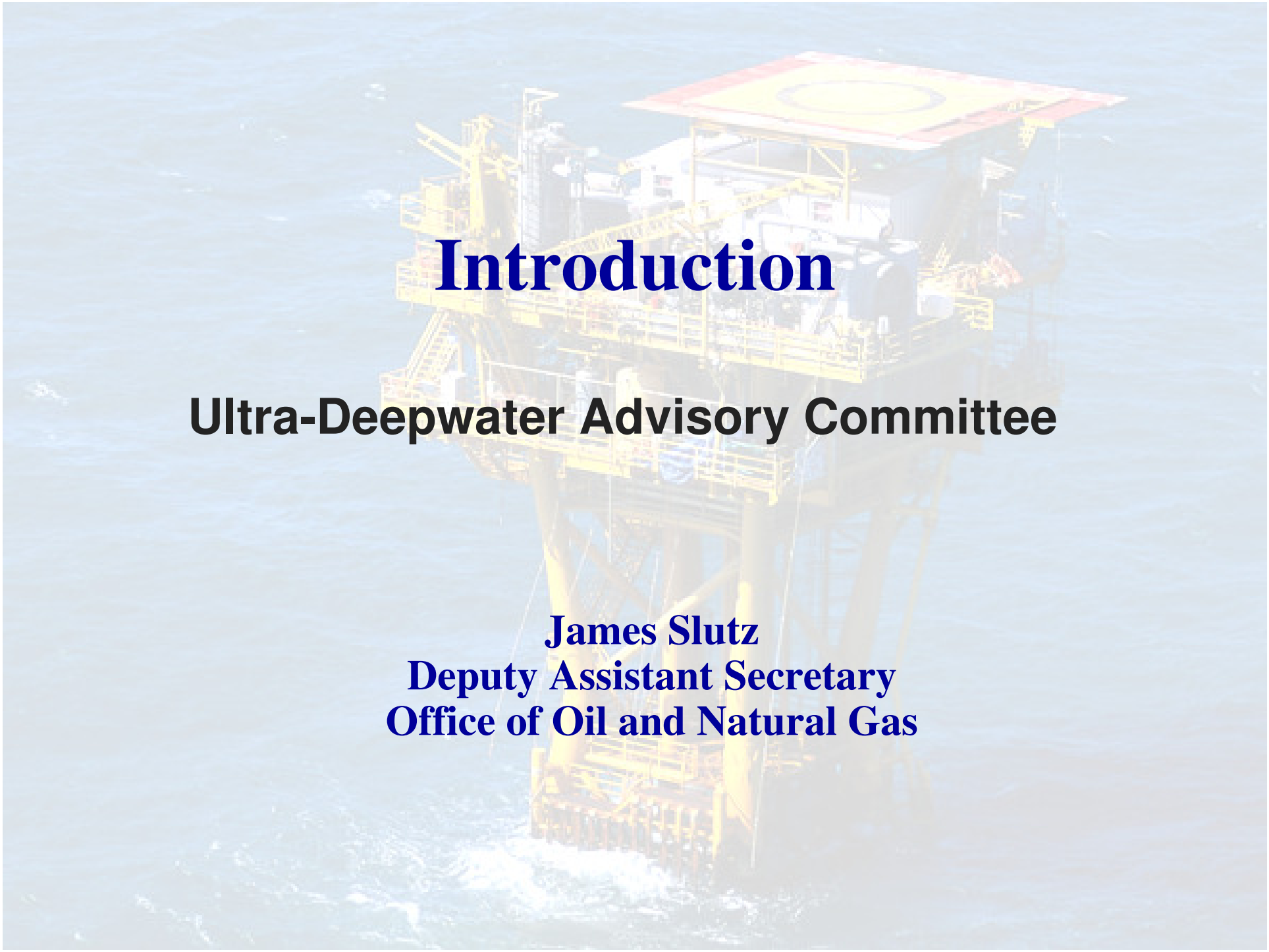
Please thank the personnel of your departments and agencies for their commitment to maintain the highest standards of integrity in Government as we serve the American people.



Appendix 4

Welcome and Introductions

Presenter: James Slutz



Introduction

Ultra-Deepwater Advisory Committee

James Slutz
Deputy Assistant Secretary
Office of Oil and Natural Gas

Role of the Committee

- **Role: Provide advice to DOE**
  - Provide recommendations on the development and priorities of the research program
  - Look at objectives of the initial annual plan within context of 10 year plan
  - Focus on Consortium-administered portion of the Plan, and also comment on NETL research and potential for duplication between NETL and Consortium portions

- **Guidance**
  - Focus on big picture. Don't rewrite plan but advise on strengths and weaknesses.
  - Consensus is good, but should not be forced.
  - Majority opinion with minority viewpoint is fine.

Committee Objective

- **Objective: Finalize Committee advice by July 2007**
  - During Today's meeting
    - Speakers provide background presentations
      - Committee asks clarifying questions
    - Facilitated Committee Discussions
      - Initiate discussion on Plan
      - Develop process to complete Committee work
  - July Meeting in Houston
    - Complete and vote on final comments for inclusion in Plan to be submitted to Secretary

Strategic Questions for the Committee

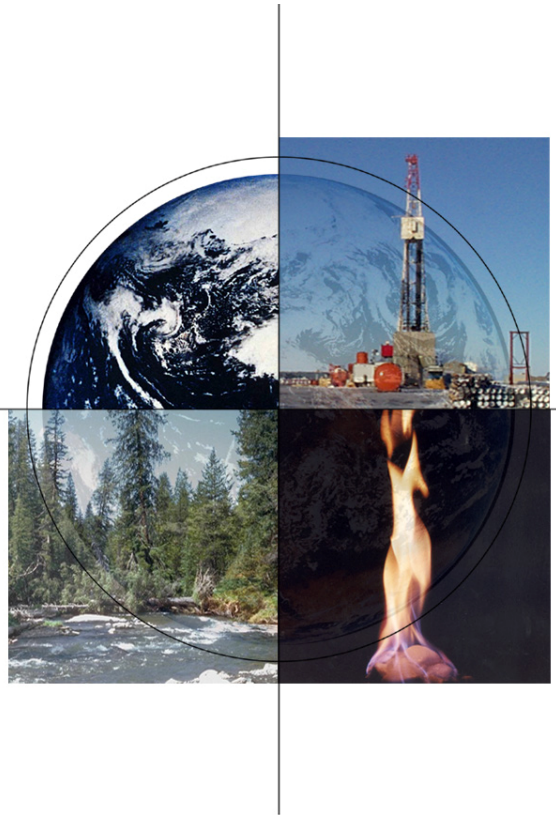
- **Does the plan, as a whole, represent the best approach for utilizing the R&D funds available?**
- **Are the plan's goals & objectives appropriate?**
  - Do they comply with the intent of EPACT 999?
  - Are they achievable yet challenging?
  - Do annual activities work toward long-term goals?
- **Are the proposed R&D themes appropriate?**
  - Do number of themes fit the expected budget?
  - Do they allow flexibility given the uncertainty of response?
- **Is the solicitation process appropriate?**
  - Fair and open, competitive, transparent?

Appendix 5

Overview of Draft Annual Plan

Presenter: Brad Tomer

US Dept of Energy Oil & Gas Research



Brad Tomer

Director, Strategic Center for Natural Gas & Oil

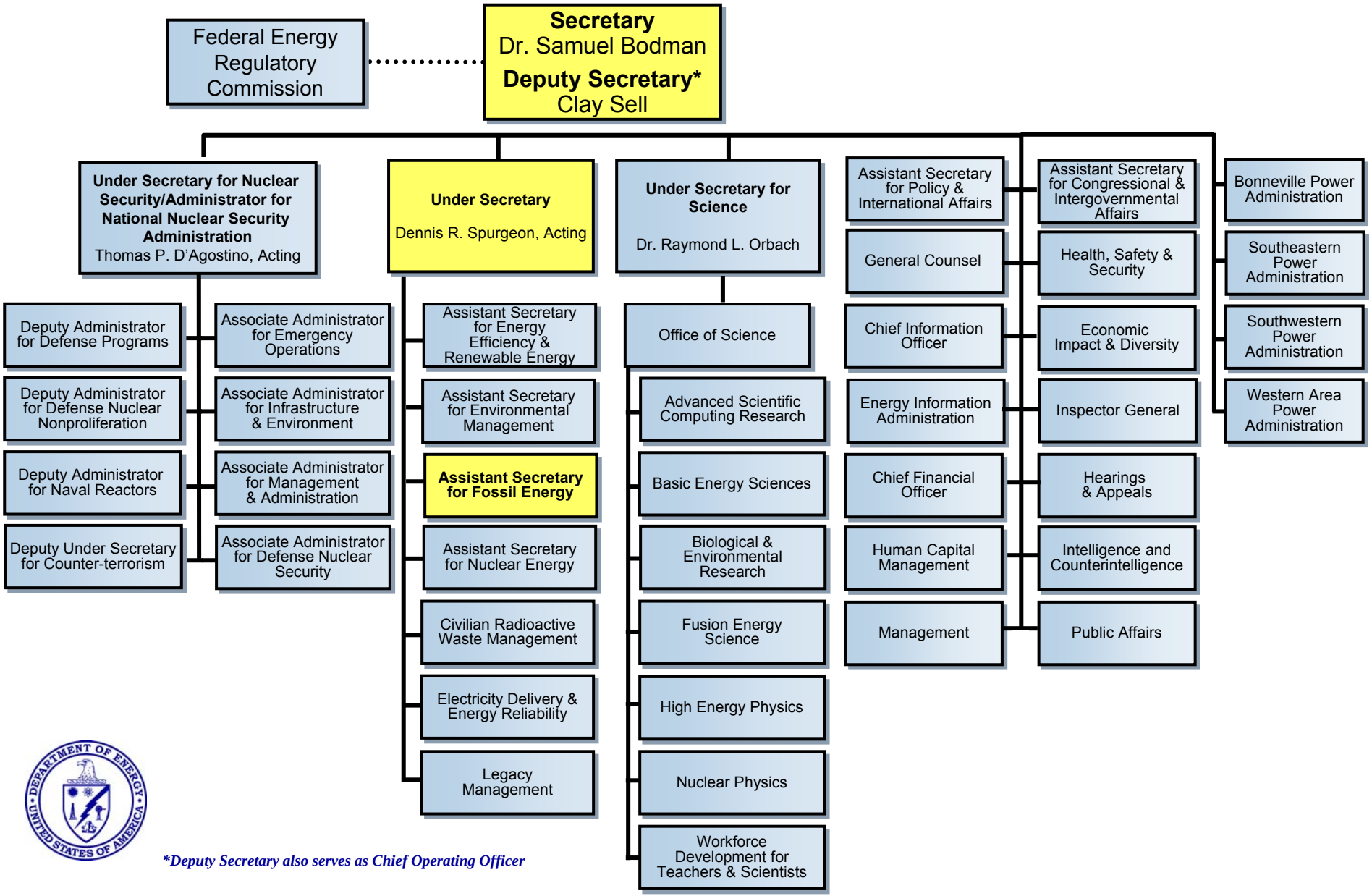
EPACT Section 999 Federal Advisory Committee Meetings

June 21-22, 2007

National Energy Technology Laboratory

Office of Fossil Energy

Department of Energy



**Deputy Secretary also serves as Chief Operating Officer*

National Energy Technology Laboratory

- **Only DOE national lab dedicated to fossil energy**
  - Fossil fuels provide 85% of U.S. energy supply
- **One lab, five locations, one management structure**
- **1,200 Federal and support-contractor employees**
- **Research spans fundamental science to technology demonstrations**

Alaska

Oklahoma

Oregon

Pennsylvania

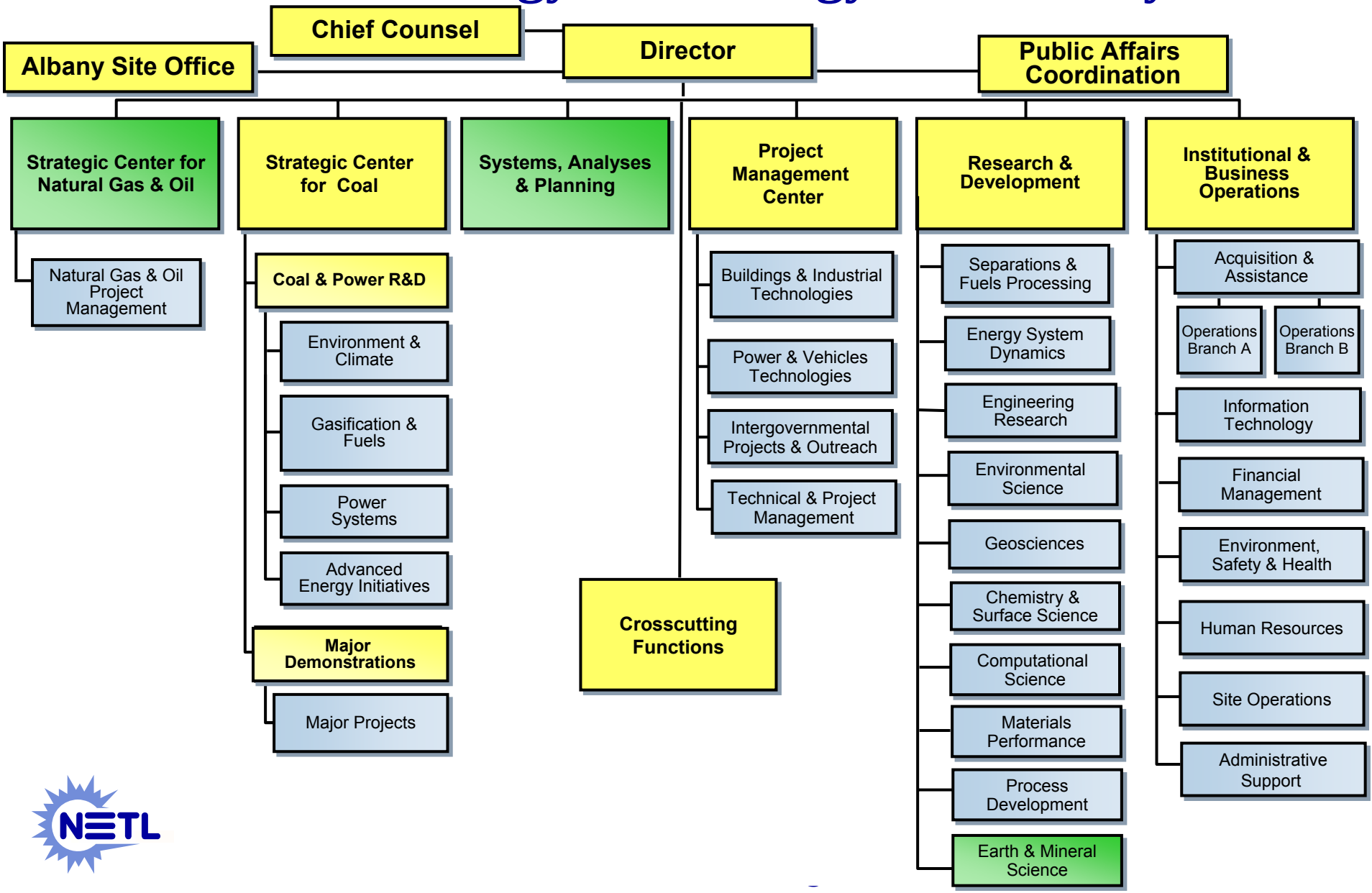
West Virginia

NETL

Accomplishing Our Mission

- Implement and manage extramural RD&D
- Conduct onsite research
- Support energy policy development

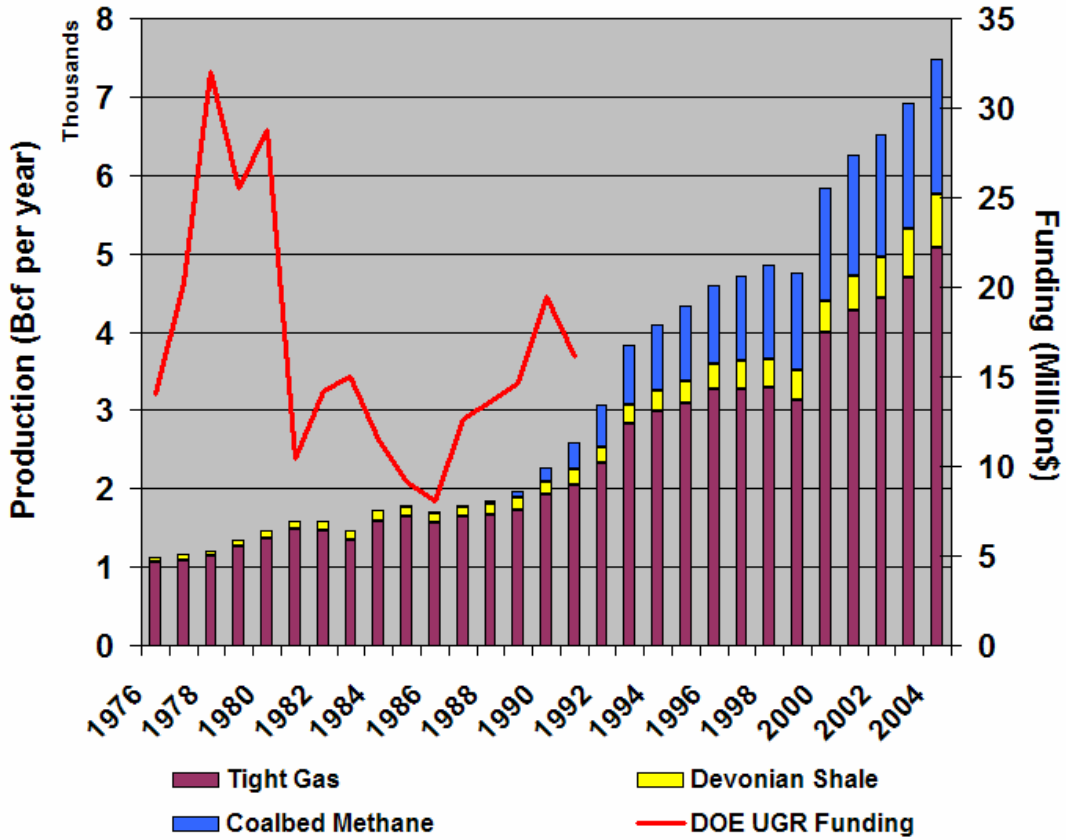
National Energy Technology Laboratory



Strategic Center for Natural Gas & Oil
History of Partnership Approach

- **Implement R&D programs for DOE Office of Fossil Energy**
  - E&P; EOR; Methane Hydrates; Res Life Extension; Environmental
- **Careful planning with significant industry input**
  - Technology roadmaps, advisory committees, consortiums, merit/peer reviews
- **Cost-shared R&D conducted with partners**
  - Industry, federal agencies, national labs, universities
- **Historically modest oil and gas program budget**
  - $65–$80 million / year total
- **Extensive experience**
  - > 35 years in oil and gas R&D
  - R&D successes linked to:
    - 25% of U.S. gas production
    - 13% of US oil production

Federally Funded Oil & Gas R&D Has Succeeded



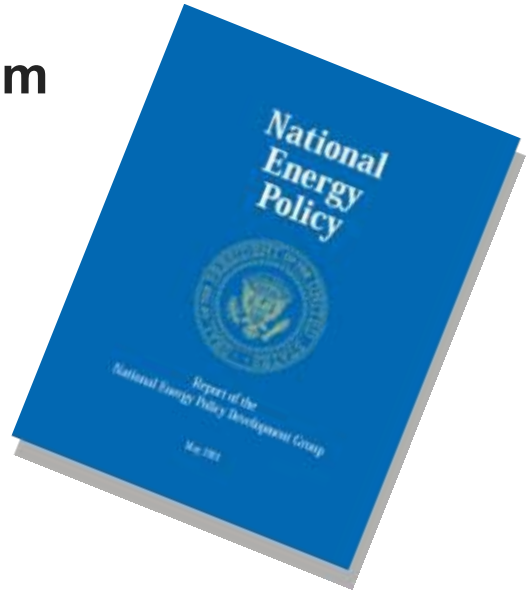
For more than 35 years, DOE has supported the development of advanced oil and gas technologies.

DOE contributed to enabling unconventional/marginal resources to provide more than 25% of the nation's gas and 13% of the nation's oil production.

Significant benefits for the nation's economy, environment, and national security.

"[The rapidly expanding coalbed methane market is the] direct result of the transfer of technology to independent producers through previous government research programs." - Craig Clark, CEO, Forest Oil

Energy Policy Act of 2005
DOE Oil & Gas RD&D Items



- **Sec 965 - DOE Traditional Oil and Gas Program**
  - DOE conduct a program of Oil & Gas RD&D
    - E&P; RLE; T&D; oil shale; environmental
- **Sec 968 – Methane Hydrate Research**
  - DOE-led multi-agency program
    - Resource, safety, environmental impacts
- **Sec 999 – Ultra-deepwater & Unconventional Program**
  - Royalty trust fund ($50 million/year for 10 years)
  - Consortium for ultra-deep water; unconventional; small producers
  - Complementary research at NETL

Traditional Natural Gas & Oil Technology Programs

Budget ($ million)

	FY05	FY06	FY07	FY08*
Exploration and Production	23.0	17.8	0	0
Gas Hydrates	9.1	8.9	12.0	12.0
Infrastructure	8.1	0	0	0
Effective Environmental Protection	3.4	1.5	0	0
Congressional Directed Projects	0	4.5	0	0
TOTAL – NATURAL GAS	*43.6*	*32.7*	*12.0*	*12.0*
Exploration and Production	18.2	13.4	2.7	2.7
Reservoir Life Extension	5.8	5.9	0	0
Effective Environmental Protection	9.0	9.5	0	0
Congressional Directed Projects	0	2.9	0	0
TOTAL - OIL	*33.0*	*31.7*	*2.7*	*2.7*
TOTAL – NATURAL GAS AND OIL	*76.6*	*64.4*	*14.7*	*14.7*

**Initial House Marks*

Oil and Gas E&P
Helping the Small Producer

- **Stripper Well Consortium**
  - Reduce premature well abandonment

PTTC
TECHNOLOGY | CONNECTIONS

- **Petroleum Technology Transfer Council**
  - Assure full utilization of technologies

- **Resource Assessments**
  - Inform industry & guide DOE R&D

NETL

Stripper Well Consortium

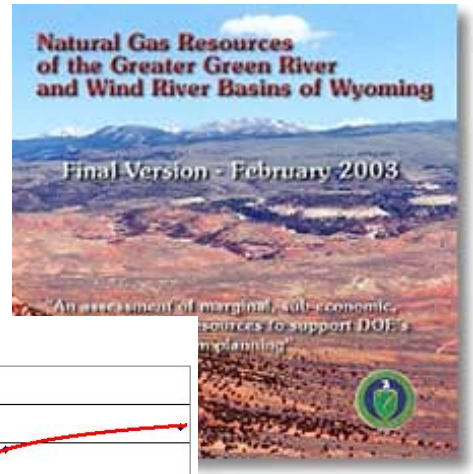
- Industry-driven consortium established Oct. 2000
- Funded by NETL, NYSERDA, members (65)
- 80 projects funded thru 2007
- SWC - $8.3 mil Cost Share - $6.1 mil
- Target: small independents
- Excellent cooperation among members
- Projects of 1 year duration
- Very “operator-friendly” process

- **Low-cost innovative technology to:**
  - Increase production
  - Reduce operating costs
  - Reduce environmental footprint

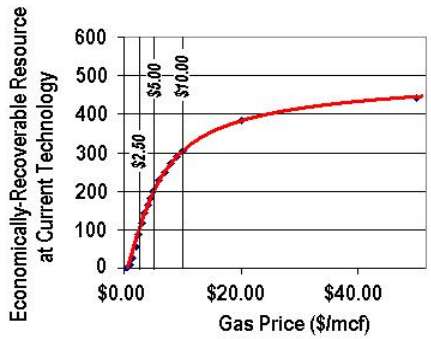
www.energy.psu.edu/swc

Resource Assessments
To Inform Industry and Guide R&D

- **Assessments conducted at NETL**
  - Expertise in measuring unconventional resource potential as a function of technology
  - Key Basins: Alaska North Slope, Greater Green River, Wind River, Uinta, Anadarko, Appalachia, Cook Inlet



- **Collaborative assessments**
  - Foundational studies of CBM, gas shales, tight sandstones & deep gas (with USGS, state surveys, universities, and industry)



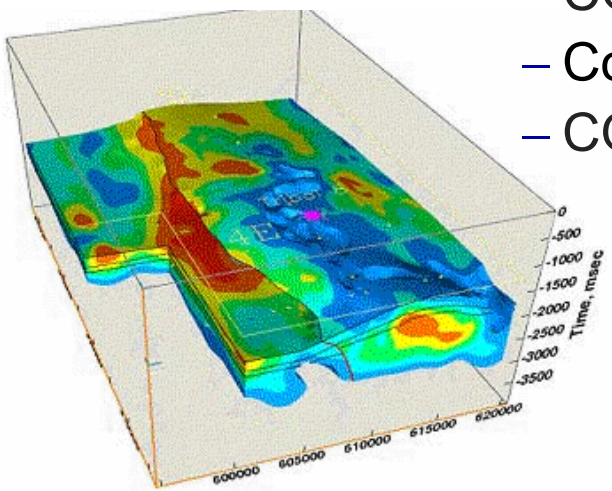
- **Contributions**
  - Provide information to quantify the potential impacts / benefits of technology advance
  - Provide public domain data on the geology and remaining resource potential of key basins

Oil and Gas Exploration & Production

Protecting the Environment while Lowering Costs

- **Drilling, Completion & Stimulation**
  - Increase rate of penetration
  - More durable tools, innovative concepts
  - Enable Greater CT Drilling Efficiencies

- **Enhanced Oil Recovery**
  - CO_2 Injection
  - Conformance control
  - CO_2 EOR Potential 43 billion barrels

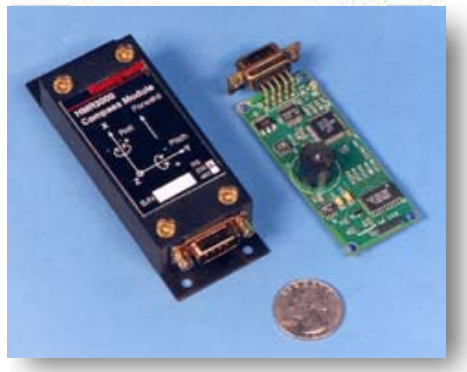


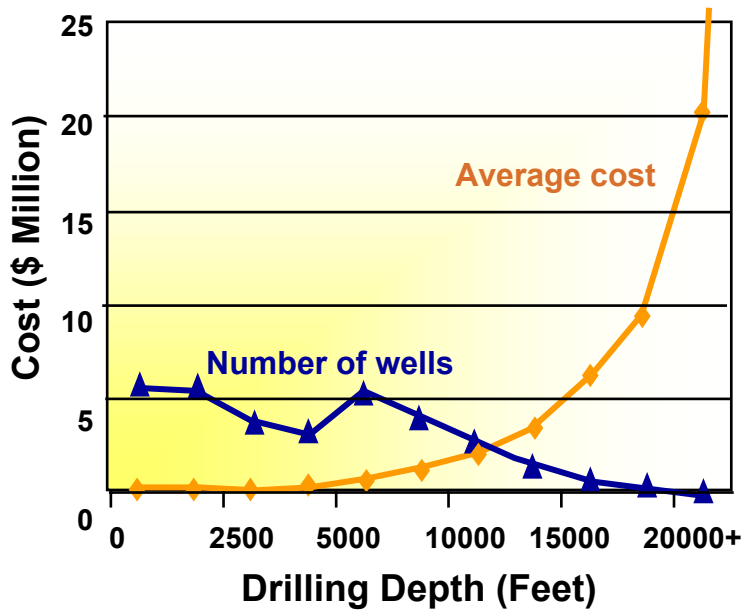
- **Advanced Diagnostics & Imaging Systems**
  - Improved characterization
  - Advanced seismic for natural fracture detection and EOR (4D)

Deep Trek Program

Tools for Extreme Environments

- **Purpose**
  - Develop high-pressure / high-temperature materials and electronics
  - Build family of deep drilling tools and sensors
  - Demonstrate integrated deep drilling system
- **Projects**
  - High-T electronics (Honeywell, GE, OSU, Giner, H-S)
  - High-T / high-P MWD (Schlumberger)
  - Super cement (CSI Technologies)
  - Downhole vibration monitoring & control (APS Technology)
  - Adv. bits & fluids benchmarking (TerraTek)
  - HT Battery (Electrochemical)
  - Downhole turbine generator (Dexter Magnetics)
  - Deep EM telemetry (E-Spectrum)
- **Program status**
  - Roadmap workshop March 2001
  - Project awards 2002, 2003, 2005 & 2006





Microhole Technologies

For High Efficiency
Mature Field Development

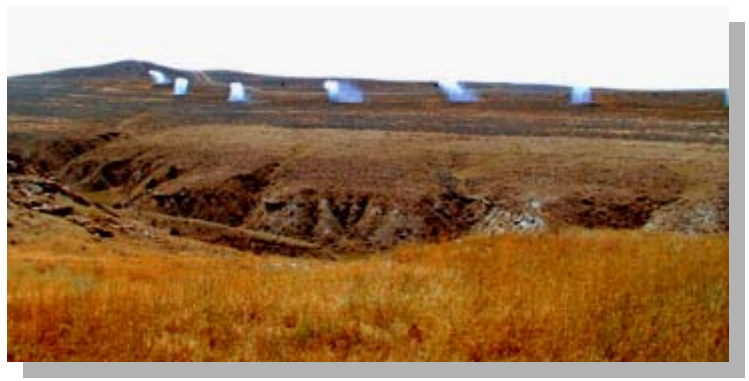
For New E&P Imaging Paradigms

- **Will allow new wave of development drilling for mature fields based on drilling cost reductions approaching 50%**
- **Low environmental impact for improved sensitive area access**
- **New paradigms in "high-res" seismic imaging to reduce E&P risk**

Oil and Gas Environmental Program

Technology and policy solutions for environmental barriers that limit domestic production

- **Federal Lands Access**
  - Reduce permitting times
  - Science-based stipulations
- **Coal Bed Natural Gas - Water Issues**
  - Treatment technologies
  - Scientific impact evaluation
- **Air and Water Emissions**
  - Treatment technologies
  - Measurement techniques
  - Streamline permitting

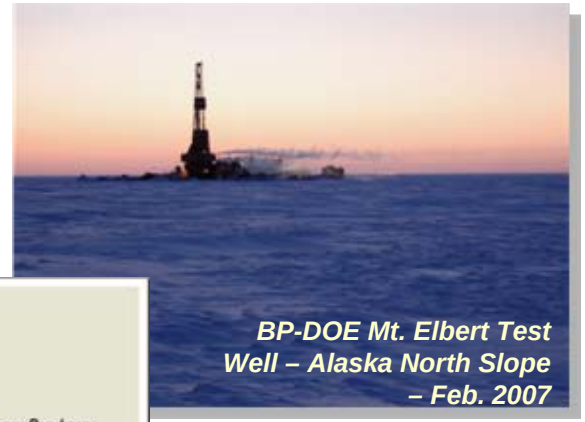


Methane Hydrates

- **DOE-led interagency program**
  - Five-year authorization by EPACT 2005 Sec 968
  - Seven collaborating agencies
- **Huge potential resources**
  - 200,000 Tcf domestic gas-in-place

If 1% can be rendered economic will double nation's supply of gas

- **Program addresses**
  - Safety & seafloor stability
  - Global climate impacts
  - Future Resource Potential
- **Impacts**
  - Better informed ocean/climate policy
  - Potential new domestic gas resource
  - Global realignment of energy supply



BP-DOE Mt. Elbert Test Well – Alaska North Slope – Feb. 2007

PUBLIC LAW 106–193—MAY 2, 2000

METHANE HYDRATE RESEARCH AND DEVELOPMENT ACT OF 2000

NETL and USGS scientists collaborate on India Expedition – Aug. 2006

Ultra-Deepwater and Unconventional Natural Gas and Other Petroleum Resources Sec. 999B(j)

Program Review and Oversight

- **National Energy Technology Laboratory, on behalf of the Secretary, shall …**
  - 1) issue a competitive solicitation for the program consortium,
  - (2) evaluate, select, and award a contract or other agreement to a qualified program consortium, and
  - (3) have primary review and oversight responsibility for the program consortium, including review and approval of research awards proposed to be made by the program consortium.

Section 999 Funding Distribution

Allocations of Funding Amounts:

- 35% ($14,963K) Ultra-Deepwater
- 32.5% ($13,894K) Unconventional Resources
- 7.5% ($3,206K) Small Producer Challenges
- 25% ($12,500K) NETL Complementary Research

Other Direction:

- 2.5% of each award for technology transfer
- ≤ 10% ($3,562K) RPSEA administration
- 5% ($1,875K) NETL program review and oversight

Ultra-Deepwater and Unconventional Natural Gas and Other Petroleum Resources

Program Administration

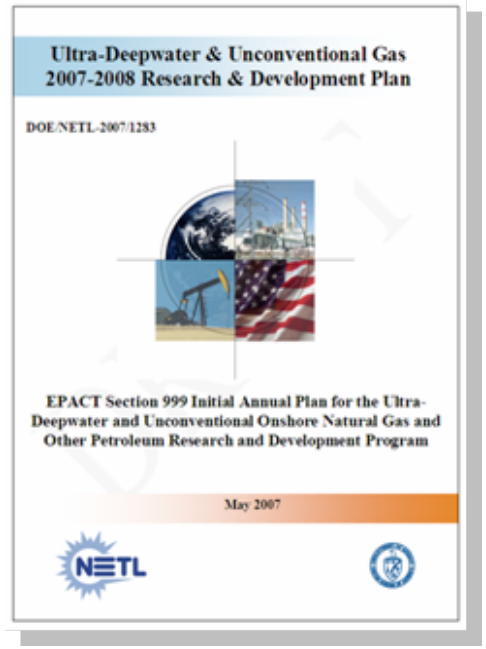
- **NETL selected RPSEA to administer program**
  - Contract effective January 4, 2007
  - Research Partnership to Secure Energy for America
  - Non-profit corporation; >100 member consortium
- **RPSEA will:**
  - Carry out research pursuant to annual plan as approved by DOE
  - Issue research project solicitations
  - Make project awards
  - Disburse research funds to performers
- **NETL will:**
  - Manage the contract between RPSEA & DOE
  - Develop annual plan based on RPSEA input
  - Review/approve research awards made by RPSEA

Ultra-Deepwater and Unconventional Natural Gas and Other Petroleum Resources
Sec. 999B(e) *Annual Plan*

- **Annual plan prepared by Secretary of Energy**
- **Secretary solicits recommendations from:**
  - RPSEA in form of draft annual plan
  - Ultra-Deepwater & Unconventional Resources Advisory Committees
- **DOE consults regularly with RPSEA throughout process**
- **Transmit plan to Congress**
- **Publish plan in Federal Register**

Draft Annual Plan Development

- **RPSEA submitted Draft Annual Plan on April 3, 2007**
  - Input from numerous sources
    - RPSEA Member Forums
    - Roadmapping by GTI under DOE contract
    - Numerous meetings with NETL
- **NETL developed complementary plan**
  - Internal working groups
  - External advisory panel
- **NETL developed overall plan**
  - Streamlined RPSEA recommendations
  - Established some priorities
  - Integrated NETL complementary plan
  - Circulated to RPSEA & HQ DOE for comment
  - Submitted current version to HQ on May 11, 2007



Ultra-Deepwater Program Goals

Goal	Target Metric
Increase the size of the UDW resource base	Identify and discover 1% or more of the 50 billion recoverable BOE remaining to be discovered. This is the equivalent of one 500 MMBOE field or five 100 MMBOE fields (200:1 return on Program investment).
Convert identified resources into economic recoverable reserves	Add 100 MMBOE or more to the technically recoverable resource (40:1 return on Program Investment).

Ultra-Deepwater R&D Themes

- **32 Themes identified by RPSEA to bridge technology gaps for the 4 field scenarios**
  - NETL reorganized into 33 themes
    - Combined common themes
    - Split out sub-themes in field types
  - 9 field-specific themes
  - 24 crosscutting themes
- **Themes were prioritized by NETL for purposes of solicitation groupings**
  - Solicitation 1: 16 themes (14 are crosscutting)
  - Solicitation 2: 13 themes (8 are crosscutting)
  - Solicitation 3: 4 themes
  - By end of July RPSEA will have specific project ideas identified based on themes which may slightly change prioritization.

Unconventional Resources Program

Goal	Target Metric
Increase the size of the technically recoverable unconventional resource.	Add 30 TCF to the technically recoverable unconventional resource.
Convert technically recoverable resources into economic recoverable reserves	Convert 10 TCF of unconventional gas resource from technically recoverable to economic reserves.

Unconventional Resources Program

Level of Field Development	Program Balance	Priority Gas Shales	Priority Coalbed Methane	Priority Tight Sands
Existing	45%	Fort Worth - Barnett	Appalachian	Green River/Uinta
		Appalachian	San Juan	South Texas
			Powder River	Appalachian
Emerging	45%	Permian	Uinta-Piceance	Appalachian
		Arkoma/Ardmore/Anadarko	Powder River	Piceance
		Illinois & Michigan		Uinta
Frontier Area	10%	Permian-Woodford	Illinois and Michigan	Western Oregon
		Green River	N. Mid-continent	Washington

Unconventional Resources Program

- Technology challenges identified from multiple industry forums, workshops and studies held 2003-06
- Gas shales selected as top priority – most difficult technology challenges, least developed, greatest potential for near-term results
- Program to be balanced across emerging (45%), existing (45%) and frontier (10%) field development levels
- Two solicitations planned
- No significant changes from RPSEA draft

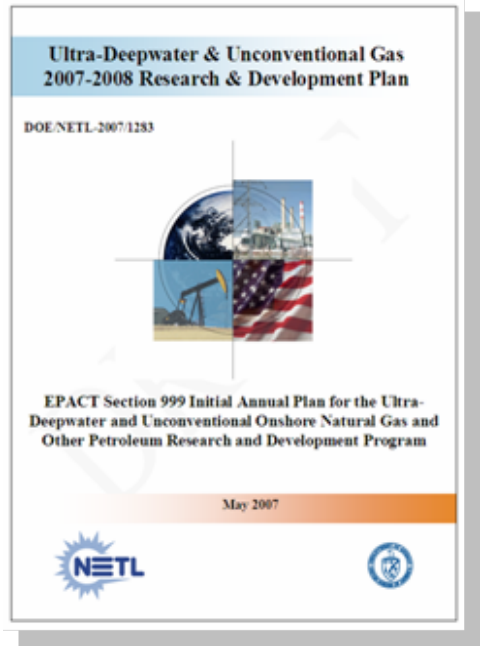
Small Producer Program

Goal	Target Metric
Add to the reserve base associated with mature fields operated by small producers.	Achieve a 10 to 1 return on R&D investment, in terms of the value of new reserves added to mature fields.

- **Program targets *"advancing technologies for mature fields."***
  - Managing water
  - Improving recovery
  - Reducing costs
- **Near term focus**

NETL Complementary R&D
Program Philosophy

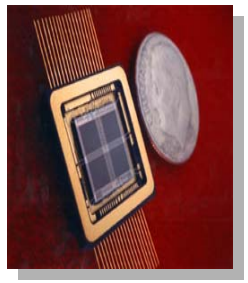
- **Conduct unique, high-value, non-duplicative work under EPACT 999**
- **Coordinate with RPSEA & traditional program**
- **Focus:**
  - Fundamental science
  - Long-term research providing basis for next-generation technologies
  - Unbiased environmental science
- **Technical areas:**
  - Drilling under extreme conditions
  - Environmental impacts of oil & gas development
  - Enhanced & unconventional oil recovery
  - Oil & gas resource & technology assessment
- **Conduct annual merit review**



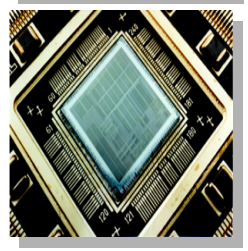
Drilling Under Extreme Conditions

EPACT 999 plan

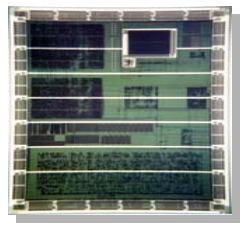
- **Ultra-deep single cutter Drilling Simulator (UDS)**
  - FY2008: UDS becomes fully operational
  - FY2012: Publish results of 8 studies of impact on ROP of different fluids as a function of P, T, and rock type



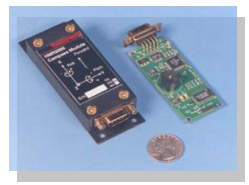
- **Novel drilling fluids**
  - FY2008: Initial nanofluid tests/characterizations



- **HP/HT electronics and sensors**
  - FY2008: Initiate work on HP/HT sensors, contacts, semiconductors and other electronic components
  - FY2012: Motor and control components and wireless silicon carbide electronics tested to 350°C



- **HP/HT materials**
  - FY2008: Benchmark tubular performance in HT/HP sour settings
  - FY2008: Investigate application of NETL High Interstitially Strengthened Steel (HISS) to HP/HT settings
  - FY2012: Complete materials development work initiated during earlier program assessments



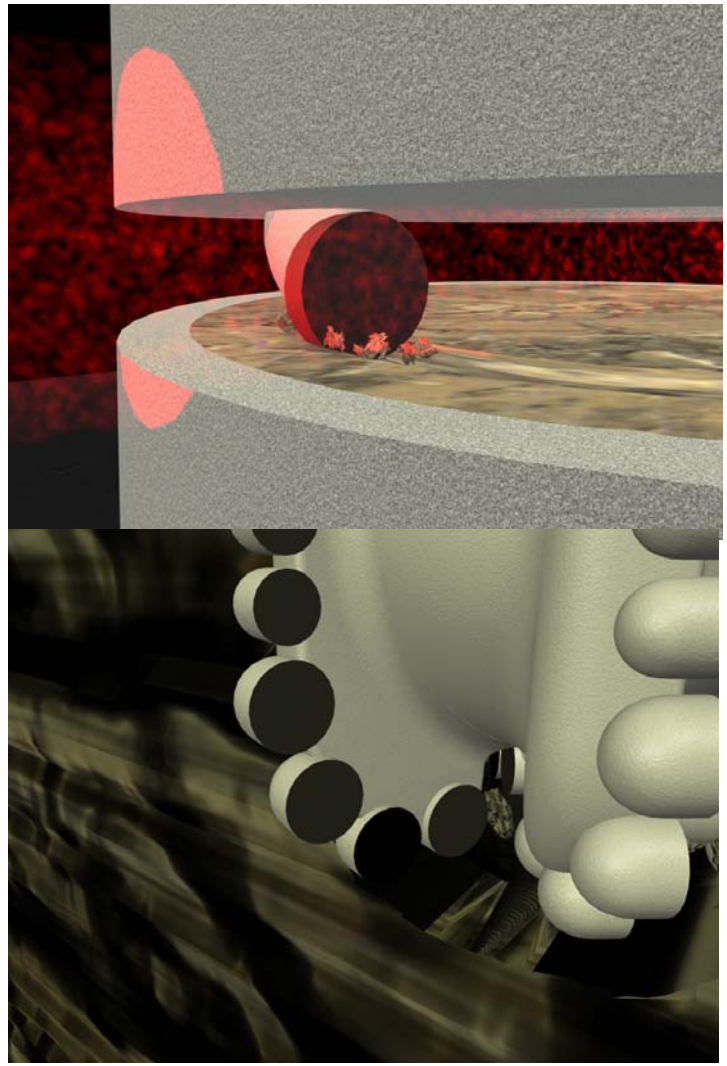
Ultra-deep single cutter Drilling Simulator (UDS)

Developed with TerraTek, a Schlumberger company, under DE-FC26-05NT42654

- **One-of-a-Kind research facility capable of recreating bottom-hole drilling environments of ultra-deep wells**
- **Capability:**
  - Pressure up to 30,000 psi (2068 bar)
  - Temperature up to 481 °F (250 °C)
- **Operates on "real" drilling mud**
- **Visualization through X-Ray video system**
  - Images of cutting at down-hole conditions (i.e. HPHT)
  - Cutter and rock immersed in an optically opaque drilling fluid
- **Available for operation – April 2008**

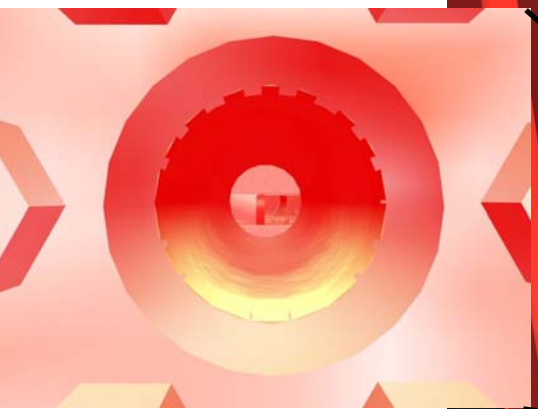
Degrees of Freedom in UDS Experiments

- **Cutter Type**
  - Material, Size, Shape, Back rake
- **Rock Type**
  - Seek analogs to formation rocks w.r.t. hardness, porosity, permeability
- **Drilling Fluid Formulation**
- **Drilling Fluid Hydrodynamics**
  - ΔP_{nozzle}, T, Re_D, Nozzle placement
- **Weight on cutter**
- **Cutter Speed**
  - Radial position, rotation speed
- **Pore Pressure Control**
  - ΔP_{core},$P_{confining}$, rock permeability

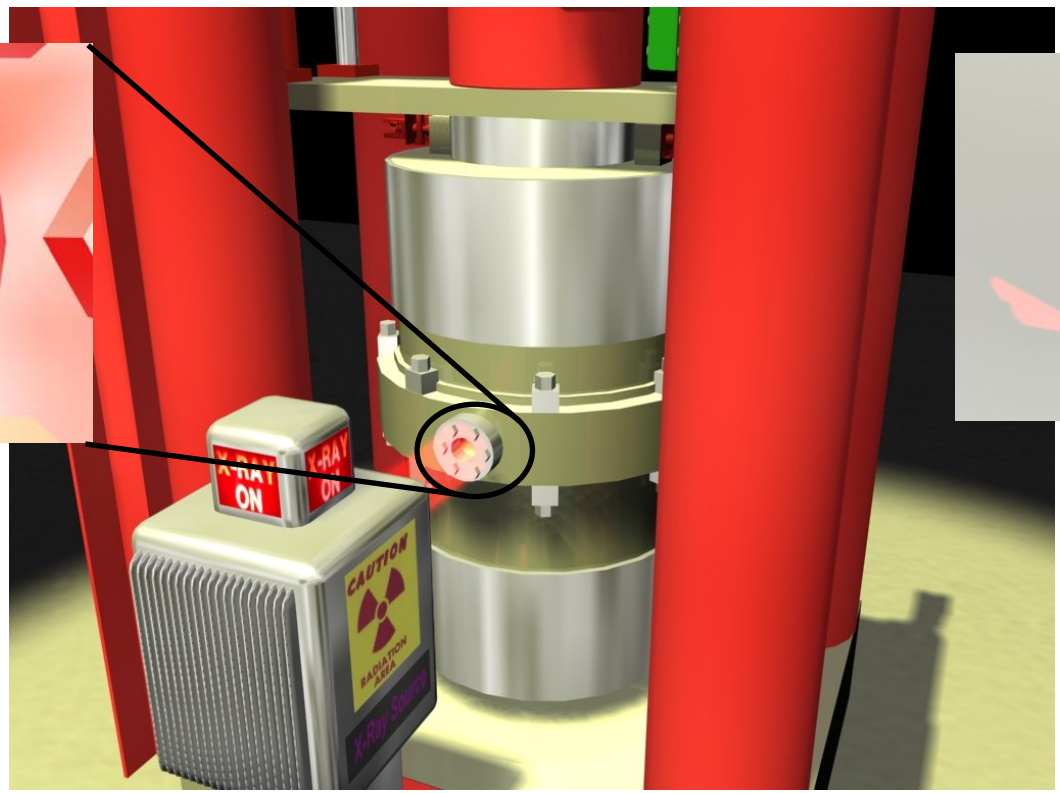


Role of X-Ray Visualization

- **Visualization provides**
  - Specifics on rock deformation & strain as cuttings form
  - Shape of rock cutting as it forms
  - Evidence of how test parameters (e.g. fluid properties) change cutting process



Front view of X-ray beam path into UDS window. PDC shown in line of sight.



Shadow image on UDS Back side. Image shown is an artist's conception of cutter interface with rock surface and generated cuttings.

Examples of Future UDS Tests

- **Parametric Studies**
  - Drilling Fluids (vary base fluid, weight, viscosity, etc.)
  - Fluid Injection (nozzle placement, Reynolds number)
  - Weight on Cutter and/or Displacement rate control
- **Fundamental Investigation**
  - Seek out evidence of filter cake formation on rock during very small time increments (i.e. between cutter passes)
  - Effects of fluid transfer between rock/wellbore
  - Role of volume changes in rock phase
  - Importance of particle size distribution of dissolved solids

Enhanced and Unconventional Oil Recovery

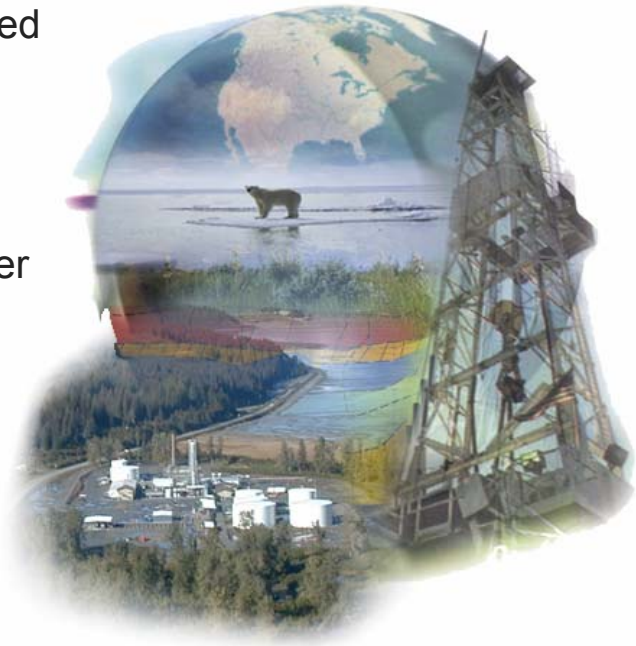
EPACT 999 plan

- **Reservoir Characterization**
  - FY2008: create reservoir characterization data archives from historic EOR and oil shale projects
- **New EOR Technologies**
  - FY2012: develop new technologies for improving the mobility control of CO_2 floods
  - FY2012: investigate new and novel thermal practices for heavy oil
- **Sensor and Catalyst Development**
  - FY2017: progress on development of nanosensors for real-time in situ data collection
  - FY2017: develop and test new catalyst for in-situ pyrolysis of oil shale

Environmental Impacts of Oil and Gas Development

EPACT 999 plan

- **Unbiased information for sound policy**
  - FY2008: Initiate remote sensing studies of methane release to the atmosphere
  - FY2012: Publish new models for air emission impacts from E&P
  - FY2012: Report on ecological impact of E&P within selected watersheds within the Appalachian basin using



- **Managing produced water**
  - FY2012: Complete scientific assessment of produced water impacts and treatment options in the Powder River Basin
    - Salt mobilization in CBNG drainage systems
    - LIDAR-based drainage capacity assessment
  - FY2012: Deliver report evaluating alternative produced water management strategies

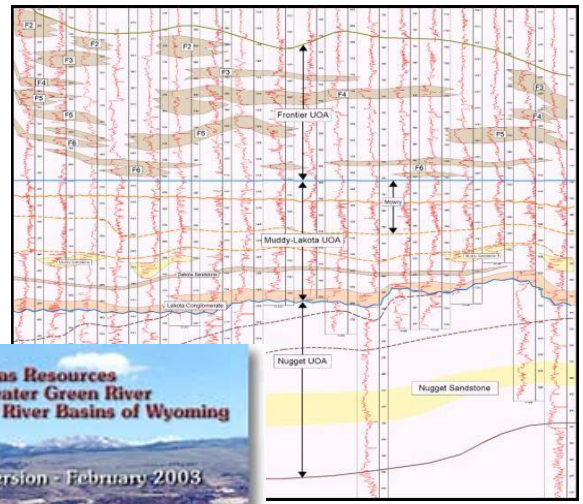
- **Oil Shale water-use minimization**
  - FY2012: Provide refined upper and lower limits to water quality and quantity required to support oil shale production as a function of production method and rate

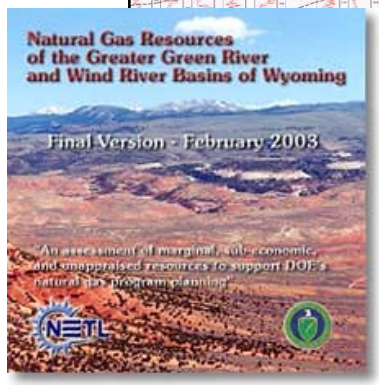
Resource and Technology Assessments

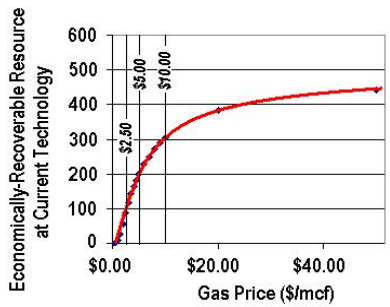
EPACT 999 plan

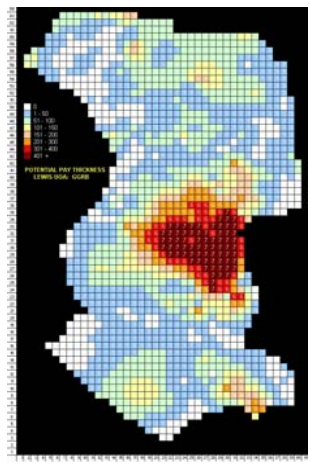
- **Resource Assessment**
  - FY2008: delineate most promising plays in the Appalachian basin (AB)
  - FY2010: complete initial AB assessment on CD
  - FY2012: complete 2nd round AB assessments
  - FY2012: identify need for additional assessments

- **Technology Assessment**
  - FY2008: document current state of advanced technology usage in the Appalachian basin
  - FY2010: complete assessment of historical trends in advanced technology adoption in mature basins
  - FY2012: develop capability for reliable modeling of technology impacts







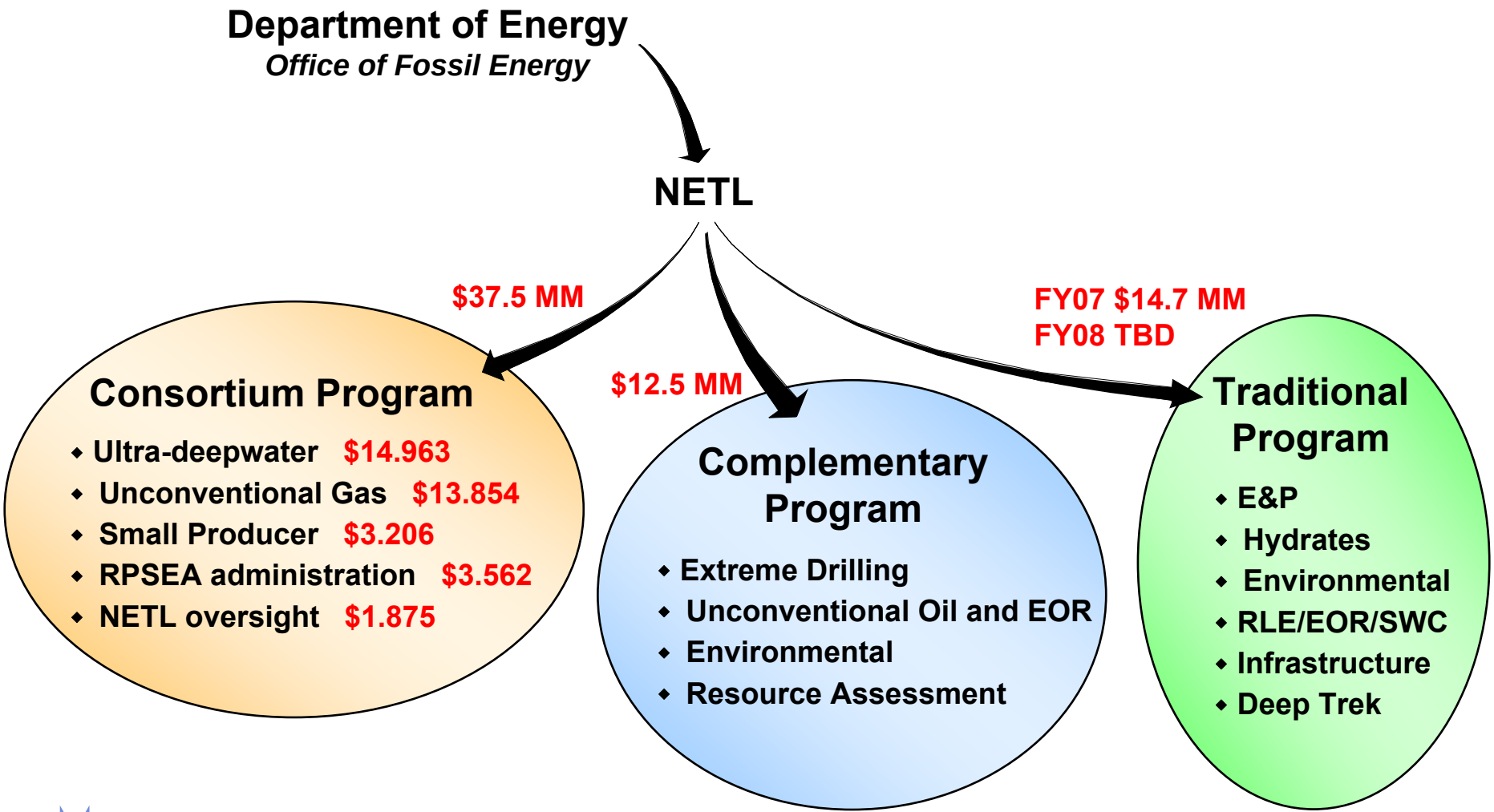


Planning and Analysis Support

EPACT 999 plan

- **NETL Office of Systems, Analyses and Planning (OSAP)**
  - Coordinate benefits analyses
  - Collaborate with RPSEA to gather data
  - Design and complete analyses focused on federal lands issues, royalty collections and environmental impacts
  - Carry out microeconomic studies to examine impact of R&D program
- **Short-Term Objectives (through 2008)**
  - Develop baseline royalty collections metric methodology for Report to Congress
  - Ensure plan for adequate data collection from consortium awardees
  - Initiate industry data/statistics collection in support of management plan
  - Finalize methodology for determining value of domestically produced gas/oil and estimating increases in royalty collections and other benefits based on EPACT 999 investments

Oil and Gas R&D Funding



Traditional and Section 999 Natural Gas and Oil Technology Programs

Budget ($ million)

	FY05	FY06	FY07	FY08
NATURAL GAS	43.6	32.7	12.0	?
OIL TECHNOLOGY	*33.0*	*31.7*	*2.7*	*?*
SECTION 999-ULTRA DEEP	*0*	*0*	*50.0*	*?*
GRAND TOTAL	*76.6*	*64.4*	*64.7*	*?*

Visit Our Websites

Office of Fossil Energy's website:

www.fe.doe.gov

NETL's website:

www.netl.doe.gov

Appendix 6

RPSEA Ultra-Deepwater Plan Introduction

Presenter: Mike Ming

RPSEA

Research Partnership to Secure Energy for America

C. Michael Ming
Section 999 Federal Advisory Committees
Arlington, VA
June 21-22, 2007

SECURE ENERGY FOR AMERICA

The Energy Policy Act of 2005 And Section 999:

Research, development, demonstration, and commercial application of technologies for:

- **Ultra-deepwater – technology and architecture focus**
- **Unconventional natural gas and other petroleum resource exploration and production – resource focus**
- **The technology challenges for small producers by consortia**

All while improving safety and minimizing the environmental impacts of activities within each area, including reduction of greenhouse gas emissions and sequestration of carbon

What is Section 999?

Specifically, the law directs --

- Research, development, demonstration, and commercial application of technologies for ultra-deepwater and unconventional natural gas and other petroleum resource
- Maximize the U.S resource value by:
  - Increasing supply
  - Reducing the cost
  - Increasing E&P efficiency
  - Improving safety and minimizing environmental impacts

What is the Program's Focus?

The Program has four program elements:

- Ultra-deepwater 35%

  (> 1500 Meters water or

  15,000' OCS drilled depth)

- Unconventional Onshore 32.5%

  (Economic accessibility)

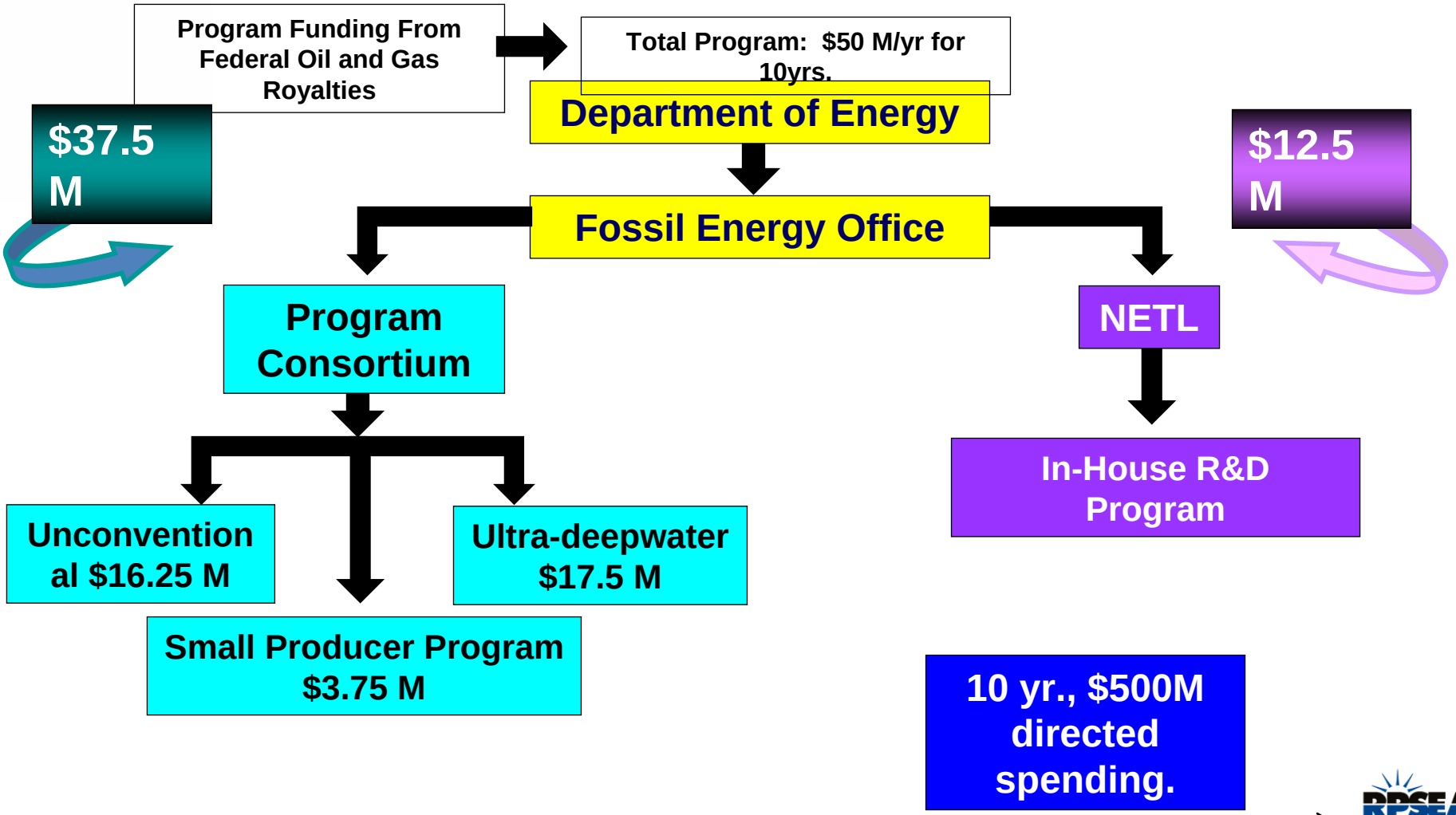
- Small Producers 7.5%

  (< 1000 BOEPD)

- Complementary Program 25%

  Managed by NETL

Current Program Structure/Funding

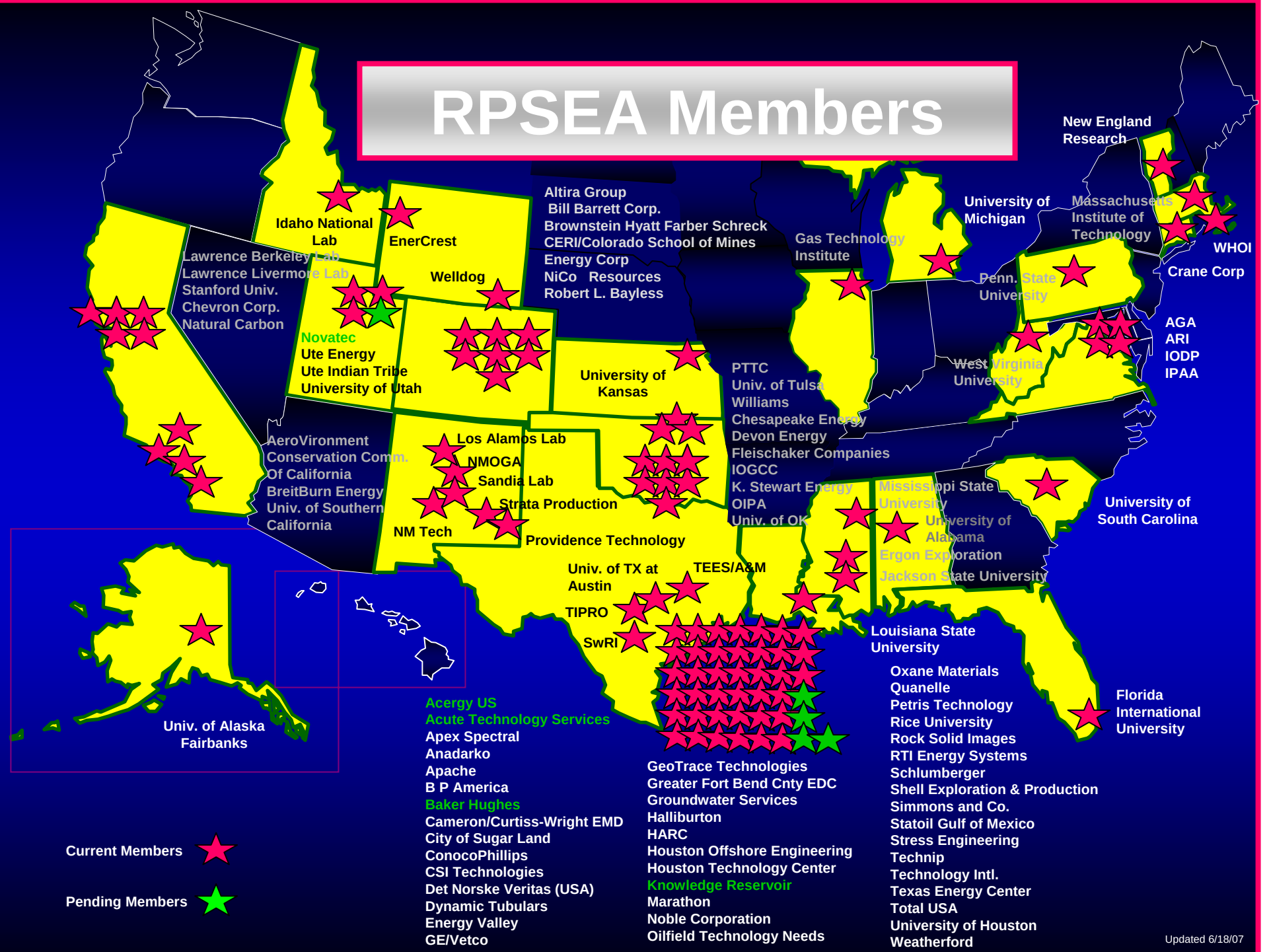


RPSEA Research Partnership to Secure Energy for America

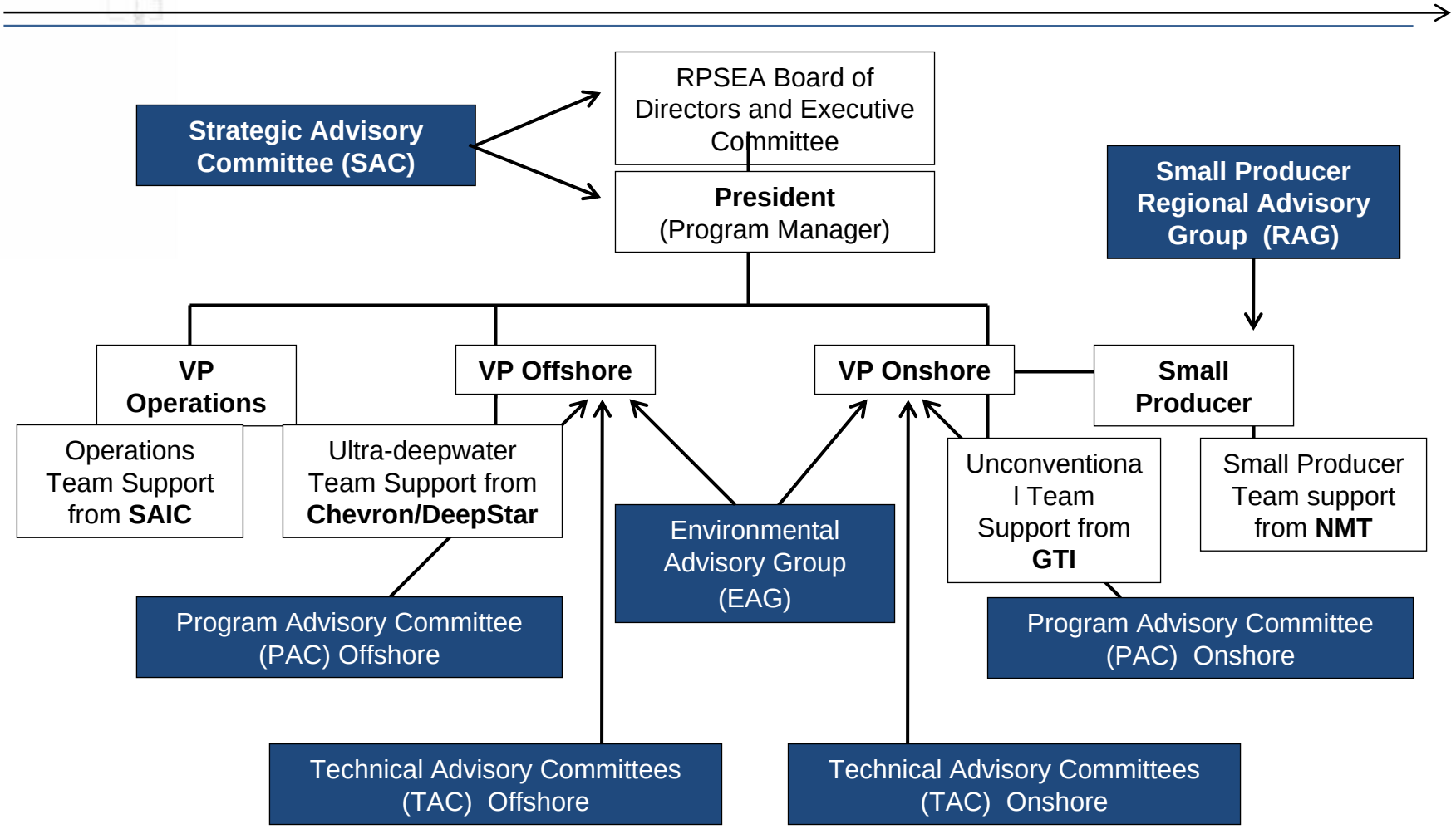
The RPSEA Organization

- A 501(c)3 not for profit
- Competitively selected by DOE as the Section 999 Consortium Manager
- 108 Members and growing

For more information visit www.rpsea.org

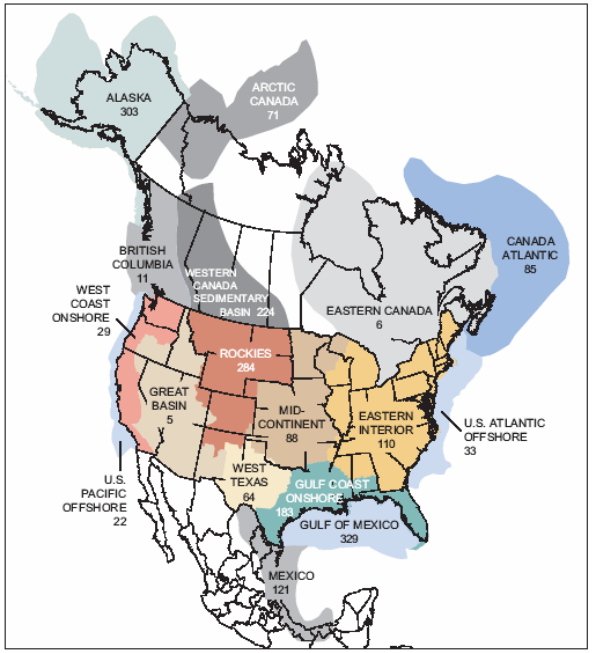

RPSEA Members
Idaho National Lab
EnerCrest
Welldog
Lawrence Berkeley Lab
Lawrence Livermore Lab
Stanford Univ.
Chevron Corp.
Natural Carbon
Novatec
Ute Energy
Ute Indian Tribe
University of Utah
Altira Group
Bill Barrett Corp.
Brownstein Hyatt Farber Schreck
CERI/Colorado School of Mines
Energy Corp
NiCo Resources
Robert L. Bayless
University of Kansas
Gas Technology Institute
University of Michigan
New England Research
Massachusetts Institute of Technology
WHOI
Crane Corp
Penn. State University
AGA
ARI
IODP
IPAA
West Virginia University
PTTC
Univ. of Tulsa
Williams
Chesapeake Energy
Devon Energy
Fleischaker Companies
IOGCC
K. Stewart Energy
OIPA
Univ. of OK
AeroVironment
Conservation Comm. Of California
BreitBurn Energy
Univ. of Southern California
Los Alamos Lab
NMOGA
Sandia Lab
Strata Production
NM Tech
Providence Technology
Mississippi State University
University of Alabama
Ergon Exploration
Jackson State University
University of South Carolina
Univ. of TX at Austin
TEES/A&M
TIPRO
SwRI
Louisiana State University
Univ. of Alaska Fairbanks
Florida International University
Acergy US
Acute Technology Services
Apex Spectral
Anadarko
Apache
B P America
Baker Hughes
Cameron/Curtiss-Wright EMD
City of Sugar Land
ConocoPhillips
CSI Technologies
Det Norske Veritas (USA)
Dynamic Tubulars
Energy Valley
GE/Vetco
GeoTrace Technologies
Greater Fort Bend Cnty EDC
Groundwater Services
Halliburton
HARC
Houston Offshore Engineering
Houston Technology Center
Knowledge Reservoir
Marathon
Noble Corporation
Oilfield Technology Needs
Oxane Materials
Quanelle
Petris Technology
Rice University
Rock Solid Images
RTI Energy Systems
Schlumberger
Shell Exploration & Production
Simmons and Co.
Statoil Gulf of Mexico
Stress Engineering
Technip
Technology Intl.
Texas Energy Center
Total USA
University of Houston
Weatherford
Current Members
Pending Members
Updated 6/18/07

A Small Organization, A Large Network

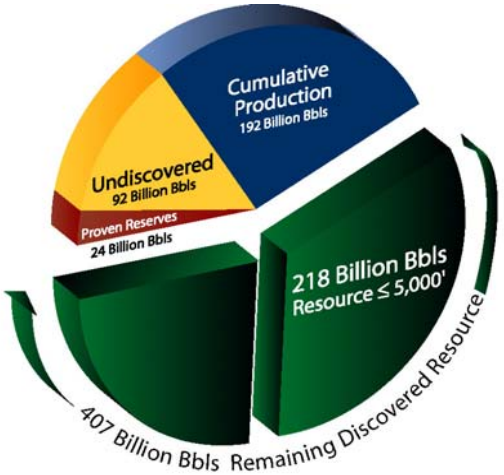


Well over 1,000 experts have participated in this process!

The Resources



NPC 2003 Technical Resources (TCF)



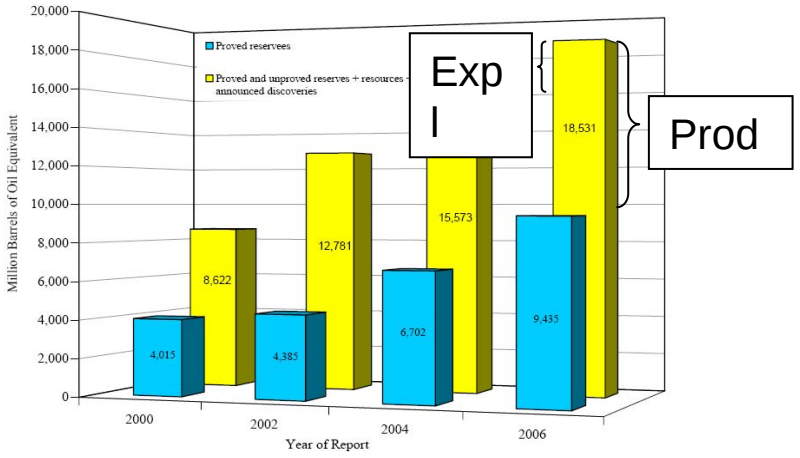


Figure 78. Comparison of 2000, 2002, 2004, and 2006 deepwater GOM reports: successive increases in deepwater BOE.

RPSEA Research Partnership to Secure Energy for America

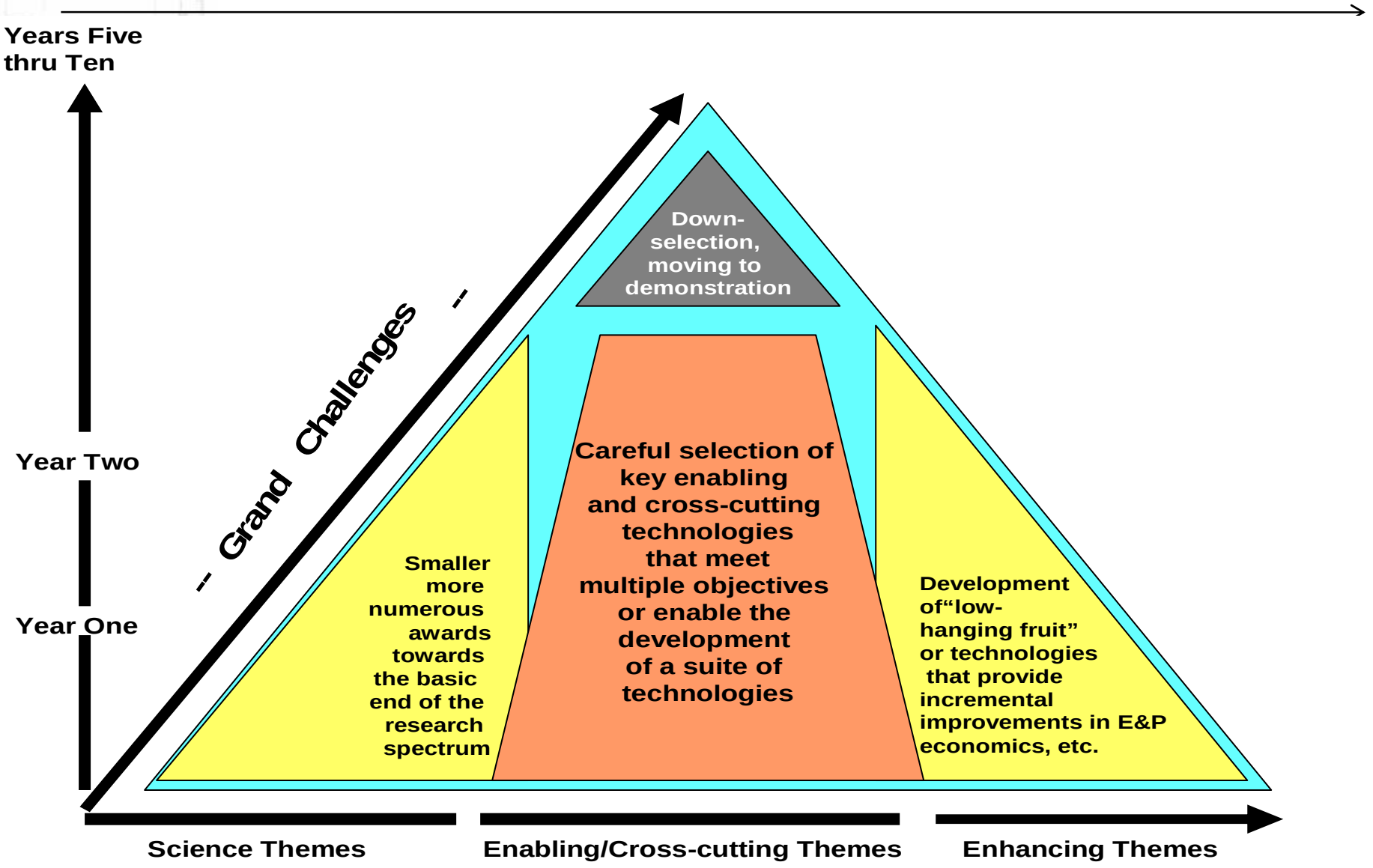
The RPSEA Process and Input Member Forums

- *Louisiana State University, Groundwater Protection*
  - *Wellbore Integrity & Environmental Topics Forum (pending August 23, 2007)*
- *University of Houston*
  - *Seismic E&P Forum, October 10, 2006*
- *Massachusetts Institute of Technology & Schlumberger*
  - *Autonomous Intervention for Deepwater O&G Operations Forum, October 31, 2006*
- *Colorado School of Mines*
  - *Tight Gas, Shale Gas & Coalbed Methane Forum, November 14, 2006*
- *University of Southern California*
  - *Problem Identification Forum, November 29, 2006*
- *University of Oklahoma*
  - *Shale Gas Forum, December 5, 2006*
- *New Mexico Institute of Mining and Technology*
  - *Produced Water Forum, December 14, 2006*
- *New Mexico Institute of Mining and Technology*
  - *Small Producer Forum, December 15, 2006*
- *Massachusetts Institute of Technology & Chevron*
  - *Vortex Induced Vibrations Forum, January 12, 2007*
- *University of Tulsa & Halliburton*
  - *Flow Assurance Forum, February 8, 2007*
- *West Virginia University & NRCCE*
  - *Unconventional Plays & Research Needs for Appalachian Basin Small Producers Forum, February 15, 2007*
- *Texas A&M University & GE*
  - *Seafloor Engineering Forum, March 9, 2007*

The 2007 Draft Annual Plan

- The Draft Annual Plan requires a 2/3 super majority vote of the RPSEA Board of Directors
- This overall process provided multiple input opportunities from well over 1,000 experts
  - Multiple Advisory Committees
  - Member forums
  - Broad member input through meetings
  - DOE et al road mapping workshops
  - NETL consultation throughout

Some General Attributes of the Annual Plan



The RPSEA Process and Draft Annual Plan Basics:

- Today present resources, processes, inputs, and themes by program element
- Focus – 8 major theme areas
  - 4 Ultra-Deepwater field types
  - 3 Unconventional Onshore resource types
  - 1 Small Producer challenge
- Component themes under each major theme are identified
- There are many players in the process!

Some General Attributes of the Annual Plan

- Research should create leverage on
  - Funding, personnel, equipment, operations, and other resources
- Integration is a key to create synergies
  - Make 1+1=3
- Research should be accumulative to mitigate risk and build upon itself
  - Build in multiple time scales for the research plan
  - Allow for failure
  - Leave more legacies than one time projects, and plan for follow on funding
- Focus on short to mid term applied projects
  - Integrate with the NETL complementary program for more basic longer term projects
- Identify opportunities industry can't tackle or are impractical for industry to tackle
- Avoid many small projects which minimizes the potential for high impact

Appendix 7

RPSEA Ultra-Deepwater Plan

Presenter: Chris Haver

RPSEA

Research Partnership to Secure Energy for America

RPSEA Ultra-Deepwater Advisory Committee

Christopher Haver
Arlington, VA
June 21, 2007

Contents

- What is DeepStar?
- EPACT Subpart J – UDW Focus
- We Can Make a Difference
- RPSEA UDW Objectives
- UDW Annual Process – Off and Running!

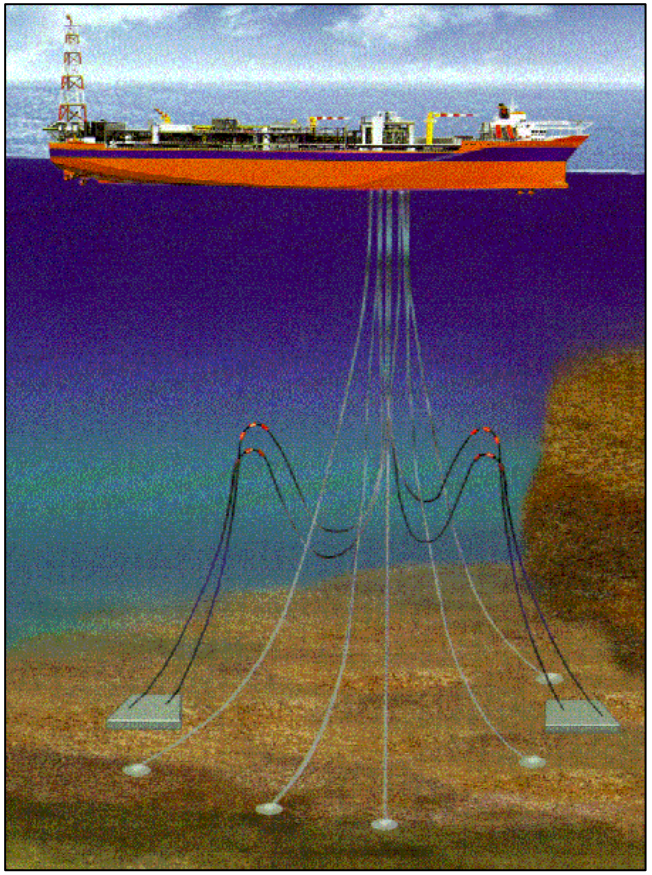
Significant Contributions Since 1992

DeepStar is a collaborative industry led forum focused on:

- Enhancing existing deepwater technologies.
- Developing new enabling deepwater technologies.
- Gaining the acceptance of deepwater technologies by regulators and industry.
- Providing a forum and a process for discussion, guidance and feedback with contractors, vendors, operators, regulators and academia, regarding deepwater production system technology.

“Focused”

Ultra-Deepwater Resources.—Awards from allocations under section 999H(d)(1) shall focus on the development and demonstration of individual exploration and production technologies as well as integrated systems technologies including new architectures for production in ultra-deepwater.

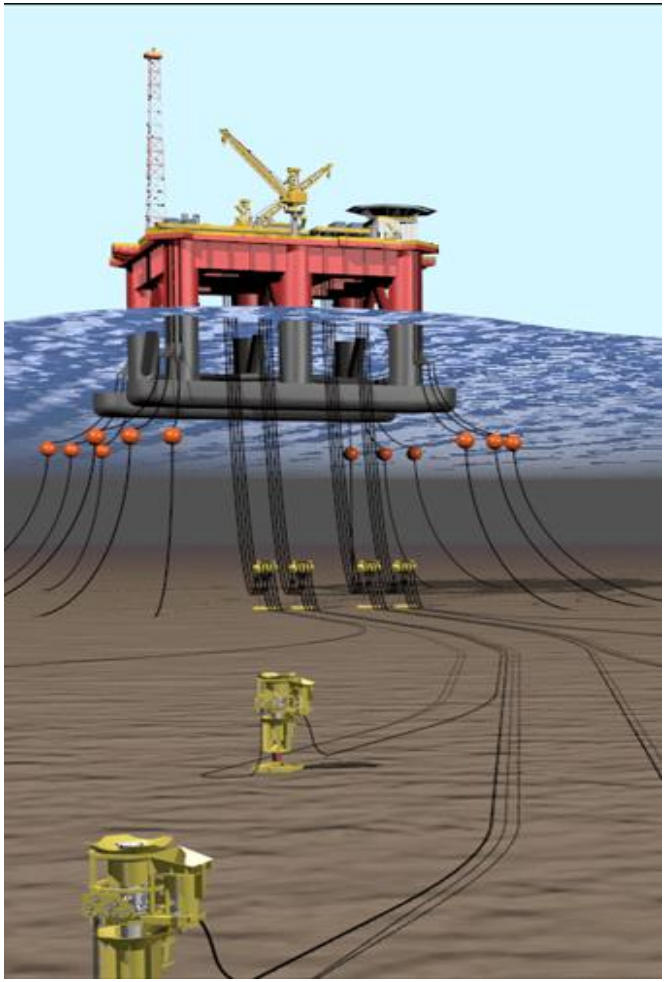


Deepwater versus Ultra-Deepwater

- DEEPWATER.—The term ‘‘deepwater’’ means a water depth that is greater than 200 but less than 1,500 meters.

- ULTRA-DEEPWATER.—The term ‘‘ultra-deepwater’’ means a water depth that is equal to or greater than 1,500 meters.

Technology Focus



- ULTRA-DEEPWATER ARCHITECTURE.—The term ‘‘ultra-deepwater architecture’’ means the integration of technologies for the exploration for, or production of, natural gas or other petroleum resources located at ultra-deepwater depths.
- ULTRA-DEEPWATER TECHNOLOGY.—The term ‘‘ultra-deepwater technology’’ means a discrete technology that is specially suited to address one or more challenges associated with the exploration for, or production of, natural gas or other petroleum resources located at ultra-deepwater depths.
- Also includes: drilling to formations in the Outer Continental Shelf to depths greater than 15,000 feet.

We Can Make a Difference

MMS estimates there is more than 50 billion recoverable BOE remaining to be discovered in the GOM in deep and ultra-deepwater (2000).

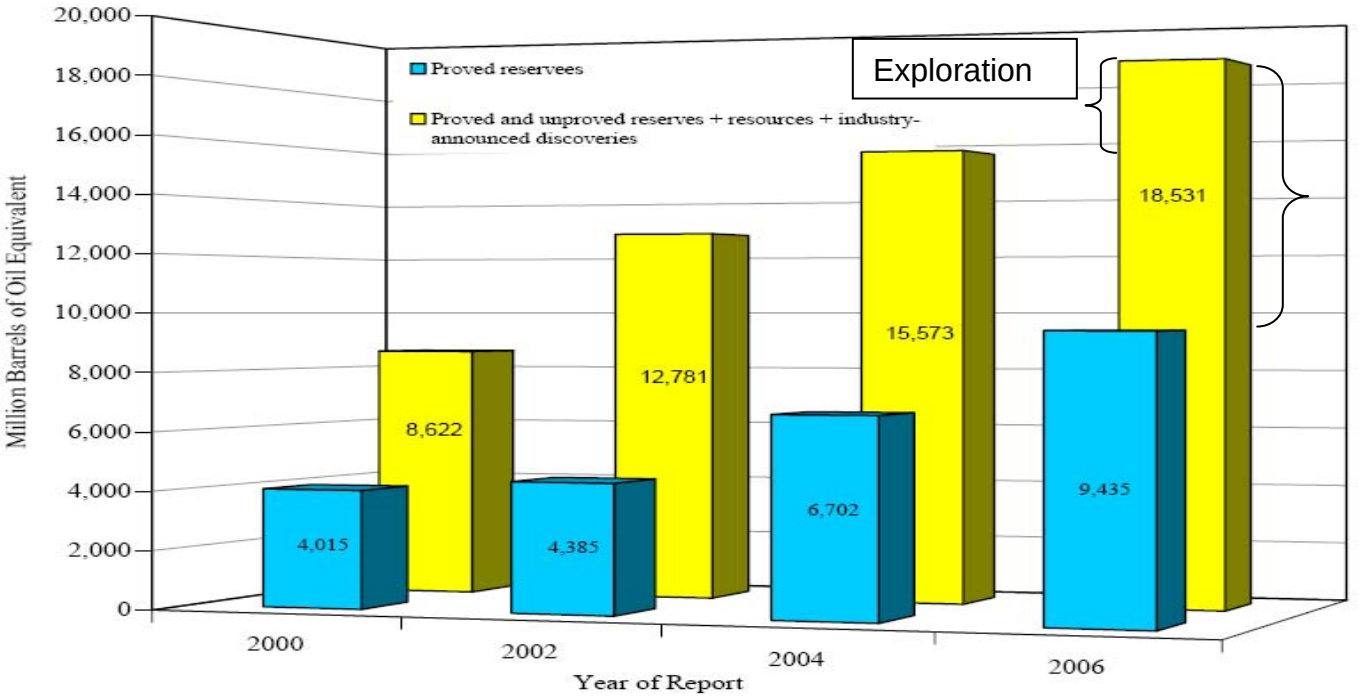


Figure 78. Comparison of 2000, 2002, 2004, and 2006 deepwater GOM reports: successive increases in deepwater BOE.

RPSEA UDW Objectives

1. Increase the supply of UDW Oil and Gas resources,
2. Reducing the costs to find, develop and produce such resources,
3. Increasing the efficiency of exploration for such resources,
4. Increasing production efficiency and ultimate recovery of such resources,
5. Improving safety, and
6. Improving environmental performance, by reducing any environmental impacts associated with UDW exploration and production.

Draft Annual Plan Input

Event Type	Location	Date	Description
Roadmap session	Houston, Tx. (Tx. A&M & RPSEA)	Oct05	Ultra-Deepwater Technology Roadmap Workshop; led by Tx. A&M, 100+ participants, 6 break-out sessions and final report
RPSEA Forums	Cambridge, MA. (MIT)	Oct06	Autonomous Intervention for Deepwater O&G Operations Forum
	Los Angeles, CA (USC)	Nov06	Ultra-deepwater Resources
	Houston, TX. (MIT & Chevron)	Jan07	Vortex Induced Vibrations Forum
	Tulsa, OK (University of Tulsa & Halliburton)	Feb07	Flow Assurance
RPSEA Advisory workshops	Houston, TX.	Oct06-Feb07	Technical Advisory Committees; numerous over this timeframe including hundreds of experts
Other	NPC study	Nov06	Draft Technical Section information
	RPSEA PAC & DeepStar Systems Engineering		Identification of Technology Needs study; 7902 report

RPSEA UDW Structure
PAC and TACs

Resource of >700 SMEs from industry, academia and government!

Program Advisory Committee
"The PAC"

Regulatory TAC (X100)
51 Active Members

Flow Assurance TAC (X200)
100 Active Members

Subsea Systems TAC (X300)
138 Active Members

Floating Systems TAC (X400)
150 Active Members

Drilling & Completions TAC (X500)
66 Active Members

Reservoir Engineering TAC (X700)
44 Active Members

Met Ocean TAC (X800)
55 Active Members

Systems Engineering TAC (X900)
76 Active Members

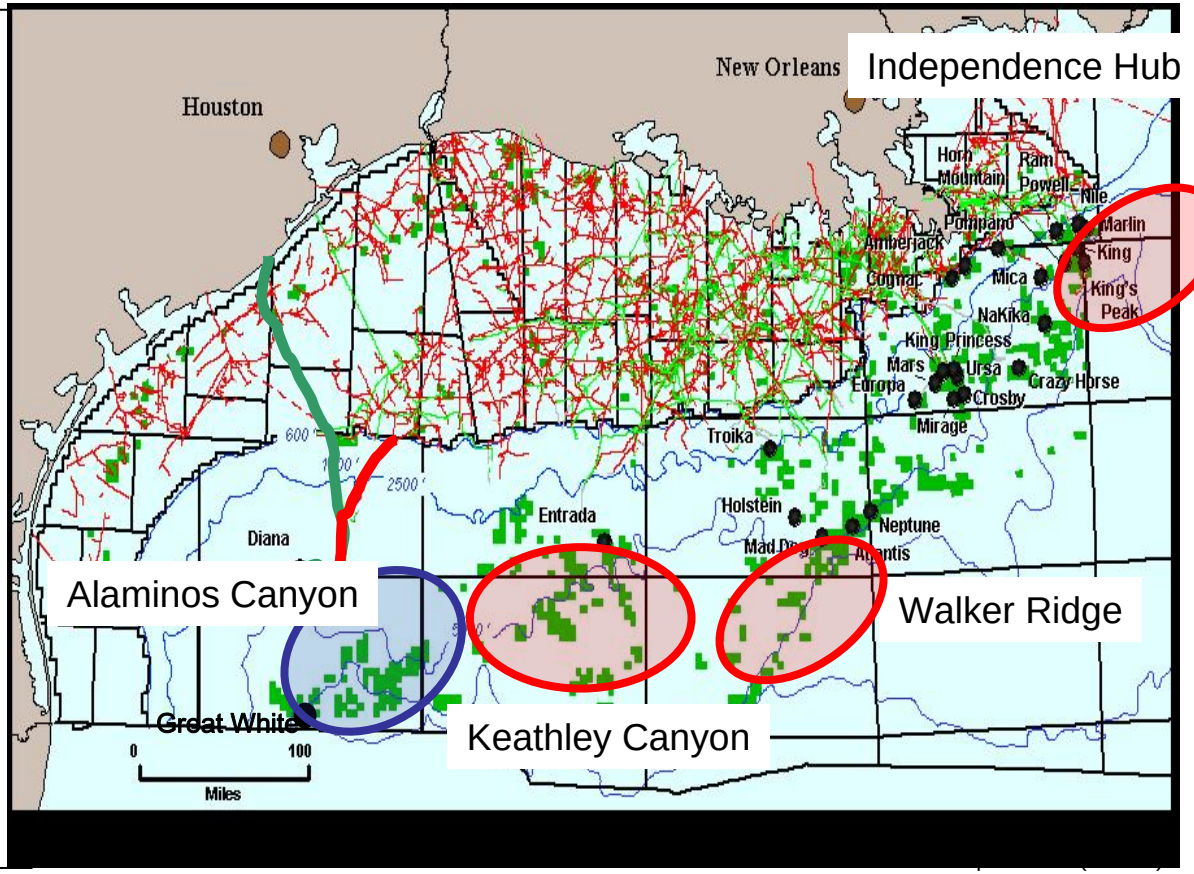
Geoscience TAC (X000)
15 Active Members

RPSEA UDW Focus Area GOM Deepwater Trends

- **Walker Ridge /Keathley Canyon**
  - **Sub-salt**
  - **Deeper wells**
  - **Tight formations**
- **Alaminos Canyon**
  - **Viscous crude**
  - **Lacking infrastructure**
- **Eastern Gulf – Gas Independence Hub**
  - **Higher pressure**
  - **Higher Temperature**
  - **CO_2 / H_2S**

Higher Drilling Costs

Challenging Economics



RPSEA Research Partnership to Secure Energy for America

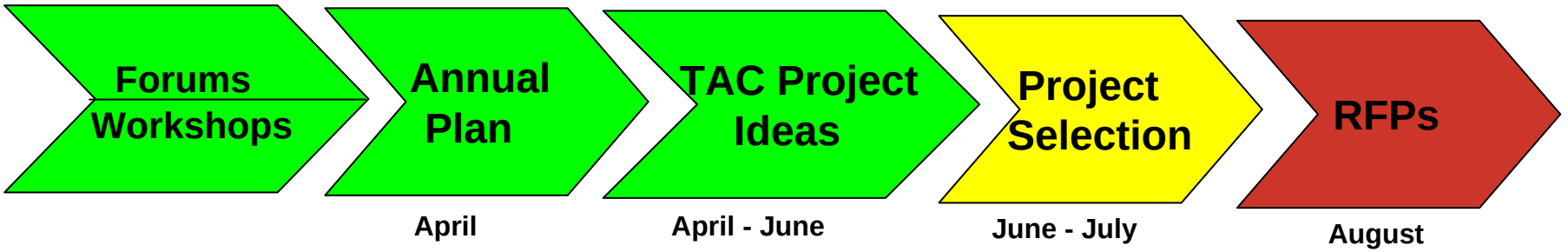
UDW Base Cases

- 4 deepwater Reservoir Base Cases focus work.
  - Canopy – (Subsalt; low perm)
  - Coyote – (Low energy reservoir)
  - Gumout – (Viscous Production)
  - Diablo (XHPHT Field)

Themes

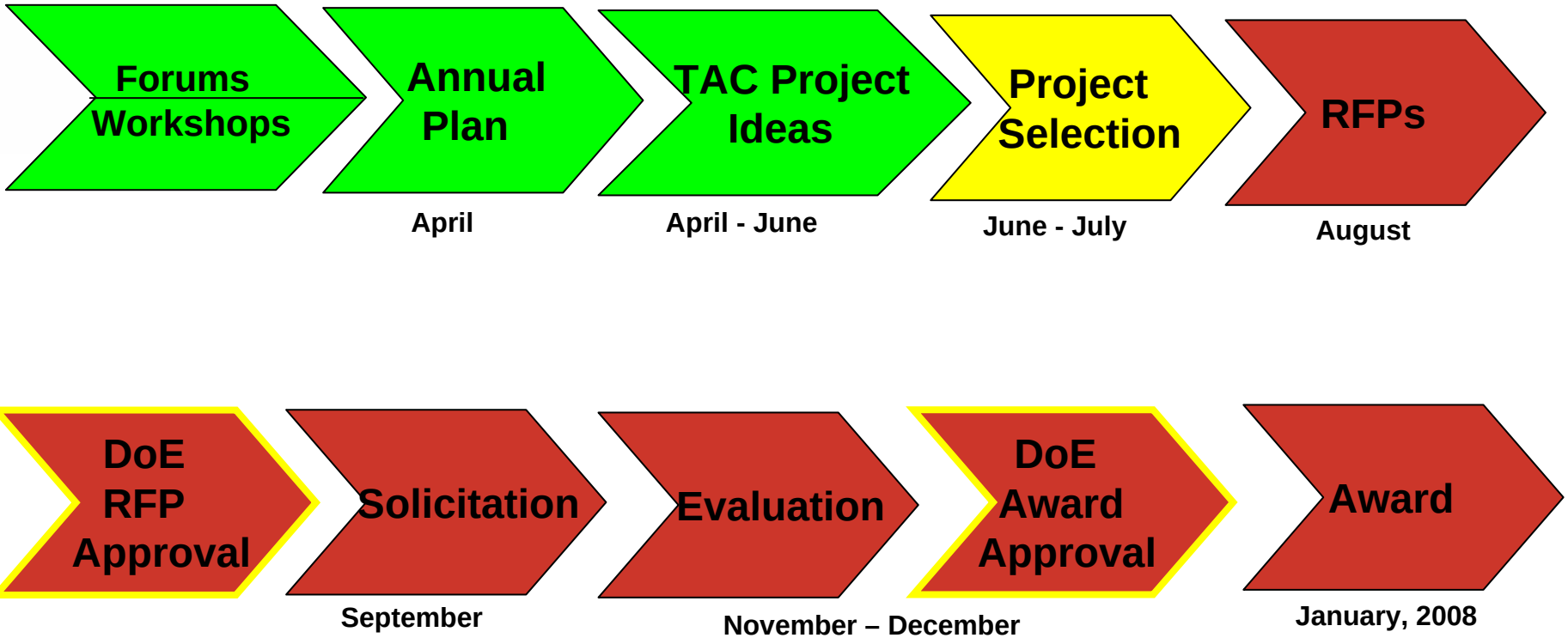
Field / Resource Area	Technology Challenge	Themes
Canopy Field	Low permeability reservoir	Completion of long reservoir sections Deep reservoir stimulation technology Formation Integrity at Commercial Production Conditions (fluid rates, differential pressures
Gumout Field	High Viscosity Oil	Intervention strategies and well architecture for downhole equipment maintenance (pumps for example) + viscous oil technologies
Coyote Field	Small Reserve Fields	Drilling with small margin between overburden and fracture pressure (dual density drilling is a potential solution for this issue
Diablo Field	XHPHT (22.5 ksi x 350+°F) Sour service	Optimized UDW Field Development Concepts for Improved Economics Materials Sciences for UDW Risers and Moorings,tubulars, tools, instrumentation, and comletion equipment Improved Design and Analysis Methods Mooring and Riser Integrity Management + HPHT Flow Assurance
Crosscutting	Environmental	Safety Barrier Testing and Validation Criteria Environmental and Regulatory Impact of Emerging Technologies UDW Produced Water Management
	Economics	Optimized UDW Field Development Concepts for Improved Economics Materials Sciences for UDW Risers and Moorings Improved Design and Analysis Methods Mooring and Riser Integrity Management Flow Assurance Geoscience (Subsalt Imaging, Reservoir & Fluid Charac
	Metocean	Effect of changing weather patterns on hurricane severity Operational 3-D current forecast model capable of simulating the Loop/eddies Modeling for strong near-bottom currents along the Sigsbee Escarpment
	Reservoir	Appraisal Field development Production and Reservoir Surveillance
	Subsea Facilities	Subsea Production Equipment Enhancements Mature Subsea Processing Technology Pipeline, Flowline and Umbilical Technology Subsea Well Intervention Technology improvement
	Systems Engineering and Architecture	Design Criteria for the Base Cases. System impact of proposed technologies on the field development scenarios. Grand Challenge projects Small Business Initiatives

Off and Running!



Questions

Off and Running!



Appendix 8

Overview of EPAct 2005 Section 999

Presenter: Bill Hochheiser

Overview of Section 999D(a)

Ultra-Deepwater Advisory Committee

Section 999D(a) Membership Categories

- Individuals with extensive research experience or offshore operational knowledge
- Individuals broadly representative of affected interests in ultra-deepwater oil and gas, including environment and safety
- No federal employees
- No board members, officers, or employees of the program consortium (RPSEA)

Section 999D(a) Committee Duties

- Advise the Secretary on the development and implementation of programs under Subtitle J related to ultra-deepwater natural gas and other petroleum resources; and
- Carry out section 999B(e)(2)(B)

(see next slide)

Section 999D(a) Annual Plan Process

- **Section 999B(e)(2)(B): The Secretary shall submit the recommendations of the program consortium (the draft annual plan) to the advisory committees and such advisory committees shall provide the Secretary written comments by a date determined by the Secretary.**
- **Section 999B(e)(3): The Secretary shall transmit to Congress and publish in the Federal Register the annual plan, along with any written comments received.**