



•  
• **Research**  
• **Partnership to**  
• **Secure Energy**  
• **for America**  
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**CO2 EOR & CCS**  
**RPSEA Member Forum**  
**C. Michael Ming**  
**Austin, TX**  
**April 23, 2008**

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**SECURE ENERGY FOR AMERICA**

# The Energy Policy Act of 2005 And Section 999:

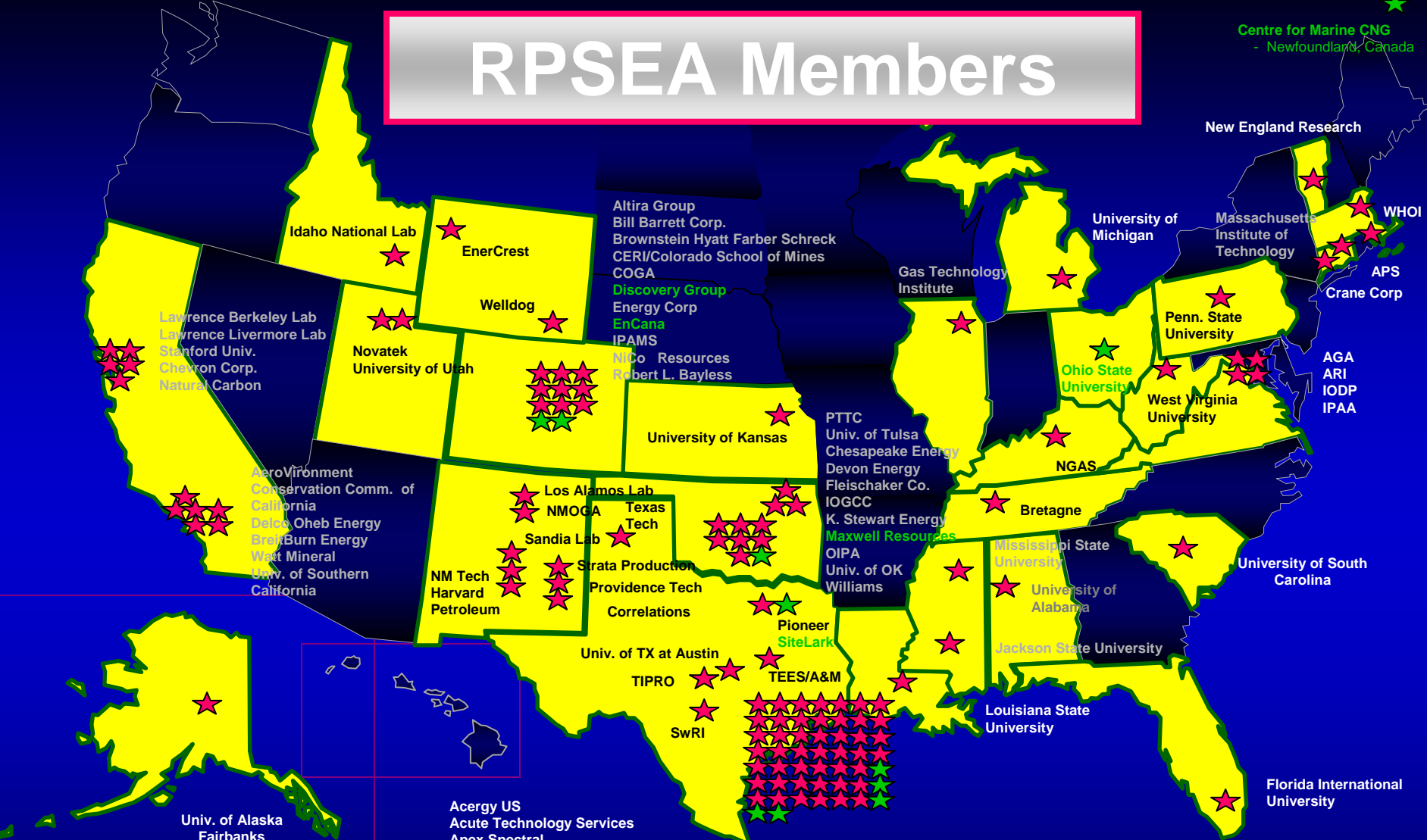
A Industry led Public/Private Partnership for R&D in the Ultra-Deepwater in the Gulf of Mexico and in Unconventional Onshore Natural Gas and Other Petroleum Resources of the United States.





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# RPSEA Members

Centre for Marine CNG  
- Newfoundland, Canada



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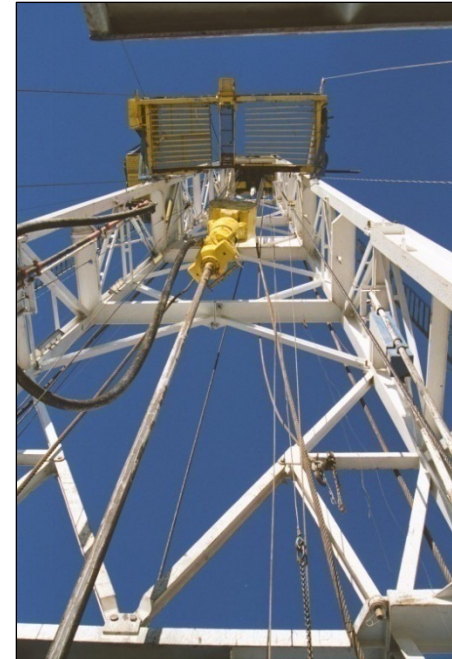
# What is Section 999?

## 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:

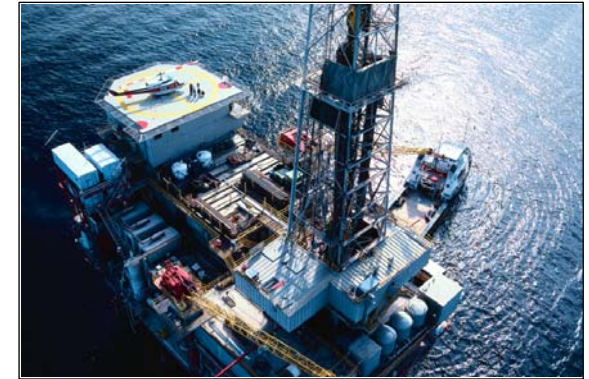
- Increasing supply
- Reducing the cost
- Increasing E&P efficiency
- Improving safety and minimizing environmental impacts



# 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)

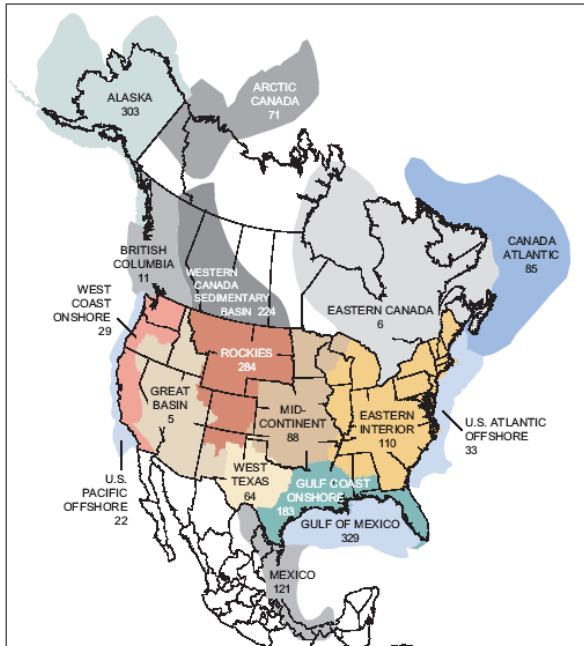
- Small Producers 7.5%  
(< 1000 BOEPD)

- Complementary Program 25%

Managed by NETL



# The Resources



NPC 2003 Technical Resources (TCF)

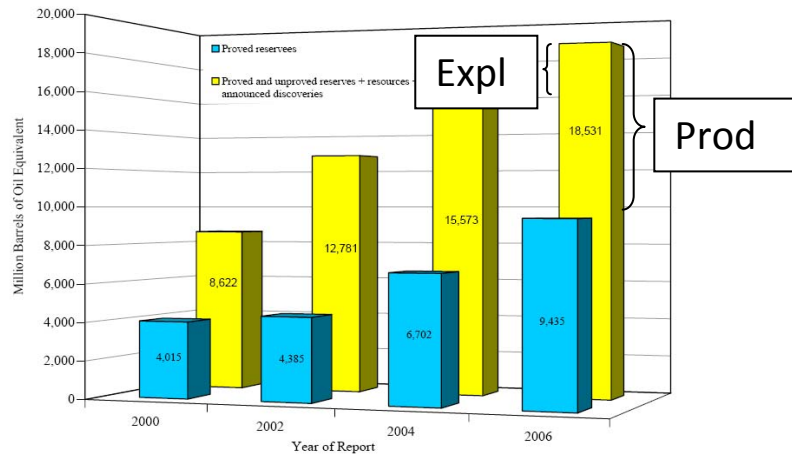
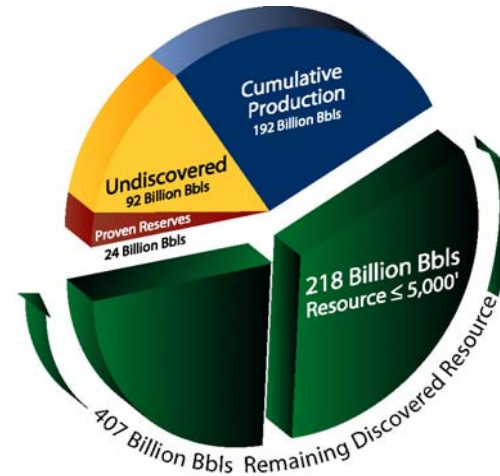
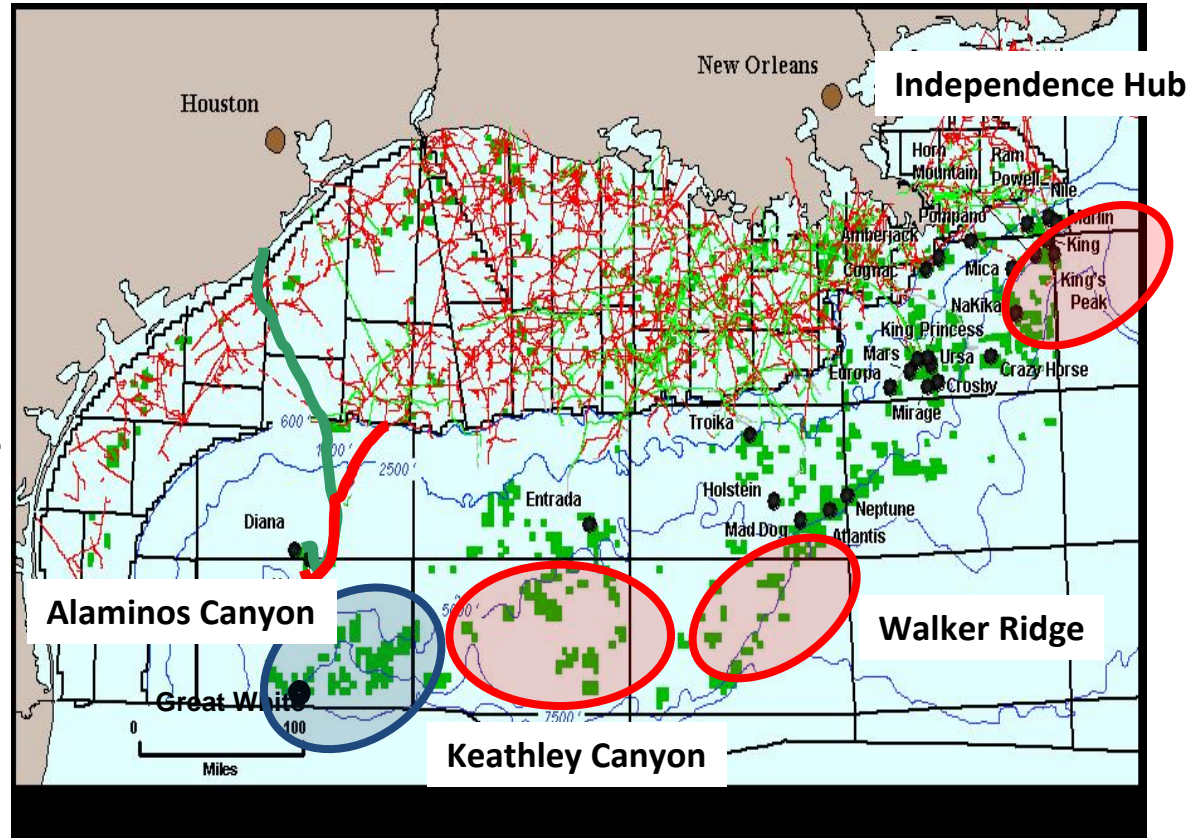


Figure 78. Comparison of 2000, 2002, 2004, and 2006 deepwater GOM reports: successive increases in deepwater BOE.

# 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
  - CO2 / H2S
- 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**



# 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





# 2007 Proposals Received to Date

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Program Element	Proposals Received	Non-Compliant
Small Producer	17	4
Unconventional Onshore	50	3
Ultra-deepwater	32	0
TOTAL	99	7



# RPSEA Research Projects Summary

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- **50 research proposals were submitted to the 2007 Unconventional Onshore solicitation**
  - **19 selected - most with extensive cost share and industry support**
    - 13 to universities
    - 2 to national labs
    - 2 to state agencies
    - 1 to a private non profit lab
    - 1 to a small technology developer
- **17 research proposals were submitted to the 2007 Small Producer solicitation**
  - **7 selected – most with extensive cost share and industry support**
    - 6 to universities
    - 1 to a national lab



# Project Cost Share and Support Examples

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## Colorado School of Mines An Integrated Framework for the Treatment and Management of Produced Water

### 4 Subcontractors & 15 Total Cost Sharing Entities

Colorado School of Mines - An Integrated Framework for the Treatment and Management of Produced Water

Kennedy/Jenks

Stratus

Argonne National Laboratory

Eltron Research

Chevron

Pioneer

Marathon

Triangle Petroleum

Anadarko

AwwaRF

Stewart Environmental

Southern Nevada Water Authority

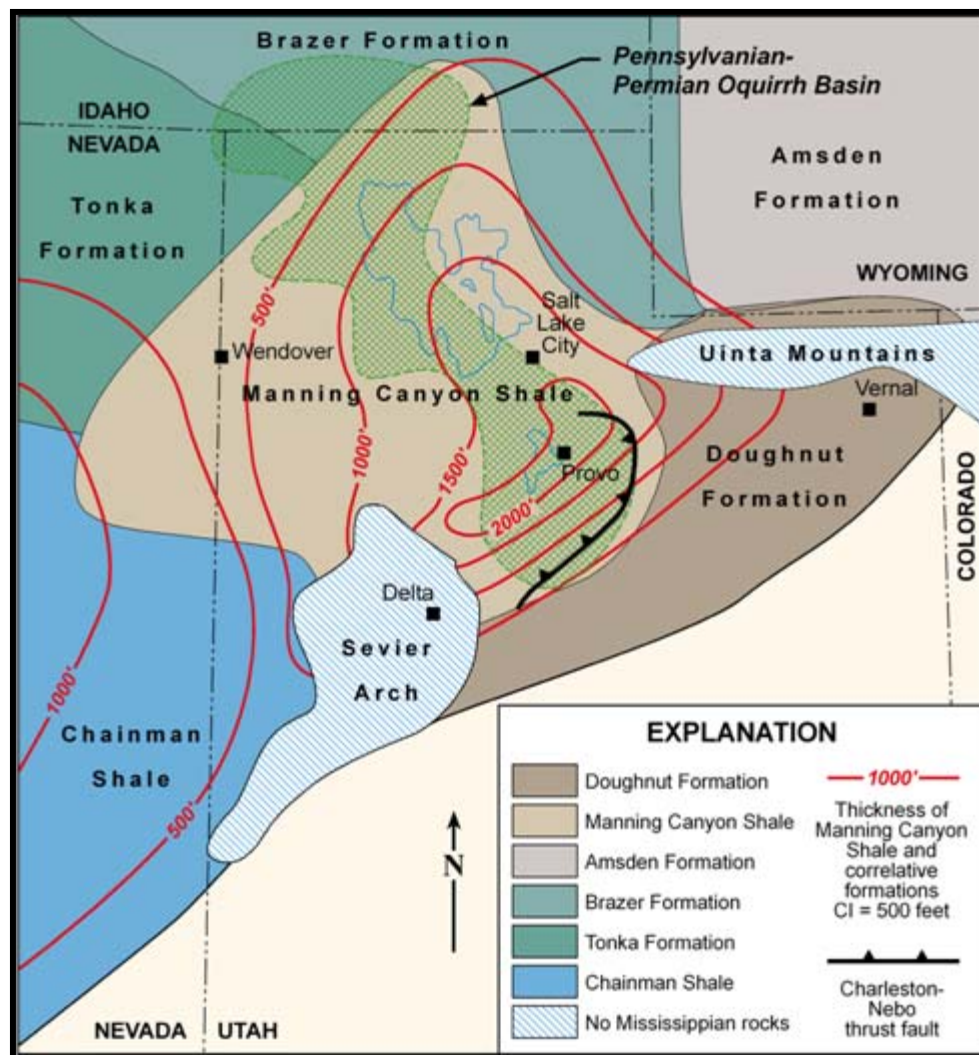
Veola Water

Hydration Technology

Petroglyph

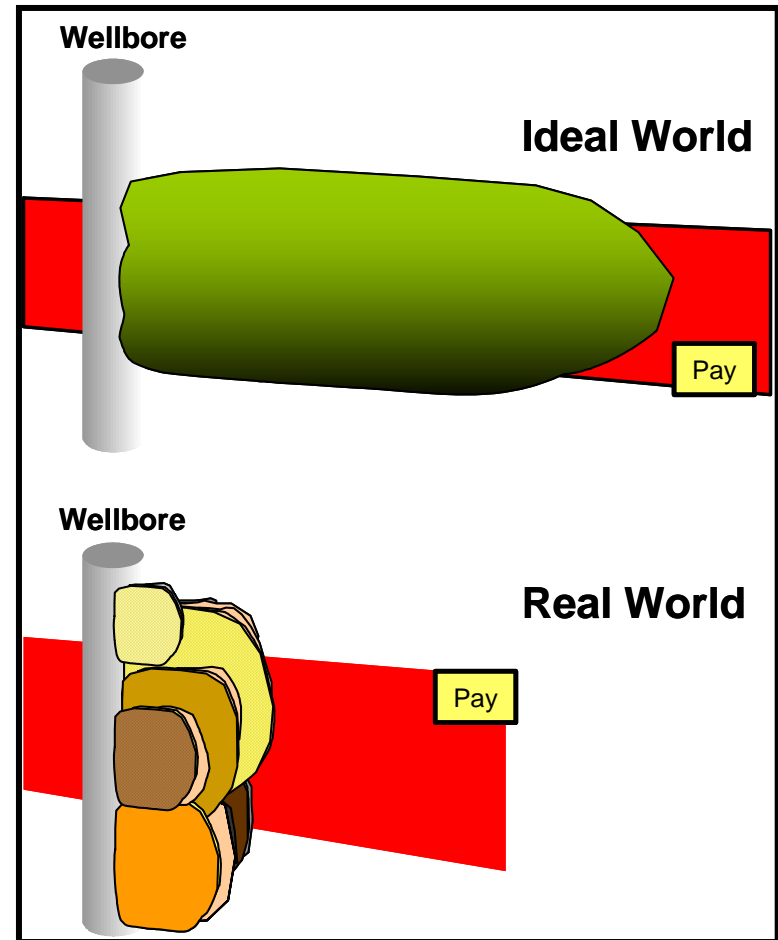
# Manning Canyon Shale - Utah

- Characterize Geological Properties
- ID Greatest Gas Potential
- Best Completion Practices



# Improvement of Fracturing for Gas Shales

- Laboratory evaluation of ultra-light weight proppant based fracturing fluid.
- Laboratory evaluation of ultra-light weight proppant and foam based fracturing fluids.
- Fracture designs for a Barnett shale reservoir.
- Field test to evaluate the effect of new fracture fluids.



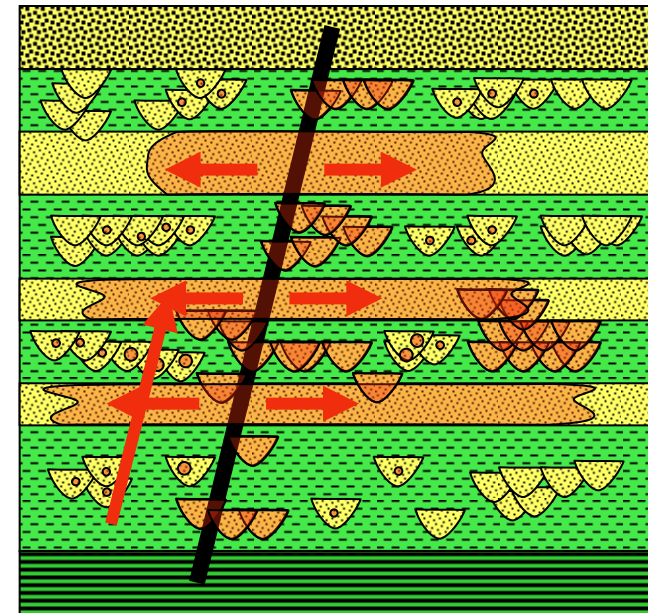
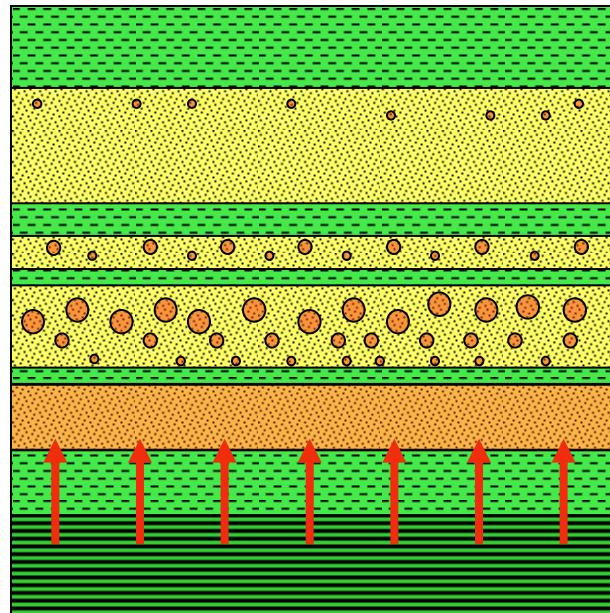
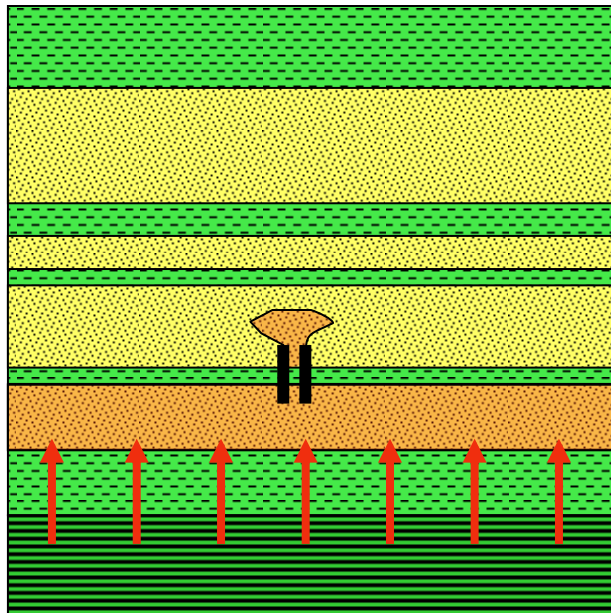
# How Does Gas Migrate into and Fill Unconventional Reservoirs?

Different Mechanisms Should Leave Different Signatures in the Gas Composition; Assisting with Exploration Strategy

Gas pressure  
Produces Fractures

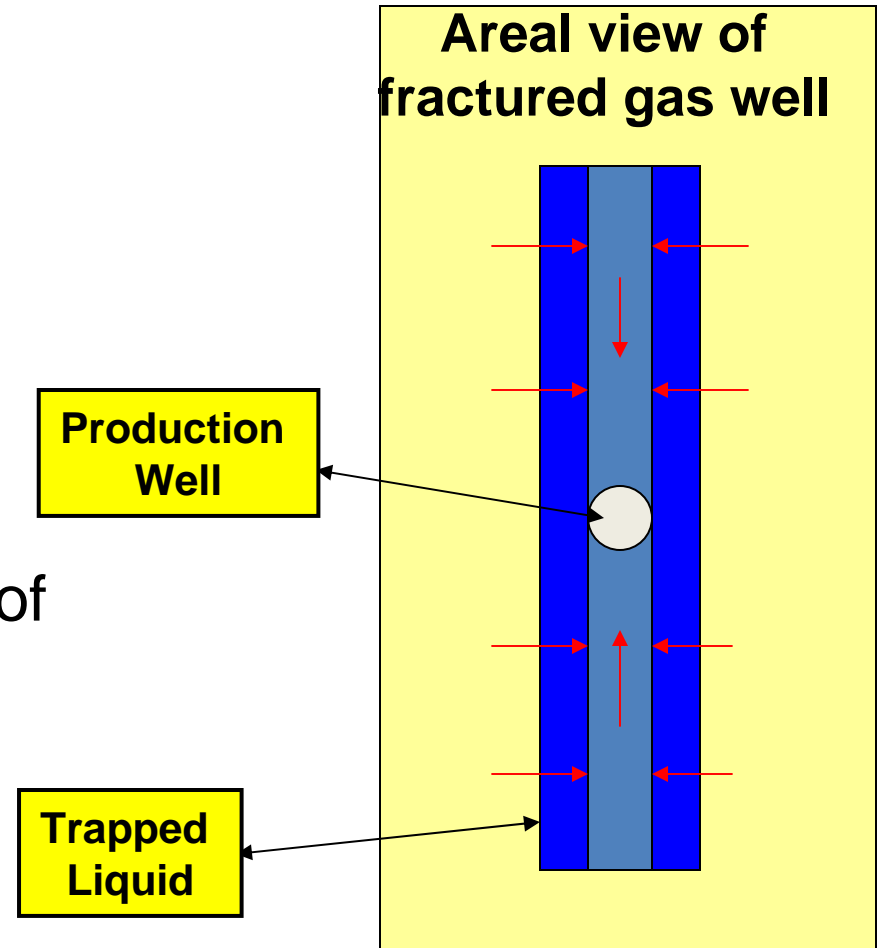
Gas Diffuses  
Through Seals

Gas Migrates Along  
Faults



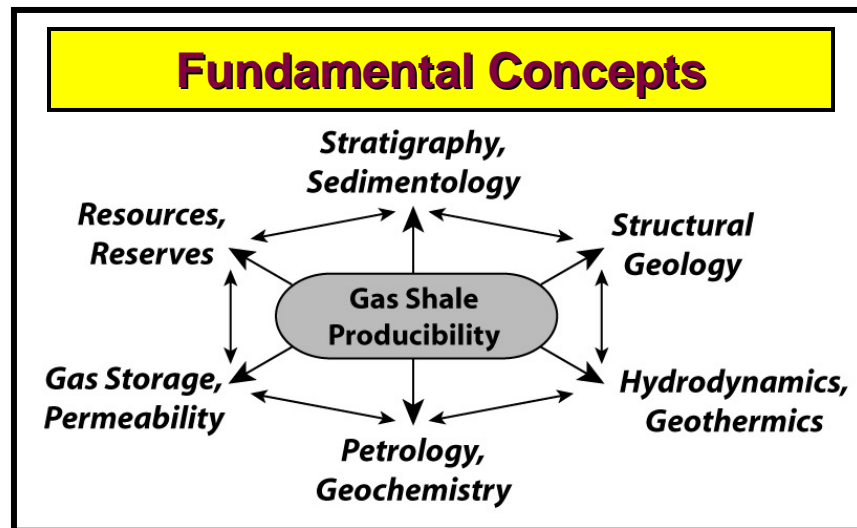
# Productivity Loss Due to Fracturing Induced Damage

- Liquids Invade the Near Wellbore/Fracture Region
- Use of Polymer Gels Can Aggravate Loss in Well Deliverability
- We Aim to Understand Factors Affecting Cleanup of Gel Induced Damage
- Lab Testing – Model Development and Field Verification



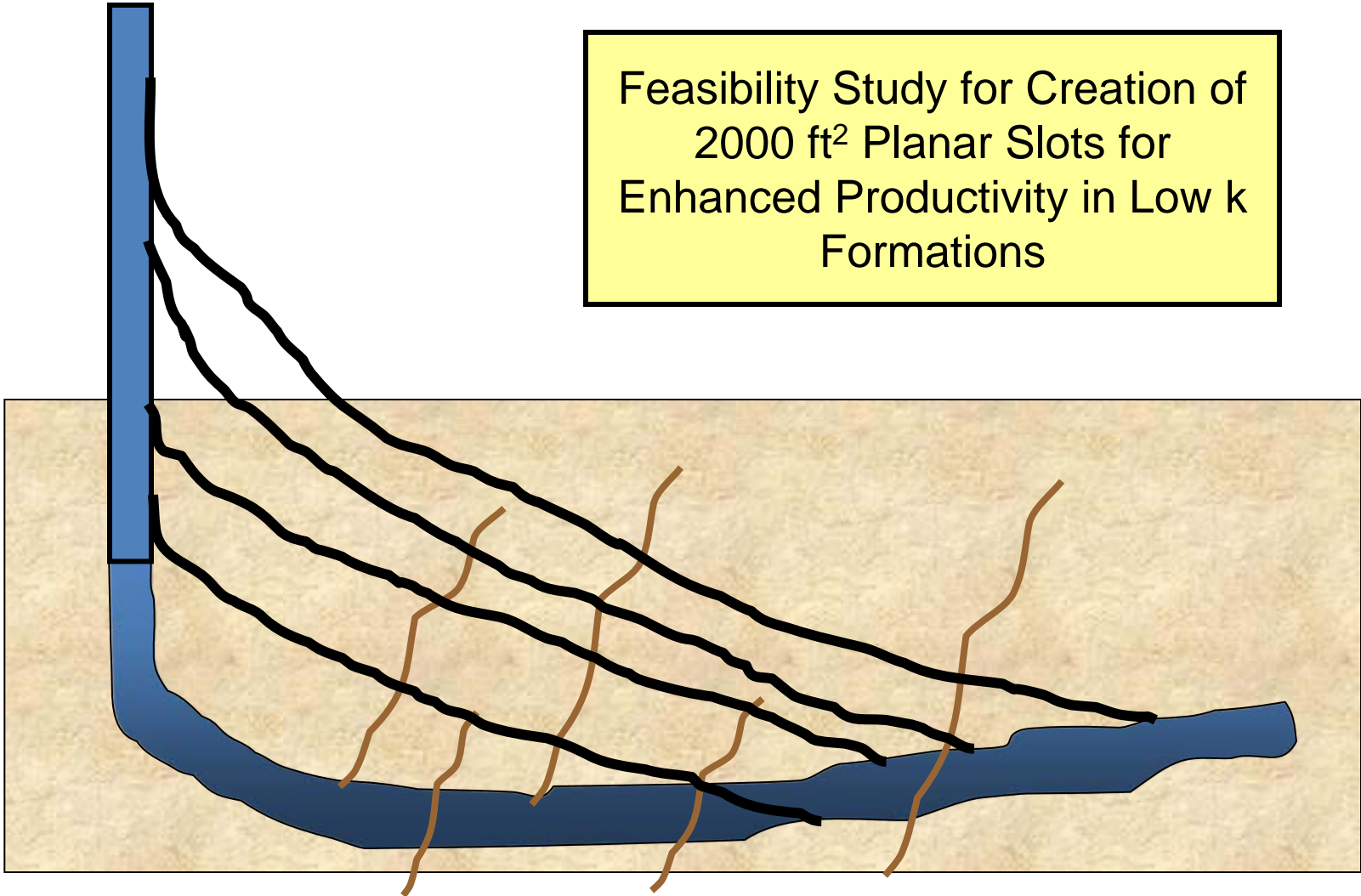
# Geological Foundation for Gas Production From Diverse Shale Formations

- Shale Prospects (Cambrian through Mississippian) are being developed in the Black Warrior Basin/Appalachian Thrust Belt of Alabama.
- Stratigraphic architecture and structural deformation differ significantly from established shale plays.
- Broadly applicable, multidisciplinary approach to geological characterization is being developed.



# Key Seat Slots Cut in Dogleg Hole

Feasibility Study for Creation of  
2000 ft<sup>2</sup> Planar Slots for  
Enhanced Productivity in Low k  
Formations



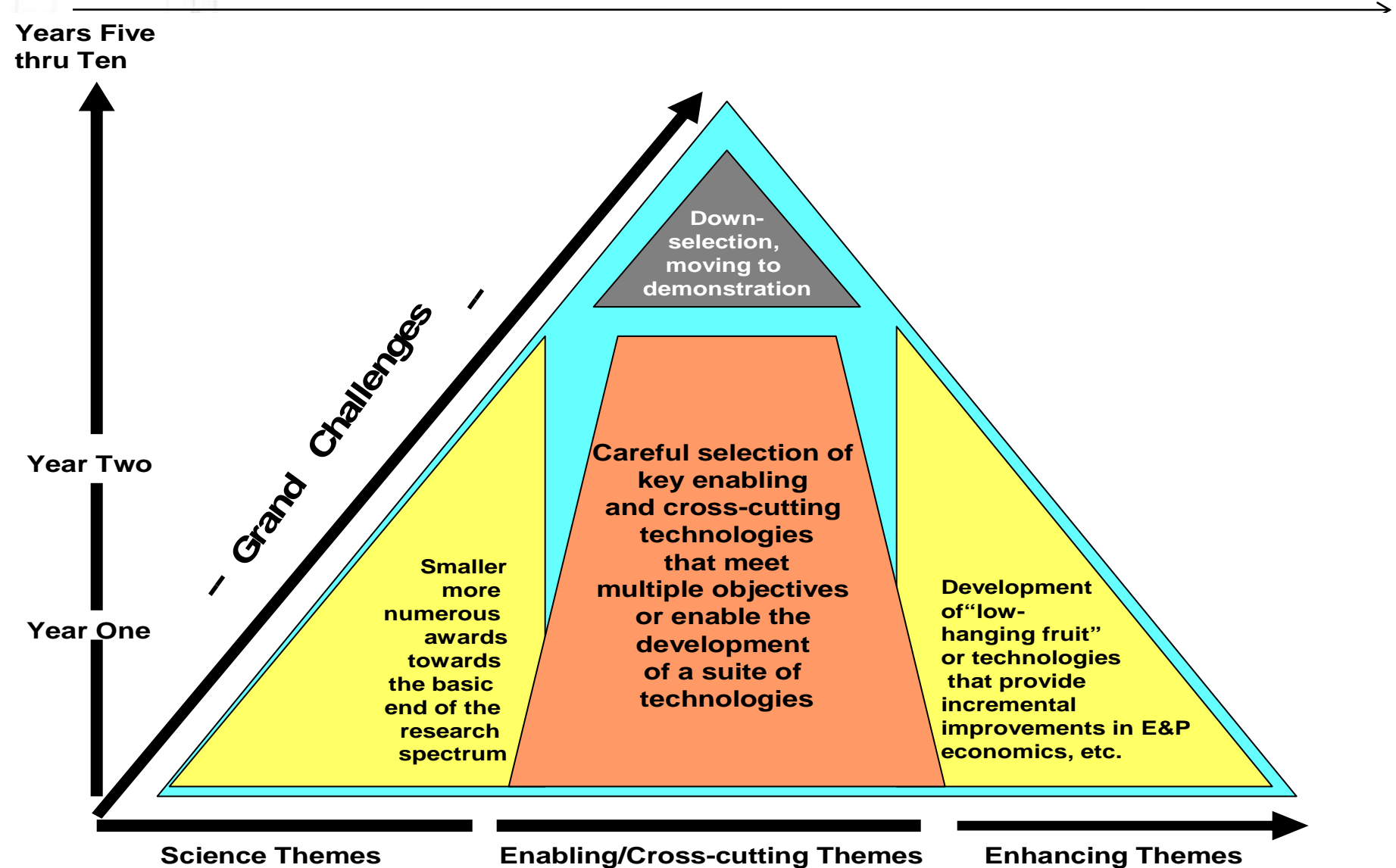


# The Path Forward

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- The 2008 plan is a continuation of the Initial 2007/2008 Annual Plan
- 2008 Solicitations will be issued upon approval of the 2008 Annual Plan
- The 2009 planning process has begun

# General Attributes of the Annual Plan





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“You miss 100% of the shots  
you don’t take.”

Wayne Gretzky

QUESTIONS?

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