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• **Research**
• **Partnership to**
• **Secure Energy**
• **for America**
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***SMU Geothermal
Conference 2009***

**C. Michael Ming
Southern Methodist
University
November 3, 2009**

Secure Energy For America

The U. S. Energy Policy Act of 2005 And Section 999:

An Industry led Public/Private Partnership for R&D in the Ultra-Deepwater in the Gulf of Mexico and in Unconventional Onshore Natural Gas and Other Petroleum Resources of the United States.



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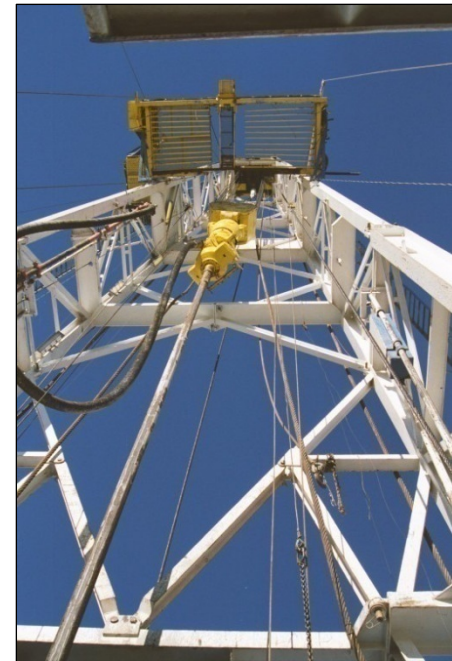
What is Section 999?

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:

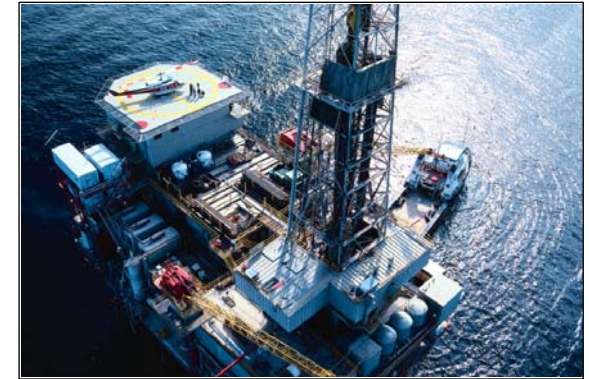
- Increasing supply
- Reducing the cost
- Increasing E&P efficiency
- Improving safety and minimizing environmental impacts



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)

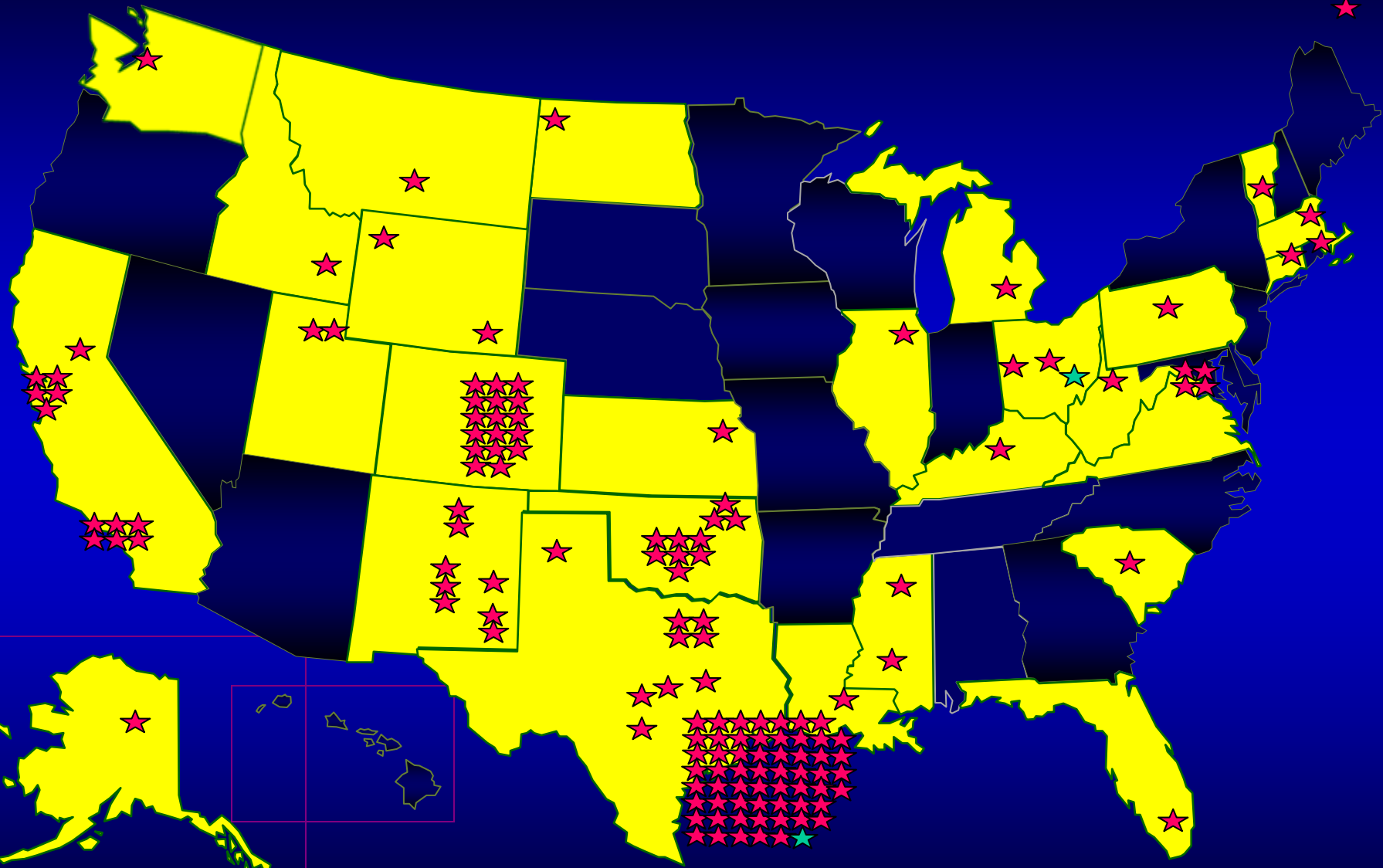
- Small Producers 7.5%
(< 1000 BOEPD)

- Complementary Program 25%


Managed by NETL



RPSEA Members



Current Members 

Pending Members 

Alaska
University of Alaska Fairbanks

California
AeroVironment, Inc.
Campbell Applied Physics
Chevron Corporation
Conservation Committee of California Oil
& Gas Producers
Delco Oheb Energy, LLC
Drilling & Production Company
Lawrence Berkeley National Laboratory
Lawrence Livermore National Laboratory
Natural Carbon, LLC
Stanford University
University of Southern California
Watt Mineral Holdings, LLC

Colorado
Altira Group LLC
Bill Barrett Corporation
Brownstein Hyatt Farber Schreck, LLP
Colorado School of Mines
Colorado Oil & Gas Association
DCP Midstream, LLC
The Discovery Group, Inc.
Energy Corporation of America
EnCana Corporation
Gunnison Energy Corporation
HW Process Technologies, Inc.
Independent Petroleum Association of
Mountain States
Leede Operating Company
NiCo Resources
Robert L. Bayless, Producer LLC
Spatial Energy
University of Colorado at Boulder

Connecticut
APS Technology, Inc.

Florida
Florida International University

Idaho
Idaho National Laboratory

Illinois
Gas Technology Institute

Kansas
The University of Kansas

Kentucky
NGAS Resources, Inc.

Louisiana

Louisiana State University
Massachusetts
Massachusetts Institute of Technology
Woods Hole Oceanographic Institution

Michigan
University of Michigan

Mississippi
Jackson State University
Mississippi State University

Montana
Nance Resources

New Mexico
Correlations Company
Harvard Petroleum Corporation
Independent Petroleum Association of
New Mexico

Los Alamos National Laboratory
New Mexico Institute of Mining and
Technology
New Mexico Oil & Gas Association
Sandia National Laboratories
Strata Production Company

North Dakota
Western Standard Energy Corporation

Ohio
NGO Development Corporation
The Ohio State University
Wright State University

Oklahoma
Chesapeake Energy Corporation
Devon Energy Corporation
Interstate Oil and Gas Compact
Commission
K. Stewart Energy Group
Oklahoma Independent Petroleum
Association
Petroleum Technology Transfer Council

The Fleischaker Companies
The University of Oklahoma
The University of Tulsa
Williams

Pennsylvania
The Pennsylvania State University

South Carolina
University of South Carolina

Texas
Acute Technological Services, Inc.
Anadarko Petroleum Corporation

Apache Corporation
Apex Spectral Technology
BP America, Inc.
Baker Hughes Incorporated
BJ Services
Cameron/Curtiss-Wright EMD
Capstone Turbine Corporation
CARBO Ceramics, Inc.
City of Sugar Land
ConocoPhillips Company
CSI Technologies, Inc.
Deepwater Structures, Inc.
Deepwater XLP Technology, LLP
Det Norske Veritas (USA)
Energy Valley, Inc.
ExxonMobil Corporation
GE/VetcoGray
Granherne, Inc.
Greater Fort Bend Economic Development
Council
GSI Environmental, Inc.
Halliburton
Houston Advanced Research Center
Houston Offshore Engineering, LLC
Houston Technology Center
Intelligent Agent Corporation
Knowledge Reservoir, LLC
Marathon Oil Company
M&H Energy Services
Merrick Systems, Inc.
Nalco Company
NanoRidge Materials, Inc.
National Oilwell Varco, Inc.
Nautilus International, LLC
Noble Energy, Inc.
OTM Consulting Ltd.
Oxane Materials, Inc.
Petris Technology, Inc.
Petrobras America, Inc.
Pioneer Natural Resources Company
QO Inc.
Quanelle, LLC
Rice University
Rock Solid Images
RTI Texas
Schlumberger Limited
Shell International Exploration &
Production
Simmons & Company International

SiteLark, LLC
Southern Methodist University
Southwest Research Institute
StatoilHydro
Stress Engineering Services, Inc.
Technip
Technology International
Tejas Research & Engineering, LP
Tenaris
Texas A&M University
Texas Energy Center
Texas Independent Producers and Royalty
Owners Association
Texas Tech University
The University of Texas at Austin
Titanium Engineers, Inc.
TOTAL Exploration Production USA
University of Houston
VersaMarine Engineering, LLC
Weatherford International Ltd.

Utah
Novatek, LLC
The University of Utah

Vermont
New England Research, Inc.

Virginia
Advanced Resources International, Inc.
American Gas Association
Independent Petroleum Association of
America
Integrated Ocean Drilling Program

Washington
Quest Integrated, Inc.

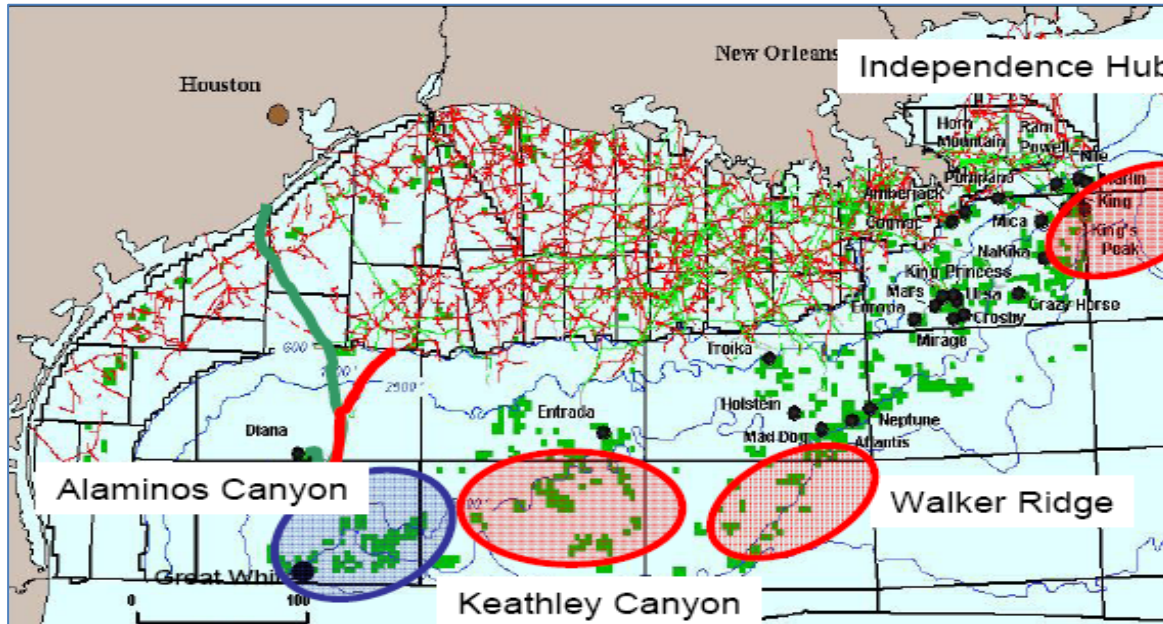
West Virginia
West Virginia University

Wyoming
EnerCrest, Inc.
WellDog, Inc.

Newfoundland, Canada
Centre for Marine CNG, Inc.

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
- CO₂/H₂S

Overall

- higher drilling costs
- challenging economics

Unconventional Onshore Themes

■ Gas Shales

- Rock properties/Formation Evaluation
- Fluid flow and storage
- Stimulation
- Water management

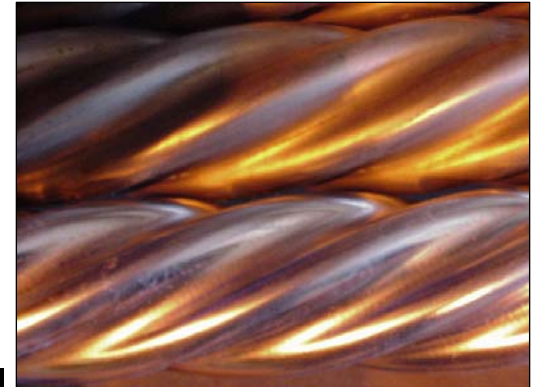
■ Coalbed Methane

- Produced water management

■ Tight Sands

- Natural fractures
- Sweet spots
- Formation Evaluation
- Wellbore-reservoir connectivity
- Surface footprint

**Cost Reduction
in All Aspects
of Operations**



	CBM 10%		Gas Shales 45%		Tight Sands 45%	
Integrated Basin Analysis						
Drilling						
Stimulation and Completion						
Water Management						
Environmental						
Reservoir Description & Management						
Reservoir Engineering						
Resource Assessment						
Exploration Technologies						

H
M
L

High Priority

Medium Priority

Low Priority

Total Cost to RPSEA

	CBM 10%	Gas Shales 45%	Tight Sands 45%
Integrated Basin Analysis		New Albany (GTI) \$3.4	Piceance (CSM) \$2.9
Drilling			
Stimulation and Completion	Microwave CBM (Penn) \$.08	Cutters (Carter) \$.09 Frac (UT Austin) \$.69 Refrac (UT Austin) \$.95	Gel Damage (TEES) \$1.05 Frac Damage (Tulsa) \$.22
Water Management	Integrated Treatment Framework (CSM) \$1.56		
Environmental			
Reservoir Description & Management		Hi Res. Imag. (LBNL) \$1.1	Tight Gas Exp. System (LBNL) \$1.7
Reservoir Engineering		Decision Model (TEES) \$.31	Wamsutter (Tulsa) \$.44 Forecasting (Utah) \$1.1 Condensate (Stanford) \$.52
Resource Assessment		Alabama Shales (AL GS) \$.5 Manning Shales (UT GS) \$.43	Rockies Gas Comp. (CSM) \$.67
Exploration Technologies	Coal & Bugs (CSM) \$.86		
2008 Program Priorities	H	High Priority	2007 Projects
	M	Medium Priority	
	L	Low Priority	

	CBM 10%	Gas Shales 45%	Tight Sands 45%
Integrated Basin Analysis		New Albany (GTI) \$3.4	Piceance (CSM) \$2.9
Drilling			
Stimulation and Completion	Microwave CBM (Penn) \$0.8	Cutters (Carter) \$.09 Frac (UT Austin) \$.69 Refrac (UT Austin) \$.95 Frac Cond (TEES) \$1.6	Gel Damage (TEES) \$1.05 Frac Damage (Tulsa) \$.22
Water Management	Integrated Treatment Framework (CSM) \$1.56	Barnett & Appalachian (GTI) \$2.5	Frac Water Reuse (GE) \$1.1
Environmental	*	Environmentally Friendly Drilling (HARC)* \$2.2	*
Reservoir Description & Management		Hi Res. Imag. (LBNL) \$1.1 Gas Isotope (Caltech) \$1.2 Marcellus Nat. Frac./Stress (BEG) \$1.0	Tight Gas Exp. System (LBNL) \$1.7 Strat. Controls on Perm. (CSM) \$0.1
Reservoir Engineering		Decision Model (TEES) \$.31 Coupled Analysis (LBNL) \$2.9	Wamsutter (Tulsa) \$.44 Forecasting (Utah) \$1.1 Condensate (Stanford) \$.52
Resource Assessment		Alabama Shales (AL GS) \$.5 Manning Shales (UT GS) \$.43	Rockies Gas Comp. (CSM) \$.67
Exploration Technologies	Coal & Bugs (CSM) \$.86	Multi-Azimuth Seismic (BEG) \$1.1	
2008 Program Priorities	H	High Priority	2007 Projects
	M	Medium Priority	2008 Projects
	L	Low Priority	

RPSEA Unconventional Gas Projects

Cross-Cutting Technical Projects

2007

UT – Fracturing
 LBNL – Self Teaching Expert System
 UT – Refracturing
 TAMU – Fracture Design
 TAMU – Decision Model
 LBNL – High Resolution Imaging
 PSU – Microwave Coals
 Carter – Saws
 U of Tulsa – Novel Fracturing Fluids
 Stanford – Condensate

CSM - Coal Bugs
 Utah GS - Paleozoic Shales
 U of Tulsa – Wamsutter
 CSM – Gas Composition
 U of Utah – TGS
 CSM – Produced Wtr.
 CSM – Piceance TGS
 CSM – Strat Control

GE – Frac Water Reuse

BEG – Marcellus Natural Fractures

GTI – Barnett and Appalachia Produced Water

GTI – New Albany

Alabama - Shales

Anchor Projects - Integrated Basin Analysis

2007 Technical/Resource Projects

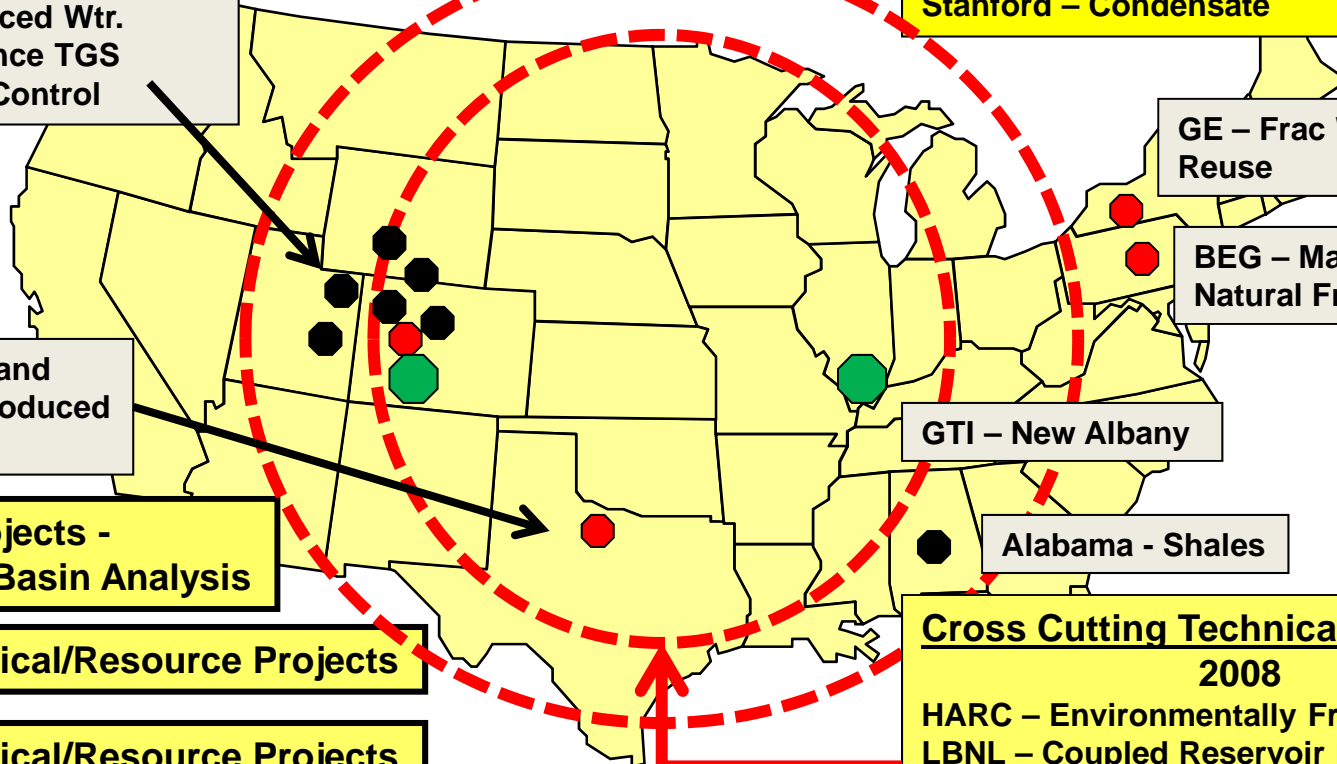
2008 Technical/Resource Projects

Cross Cutting Technical Projects

2008

HARC – Environmentally Friendly Drilling
 LBNL – Coupled Reservoir Model
 TAMU – Fracture Conductivity
 BEG – Multi – Azimuth Seismic
 Caltech – Gas Isotopes

\$32 Million Research Portfolio



The Technology Challenges of Small Producers

Focus Area – Advancing Technology for Mature Fields

- Target – Existing/Mature Oil & Gas Accumulations
 - Maximize the value of small producers' existing asset base
 - Leverage existing infrastructure
 - Return to production of older assets
 - Minimal additional surface impact
 - Minimize and reduce the existing environmental impact
- Lower cost and maximize production



Small Producer Program - 2007 Projects & 2008 Selections

- **Thirteen projects addressing concerns of small producers operating mature assets**
 - Produced water treatment
 - Reservoir Characterization (3)
 - Enhanced oil and gas recovery (5)
 - Environmental impact & increased efficiency (3)
 - Improve recovery and sweep efficiency
 - **Projects each involve a consortium of researchers and small producers**
 - **Small Producer Research Advisory Group (RAG) actively involved**
-

2007 & 2008 Portfolio Overview

2007 Program Selections				
	Small Producer	Unconventional Resources	Ultra-Deepwater	Total
Universities	10	18	9	37
For Profits	0	2	15	17
Non-Profits	2	3	5	10
National Labs	1	3	0	4
State Agencies	0	2	0	2
Total Selected	13	28	29	70

Questions?

