Ultra-Deepwater Advisory Committee (UDAC)

July 15, 2009

Tenth Meeting

Teleconference Meeting Minutes

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

Ultra-Deepwater Advisory Committee

I hereby certify that this transcript constitutes an accurate record of the Ultra-Deepwater Advisory Committee Teleconference held on July 15, 2009.

Arnis Judzis, Vice Chair
Ultra-Deepwater Advisory Committee

7-2-10

Date

Minutes of the 10th Meeting of the Ultra-Deepwater Advisory Committee
(Conference Call Meeting held July 15, 2009)

The conference call meeting[1] was called to order by Mr. Arnis Judzis, Vice-Chair, at 8:15 am EDT. The Committee Manager (CM), Ms. Elena Melchert, DOE, called the roll of members and confirmed that a quorum was present. Nine of 14 Ultra-Deepwater Advisory Committee (UDAC) members were present on the call[2]. Also present were Mr. Guido DeHoratiis, DO and Designated Federal Officer (DFO), and Mrrs. Roy Long, Gary Covatch, George Guthrie and Chandra Nautiyal of DOE/NETL. Mrrs. Karl Lang and Rob Matey, DOE support contractors, were present as Recorder and Webex operator, respectively. After confirming the presence of a quorum, the UDAC Vice-Chair, Mr. Arnis Judzis, took control of the meeting in the absence of the Chair, Mr. Kent Abadie.

Mr. Judzis called the meeting to order and asked the DFO for any opening remarks. The DFO thanked everyone for participating, introduced the members of the public who were present[3]. The CM read a comment for the record provided by a member of the public related do noise caused by subsea processing equipment.[4]

Mr. DeHoratiis presented a short update on issues related to continued funding for Section 999. He pointed out that there was no mention of Section 999 in the House of Representatives (HR) Energy & Water Appropriations Sub-Committee bill reported out last week, and that this meant the funding would continue for Fiscal Year (FY) 2010. He reported that the HR Interior Appropriations bill did include language to restrict the funds from being transferred from the MMS[5], which did threaten FY 2010 funding but that the Senate Interior Appropriations bill included no such language.

He further reported that the Senate Energy bill included language calling for transfer of the funds related to the ultra-deepwater portion of Section 999 to the Interior Department for use in conducting an inventory of oil and gas resources on the OCS[6]. He also reported that the Defense Authorization bill, which had cleared the HR and is in the Senate, calls for a redirection of the Section 999 funding in FY 2011 to fund disabled veteran retirement benefits. Mr. DeHoratiis said that this would be the bill most likely to pass. He expects to have updated information on all of these items for the September 15th meeting.

Ms. Melchert reported on the recent Presidential Order establishing an Ocean Policy Task Force that will be an interagency group focused on the accommodation of multiple uses of the oceans. She will be monitoring this activity for any impact it may have on the Section 999 research program.

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[1] Approved agenda included as Attachment 1
[2] List Members and DOE staff and contractors included as Attachment 2
[3] Public sign-in sheet included as Attachment 3
[4] Statement provided by Michael Stocker included as Attachment 4
[5] Minerals Management Service
[6] Outer Continental Shelf

The DFO stated for the record that the purpose of the UDAC meeting was to provide an update on the Section 999 research program activities as a context for the Committee's future review of the next annual plan. He then returned control of the meeting back to Mr. Judzis.

Mr. Judzis then recognized Ms. Mary Jane Wilson, Chair of the UDAC Subcommittee on Process[7], to present the most recent findings by the Standing Committee. Ms.Wilson highlighted the changes that had taken place with regard to project solicitation, project selection, project award, and program management. She pointed out that the time between solicitation and selection, and between selection and contract, had decreased significantly, and that, overall, the Subcommittee members were pleased with the improvements.

Ms.Wilson listed some of the specific actions taken by RPSEA[8] and NETL to achieve these improvements. She said that there is still some concern regarding the relatively low number of responses to solicitations, and the lack of growth in industry cost-share above the minimum requirement.

Mr. Ray Charles, filling in for Mr. Joe Fowler (who was absent at this point but who joined the meeting later), was then recognized to present a brief report for the UDAC Standing Subcommittee on Portfolio[9]. He reported that the Subcommittee held several conference calls. The Subcommittee worked with RPSEA to construct a matrix illustrating the balance of the program portfolio comparing different parameters including incremental technology improvements versus breakthrough improvements, long-term versus near-term, and finding new resources versus moving discovered resources to production, and cost reduction.

He reported that the Subcommittee is comfortable with the breadth, depth and balance of the portfolio. They also identified that funding should be increased, and recognized the improvements noted by the Process Subcommittee. He pointed out that the balance of the portfolio will be adjusted as projects are added, and that the Subcommittee's review will be more meaningful over a three year period when more projects are in place.

At this point, Mr. Roy Long, NETL, presented a status update on overall program activities for Ultra-Deepwater research (Attachment 5). He responded to questions about templates for subcontracts and how their implementation had reduced award time, and the change in makeup of the RPSEA TACs[10] over time.

Mr. Art Schroeder, RPSEA, was recognized for an update on the progress of the Ultra-Deepwater research project portfolio administered by RPSEA reporting on 2008 and 2009 project progress (Attachment 6). He commented on the factors responsible for the

[7] Standing Subcommittee on Process members listed in Attachment 2
[8] Research Partnership to Secure Energy for America
[9] Standing Subcommittee members on Portfolio listed in Attachment 2
[10] Technical Advisory Committees

low number of proposals (a point raised earlier), noting that companies were not interested in making the financial accounting changes necessary to comply with Federal procurement regulations. He said that a change to the 2009 project solicitation would be a less proscriptive, "initiative-based" approach.

At this point a 10-minute break was called, and Mr. Morton Wiencke noted that he would not be able to return to the meeting. The Chair acknowledged that a quorum would not be present after the break. The CM noted that because the purpose of the meeting was for information only and no consensus decisions were planned, that a quorum was not needed for the meeting to continue. The DFO agreed to allow the meeting to proceed.

After the break, Mr. George Guthrie, NETL, presented the NETL Complementary Program status (Attachment 7) . Mr. Guthrie described each focus area and described the work currently underway on projects within each area. He highlighted the fact that NETL had proposed a project on equation-of-state development for high-pressure/high-temperature systems in response to a RPSEA request because no proposals on that topic had been received by RPSEA.

He answered several questions related to the timing of the online "knowledge management database." Mr. Dan Daulton offered to send him some current information related to a microwave heating of oil shale project. Ms. Wilson suggested that as related to the air monitoring project, the speciation of hydrocarbons is an important and under-researched area. She indicated her personal endorsement of this line of research in particular, and agreed to set up a conference call with Mr. Guthrie to discuss specific issues related to the project.

At this point Mr. Fowler joined the meeting bringing into effect a quorum of members.

Mr. Long was again recognized to present an update on NETL's responses to the Committee's recommendations received to date, and an update of the NETL Technology Transfer Program (Attachment 8). He answered a question about the timing of the various features of the NETL website in September 2009 and thereafter. Ms. Melchert, DOE, commented on the importance of technology transfer in making possible the benefits projected by the NETL Benefits Assessment Project.

At this point, Mr. Charles was called away, and a quorum was no longer in effect. The DFO allowed the meeting to continue as no consensus decisions were pending.

The CM then outlined the dates of the UDAC's next steps:

- 1st week of August- Draft 2010 Annual Plan delivered to the UDAC and posted on the UDAC website[11]. Members to begin private review of the annual plan.
- Sept 16-17, 2010- 1 ½ day UDAC meeting in San Antonio, TX, to review the annual plan and establish review subcommittees

[11] http://www.fossil.energy.gov/programs/oilgas/advisorycommittees/UltraDeepwater.html

- October 14th, full-day UDAC meeting in Los Angeles, CA, to review subcommittee reports and develop final UDAC recommendations; establish Editing Subcommittee
- October 23, conference call UDAC meeting to review Editing Subcommittee report and to vote on final recommendations.

The CM advised that the URTAC[12] had decided to have members send their comments on the draft annual plan to the chair and two other members (a "kitchen cabinet"), to facilitate the development of a preliminary approach for how the committee would organize itself for formal review of the annual plan during the September meeting in San Antonio. There was some discussion of this approach, and it was decided to adopt the same approach.

Mr. Judzis expressed his appreciation for everyone's participation, and complemented all of the presenters on their good information. In general, the members felt the meeting to be very productive, and that they were well prepared for a speedy and efficient meeting in September. The meeting was adjourned at ~11:30 a.m.

[12] Unconventional Resources Technology Advisory Committee established with the UDAC to advise the Secretary of Energy on implementation of EPAct Title IX, Subtitle J, Section 999.

Attachments

	Presenter	Topic
1	For the Record	Meeting Agenda
2	For the Record	Committee Members and Meeting Participant Attendance
3	For the Record	Members of the Public Attendance
4	For the Record	Statement Provided by Michael Stocker
5	Mr. Roy Long	Status Update on Program Activities for Ultra-Deepwater Research
6	Mr. Art Schroeder	Ultra-Deepwater Research Project Portfolio
7	Mr. George Guthrie	NETL Complementary Program Status
8	Mr. Roy Long	Status Update of the NETL Technology Transfer Program

Attachment 1

Department of Energy
Washington, DC 20585

10th Meeting
Ultra-Deepwater Advisory Committee
July 15, 2009, 8:00 a.m. EASTERN, WebEx/Conference Call Meeting

PUBLIC ACCESS: 955 L'Enfant Plaza North, SW, Suite 1500, Washington, DC

AGENDA

7:30	Registration; Begin Member call in	
8:00	Call to Order - Welcome	Arnis Judzis, Vice-Chair
	Member Roll Call and the presence of a quorum	Elena Melchert, Committee Manager
	Meeting purpose and review of the agenda; Insights regarding future funding and other pending legislation; *Draft 2010 Annual Plan* delivery, and pending meetings in September and October 2009	Guido DeHoratiis Designated Federal Officer
8:25	Report from the Standing Subcommittee regarding Process; Member Q/A and Discussion	Mary Jane Wilson Subcommittee Chair
8:45	Report from the Standing Subcommittee regarding Portfolio; Member Q/A and Discussion	Joe Fowler for Quenton Dokken Subcommittee Chair
9:05	Status Update of Subtitle J: Benefits Assessment Project; Technical Committee;	Roy Long, DOE/NETL
9:20	Status Update of Cost-Shared Program: Overview of 2008 and 2009 activities in the Ultra-Deepwater Program	Art Schroeder, RPSEA
9:50	Member Q/A and Discussion regarding the Cost-Shared Program	Arnis Judzis, Vice-Chair

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10:15	BREAK	
10:25	Status Update regarding the NETL Complementary Research Program activities	Roy Long, DOE/NETL
10:35	Member Q/A and Discussion regarding the Complementary Research Program	Arnis Judzis, Vice-Chair
10:45	Status Update of Committee Recommendations with focus on Technology Transfer Program	George Guthrie DOE/NETL
11:45	Member Discussion	Arnis Judzis, Vice-Chair
12:00	Adjourn	Arnis Judzis, Vice-Chair

APPROVED: _____ 7/14/09
Guido DeHoratiis, Designated Federal Officer — Date

Attachment 2

Committee Members and Meeting Participants

Committee Members Present
Raymond Charles (present part time)
Dan Daulton
Joe Fowler (present part time)
Luc Ikelle
Arnis Judzis (Vice-Chair)
Richard Mitchell
Dan Seamount
Stephen Sears
Paul (Morton) Wiencke (present part time)
Mary Jane Wilson

Committee Members Not Present
Kent Abadie (Chair)
Paul Cicio
Quenton Dokken
Paul Tranter

DOE and Contractor Staff Present
Guido DeHoratiis (DOE- Designated Federal Officer)
Elena Melchert (DOE – Committee Manager)
Roy Long (National Energy Technology Laboratory (NETL))
Gary Covatch (NETL)
George Guthrie (NETL)
Chandra Nautiyal (NETL)
Art Schroeder (Research Partnership to Secure Energy for America (RPSEA))
Rich Haut (H ouston Advanced Research Center)
Karl Lang (TMS) (Minutes)
Rob Matey (TMS) (Audiovisual/Webex)

Portfolio Sub-Committee
Quenton Dokken – Chair
Ray Charles
Arnis Judzis
Joe Fowler
Steve Sears

Process Sub-Committee
Mary Jane Wilson - Chair
Morton Wiencke
Paul Tranter
Luc Ikelle
Kent Abadie
Ray Charles

Attachment 3

Ultra-Deepwater Advisory Committee Meeting

Public Walk-In List - July 15, 2009

First Name	Last Name	Organization
Carliane	Johnson	Env. Consultant
Serda	Ozbenian	Ocean Conservation Research

Attachment 4

OCEAN CONSERVATION RESEARCH

Science and technology serving the sea

Elena Melchert
U.S. Department of
Energy, Office of Oil and Natural Gas,
Washington, DC 20585

Dear Ms. Melchert, July 8, 2009

Thank you for spending a moment with me today discussing the objectives of the Ultra-Deepwater Advisory Committee. As the US moves ahead in developing domestic sources of oil and gas, the outer continental shelf is becoming a planned area of development. The new technologies which are permitting field development in deeper waters include equipment that puts some of the extraction processing on the sea floor. This equipment includes separators, de-sanders, pressurizers and injectors.

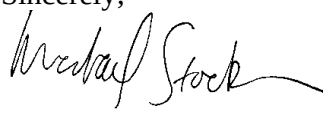
This equipment is operating under pressures in excess of 100 atmospheres, and themselves often generate pressures in excess of 5000 psi. Given these conditions, particularly in settings where there are mixed viscosity fluids and gasses, this equipment is likely to be very noisy.

As you may be aware, human generated ocean noise has been linked to compromised habitat, decreased fisheries productivity, and in extreme cases, catastrophic marine mammal strandings. These effects have come up as a surprise only within the last decade or so, and the science of understanding the impacts is far behind the generation of the noise.

While we know that the ocean is an acoustic environment and that most sea animals have some adaptation to sound perception, we know very little about how the growing saturation of the marine environment with the sounds of human enterprise is compromising marine habitat. We don't know how masking impacts marine animal's ability to communicate, avoid predation, establish contact with conspecifics, and find food. We do not know how chronic exposure to elevated noise levels affects the hearing of fish, sharks, sea turtles, or marine mammals.

In order to begin to understand scope of these impacts, we first need to characterize the sounds we introduce into the environment. Toward this end we feel that it is imperative that the noise from the new seafloor processing equipment be characterized and evaluated prior to permitting their widespread use in the development of offshore oil and gas resources.

Sincerely,



Michael Stocker
Director

Box 559, Lagunitas, California 94938
V. 415.488.0553 F. 415.488.1725
www.OCR.org

Attachment 5

Status Update: EPAct 2005 Title IX, Subtitle J Section 999 – Project NT42677, "Ultra-Deepwater and Unconventional Natural Gas and Other Petroleum Resources Program

Roy Long
Technology Manager, EPAct 2005 Title IX, Subtitle J, Section 999

July 15, 2009

UDAC Update Presentation Outline

- **Consortium Accomplishments**
- **UDW Program RFP Summary**
  - **2007**
  - **2008**
- **2009 Funding Disbursement History**
- **2009 Program / Process Enhancements**
  - Contractual / GAO
  - Risk Mitigation / Management

Program Accomplishments
Solicitations & Awards

Overall:

- 3 Annual Plans completed
- 15 solicitations released under 2007 R&D funding
- 43 projects selected for award under 2007 solicitations
  - 17 Ultra-Deepwater projects
  - 19 Unconventional Resources projects
  - 7 Small Producers projects

Program Accomplishments
Solicitations & Awards

- **Current Status:**
- Initial projects just underway
- 69 proposals received under 2008 Unconventional Resources RFP
  - 9 selections approved
- 23 proposals received under 2008 Small Producers RFP
  - 6 selections approved, 1 subcontract awarded (7/8/09)
- 27 proposals received under 11 UDW RFPs
  - 3 selections approved
- 7 solicitations planned to be released late Summer 2009
  - 5 Ultra-deepwater ($14.8 million)
  - 1 Unconventional Resources ($13.7 million)
  - 1 Small Producers ($3.2 million)

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RPSEA Ultra-Deepwater RFP Activity 2007 Funding

• **4 RFPs released**	**Nov. 5, 2007**
• **5 RFPs released**	**Nov. 28, 2007**
• **4 RFPs closed**	**Dec. 27, 2007**
• **5 RFPs closed**	**Jan. 28, 2008**
• **5 RFPs released**	**Feb. 11, 2008**
• **5 RFPs closed**	**April 14, 2008**
• **8 Selections approved**	**May 7, 2008**
• **9 Selections approved**	**July 28, 2008**

RPSEA Ultra-Deepwater RFP Activity 2008 Funding

• 6 RFPs released	Dec. 23, 2008
• 5 RFPs released	Feb.19, 2009
• 6 RFPs closed	Mar. 3, 2009
• 5 RFPs closed	Apr.20, 2009
• 3 selections approved	May 29, 2009
• 11 additional selections anticipated	TBD

UDAC Update Presentation Outline

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2009 Funding Disbursement History

- **November 6, 2008: 2009 Annual Plan submitted to Secretary of Energy**
- **December 22, 2008: NETL obligates $1,000,000 to RPSEA contract**
- **January 13, 2009: Annual Plan approved**
- **January 27, 2009: Annual Plan published in Federal Register**
- **February 11, 2009: Remainder of FY09 funding arrives at NETL**
- **March 4, 2009: Remainder of FY09 Funds obligated to RPSEA contract**

UDAC Update Presentation Outline

- Consortium Accomplishments
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  - 2008
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  - Contractual / GAO
  - Risk Mitigation / Management

2009 Program / Process Enhancements - Contractual / GAO

- RFP templates developed
- Subcontract templates developed
- Streamlined proposal submission process
- Hold Contracting Process Overview Meeting prior to solicitation release
- Use secure FTP site to distribute proposals to reviewers
- NETL's technology transfer program inclusive of RPSEA – Comprehensive Tech Transfer Program
- Streamlined Subcontract Approval Process
- Benefits methodology developed
- **Added documentation to address GAO comment on whether this work would be done without government funding.**

2009 Program / Process Enhancements - Risk Mitigation / Management

- Annual Plan Schedule developed for optimal program continuity, i.e., minimal delays in funding
- Houston Area Office opened
- Continuous dialogue with RPSEA
- Blanket waiver received for Intellectual Property
- NETL Begins Development of comprehensive metrics for Offshore and Onshore Programs synergistic with Technology Transfer effort

Questions

Attachment 6

RPSEA

Research Partnership to Secure Energy for America

Ultra-Deepwater Advisory Committee
July 15, 2009, 8:00 a.m. EASTERN,
WebEx/Conference Call Meeting

Art Schroeder
Manager, UDW Technology

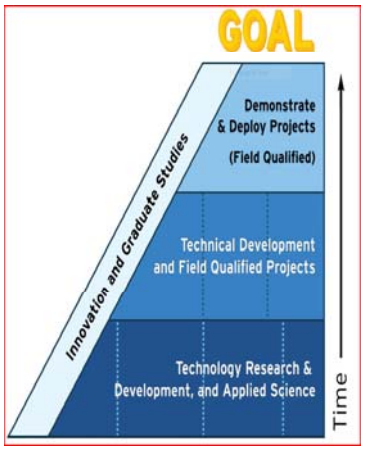
Secure Energy for America

UDW Program Goal

The goal of the UDW is to exploit the ultra-deepwater resource base and to convert currently identified (discovered) resources into economic recoverable (proven) reserves, while protecting the environment, thereby providing the U.S. consumer with secure and affordable petroleum supplies. This goal will be achieved by:

- Increasing the production of ultra-deepwater oil and gas resources
- Reducing the costs to find, develop, and produce such resources
- Increasing the efficiency of exploitation of such resources
- Increasing production efficiency and ultimate recovery of such resources
- Improving safety and environmental performance by minimizing environmental impacts associated with ultra-deepwater exploration and production

UDW Program Objectives



Near Term

Objective 1: Ongoing Identification of Technology UDW Needs

Objective 2: Technology Research & Development, & Applied Science

Objective 3: Awareness and Cost-Share Development.

Longer Term

Objective 4: Technical Development and Field Qualified

Objective 5: Environmental & Safety Technology Development & Deployment

Objective 6: Technology Demonstration.

Objective 7: Technology Commercialization and Industry Deployment

Increasing Lag Between Discovery and Development

Proven Reserves Add Value

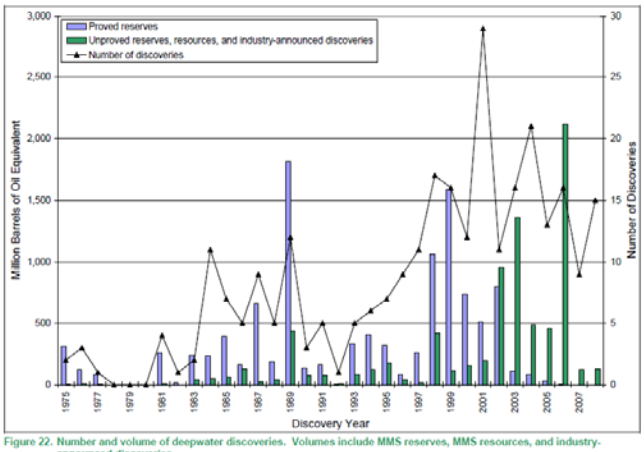


Figure 22. Number and volume of deepwater discoveries. Volumes include MMS reserves, MMS resources, and industry-announced discoveries.

MMS Report 2009 – 016: Deepwater Gulf of Mexico 2009. (continuing trend from 2008-013 report)

Need to reduce costs

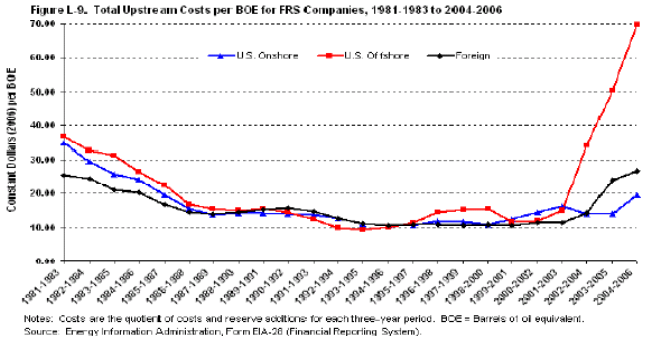
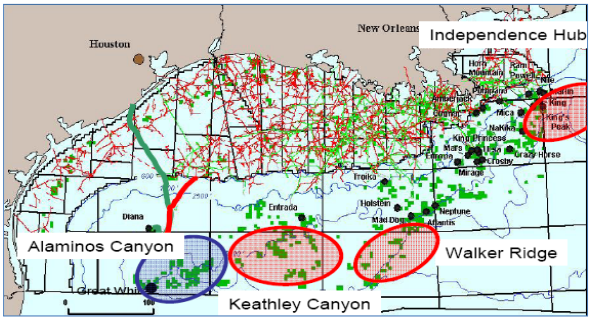


Figure 5. Cost per Barrel of Oil Equivalent (BoE) per US Department of Energy, Energy Information Agency (EIA) January 2008, for companies reporting to EIA's Financial Reporting System (FRS). It does not include state-owned oil companies. http://www.eia.doe.gov/neic/infosheets/crudeproduction.html

UDW Program Approach

Four base-case field development scenarios



The Challenges

Walker Ridge/Keathley Canyon
- subsalt
- deeper wells
- tight formations

Alaminos Canyon
- viscous crude
- lacking infrastructure

Eastern Gulf – Gas
Independence Hub
- higher pressure & temperature
- CO_2/H_2S

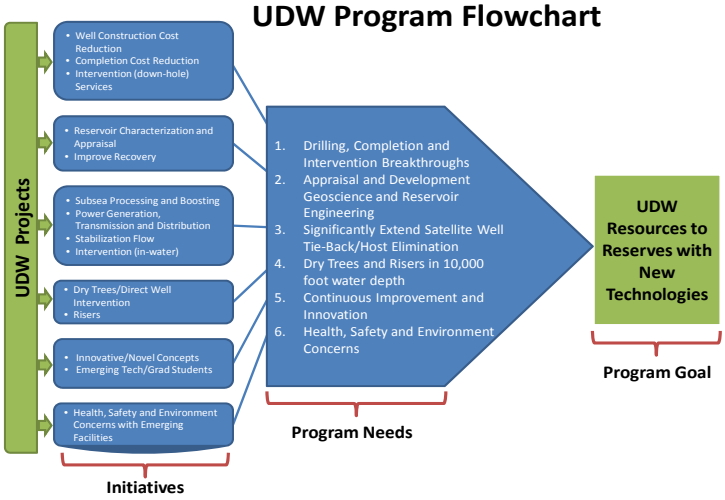
Overall
- higher drilling costs
- challenging economics

UDW Program 'Needs'

1. Drilling, completion and intervention breakthroughs
2. Appraisal & development geoscience and reservoir engineering
3. Significantly extend subsea tieback distances & surface host elimination
4. Dry trees/direct well intervention and risers in 10,000' wd
5. Continuous improvement / optimize field development
   - Per wellbore recovery
   - Cost reduction
   - Reliability improvements
   - Efficiency improvements
6. Associated safety and environmental trade-offs

UDW Program Approach

UDW Program Flowchart



2007 UDW projects

Project	Project Title	Number of bids	Selected	Award (RPSEA max)
DW1201	Wax Control	3	University of Utah	$400,000
DW1301	Improvements to Deepwater subsea measurements	2	Letton Hall Group	$3,564,000
DW1302	High Conductivity Umbilicals	2	Technip	$448,000
DW1401	Composite Riser for UDW High Pressure Wells	3	Lincoln Composites	$1,680,000
DW1402	Deepwater dry tree system for drilling production	4	FloTec / Houston Offshore	$936,000
DW1403	Fatigue Performance of High Strength Riser Materials	2	SwRI	$800,000
DW1501	Extreme Reach Development	2	Tejas	$200,000
DW1603	Design investigation xHPHT, SSSV	6	Rice Univ.	$120,000
DW1603	Robotic MFL Sensor; monitoring & inspecting risers		Rice Univ.	$120,000
DW1603	Hydrate Plugging Risk		Tulsa Univ.	$120,000
DW1603	Hydrate Characterization & Dissociation Strategies		Tulsa Univ.	$120,000
DW1701	Improved Recovery	2	Knowledge Reservoir	$1,600,000
DW1801	Effect of Global Warming on Hurricane Activity	1	NCAR	$560,000
DW1901	Subsea processing System Integration	2	GE Research	$1,200,000
DW1902	Deep Sea Hybrid Power Systems:	1	HARC	$480,000
DW2001	Geophysical Modeling Methods	2	SEG	$2,000,000
summary		32		

2008 UDW projects

TAC Number	Impact	2008 RPSEA Max Share
DW 2101	New Safety Barrier Testing Methods	$ 128,000
DW 1202	EOS improvement for xHPHT	$1,600,000
DW 2201	Viscous Oil PVT	$460,000
DW 2301	Deepwater Riserless Light Well Intervention	$3,411,500
DW 1502	Coil Tubing Drilling & Intervention	$820,000
DW 2501	Early Reservoir Appraisal, Utilizing a Low Cost Well Testing System - Phase 1	$880,000
DW 2502	Modeling and Simulation; MPD	$384,000
DW 2701	Resources to Reserves Development and Acceleration through Appraisal	$400,000
DW 2801	Gulf 3-D Operational Current Model Pilot	$1,248,000
DW 2901	power distribution & components (Component Qualification)	$4,811,000
10 Projects	Totals	$14,142,500

UDW Program status

Categories	2007 Proposals	2007 selected	2007 awarded	2008 proposals	2008 selected	2008 awarded
Universities		5	5	8	3	
National Laboratories		-	-	-		
Nonprofit Corporation		4	4	1	1	
For Profit Corporation		8	7	16	8	
Total	32	17	16	25	12 out of 16(10 + 6)	0

2009 UDW Plan Strategy

- 6 Initiative-based RFPs (6 to 10 project awards)
- Unlike 2007 and 2008, UDW TACs have not voted for individual projects. Rather, the TACs prioritized project ideas by initiatives.
- This input was evaluated by the PAC to decide appropriate balance for 2009 UDW program.
- UDW 2009 RFPs will consist of both specific projects and broader initiative-based requests.

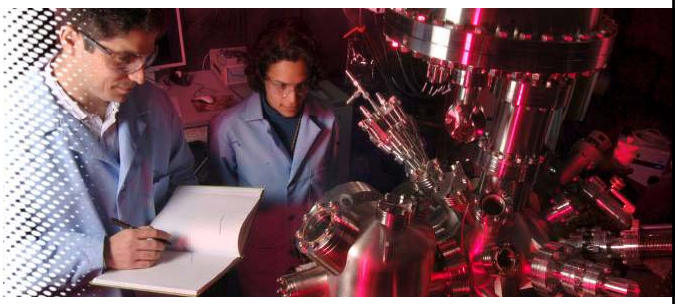
- Timing; anticipate release of RFPs mid August 2009 with 60 day clock, selection November / December 2009 and awards 1Q2010

2009 UDW Funding

RPSEA YR3 Funding Allocation (2009)		Funding Distribution ($k)		
	Title / Description	**Low**	**High**	**Average**
Need #1	**Drilling Completion and Intervention Breakthroughs**			**6,250**
1	Drilling	2,000	5,000	3,500
2	Completions	1,000	3,000	2,000
3	Intervention (Downole Services)			-
4	Intervention (In-Water IMR)	500	1,000	750
5	Extended Well Testing			-
Need # 2	**Appraisal & development geosciences and reservoir engineering**			**1,500**
6	Reservoir Surveillance	1,000	2,000	1,500
Need #3	**Significantly extend subsea tieback distances / surface host elimination**			**3,625**
7	Stabilized Flow	750	1,500	1,125
8	Subsea Power			-
9	Subsea Processing, Pressure Boosting, Instrumentation and Controls	2,000	3,000	2,500
Need #4	**Dry trees / Direct well intervention and risers in 10,000' wd.**			**-**
10	Riser Systems			-
11	Dry Tree Structures			-
Need #5	**Continuous Improvement / Optimize field development**			**3,000**
12	Long Term Research and Development and Graduate Student Program	1,000	2,000	1,500
13	Sensors, tools and Inspection Processes	1,000	2,000	1,500
	Bridging and Contingency	500	750	625
Need #6	**Associated Safety and Environmental Concerns**			**500**
14	Environmental Issues	250	750	500
		10,000	**21,000**	**14,875**

Back-ups

Attachment 7



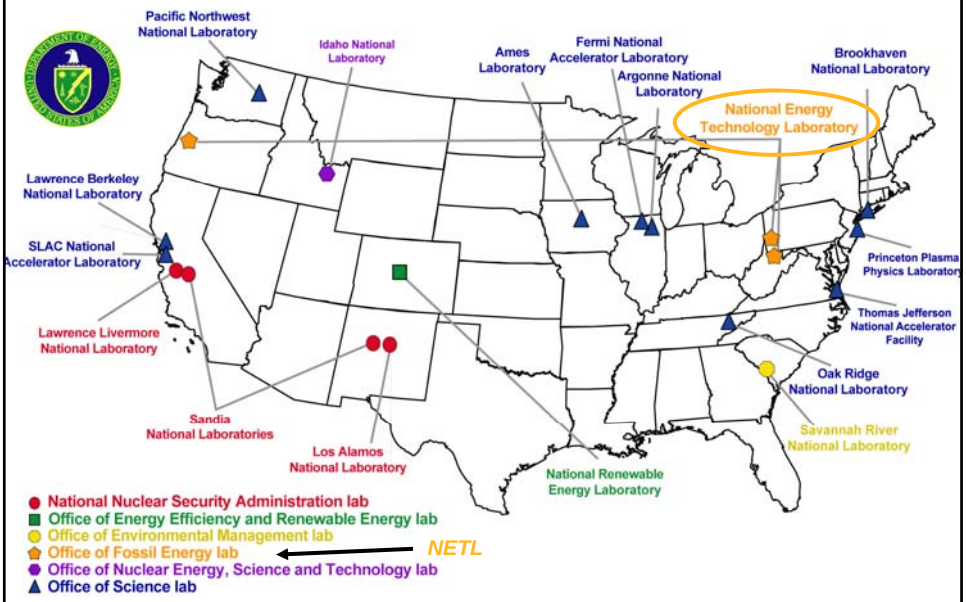
NETL's Complementary Research Program

George Guthrie
Geological and Environmental Systems Focus Area
Office of Research & Development

Primary Research Areas for NETL's Complementary Program

- **Drilling under extreme conditions**
  - experimental facility; materials development/testing; computation
- **Environmental impacts of oil/gas productions**
  - produced water management: data collection, management, assessment
  - air quality: improved reliability and accuracy of predictions (data collection; model development)
  - ecological impacts: improved assessments through novel sensors
  - unconventional fossil production: identification and assessment of potential barriers
- **Unconventional oil and enhanced oil recovery**
  - CO_2 enhanced oil recovery: control of CO_2 viscosity
  - in-situ oil shale production: tunable microwaves with CO_2; environmental barriers
  - oil production from fractured media (e.g., shales): improved reliability and accuracy of predictions for multiphase flow in Bakken
- **Resource assessment; geospatial data management**
  - knowledge management database development
  - high resolution data on Marcellus shale for improved assessment

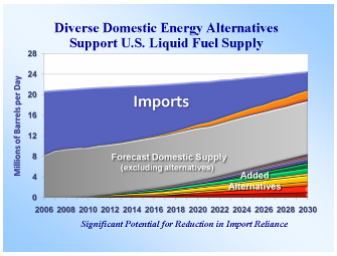
U.S. Department of Energy National Labs



NETL applies basic science to technology development, demonstration, and transfer.

Onsite Research and Development

Systems, Analysis, and Planning



Extramural Research and Collaboration

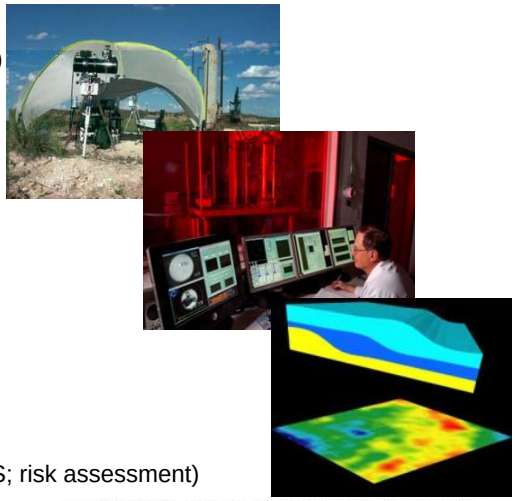
More Than 1,800 Activities in the United States and 40+ Other Countries

Geological/Environmental Systems Research Areas

Science and engineering research of natural systems to enable the clean production & utilization of fossil energy.

Complementary Program

- Extreme drilling (deep & ultradeep)
- Environmental impacts
- Unconventional oil & gas
- CO_2-EOR



Methane hydrates

CO_2 Storage

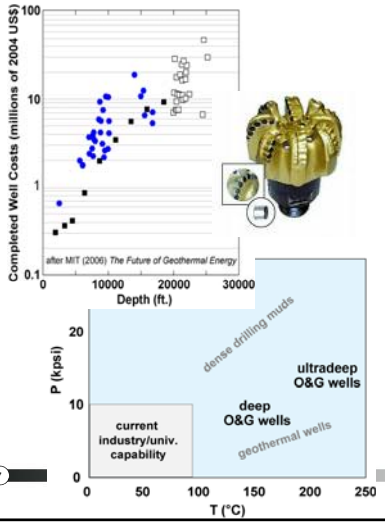
- Capacity, injectivity, long-term fate
- Seal integrity (cement durability)
- Potential impacts (fluid-rock interactions)
- Monitoring and assessment (airborne, surface, subsurface; GIS; risk assessment)

Primary Research Competencies for Geologic & Environmental Systems (GES)

- **Ultra-deep drilling**
  - experimental facility; materials development/testing; computation
- **Multiphase, multiscale flow**
  - particular strength in fracture flow (both computation and experiment; e.g., CT scanner)
  - coupled geomechanics and flow
- **Environmental field measurements and monitoring**
  - air, soils, tracers, water (including produced water)
- **Geomaterials characterization**
  - coal properties (structure; sorption behavior; swelling)
  - high pressure high temperature fluid-solid reactions (e.g., CO_2-brine-cement/rock); depth in experimental facilities
  - geophysical properties of materials at conditions (e.g., permeability; acoustic velocities)
- **Geospatial data and independent assessments (e.g., environmental; resource)**
  - Cyberinfrastructure database development (e.g., NATCARB)
  - Knowledge Management Database

Drilling under Extreme Conditions

Goal: To improve the economics of drilling deep and ultra-deep wells by increasing the rate of penetration and by developing better-performing materials for extreme drilling environments



Four Elements to Research Focus

- **Experimental investigation of drilling dynamics**
  - **Ultra-deep Drilling Simulator (UDS) and the Extreme Drilling Laboratory**
- **Development of predictive models for drilling dynamics**
- **Development of novel nanoparticle-based fluids for improved drilling**
- **Improvement of materials behavior/performance in extreme environments**

Drilling under Extreme Conditions

Status

- **Experimental investigation of drilling dynamics**
  - **Completed facility mods and equipment procurement for extreme drilling lab**
  - **Installation of UDS at NETL completed; pressure vessel proof tested**
  - **Initiated shakedown of UDS**
  - **Baseline testing to begin in early fall 2009**
    - **Validate single cutter relative to multi-cutter**
    - **Extend full bit simulation to elevated PT**
    - **Initiate testing matrix of drilling fluids with model rock system**
- **Development of predictive models for drilling dynamics**
  - **Discrete-element & continuum-scale models under development to predict reaction forces on bits & rock fragmentation; validation with future UDS data**
  - **CFD model of filter cake formation under development; validation with future UDS results; baseline comparison with commercial code (ANSYS Fluent)**
- **Development of novel nanoparticle-based fluids for improved drilling**
  - **Demonstrated nanoparticle haloing to stabilize colloidal barite suspensions**
  - **Demonstrated hydrophobic nanoparticles stabilize inverted emulsions**
- **Improvement of materials behavior/performance in extreme environments**
  - **Key failure mechanisms in Cl- and H_2S-environments identified via industry**
  - **Ambient-pressure fatigue testing initiated for corrosion fatigue (H_2S)**
  - **Completed design of HPHT fatigue test unit; procurement/installation initiated**

Environmental Impacts of Oil/Gas

Goal: To develop an improved, science-base understanding that leads to solutions for potential environmental challenges to oil/gas production

Major Elements to Research Focus

- **Evaluation of strategies for effective and environmentally sound disposition of produced waters**
  - **Produced water database (PWMIS)**
  - **Evaluation of potential options (subsurface drip irrigation; ephemeral streams)**
  - **Quantitative models via a portfolio of monitoring options (airborne, UAV, hyperspectral, electromagnetic, LIDAR, etc.)**
- **More accurate assessment of air-quality impacts by detailed measurement and improved computational representations**

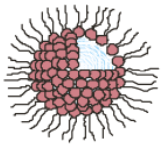
Environmental Impacts of Oil/Gas

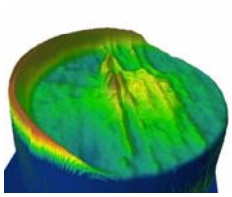
Status

- **Produced Water**
  - **Expanded the on-line Produced Water Management Information System (PWMIS); averaging ~6000 hits/month**
  - **Continued monitoring & independent evaluation of subsurface drip irrigation**
    - **Fall and mid-winter electromagnetic-conductivity surveys; meteorological station installed; groundwater wells sampled**
    - **Planned 5-yr study, unless site equilibrium is attained earlier**
    - **Sufficient divalent cations in groundwater and soil minerals to counteract impact of high-SAR produced water at least in the short term; too early to assess potential impact on groundwater flow**
- **Air Quality**
  - **Completing construction of mobile air monitoring station; to be deployed in Allegheny National Forest in Q3 FY09**
    - **Will provide site-specific data for improving accuracy and reliability of predictive atmospheric-dispersion and source-receptor models**
  - **Developing wireless monitoring network and unmanned aerial vehicle (UAV) platforms for efficient and effective site monitoring**

Unconventional Oil & Enhanced Oil Recovery

Goal: To enable broader utilization of domestic fossil resources through improved efficiency and lowered environmental impact





Four Elements to Research Focus

- **CO_2-enhanced oil recovery: Improved flow control by increasing CO_2 viscosity (tailored surfactants)**
- **In-situ production of oil shale: Improved heating of kerogen by tuned microwave and CO_2; environmental impacts**
- **Oil production in fractured media: Improve accuracy/reliability of predicting primary–tertiary oil recovery in shale**
- **Catalog experience/knowledge from oil-shale and tar-sand activities**

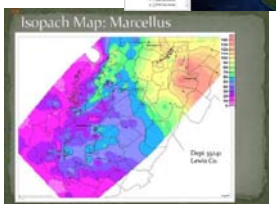
Unconventional Oil & Enhanced Oil Recovery

Status

- **CO_2 Enhanced Oil Recovery**
  - **Designed and synthesized fluorous and non-fluorous CO_2-soluble surfactants that can form rodlike micelles, increasing CO_2 viscosity**
  - **Demonstrated that two commercially available nonionic surfactants can stabilize a CO_2-in-brine emulsion at MMP**
  - **Developing core-flow experiment to assess viscosity performance in porous media**
- **In-Situ Production of Oil Shale**
  - **Initiated experiments to assess the dielectric and thermophysical properties of isolated kerogen; review of electromagnetic methods in oil shale production**
  - **Developing effort on science-based understanding of potential water issues for various in-situ production methods**
- **Oil Production in Fractured Media**
  - **Characterizing multiphase flow in Bakken shale cores**
    - **CT imaging of fractures; permeability/geomechanics under stress**
    - **Imaging of multiphase flow with CO_2 planned Q4 2009**
  - **Neural-network approach to predict location of highly productive wells**
- **Catalog Experience/Knowledge from Oil-Shale and Tar-Sand Activities**
  - **Archived historic oil-shale and tar-sand documents (18,000 reports) in a relational database management system**

Resource Assessment

Goal: To enable better assessment of fossil resources by collection, management, and integration of high-resolution geospatial data



Elements to Research Focus

- **Knowledge management database development**
  - **Repository for R&D results related to the Section 999 R&D program**
  - **Searchable database that also includes historical oil/gas research from NETL**
  - **ArcGIS to enable data visualization**
  - **Beta version anticipated Aug/Sept 2009**
- **Marcellus shale database: high resolution data for improved assessment**
  - **Quantitative assessment of commercial gas in place via laboratory/well-logs correlations for improved models**

Questions

Attachment 8

UDAC Recommendations

Roy Long
Technology Manager, EPAct 2005 Title IX, Subtitle J, Section 999

May 27, 2009

Overview of UDAC 2009 Recommendations Recommendation Areas

- **R&D Program Focus**
- **Program Scope**
- **Process**
- **Program Progress & Value**
- **Societal Impact**

R&D Program Focus Area

- **Safety and environmental projects should be considered as separate topics**.
- Safety and environmental projects should be **identified with specific phases of the exploration and production lifecycle**.
- The **project impact assessment utilized in the project selection process should be made public and available to the UDAC**.
- Fund projects which address the overall safety impact of UDW activity.
- Fund projects which address the overall environmental impact of UDW activity.
- The metocean program should be strengthened regarding wind and wave predictions.
- Environmental studies should address the biological and ecological impacts, both positive and negative, of UDW activity.
- The UDW Program element should be primarily directed at R&D that drives step changes in the industry (i.e., **Grand Challenges**).

Program Scope Area

- Expand the Plan's scope to petroleum provinces within the definition of EPAct (e.g., Arctic) and undertake technology development to maximize the supply of domestic oil and gas. Caution should be exercised to avoid diluting available funds in a way that impacts the total size of projects and promoting the most beneficial R&D technologies.
- **Seek cooperation and experience with similar programs internationally** in order to gain leverage/ synergy and avoid redundancy/duplication of effort.

Process Area

- Continue **monitoring IP rights** in the project selection/award process.
- The RFP solicitation process should be reviewed to allow a broader approach to problem identification and solving to promote "out of the box" thinking and a broader base of respondents.
- Explore and implement ways to further streamline the contract award process.
- Perform an after action review to identify the key success elements of the Unconventional Program and apply these learnings to the UDW Program element, as appropriate**.**
- Conduct a **survey of the UDW research community to identify process changes which may yield increased response to UDW RFPs.**
- **Promote higher cost share proposals** by increasing the weight allocated to the cost share element in the proposal evaluation and selection process
- **Consider in-kind contributions** in the cost share element of the proposal (e.g., rig time, vessel utilization, core samples, etc.)
- **Encourage private funding sources to support the UDW Program element**
- The Complementary Program should identify and assign resources to UDW technology needs specified in the Plan that are unfunded and not redundant.

Program Progress & Value Area

- The referenced status reports (Management Performance and Budget Metrics, Program Benefits Assessment) should be made available to the public through the **"**Technology Transfer**"** vehicles used by NETL and RPSEA (i.e., web sites, public mailers, etc).
- Produce a quarterly executive summary document using a simple table format. An example of the data to be included follows:
  - Reference year of funding allocation
  - Number of projects solicited
  - Number of projects awarded
  - Contract award value
  - Project name and affiliate (university, private sector company, etc.)
  - Projected start and completion dates
  - Value of the UDW Program element (estimated by Benefits Assessment)
  - Projected additional federal royalty
  - Potential jobs created
- **Funding levels should be closely monitored** and appropriation authorization provided by EPAct (section 999H[e]) may need to be activated in the future.
- **Continue EPAct** and other programs of this nature to provide R&D for the required UDW technologies throughout the entire E&P lifecycle (find, develop, produce & abandon), which will take place over the next several decades.

Societal Impact Area

- Fund projects on atmospheric or oceanic research that clearly demonstrate a benefit to UDW development, not merely augmenting research already funded by other government agencies. (See R&D Program Focus)
- Emphasis should be placed on **environmental projects which study the impacts of UDW activity, both positive or negative** (noted in Program Content).
- Define strategies for assessing and monitoring potential environmental impact, both positive and negative**.** Consider developing a detailed document describing what is known and not known about the ecology of UDW environments, and how oil/gas exploration, drilling, and production activities could potentially impact environmental quality, productivity, and sustainability.
- **Encourage continuation of the practice of private funding of fellowships/scholarships/internships supporting UDW R&D programs** to enhance future workforce and attract young professionals to the oil and gas industry.

Themes from Recommendation Areas

- **Cost Shared Research Support**
  - identify and assign resources to UDW technology needs specified in the Plan that are unfunded and not redundant.
- **Program Environmental Focus**
  - Fund projects which address the overall safety impact of UDW activity
  - Fund projects which address the overall environmental impact of UDW activity
  - metocean program should be strengthened regarding wind and wave predictions.
  - address the biological and ecological impacts, both positive and negative
  - Expand scope to petroleum provinces (e.g., Arctic)
  - Promote “out of the box” thinking and a broader base of respondents.
  - Fund projects on atmospheric or oceanic research that clearly demonstrate a benefit to UDW development
- **Technology Transfer**
  - Identify the key success elements of the Unconventional Program and apply these learnings to the UDW Program
  - Make status reports (Management Performance and Budget Metrics, Program Benefits Assessment) available to the public through “Technology Transfer”
  - Produce a quarterly executive summary document using a simple table format

Outline from Recommendation Themes

- **Cost Shared Research Support**
  - NETL Direct Complementary and Program Support
- **Program Environmental Focus**
  - Current ES&H Initiatives
  - New Solicitation Environmental Support
    - 2010 Solicitation Strategy
    - Organization
- **Technology Transfer**
  - Overall Plan
  - Partners and Products
    - Knowledge Management Database
  - Benefits: Establishing Program Value

Cost Shared Research Support

- **NETL/Albany support to DW1403 - SWRI: Fatigue Performance of High Strength Riser Materials for Improvement of materials behavior/performance in extreme environments**
  - Key failure mechanisms in Cl- and H2S-environments identified via industry
  - Ambient-pressure fatigue testing initiated for corrosion fatigue (H2S)
  - Completed design of HPHT fatigue test unit; procurement/installation initiated
- **NETL and University Partners support to DW1202: Equation of State (EOS) Improvement for Extreme High Pressure and High Temperature Conditions (xHPHT)**
  - Project initiated July 14, 2009
  - Goal: Provide advanced EOS solutions for reservoir fluids at extremes of 30 KSI and 250^{o} C
- **NETL Environmental FOA: Closed June 5, 2009**
  - Water resources & water management for shale gas development
  - Science to support regulatory streamlining and permitting associated with shale gas development
  - Alaskan water management solutions for issues arising from development of local oil and natural gas resources for use by remote communities.

Outline from Recommendation Themes

- **Cost Shared Research Support**
  - NETL Direct Complementary and Program Support
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  - Overall Plan
  - Partners and Products
    - Knowledge Management Database
  - Benefits: Establishing Program Value

Current ES&H Initiatives

Program Need 6: HS&E Concerns (Safety and Environmental)

- **Metocean Needs That Impact Operations and Facility Design**
  - DW1801 (2007): Effect of Global Warming on Hurricane Activity
  - DW2801 (2008): Gulf Three Dimensional Operational Current Model Pilot
- **HS&E Concerns with Emerging New Technologies**
  - DW33xx (2009 RFP): Subsea Processing and Seabed Discharge of Produced Water
    - Proposals addressing review and evaluation of existing regulations, standards and HS&E requirements that may govern deepwater surface and/or seabed direct discharge of produced water, define relative seabed conditions, environment, and marine toxicology will be of interest.
    - Cost/benefit/impact assessments and conceptual design(s) of subsea processing systems(s) that incorporate discharge of solids and produced water at the seafloor and proposals on other related topics will also be requested.

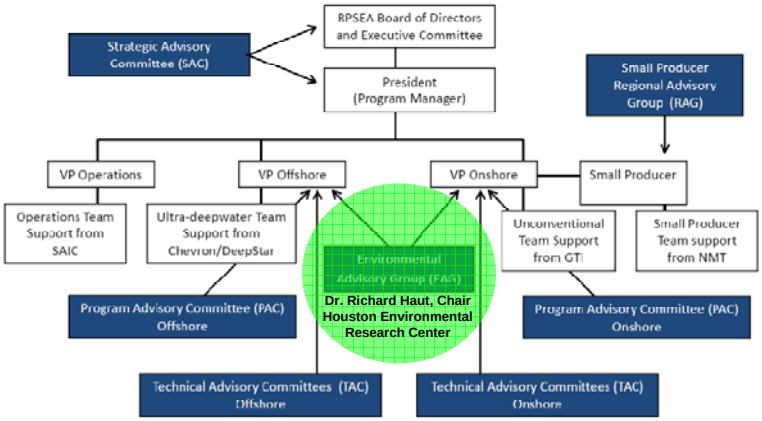
New RFP Environmental Support 2010 Strategy

- **As in 2009, RFP's directed to UDW needs and initiatives in a very general way**
- **Desired Outcomes**
  - Proposers have considerable latitude regarding methods and processes of accomplishment
  - Generation of truly novel proposals from a broader community of experts

New RFP Environmental Support: Organization *Environmental Advisory Group (EAG)*

NAME	AFFILIATION
Dr. Richard Haut, Chair	Houston Advanced Research Center
Dr. Steve Bryant	The University of Texas at Austin
Sharon Buccino	Natural Resources Defense Council
David Burnett	Texas A&M University
Dr. Russ Johns	The University of Texas at Austin
Dr. Joe Kiesecker	The Nature Conservancy
Roy Long	National Energy Technology Laboratory
Dr. Pam Matson	Stanford University
Dr. Charles Newell	Groundwater Services, Inc.
Øyvind Strøm	StatoilHydro
Dr. Mason Tomson	Rice University

New RFP Environmental Support: Organization



Environmental Advisory Group (EAG) - Environmental stewardship is at the core of all RPSEA activities. The EAG is designed to provide input to the Program regarding environmental issues. It organizes and brings together key experts and policy leaders from academia, regulatory entities, non-governmental organizations, and industry for road mapping exercises to identify key regulatory barriers/issues.

New RFP Environmental Support: Houston Advanced Research Center (HARC)

About HARC

HARC is a 501(c)(3) not-for-profit organization dedicated to improving human and ecosystem well-being through the application of sustainability science and principles of sustainable development.

Current Activities

Dr. Richard C. Haut, HARC senior research scientist has been invited to be the speaker at the may luncheon meeting for the **Texas Association of Environmental Professionals**. The topic of his presentation: **"balancing nature with future energy needs"**

May 4, 2009: HARC Launches the Study of Houston Atmospheric Radical Precursors (SHARP)

April 27, 2009: HARC Intern studies legal barriers to regulation of industrial benzene emissions in Houston

HARC's Three Priorities

Air Quality & Climate

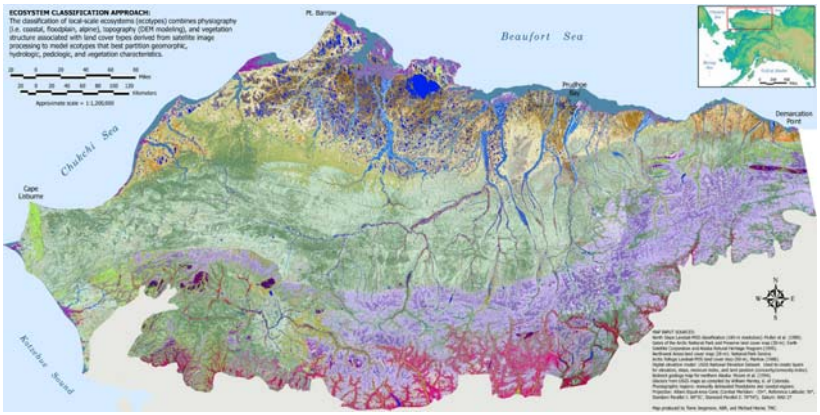
Clean Energy

Human & Natural Systems

HARC / Industry Example Project (Alaska)

Ecosystem and Biodiversity Measurement and Assessment

Develop tools for adaptive ecosystem management to assist integrated management of land, water and living resources that promotes conservation and sustainable use.



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  - Overall Plan
  - Partners and Products
    - Knowledge Management Database
  - Benefits: Establishing Program Value

Technology Transfer: Overall Plan

NETL has developed and will implement a Technology Transfer plan that provides the internal process for integrating information from the following DOE Oil and Gas Programs for dissemination to a broad audience of stakeholders:

- **Methane Hydrates**
- **Effective Environmental Protection**
- **(Unconventional) Oil**
- **EPAct 2005, Title IX, Subtitle J, Section 999**
- **Congressionally Directed Projects**

Technology Transfer Partners and Products

- **Partners:**
  - PTTC
  - RPSEA
  - New Technology Transfer Agreement (Existing ends 8/30)
    - Solicitation closed May 15, 2009

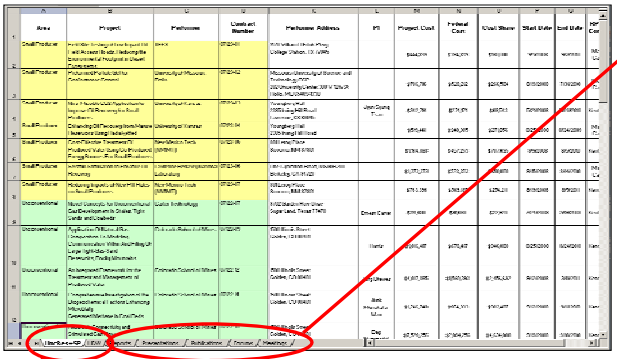
- **Products:**
  - E&P Focus Newsletter
  - RPSEA Workshops and Conferences
  - Active engagement of trade press for technology publications
  - Publications and workshops from the New Tech Transfer agent
  - NETL Website
    - **Knowledge Management Database/System**

NETL Technology Transfer Program

	RPSEA	NETL	Contractors	DOE-HQ
Information to be Delivered				
Project Reports		Complementary program	Interim and final reports	
Project Data Sets		Complementary program	Spreadsheets, GIS, other	
Project Software			Models and online tools	
Presentations/papers	Program and project level	Program and project level	Project level	High Level Program
Program Information	RFPs, deliverables, metrics, feedback	Program updates, benefit assessments		Program activity, FAC reports, mandated info.
Delivery Vehicle				
Project websites			Selected projects have websites	
Program websites	RPSEA site with links	Portal on NETL site with links		Pages on DOE site
Publications	Newsletter, articles in trade press	Newsletter, Techlines, articles in trade press	Technical papers, articles	Press relaeases, Techlines
Forums/workshops	RPSEA forums and workshops	PTTC workshops		
Public meetings	SPE papers, other technical meetings	SPE papers, other technical meetings	SPE papers, other technical meetings	

URTAC 2009 Technology Transfer Publications Currently Available

Section 999 Tech Transfer Index



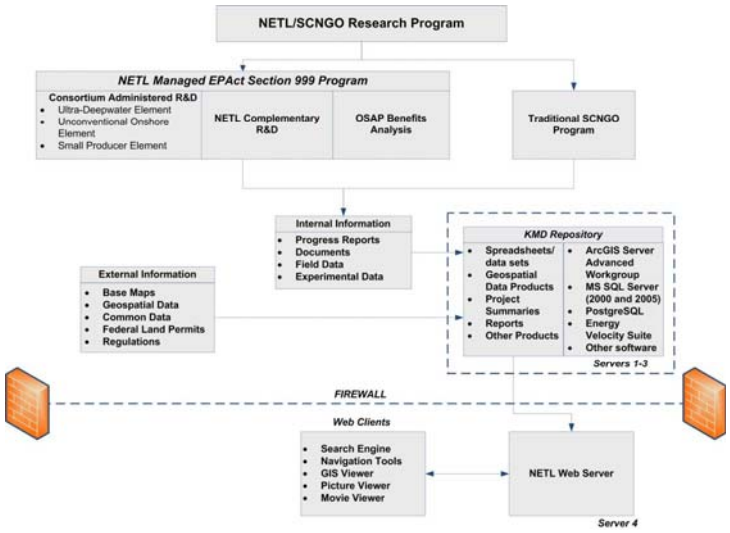
- 2 Primary Worksheets: Unc. Resources/Small Producers and UDW … list all basic project information: Who, What, Where, When, How Much, as well as all tech transfer products/delivery dates

- Other work-sheets roll up tech transfer items by type, date and program area
- Each document is linked to its location on NETL, RPSEA, FE-HQ or PI website
- Additional worksheet provides future planned events - RPSEA forums, meetings, papers, presentations, etc.
- Spreadsheet will be updated regularly and can be easily e-mailed

Technology Transfer: NETL KMD Deployment Timeline

ID	Task Name	Jun 2009				Jul 2009				Aug 2009				Sep 2009				Oct 2009			
		5/31	6/7	6/14	6/21	6/28	7/5	7/12	7/19	7/26	8/2	8/9	8/16	8/23	8/30	9/6	9/13	9/20	9/27	10/4	10/11	10/18	10/25
1	Prototype KMD Online at NETL INTERNET																						
2	Fully Searchable Document Repository (50GB) ONLINE																						
3	Interactive Dashboards ONLINE																						
4	Interactive GIS (Map) Applications ONLINE																						

Technology Transfer: NETL KMD Organization of Information Flow



KMD Planned Key Products/Capabilities

- **CD/DVD Library online containing previous oil and gas research at NETL**
  - Compiles historical research
  - Converts the NETL publications page to a dynamic library for retrieving documents
  - Maintains the CD/DVD tree structure for searching
  - Contains 45 CDs and DVDs with 9,000+ PDFs, 186 Word DOCs, 61 spreadsheets, and 217 databases
- **Document Database to allow searching of historical oil and gas research that will contain**
  - ProMIS technical/topical reports
  - Key publications from the CD/DVD library
  - Key publications from the OSTI database
  - Reference for copyright-protected documents and documents that are not available in electronic format
  - Additional documents from the NETL Morgantown library: 397 final reports in PDF format and references to 5,000+ additional hard-copy reports

KMD Planned Key Products/Capabilities

- **Xcelsius Models to provide a dashboard visualization of detailed oil and gas, and environmental data**
  - Outer Continental Shelf (OCS) Model
    - Details information for the OCS Regions and Planning Areas
    - Provides undiscovered technically recoverable resources (UTRR) for gas and oil
    - Allows user control to select region or planning area display of resources
    - Indicates resources by water depth
  - Allegheny National Forest Model
    - Display environmental data related to drilling in the Allegheny National Forest including well density and watershed boundaries
    - Future enhancements may include relationship of data to the Marcellus Shale, along with trends of data for roads and chemical analysis within the National Forest

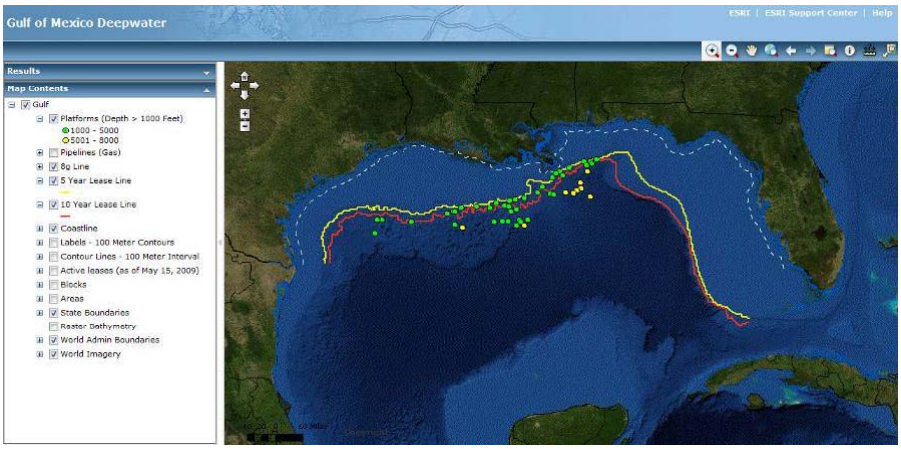
KMD Planned Key Products/Capabilities

ArcGIS Web Map Services

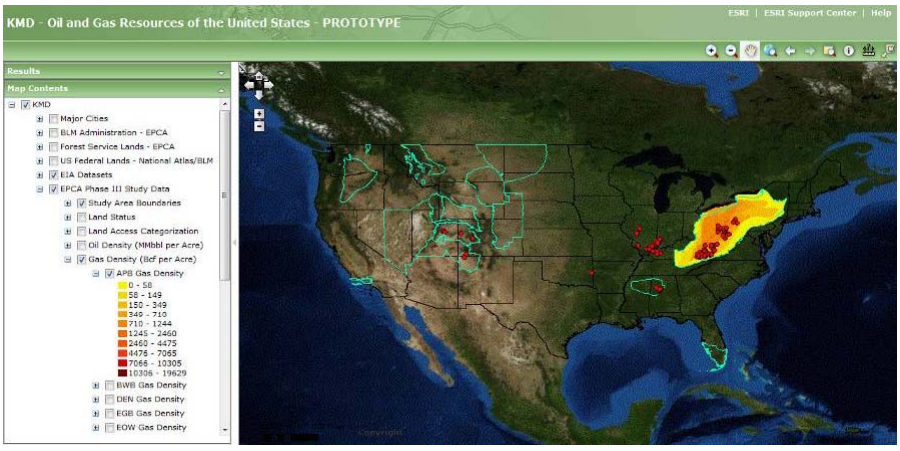
allows visualization of data related to oil and gas research

- Gulf of Mexico (GOM) Deepwater
  - Data from the Minerals Management Service related to leases (i.e. 5- and 10-year lease lines, active leases, 8g line, coastline, state boundaries, and leases by water depth greater than 1,000 ft)
  - Infrastructure including platforms in water depth greater than 1,000 ft and gas pipelines
  - Location (area and block) and detailed bathymetry data for the GOM
- KMD – Oil and Gas Resources of the United States
  - Data from the Energy Policy and Conservation Act (EPCA) Phase III assessment for onshore oil and gas resources and restrictions/impediments to their development
    - Study area boundaries, land status, and land access categorization
    - Total oil density and total gas density per study area
    - Boundary data including Federal Lands, county/state boundaries, lakes/rivers, highways, railroads, and major cities
  - Data from the Energy Information Administration
    - Boundary data for U.S. oil and gas field maps
    - Coalbed methane cumulative production, reserves and resources, and gassy coal mines
    - Shale gas basins and plays

KMD Planned Key Products/Capabilities
Gulf of Mexico Deepwater ArcGIS Prototype



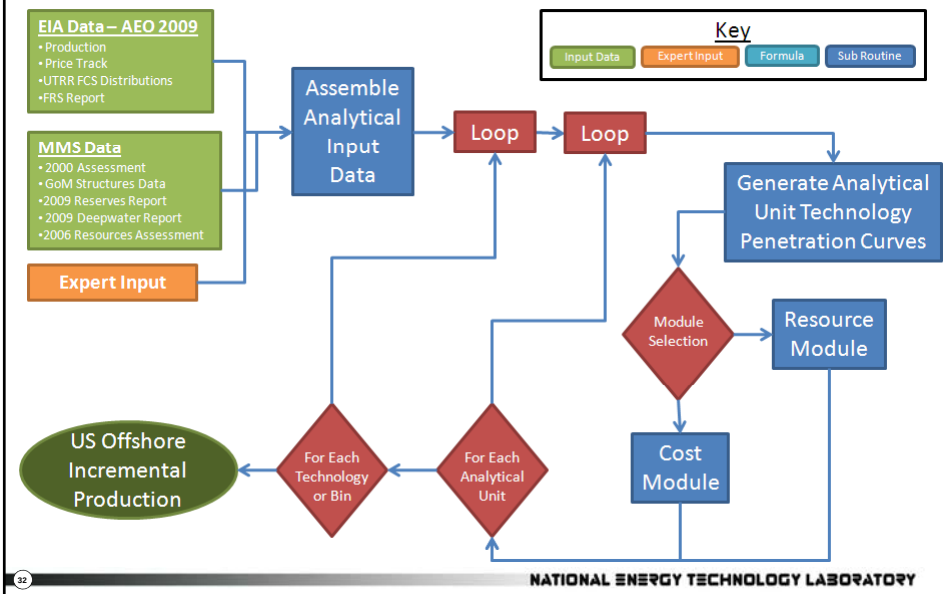
KMD Planned Key Products/Capabilities
Onshore Oil and Gas Resources of the U.S. Prototype



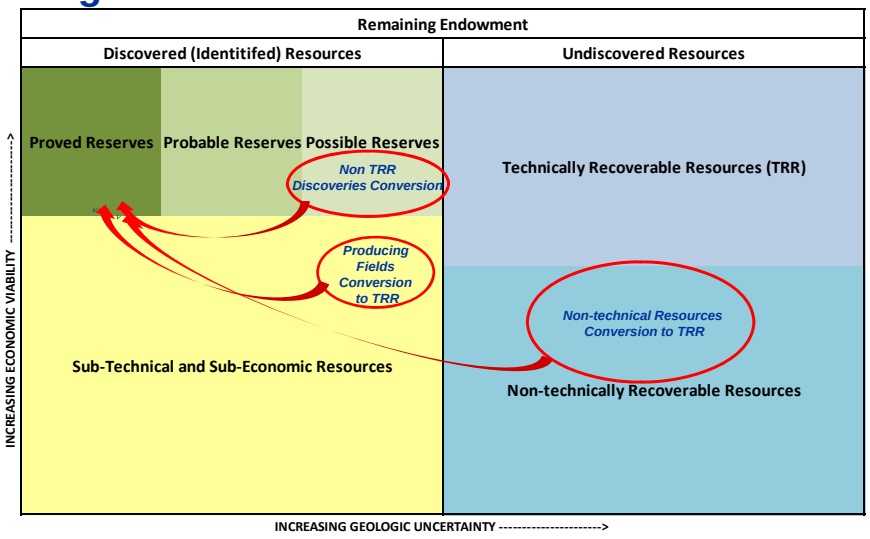
Outline from Recommendation Themes

- **Cost Shared Research Support**
  - NETL Direct Complementary and Program Support
- **Program Environmental Focus**
  - Current ES&H Initiatives
  - New Solicitation Environmental Support
    - 2010 Solicitation Strategy
    - Organization
- **Technology Transfer**
  - Overall Plan
  - Partners and Products
    - Knowledge Management Database
  - Benefits: Establishing Program Value

EPAct 999 Benefits Process Methodology for UDW Projects



UDW Research Portfolio: Targets Relative to the Offshore Endowment



UDW Technology Portfolio—Binning

Project Number	Project Name	Bin	Resource Impact	Cost impact	Notes
DW1201	Wax Control in the Presence of Hydrates	Crosscutting	N/A	Allows more cost effective handling of waxy oil *where it exists* in GoM	
DW1301	Improvements to Deepwater subsea measurements	Subsea Completion	Increased resource recovery efficiency	N/A	
DW1302	Ultra-High Conductivity Umbilicals	Subsea Completion	Increased resource recovery efficiency	Subsea production from distances that is greater than current technology allows	Competitive with 1902
DW1401	Composite Riser for Ultra Deepwater High Pressure Wells	Crosscutting	Ultra deep water and high pressure	Non-ultra deep areas	Expect a significant weight savings from steel
DW1402	Ultra Deepwater Dry Tree System for Drilling and Production	Dry Tree	N/A	Competitive with Spar platform economics	Change in subsea to dry tree ratio (Δ SS/DT)
DW1402	Ultra Deepwater Dry Tree System for Drilling and Production	Dry Tree	N/A	Competitive with Spar platform economics	Change in subsea to dry tree ratio (Δ SS/DT)
DW1403	Fatigue Performance of High Strength Riser Materials in Sour Environments	Crosscutting	N/A	Reducing cost by reducing design risk in entire GoM	
DW1501	Extreme Reach Development	Crosscutting	N/A	Devlopment of resources beyond the reach of current horizontal drilling technology limits	Change in subsea to dry tree ratio (Δ SS/DT)
DW1603	Flow Phenomena in Jumpers-Relation to Hydrate Plugging Risk	Subsea Completion	N/A	Lower operation cost for all subsea completion	
DW1603	Hydrate Characterization & Dissociation Strategies	Subsea Completion	N/A	Lower operation cost for subsea completion in UDW	
DW1603	Design investigation of extreme high pressure, high temperature, (XHPHT), subsurface safety valves (SSSV)	Crosscutting	Ultra deep water and high pressure	Increased recovery due to lower cost	
DW1603	Robotic MFL Sensor for Monitoring and Inspection of Deepwater Risers	Subsea Completion	N/A	Increased production due to lower cost for all GoM	
DW1701	Improved Recovery Analysis	Crosscutting	All future undiscovered resources	N/A	
DW1801	Effect of Global Warming on Hurricane Activity	Crosscutting	N/A	Quantify the risk mitigation and design cost improvement for increased certainty in knowledge of	
DW1901	Subsea Systems Engineering Integration	Subsea Completion	Increased resource recovery efficiency	Lower cost Subsea production	Complementary to both 1902 and 1302
DW1902	Deep Sea Hybrid Power System	Subsea Completion	Increased subsea resource recovery at distances that is greater than current	N/A	Competitive with 1302
DW2001	Geophysical Modeling Methods	Crosscutting	Subsalt resources	N/A	

Questions